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# **Evaluation of a New Nutrition Education Curriculum and Factors Influencing Its Implementation**

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**Abstract:** The study reported here evaluated a nutrition education curriculum through examining participant behavior change. A previously used curriculum (April - September 2005 and 2006) was compared to a new curriculum (April - September 2007) using pre- and post-program 24-hour dietary recalls and food behavior surveys. Participant, educator, and program variables were explored relative to behavior change. The new curriculum elicited behavior change similar to that elicited by the previous curriculum. Factors influencing behavior change included participant and educator race and educator experience. Participant and educator variables should be considered in future program/curriculum implementation.

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## **Introduction**

The Expanded Food and Nutrition Education Program (EFNEP) and Food Stamp Nutrition Education (FSNE) are federally funded programs found in all 50 states and several United States territories. These programs seek to help families with limited incomes use available resources to improve food- and nutrition-related practices to prevent future nutrition-related health problems. They are unique in that they do not offer financial assistance; rather, they provide nutrition education, to supply lifelong as well as immediate benefits to the family. These programs frequently employ paraprofessional educators to teach basic nutrition information, food preparation skills, shopping skills, food safety, and sanitation (Montgomery & Willis, 2005). In Iowa, paraprofessionals teach program participants in small groups, individually, or a combination of both.

The curricula used by EFNEP and FSNE must reflect the most current nutrition and health guidelines. In the United States, these are the 2005 Dietary Guidelines for Americans (DGA) and MyPyramid (United States Department of Agriculture [USDA] & United States Department of Health and Human Services [HHS], 2005; USDA, 2005). In March 2007, the Iowa EFNEP and FSNE implemented a new curriculum entitled Eating Smart · Being Active (ESBA), developed by Colorado State University and University of California, Berkeley, to reflect these new guidelines.

Evaluation of EFNEP and FSNE is necessary for program management and documentation of effectiveness to assist with securing future funding. Effectiveness is the ability to meet program objectives as well as specific curriculum objectives. Objectives of EFNEP and FSNE include changing food- and nutrition-related behaviors. Program effectiveness should be examined relative to the curriculum employed as well as program, curriculum, and participant/educator characteristics, which may influence food- and nutrition-related behavior change.

The study reported here evaluated the new ESBA curriculum in the Iowa EFNEP and FSNE, and explored program, curriculum, participant, and educator characteristics thought to influence participant behavior change. Specifically, servings of food groups, dietary intake of six of the seven nutrients of concern identified by the DGA (USDA & HHS, 2005), and food- and nutrition-related behaviors were examined relative to the content of the ESBA curriculum along with characteristics of the program, curriculum, participants, and educators.

## Methods

### Participants

Research participants were voluntary recipients of the Iowa EFNEP and FSNE in 2005, 2006, or 2007. All participants were program graduates, which requires completion of a minimum of eight lessons. They represented both urban and rural areas, and consisted primarily of parents with young children ( $\leq 10$  years of age) and an income  $\leq 185\%$  of the federal poverty level. Many participants also took part in food assistance programs such as food stamps and the Special Supplemental Program for Women, Infants, and Children. All protocols followed during the study were approved by the Iowa State University Human Subjects Review Board. Participants were given an informational letter describing the research project and their rights as a research participant.

### Data Collection

Participant demographics, family composition, ethnicity, and pregnancy/nursing status were collected using the EFNEP and FSNE enrollment form. Dietary intake and food- and nutrition-related behaviors were collected from 24-hour dietary recalls and food behavior surveys, each taken at entry into and exit from the program. Data were collected between April - September 2005 and 2006 (old curriculum) and April - September 2007 (ESBA curriculum).

### *24-Hour Dietary Recall*

The 24-hour recalls were collected using the multiple pass method (Guenther, DeMaio, Ingwersen, & Berlin, 1997). In this method, the educator first obtained a quick list of foods consumed by the subject in the last 24 hours. Next, the educator reviewed the quick list to gather more detailed information about the food consumed (i.e., preparation methods, ingredients used, and brand names) and the amounts consumed. Last, the educator reviewed the list one last time to verify the information for accuracy and completeness.

