Feature Article

A randomized controlled trial of an office-based physical activity and physical fitness intervention for older adults

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A B S T R A C T
This primary care-based study aimed to evaluate the efficacy and feasibility of a 24-week intervention on physical activity and physical fitness in a group of community-dwelling older adults. Secondary aims were to determine the effect of the intervention on self-efficacy and barriers to physical activity. Intervention participants (n = 36) received an exercise prescription based on physical fitness test results and personal choice. Comparison participants (n = 36) received a nutrition intervention. Both groups received 10 follow-up telephone calls. Repeated measures ANOVA analyses showed no direct effects of the intervention on the primary outcomes of physical activity or physical fitness in the intervention group (p > 0.05). Secondary analyses with ANCOVA that included potential moderating variables of age, gender, income, BMI, and support for physical activity showed that the intervention group significantly increased frequency of all physical activity (F = 3.50, p < 0.05) as well as the fitness outcomes of lower body strength (F = 3.63, p < 0.05) and aerobic endurance (F = 4.03, p < 0.05). This is one of the first studies to evaluate the use of fitness measures to increase physical activity and fitness in the primary care setting. The intervention improved some aspects of physical activity and fitness for selected participants.

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Regular physical activity (PA) can help prevent or delay many diseases and disabilities attributed to aging.1 The growing number of older adults and the burden of inactivity-related health problems mandate that health care providers develop strategies to help their older adult clientele increase activity. The US Preventative Services Task force currently recommends PA behavioral counseling in the primary care setting with selected individuals2 and the American College of Sports Medicine [ACSM] recommends health care provider assessment and counseling their patients about the benefits of PA.3 While some health care providers may ask their patients about activity,4 they frequently stop short of further assessment. PA self-report often leads to substantial over-reporting.5,6 This has led researchers to suggest that using objective PA and fitness measures would likely yield greater accuracy in determining actual PA as well contribute to stronger associations between PA and health outcomes.5,6

The overarching goal of this primary care-based study was to assess the efficacy and feasibility of a 24-week intervention on PA and physical fitness in a group of community-dwelling older adults. The specific aims were to determine the effect of a PA intervention on multiple outcomes measures of physical activity (e.g., weekly caloric expenditure, weekly frequency of physical activity) and physical fitness (e.g., lower body strength, aerobic endurance) compared to an attention-comparison group receiving a healthy diet intervention. Secondary aims were to determine the effect of the intervention on self-efficacy and barriers to PA, and to evaluate the acceptability of the intervention.

1. Theoretical basis for the intervention

The Adapted Physical Activity Model (APAM) frames this intervention. Fig. 1 delineates the components of the model. The APAM is informed by the Interaction Model of Client Health Behavior (IMCHB).7 The parent model proposes that people are unique agents who are capable of change and who can be active participants in their own health care. The IMCHB suggests that patients should be given maximum control in determining actions taken to preserve their health.7 Based on social-cognitive theory
and choice, the model gives participants the freedom to choose type and frequency of PA. Self-efficacy, a person’s confidence in his/her capabilities to carry out a behavior, is positively linked to PA. Background variables, including demographic characteristics, social influence and environment all affect physical activity.

Critical components, considered mediators in the model, include self-efficacy and barriers to PA. There is thought to be a strong positive relationship between self-efficacy and objective measures of fitness. Barriers, the disadvantages to engaging in a behavior, have also been demonstrated to be significantly related to change in PA and fitness in older adults. Identifying barriers and developing strategies to overcome these barriers are critical parts of the APAM model.

2. Background

Among older adults, behavioral interventions that use goal setting exercise prescriptions and telephone follow-up show improvement in PA. Choice-based and tailored interventions also show improvement in physical activity with older adults. These findings support the notion that important components of a successful plan to improve PA in older adults are: goal setting, focusing on PA as a single life-style change, having strong follow-up, and providing freedom to choose a regimen. This study’s intervention combined many of the key components outlined above (e.g., goal setting for PA and fitness) and specifically addressed self-efficacy and barriers to meeting goals as part of the intervention.

Several studies reported on PA counseling with older adults by primary care providers or providers in direct collaboration with others. In many of these reports, objective fitness measures were not used as either a basis of these interventions or as an outcome measure. For older adults, there has been increased interest in interventions that improve fitness/function-based outcomes in addition to outcomes that increase levels of PA.

