

**Title:** Positive Effects of Educational Outreach on Physical Activity, Sitting, and Nutrition Behaviors in SNAP-Eligible Adults.

**Authors:** Kathryn M. Orzech<sup>1</sup>, Laurel Jacobs<sup>1</sup>, Theresa A. LeGros<sup>1</sup>, Gregory Goodman<sup>1</sup>, Stephanie H. Martinez<sup>2</sup>

**Abstract:**

**Background:** The Supplemental Nutrition Assistance Program-Education (SNAP-Ed) encourages nutrition- and physical activity (PA)-related change at the individual, organizational, and community levels. To build a stronger evidence base for individual-level changes, we conducted an impact evaluation of one adult health education curriculum, MyPlate for My Family (MPFMF).

**Methods:** SNAP-eligible individuals ( $N=98$ ) took part in a four-lesson class series focused on nutrition and PA in Arizona in 2016. A comparison group was recruited ( $N=80$ ) to match county and SNAP eligibility. Both groups completed pre and posttests. Primary outcomes were reported PA, weekly hours spent sitting, fruit and vegetable intake, and consumption of sugar-sweetened beverages.

**Results:** Relative to the comparison group, the intervention group reported significantly increased PA ( $p<.01$ ), reduced weekly sitting time ( $p<.01$ ), increased vegetable consumption ( $p<.05$ ), and decreased consumption of sugar-sweetened beverages ( $p<.05$ ) at post.

**Conclusions:** Findings support the MPFMF curriculum as an effective individual-level intervention promoting health behavior change among SNAP-eligible adults.

**Keywords:** Health education, exercise, low income, socio-ecological model, program evaluation

**Suggested citation:**

Orzech, K.M., Jacobs, L., LeGros, T.A., Goodman, G., & Martinez, S.H. 2019. Positive Effects of Educational Outreach on Physical Activity, Sitting, and Nutrition Behaviors in SNAP-Eligible Adults. URL: <https://nutritioneval.arizona.edu/positive-effects-educational-outreach-physical-activity-sitting-and-nutrition-behaviors-snap>

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**Author contact information:**

Dr. Kathryn M. Orzech  
kmcelvee@email.arizona.edu

<sup>1</sup>Department of Nutritional Sciences, University of Arizona, Tucson, AZ

<sup>2</sup>Bureau of Nutrition and Physical Activity, Arizona Department of Health Services, Phoenix, AZ

## INTRODUCTION

As the education component of SNAP, SNAP-Ed serves SNAP recipients and eligibles by providing evidence-based, behaviorally-focused obesity prevention interventions based on the socio-ecological model (SEM) <sup>1</sup>. SNAP-Ed interventions are expected to be multilevel – to pair policy, systems, and environmental (PSE) supports and social marketing efforts at the site or community level with education at the individual level. PSE supports are designed to enhance the local environments for active living and food systems, while individual education seeks to enhance adults’ knowledge and skills to make healthful behavior changes.

As evidence builds for the effectiveness of multilevel interventions, questions remain about the contribution of different SEM levels to adult behavioral change, including the individual level. Meta-analyses of health education outreach with adults shows small positive <sup>2</sup> or mixed effects <sup>3</sup>, and few community-based studies use comparison groups. The current study was designed to expand upon typical pre-post health education assessments by incorporating a comparison group within a real-world, community-based context. We sought to examine the impact of a widely used SNAP-Ed curriculum on individual behaviors; our hypothesis was that the MPFMF intervention group participants would report healthier PA and nutrition behaviors than the comparison group participants.

## METHODS

### Study Design

This study assessed the efficacy of the MPFMF curriculum in improving PA and nutrition behaviors. MPFMF targets English and Spanish speakers with children aged 2-18 <sup>4</sup>. Random assignment was not suitable for participants interested in class enrollment; instead, we sought

equivalence in demographics between intervention and comparison groups by recruiting both groups from SNAP-Ed approved (census-designated lower income) locations in the same counties within Arizona. Our total sample size was 178. Ninety-eight individuals (55%) were in the intervention group.

## **Intervention**

The MPFMMF series included four 45-minute lessons covering nutrition, PA, stretching the food dollar, and getting family members involved in physical activity and food preparation.

Instructors were trained on this curriculum in December 2015 by participating in a webinar that covered major content areas and implementation strategies for MPFMMF. Lesson activities incorporated class participation and discussion, and included supplemental handouts with recipes and suggestions for family physical activities<sup>4</sup>. Classes were typically scheduled weekly, and eight of the 16 intervention class series were taught in Spanish by a native speaker.