Data from the 24-hour recall was aligned with key concepts of the curriculum for analysis (Table 1). Consumption of fiber, calcium, magnesium, potassium, and vitamins A and C were examined because they are six of the seven nutrients of concern identified by the DGA (USDA & HHS, 2005). Magnesium intake was estimated using fruit, vegetable, dairy, meat, and whole grain servings; potassium intake was estimated using fruit and vegetable servings. Average magnesium and potassium content was calculated for each food group; average content in fruits and vegetables was based on the ten most commonly consumed (USDA Economic Research Service, 2006).

### **Food Behavior Survey**

The food behavior survey included the core set of 10 food- and nutrition-related behavior questions required of all EFNEP programs (Table 1, in *italics*). The questions address meal planning, food shopping practices, food safety, and eating breakfast-concepts discussed in at least one of the lessons of the ESBA curriculum. All food behavior survey questions were answered using a 5-point Likert-type scale, with one corresponding to "never perform the described behavior" and five corresponding to "almost always perform the behavior." Total food behavior score was calculated by summing the 10 food behavior scores for a maximum possible score of 50; questions for which a lower score was desired were reverse scored.

**Table 1.**  
Lesson Topics and Evaluation Data

<b>Lesson*</b>	<b>Key Topics</b>	<b>Evaluation Data</b>
Lesson #2 <b>Plan, Shop, \$ave</b>	Meal planning Using a shopping list Comparing food prices Food safety while shopping and storing food	<i>Food Behavior Survey</i> <i>-How often do you plan meals ahead of time?</i> <i>-How often do you compare prices before you buy food?</i> <i>-How often do you run out of food before the end of the month?</i> <i>-How often do you shop with a grocery list?</i>
Lesson#3 <b>Vary Your Veggies... Focus on Fruits</b>	Benefits of consuming fruits and vegetables How to increase fruits and vegetables in the diet How to save money when buying fruits and vegetables Washing and storing fruits and vegetables	<u>24-Hour Recall</u> -Servings of vegetables -Servings of fruits -Vitamin A intake (RE) -Vitamin C intake (milligrams)
Lesson #4 <b>Make Half Your Grains Whole</b>	Benefits of consuming whole grains Choosing whole grains as at least half of the grains consumed Storage of grains	<u>24-Hour Recall</u> -Servings of bread -Fiber intake (grams) <i>Food Behavior Survey</i> <i>-How often do your children eat something in</i>

	Importance of consuming breakfast	<i>the morning within 2 hours of waking up?</i> < /TD>
Lesson #5 <b>Build Strong Bones</b>	Dairy foods are the best source of calcium Non-dairy sources of calcium Choosing low-fat and non-fat dairy foods Calcium and physical activity for bone health Storage of dairy foods	<u>24-Hour Recall</u> -Servings of dairy -Calcium intake (milligrams)
Lesson #6 <b>Go Lean with Protein</b>	Choosing lean sources of protein Food safety	<u>24-Hour Recall</u> -Servings of meat <i>Food Behavior Survey</i> <i>-How often do you let meat and dairy foods sit out for more than 2 hours?</i> <i>-How often do you thaw frozen foods at room temperature?</i>
Lesson #7 <b>Make a Change</b>	Limiting foods high in fat, sugar, and salt Benefits of consuming less fat, sugar, and salt	<u>Food Behavior Survey</u> <i>-How often have you prepared foods without adding salt?</i>
* Lessons 1 and 8 consist of enrollment and physical activity information, which were not used in this evaluation.		

