A randomized trial of a health promotion intervention for adults with disabilities

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Abstract

Background: People with disabilities face a range of health disparities, including increased risk for preventable health problems. Thus, health promotion efforts addressing the reduction of risk factors are especially important for this population.

Objective: This study examined changes in health behaviors among adults with disabilities following participation in the Healthy Lifestyles for People with Disabilities health promotion program. It was hypothesized that intervention participants would demonstrate significant increases in healthy behaviors in areas such as health responsibility, physical activity, nutrition, stress management, interpersonal relationships, and spiritual growth while controls would not show significant change.

Methods: Participants (n = 95) were randomly assigned to the intervention or to a wait-list. After initially serving as controls, wait-list members later received the intervention as well. A measure of health behaviors was completed at baseline, 4 months, 7 months, and 10 months.

Results: Health behavior scores of immediate intervention participants increased significantly (p < .001) while the scores of wait-list members showed no significant change. After subsequently attending a Healthy Lifestyles workshop, scores of wait-list participants also increased significantly (p = .001).

Conclusions: The Healthy Lifestyles intervention appears to be successful in helping adults with disabilities increase healthy behaviors. © 2011 Elsevier Inc. All rights reserved.

Keywords: Health behavior; Intervention studies; Randomized controlled trial; Disabled persons

Approximately 54.4 million Americans have a disability, representing nearly 19% of the US population [1]. Individuals with disabilities face a range of health disparities in comparison to the general population [2-6]. People with disabilities typically report poorer health status, are at increased risk of early mortality, and often encounter barriers to routine health care [2,3,7-11]. Relative to the general population, the disability population experiences elevated prevalence of oral disease [12], diabetes [13], and mental health issues such as depression and anxiety [2,14].

People with disabilities also experience a number of secondary conditions, broadly defined as conditions for which individuals with preexisting disabilities are at greater risk [15]. Secondary conditions are sometimes considered to include socio-environmental issues such as participation and access barriers [4,16,17] but were originally defined specifically as physical or mental problems (eg, pressure sores; urinary tract infections) that are physiologically linked to a primary disability [18,19]. Importantly, secondary conditions are potentially preventable [15,16,18]. In addition, people with disabilities are more likely to experience preventable health risk factors such as obesity, physical inactivity, and smoking than are people without disabilities [20]. Consequently, health promotion efforts, including interventions that address the reduction of risk factors and secondary conditions, are especially important for persons with disabilities [20,21].

During the past 10 years, there has been a significant expansion in the number of health promotion interventions and programs developed with individuals with disabilities as the target group [22]. Health promotion programs for persons with disabilities have been supported by federal agencies such as the National Center on Birth Defects and Developmental Disabilities at the Centers for Disease Control and Prevention (CDC), the National Institute on Disability and Rehabilitation Research at the US Department of Education, the National Institutes of Health (NIH),

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and private nonprofit organizations such as United Cerebral Palsy Foundation, Special Olympics, and the Christopher & Dana Reeve Foundation [3]. However, this is a relatively new area of emphasis. A recently completed review of health promotion interventions for persons with sensory, mobility, or cognitive disabilities identified 79 intervention studies published between 1986 and 2006 in peer-reviewed journals, with the vast majority of these studies published between 2000 and 2006 [22]. All of the interventions reviewed targeted either a specific diagnostic group (eg, multiple sclerosis, spinal cord injury) or a single functional category of disability (eg, intellectual, mobility). The majority (70%) of the interventions focused on a single health promotion topic such as physical activity or oral health. Overall, 60% of the studies demonstrated some evidence of effectiveness, as indicated by positive change on at least 1 outcome measure [22].

