

Recent Advances in Internet-Delivered, Evidence-Based Weight Control Programs for Adults

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Abstract

With the explosion of Internet accessibility, online delivery offers potential for significantly greater reach of evidence-based obesity treatment programs for adults. Online behavioral weight control has been shown to produce significant weight loss, with more recent programs demonstrating larger losses and general consumer satisfaction. A growing literature indicates several program parameters that may offer greatest engagement in online obesity interventions and better weight loss outcomes, including interactive, dynamic Web site features and synchronous counselor contact, although this research is in the early stages, and a clear picture of the essential components for the most effective online obesity program remains to be determined. Further research is required to enhance weight loss outcomes, determine cost-effectiveness of Internet-delivered programs, and identify the individuals most likely to benefit from treatment in this format.

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Introduction

Obesity ranks prominently among current public health problems, with about two-thirds of U.S. adults categorized as overweight or obese.¹ Effective obesity interventions have been identified, with those that combine dietary restriction, physical activity, and behavior therapy considered the most effective in promoting weight loss and maintenance.² Evidence-based lifestyle weight loss programs produce clinically significant weight losses of 7–10%.^{3,4} Lifestyle interventions have also demonstrated greater effectiveness in reducing the incidence of type 2 diabetes and cardiovascular risk factors than medication.³ Average weight losses of greater than 8% have been achieved among individuals with type 2 diabetes and are associated with significant

improvements in health status, including diabetes control, cardiovascular risk, and medication use.⁴ However, due to issues of proximity to evidence-based weight management programs, transportation, and time constraints, access and adherence to these beneficial programs may be limited. Development of new weight control technologies that utilize the Internet and increased Internet use in rural, lower income, and minority populations may be reducing these barriers to treatment.

Research indicates that Internet utilization continues to grow, with a 7% increase in utilization between 2005 and 2006⁵ in the United States overall. The vast majority (75%) of American adults in 2007 reported using the Internet,

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including 64% of individuals living in rural areas, 61% of adults in the lowest income category, and 56% of African Americans.⁶ Of the Internet users, 79% reported obtaining health information online.⁷ From 2002 to 2004, there was notable growth in the use of the Internet for information about diet (7% increase) and exercise and fitness (6% increase).⁸ Of Internet users, 93% reported that it is important for them to be able to access health information when it is convenient for them, at any hour of the day.⁹ These factors may coalesce to produce increasing interest in Web-based weight loss technologies.

Efficacy of Internet-Based Weight Control Programs

Recent evidence suggests that the Internet is a promising weight loss treatment modality.¹⁰⁻¹⁴ Contrary to speculations about computer-facilitated communication problems, the majority of participants in an Internet-based physical activity promotion program reported that they were able to develop trust with their online facilitator (85%) and that they did not experience any miscommunication between the facilitator and themselves due to the use of e-mail (89%).¹⁵ Other research indicates that Internet technology may facilitate successful weight maintenance^{16,17} and weight-gain prevention,¹⁸ and may even reduce participant burden. Research¹⁷ has found no difference in satisfaction or weight losses between in-person or online weight maintenance programs; however, the individuals in the online program rated it as more convenient than those in the in-person program. There is even some indication that Internet-based programs may produce greater self-monitoring than in-person programs,¹⁶ which may be related to ease of self-monitoring through online tools. In addition, comparable levels of perceived social support or therapeutic alliance for in-person and online weight maintenance programs have been found,¹⁶ suggesting that effective group dynamics can be achieved online.

Demonstrated weight losses have ranged from approximately 1¹⁹ to 8 kg.¹⁰ Several factors may explain the variance in weight loss between different Internet-based programs. First, several studies have pointed to the importance of maintaining the programmatic structure of in-person interventions, specifically such elements as ongoing scheduled contact, specific lesson materials, and homework expectations,^{10,12,19} which has been a limitation of some commercial Internet-based programs, which often fail to incorporate them. In addition, it appears that replicating behavioral therapy components (e.g., self-monitoring, behavioral skills training, and reinforcement and feedback from a trained professional) of successful

in-person weight management programs produces greater weight loss in online interventions compared with simply making health education available.^{12,13} However, even with these critical components, only a few studies of online interventions have achieved clinically significant weight losses (5% or greater) that are comparable to weight losses that are typical in in-person interventions.^{10,11,14}

