Efficacy of a Weight-Loss Website Based on Positive Deviance
A Randomized Trial

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Background: Web-based interventions for weight control could promote more-widespread dissemination of weight-loss opportunities; however, they remain limited in effectiveness. Incorporating weight-control practices used by individuals with long-term weight-loss success (“positive deviants”) may improve the efficacy of web-based weight control interventions.

Purpose: To evaluate the efficacy of AchieveTogether, a web-based weight-loss intervention for adults based on user-generated weight-loss strategies from successful weight losers.

Design: In 2009–2010, participants were randomized to either a 12-week web-based intervention, AchieveTogether, or a wait-list control condition.

Setting/participants: 100 overweight or obese adults participated in the study.

Intervention: AchieveTogether was designed to help individuals implement weight control practices used by others who successfully lost and maintained weight.

Main outcome measures: The primary outcome was change in weight. Secondary outcomes included blood pressure, daily caloric intake, quality of life, and use of weight control practices. ANCOVA, with adjustment for baseline values on outcome measures, was used to assess differences between groups in primary and secondary outcomes. Statistical analyses were conducted in 2010–2011.

Results: Most participants were women (69.7%) and white (90.8%), with a mean age of 50.3 years and baseline BMI of 33.2; 88% completed post-program assessments. Mean weight loss among intervention participants was -1.4 kg (95% CI = -2.2, -0.5), compared with a mean weight gain of 0.6 kg (95% CI = -0.3, 1.4) in control participants (p < 0.01).

Conclusions: User-generated weight-loss practices from “positive deviants” could promote weight control in web-based interventions; however, further research is needed to improve program efficacy.

Trial registration: This study is registered at ClinicalTrials.gov NCT00709501.

Introduction

The obesity epidemic has widespread adverse health and economic effects. Internet-based weight-loss programs could help address the obesity epidemic, as they can be widely disseminated with low costs. Existing Internet-based weight-loss programs have largely promoted weight-loss strategies designed by health professionals, including goal-setting and feedback, and features to promote social interaction. These programs have had modest short-term effects, suggesting that exploring alternative approaches may be beneficial.
The present study evaluated the efficacy of using a positive deviance framework to guide the design of an Internet-based weight-loss intervention. The central premise of positive deviance is that solutions to population-based problems often exist within a population, and that population members’ solutions can be generalized to improve other members’ performance. Positive deviance uses qualitative research to identify the behaviors of individuals who have obtained rare success (typically top 10% of the population) at achieving specific outcomes. These behaviors are then disseminated through community engagement and behavior modification strategies. Positive deviance has been used in diverse health-related interventions, but has not previously been used in weight-loss interventions.

The present Internet-based intervention evaluated the efficacy of promoting weight-loss behaviors that were generated from a prior qualitative study of individuals who maintained long-term weight loss of at least 30 lbs (positive deviants). It was hypothesized that an Internet-based intervention that disseminated weight-loss behaviors of these positive deviants could promote weight loss among overweight and obese adults.

**Methods**

**Design**

The study was conducted at a single institution (Penn State Hershey Medical Center) in 2009–2010 with 100 participants randomized to the 12-week AchieveTogether intervention or wait-list control condition with in-person assessments at baseline and post-program (12 weeks). This sample size enabled 90% power to detect a 2.0-kg difference between conditions in the primary outcome of weight loss, assuming 20% attrition. Randomization took place at the baseline visit using concealed envelopes. If randomized to the AchieveTogether intervention, participants were e-mailed a link to the website. If randomized to wait-list control condition, participants were notified that they would receive website access after 12 weeks. All participants were shown in person how to use the AchieveTogether weight-loss website at the baseline visit (Appendix A, available online at www.ajpmonline.org).

The primary outcome was weight loss. Secondary outcomes were blood pressure, daily caloric intake, quality of life, and weight-control behaviors. All measures were administered by a trained research coordinator at a clinical research facility. Participants were compensated with gift cards at the baseline ($25) and post-program ($50) visits. The study was approved by the Penn State Hershey IRB, and participants provided written informed consent.

**Participants**

Participants were recruited via flyers and the Internet from an academic medical center, and screened by phone (Figure 1). Inclusion criteria were BMI between 27 and 40, aged 21–65 years, Internet access at home or work, ability to speak and read English, access to a scale to measure body weight, and ability to safely engage in physical activity (measured by the Physical Activity Readiness Questionnaire). Participants were excluded for pregnancy, planned or past weight-loss surgery, weight loss ≥15 lbs in prior 6 months, and history of heart disease, stroke, diabetes, cancer, and major cognitive or psychiatric impairment.

