E-Coaching for Weight Loss

Jennifer Warren MS, RD, LD
School of Nutrition & Dietetics
The University of Akron
Akron, Ohio

Sandra L. Hudak Ph.D., RD, LD
School of Nutrition & Dietetics
The University of Akron
Akron, Ohio

Mark Fridline PhD
Department of Statistics
The University of Akron
Akron, Ohio

Keith Roach M.D
Presbyterian Hospital
New York
NY

Abstract

The obesity epidemic continues to be a major problem with no clear end in sight. Health professionals and public health experts must look for innovative ways to prevent further increases of obesity. Using technology could be one way to solve this problem through the use of e-coaching. E-coaching is a way to offer personal coaching, or support, in an electronic manner that is also cost effective. The purpose of this study is to research the effects of the e-coaching system as a valuable weight loss method. Clients participating in an e-coaching program for weight loss showed a reduction in weight and waist circumference, as well as an overall shift in BMI. E-coaching could be an effective method of achieving weight loss as participants had modest weight loss and reduced their waist circumference.

Keywords: ecoaching, nutrition, technology, weight loss, obesity

1. Introduction

The rapid increase in technology has changed the way many people perform day-to-day jobs from paying bills to purchasing books. It is no surprise that with these increases in technology a shift in attitudes towards these new tools is more apparent. Many people now prefer to use technology to enhance their daily routine (Garcia, 2012) with the hopes of simplifying their lifestyle. These outlooks are also being used to change the way people deal with weight management (Gabriele et al., 2011). One form of technology being used for weight management is e-coaching.

E-coaching is a way to offer personal coaching, or support, in an electronic manner. E-coaches can offer support services through electronic mediums such as e-mail, the internet, or smart phone applications (Dwyer, n.d.) . This contact offers a convenient way to set goals, monitor daily diet and exercise regimens, or to answer questions. In many cases e-coaches are more available to clients and do not require an appointment in order to receive services. They are more accessible than health care workers, and can offer assistance in a more 'on-demand' style. This method provides instant communication when the assistance is needed, and might be an innovative step in battling the obesity epidemic. Additionally, this form of support offers cost-effective, fast communication, satisfying the fast-paced needs of busy people.

According to the World Health Organization, global obesity (defined as having a Body Mass Index greater than or equal to 30) has more than doubled since 1980, with no clear end in sight. This problem has been identified as an epidemic and cannot be ignored. Additionally, in 2010, more than 40 million children under the age of five were considered to be overweight (having a Body Mass Index greater than or equal to 25) (World Health Organization, 2012). These statistics suggest the urgency of establishing a successful weight loss program. Obesity increases the risk of an array of chronic diseases which increases healthcare costs (Ogden, 2012). An estimated 6% of all U.S. health care costs ($75 billion) areassociated with excess body weight (Thorpe et al, 2004). The increase in desk jobs and the computer-based work site coupled with an unhealthy diet contribute to this problem. A need exists for a streamlined, accessible weight loss program that offers support, simple instruction, and is cost effective. An e-coaching program could meet these needs. The purpose of this study is to research the effects of the e-coaching system as a valuable weight loss method.

2. E-Coaching in the Literature

Previous research has evaluated many types of technology used for weight loss including internet programs, SMS (short message service) reminders, smartphone applications, and even energy monitoring equipment that download results to a computer (Svensson and Legerros, 2010 and Pellegrini et al, 2011). However, e-coaching research is minimal as it is a newer technique for weight loss. Gabriele et al studied the effect of e-coaching for weight loss in 2010 and found e-coaching to be a successful method for weight loss, especially for females (Gabriele et al, 2011). Further, the researchers discovered that e-coaching could be a highly effective method to use for participants who are highly motivated to lose weight.

Benedict et al (2008) performed a systematic review of worksite-based weight loss programs in and found that programs incorporating face-to-face intervention more than once a month were most successful. Nevertheless, the most successful programs were found to be face-to-face initiatives where subjects participated more than once a month. Face-to-face programs can be less cost-effective than e-coaching, requiring participants to have appointments and increased travel time (Benedict, 2008). E-coaching programs can save time by minimizing face-to-face contact while offering support through alternative means of communication.