3. Methods

3.1. Design

This study was a randomized controlled trial with an attention-comparison group. Study duration was 6 months, with repeated measurements taken at 3 and 6 months following baseline assessment for a total of 3 assessments on the primary outcomes for analysis. The study was approved by the university institutional board and the clinic board.

3.2. Setting and participants

The study setting was a nurse-managed clinic in eastern Washington that provides primary care to low income and underserved persons. Direct-care staff included a nurse practitioner who is the clinic director, a physician assistant, a counselor, a nurse, 2 medical assistants, and a variety of medically trained volunteers. At the time of the study there were 178 patients who were over the age of 60 years in the clinic population.

3.3. Inclusion/exclusion criteria

Telephone pre-screening excluded persons who reported that they: 1) were already active (more than 150 min per week of moderate PA; 2) were less than 60 or older than 85 years of age; 3) did not have a phone; or 4) would be away for greater than one month at a time and/or not able to complete the 6-month study. Clinic face-to-face screening was then used to identify eligible participants who: 1) had a satisfactory score on the Mini-Cog (able to recall 1–2 of 3 nouns with correct clock draw); 2) had a PAR-Q screening that identified no serious medical condition that could limit participation in moderate PA including angina during activity or at rest, or balance problems and 3) were not physically active more than 150 min per week.

3.4. Sample size determination

We calculated sample size based on published data for fitness test measurements [Mean (SD), unit] including chair stand, arm curl, 2 min step and 8-ft up-and-go. A 10% change from pre- to post-intervention scores for these measurements corresponded to medium effect size. To detect medium-sized effects, we planned to enroll a minimum of 64 study participants.

3.5. Procedure

Clinic staff sent a letter to patients who met the age criteria (N = 163) and placed flyers in the waiting room informing clinic patients about the study. In order to enroll more participants, a second wave of letters was sent 5 months into the study. Persons who contacted the research office were randomized by sealed envelope then pre-screened for eligibility. To maintain study arm balance, we used 10 envelopes (5 intervention and 5 control), assigning all 10 envelopes before we started over. Interested persons who met the telephone pre-screening criteria were scheduled for a clinic appointment to obtain informed consent and to further screen for eligibility. Persons with positive risk were assessed by their health care provider for contraindications prior to participation. After consenting, all participants completed written questionnaires, read by the P.I., and fitness testing to assess muscle strength, aerobic endurance, and balance. Tests to evaluate fitness were completed in a specified order to minimize fatigue. Data collection was repeated at 3 and 6 months. All participants received $20.00 for attending each in-person meeting.
3.5.1. Intervention group procedure

After fitness testing, the PI had a face-to-face discussion of fitness test results with participants. The individual’s results were compared with standardized results of persons of like age and gender.36 Participants completed How Ready Are You to Change Your Physical Activity. Adapted from the PACE intervention, this survey assessed desire to change endurance, muscle strengthening and balance activities.36 Participants set PA goals for the next 2 weeks that they enjoyed and felt safe in doing. They received a written prescription with the activity goal(s) written on it and asked to record their activity in a diary. If they did not choose a goal, they still continued the study. Arrangements were made to follow-up via phone in 2 weeks. Ten follow-up phone calls were placed to each participant over the course of the intervention. Telephone call content was outlined and included a scripted discussion of barriers and overcoming barriers as well self-efficacy (vicarious experience, positive framing, performance successes, and physiologic and affective states). Table 1 provides a description of the use of self-efficacy and barriers in each telephone contact. At 3 months, interim fitness test results were reviewed and intervention participants were invited to revise their goals to increase their activity. Final testing occurred at 6 months.

3.5.2. Attention-comparison group procedure

The PACE project protocol was followed for the nutrition intervention.36 How Ready Are You to Change Your Diet was completed.36 Participants were encouraged to set goals for the next 2 weeks to increase fruits and vegetables and/or decrease fats or portion sizes, information was provided about the goal. We also provided a prescription style note with the nutrition goal(s) written on it. If comparison participants chose not to set a goal, they were still included in the study. The comparison group received ten follow-up telephone calls related to their goals and healthy eating, and their fitness test results were not discussed with them until completion of the study. The principal investigator delivered the intervention and the follow-up telephone calls for both groups.

