

# About Eating: An Online Program With Evidence of Increased Food Resource Management Skills for Low-Income Women

Barbara Lohse, PhD, RD, LDN<sup>1</sup>; Rhonda Belue, PhD<sup>2</sup>; Stephanie Smith, MS, RD<sup>3</sup>; Patricia Wamboldt, PhD<sup>1</sup>; Leslie Cunningham-Sabo, PhD, RD<sup>3</sup>

## ABSTRACT

**Objective:** Produce and evaluate About Eating (AE), an online program for low-income women aligned with the Satter eating competence model, congruent with best practices for nutrition education of low-income audiences.

**Methods:** Responses from iterative cognitive interviews and online surveys with diverse samples of low-income women informed lesson revisions. The researchers conducted a randomized controlled trial of AE with low-income women to determine its impact on dietary behavior and food security.

**Results:** In all, 284 women reviewed at least 1 AE lesson and endorsed it. After AE, women ( $n = 288$ ) increased in use of food resource management skills (eg, using a budget [ $P = .008$ ] and planning meals to include all food groups [ $P = .002$ ]). About Eating participants who were food secure had more confidence in managing money for food ( $P = .002$ ) and keeping track of food-related purchases ( $P = .02$ ) than food-insecure persons.

**Conclusions and Implications:** Mixed-methods research with life stage and geodiverse samples confirmed the usefulness of AE. Food security assessment may enhance interpretation of intervention effectiveness.

**Key Words:** food management, low income, nutrition education, food security, online education (*J Nutr Educ Behav.* 2015;47:265–272.)

Accepted January 25, 2015. Published online March 2, 2015.

## INTRODUCTION

The Satter model of eating competence (ecSatter) is an intra-individual approach to food selection and eating behaviors focused on enjoyment, attention to internal regulation of intake, food acceptance, and food resource management skills to plan, purchase, and prepare meals and snacks on a regular basis.<sup>1</sup> Eating competence is associated with greater dietary quality,<sup>2,3</sup> reduced cardiovascular risk,<sup>3,4</sup> increased physical activity,<sup>5</sup> fewer symptoms of disordered eating, including weight satisfaction and normal body mass

index,<sup>6–9</sup> better sleep quality,<sup>10</sup> and parent modeling healthful eating behaviors.<sup>11</sup> Satter offered descriptions of ecSatter-driven nutrition education and guidance for adoption,<sup>12</sup> and nutrition education programs congruent with ecSatter have been suggested.<sup>8,13,14</sup> However, to date, none have been tested or made available to nutrition educators, especially those working with low-income audiences.

Specific recommendations have recently been nominated as best practices for nutrition education of low-income audiences.<sup>15</sup> Domains include program design, delivery, and evaluation. Specifically noted is con-

tent that is appropriate for the target audience and related to physical activity, food resource management, and eating behaviors. Experts recommend the following: behavior change goal setting; apparent evidence base and theoretical underpinning; learner-centered methodologies; and evaluation with formative, process, outcome, and impact stages to realize sustained behavior change.<sup>16,17</sup>

The purpose of this project was to produce and evaluate an online curriculum for low-income women that was aligned with ecSatter tenets and congruent with best practices for nutrition education for low-income audiences with the potential to be evidence-based and sustainable.

## METHODS

### About Eating Development and Description

As shown in [Figure 1](#), About Eating (AE) was developed and tested in several phases beginning with modification of WebHealth, an online, non-dieting, 10-module program developed for college students that successfully motivated healthful behaviors and

<sup>1</sup>Department of Nutritional Sciences, Pennsylvania State University, University Park, PA

<sup>2</sup>Department of Health Policy & Administration, Pennsylvania State University, University Park, PA

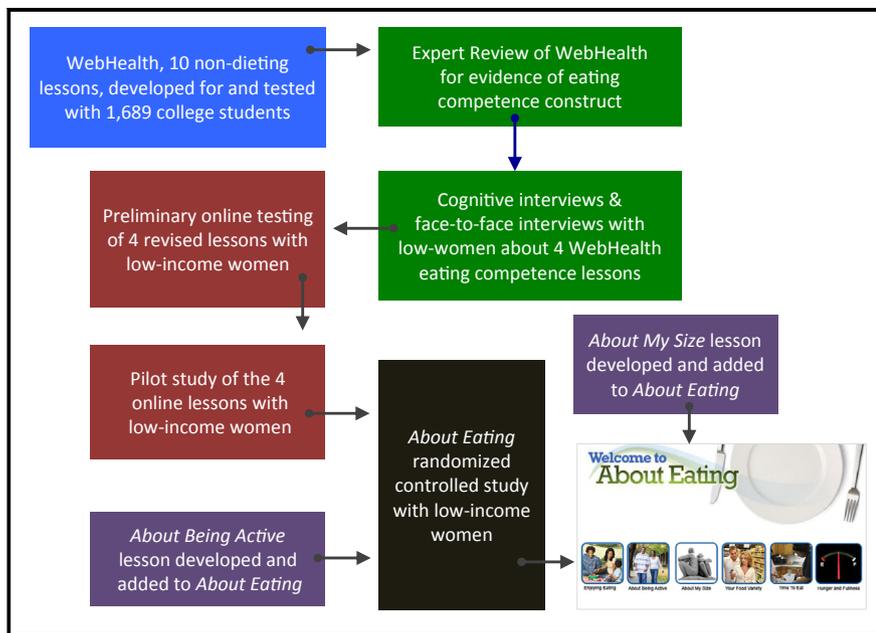
<sup>3</sup>Department of Food Science and Human Nutrition, Colorado State University, Fort Collins, CO