Technology-based weight loss systems were studied in contrast to in-person programs and found that traditional, behavioral modification programs were slightly more effective than technology-based programs (Pellegrini et al, 2011). A third group involving a hybrid of traditional and technology-based weight loss systems was most effective. The technology used in this program, however, was access to a website that monitored energy expenditure coupled with monthly telephone calls. Differences in monthly telephone calls as opposed to a daily email or smartphone application use could be a significant factor in these results.

Similarly, Harvey-Berino, et al (2010) evaluated the effectiveness of internet-based behavioral weight loss programs and found in-person weight loss programs to result in slightly greater weight loss than internet-based programs. The study used internet-based, in-person, and hybrid groups, with the internet-based group using chat rooms weekly along with an online food database and bulletin boards. Emails were not used in this study, and chat room meetings occurred at set times as opposed to being on-demand. Previous research (Micco et al, 2007) has suggested little advantage is found in face-to-face communication.

Communication preferences vary significantly by generation (Thayer and Ray, 2006). Younger generations prefer online communication to telephone or face-to-face choices, and increases in access to technology continue to drive the need for more online communication options. Weight loss programs using texting, email, or internet-based communication systems must continue to develop to serve the needs of a changing population.

3. Methods

The e-coaching program used in this study is an e-mail based communication program. Enrolled participants were encouraged to email their e-coach each day, and subsequently, their e-mails were returned the same day. No websites or logins were necessary, but only personal contact through e-mail. The e-coaches used in the program offer motivational support aimed to engage clients to precipitate lifestyle change and weight loss. All e-coaches have a health and wellness background and use a tough, no-excuses approach that can be appealing to participants. The overarching goal includes increased exercise and modification of diet. Participants must report their daily number of steps taken after receiving a pedometer after enrolling in the program. They are encouraged to achieve a daily goal of 10,000 steps.

Participants were required to report weekly weight and waist measurements, and specific instructions were given to achieve consistent results. Instructions for weight were to weigh nude, first thing in the morning, after their bathroom routine and before breakfast. To measure their waist, they were to place the tape measure at the belly button, loop it around their body keeping the tape parallel to the floor, exhale and suck in their belly to make it as small as possible. It was found that more consistent measurements were found with these instructions. All data was self-reported weekly, and the day reported is chosen by the participant.

After one month of daily weight, waist, and step reporting, participants were given dietary information. This information includes minimal consumption of added sugars, avoidance of trans fatty acids, reduced intake of 'processed' grains and abstention of 'four-legged' animal protein sources. After these instructions were given, participants were instructed to provide a daily food dairy via e-mail for which feedback is given. Daily self-reporting of weight (in pounds) and waist circumference (in inches) was also required; however the amount of daily contact and level of participation is determined by the participant. They may contact their e-coach as frequently as desired. Participants were followed for approximately six months.

4. Sample Characteristics

One hundred and seven participants enrolled in this study. The participants involved in this study were between the ages of 24 and 69 (M=45.96, SD=10.18) and approximately 58% of the participants were female. The mean baseline BMI of participants was 31.55 (SD=5.73). Table 1 shows the participant attributes with the univariate statistics.

5. Data Analysis Procedures

The data was analyzed using IBM's Statistical Package for the Social Sciences (SPSS Version 19). Univariate analysis was repeated for the participants upon enrollment in the E-coaching program and after the program ended. For all the statistical inferential tests, the significance level was set at $P < .05$.

The standard parametric paired t-test was completed to determine if there was any statistical difference in the two population means. A paired t-test is a common procedure when one population group is paired with observations in the other population. In our study, before and after observations on the same participants were observed and changes in measurements were recorded. All statistical analysis procedures were particularly focused on these changes in measurements. The paired t-test procedure is done under the assumptions that the changes in measurements are normally distributed. To determine if the sampled population is normally distributed, graphical procedures were observed to view shapes and if there was any presence of outliers. These graphical procedures determined possible violations in the normality assumption; however by applying the sampling distribution theory, there will not be an issue with this assumption since our study included large paired sample sizes.

