



Pilot weight control intervention among US veterans to promote diets high in fruits and vegetables

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ABSTRACT

Background. Obesity is a significant problem among US veterans. Diets high in fruits and vegetables (FV) can lower obesity risk. Health communication interventions are promising strategies for promoting healthy eating. We evaluated whether an enhanced intervention with tailored newsletters and motivational interviewing calls would be more effective than the Veterans Affairs (VA) weight management program, MOVE!, at increasing FV intake among overweight/obese veterans.

Methods. Using a quasi-experimental design, 195 veterans at two clinics participated at baseline and 6-month follow-up from 2005 to 2006. Measures included daily FV intake and information processing of the intervention. The control group (MOVE!) received educational information, group sessions, and standard phone calls about weight. The intervention included MOVE! components plus tailored newsletters and motivational interviewing calls.

Results. The intervention group reported a statistically significant increase in FV servings compared to control (1.7 vs. 1.2; $p \leq 0.05$). Veterans who read more of the tailored newsletters ($\beta = 0.15$, $p = 0.01$) and perceived the messages as important ($\beta = 0.12$, $p < 0.01$) and applicable to their lives ($\beta = 0.12$, $p < 0.01$) ate more FV than those who did not. However, receiving MI calls and information processing regarding the calls were not associated with FV intake.

Conclusion. A tailored intervention can impact short term FV intake for obesity prevention.

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Introduction

A study of 1.8 million veterans receiving care at the Veterans Health Administration (VHA) found that 73% of men were overweight and 32.9% were obese and among women veterans 68.4% were overweight and 37.4% were obese (Das et al., 2005). National survey data (Almond et al., 2008) have highlighted higher rates of obesity and overweight among veterans compared to the US general population. Thus, preventive strategies targeting weight control among US veterans are warranted.

Strategically designed and delivered health communication interventions offer promising strategies for promoting healthier diets (Campbell and Quintiliani, 2006). Tailored print communication (TPC) and motivational interviewing (MI) are examples of communication approaches that have been shown to be effective for dietary change (Resnicow et al., 2001).

This pilot study evaluated whether the dissemination of an evidence-based fruit and vegetable (FV) intervention (NC STRIDES) (Campbell et al., 2009) using TPC and MI would enhance change in FV intake among veterans participating in the VHA's weight management program (MOVE!) (Kinsinger et al., 2009).

Overview of NC STRIDES

The North Carolina Strategies for Improving Diet, Exercise, and Screening (NC STRIDES) (Campbell et al., 2009) was a randomized trial among 735 general population and colorectal cancer survivors. Baseline and 12-month follow-up surveys assessed demographics, health, diet, exercise, and psychosocial factors (response rate 90%). Interventions included 4 TPCs, 4 tailored MI calls, combined (both interventions), or control (generic health information). The combined intervention was most effective and cost effective for dietary change (1.0 daily FV serving increase, $p < 0.05$, compared to 0.5 for other arms). No significant effects were found for exercise. The older population of NC STRIDES and efficacy for both genders and for African Americans and Whites (Campbell et al., 2009) made dissemination to the veteran population a good fit.

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Methods

Overview of the intervention arms

In 2003, the VHA developed a weight control program *MOVE!*. In collaboration with the Department of Veterans Affairs (VA), “Healthy STRIDES/Healthy *MOVE!*” (HSHM) was piloted at two sites using a quasi-experimental design to increase FV intake. The intervention site received *MOVE!* plus the tailored intervention (HSHM) and the control site received only *MOVE!* (feedback on weight management status/health behaviors, weight management/lifestyle change groups, and telephone follow-up). General FV information handouts were provided during group sessions focused on weight control.

HSHM participants received the standard *MOVE!* program plus four tailored newsletters and 2–4 MI calls over the 6-month study period. The newsletters were tailored using baseline data and focused on FV consumption with additional messages related to weight control. The NC STRIDES message library was modified for graphic design and text elements to appeal to the veteran audience. For the MI calls, 18 staff members (mainly nurses) participated in a 2-day training led by a professional MI trainer and follow-up sessions (2 hours led by the site coordinator and a half-day with the MI trainer via video conferencing).