*Conflict of Interest Disclosure:* The authors' conflict of interest disclosures can be found online with this article on [www.jneb.org](http://www.jneb.org).

Address for correspondence: Barbara Lohse, PhD, RD, LDN, 205 Chandlee Lab, Department of Nutritional Sciences, Pennsylvania State University, University Park, PA 16802; Phone: (814) 865-5169; Fax: (814) 863-6103; E-mail: [lohseb@psu.edu](mailto:lohseb@psu.edu)

©2015 Society for Nutrition Education and Behavior. Published by Elsevier, Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.jneb.2015.01.006>



**Figure 1.** Development stages of About Eating, a curriculum based on the ecSatter model.

increased fruit and vegetable intake.<sup>14,18</sup> WebHealth included 4 ecSatter-driven lessons that were translated for a low-income audience using an iterative process of cognitive interviews and revision review by the target audience. These reframed lessons became the first 4 AE lessons. To expand AE to 6 lessons, additional WebHealth modules (2 on physical activity and 2 on body image and weight issues) were similarly repurposed for a low-income audience in 2 separate stages that included realignment into 1 lesson for each topic to evolve into About Being Active<sup>5</sup> and About My Size.<sup>19</sup> In all, formative evaluations informed revisions of 8 of the 10 WebHealth lessons that featured ecSatter tenets, physical activity information, and approach to body size and weight acceptance.

The resulting AE program is a Web-based, self-directed, interactive program designed for low-income women that addresses core constructs of ecSatter and is learner-centered in that each of the 6 lessons can be viewed in any order and as often as desired, with individually tailored depth and scope of participation. Each AE lesson is self-directed; it is designed to take from 15 to 30 minutes to review and includes interactive activities that can be tailored to participant responses. Enjoying Eating was developed to in-

crease appreciation for enjoyment of food as a component of healthful eating. Your Food Variety identifies the value of food acceptance, offers ways to increase food variety in the diet, and includes a food preference survey validated to be a proxy for a food frequency questionnaire.<sup>20</sup> About Being Active provides opportunity to examine benefits of physical activity and helps develop methods and goals to increase the level of physical activity. Time to Eat provides skill-building activities to plan, shop, and prepare healthful meals and snacks. About My Size encourages participants to accept their own and others' body size and to consider societal values about body image. Finally, Hunger and Fullness examines factors that influence internal regulation and cues for eating.

### Formative and Outcome Assessment

Formative assessment of the ecSatter lessons<sup>21</sup> and of About Being Active have been described previously.<sup>5</sup> WebHealth's body image and size perception lessons were initially evaluated through face-to-face cognitive interviews with 24 low-income women from 3 geographically disparate settings. Criteria for participation

included having access to the Internet, being female, between aged 18–45 years, being healthy with no chronic disease or condition (eg, diabetes, cancer, weight loss surgery), being English literate, and having been recruited from a low-income venue (eg, food pantry, job training center, housing assistance office, Special Supplemental Nutrition Program for Women, Infants, and Children clinic). The order of lessons was alternated to address bias from interview fatigue. Subsequently, the revised lesson, now titled About My Size, was evaluated through face-to-face cognitive interviews with 7 original and 3 new low-income participants.<sup>19</sup> All interviews were audio-recorded and led by the same experienced, trained interviewer (PMW). About My Size was also evaluated by a sample of parents of fourth-graders participating in a larger school-based nutrition education study.<sup>22</sup>

In summary, the lessons revamped for inclusion in AE were reassessed by 6 separate samples diverse in age, ethnicity, and economics (Table 1). Completion of About Eating occurred at home, work, libraries, and community centers. Participant responses were captured with online surveys that measured food resource management and eating competence before and after AE delivery and with questions presented to learners upon completion of each lesson.