## Statistical Analysis

Analysis of all data was conducted using SPSS for Windows (SPSS version 15.0; Chicago, IL). One-way ANOVA was used to explore differences in demographics, dietary intakes, and questionnaire responses between program years. Participants' behavior change was examined by comparing markers from pre- and post-program 24-hour recalls and food behavior surveys within program years using paired t-tests. Change in food group intake (pre- to post-program) was examined within program years by absolute intake by paired t-tests. Change in food group intake between program years by percent change in intake because a change in reporting from Evaluation/Reporting System (ERS) to Nutrition Education Evaluation and Reporting System (NEERS) made comparison of absolute intake impossible. Finally, differences in dietary intake and questionnaire responses of participants by instructional setting (group, individual, both), participant and educator race, and experience of the educator were analyzed using one-way ANOVA. The level of statistical significance for all analyses was set at  $p < 0.05$ .

## Results

### Participant and Educator Characteristics

Participant characteristics are reported in Table 2. The majority of the participants from each year were

female, white, and in their mid- to late-twenties. From 2005 to 2007 the percentage of graduates who were white decreased significantly ( $p=0.01$ ), while the percentage of participants who were Hispanic increased. The percentage of graduates who participated in group instruction decreased significantly while the percentage receiving individual instruction increased significantly in 2006 and 2007 when compared to 2005 numbers ( $p<=0.01$ ). There were no significant differences in educator characteristics across years (data not shown).

**Table 2.**  
Participant Characteristics

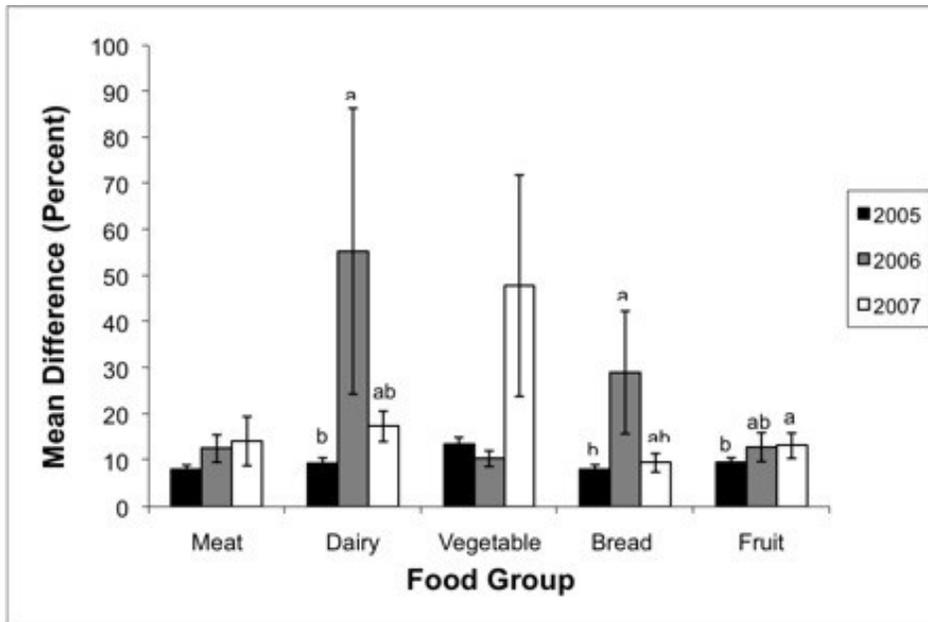
	2005 (n=328)		2006 (n=201)		2007 (n=296)	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Age	27.1	8.51	27.9	8.13	28.1	8.76
Other Adults in Home	0.823 <sup>b</sup>	0.874	1.03 <sup>a</sup>	1.12	0.845 <sup>ab</sup>	0.813
	Number	Percent	Number	Percent	Number	Percent
<b>Sex - Female</b>	301 <sup>a</sup>	91.8	169 <sup>b</sup>	84.1	276 <sup>a</sup>	93.2
<b>Race</b>						
White	216 <sup>a</sup>	65.9	114 <sup>b</sup>	56.7	162 <sup>b</sup>	54.7
Black	24	7.3	16	8.0	35	11.8
Native American	14	4.3	7	3.5	4	1.4
Hispanic	70	21.3	57	28.4	87	29.4
Asian	4	1.2	7	3.5	4	1.4
<b>Lesson Setting</b>						
Group	188 <sup>a</sup>	57.3	66 <sup>b</sup>	32.8	122 <sup>b</sup>	36.5
Individual	112 <sup>b</sup>	34.1	106 <sup>a</sup>	52.7	137 <sup>a</sup>	41.0
Both	28	8.5	29	14.4	37	11.1
a>b p<=0.05						