3.6. Intervention fidelity

To maximize fidelity, the study design was explicitly outlined in a procedure manual. Intervention and comparison group-specific procedures were used to minimize contamination. In order to assure delivery of all components, a checklist was followed for each of the face-to-face meetings as well as the follow-up telephone calls for both groups. The intervention was reviewed by 2 physical activity experts who provided feedback related to content and implementation. The fitness procedures were included in the patient’s research record to facilitate easy referral to testing instructions. Each follow-up telephone call included scripted questions about the goal, any obstacles to meeting the goal, any need or desire to change the goal, and specific barriers encountered. Specific content related to the critical components of the framework for the study was included in each phone call. The number of telephone calls delivered to the intervention and control groups was tracked and was not significantly different between the 2 groups.

3.7. Measurement

3.7.1. Outcome: physical activity

The 41-item CHAMPS Questionnaire measured weekly frequency and duration of PA.33 Items are presented as four unique PA outcome scores: 1) estimated weekly caloric expenditure all activity, 2) estimated weekly caloric expenditure per week moderate activity, 3) weekly frequency of all activity, and 4) weekly frequency of moderate- or greater-intensity activity. Moderate-intensity activity was defined as those activities that require energy expenditure at ≥3 metabolic equivalents. Using these four outcomes allowed for estimation of activity based on current recommendations for moderate activity and for evaluation of all forms of activity, an important consideration for older adults, as some may not be able to engage in moderate-level activity.3 Activities not included in CHAMPS questionnaire were assigned values using activity codes from the Compendium of Physical Activities Tracking Guide.38 In our study, a subset of 34

<table>
<thead>
<tr>
<th>Table 1 Outline of face-to-face and telephone intervention.</th>
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<tbody>
<tr>
<td><strong>Model component</strong></td>
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<tr>
<td>Building SE (self-efficacy) (verbal persuasion using positive framing)</td>
</tr>
<tr>
<td>Mutual goal setting</td>
</tr>
<tr>
<td>SE enhancement (small performance successes)</td>
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<tr>
<td>Barriers Social influence: health care provider support of PA</td>
</tr>
<tr>
<td>SE enhancement (self-monitoring)</td>
</tr>
<tr>
<td>Components of telephone follow-up</td>
</tr>
<tr>
<td>#1/wk2: Barriers, SE (enactive mastery: noting personal successes, self-monitoring)</td>
</tr>
<tr>
<td>#2/wk 4: Barriers, SE (physiologic and affective states)</td>
</tr>
<tr>
<td>#3/wk 6: Barriers, SE, social influence</td>
</tr>
<tr>
<td>#4/wk8: Barriers, mutual goal setting</td>
</tr>
<tr>
<td>#5/wk10: Barriers, SE (vicarious experience, verbal persuasion)</td>
</tr>
<tr>
<td>#6/wk14: Barriers, SE (positive framing)</td>
</tr>
<tr>
<td>#7/wk16: Barriers, SE (enactive mastery, performance success, vicarious experience)</td>
</tr>
<tr>
<td>#8/wk18: Barriers, SE (enactive mastery, self-monitoring)</td>
</tr>
<tr>
<td>#9/wk20: Barriers, SE (vicarious experience, verbal persuasion)</td>
</tr>
<tr>
<td>#10/wk22: Barriers, SE (verbal persuasion, physiological and affective states)</td>
</tr>
</tbody>
</table>

* Bandura, 1997.
participants volunteered to wear or wore an accelerometer (Actical<sup>TM</sup>) at the iliac crest of the hip for one week prior to their one of their clinic visits. The CHAMPS weekly caloric expenditure and weekly frequency for moderate activity correlated with the Actical<sup>TM</sup> measure for energy expended in moderate activity ($r = 0.38$ and $0.36$, respectively) as well as with caloric expenditure and frequency/week for all activity correlated ($r = 0.37$ and 0.40, respectively) in the subgroup.