### Impact Assessment

Before adding About My Size to AE, the 5-lesson version was assessed in a randomized, controlled study with a US Department of Agriculture (USDA) nutrition information Web site (Click 'n Go [CG]) that served as the comparison treatment.<sup>23</sup> Participants were recruited from low-income venues and Supplemental Nutrition Assistance Program (SNAP) participation lists supplied by the state office. Eligibility criteria included being female, aged 18–45 years, and English literate, and having an e-mail address and online access. Exclusion criteria included a history of heart, cancer, liver, or lung disease; employment in or study related to a nutrition profession, enrollment in a 4-year college, or residence in a county receiving SNAP

**Table 1.** About Eating Evaluation Samples From 5 Studies (n [%])

	6-Lesson Version		5-Lesson Version		Single-Lesson Formative Assessment	
	Parents of Fourth-Graders <sup>a</sup> (n = 57)		Randomized Controlled Study <sup>21</sup>		About My Size <sup>b</sup> (n = 24)	
	Health Center Project (n = 84)	Comparison (n = 244)	About Eating (n = 288)	About Being Active <sup>b</sup> (n = 12)	About My Size <sup>b</sup> (n = 24)	
Age, y (mean ± SD)	18–45 <sup>c</sup>	30.7 ± 7.1	30.7 ± 7.8	25.3 ± 6.0	37.3 ± 9.1	
Female	62 (74)	224 (100)	288 (100)	12 (100)	24 (100)	
Race						
White non-Hispanic	15 (12)	208 (93)	267 (93)	n/a	18 (75)	
Black	1 (1)	12 (5)	18 (6)	n/a	6 (25)	
Supplemental Nutrition Assistance Program participation	49 (35)	120 (58)	153 (61)	n/a	21 (88)	
Special Supplemental Nutrition Program for Women, Infants, and Children participation	n/a	n/a	n/a	12 (100)	7 (29)	
Body mass index (mean ± SD) <sup>d</sup>	28.3 ± 10.3	28.2 ± 7.1	28.5 ± 7.3	n/a	32.8 ± 7.5	
Underweight	7 (10)	5 (2)	7 (2)	n/a	0	
Normal	15 (22)	86 (38)	106 (37)	n/a	2 (9)	
Overweight	26 (38)	53 (24)	78 (27)	n/a	7 (30)	
Obese	21 (30)	80 (36)	97 (34)	n/a	14 (61)	

n/a indicates not available.

<sup>a</sup>Parents of fourth-grade children participating in a larger school-based nutrition education study<sup>22</sup>; <sup>b</sup>Formative data collected with cognitive interviews; <sup>c</sup>Affirmed age range, 18–45 years; <sup>d</sup>Based on self-reported height and weight.

education. Eligible persons were stratified by participation in the Expanded Food and Nutrition Education Program and then randomized to the AE or comparison group before completing the pre-survey. About Eating participants were given 10 days to complete a lesson and were sent up to 2 e-mail reminders per lesson. After a 14-day adoption period, the post-survey link was e-mailed. Comparison participants had access to the CG Web site for 30 days and received a total of 5 e-mail reminders to visit the site. Both groups had access to the post-survey for 9 days and up to 2 e-mail reminders were sent to nonresponders. Participants completed pre- and post-survey sets that included measures of food security, food resource management, and eating competence.

### Evaluation Instruments

For all samples, individual lessons were assessed for reading difficulty, Web site navigation, interest, usefulness, graphics, length, and design/color by selecting a response option indicating level of agreement with the positively framed statement. Response options ranged from *no, not at all* to *yes, definitely*. This instrument was tested for comprehension and reading ease with the target audience before use. Demographic items were also included on evaluation surveys.

Food security was assessed with the USDA 6-item food security screener to reduce respondent burden.<sup>24</sup> Scores of 0 or 1 indicated food security; higher scores (2–6) were identified as food-insecure. Food resource management skills were evaluated with 13 Likert-scaled items from the Behavior Checklist developed for Expanded Food and Nutrition Education Program.<sup>25</sup> Response options ranged from 1 to 5, with higher scores denoting better skills. Eating competence was measured with the 16-item Satter eating competence inventory validated with low-income audiences (ecSI 2.0).<sup>7</sup> Scores for each statement range from 0 (never/rarely) to 3 (always). Responses are summed; thus, ecSI 2.0 scores can range from 0 to 48; scores ≥ 32 indicate eating competence.

All survey data were collected online with study-specific formats. Cognitive interview participants

**Table 2.** Respondents Reporting Yes, *Definitely* or Yes, *Sometimes* to Evaluation Items

Lesson	Sample <sup>b</sup>	Evaluation Item, n (%) <sup>a</sup>						
		1	2	3	4	5	6	7
Enjoying Eating	A (n = 179)	13 (7)	7 (4)	172 (96)	162 (92)	171 (96)	175 (99)	177 (99)
	B (n = 62)	4 (6)	3 (5)	53 (86)	54 (86)	55 (86)	58 (91)	56 (89)
About Being Active	A (n = 168)	1 (1)	5 (3)	162 (98)	164 (98)	163 (98)	166 (99)	165 (99)
	B (n = 58)	4 (7)	5 (9)	50 (89)	52 (91)	50 (86)	53 (91)	48 (87)
About My Size	C (n = 12)	0	0	12 (100)	11 (92)	11 (92)	12 (100)	11 (92)
	D (n = 10)	0	0	10 (100)	9 (90)	10 (100)	10 (100)	10 (100)
Your Food Variety	A (n = 197)	11 (6)	24 (13)	187 (95)	178 (91)	184 (95)	190 (97)	190 (97)
	B (n = 65)	3 (5)	6 (9)	47 (72)	49 (75)	50 (78)	53 (82)	52 (84)
Time to Eat	A (n = 166)	9 (5)	10 (6)	155 (94)	148 (89)	160 (96)	161 (97)	159 (98)
	B (n = 65)	3 (5)	4 (6)	46 (72)	51 (82)	53 (83)	58 (89)	56 (89)
Hunger and Fullness	A (n = 174)	12 (7)	23 (14)	163 (95)	166 (95)	172 (99)	169 (98)	171 (99)
	B (n = 59)	4 (7)	5 (9)	47 (80)	52 (88)	48 (81)	52 (88)	51 (88)

