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# **Promoting Healthy Eating and Exercise Through Online Messages: A Pilot Study**

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**Abstract:** The effectiveness of online messages to change dietary intake and level of physical activity was assessed. Thirty-six volunteers completed a 26-item pre- and post-intervention online survey and received a total of 36 email messages about MyPyramid, food labels, healthier lifestyles, and physical activity. Participants reported increased fiber intake, decreased fat intake, and increased physical activity. Overweight/obese participants lost an average of 8.0 lbs. during the 12-week period. Online messages can contribute to an increase in healthy food consumption and level of physical activity and is a desirable intervention tool for Extension nutrition and health practitioners.

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## **Introduction**

Exposure to information regarding food can affect dietary behavior. With 79% of Americans using the Internet (Pew Internet & American Life Project, 2010), eHealth is an emerging, cost-effective intervention tool with applications for Extension professionals. Despite the widespread use and abundance of health-related information on the Internet, Extension community health advisors demonstrated low awareness and knowledge of the health information on MyPyramid.gov (Zoellner, Bounds, & Connell, 2009).

eHealth can be defined as using technology with an emphasis on the Internet to communicate and monitor health-related practices (Norman, et al., 2007). eHealth was found to be an effective and valid intervention for both short-term (24 weeks) and long-term (18 months) weight loss; it also encouraged healthy eating practices and physical activity (Tate, Wing, & Winett, 2001; Harvey-Berino, Pintauro, Buzzell, & Gold,

2004; Cullen & Thompson, 2008; Silk et al., 2008). eHealth still is considered to be in its infancy, and to establish its full effectiveness, more research is needed (Brug, Oenema, & Campbell, 2003). If the eHealth messages result in improved lifestyle behaviors among Extension clients, this would provide expanded opportunities for Extension personnel to disseminate health messages in rural underserved areas. The pilot study reported here, therefore, assessed whether online messages resulted in changes in dietary intake and physical activity among adults. The ultimate goal was weight loss among participants who needed to lose weight.

## Methods

The study protocol was reviewed and approved by the Institutional Review Board. Volunteers age 18 or older with daily access to the Internet completed the informed consent and a 26-item pre- and post-intervention survey administered online. The Behavior Risk Factor Surveillance System's historical questions on diet, physical activity, and weight control were used to assess changes in participants' behavior (Centers for Disease Control and Prevention (CDC), 2008). The survey evaluated the participants' overall behavior related to dietary intake, physical activity and methods of weight control.

During the 12-week study, participants received three messages weekly for a total of 36 different messages based on the Dietary Guidelines for Americans (DGA) 2005 (U.S. Department of Health and Human Services, 2005). The messages also were posted on a Web-based content management system to allow review of previous messages. Topics included:

- Using MyPyramid to assess individual nutrition recommendations
  
- Understanding food labels
  
- Choosing nutrient-rich foods
  
- Eating in moderation
  
- Getting the recommended amount of moderate physical activity
  
- Understanding portion distortion and control (National Heart, Lung and Blood Institute, 2007)

Body mass index (BMI) was calculated from self-reported height and weight. BMI is used as a screening tool to determine weight categories that may lead to health problems (CDC, 2011). The four weight status categories typically used are underweight [BMI below 18.5 (kg/m<sup>2</sup>)], normal [BMI of 18.5 to 24.9 (kg/m<sup>2</sup>)], overweight [BMI of 25.0 to 29.9(kg/m<sup>2</sup>)], and obese [BMI of 30.0 (kg/m<sup>2</sup>) and above]. Using SAS (version 9.1; SAS Institute Inc., Cary, NC), the data were analyzed overall and by two BMI groups: under/healthy weight group [BMI ≤24.9 (kg/m<sup>2</sup>)] and overweight/obese group [BMI ≥25 (kg/m<sup>2</sup>)]. Two groups based on weight were used for data analysis because of the relatively small sample size in the study.

To better assess dietary changes, the variables were grouped into the categories of fruit, vegetables, fatty foods, and lean meats. The changes in the food categories between baseline and end of the study were analyzed using a paired t-test with an alpha level of <0.05. Chi-square tests determined changes in the

percent of the perceived fiber and fat consumption; duration and frequency of physical activity throughout the previous month; and weight maintenance techniques used by the participants. With an alpha level of  $<0.05$ , a one-way ANOVA was used to analyze the relationships between BMI categories with the following variables: a) weight change and b) weight change based on the number of messages read.