3.7.2. Outcome: physical fitness

Four parts of the Senior Fitness Tests (SFT) specific to muscle strength, endurance, and balance that could be measured in the confines of a clinic office were used to measure fitness levels. This battery of tests is standardized by age and gender and takes approximately 10 min to administer. The chair stand measured lower body strength. The test measures the number of times an individual rises from a seated position to standing in 30 s. Higher scores represent better lower body strength. The arm curl measured upper body strength. The test measures the number of times a person curls a hand weight (5 lbs. for women, 8 lbs. for men) from arm extension to flexion in 30 s. The 2-min step test measured aerobic endurance. In this test, the number of steps taken in place where the knee reaches the knee and iliac crest are counted for 2 min. The 8-foot up-and-go measured agility and dynamic balance. This tests the time required to get up from a seated position, walk as quickly as possible around a cone that is 8 feet away, and return to sitting. The SFT data are normed. Normed scores make it possible for older adults and health care providers to compare quantitative results with others of the same age and gender. Body mass index (BMI) is also considered a component of fitness in the SFT. BMI was computed as pounds/height in inches squared (National Heart, Lung, and Blood Institute, [NHLBI] 2002). A Tanita<sup>TM</sup> digital scale (model BWB-800-S) measured weight and a wall mounted stadiometer (Health-o-Meter, Bridgeview, IL) measured height.

3.7.3. Additional measures

We assessed baseline demographic variables. The influence of family and friends was measured using three items from the Social Support for Exercise Survey. Participants were also asked to rank the encouragement they received for PA from their health care provider. Higher scores equated to higher encouragement. Data were taken at each time point and computed as the total points for each time. We also used ANCOVA with Greenhouse—Geisser adjustment to evaluate the potential moderating effect of the baseline variables (age, gender, income, BMI, friend/family support, and health care provider support) and their interaction with group assignment on the PA and physical fitness outcomes. Acceptability and feasibility were evaluated with descriptive statistics. All of our effect sizes are reported as partial eta-squared (i.e., $\eta^2$) values, which is an assessment of the commonly referenced ‘variance accounted for’ (i.e., $R^2$) when estimating an ANOVA or ANCOVA model instead of a regression model. We set our alpha at $p < 0.05$ for all statistical tests.

4. Results

4.1. Participant flow

Participants were initially recruited from January to June 2010. A second wave of letters was sent from the clinic to potential participants in August of 2010. All data collection was completed by March 2011. There were 72 participants, 53 women and 19 men between the ages of 61 and 85 years. Mean age was 66.2 years ($SD = 5.2$). Eight participants, seven in the intervention group and one in the comparison group, withdrew from the study prior to its completion. Five participants withdrew prior to the 3-month assessment and 3 withdrew prior to the 6-month assessment. This resulted in an 11% dropout rate. Participants who withdrew reported significantly lower baseline caloric expenditure estimated from the CHAMPS for all activity and in moderate-intensity activity as well as the frequency in times per week of activity compared to those who completed the study. Those who withdrew did not have significant differences in frequency in times per week of moderate activity and in any of the fitness outcome measures. Fig. 2 shows enrollment and attrition patterns in the study.

4.2. Baseline findings

Table 2 shows a descriptive summary of the sample. Most participants were female, white, unmarried, and earned less than $20,000/year. Mean age was 66 years. Mean years of education was 2 years post high school. The most common conditions were musculoskeletal problems including arthritis ($n = 33$, 49%), hypertension ($n = 27$, 36%), type II diabetes ($n = 20$, 28%), respiratory problems ($n = 18$, 25%), and other cardiac and vascular disease ($n = 18$, 25%). Only 2 participants reported no chronic conditions. Randomization resulted in groups that were similar in most categories. However, the intervention group had higher BMI ($34.2$ [$SD = 8.0$] compared to $29.9$ [$SD = 5.1$]) and lower physical activity self-efficacy ($39.4$ [$SD = 20$] compared to $49.9$ [$SD = 22.8$]) than the comparison group ($p < 0.05$).

4.2.1. Social support

Twenty six of 72 (36%) of participants reported family encouragement to do PA sometimes, often or very often and 19 of 70 (27%) reported friend encouragement. Fifty two of 71 (73%) reported that their health care provider sometimes, often or very often encouraged activity.
4.2.2. Self-efficacy
Mean self-efficacy for the participants was approximately midrange at 44.6 (possible range 0–100). Participants were most confident that they could exercise alone and least confident that they could exercise if they felt pain while engaging in activity, if they were too busy, or too tired.

