



Improving Weight Maintenance Using Virtual Reality (Second Life)

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ABSTRACT

Objective: Compare weight loss and maintenance between a face-to-face (FTF) weight management clinic and a clinic delivered via virtual reality (VR).

Methods: Participants were randomized to 3 months of weight loss with a weekly clinic delivered via FTF or VR and then 6 months' weight maintenance delivered with VR. Data were collected at baseline and 3 and 6 months for weight and process variables. Twenty overweight and obese individuals (31.1 ± 3.6 years of age; body mass index, 32.8 ± 5.1 ; 85% females; 20% minorities) responded to advertisement and met inclusion criteria. Diets (1,200–1,800 kcal/d) used prepackaged meals, fruits and vegetables, and physical activity (300 min/wk).

Results: Weight loss was significantly greater for FTF at 10.8% compared with 7.6% for VR ($P < .05$). However, weight maintenance was significantly greater for VR at 14.0% compared with 9.5% for FTF ($P < .05$).

Conclusions and Implications: Virtual reality compares favorably with FTF for weight loss and may facilitate greater weight maintenance.

Key Words: virtual reality, obesity, weight maintenance (*J Nutr Educ Behav.* 2013;45:264–268.)

INTRODUCTION

Weight loss and particularly weight maintenance continue to be problematic for individuals who are overweight or obese. State-of-the-art treatment includes a face-to-face behavioral weight loss clinic that emphasizes nutrition, physical activity, and lifestyle changes and is delivered by health educators in a group for-

mat.^{1,2} Face-to-face delivery of weight management is time-consuming and expensive, and presents barriers to participants, such as travel, conflict with work and home, need for child care, and loss of anonymity.^{3,4} There is limited time during group meetings to develop and practice behavioral skills associated with successful weight loss and weight maintenance. Although the face-to-

face delivery system is effective for weight loss, most individuals regain substantial weight.⁵

To decrease the burden for both provider and participant, an alternative delivery system comparing a face-to-face clinic with a clinic delivered by phone (group conference call) was developed. The pilot study was published and the findings indicated equivalent weight loss (3 months) and maintenance (6 months).⁶ Encouraged by these results and aiming to continue exploring alternative weight management delivery, the authors evaluated virtual reality for weight loss and weight maintenance.

Second Life (Linden Labs, San Francisco, CA) is a Web-based virtual reality environment available to the public.⁷ Participants in Second Life create virtual representations of themselves, called "avatars," which can interact with other avatars and navigate through the virtual world of Second Life. Voice communication is accomplished via headset, which allows for person-to-person and group interaction. Education and training takes place on an "island," which is purchased from Second Life and provides restricted group access to the education/training site. Second Life may

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<http://dx.doi.org/10.1016/j.jneb.2012.10.007>

promote behavior change through rapid dynamic feedback, learner experimentation, real-time personalized task selection, and exploration.⁸ Participants using Second Life for weight management can engage in repeated experiential learning, practice skills, and participate in real-life scenarios without real-life repercussions. For example, participants can practice meal planning, grocery shopping, dietary control when eating at restaurants, and holiday parties at no cost and to a much greater extent than possible during a time-limited clinic meeting. To date, the use of virtual reality for weight loss and maintenance has not been evaluated.

The primary aim of this investigation was to evaluate the efficacy of Second Life for weight loss and weight maintenance. The second goal was to characterize program variables including minutes of physical activity; number of steps; consumption of prepackaged meals or fruits and vegetables; and attendance at clinic meetings. Therefore, the researchers conducted a 9-month study with 3 months of weight loss and 6 months of weight maintenance. Participants were randomized to 1 of 2 groups: face-to-face for weight loss followed by Second Life for weight maintenance, or Second Life for both weight loss and maintenance. This provided 6 months and 9 months of exposure to Second Life for the face-to-face and Second Life and Second Life-only groups, respectively.

METHODS

Participants

The authors randomized 20 overweight and obese individuals (31.1 ± 3.6 years of age; body mass index, 32.8 ± 5.1), 85% females and 20% minorities, in a block size of 10 and an allocation ratio of 1:1, to receive either face-to-face and Second Life or Second Life-only. Participants had access to high-speed internet, were free from disease as determined by a health history, did not smoke, and were sedentary, defined as <500 kcal/wk of exercise, determined by questionnaire.⁹ A control group was not used because the literature indicates that control groups maintain or more likely gain weight.¹⁰⁻¹³

Participants were modestly compensated for participation. The Human Subjects Committee at The University of Kansas Medical Center approved this study.

Procedures

Both face-to-face and Second Life clinics were based on the Weight Control Research Project (WCRP), which has been ongoing since 1986.⁶ Clinics are 60 minutes in length and use behavioral strategies to promote change in diet and exercise.¹⁴ The same experienced, trained health educator delivered both face-to-face and Second Life clinics. Quality control and standardization of materials were achieved with weekly staff meetings and review of tape recordings of face-to-face and Second Life sessions. Face-to-face and Second Life clinics met weekly for 6 months and then bimonthly (2 meetings/mo) for 3 months.

Face-to-face clinics consisted of a 10-minute protocol to obtain attendance, weight, and self-reported minutes of physical activity, steps (per step counter), number of fruits and vegetables, and prepackaged meals consumed. Subsequently, the health educator delivered a WCRP lesson for approximately 30 minutes from the topics of nutrition, physical activity, and lifestyle modification. The final 20 minutes consisted of group discussion and problem solving. Finally, experiential learning assignments were given to help participants practice and develop behavioral strategies associated with successful weight management. Participants completed a midweek check-in via phone, fax, or e-mail and again reported physical activity and dietary compliance records (prepackaged meals, or fruits and vegetables) to the health educator.

Participants attended a 1-hour face-to-face training session prior to the intervention to learn how to navigate the Second Life island. On the island, the Second Life weight management center contains a conference room for clinic meetings and several areas where learning experiences with real-time feedback were conducted. These included a virtual home with a stocked kitchen, grocery store, restaurant, buffet line, holiday party environment, and gym. To initiate the Second Life session, participants logged in to the

Second Life Web-based program and were directed to the weight management center. Participants communicated with each other and interacted with the health educator through their computer keyboard or by using a headset. Participants were immediately transported to any area of the weight management center (ie, conference room, grocery store) by clicking on the site map. The Second Life group sessions used the same procedures and delivered information identical to that of the face-to-face sessions described previously. The major difference between the face-to-face and Second Life groups was the opportunities for the Second Life group to more easily complete assignments designed to practice and reinforce behavioral strategies taught during clinic meetings. Participants completed practice on their own schedule and received immediate feedback. This is in contrast to the phone group, in which assignments were completed in real life and feedback was delayed until the following clinic meeting.

All participants received comprehensive WCRP notebooks that included contact information for health educators and program coordinators. Also included were guidelines for participation in the program, such as confidentiality, active participation, rules of engagement, how to be recognized to speak without speaking over others, respect for others opinions, and proper conduct in a group meeting. In addition, the notebook included detailed instructions for the weight loss/maintenance diets including recipes, detailed instructions for the exercise protocol, and calendars and timelines for class meetings and midweek calls. The materials standardized instruction between the face-to-face and Second Life groups.

Energy intake was reduced to approximately 1,200 to 1,500 kcal/d using commercially available prepackaged meals, fruits and vegetables, and non-caloric beverages during the weight loss phase (months 1–3). Participants consumed a minimum daily total of 3 shakes at approximately 100 kcal each, 2 entrees between 200 and 270 kcal each, and 5 or more servings of fruits and vegetables.

During months 4–9 (weight loss/maintenance), the recommended energy intake was equivalent to resting

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