Other possible factors may have contributed to the impressive and clinically significant weight losses achieved in these recent studies, including supplementing the online program with partial meal replacement¹⁴ and the inclusion of synchronous group meetings ("real-time" chat forums)¹¹ as well as general improvements in Internet technologies and online programs.¹¹ Meal replacements have been demonstrated to improve weight losses among in-person programs,²⁰ so it is not surprising that the online programs that offer them have enhanced weight loss outcomes.¹⁴

Harvey-Berino *et al.*^{10,11,16} have systematically investigated Internet-based weight loss and weight maintenance programs (since 1998) and have been able to achieve the most successful weight losses to date. Based on their investigations, they have developed an Internet-based weight loss and maintenance program, VtrimTM, that contains the elements of programmatic structure, behavior therapy, as well as synchronous group meetings and an interactive and dynamic Web site. Harvey-Berino and colleagues argue that the group meetings in the chat forum offer a powerful format to improve overall outcomes for a group-based intervention.¹¹ Thus, while participants in previous studies have been able to communicate with their therapist and other participants through e-mail and/or bulletin boards (i.e., asynchronous communication), the online chat forum allowed for additional real-time (i.e., synchronous) communication between the participant and therapist as well as between the group members, similar to communication patterns in face-to-face meetings. These researchers speculated that synchronous communication could facilitate social support, a component that has been previously found to enhance weight losses in behavioral obesity programs.²¹ The Vtrim Web site also includes many elements that are interactive and frequently updated (e.g., progress charts/tools, contests, and news flashes), which may facilitate sustained interest in the Web site. Micco and colleagues¹¹ noted that participants logged into this Web site approximately twice as often over a 6 month period (on average, 200 log-ins) than did individuals using a previous, less dynamic Web site.¹³

Log-in frequency, like other measures of adherence, has been consistently related to weight loss success^{12,13,22} and may be related to aspects of the Web site or the Internet connection. In addition to stimulating log-in frequency, dynamic features providing progress feedback and social support may be important factors in producing weight loss and maintenance.²² These findings may also help to explain why some programs with more static Web sites and a more minimal social support component have failed to demonstrate the same degree of weight loss¹³ or weight maintenance success²³ compared to a more dynamic Web site with greater social support features. According to recent research, 70% of home Internet users had high-speed Internet in 2007,²⁴ which may facilitate the development and utilization of interactive and multimedia features (e.g., text, audio, and animation) on these Web sites. As Neuhauser and Kreps²⁵ noted, Internet-based health programs could potentially address limitations of traditional in-person programs through customized, dynamic, multimedia Web sites. As reducing attrition and increasing Web site utilization would likely improve weight management success, the development of Web site features that participants find attractive and captivating is clearly important.

Clinical Implications

Online approaches to weight control have important clinical implications due to possibilities for greater reach and cost-effectiveness. As Cassel and colleagues²⁶ pointed out, Internet-based health programs can combine the individual and public health advantages of a tailored yet wide-reaching intervention. Currently, however, the most easily accessible Internet interventions are commercial programs, which have not produced the magnitude of weight loss seen in research-based Internet programs.^{10,19} This is perhaps because available commercial programs do not contain all the critical components detailed earlier. Therefore, it is clearly important to prioritize the development and dissemination of widely accessible evidence-based online weight management programs.

Limited research²⁷ has examined the cost-effectiveness of disseminating Internet-based interventions compared with in-person interventions; however, cost-effectiveness would likely be one of the most important factors in determining the dissemination capacity of an intervention program. While upfront costs are likely substantial in the development of an online intervention, such development costs should be considered as one-time costs in economic evaluations. The long-term costs of an Internet program could be lower than an in-person program due to lower

structural costs (such as printing intervention materials and meeting space) and participant costs (such as time and transportation). However, availability of a technology specialist or webmaster to maintain the online program is an often overlooked ongoing cost of online programs that merits consideration in cost-effectiveness evaluations.

Establishing the cost-effectiveness of Internet-based interventions may, however, prove challenging due to the rapid pace at which technology, and its price, changes. For dissemination purposes, it will also be important to determine what consumers will be willing to pay for an Internet-based weight control program for long-term weight loss/maintenance, since the available scientific literature is largely, if not completely, based on research-based programs provided at no cost to the participants. Nonetheless, greater reach and convenience may well be more noteworthy advantages of online program delivery than cost savings per se.