4.2.3. Barriers
The mean score from the barrier scale of 36.7 indicated that the participants tended toward disagreeing with most of the barrier statements and ascribed to comparatively fewer barriers. The highest mean individual barriers related to physical problems and symptoms, and included difficulty to exercise when aching, poor health, and shortness of breath with exercise.

4.2.4. Physical activity
At baseline, participants’ mean weekly estimated caloric expenditure in all types of PA was just over 1000 kcal/week. Baseline estimated caloric expenditure in moderate- or vigorous-intensity PA was 317 kcal/wk. Participants reported that they engaged in all types of intensity of physical activity for a mean of 13.6 times per week and moderate-intensity activities for a mean of 3.7 times per week.

4.3. Primary aim analysis: change in physical activity and physical fitness over time

4.3.1. Weekly estimated caloric energy expenditure
Participants in the intervention group increased their weekly estimated caloric energy expenditure in all activities from baseline to 3 months as did the comparison group. At 6 months, the intervention group increased their estimated caloric energy expenditure for all activity by a mean of 1543.6 kcal/week from baseline. Comparison participants increased their estimated caloric energy expenditure for all activity by 695.1 kcal/week for the same time period. Although the estimated caloric energy expenditure increased for both groups, there were no significant group differences over time or any significant group by time interactions in estimated calories per week in all activity and in estimated calories per week in moderate-intensity activities.

4.3.2. Frequency of PA
Weekly frequency for all PA increased in the intervention group at three months and dampened slightly at 6 months, while the comparison group showed a mean decrease in weekly frequency of all activity at both time points. There were no significant group differences or group by time interactions for changes in weekly frequency of moderate activity and all weekly frequency of PA between the groups.
4.3.3. Physical fitness

The fitness outcome percentiles for all tests increased from baseline for both the intervention and comparison groups. However, there were no significant group differences or group by time interactions when compared to baseline for both groups. Table 3 provides a report of the change reflected in each outcome at 3 and 6 months compared to baseline.

4.4. Secondary aim analysis: self-efficacy and barriers

There was no significant change in total barriers and total self-efficacy between the 2 groups at 3 and 6 months.

4.5. Additional analysis: baseline covariates of physical activity and physical fitness

In our repeated measures ANCOVA analyses we modeled intervention group as well as the following covariates to assess for potential moderation (i.e., interaction between the intervention and relevant baseline covariates) and their individual main effects: age, gender, income, BMI, friend/family support of physical activity/fitness, and health care provider support. Higher friends/family support (\( F = 3.23, \eta^2 = 6.2\%, p < 0.05 \)) and higher health care provider support (\( F = 3.76, \eta^2 = 7.1\%, p < 0.05 \)) interacted significantly with higher change in total weekly caloric energy expenditure for all activities. Males had a significantly higher increase in estimated caloric energy expenditure/week for all activity compared to females (\( F = 6.35, \eta^2 = 11.5\%, p < 0.05 \)). In addition, intervention participants significantly increased frequency of all PA per week relative to comparison participants (\( F = 3.27, \eta^2 = 6.5\%, p < 0.05 \)) when controlling for the baseline covariates.

With regard to fitness, when controlling for the covariates listed above, there was a significant interaction between group assignment and increased lower body strength over time (\( F = 3.59, \eta^2 = 6.7\%, p < 0.05 \)). Higher income status significantly co-varied for intervention participants who improved their lower body strength over time (\( F = 3.63, \eta^2 = 6.8\%, p < 0.03 \)). Participants with lower BMI significantly co-varied with improved lower body strength over time (\( F = 6.15, \eta^2 = 11.0\%, p < 0.05 \)) in that participants with lower BMI’s did improve their lower body strength performance over time. Intervention participants displayed significantly higher levels of aerobic endurance, (\( F = 4.03, \eta^2 = 7.7\%, p < 0.05 \)). BMI (\( F = 8.08, \eta^2 = 15.5\%, p < 0.05 \)) and age (\( F = 3.90, \eta^2 = 7.5\%, p < 0.05 \)) significantly co-varied with endurance over time.