## Dietary Intake

All program years saw improvement in dietary intake indicated by an increase in the number of servings consumed from each food group and intake of fiber, calcium, magnesium, potassium, and vitamins A and C. Percent change in dietary intake from food groups from pre- to post-program by year is shown in Figure 1; actual change in dietary intake from nutrients is shown in Figure 2. Differences in food group (dairy, bread, and fruit) intake and nutrient consumption (vitamin A) were observed among the three program years ( $p<0.05$ ). A number of program factors, including instructional setting, participant and educator race, and educator experience, were found to have significant, but inconsistent, relationships with change in dietary

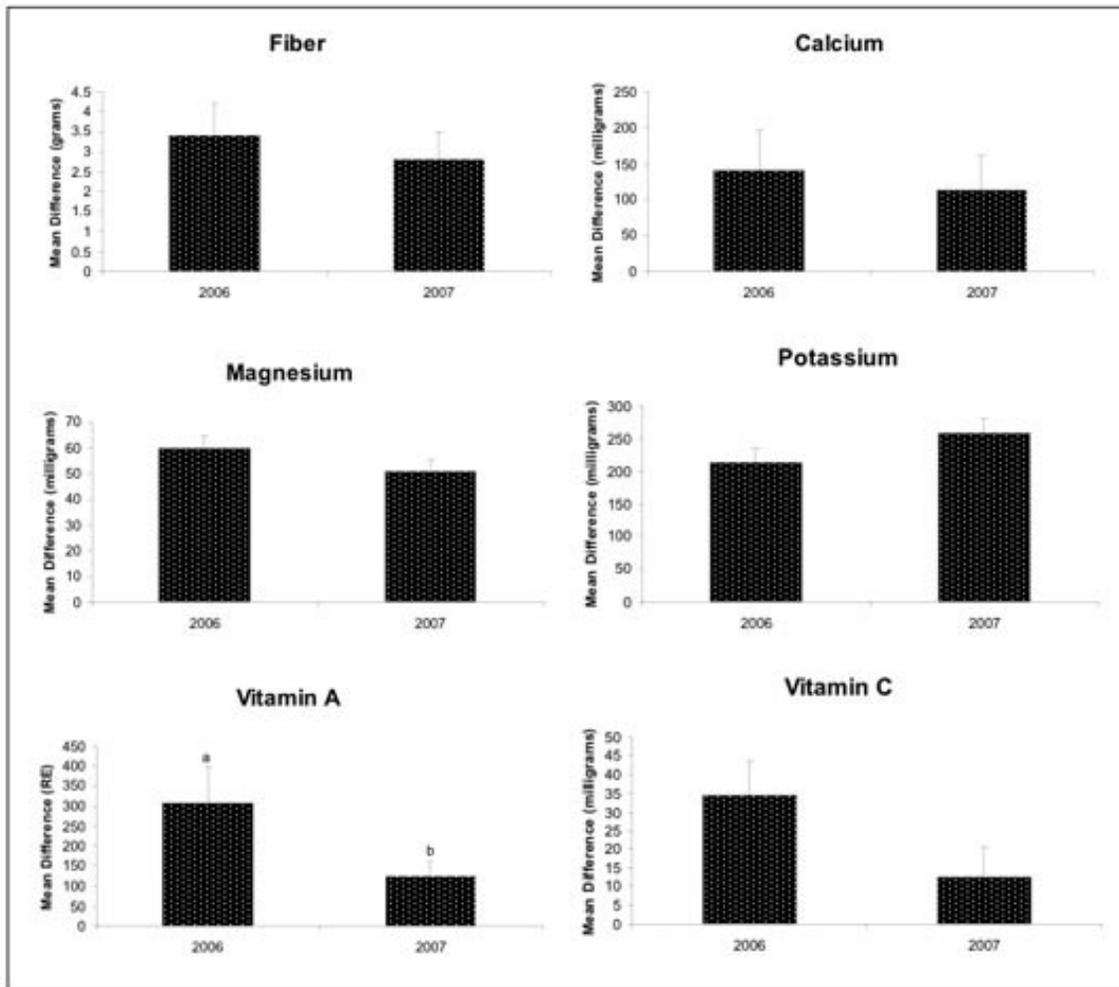
intake (data not shown).