<sup>a</sup>Numbers correspond to evaluation item: (1) The lesson was difficult to read; (2) Getting around the Web site was difficult; (3) The lesson was interesting; (4) The lesson was useful to me; (5) I liked the pictures; (6) Overall the length of the lesson was good; (7) I liked the overall design/color. Sample A response options were *No, not at all; No, not much; Sometimes; Yes; Yes, definitely*. Response options for other samples were *No, not at all; No, not much; Yes, sometimes; Yes, definitely*. Entries denote *Sometimes, Yes, and Yes, definitely* responses for sample A; <sup>b</sup>Letters refer to the following samples: (A) randomized, controlled study; (B) Health Center Project; (C) parents of fourth-graders participating in Fuel for Fun: Cooking With Kids Plus Parents and Play study; (D) Formative assessment (cognitive interviews and follow-up online surveys).

completed an online survey set after cognitive interviews with response input on researcher-supplied computers. Other samples completed surveys at their convenience using their own or available computers. Survey responses were downloaded from either a Qualtrics platform (Qualtrics LLC, Provo, UT, 2014) or Perseus platform (Perseus SurveySolutions, Perseus Development Corporation, Bucks, UK) (for the pre-post AE and end-of-lesson surveys, respectively) into an SPSS database (version 21.0, IBM, Inc, Armonk, NY, 2012) for analyses. Data were analyzed with descriptive statistics, chi-square, independent, and paired *t* tests, and ANOVA as appropriate. A univariate generalized linear model assessed pre to post differences between AE and comparison groups and interaction with food security status.

The Pennsylvania and Colorado State University Institutional Review Boards for the Protection of Human Subjects each reviewed and approved their state-specific studies.

## RESULTS

Women reviewing WebHealth lessons for translation to a low-income audience were mostly white, non-

Hispanic, obese SNAP participants (Table 1) with responsibility for minor children. Initial interviews to develop About My Size suggested that revisions to the 2 WebHealth lessons be centered on content load, language level, pictures, and layout, including navigation components. Suggestions included increasing diversity for images of body size and eliminating technical terms. Cognitive interview results, interviewer notes, and team discussion led to merging key concepts from the WebHealth lessons on body image and body size perception into 1 lesson with a focus on content load, language level, pictures, layout, and navigation components. Upon review of this revised lesson, participants reported the single lesson to be more useful, preferring the revised length, content, and overall design. Feedback revealed that low-income women were interested in learning about body image and body size issues. For each of the 6 AE lessons, all lesson evaluations documented a positive response and supported continued use and application to low-income audiences (Table 2).

### Impact Assessment

As shown in Table 1, participants were young, mostly white SNAP partici-

pants, and overweight or obese. Food security was low or very low for 39%; 60% of CG and 38% of AE were considered food-insecure. A minority was categorized as eating-competent (39% with an ecSI 2.0 score  $\geq 32$ ); ecSI 2.0 demonstrated internal consistency with Cronbach alpha of .87. About Eating positively affected food resource management skills. After AE, participants reported running out of food before the end of the month less often, increased use of nutrition facts labels to make food choices, greater use of a written spending plan for food, more confidence to manage money to make healthy food available, and more frequent meal planning to include all food groups. Click 'n Go participants only increased tracking of food-related expenses and (like AE) increased planning of meals to include all food groups (Table 3). Click 'n Go participants decreased comparison of prices to save money ( $P = .05$ ); AE reported no change. Compared with no change in AE use of comparing prices to save money, decrease of the practice for CG was significant ( $0.06 \pm 0.79$  vs  $-0.19 \pm 0.91$ ;  $P = .01$ ). Food security status was related to intervention effect for 3 food resource management behaviors: (1) confidence in managing money to make food available; (2)

**Table 3.** Pre–Post Group Comparison of Food Resource Management Skills by Low-Income Women in Randomized, Controlled Study