## **Recruitment and Data Collection**

SNAP-eligible intervention participants were recruited through schools and early childhood centers in eight Arizona counties. They received the MPFMMF class series between January and April 2016. The comparison group, also SNAP eligible, was recruited during SNAP-Ed community events in counties where the intervention took place; events included school-based health fairs and early childhood center parent events. English and Spanish speakers were present in both groups. All intervention and comparison group participants who completed pretests or posttests were provided a \$10 grocery store gift card.

Trained proctors administered pretests to participants immediately prior to the first lesson and posttests immediately following the final lesson for the intervention group. Comparison group

participants took a pretest with a trained proctor at a community event, and a posttest was mailed after four weeks. Participants completed the University of California Cooperative Extension's (UCCE) Food Behavior Checklist (FBC) to assess food behaviors<sup>5</sup>, and the UCCE On the Go!<sup>6</sup> to assess PA behaviors. Both of these validated instruments have been adapted for low-income audiences and are available in English and Spanish. The behavioral outcomes investigated, including moderate and vigorous PA, time spent sitting, fruit and vegetable consumption, and sugar-sweetened beverage consumption, are the focus of individual-level assessments across the SNAP-Ed program, as they indicate individuals' movement toward healthier behaviors.

This project was approved by [blinded for review] and determined to be of minimal risk to participants. A written disclaimer provided to all participants reinforced that participation was optional.

### **Statistical Analyses**

Statistical analyses were conducted in PASW Statistics, version 25.0 (SPSS, Inc., Chicago IL). Significance was set at  $p < 0.05$  (two-tailed). For both continuous and dichotomous outcome variables, we calculated a minimum detectable effect size of 0.38 ( $\alpha = 0.05$ , power = 0.80,  $R^2=0.20$  for up to three covariates) given the full sample size. Pretests and posttests were matched at the participant level, with sample sizes differing slightly across items. General linear models were adjusted for baseline values and were used to determine intervention effects for continuous outcomes. The effect size index was Hedges'  $g$  with reported effects for small (0.2), medium (0.5) or large (0.8) sizes. Non-parametric analysis utilizing Mann Whitney U was used to examine between-group effects on categorical outcomes – with the accompanying effects of  $r$

for small (0.1), medium (0.3) and large (0.5) sizes <sup>7</sup>. A random intercept-only model determined there was no significant within-group clustering of sites or counties under intervention or comparison conditions.

## **RESULTS**

### **Demographics**

This study took place in eight Arizona counties. Across intervention and comparison groups, participants were female (91%) and had children under 18 at home (89%). Most were Hispanic (84%), and between 18 and 49 years of age (85%), and 38% received SNAP benefits. Sixty-one percent of participants took pre and posttests in Spanish.

### **Physical Activity (PA) Behaviors**

For moderate activity minutes, the ANCOVA showed a statistically significant difference in posttest means between the intervention and comparison groups. SNAP recipient status (yes/no) was included in the analysis as a covariate and was not statistically significant. The effect size was 0.46, a medium effect. For vigorous activity minutes, the ANCOVA also showed a statistically significant difference in posttest means between intervention and comparison groups. Again, SNAP recipient status was a covariate and was not significant. The effect size was 0.33, a small-to-medium effect. For the total hours per week spent sitting, the intervention group showed a significantly smaller mean than the comparison group at post. The effect size was 0.56, a medium effect (**Table 1**).

**Table 1.** Weekly Moderate and Vigorous Activity Minutes and Sitting Hours between Groups

Category	<u>Pretest</u>		<u>Posttest</u>		Percent Improved Pre-Post <sup>a</sup>	<i>F</i>	95% <i>CI</i>	<i>p</i> <sup>b</sup>	Effect Size <sup>c</sup>
	<i>N</i>	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>					
<b>Moderate Minutes</b>									
Intervention	68	214.49	268.35	66.2%	7.98	28.5, 153.2	.005**		.46
Comparison	63	236.27	178.61	42.9%					
<b>Vigorous Minutes</b>									
Intervention	61	159.24	190.04	59.1%	4.61	6.6, 109.9	.034*		.33
Comparison	65	145.30	126.77	33.3%					
<b>Sitting Hours</b>									
Intervention	90	22.26	19.33	56.7%	11.26	-9.07, -2.23	.001**		.52
Comparison	73	22.09	25.13	37.0%					

<sup>a</sup>. Indicates a within group comparison.

<sup>b</sup>. \*=-Statistically significant at  $p < 0.05$ ; \*\*=-Statistically significant at  $p < 0.01$

<sup>c</sup>. The adjusted posttest means, and unadjusted standard deviations were used to compute Hedges' *g* effect size.