4.6. Intervention acceptability and feasibility

Twenty eight of the 29 intervention participants completed an evaluation at the end of the study. Twenty seven agreed or strongly agreed that the fitness tests results provided them with useful information about their abilities. Twenty two reported that the knowing their fitness test results encouraged them to do physical activity. Most noted that the biweekly telephone calls were not too frequent (\( n = 24 \)) and were preferred to a computerized follow-up (\( n = 22 \)). Advice was seen as understandable (\( n = 28 \)) and were preferred to a computerized follow-up (\( n = 22 \)).

5. Discussion

This study included the use of fitness measures to increase PA and physical fitness among older adults with a broad range of PA and fitness levels. Participants evaluated the intervention positively and study sub-samples improved several aspects of physical activity and fitness.

Table 3

Comparison of changes in physical activity and physical fitness outcomes from baseline to 3 and 6 months according to group.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time 1 (baseline) M (SD)</th>
<th>Time 2 (3 months) M (SD)</th>
<th>Time 3 (6 months) M (SD)</th>
<th>F-value (( \eta^2 ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical activity</td>
<td></td>
<td></td>
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<tr>
<td>Weekly caloric expenditure (all activity)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison</td>
<td>1124.3 (1062.2)</td>
<td>2950.9 (3263.9)</td>
<td>1819.4 (1478.8)</td>
<td>0.380 (0.06%)</td>
</tr>
<tr>
<td>Intervention</td>
<td>893.7 (1019.1)</td>
<td>2789.4 (2362.6)</td>
<td>2437.3 (2258.7)</td>
<td></td>
</tr>
<tr>
<td>Weekly caloric expenditure (moderate activity)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison</td>
<td>297.5 (923.1)</td>
<td>1334.5 (2246.3)</td>
<td>743.1 (966.7)</td>
<td>1.761 (3.00%)</td>
</tr>
<tr>
<td>Intervention</td>
<td>356.4 (716.6)</td>
<td>1369.55 (1897.8)</td>
<td>1178.8 (1670.7)</td>
<td></td>
</tr>
<tr>
<td>Weekly frequency (all activity)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Comparison</td>
<td>14.4 (398.1)</td>
<td>12.5 (8.1)</td>
<td>9.8 (6.9)</td>
<td>0.188 (0.03%)</td>
</tr>
<tr>
<td>Intervention</td>
<td>12.8 (9.6)</td>
<td>13.9 (10.6)</td>
<td>12.3 (6.6)</td>
<td></td>
</tr>
<tr>
<td>Weekly frequency (moderate activity)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison</td>
<td>3.2 (10.1)</td>
<td>4.2 (5.1)</td>
<td>2.4 (2.8)</td>
<td>1.297 (2.20%)</td>
</tr>
<tr>
<td>Intervention</td>
<td>4.1 (5.9)</td>
<td>4.8 (6.2)</td>
<td>4.0 (5.1)</td>
<td></td>
</tr>
<tr>
<td>Physical fitness</td>
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</tr>
<tr>
<td>Lower body strength percentile (chair stand)</td>
<td>28.8 (5.6)</td>
<td>33.9 (24.9)</td>
<td>39.6 (29.9)</td>
<td>1.593 (3.00%)</td>
</tr>
<tr>
<td>Comparison</td>
<td>31.7 (23.2)</td>
<td>39.8 (27.8)</td>
<td>50.3 (31.9)</td>
<td></td>
</tr>
<tr>
<td>Upper body strength (arm curl)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison</td>
<td>38.0 (26.8)</td>
<td>49.5 (25.4)</td>
<td>56.8 (25.5)</td>
<td>0.486 (0.80%)</td>
</tr>
<tr>
<td>Intervention</td>
<td>42.9 (23.1)</td>
<td>58.7 (28.2)</td>
<td>63.0 (26.9)</td>
<td></td>
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<tr>
<td>Aerobic endurance percentile (2-min step)</td>
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<tr>
<td>Comparison</td>
<td>30.4 (21.0)</td>
<td>40.2 (26.9)</td>
<td>43.0 (27.4)</td>
<td>2.366 (4.00%)</td>
</tr>
<tr>
<td>Intervention</td>
<td>39.2 (29.5)</td>
<td>46.8 (33.0)</td>
<td>55.4 (33.7)</td>
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<tr>
<td>Balance percentile (8-foot up-and-go)</td>
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</tr>
<tr>
<td>Comparison</td>
<td>51.7 (23.3)</td>
<td>61.9 (29.9)</td>
<td>59.3 (29.5)</td>
<td>0.002 (0.00%)</td>
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<tr>
<td>Intervention</td>
<td>56.6 (29.6)</td>
<td>57.4 (33.3)</td>
<td>63.2 (28.5)</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison</td>
<td>30.0 (1.6)</td>
<td>29.3 (4.9)</td>
<td>29.5 (5.1)</td>
<td>4.621* (7.00%)</td>
</tr>
<tr>
<td>Intervention</td>
<td>34.1 (8.0)</td>
<td>33.7 (7.8)</td>
<td>32.8 (7.1)</td>
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</tr>
</tbody>
</table>