Sample

Participants were patients recruited from two VA clinics in New York from 2005 to 2006 and eligible for *MOVE!* (i.e., body mass index of ≥ 25). For analysis, we excluded participants whose baseline surveys were missing food frequency questionnaire data, had no follow-up data, no BMI measurements, and/or no available FV sum data. Study procedures were approved by the institutional review boards at each site and the University of North Carolina at Chapel Hill.

Data collection

All participants completed self-administered paper-and-pen surveys at baseline and 6 months assessing demographics, health, and psychosocial mediators needed for tailoring including self-efficacy, social support, and barriers. Incentives were 20-minute pre-paid phone cards following each survey (baseline completion: 289; 6 months: 195, 65.7%).

Measures

Fruit and vegetable consumption (FVC)

A 35-item Food Frequency Questionnaire (Resnicow et al., 2000) measured FV intake. Modifications included ‘past month’ in place of ‘past week’ and omitted non-FV food items.

Intervention exposure and information processing

Queries included number of newsletters received (1 to more than 4) and amount of newsletters read (none to all/most); message relevance: “How much did you feel that the newsletters were designed especially for you?”; “How important was the information in the newsletter for you?”; “How much did the information in the newsletters apply to your life?” (not at all to completely); message trust: “How much did you trust that the information in the newsletter was accurate?” (not at all to completely); behavior change: “Did the information in the newsletter cause you to change any of your health behaviors?” (yes or no). Similar questions were asked about the MI calls.

Demographics

Demographic characteristics, including, age, race, gender, marital status, ethnicity, education, employment, and annual income were collected.

Obesity status

Obesity status was determined by calculating BMI. Individuals were classified into overweight (BMI = 25.0–29.9), mildly obese (BMI = 30.0–34.9), moderately obese (BMI = 35.0–39.9), and extremely obese (BMI ≥ 40) based on World Health Organization criteria.

Analyses

All analyses used SAS (Version 9.1, SAS Institute, Inc., Cary, NC). Descriptive analyses generated frequencies for categorical variables and

means for continuous variables. Bivariate analyses were conducted with *t*-tests, analysis of variance, and Fisher’s exact test of significance. Multivariate analyses used multiple regression, adjusting for demographic covariates. Significance level was set at $p < 0.05$.

Results

Descriptive analyses

Veterans were on average 59 ± 12 years old, white (88%), and male (92%). Seventy-one percent had some or more than a college degree, and 60% had an annual income $\geq \$30,000$ (56%). Twenty-seven percent were employed either full or part time. There were no significant differences between the intervention and comparison groups except in baseline weight and BMI with the control group being higher.

Outcome analyses

The intervention group (HSHM) had an increase of 1.7 FV servings compared to 1.2 servings for the comparison group (*MOVE!*) adjusting for baseline weight, BMI, and FVC ($p < 0.05$). In the HSHM group, we measured exposure to and information processing of intervention materials (Table 1). Regarding the newsletters, 88% remembered receiving the newsletters and 96% reading the newsletters with 87% reporting reading some to all. Veterans perceived the newsletters as individually tailored (77%), personally important (82%), and applicable (82%). More than half (64%) of the veterans reported that the newsletters led to health behavior changes, and 78% reported trusting the information a great deal or completely.

Most participants (96%) reported receiving at least 2 or more MI calls. A majority (78%) perceived that the calls were tailored to their needs, personally important (76%), and applicable to their lives (70%). About half reported that the calls led to health behavior changes and 81% reported trusting the information from the MI calls somewhat to completely.

Relationship between information processing and fruit and vegetable consumption

Regression analyses (Table 2) found information processes were related to eating more FV. Reading more newsletters was related to FVC ($\beta = 0.15$; $p = 0.01$). Veterans who perceived that the newsletters were especially tailored for them ($\beta = 0.08$; $p = 0.04$), rated the newsletters as personally important ($\beta = 0.12$; $p < 0.01$), and perceived that the newsletters were applicable to their lives ($\beta = 0.12$; $p < 0.01$) ate greater amounts of FV. Exposure to and perceptions about the MI calls were not related to FVC.