**Figure 1.**  
Percent Change in Dietary Intakes from Food Groups



a>b p<=0.05

**Figure 2.**  
Change in Dietary Intakes from Nutrients



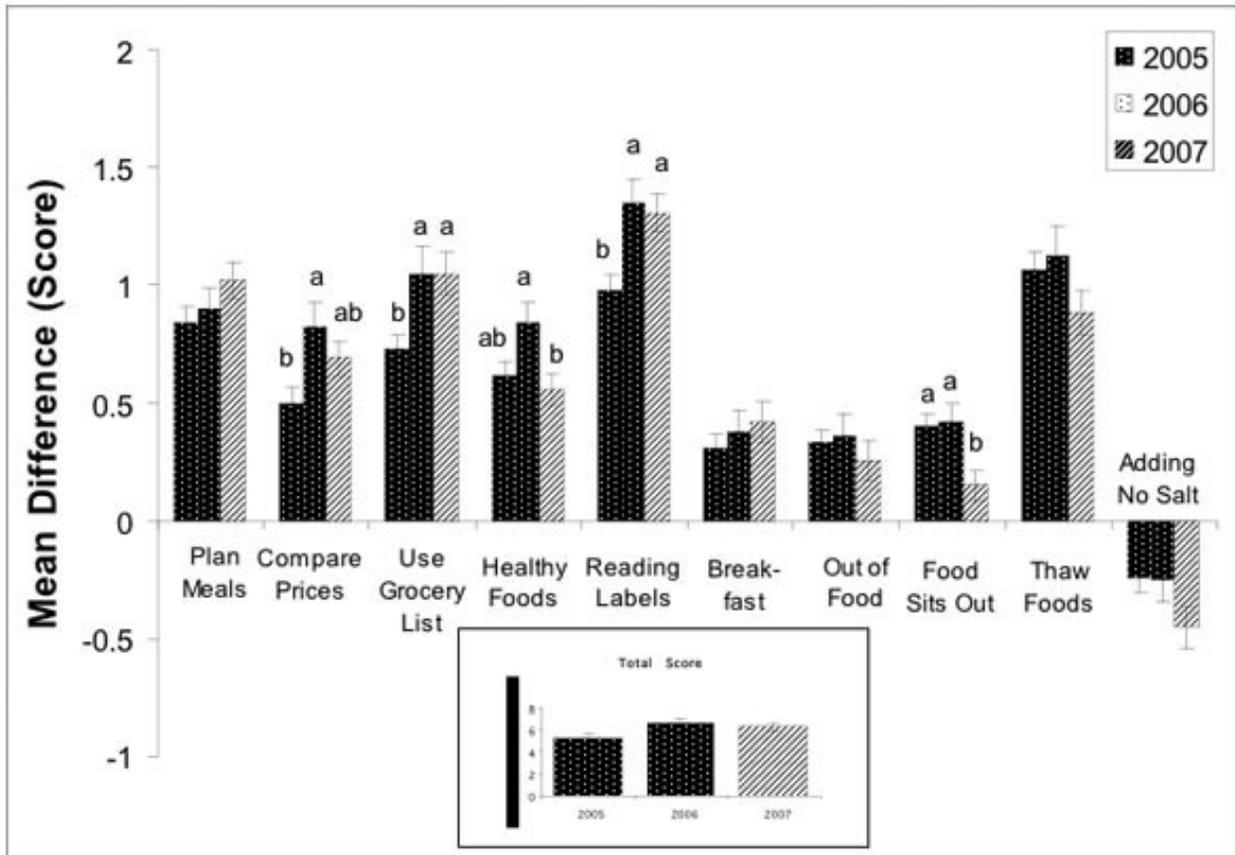
a>b p<=0.05

## Food Behavior

To explore change in food behavior, the total behavior score and individual items from the food behavior survey were examined. Of a maximum total behavior score of 50, program entry averages were  $33.2 \pm 4.93$ ,  $32.8 \pm 5.40$ , and  $32.1 \pm 5.94$ , and exit averages were  $38.5 \pm 6.12$ ,  $39.5 \pm 6.14$ , and  $38.4 \pm 5.84$  for 2005, 2006, and 2007, respectively. Significant positive change was seen from pre- to post-program on nine of 10 food-behavior questions, whereas "adding no salt" showed significant negative change in all three program years ( $p < 0.05$ ). Of the behaviors, five exhibited significant yet inconsistent differences between program years (Figure 3) ( $p < 0.05$ ).