The present study examines the effects of the Healthy Lifestyles (HL) for People with Disabilities curriculum [23]. Unlike the many single-topic programs available, HL addresses multiple aspects of health and well-being, including physical, social, and emotional health. A similar holistic approach has yielded successful results in a handful of other studies (eg, Hughes et al [24] and Ravesloot et al [25]). However, HL differs from these and other disability-specific programs in being designed for a cross-disability population (ie, any type of disability). The curriculum was developed using community-based participatory research (CBPR) methods. CBPR is a collaborative approach designed to ensure participation in all aspects of the research process by communities affected by the issue under study [26]. In the HL development process, community members with disabilities defined the curriculum content, participated in conducting pilot HL workshops, disseminated project results, and promoted new health practices for the broader disability community. The framework underlying the development of the HL curriculum incorporated 4 major principles:

1. An integrated approach that defines health as multidimensional and promotes balance among the dimensions.
2. Self-determination, and the fundamental principle that people with disabilities must have the opportunity to practice choice, control, responsibility, and accountability for their lifestyle choices and actions.
3. Salutogenic (health causing) approaches, ie, rather than being focused on preventing disease, focusing primarily on increasing health [27].
4. Application of Bandura’s social-cognitive theory [28], emphasizing knowledge and skills acquisition to increase self-efficacy for engaging in certain behaviors.

After reviewing existing curricula and obtaining input from a series of focus groups of people with various types of disabilities, the HL curriculum was developed by authors with disabilities. The curriculum was intended to provide general health information appropriate for women and men with a variety of disabilities in an interactive and easy-to-understand format. Initial implementation of the HL curriculum used a format of short sessions distributed across six weeks. Attrition across sessions during this piloting stage led to a revision to offer the curriculum more intensively, with the core training occurring during a 2½-day workshop, supplemented with monthly follow-up support groups [29].

This report provides the results of a randomized controlled trial to assess the efficacy of the HL intervention with a cross-disability sample of adults. Specifically, the study tested the following hypotheses: (1) immediate intervention participants will significantly increase healthy behaviors in areas such as health responsibility, physical activity, nutrition, stress management, interpersonal relationships, and spiritual growth while wait-list members who have not yet received the intervention show no significant change and (2) after wait-list members receive the intervention, their healthy behaviors will also increase significantly.

Methods

Participants

Individuals were eligible to participate if they were (1) 18 years of age or older, (2) lived in Oregon or southwest Washington, and (3) had a self-reported disability. Recruitment of participants was conducted in collaboration with Independent Living Resources, a Center for Independent Living (CIL). Various techniques were used to recruit participants. This included, but was not limited to, distribution of flyers and brochures, personal presentations, hosting tables at disability fairs, e-mails to disability agencies and organizations, and through word of mouth. Individuals interested in the study were provided with an oral description of the study requirements. Those who decided to participate were scheduled to attend an orientation session. At the orientation, the study and participation requirements were again described, attendees were given an opportunity to ask questions, and signed consent was obtained using a standard university form (provided in alternate formats as needed).

Measures

Demographics

Participants completed a short demographic questionnaire that recorded age, gender, race and ethnicity, marital status, highest level of education attained, and employment status at the time of entry into the study.

Workshop evaluation

A preworkshop questionnaire asked participants to rate how much they knew about general areas of health covered
in the workshop (physical activity, nutrition, emotional health, and social health and the relationship among these areas). At the end of the workshop, the same questions were asked again to determine whether participants thought they had learned more about these areas. In addition, the post-workshop questionnaire asked participants to rate the quality of the workshop on a 5-point scale ranging from poor (1) to excellent (5).

Health behaviors
Health behaviors were measured using the Health-Promoting Lifestyle Profile II (HPLP II) [30]. The HPLP II is an updated version of the Health-Promoting Lifestyle Profile [31]. It consists of 52 items that address many of the topics covered by the HL curriculum. The HPLP II measures health-promoting behaviors in the domains of health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations, and stress management. Items are scored on a 4-point scale indicating how often respondents engage in specific behaviors or have certain feelings: never (1), sometimes (2), often (3), or routinely (4). Sample items from each domain are presented in Table 1. Internal consistency of the HPLP II subscales is strong, with alpha values ranging from .79 to .94 (Susan Nobel Walker, personal communication, October 2001). The HPLP II was administered at 4 time points (see Research Design later).