Assessment Item <sup>a</sup>	About Eating <sup>21</sup> (n = 155)			Comparison <sup>21</sup> (n = 148)		
	Pre Mean (SD)	Post Mean (SD)	P <sup>b</sup>	Pre Mean (SD)	Post Mean (SD)	P <sup>b</sup>
How often do you:						
Run out of food before the end of the month?	2.7 (1.3)	2.4 (1.2)	< .001	2.7 (1.3)	2.5 (1.3)	NS
Use nutrition facts on the food label to make choices?	3.1 (1.1)	3.3 (1.2)	.01	3.0 (1.1)	3.1 (1.1)	NS
Use a written spending plan or budget for food?	2.7 (1.4)	3.0 (1.3)	.008	2.8 (1.4)	3.0 (1.4)	NS
Keep track of some or all of your food-related expenses?	2.8 (1.3)	2.9 (1.3)	NS	2.9 (1.3)	3.1 (1.3)	.03
Feel confident about managing your money to make healthy food available to you?	3.1 (1.1)	3.3 (1.1)	.001	3.1 (1.1)	3.2 (1.2)	NS
Plan meals to include all food groups?	3.2 (1.0)	3.4 (1.0)	.002	3.2 (.95)	3.4 (.90)	.03
Make successful recipe from scratch?	3.7 (1.1)	3.9 (1.0)	NS	3.6 (1.1)	3.7 (1.1)	NS
Compare prices to save money?	4.1 (0.94)	4.1 (0.84)	NS	4.0 (0.87)	3.9 (1.1)	NS

NS indicates not significant.

<sup>a</sup>Possible responses range from 1 (*do not do this*) to 5 (*almost always do this*); <sup>b</sup>Pre–post paired *t* test.

keeping track of food-related expenses; and (3) use of a written spending plan or budget for food. As shown in Figure 2, these behaviors tended toward or significantly improved in AE food-secure but not food-insecure participants. Click 'n Go food security status was not related to change in food resource management skills. In addition, comparison of changes from baseline for these behaviors between AE and CG revealed trends toward or significant interactions with food security status. Behaviors were either unchanged or only slightly improved for CG food-secure and food-insecure participants, respectively (confidence to manage money to make food available:  $0.11 \pm 0.12$  vs  $0.20 \pm 0.16$ ; keeping track of food-related purchases:  $0.23 \pm 0.13$  vs  $0.32 \pm 0.18$ ; use of a written spending plan/budget:  $0.13 \pm 0.13$  vs  $0.34 \pm 0.18$ ), but were improved for AE food-secure participants and unchanged or worse for AE food-insecure participants (confidence to manage money to make food available:  $0.56 \pm 0.12$  vs  $-0.04 \pm 0.16$ ; keeping track of food-related purchases:  $0.31 \pm 0.13$  vs  $-0.19 \pm 0.18$ ; use of a written spending plan/budget:  $0.40 \pm 0.13$  vs  $0.00 \pm 0.18$ ). Although AE and CG participants both reported running out of food at the end of the month less frequently ( $-0.42 \pm 0.10$  vs  $0.12 \pm 0.10$ ), the AE decrease was significantly greater ( $P = .04$ ) when controlling for food security status. About Eating

food-insecure participants had the greatest decrease in worry about running out of food before the end of the month (AE:  $-0.60 \pm 0.17$  vs  $-0.24 \pm 0.12$ ; CG:  $-0.21 \pm 0.17$  vs  $-0.03 \pm 0.12$ ).