## Nutrition Behaviors

For vegetable and fruit intake, one behavior improved significantly for the intervention group versus the comparison group: *eating two or more vegetables at the main meal*. The effect size

was 0.15, a small effect. Although *cups of vegetables and fruits eaten each day* were not

significantly different at posttest between groups, the intervention group showed an average

improvement from pre to post of 0.2 cups, unlike the comparison group, which showed no

change in vegetable consumption and a small decline (0.1 cups) in fruit consumption (**Table 2**).

For sugar sweetened beverages, the intervention group significantly decreased their consumption

of *fruit drinks, sports drinks, and punch*. The effect size was 0.15, a small effect.

**Table 2.** Nutrition Behaviors between Groups

<b>Fruit and Vegetable Intake</b>	<i>N</i>	Percent		<i>Z</i>	<i>p</i> <sup>b</sup>	Effect Size <sup>c</sup> <i>r</i>
		Improved	Pre-Post <sup>a</sup>			
<b>Eat Two or More Vegetables at Main Meal</b>						
Intervention	97	6.2%		2.02	.043*	.15
Comparison	77	1.3%				
<b>Cups of Fruit Eaten</b>						
Intervention	97	9.5%		1.16	.248	.09
Comparison	71	-.01%				
<b>Cups of Vegetables Eaten</b>						
Intervention	95	9.4%		.440	.660	.03
Comparison	72	0.0%				
<b>Other Nutrition Behaviors</b>						
<b>Drink Fruit Drinks, Sports Drinks &amp; Punch</b>						
Intervention	97	6.5%		2.00	.046*	.15
Comparison	77	1.6%				

<sup>a</sup>. Indicates a within group comparison.

<sup>b</sup>. \*=Statistically significant at  $p < 0.05$ .

<sup>c</sup>. Effect Size *r* calculated by dividing *Z* value by the square root of sample size (*N*). Absolute value of *Z* > 1.96 indicates statistical significance.

## DISCUSSION

Although evidence for the effectiveness of health education interventions is mixed in a number of systematic reviews emphasizing randomized controlled trials<sup>2,3</sup>, a number of smaller, nonrandomized studies have shown positive effects of health education on low-income adults<sup>8,9</sup>. However, only a few such studies<sup>10,11</sup> have used comparison groups to consider whether observed effects can reasonably be attributed to the educational intervention. Using a comparison group, this community-based study revealed that the MPFMF curriculum

contributed to increased PA and improved nutrition behaviors among intervention group participants.

This study's finding that PA increased in the intervention group is in line with the significant increases in PA found among obese African American women in the Lower Mississippi Delta <sup>10</sup>, and also a small pilot study of low-income Latina mothers <sup>9</sup>. Four factors may have increased our participants' PA: 1) The pretest may have sensitized participants to the fact that common activities (walking, dancing, cleaning) could be considered PA, 2) As participants decreased their sitting, they may have replaced sedentary time with PA, 3) Participant feedback suggested that PA was easier to incorporate into daily life than dietary change, and 4) Most MPFMF instructors incorporated 2-10 minutes of moderate to vigorous PA in the fourth MPFMF class, which was captured by participants when they took the posttest that day.

Regarding nutrition behaviors, vegetable and fruit consumption increased by a small amount relative to the comparison group, and the intervention group reported significantly increasing the consumption of two or more vegetables at their main meal. The intervention group also significantly decreased their consumption of sugary beverages, specifically fruit drinks, sports drinks, and punch. These findings are similar to other studies <sup>12,13</sup>. Participant feedback after the final lesson indicated a new propensity for trying more new vegetables and fruits, but participants also expressed challenges around serving healthier foods and changing family eating patterns, including shifting portion sizes. These comments point to eating patterns as socially determined <sup>14</sup>, indicating why nutrition behaviors may not have changed more dramatically.



## **Limitations**

Strengths of this study include recruitment of participants across more than half of all Arizona counties and the use of a comparison group within a real-world, community-based setting.

Limitations include the use of self-report questionnaires<sup>15</sup>. For PA recall, the timeframe used was “the last 7 days,” which enhances short-term accuracy, however conclusions may be less generalizable to longer-term activity patterns.

## **Conclusions**

Considered in the context of the socio-ecological model, our results add to the evidence base for MPFMF as an effective curriculum promoting behavior change at the individual level in SNAP-eligible adult participants. Intervention participants showed significant improvements versus a comparison group for PA behaviors, as well as improvements to vegetable intake and sugary beverage consumption. Reported increases in fruit and vegetable consumption were modest (< 10% improving consumption), suggesting that factors other than awareness may need to be targeted. SNAP-Ed’s continuing focus on pairing environmental and community level interventions with direct education may increase the likelihood that the behavior changes begun during an educational series will be sustained.

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