Intervention
The HL program consisted of a 2½-day workshop followed by 2-hour monthly support group meetings. All intervention components were provided free of charge and meals were included. Workshops and meetings were conducted in community settings that were easy to get access via multiple modes of transportation and accessible according to the requirements of the Americans with Disabilities Act. Intervention components were led by teams composed of project staff and trained community members with disabilities. Workshops were highly interactive and provided knowledge and skills in 4 distinct sessions. In Sessions 1 and 2, participants defined a health lifestyle and identified values of importance to them. In Session 3, participants learned about the components of a health lifestyle—including physical, social, spiritual, and emotional health, health through meaningful activities, and how these areas are interconnected. They then identified areas in which they would like to change in order to move toward a healthier lifestyle. In the final session, participants learned how to make positive changes in their chosen areas using a goal-planning process. During the course of the workshop, participants also engaged in healthy activities such as nonimpact aerobics, adapted yoga, and healthy eating. Participants learned skills and strategies for incorporating such activities into their daily lives. At the end of the workshop, participants identified 2 achievable health-related goals to work toward over the next several months. Workshop materials were available in a variety of formats, including large print and Braille.

Following the workshop, participants attended 2-hour support group meetings once a month. During the first hour of the support group meeting, participants discussed challenges and barriers to achieving goals, and also celebrated successes and shared tips. During the second hour of each meeting, outside speakers presented information on health-related topics such as pain management, healthy eating on a budget, strategies for healthy sleep, how to talk to your doctor, and various forms of physical activity.

Research design
The efficacy of the HL program in improving health behaviors was assessed with a randomized controlled trial, using a wait-list comparison condition. Because small workshops (10 to 15 people) were considered ideal for allowing discussion and interaction, participants were recruited in 5 separate cohorts. Pairs of workshops were conducted in various locations in Oregon and southwest Washington. During an orientation session, participants in a given cohort were randomly assigned (by coin toss) to an immediate intervention group, which attended a workshop immediately, or a wait-list group, which served as a control group for 3 months and then attended a workshop. For each group, the workshop was followed by monthly support group meetings. Immediate intervention group members attended 9 months of support groups. Due to the 3-month delay for the wait-list groups to receive the workshop, participants in this condition only attended 6 months of support group meetings.

Health behaviors were measured at baseline (during orientation) and at 4, 7, and 10 months after the baseline

<table>
<thead>
<tr>
<th>Domain</th>
<th>Sample Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health responsibility</td>
<td>- Discuss my health concerns with health professionals.</td>
</tr>
<tr>
<td></td>
<td>- Ask for information from health professionals about how to take good care</td>
</tr>
<tr>
<td></td>
<td>of myself.</td>
</tr>
<tr>
<td>Physical activity</td>
<td>- Follow a planned exercise program.</td>
</tr>
<tr>
<td></td>
<td>- Reach my target heart rate when exercising.</td>
</tr>
<tr>
<td>Nutrition</td>
<td>- Eat breakfast.</td>
</tr>
<tr>
<td></td>
<td>- Eat 3-5 servings of vegetables each day.</td>
</tr>
<tr>
<td>Spiritual growth</td>
<td>- Believe that my life has purpose.</td>
</tr>
<tr>
<td></td>
<td>- Feel connected with some force greater than myself.</td>
</tr>
<tr>
<td>Interpersonal relations</td>
<td>- Spend time with close friends.</td>
</tr>
<tr>
<td></td>
<td>- Get support from a network of caring people.</td>
</tr>
<tr>
<td>Stress management</td>
<td>- Take some time for relaxation each day.</td>
</tr>
<tr>
<td></td>
<td>- Balance time between work and play.</td>
</tr>
</tbody>
</table>

From Walker, Sechrist, and Pender, 1995 [30].
* For all items, respondents are asked to indicate the frequency with which they engage in the behavior. Response options are: never, sometimes, often, or routinely.
The wait-list groups' second preworkshop data collection coincided with the immediate intervention groups’ first postworkshop data collection, allowing a control period comparison. Alternate formats and assistance with filling out measures were provided for participants as needed. Participants were compensated for their time spent completing data collection with a 1-time payment. The study was conducted with approval and oversight by the institutional review board at Oregon Health & Science University.