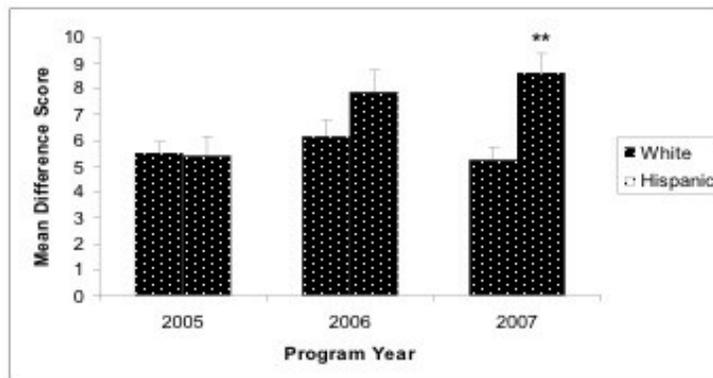
A number of factors, including instructional setting, participant and educator race, and educator experience, were found to have significant, but inconsistent relationships with change on individual survey questions (data not shown). Change in total score from entry to exit was significantly higher among Hispanic participants than white participants in 2007 ( $p < 0.05$ ) (Figure 4). Participants taught by educators with 10 to 15 years of experience in 2005 and educators with two to five and 10 to 15 years of experience in 2007 had significantly higher total scores and change in total score from entry to exit ( $p < 0.05$ ) (Figure 5).