Discussion

This study evaluated the dissemination of an evidence-based FV intervention that was efficacious in a population-based randomized controlled trial and found that a weight management intervention using tailored messages and motivational interviewing calls led to increased FVC. Veterans reporting more exposure to the tailored newsletters (i.e., reading more), and those who perceived the tailored messages as important and applicable to their lives ate more FV than those who did not. However, receiving MI calls and veterans’ perceptions about the personal relevance, importance, and applicability of the calls were not associated with FVC.

These findings are consistent with previous studies. Kroeze and colleagues’ (2006) systematic review of 10 computer-tailored dietary interventions showed a significant effect on FVC 6 months post-intervention in favor of the tailored group. In this study, the comparison participants received non-tailored FV education through

Table 1

Results of the information processing of the newsletters and phone calls of veterans at a New York health clinic in January/August 2006.

	Newsletters		Telephone calls	
	(n)	%	(n)	%
Number of communications received				
0			(1)	1.2
1	(3)	3.5	(3)	3.6
2	(13)	15.3	(16)	19.3
3	(47)	36.5	(19)	22.9
4	(25)	29.4	(22)	26.5
4+	(6)	7.1	(20)	24.1
Newsletters read				
None	(1)	1.2		
A little	(8)	9.4		
Some	(18)	21.2		
All/most	(56)	65.9		
Communication especially designed for self-communication individually tailored?				
Not at all	(5)	6.2	(5)	6.2
A little	(11)	13.6	(10)	12.1
Somewhat	(32)	39.5	(26)	31.3
Very much so	(24)	29.6	(21)	25.3
Completely	(6)	7.4	(18)	21.7
Importance of the communication				
Not at all	(4)	5.0	(5)	6.1
A little	(10)	12.4	(12)	14.6
Somewhat	(25)	30.9	(25)	30.5
Very much so	(31)	38.3	(26)	31.7
Completely	(10)	12.4	(11)	13.4
Communication application to life				
Not at all	(3)	3.7	(5)	6.2
A little	(10)	12.4	(15)	18.5
Somewhat	(29)	35.9	(22)	27.2
Very much so	(29)	35.9	(24)	29.6
Completely	(8)	9.9	(11)	13.6
Communication caused behavior change				
Yes	(52)	64.2	(28)	29.5
No	(21)	26.0	(48)	50.5
Trust in the communication				
Not at all	0		(2)	2.4
A little	0		(5)	6.1
Somewhat	(16)	19.5	(15)	18.3
A great deal	(38)	46.3	(26)	31.7
Completely	(25)	30.5	(25)	30.5

Note. % may not total 100% because of rounding and missing values.

MOVE!, indicating that the FV increase was statistically significant for the computer-tailored FV newsletters. Additionally, our process measures indicated that exposure, perceived relevance, and applicability of the tailored newsletters were related to increased FVC. Persuasion–communication theory supports increased effectiveness of education messages if the intended targets are exposed to, attend to, and perceive messages as relevant and trustworthy (Ko et al., 2010; Petty and Cacioppo, 1981).

Although MI has been successfully applied to FV intake in previous studies (Resnicow et al., 2001), we found no significance. While phone support was intended to be a core part of the intervention, staff

indicated that actual calls were limited due to multiple factors (e.g. time constraints, staff's low confidence about working effectively with patients via phone) and fidelity to MI could not be assessed. Another pilot study, ASPIRE-VA (Damschroder et al., 2009), showed a 2.2 FV serving increase with a similar group of veterans; this more intensive program involved a coach dedicated to making MI calls, unlike our study, in which nurses with other clinical responsibilities made the calls.