Data analysis

Cohorts were combined for analysis purposes. Chi-squared tests were used to examine differences in categorical demographic characteristics (sex, race/ethnicity, education level, and employment status). Independent sample t-tests were used to compare experimental groups on age, baseline health behavior scores, and mean workshop satisfaction ratings. Paired sample t-tests compared baseline and postworkshop subjective knowledge ratings within experimental conditions. To examine the effect of the intervention on health behavior scores over time, a 2 (experimental condition) \times 4 \) (time) repeated measures analysis of variance was conducted.

Results

A total of 185 people attended an orientation session, were enrolled in the study, and were assigned to an experimental condition. Fifty participants (18 in the immediate intervention condition and 32 in the wait-list condition) dropped out of the study before their scheduled workshop. Of the 135 people who attended a workshop, 2 (1 immediate intervention, 1 wait-list) did not stay for the whole workshop. The 133 individuals who completed a workshop included 16 people who withdrew from the study before completing any postworkshop health behavior data, 22 who remained enrolled but were missing 1 or more data collection points, and 95 people (47 immediate intervention, 48 wait-list) who completed all 4 data collection points. Results from the 95 participants with complete data are presented here. Participants with full data differed from other enrollees in that they were about 5 years older on average \((t = 2.63, p = .009)\) and less likely to be unemployed \((29.2\% \text{ vs } 50.6\%, \chi^2 = 8.95, p = .030)\). There were no other significant demographic differences and no significant differences in baseline health behavior scores.

Participants with full data ranged in age from 19 to 82, with an average age of 49 years. Table 2 summarizes additional demographic characteristics of these participants. With regard to disability type, the physical disability category included people with a variety of conditions such as fibromyalgia, multiple sclerosis, hip degeneration, amputation, muscular dystrophy, post-polio syndrome, cerebral palsy, and spinal cord injury. Most of the participants in this category used some type of mobility device (cane, walker, crutches, wheelchair, or scooter). The sensory disability category included 1 person with both vision and hearing impairments. The remainder had vision impairments alone, ranging from partial vision loss to complete blindness. The cognitive/intellectual disability category consisted of 3 people with cognitive limitations due to brain injury or prior brain cancer. The other individuals in this category had developmental intellectual disabilities related to

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**Figure 1. Research Design.**

<table>
<thead>
<tr>
<th>Time 1</th>
<th>Time 2 (Month 4)</th>
<th>Time 3 (Month 7)</th>
<th>Time 4 (Month 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL Workshop</td>
<td>Support Group 1</td>
<td>Support Group 4</td>
<td>Support Group 7</td>
</tr>
<tr>
<td>I.I. GROUP</td>
<td>Support Group 2</td>
<td>Support Group 5</td>
<td>Support Group 8</td>
</tr>
<tr>
<td></td>
<td>Support Group 3*</td>
<td>Support Group 6*</td>
<td>Support Group 9*</td>
</tr>
</tbody>
</table>

Data collection points: 1, 2, 3, 4
* Data collection for immediate intervention (I.I.) group
† Data collection for wait-list (W.L.) group
conditions such as Down syndrome, autism, and fetal alcohol syndrome. All of the intellectual disabilities were mild in nature. Specific conditions within the mental health disability category included bipolar disorder, depression, and post-traumatic stress disorder. People with multiple disabilities had a mix of physical, sensory, and/or mental health conditions. Those in the "other" category were unspecified. Compared to individuals in the wait-list condition, immediate intervention participants were more likely to be college educated (76.6% vs 51.1%) but also more likely to have less than a high school education (10.6% vs 2.1%). The relationship between experimental condition and education was significant ($\chi^2 = 14.21, p = .001$). There were no other significant differences between immediate intervention and wait-list participants at baseline.

**Workshop evaluation**

The average rating of workshop quality was 4.61 on a 5-point scale, with 5 indicating the highest level of satisfaction. There were no significant differences in quality ratings between immediate intervention and wait-list participants ($p = .196$) or between participants with full data and other workshop attendees ($p = .975$). Both immediate intervention and wait-list participants had significant increases in subjective ratings of their health knowledge in all areas following the workshop (all $p$ values $< .001$). There were no significant differences between experimental conditions in mean knowledge gains ($p$ values $\geq .291$).