**Figure 3.**  
Change in Food Behaviors



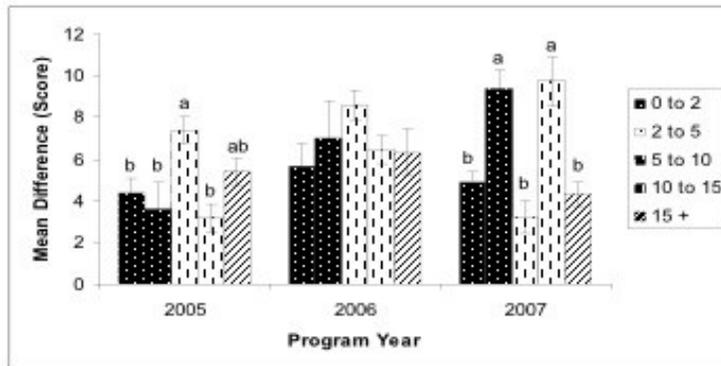
a>b p<=0.05

**Figure 4.**  
Change in Total Food Behavior Survey Score by Participant Race



\*\*p=0.001

**Figure 5.**  
Change in Total Food Behavior Survey Score by Educator Years of Experience



a>b p<0.05

## Discussion

Dietary intakes and food behavior survey data have previously been used to evaluate EFNEP and FSNE. Improvement in consumption of food groups and nutrients by program participants has varied across studies (Amstutz & Dixon, 1986; Burney & Haughton, 2002; Cason, Cox, Wenrich, Poole, & Burney, 2004; Del Tredici, Joy, Omelich, & Laughlin, 1988; Romero, Medeiros, & Melcher, 1988; Torisky et al., 1989). The study reported here found that Iowa EFNEP and FSNE graduates improved dietary intakes from meat, dairy, vegetable, bread, and fruit groups during 2005, 2006, and 2007, and improved intake of fiber, calcium, magnesium, potassium, and vitamins A and C in 2006 and 2007. Previous studies reported improvements on two to 10 food behavior survey questions (Arnold & Sobal, 2000; Brink & Sobal, 1994; Burney & Haughton, 2002; Cason, Cox, Wenrich, Poole, & Burney, 2004). The study reported here found that Iowa EFNEP and FSNE graduates demonstrated positive change in nine of 10 food behavior survey questions.

The variable results in dietary intake and food behavior survey data may be due to differences in program delivery. Each evaluation was conducted in only one state, where participant and educator demographics, curricula used, and instructional setting likely differ. These factors may influence participant behavior change, thus results of various evaluations. The study sought to further examine factors influencing participant behavior change, though only in Iowa. It would be beneficial to examine these factors nationwide or in multiple states.

The primary aim of the study was to compare participant behavior change seen in 2007 following implementation of the new ESBA curriculum to change seen in 2005 and 2006, when the previous curriculum was used. No other research on EFNEP and FSNE has reported differences between curricula. Some significant differences in dietary intake and food behavior survey data existed between program years ( $p \leq 0.05$ ); however, these differences were not consistent. This suggests that neither curriculum was superior. Rather, both have strengths and weaknesses, and both support positive behavior changes.

The second aim of the study was to examine factors influencing participant behavior change. Previous research has examined one factor influencing behavior change-instructional setting. Luccia and colleagues

suggested significant changes in dietary behaviors were independent of instructional setting (group versus individual) (2003). Conversely, others report the individual setting leads to significantly greater improvement in food- and nutrition-related behaviors than the group setting (Cason, Scholl, & Kassab, 2002; Dickin, Dollahite, & Habicht, 2005; Dollahite & Scott-Pierce, 2003).

Though the study reported here examined many factors influencing behavior change, the only factors that were consistently and significantly associated with change in dietary intake and food behavior survey scores across all three program years were instructional setting, participant and educator race, and educator years of experience. Data from the study suggests that the ESBA curriculum supports behavior change independent of instructional setting despite being written using the adult learning theory and learner centered approach, which support education in groups (Amstutz, 1999; Henson, 2003; Imel, 1999; Norris, 2003; Tweedell, 2000). This finding is important to the Iowa EFNEP and FSNE, where lessons are taught in both instructional settings and the number of participants in the group setting has significantly decreased since 2005.

Participant and educator race influenced behavior change, particularly in 2007, when the number of white participants decreased significantly ( $p < 0.05$ ) and the number of Hispanic participants increased. Hispanic participants and those taught by Hispanic educators experienced significantly greater improvement than white participants and those taught by white educators on individual food behaviors and total food behavior score ( $p < 0.05$ ). During a portion of the 2007 data collection period, none of the ESBA lesson materials were translated into Spanish. Thus, as educators delivered lessons, the lesson materials often had to be translated into Spanish for Hispanic participants.

It is possible that this stimulated more discussion of the lesson materials, resulting in greater behavior change in Hispanic participants. It is also possible that some learning strategies incorporated in the ESBA curriculum support a preferred learning style among Hispanic participants leading to greater behavior change. A qualitative study of the ESBA curriculum suggests that the learner-centered approach, which accommodates a variety of learning styles, benefits participants of various racial and ethnic backgrounds (Hoover, Martin, & Litchfield, unpublished manuscript).