6. Results

The amount of weight loss while participants were e-coached was one of the primary outcome measures for this study. The mean baseline weight of participants was 206.37 pounds (SD=45.23) and the mean weight after participants were e-coached was 196.86 pounds (SD=43.51). For the e-coaching participants, the mean weight loss for all the participants that had a baseline and ending weight value was approximately 9.5 pounds (SD=10.48). The paired t-test procedure showed statistical significance between the baseline and ending weight groups [t=-9.386, p=0.000]. There is enough statistical evidence to conclude that the e-coaching program worked in the reduction of weight. When making statements using a confidence interval, we must also consider the population. In this case, we are 95% confident that the mean weight loss for all potential e-coaching participants will be between 7.50 and 11.51 pounds.

The circumference change (inches) in the waist measurement while participants were e-coached was another primary outcome for this study. The mean baseline waist measurement of participants was 39.19 inches (SD=5.33) and the mean waist measurement after participants were e-coached was 37.18 inches (SD=5.13). For the e-coaching participants, the mean reduction in waist circumference for all the participants that had a baseline and ending waist value was approximately 2 inches (SD=2.74). The paired t-test procedure showed statistical significance between the baseline and ending waist circumference groups [t=-7.521, p=0.000]. There is enough statistical evidence to conclude that the e-coaching program worked in the reduction of waist circumference. In this case, we are 95% confident that the mean reduction in waist circumference for all potential e-coaching participants will be between 1.48 and 2.54 inches.

Weight and waist reduction was also observed as a percentage change from their baseline measurements. The mean weight loss as a percentage change from their baseline measurement was approximately 4.5% (SD=4.77). The mean waist circumference loss as a percentage change was approximately 4.9% (SD=6.49). Both percentage change distributions can be observed using the boxplot graphical procedure seen in Figure 1. This graphical procedure can easily show a variables center (median), spread, skewness, and presence of outliers. The box potion of this graph contains the middle 50% of the data, and the whiskers extend to the smallest and largest value that is not an outlier. When observing percent change for the weight loss and waist reduction, weight percent changes appear to be skewed to the left while the waist percent changes appear to be approximately symmetrical. Both percent change distributions indicate that there are a few moderate participant outliers. It can be clearly determined from the boxplots in Figure 1 that the percent change tendency for each outcome measure for the participants dropped.

7. Engagement

In addition to these findings, the number of times a participant submitted information to the e-coach about weight, waist circumference, and physical activity (number of steps reported) was recorded. The mean number of times a participant submitted their weight was 15.56 (SD=13.33), waist circumference was 13.46 (SD=13.14), and the number of steps was 104.56 (SD=45.33). The results from this study demonstrated that there were statistically significant correlations ($p < .05$) between each engagement measure and the amount of weight lost, and the change in waist circumference. This would indicate that as the engagement measure increased the amount of weight lost or the change in waist circumference also increased.

8. Limitations

We realize that the use of technology may not be effective method of weight loss for all people. Level of comfort with technology must be evaluated before program implementation. Limitations to this study include absence of a control group and the inclusion of self-reported data. Self-reported data relies on the dependency of the participants' understanding of weight and waist measurements, as well as truthfulness in reporting data. Follow-up interactions were not utilized, and maintenance of weight loss is unclear.

9. Discussion

The results of this study show that e-coaching could be an effective method for weight loss. The participants in this study demonstrated modest weight loss and reduced their waist circumference by using this program. Increased support, ease of use, and rate of responses from the e-coaches can be cited as positive aspects of the program. More research must be conducted to assess the use of e-coaching as an effective method for weight loss. Increased engagement by enhancing the amount of contact with the e-coach resulted in greater weight loss.