**Health behaviors**

For mean scores on the entire HPLP II, there was a significant main effect for time ($F[3, 279] = 41.64, p < .001$) and a significant condition-by-time interaction ($F[3, 279] = 3.21, p = .024$). Follow-up within-subjects contrasts for each experimental condition revealed that scores for all participants increased significantly, but the timing of the change was dependent on when they attended a Healthy Lifestyles workshop (see Figure 2). Scores of immediate intervention participants increased significantly from baseline to Time 2 ($F[1, 46] = 25.59, p < .001$) while wait-list scores did not show significant change ($F[1, 47] = 2.914, p = .094$). Between Time 2 and Time 3 (after wait-list participants had attended a workshop), wait-list group scores increased significantly ($F[1, 47] = 11.81, p = .001$) and immediate intervention group scores held steady ($F[1, 46] = 0.001, p = .979$). From Time 3 to Time 4, scores for the immediate intervention condition again increased significantly ($F[1, 46] = 15.71, p < .001$), while scores in the wait-list condition did not change significantly ($F[1, 47] = 3.44, p = .070$).

There were significant main effects of time on all HPLP II subscales (Health Responsibility: $F[3, 279] = 19.94, p < .001$; Physical Activity: $F[3, 279] = 19.55, p < .001$; Nutrition: $F[3, 279] = 18.72, p < .001$; Spiritual Growth: $F[3, 276] = 20.54, p < .001$; Interpersonal Relations: $F[3, 279] = 16.92, p < .001$; Stress Management: $F[3, 279] = 28.80, p < .001$), with scores increasing over time. There were significant condition by time interactions for Spiritual Growth ($F[3, 276] = 3.25, p = .022$) and Stress Management ($F[3, 279] = 2.74, p = .044$). For the Health Responsibility subscale, the condition-by-time interaction was significant at the trend level ($F[3, 279] = 2.44, p = .065$). Patterns for these subscales mirrored those found with overall HPLP II scores (see Table 3). Immediate intervention condition participants showed significant increases from baseline to Time 2, no significant change from Time 2 to Time 3, and another significant increase from Time 3 to

![Figure 2. Changes in Total HPLP II Scores.](image-url)
Time 4. Wait-list participants showed no significant changes from baseline to Time 2 (while serving as controls), significant increases from Time 2 to Time 3 (after attending a workshop), and no significant change from Time 3 to Time 4. Interaction effects did not reach significance for Physical Activity, Nutrition, or Interpersonal Relations. However, scores on these scales followed the same general pattern as described above (Table 3).

**Discussion**

This study provides empirical support for the efficacy of the HL intervention among a sample of individuals with various types of disabilities. Health behavior scores of immediate intervention participants increased significantly, while the scores of wait-list participants who had not yet attended a workshop showed no significant change. After attending an HL workshop, health behavior scores of wait-list condition members also increased significantly. Increases were maintained or strengthened throughout the subsequent post-workshop data collection points. These results are consistent with social-cognitive theory [28], in which an increase in skills and self-efficacy, in a supportive environment, is expected to result in the adoption of positive health behaviors. The HL curriculum provides knowledge, skill building, and support that appear to be successful in helping participants increase the frequency with which they engage in healthy behaviors.

In both experimental conditions, once health behavior scores had increased following a workshop, there were no significant changes at the next follow-up 6 months after the workshop. During the intervening time period, participants were continuing to attend monthly support groups. These may have helped maintain the earlier health behavior gains but did not appear to contribute to further increases. However, participants in the immediate intervention condition (who received an additional 3 months of support groups) demonstrated significant increases in health behavior scores during those final 3 months, suggesting that there may be added value in providing longer-term support.

In addition to the outcomes formally measured in this study, participants reported other benefits of participation. Most notably, a number of overweight participants lost weight during the course of the program. Participants also showed a high level of enthusiasm for the HL program. After program-led support groups ended, participants from multiple cohorts formed an ongoing support group that continued for several months after the completion of the project. Several participants referred their friends to HL workshops offered after the study ended. A few participants requested and received training to become peer trainers for future HL workshops. The success of the intervention led to development of train-the-trainer protocols, which have now been implemented in several states.