Educator experience was significantly associated with learner outcomes in all 3 years of data collection. Educators with 2 to 5, 5 to 10, and 10 to 15 years of experience were more likely to influence positive behavior change than those with zero to 2 or more than 15 years of experience. These educators likely have more nutrition knowledge and experience teaching to the target audience than those with zero to 2 years of experience, thus explaining why their graduates showed greater behavior change. It is also possible that these educators had less experience with the old curriculum and were less resistant to changing to the new ESBA curriculum; thus, their participants demonstrated greater behavior change than those of more experienced educators. One final possibility is that there may be a bell shaped curve relative to educator experience and behavior change, where educators with the least or most experience are less likely to influence behavior change than participants taught by educators with levels of experience that fall in the middle.

Limitations to this study include the following.

- The reporting system used by the Iowa EFNEP/FSNE (ERS/NEERS) changed data collection procedures between program years, making it difficult to compare dietary intakes between years. For this reason, dietary intake data were examined as a percent change between pre- and post-program rather than change in number of servings or amount consumed.
- Data collection in 2007 started shortly after educators had been trained on the ESBA curriculum, and educators had much less experience teaching this curriculum than the previous curriculum taught in

2005 and 2006.

- Significant differences existed between participant characteristics from the three program years; thus, some differences among program years may be related to changing demographics rather than program curriculum or educator.

Implications of these results for educators include the following.

- The 2007 data demonstrated improvements in food- and nutrition-related behaviors similar to that of 2005 and 2006, suggesting that thorough educator training on a new curriculum, such as that conducted in this project, can result in immediate program effectiveness.
- The absence of differences between instructional settings (group versus individual) suggests that the curriculum is effective in both settings.
- Differences in behavior change among racial/ethnic groups as well as the increasing diversity of the target population necessitates accommodating a variety of learning needs during curriculum development, which may require:
  - ◆ Educator training on cultures other than their own,
  - ◆ Hiring educators who mirror the diversity of the target population, and
  - ◆ Writing curricula that incorporate culturally diverse concepts while accommodating many learning styles.
- The differences in behavior change with educator years of experience suggest that training should occur early in the career of educators to help them gain nutrition knowledge and become comfortable teaching the target audience. Additionally, educators who have been with the program longest may need additional support to transition to a new curriculum and prevent complacency with the current curriculum.

More research is needed to examine factors that influence participant behavior change. The research reported here conflicts with most research examining the influence of instructional setting (Cason, Scholl, & Kassab, 2002; Dickin, Dollahite, & Habicht, 2005; Dollahite & Scott-Pierce, 2003), while supporting only one study (Luccia, Kunkel, & Cason, 2003). Thus, further research should examine the differences in instructional setting, possibly across multiple states, because previous research has been conducted in single states.

The influence of race and ethnicity of participants and educators should be further examined as well. Though the study reported here suggests an effect of race/ethnicity on behavior change in this program, especially

between Hispanic and white participants, an explanation for this effect has not been established. Another research direction may be to examine the training and other needs of educators with varying amounts of experience. A last possible research direction would be to examine behavior change of program graduates across multiple states because this would provide a more complete assessment of the effectiveness of EFNEP and FSNE nationally. Yet, in order to conduct an evaluation of this magnitude, it would be beneficial for the ERS to develop reports that demonstrate participant behavior change that align with the 2005 DGA.

## Conclusions

The study reported here evaluated the new ESBA curriculum in the Iowa EFNEP and FSNE, and factors influencing participant behavior change. Though the ESBA curriculum had been in place for only a short time, behavior change of graduates taught using ESBA was similar to those taught using an established curriculum. The most significant factors influencing curriculum effectiveness, measured by participant behavior change, were participant and educator race and educator years of experience. These two factors should be further examined on all levels of program implementation (national, state, and county) in order to promote behavior change among all participants regardless of their own characteristics or the characteristics of their educator.

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