Tate and colleagues¹⁴ investigated one option that could improve both the reach and the cost-effectiveness of online programs: computer-automated tailored counseling. Although these researchers reported significantly lower weight loss for participants in the computer-automated condition at 6 months compared to those who had human e-mail counseling, 34% of participants in the computer-automated condition achieved a 5% or greater weight loss. Improvements to computer-automated feedback or a combination of computer-automated feedback and human counseling could allow this methodology to be utilized to produce clinically significant weight losses in a wide-reaching, cost-effective manner.

Future Directions for Research Investigating Internet-Based Weight Control Programs

Future research on Internet-based weight management programs may wish to investigate approaches to improve the reach, cost-effectiveness, and treatment efficacy of these programs. First, with regard to reach, eligibility for these research-based weight management programs may have been limited to participants who live proximal to the research center (even though the programs are conducted over the Internet) because of transportation burden for data collection visits. While objective clinic-based weight measurement is clearly an advantage of many of these studies,^{10,12-14,19} preliminary investigations of the validity of self-reported weight over the Internet indicate that self-reported online data are comparable to observed measures.²⁸ Reach of online comprehensive

programs could be improved if distance of participant residence was not a consideration. In addition, there is some evidence that online programs may not be reaching certain population segments. As Weinstein²⁹ noted in her review of Internet-based weight control programs, women have outnumbered men in these studies at a rate of 2 to 1, a finding that mirrors the enrollment for in-person programs.³⁰ Researchers designing weight management Web sites may wish to consider aspects that may be more appealing to overweight men to engage this hard-to-reach population.

Factors that may influence the cost-effectiveness of Internet-based weight control programs include duration of treatment, the linkage of online interventions with participants' health care providers, the addition of in-person sessions to online programs, and training for program facilitators. While previous research of in-person treatments shows that longer duration is associated with greater weight loss,³¹ this factor has not been examined in Internet-based obesity programs. Furthermore, it will be important to determine whether linking online weight control interventions to the participants' health care providers will have an impact on weight loss/maintenance, overall health, and/or cost-effectiveness. In addition, the impact of supplemental in-person sessions is unknown. Although an initial pilot study examining the addition of monthly in-person support to Internet-based treatment did not indicate a benefit over and above Internet-based treatment alone,¹¹ a full-scale randomized controlled trial of this innovative hybrid design has not been published.

Crucial aspects of training and the characteristics of effective online program facilitators have also largely not been examined, although certainly, training in behavioral therapy principles is critical.^{12,13} Program facilitators in online intervention research studies are typically trained professionals in psychology, nutrition, exercise physiology, or health education,¹⁰⁻¹⁴ while qualifications and training of the facilitators for the less effective commercial programs were not specified.^{10,19} Based on the literature, however, it is not possible to determine whether the decreased effectiveness of these programs can be attributed to the training/qualifications of the facilitators, to the intervention, or to some other factor. Nonetheless, the reach and cost-effectiveness of these programs may be influenced by the capacity for lay health educators or "coaches" to facilitate the programs, the duration and subject matter of effective training, and the feasibility of online training.

An additional direction offered by online programs is the potential for matching individuals to a preferred treatment format. Increasingly, clinicians speculate that a single obesity treatment modality may not be the most effective way to conceptualize treatment delivery^{32,33} and that consumer preference for format may guide uptake of weight control programs.³⁴ Adherence to treatment recommendations consistently predicts greater success in weight loss and maintenance,^{12-14,16,22,35} and thus it is reasonable to hypothesize that individuals who indicate that they prefer an online format may adhere better to such programs and therefore succeed in losing more weight than those who indicate less confidence in their ability to lose weight by a Web-based program. To date, no randomized trials have included individual preference when considering the efficacy of online obesity programs, but the published outcomes of online programs may underestimate the efficacy that could be achieved among individuals who indicate a strong preference for the format, convenience, or other aspects of an online program.

Conclusions

Recent research evaluating online obesity intervention outcomes demonstrates that delivery by Internet is a promising avenue to promote weight loss and maintenance. A developing picture of the program parameters indicates that interventions that incorporate programmatic structure, behavior therapy components, interactive and dynamic Web site features, and synchronous communication achieve the most significant weight losses. Therefore, theory-based components of in-person interventions appear to transcend the intervention channel. However, on balance, online programs have not achieved weight losses of the magnitude typically produced by in-person behavioral weight control programs. Further research to enhance the weight losses produced with online programs and to expand research on augmenting such programs, perhaps with novel Internet-based strategies, is clearly warranted. Finally, data to inform questions about the cost-efficacy of Internet obesity treatment are sorely needed.

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