The HL program has a variety of features that make it ideal for implementation with the disability population. Drum et al. [3] presented a set of guidelines for implementing community-based health promotion programs for people with disabilities. These guidelines recommend that programs (1) have an underlying conceptual or theoretical framework; (2) implement process evaluation; (3) collect outcomes data using disability-appropriate outcome measures; (4) involve people with disabilities, families or caregivers in program development and implementation; (5) consider the beliefs, practices and values of its target group(s), including support for personal choice; (6) be socially, behaviorally, programmatically, and environmentally accessible; and (7) be affordable.

A minority of the studies found in the review of health promotion interventions for people with disabilities described methods in agreement with the guidelines [22]. The HL program, on the other hand, meets all of these criteria. The HL curriculum is grounded in social cognitive theory (Criterion 1). It is built on the belief that people can be both disabled and healthy and is designed to help people with disabilities develop and work toward health goals of their own choosing (Criterion 5). The program was developed by people with disabilities and is implemented in collaboration with trainers with disabilities (Criterion 4). The study included process evaluation (Criterion 2) and collected outcomes data using a measure of behaviors that can be engaged in regardless of presence of a disability (Criterion 3). The intervention has always been provided free of charge (Criterion 7) and particular attention is given to selecting accessible locations, providing materials in alternate formats, and adapting activities to work for participants with various types of disabilities (Criterion 6).
Although the findings regarding the HL program are promising, this study had several limitations. The majority of the sample was female, white, and fairly well educated. Randomization was not stratified based on demographic variables. The fact that more people at both extremes of the educational spectrum were included in the immediate intervention condition may have impacted study results. However, both immediate intervention and wait-list conditions demonstrated similar improvements following an HL workshop. More than half of the sample had physical disabilities, while much smaller proportions had other types of disabilities. Thus, the results may not be generalizable to groups that were not as well represented in the study. Further, only 20% of study participants were employed for wages. The structure of the workshop may not work as well for people who are employed, especially those working full-time.

There was a substantial amount of attrition between enrollment and study’s end. The majority of the attrition occurred before enrollees had even attended a workshop. This was particularly pronounced in the wait-list condition. Increased preworkshop attrition among wait-list participants was likely due to the 3-month delay before they could receive the intervention, during which time participants may have lost interest or made other commitments. However, once participants did attend a workshop, only 18 failed to complete the study. An additional 22 participants remained enrolled in the study but had missing data at 1 or more time points. In an exploratory analysis (not reported), we found that these participants demonstrated significant increases in health behavior scores from baseline to the first available postworkshop data collection. Thus, the overall findings of the study are not unique to participants with full data.

The HL curriculum is currently in its third edition [32]. To date, the Healthy Lifestyles intervention has been implemented in nine states, in addition to Oregon (Angela Weaver, personal communication, May 2010). Continuing research is warranted to evaluate the effectiveness of the HL intervention in other sites, measure other possible health promoting effects of the program (eg, weight loss; reduction in secondary conditions), test the efficacy of the intervention within specific disability populations, evaluate the possibility of a dose-response effect with increased follow-up support after a workshop, and assess the long-term effects of the program.

Conclusions

This study indicates that a 2½-day health promotion workshop followed by monthly support groups can be successful in helping adults with disabilities increase healthy behaviors. Such interventions are important given the preventable health risks and secondary conditions common among individuals with disabilities. The Healthy Lifestyles for People with Disabilities program is an intervention that meets expert-developed guidelines for health promotion programs for people with disabilities. The program is grounded in social-cognitive theory and includes several features that make it particularly appropriate for the disability population. It can easily be implemented by health educators and community members with disabilities following a brief training. The program is also highly valued by participants. Taken together, these characteristics support ongoing implementation and expanded adoption of the Healthy Lifestyles curriculum. Through broad implementation of Healthy Lifestyles and similar evidence-based disability-specific programs, health promotion practitioners can make important contributions to improving the health of people with disabilities.

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