## Results

Fifty-four volunteers were recruited via email messages with 36 participants, 6 men and 30 women, completing the study (response rate = 66.7%). The mean age was  $45.6 \pm 10.6$  years. Overall mean BMI was  $29.6 \pm 6.9$  kg/m<sup>2</sup> at baseline and  $29.4 \pm 6.6$  kg/m<sup>2</sup> at the end of the study. BMI for both groups did not change; however, the overweight/obese participants lost an average of  $8.0 \pm 8.5$  lbs, whereas those who were underweight/healthy weight gained an average of  $1.8 \pm 3.6$  lbs ( $p=0.007$ ).

Mean increase in vegetable, fruit and lean meat intake per month were  $1.4 (\pm 8.2)$ ,  $0.4 (\pm 5.3)$  and  $0.8 (\pm 8.0)$ , respectively. Although there was no statistically significant change in reported fruit, vegetable or lean meat intake, reported weekly fatty food consumption decreased ( $p=0.02$ ). Overall, more participants perceived fiber intake to be higher (Table 1). Regardless of BMI, reported fiber intake increased with only 8% of the participants reporting low fiber intake at the end of the study. As fiber consumption increased, reported intake of fatty foods decreased ( $p=0.03$ ). Many of the individuals reduced their fat intake to more moderate levels; nevertheless, the number of participants reporting low intake of fatty foods remained the same (Table 1).

**Table 1.**

The Perceived Fiber and Fat Consumption at Baseline and End of the Study

	Overall		Under/Healthy weight <sup>+</sup>		Overweight/Obese <sup>++</sup>	
	Baseline	Post Study	Baseline	Post Study	Baseline	Post Study
	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)
Fiber						
Low	28 (10)	8 (3)	30 (3)	0 (0)	27 (7)	11 (3)
Medium	64 (23)	75 (27)	60 (6)	90 (9)	65 (17)	69 (18)
High	8 (3)*	17 (6)*	10 (1)	10 (1)	8 (2)	19 (5)
Fat						
Low	6 (2)	6 (2)	10 (1)	20 (2)	4 (1)	0 (0)
Medium	64 (23)	83 (30)	50 (5)	60 (6)	69 (18)	92 (24)
High	30 (11)*	11 (4)*	40 (4)	20 (2)	27 (7)	8 (2)
<sup>+</sup> Under/Healthy weight: BMI $< 19$ kg/m <sup>2</sup> -24.99 kg/m <sup>2</sup> <sup>++</sup> Overweight and Obese: BMI $\geq 25$ kg/m <sup>2</sup> * $p<0.05$						

Overall and across both BMI groups, those reporting any physical activity increased (Table 2). Generally duration of physical activity increased. The number of participants who reported eating fewer calories for weight control remained unchanged during the 12 weeks; however, the number who reported using physical activity for weight management increased.

**Table 2.**

The Reported Physical Activity and Duration of Physical Activity at Baseline and End of the Study

	Overall		Under/Healthy weight <sup>+</sup>		Overweight/Obese <sup>++</sup>	
	Baseline	Post Study	Baseline	Post Study	Baseline	Post Study
	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)
Physical activity						
No	17 (6)	3 (1)	10 (1)	0 (0)	19 (5)	4 (1)
Yes	83 (30)	97 (35)	90 (9)	100 (10)	81 (21)	96 (25)
Duration Minutes/day						
0	3 (1)	3 (1)	0 (0)	0 (0)	4 (1)	4 (1)
>0-30	39 (14)	31 (11)	30 (3)	20 (2)	42 (11)	35 (9)
>30-60	39 (14)	42 (15)	40 (4)	40 (4)	39 (10)	42 (11)
>60-90	17 (6)	22 (8)	20 (2)	40 (4)	15 (4)	15 (4)
>90	3 (1)	3 (1)	10 (1)	0 (0)	0 (0)	4 (1)
<sup>+</sup> Under/Healthy weight: BMI < 19 kg/m <sup>2</sup> -24.99 kg/m <sup>2</sup> ; <sup>++</sup> Overweight and Obese: BMI ≥ 25 kg/m <sup>2</sup>						

Overall, there was a trend ( $p=0.06$ ) between the number of messages read and weight loss (Table 3). Reading most of the messages did not alter weight in the under/healthy weight participants ( $0.0 \pm 3.0$  lbs); however, the overweight/obese participants lost  $4.5 (\pm 8.6)$  lbs ( $p=0.07$ ). Reading even a few messages was associated with weight loss ( $1.2 \pm 4.8$  lbs) for the overweight/obese group.