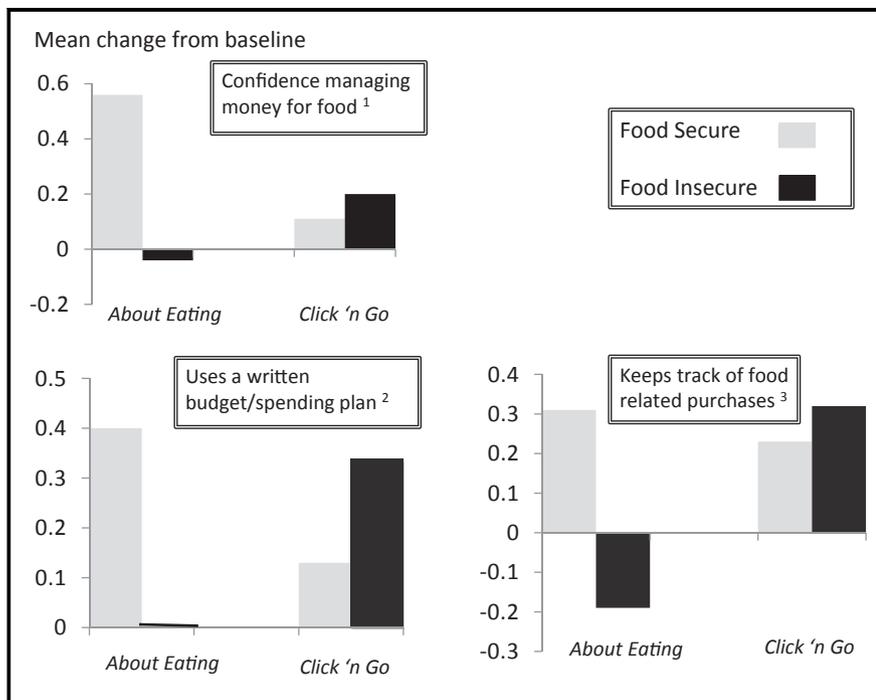
## DISCUSSION

This project described the promising transition of WebHealth, an online, nutrition-centered, non-dieting-based intervention for college students to AE, an online program for low-income women based on the Satter model of eating competence and alert to best practices in nutrition education for low-income audiences. A controlled, randomized impact study revealed greater improvement of food resource management skills for AE participants; the magnitude of changes was congruent with those reported by Auld et al<sup>26</sup> after an intervention more intensive than AE. A strength of this project was the use of qualitative and quantitative evaluation methods as well as formative, process, outcome, and impact approaches to study this specific curriculum. In addition, involvement of several diverse samples providing food behavior practices and food security status in addition to curricular responses better informed the revisions. Small sample size and self-selection to participate limit the generalizability of the findings. The design of the ran-

domized impact assessment did not allow for participants to revisit AE after 1 viewing. Thus, the more realistic experience of returning to information and activities of interest could not be considered when making conclusions of AE efficacy.

These findings support the underpinnings of SNAP–Education (SNAP–Ed) (ie, positive impacts that follow from SNAP-driven food security can synergize nutrition education efforts).<sup>27</sup> People who do not worry about food being unavailable have more cognitive capacity to learn new concepts and practices. Whereas AE participation required engagement and attention to information to progress through the lessons, CG participants were only frequently informed about the availability of the lessons; study completion did not depend on the threshold of participation. Thus, food-insecure as well as food-secure persons could achieve completion without effort; this was not the case with AE.

The emergence of AE from WebHealth provided an opportunity to examine strategic considerations in contemporary conversations of intervention development and deployment: implementation and dissemination science, translational science, evidence-based analysis, and best practices in education. WebHealth efficacy was tested in a randomized, controlled multicenter trial that revealed a positive impact on fruit and vegetable intake



**Figure 2.** About Eating and Click 'n Go mean change from baseline for 3 Expanded Food and Nutrition Education Program screener items compared between food-secure and food-insecure participants using a *t* test. Possible item responses ranged from 0 to 5. Positive values indicate greater behavior frequency. <sup>1</sup>Confidence about managing money to make healthy food available, About Eating ( $P = .002$ ). <sup>2</sup>Uses a written spending plan or budget for food, About Eating ( $P = .07$ ). <sup>3</sup>Keeps track of food-related purchases or expenses, About Eating ( $P = .02$ ). All differences between food-secure and food-insecure Click 'n Go participants were not significant.

and physical activity.<sup>14</sup> However, efficacy does not always translate to effectiveness, which is the real-life under non-research conditions. Deficient attention to this external validity has hindered application of health promotion research to the practice of health education.<sup>28</sup> Indeed, WebHealth investigators demonstrated possible limitations in generalizing their findings by noting significant gender differences in response to program components.<sup>18</sup> Gender was even identified as an issue at baseline, when clusters of college students, defined by psychographics and gender, were identified who differed in physical activity and fruit and vegetable intake.<sup>13</sup> These findings and issues raised about making interventions more useable<sup>29</sup> prompted interviews with experts and low-income women to ascertain whether WebHealth could be expected to perform for this target audience. Responses revealed that although the basic structure of the program could remain intact, changes in graphics, language, reading level, and design would be required. In a sense, the required modifications represented

application of translational science<sup>30</sup>; that is, research about needs, health, lifestyle, and interests of food-insecure and resource-constrained women were translated to an educational structure that had been crafted for another demographic. However, the development stages presented here represent mostly another efficacy study, because each had inclusion criteria for participation and were limited in scope and sample size. In fact, finding that food security status interacted with intervention impact argues against broadly assigning efficacy to low-income women. It is unknown whether AE will be acceptable, useful, interesting, and effective for women of varying ages and socioeconomic position. Principles of dissemination and implementation science must be applied to make these determinations.<sup>31</sup>

Inherent in implementation science is the use of evidence-based interventions. However, in nutrition science and nutrition education, the explicit meaning of "evidence-based" has been the subject of debate. According to the USDA, criteria for an

evidence-based nutrition education intervention delivered to low-income, SNAP-eligible persons are less stringent than those required by the Centers for Disease Control and Prevention or the Institute of Medicine. For SNAP-Ed, a continuum of evidence-based practices is proposed by noting that.

*An evidence-based approach for nutrition education and obesity prevention is defined as the integration of the best research evidence with the best available practice-based evidence. The best research evidence refers to relevant rigorous nutrition and public health nutrition research including systematically reviewed scientific evidence. Practice-based evidence refers to case studies, pilot studies, and evidence from the field on nutrition education interventions that demonstrate obesity prevention potential.<sup>27</sup>*

Further explanation supports the use of "... interventions that have not been rigorously tested but show promise based on results from the field (practice-based)."<sup>27</sup>

In her commentary on evidence-based analysis, Achterberg<sup>32</sup> also suggested a more facile approach, noting that an evidence base can be assessed considering "all of our evidence, to use and apply the best of it, to work with what is available at the time, and to generate sound advice and public policy." Research designs such as the sequential multiple assignment randomized trial are valid options to a randomized, controlled trial,<sup>33</sup> which have limited application and ethical issues in nutrition interventions.<sup>27</sup> The rigor, relevance, and robustness of nutrition education will benefit from the many options available to demonstrate the evidence supporting each approach.