**Intervention**

The AchieveTogether website guided participants in implementing 36 weight-control behaviors that were identified in previous qualitative work with individuals who maintained a weight loss of 30 lbs for at least 1 year (role models). Weight-control behaviors were evaluated by a physician for safety. AchieveTogether intervention participants were asked to access the website at least once weekly, and to provide their target body weight at the initial log-in. At all log-ins, participants were directed to enter their weight, height, and frequency of using the 36 weight-loss practices in the past 7 days. Algorithms matched participants to three role models closest to them on gender, age, and target body weight. Participants could then review their role models’ strategies for implementing each of the 36 weight-loss practices. For example, for the weight-loss practice “Eat plenty of fruits and vegetables,” diverse strategies were suggested (e.g., making a vegetarian chili using garden vegetables), and participants could view videos of role models incorporating the practices. Participants were prompted to build a weight-loss plan by selecting their preferred practices and setting weekly goals for practice use. Using at least one practice was suggested but participants could select any number of practices. At each log-in, participants received tailored feedback to help them choose which practices to sustain or adapt, based on their own practice use, and practices used by matched role models. Participants without log-ins during a given week received an automatic e-mail reminder.
**Measures**

Height was measured with a wall-mounted stadiometer (Seca, model 242). Weight was measured with a digital scale (Seca, model 220). Blood pressure was measured with an aneroid sphygmomanometer (Allegiance Deluxe Sphygmomanometer, Cardinal Health). Previously validated questionnaires were administered including the Block 2005 Food Frequency Questionnaire\textsuperscript{17,18} to assess caloric intake and the Impact of Weight on Quality of Life questionnaire.\textsuperscript{19 –21} Demographic variables and self-reported medical (self-reported history of high blood pressure, cholesterol, sleep apnea, osteoarthritis) and weight history were also assessed. Process measures included the number of website log-ins (derived from server registrations); website satisfaction; and weight control practices used on the Weight Control Practices Questionnaire.\textsuperscript{7,16}

**Statistical Analysis**

Analyses were conducted in 2010–2011 using SAS, version 9.2. Baseline group comparisons of demographics were computed using chi-square tests and \( t \) tests. A change score was calculated for each outcome by subtracting the baseline measurement from the post-program measurement. ANCOVA was used to compare study groups, adjusted for baseline values on outcome measures.\textsuperscript{22}

**Results**

**Participants**

Baseline characteristics of participants are shown in Table 1; no significant group differences were observed. At post-program, treatment completers \((n=88)\) were older than those lost to follow-up \((n=12); \text{mean age} = 50.3 \text{ vs } 43.4 \text{ years}, p<0.05\); no other differences were noted.

**Weight Change and Health Outcomes**

Table 2 shows weight-loss and health outcomes among study completers. There was a 2.0-kg difference in weight change between groups \((p<0.01)\). The difference in weight change between groups remained significant with intent-to-treat analysis using the baseline weight carried forward \((\text{AchieveTogether intervention group: } 1.2 \text{ kg;} \text{wait-list control condition group: } 0.6 \text{ kg}, p<0.01)\).

**Process Measures**

\textit{AchieveTogether} intervention participants had a mean of 7.7 website log-ins \((SD=5.1, \text{range}=1–30)\) over the 12-week study. Login rates were not correlated with weight change \((p=0.4)\). Participants rated the website as a 3.0 (average), on a Likert-type scale (1 = poor; 5 = excellent). The most frequently chosen weight control practices were “eat plenty of fruits/vegetables” \((74\%)\); “follow a consistent exercise routine” \((72\%)\); and “weigh yourself” \((70\%)\).

**Discussion**

The present study evaluated the efficacy of a website based on positive deviance for disseminating weight-control behav-
baviors used by individuals successful with weight loss.7 In contrast to the expert-driven approach that has guided the design of many other weight-loss websites,3,6 the AchieveTogether website design was driven by successful solutions that individuals have used to manage their weight.

The use of aggregate qualitative data on weight-loss behaviors from those who successfully lost weight may offer potential to create long-term, sustainable interventions with limited expert oversight. Without any in-person intervention, participation on the AchieveTogether website was associated with a 2.0-kg difference in weight change between groups. Although the amount of weight lost was modest, it is within the range seen for Internet-based weight-loss interventions,3,4,23,24 including those with more human contact.23 Because the AchieveTogether website could be offered free of charge, this website (or similar programs) could increase physicians’ referral rates for weight management25 and could be a cost-effective strategy for promoting population-level weight loss.

Limitations of the current study include a self-selected sample, minimal ethnic diversity, and lack of long-term follow-up. These features may limit the generalizability of study findings. Website participation rates were also suboptimal. Because increased log-ins predict greater weight loss,3,5,23,26,27 future work should explore how to increase engagement in Internet-based interventions, and examine individual characteristics associated with differential treatment outcomes.28,29

Although the behaviors identified with positive deviance were not notably different from those promoted in other weight control interventions, the AchieveTogether website has potential for future growth by enabling individuals to post additional weight-loss practices online, allowing to disseminate individual and cultural differences in weight-control patterns. Future research should explore how best to harness the experiences of diverse groups to build collective capacity for weight-loss interventions and weight-loss maintenance.

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References


Appendix

Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.amepre.2011.08.012.