* p < 0.05.
5.1. Physical activity

Getting older adults to increase PA is a major challenge and few studies have attempted to use objective fitness measures as a basis for counseling to promote physical activity. The intervention group’s significant increase in frequency of all physical activity when controlling for baseline moderators provides limited support for the intervention. With regard to moderate activity, the sample’s baseline estimated caloric energy expenditure of 317 kcal/week was considerably less than recommendations of 1000 kcal/week. Further, the increase in weekly estimated caloric expenditure per week in all activities by approximately 1543 kcal/week, though not statistically significant, is clinically important, especially for older adults, a group with a wide range of physical activity and fitness. This caloric expenditure, equivalent to walking five miles per week, has clinical relevance for reducing risks for developing chronic diseases, increasing longevity, and enhancing functional independence. The increase in moderate-intensity activity by approximately 185 kcal/week in the intervention group fell short of the level of activity reported by Stewart and colleagues that showed increases of 500 kcal/week at the end of their 12-month study period. Petrella et al also reported greater change using exercise prescriptions and individual counseling based on submaximal step test results. Intervention participants increased the number of times per week that they engaged in moderate-intensity PA, but they still did not achieve the recommended rate of 5 times per week or more.

Our use of the CHAMPS measure provided participant’s self-reported number of hours per week performed in specific types of PA but did not provide a precise measurement of weekly minutes engaged in moderate-intensity activities. Physical activity measures that delineate specific time spent at activities would help determine whether interventions meet recommendations of 30 min of moderate-intensity activity on at least 5 days per week. The use of accelerometers and other objective data collection methods are a reliable method to assess time spent at different intensities of PA.

5.2. Physical fitness

Our findings of improved lower body strength and aerobic endurance are encouraging. Both of these tests relate to mobility, an attribute central to maintaining functional independence and safety for older adults. However these results must be viewed with caution as fitness test results were used as a basis for the intervention. This may have led intervention participants to exert more effort in the tests at the subsequent time points. Gains in all fitness outcomes for both groups might have been the results of the Hawthorne effect as well as increased familiarity with the tests. It is also important to note that these intervention effects only emerged after controlling for baseline covariates.

5.3. Limitations and recommendations

A potential limitation of this trial was the differential attrition between groups. Study drop outs had very low levels of physical activity, which may indicate that the intervention did not appeal to all participants. The bundling of fitness testing with choice of activity, exercise prescription and follow-up telephone calls made it difficult to determine which part of the intervention had the greatest effect. Continued research intervention efforts are needed to determine the types of interventions that appeal to older adults with the lowest fitness levels in order to help this group reduce risks for dependence and disability. Replicating this work in groups with a broader range of fitness levels would help researchers identify the effect of improving fitness on function and independence.

Interventions that improve PA and fitness/function should be a high priority for prevention and treatment in older adults. In primary care, nurses and nurse practitioners are at the front line of care and are important facilitators for good health practices for older adults. That being said, there are real health promotion challenges for primary care-based clinics. Reimbursement for counseling services needs to be assured, as current Medicare reimburses US Preventative Services Task Force levels A and B level of evidence and does not include PA. As empirical support for interventions in primary care increases and as we move to other delivery models, intensive interventions such as this will likely be a component of future care.

References