## IMPLICATIONS FOR RESEARCH AND PRACTICE

About Eating (available for preview through the Nutrition Education Engineering & Designs Center at The Pennsylvania State University) is an evidence-based program, framed by

ecSatter, shown to enhance food resource management skills, and is available for dissemination to assistance program participants, including SNAP–Ed, that target low-income persons with household food management responsibilities. Impact assessment revealed that being food-secure may have an added benefit of being more receptive to education on food resource management, and suggested that food security be considered when characterizing nutrition education success with low-income audiences. Next steps for AE must employ dissemination and implementation science concepts, especially to address adoption and sustainability.<sup>29</sup> Adoption of AE could be applied as a single-case research design of dissemination and implementation science practices in nutrition education. This approach is made all the more challenging by the need to educate nutrition and health professionals about the value of ecSatter, a model shown to be congruent with desired health outcomes but less aligned with many current nutrition guidelines.

## ACKNOWLEDGMENTS

This study was funded in part by the Pennsylvania Department of Public Welfare through the Pennsylvania Nutrition Education TRACKS, as part of USDA's SNAP, and by Agriculture and Food Research Initiative Grant 2012-68001-19603 from the USDA National Institute of Food and Agriculture, Childhood Obesity Prevention: Integrated Research, Education, and Extension to Prevent Childhood Obesity–A2101. The authors acknowledge Denise Wall, MS, RD, who participated in early formative assessment activity, and initial development activities by WebHealth investigators: Geoffrey W. Greene, PhD, RD, LDN; Adrienne A. White, PhD, RD; Sharon L. Hoerr, PhD, RD; Susan M. Schembre, PhD, RD; Deborah Riebe, PhD; Jill Patterson, PhD; Kendra K. Kattelman, PhD, RD; Suzanne Shoff, PhD; Tanya Horacek, PhD, RD; Bryan Blissmer, PhD; and Beatrice W. Phillips, EdD, RD, with support from the National Research Initiative of the USDA Cooperative State Research, Education, and Extension Service, Grant 2005-35215-154121541, National In-

stitutes of Health grant M01RR10732, and the General Clinical Research Center of the Pennsylvania State University.

## REFERENCES

1. Satter E. Eating competence: definition and evidence for the Satter eating competence model. *J Nutr Educ Behav.* 2007;39:S142-S153.
2. Lohse B, Bailey R, Krall J, Wall D, Mitchell DC. Diet quality is related to eating competence in cross-sectional sample of low-income females surveyed in Pennsylvania. *Appetite.* 2012;58:645-650.
3. Lohse B, Psota T, Estruch R, et al. Eating competence of elderly Spanish adults is associated with a healthy diet and a favorable cardiovascular disease risk profile. *J Nutr.* 2010;140:1322-1327.
4. Psota TL, Lohse B, West SG. Associations between eating competence and cardiovascular disease biomarkers. *J Nutr Educ Behav.* 2007;39:S171-S178.
5. Lohse B, Arnold K, Wamboldt P. Evaluation of About Being Active, an online lesson about physical activity shows that perception of being physically active is higher in eating competent women. *BMC Womens Health.* 2013;13:12.
6. Lohse B, Satter E, Horacek T, Gebreselassie T, Oakland MJ. Measuring eating competence: psychometric properties and validity of the ecSatter inventory. *J Nutr Educ Behav.* 2007;39:S154-S166.
7. Krall JS, Lohse B. Validation of a measure of the Satter eating competence model with low-income females. *Int J Behav Nutr Phys Act.* 2011;8:26.
8. Brown LB, Larsen KJ, Myland NK, Eggett DL. Eating competence of college students in an introductory nutrition course. *J Nutr Educ Behav.* 2014;45:269-273.
9. Clifford D, Keeler LA, Gray K, Steingrube A, Morris MN. Weight attitudes predict eating competence among college students. *Fam Consum Sci Res J.* 2010;39:184-193.
10. Quick V, Byrd-Bredbenner C, White AA, et al. Eat, sleep, work, play: associations of weight status and health-related behaviors among young adult college students. *Am J Health Promot.* 2014;29:e64-e72.
11. Lohse B, Cunningham-Sabo L. Eating competence of Hispanic parents is associated with attitudes and behaviors that may mediate fruit and vegetable-related behaviors of 4th grade youth. *J Nutr.* 2012;142:1904-1909.
12. Satter E. Eating competence: nutrition education with the Satter eating competence model. *J Nutr Educ Behav.* 2007;39:S189-S194.
13. Greene GW, Schembre SM, White AA, et al. Identifying clusters of college students at elevated health risk based on eating and exercise behaviors and psychosocial determinants of body weight. *J Am Diet Assoc.* 2011;111:394-400.
14. Greene GW, White AA, Hoerr SL, et al. Impact of an on-line healthful eating and physical activity program for college students. *Am J Health Promot.* 2012;27:e47-e58.
15. Baker S, Auld G, MacKinnon C, et al. Best practices in nutrition education for low-income audiences. <http://snap.nal.usda.gov/snap/CSUBestPractices.pdf>. Accessed November 11, 2014.
16. Jonsdottir S, Hughes R, Thorsdottir I, Ynave A. Consensus on the competencies required for public health nutrition workforce development in Europe—the JobNut project. *Public Health Nutr.* 2011;14:1439-1449.
17. Wakou BA, Keim KS, Williams GS. Personal attributes and job competencies needed by EFNEP paraprofessionals as perceived by EFNEP professionals. *J Nutr Educ Behav.* 2003;35:16-23.
18. Dour CA, Horacek TM, Schembre SM, et al. Process evaluation of Project WebHealth: a non-dieting web-based intervention for obesity prevention in college students. *J Nutr Educ Behav.* 2013;45:288-295.
19. Wamboldt PM, Lohse B. Adapting on-line body image education to address needs unique to low-income adult females. *J Nutr Educ Behav.* 2013;45(suppl):S4.
20. Drewnowski A, Hann C. Food preferences and reported frequencies of food consumption as predictors of current diet in young women. *Am J Clin Nutr.* 1999;70:28-36.
21. Patterson J, Arnold K, Lohse B. Randomized, controlled study demonstrates that *About Eating*, a web-based curriculum focused on eating competence increases food resource management skills of SNAP–Ed eligible women in Pennsylvania [abstract]. *FASEB J.* 2012;26:246-248.
22. Cunningham-Sabo L, Lohse B, Baker S, Bellows L. Cooking with

