First Step to Active Health - Online *Plus*: Pilot Study

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Abstract. The aim of this project is to implement, and demonstrate the efficacy of, a blended delivery multi-component physical activity program. The experimental group (FSAH-O) consisted of 24 male and females (age = 68.7 ± 5.5 yrs). The control group (N = 15; 74.7 ± 6.2 yrs) was drawn from a similar project. The program consisted of flexibility, strength, and balance training, and cardio-respiratory activity. Participants met 1day/week for 8 weeks for 50 minutes of exercise at a senior center while supplementing class with home exercise 2 days/week. Participants were given access to a program web site (an interactive, secure, online method to motivate, educate, and track activity). Program effectiveness was assessed using the Senior Fitness Test (SFT) (chair stand, arm curl, sit and reach, up & go, scratch test, and 12-min walk); balance (movement velocity (MVL), endpoint excursion (EPE), maximum EPE (MXE), and directional control (DCL) for forward (F), right (R), left (L) and back (B) movements). No baseline difference existed between groups. Repeated measures ANOVAs revealed interactions ($p<.05$) on most measures. SFT improvements were noted in the FSAH-O group: Chair Stand 10%, Arm Curl 22%; Up-&-Go 8%; 12-min Walk 18%. With respect to LOS, EPE and MXE improved in two directions (R 21%, R 8%; L 7%, L 7%). The control group did not change on any variable. Participating in an 8-week blended FSAH-O program improves FF, and 2 of 4 balance measures. A longer intervention may result in greater improvements.

1. Introduction

A vast amount of research supports the hypothesis that regular physical activity improves health and function and contributes to the prevention or delay of disability and disease. Despite this evidence, most Americans are not sufficiently physically active. More than one-half of US adults do not meet the public health recommendations for physical activity and those over the age of 50 years report the highest levels of insufficient physical activity (34%). We need to take greater initiative to communicate physical activity recommendations and to support increased regular physical activity among midlife and older adults. This project implemented an internet program to provide support for older adults interesting in engaging in a well-rounded exercise program. The program was designed to be delivered in a hybrid setting (class and home) using simple and inexpensive equipment (i.e. pedometer, elastic resistance band, balance stability trainer). Design of this program is based on two areas in the literature, home and class based exercise and internet applications. Briefly, evidence from a recent review suggests that exercising at home **or** at a center improves the health and physical function of older adults. Notably, home based programs appear to have a significantly higher adherence rates than center based programs, and are superior over the long-term. According to Sciamanna et al., "the Internet has a vast capacity for disseminating patient-oriented interventions to improve the quality of the nation's care."[1] Web-based interventions provide inexpensive delivery of components of effective, but expensive interventions, such as personal feedback and individual goal-setting[2,3]. In a review by Latner [4], the author describes several interventions demonstrating the effectiveness of computer-assisted self-monitoring of caloric intake and physical activity, goal setting, response-contingent feedback, and regular prompts reminding users to enter self-reports. Ryan et al [5] reports computer interventions to be especially effective when ipsative feedback (eg, comparing current to past behavior) is utilized. This is evident in a recent pilot study examining enhanced pedometer feedback + nutritional counseling on weight loss [6]. Findings suggest that tailored, computer-generated, step-count feedback to be an affordable way to increase the physical activity and lose weight.

2. Experiment, Results, Discussion, and Significance

Recruitment: Older adults were recruited through newspaper advertisement. Potential participants were screened using the EASY (Exercise and Screening for You) tool to ensure it was safe for individuals to participate in the program. ***Assessment.*** Eligible subjects underwent a variety of assessments including a functional fitness battery, balance measures, and measurement of daily physical activity. Functional Fitness was measured using the following assessments: 1. *chair stand* (lower body strength); 2. *arm curl* (upper body strength); 3. *sit and reach* (lower body flexibility); 4. *scratch test* (upper body flexibility); 5. *up and go* (physical mobility); and 6. *12-min walk* (aerobic endurance). Daily physical activity was measured using *pedometers.* A force platform (Balance Master Platform,

NeuroCom International) was utilized to obtain the dynamic balance measure called *Limits of Stability*. The Limits of Stability assessment quantified the maximum distance a participant could lean in a given direction without losing balance. The subject's center of gravity appeared as a point in the middle of a computer screen and targets were arranged around this point. The subject leaned toward each target (front, back, left, and right) holding each position for 10s. Measured parameters were reaction time, sway velocity, directional control, endpoint excursion, and maximum excursion. ***Intervention***: The program web site was a user-friendly, interactive, secure, online method to motivate, educate, and track physical activity. The site consists of eight elements: educational material, step tracking logs and graphs, individualized step goals, strength training routines and logs, walking progression along a virtual US trail, walking competition, motivational newsletters, and incentives. Subjects formed teams of 4 to "race" across the US. They logged into the site at least once per week and recorded steps, non-translatory physical activity (swimming, gardening, etc), and home FSAH exercise sessions. Non-translatory physical activity was converted to steps and combined with daily step counts to be reported as one measure of total physical activity. Subjects received immediate feedback regarding activity accumulation and could view graphs and maps of their progress as well as team standings. Program staff provided newsletters sharing health-related information as well as team and individual progress and activity goals. FSAH-O was offered at a local senior center once per week for 50 minutes. The FSAH-O program consisted of: (a) flexibility training; (b) strength training, using elastic resistance bands; (c) balance training, using firm and pliable foam pads surfaces; and (d) increasing cardio-respiratory activity. Cardio-respiratory progression was based on an individualized approach of goal-setting and self-monitoring. A 1-week baseline (steps/day) was established as subjects performed their normal daily activities while wearing a pedometer and recording non-translatory physical activity. The web site calculated activity goals by increasing baseline values 10% week until an overall step goal (6,000-10,000 steps) was achieved. Subjects received FSAH program instructions and demonstrations during class. Photos and instructions were also provided on the web site. ***Results***: The FSAH-O group consisted of 24 male and females (age = 68.7 ± 5.5 yrs). The control group (n = 15; 74.7 ± 6.2 yrs) was drawn from a similar project. No baseline difference existed between groups or genders. Repeated measures ANOVAs revealed group x time interactions ($p<.05$) on most measures. SFT improvements were noted in the FSAH-O group: Chair Stand 10%, Arm Curl 22%; Up-&-Go 8%; 12-min Walk 18%. With respect to LOS, EPE and MXE improved in two directions (R 21%, R 8%; L 7%, L 7%). The control group did not change on any variable. With respect to website use, 20 of 24 users successfully entered physical activity data. Four subjects lacked computer experience and were non-compliant with website entry. In lieu of this, subjects recorded steps and other activities on paper logs and program staff entered data in subject accounts. Ninety-eight percent of subjects entered their daily activities each day of the project. One hundred percent of subjects completed at least one FSAH session at home, and 91% of subjects completed 3 home sessions. Subjects appeared to enjoy the friendly team competitions.

3. Conclusions

Given the brief duration of this project, results were promising. Significant improvements were noted for most functional fitness tests. Balance improvement was not as prevalent; however there was a trend for improvement in EPE and MXE for the front and back directions. Longer project duration would likely lead to additional balance improvements. Due to the progressive nature of the program and subject's poor initial balance, more challenging balance exercises would come in latter weeks of a longer program. More importantly, overall, subjects were successful in using the website to track their daily activity, suggesting an internet-based physical activity program could be successful in motivating older adults to initiate and maintain a physical activity program. Future studies will be more qualitative in nature, evaluating older adult's opinions and suggestions regarding the usability of the program website.

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