In addition, some participants showed BMI classification change, which should be noted. Using the BMI value, a weight classification was determined for each e-coach participant. Participants were classified as Healthy Weight if their BMI was between 18.5 and 25, Overweight if BMI was between 25 and 30, and Obese if BMI was greater than 30 (CDC, n.d.). Table 2 shows a cross tabulation table indicating e-coaching participants initial and ending weight classifications. For the e-coaching participants who started out in the Overweight weight classification, 36% moved to the Healthy weight classification. The e-coaching participants who started out in the Obese classification, 21% moved to the Overweight weight classification.

E-coaching can be a cost-effective option for a weight loss program. It minimizes the need for face-to-face appointments and can therefore reduce the need for office space. E-coaches can work at home or from any site equipped with internet access. Many possibilities exist for implementing e-coaching into weight loss programs including smartphone applications, voice over internet programs (VoIP), or texting making weight loss programs more accessible and user-friendly. Obesity is a widespread public health problem that could benefit from multiple methods of treatment.

References

Benedict, M.A.&Arterburn, D. (2008). Worksite-based weight loss programs: A systematic review of recent literature. American Journal of Health Promotion, 22(6): 408-416.

Centers for Disease Control. (n.d.). Interpretation of BMI for adults. Available: http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html#Interpreted(December 12, 2013).

Dwyer, J. (n.d.) E-coaching. Available: http://edweb.sdsu.edu/people/arossett/pie/Interventions/ecoaching_1.htm. (December 12, 2013)

Harvey-Berino, J., West, D., Krukowski, R., Prewitt, E., VanBiervliet, A., Ashikaga T.,& Skelly J. (2010). Internet delivered behavioral obesity treatment. Preventive Medicine, 51; 123-128.

Garcia, T. (2012). Research: People prefer technology that makes life easier. PRNewser. Available: http://www.mediabistro.com/prnewser/research-people-prefer-technology-that-makes-life-easier_b37687(December 12, 2013).

Gabriele, J.M., Carpenter, B.D., Tate, D.F.& Fisher, B. (2011). Directive and nondirective e-coach support for weight loss in overweight adults. Annals of Behavioral Medicine, 41:252-263.

Hurling, R., Bexelius, C.&Slinde, F. (2012). An internet-based virtual coach to promote physical activity adherence in overweight adults: Randomized controlled trial. Journal of Medical Internet Resources, 14(1):e1.

Micco, N., Gold, B., Buzzell, P., Leonard, H., Pintauro, S.& Harvey-Berino, J. (2007). Minimal in-person support as an adjunct to internet obesity treatment. Annals of Behavioral Medicine, 33; 49-56.

Ogden, C.L., Carroll, M.D., Kit, B.K.&Flegal, K.M. (2012). Prevalence of obesity in the United States, 2009-2010. NCHS Data Brief, No. 82 – US DHHS.

Pellegrini, C.A., Verba, S.D., Otto, A.D., Helsel, D.L., Davis, K.K.&Jakicic, J.M. (2011). The comparison of a technology-based system and an in-person behavioral weight loss intervention. Intervention and Prevention, 20(2): 356-363.

Svensson, M.&Lagerros, Y.Y. (2010). Motivational technologies to promote weight loss – from internet to gadgets. Patient Education and Counseling 79: 356-360.

Thayer, S.E.& Ray, S. (2006). Online communication preferences across age, gender, and duration of internet use. CyberPsychology& Behavior, 9(4) 432-440.

Thorpe, K.E., Florence, C.S., Howard, D.H., Joski, P. (2004). The impact of obesity on rising medical spending. Health Affairs W4-480-486.

World Health Organization (2012). Obesity and overweight factsheet. Available: http://www.who.int/mediacentre/factsheets/fs311/en/ (December 12, 2013).