**Table 3.**

The Number of Messages Read and Weight Change from the Baseline and End of the Study\*

Messages read	Overall		Under/Healthy weight <sup>+</sup>		Overweight/Obese <sup>++</sup>	
	% (n)	wt change (lb)	% (n)	wt change (lb)	% (n)	wt change (lb)
All or most	78 (28)	-3.5 + 8.0	60 (6)	0.0 + 3.0	85 (22)	-4.5 + 8.6
A few	22 (8)	1.6 + 5.0	40 (4)	4.5 + 3.7	15 (4)	-1.2 + 4.8
P-value		0.06		0.07		0.47
*Data were presented as mean $\pm$ standard deviation; <sup>+</sup> Under/Healthy weight: BMI < 24.99 kg/m <sup>2</sup> ; <sup>++</sup> Overweight and Obese: BMI $\geq$ 25 kg/m <sup>2</sup>						

## Discussion

The study reported here evaluated the influence of electronic nutrition messages on perceived dietary intake, physical activity, and weight status. Similar studies have found that email messages encouraging the use of nutrition education websites contribute to participants' access to the promoted online material (McNeill, Viswanath, Bennett, Puelo, & Emmons, 2007; Woodall et al., 2007). Nutrition education websites can be effective in increasing fruit and vegetable consumption (Cullen & Thompson, 2008; Block, Block, Wakimoto, & Block, 2004).

The majority (78%) of participants reported reading all or most of the messages, which increased their awareness of the nutrition messages. Exposure to these websites may contribute to changes in diet-related behaviors, supported by the overall increase in vegetable intake, although not statistically significant, and the increase in the number of participants who perceived fiber intake to be higher. The significant decrease in the reported consumption of fatty foods coincides with previous reports (Block, et al., 2004).

Although not statistically different, the increased number of participants who reported an increase in exercise participation and duration suggest that online messages may contribute to an increase in physical activity level and, potentially, the reported weight loss. Small changes in dietary intake and the frequency and duration of physical activity resulted in significant weight loss among the overweight/obese group. Those who were under/healthy weight maintained their current weight or gained weight (while remaining in the "normal weight" category).

The study aimed to encourage healthier lifestyles. In addition to sending out email messages, the study promoted the use of the MyPyramid website, which is similar to a study that promoted using a nutrition education website in the workplace (Cook, Billings, Hersch, Back, & Hendrickson, 2007). The significant changes in the diet-related behaviors may be attributed to the encouraged use of the DGA 2005 and MyPyramid websites, as well as exposure to information through the online messages.

According to participant comments, the majority stated that they found the messages to be helpful and informative. One participant encouraged her children to use the MyPyramid website as a fun game to check on meeting their recommendations. Multiple participants stated they felt more energized and more aware of how to make better food choices.

About 79% of American adults use the Internet, with 94% using it to send or read email, according to a May 2010 survey. According to a December 2008 survey, 83% of those adults who use the Internet use it to look for health or medical information (Pew Internet & American Life Project, 2010). Kreps and Neuhauser (2010) reported encouraging evidence about the effectiveness of eHealth interventions for promoting the health of vulnerable populations. Health promotion programs using eHealth potentially can reach adults with less than optimal behaviors (Franklin, Rosenbaum, Carey, & Roizen, 2006). Based on this information, it seems likely that individuals who use the Internet would read health-related information via email. Using an eHealth approach, Extension agents could reach people in rural or isolated areas who are interested in health information but lack the time or resources to attend an informative meeting many miles away.

Limitations of the study include small sample size and the use of participants' perception of changes in their dietary intake. Nevertheless, lifestyle changes likely occurred since weight loss was reported in those who were overweight/obese. Future studies may include a food diary to better track changes in behavior.

The study reported here supports using eHealth as an effective way to raise awareness about lifestyle changes that improve health. Exposing participants to information from the DGA 2005 was associated with lifestyle changes, including healthier dietary intake and increased physical activity. With its wide-reach potential without reliance on face-to-face contact, eHealth is a desirable intervention tool for Extension nutrition and health practitioners in fighting the overweight and obesity epidemic.

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