Study limitations include using a self-report FV assessment which is subject to response and recall bias. The pilot sites were in the same area thus limiting generalizability. Given the 33% dropout, results apply to participants completing the program but would be lower in an intention-to-treat analysis. The quasi-experimental design meant that sites were not randomly assigned so there may be some internal validity issues regarding selection bias. The comparison group was more overweight at baseline. It was not possible to separate the effect of the TPC from MI or just getting called. However, the information processing measures suggest a greater effect of the TPC. Despite these limitations, the study provides evidence that using computer tailoring can be effective in promoting increased FV for a veteran population.

Conclusions

Obesity is a rising epidemic that imposes a huge burden on systems such as the VA. This pilot's findings contributed knowledge about the potential of health communication interventions for targeting lifestyle changes for weight management among veterans. Although evidence-based programs can address obesity-related behaviors, further research is needed to determine optimal channels for delivering MI support.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

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References

- Almond, N., Kahwati, L., Kinsinger, L., Porterfield, D., 2008. The prevalence of overweight and obesity among US military veterans. *Mil. Med.* 173, 544–549.
- Campbell, M.K., Quintiliani, L.M., 2006. Tailored interventions in public health: where does tailoring fit in interventions to reduce health disparities? *Am. Behav. Sci.* 49, 775–793.
- Campbell, M.K., Carr, C., DeVellis, B., et al., 2009. A randomized trial of tailoring and motivational interviewing to promote fruit and vegetable consumption for cancer prevention and control. *Ann. Behav. Med.* 38, 71–85.
- Damschroder, L.J., Lutes, L.D., Goodrich, D.E., Gillon, L., Lowery, J.C., 2009. A small-change approach delivered via telephone promotes weight loss in veterans: results from the ASPIRE-VA pilot study. *Patient Educ. Couns.* 79 (2), 262–266.
- Das, S.R., Kinsinger, L.S., Yancy, W.S., et al., 2005. Obesity prevalence among veterans at Veterans Affairs medical facilities. *Am. J. Prev. Med.* 28, 291–294.
- Kinsinger, L.S., Jones, K.R., Kahwati, L., et al., 2009. Design and dissemination of the MOVE! weight-management program for veterans. *Prev. Chronic Dis.* 6, A98 http://www.cdc.gov/pcd/issues/2009/jul/08_0150.htm, accessed 2/12/2010.
- Ko, L.K., Campbell, M.K., Lewis, M.A., Earp, J., DeVellis, B., 2010. Information processes mediate the effect of a health communication intervention on fruit and vegetable consumption. *J. Cancer Surviv.* 4 (2), 149–158.
- Kroeze, W., Werkman, A., Brug, J., 2006. A systematic review of randomized trials on the effectiveness of computer-tailored education on physical activity and dietary behaviors. *Ann. Behav. Med.* 31, 205–223.
- Petty, R.E., Cacioppo, J.T., 1981. *Attitudes and Persuasion: Classic and Contemporary Approaches*. W.C. Brown, Dubuque, IA.
- Resnicow, K., Odom, E., Wang, T., et al., 2000. Validation of three food frequency questionnaires and 24-hour recalls with serum carotenoid levels in a sample of African-American adults. *Am. J. Epidemiol.* 152, 1072–1080.
- Resnicow, K., Jackson, A., Wang, T., et al., 2001. A motivational interviewing intervention to increase fruit and vegetable intake through Black churches: results of the eat for life trial. *Am. J. Public Health* 91, 1686–1693.

Table 2

Relationship between information processing and fruit and vegetable consumption of veterans at a New York health clinic in January/August 2006.

	Newsletters		Telephone calls	
	β (SE) ^a	P value	β (SE) ^a	P value
Number of communications received	0.01 (0.04)	0.79	−0.03 (0.4)	0.34
Newsletters read	0.15 (0.06)	0.01		
Communication individually tailored	0.08 (0.04)	0.04	0.04 (0.04)	0.34
Importance of the communication	0.12 (0.04)	<0.01	0.04 (0.04)	0.28
Communication application to life	0.12 (0.04)	<0.01	0.05 (0.04)	0.20
Communication caused behavior change	0.25 (0.10)	0.01	−0.03 (0.10)	0.79
Message trust	0.07 (0.06)	0.24	−0.00 (0.04)	0.89

^a SE = standard error.