Table 1: Means, Standard Deviations, and Frequency of Participants Gender

	E-Coaching (n=34)			
	M	SD	n	%
Age	45.96	10.18		
Height	67.63	4.16		
Start Weight	206.37	45.23		
End Weight	196.86	43.51		
Weight Change	-9.51	10.48		
% Weight Change	-4.51%	4.77		
BMI	31.53	5.73		
First Waist Value	39.19	5.33		
Last Waist Value	37.18	5.13		
Waist Change	-2.01	2.74		
% Waist Change	-4.91%	6.49		
Gender				
Female			62	58
Male			45	42

Figure 1: Percent Change in weight and waist side-by-side boxplot

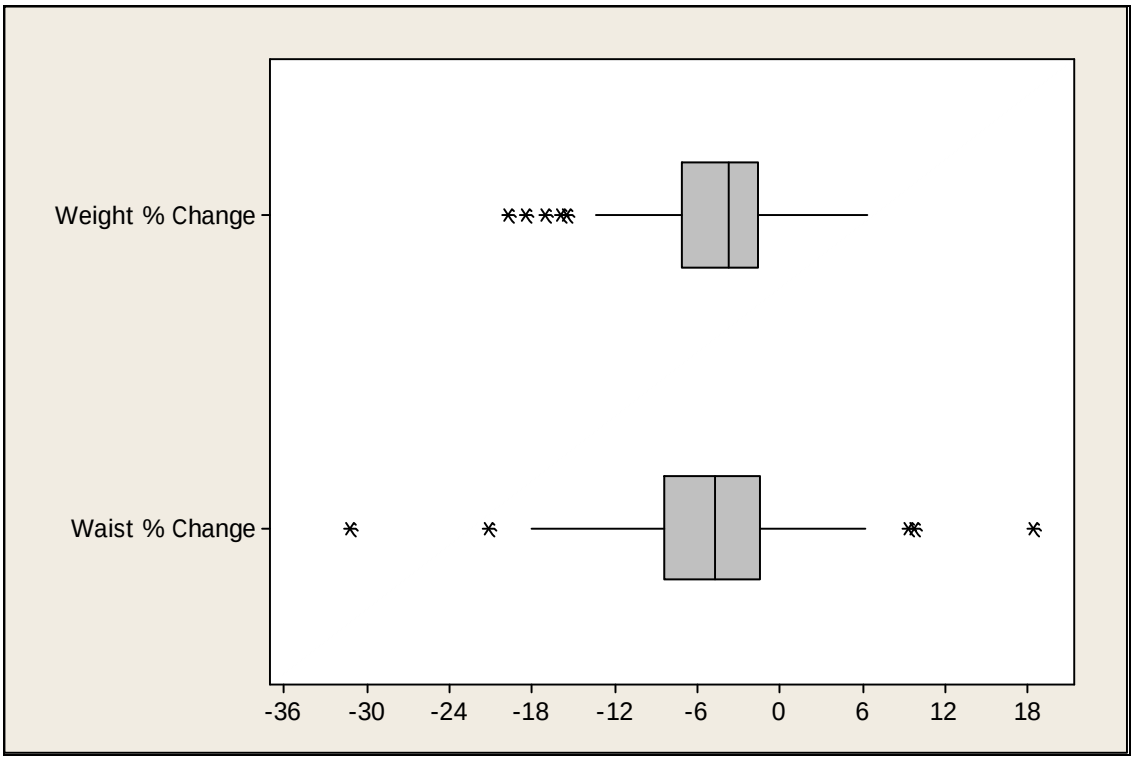

Table 2: Cross-Tabulation Table for Initial and Ending Weight Classifications

			Ending Weight Classification			Total
			Healthy Weight	Overweight	Obese	
Initial Weight Classification	Healthy Weight	Count	12	0	0	12
		Row %	100.0%	.0%	.0%	100.0%
	Overweight	Count	9	16	0	25
		Row %	36.0%	64.0%	.0%	100.0%
	Obese	Count	0	12	45	57
		Row %	.0%	21.1%	78.9%	100.0%
Total		Count	21	28	45	94
		Row %	22.3%	29.8%	47.9%	100.0%