- Kids 2.0: Plus Parents and Play. *J Nutr Educ Behav.* 2013;45(suppl):S80.
23. USDA. SNAP-Ed Connection. Handouts and websites. <http://snap.nal.usda.gov/resource-library/click-n-go-education-materials>. Accessed November 15, 2014.
  24. USDA Economic Research Service. US Adult Food Security Survey Module. [www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools.aspx#adult](http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools.aspx#adult). Accessed November 14, 2014.
  25. USDA National Institute of Food and Agriculture. Evaluation/Reporting System (ERS4). [www.csrees.usda.gov/nea/food/efnep/ers/ers4.html](http://www.csrees.usda.gov/nea/food/efnep/ers/ers4.html). Accessed November 14, 2014.
  26. Auld G, Baker S, Conway L, Dollahite J, Lamba MC, McGirr K. Outcome effectiveness of the widely adopted EFNEP curriculum Eating Smart—Being Active. *J Nutr Educ Behav.* 2015;47:19-27.
  27. USDA. Supplemental Nutrition Assistance Program Education Guidance. <http://snap.nal.usda.gov/national-snap-ed/snap-ed-plan-guidance-and-templates>. Accessed November 14, 2014.
  28. Glasgow RE, Lichtenstein E, Marcus AC. Why don't we see more translation of health promotion research to practice? Rethinking the efficacy-to-effectiveness transition. *Am J Public Health.* 2003;93:1261-1267.
  29. Glasgow RE, Chambers D. Developing robust, sustainable, implementation systems using rigorous, rapid and relevant science. *Clin Trans Sci.* 2012;5:48-55.
  30. Serrano E, Anderson J, Chapman-Novakofski K. Not lost in translation: nutrition education, a critical component of translational research. *J Nutr Educ Behav.* 2007;39:164-170.
  31. Glasgow RE, Vinson C, Chambers D, Khoury MJ, Kaplan RM, Hunter C. National Institutes of Health approaches to dissemination and implementation science: current and future directions. *Am J Public Health.* 2012;102:1274-1281.
  32. Achterberg C. A commentary on evidence-based analysis. *Nutr Today.* 2013;48:153-160.
  33. Collins LM, Murphy SA, Strecher V. The multiphase optimization strategy (MOST) and the sequential multiple assignment randomized trial (SMART): new methods for more potent eHealth interventions. *Am J Prev Med.* 2007;32:S112-S118.

## Submit GEMs to JNEB

Great Educational Materials (GEMs) are brief descriptions of innovative and useful approaches to nutrition education and behavior. GEMs include a description of the teaching technique, activity, or material; implementation procedures; and evidence of usefulness or impact. Submit your next GEM to JNEB.

Questions? Review detailed author instructions online or send email to [managingeditor@jneb.org](mailto:managingeditor@jneb.org).

[www.jneb.org](http://www.jneb.org)

### **CONFLICT OF INTEREST**

The authors have not stated any conflicts of interest.