Project LIFE: A Partnership to Increase Physical Activity in Elders With Multiple Chronic Illnesses

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The authors describe a medical center-based randomized trial aimed at determining the feasibility and effectiveness of partnering patients and primary-care providers with an exercise health counselor. Study participants included 165 veterans age 70 years and older. The primary end point was change in physical activity at 3 and 6 months comparing patients receiving high-intensity physical activity counseling, attention control counseling, and usual care after receiving standardized clinic-based counseling. We noted a significant Group \times Time interaction (p = .041) for physical activity frequency and a similar effect for caloric expenditure (p = .054). Participants receiving high-intensity counseling and usual care increased physical activity over the short term, but those with usual care returned to baseline by the end of the study. The intervention was well received by practitioners and patients. We conclude that partnering primary-care providers with specialized exercise counselors for age- and health-appropriate physical activity counseling is effective.

Key Words: aging, exercise, geriatric assessment, primary care, health counseling, randomized clinical trial, chronic disease, veterans

Physical activity is known to increase independence, reduce functional decline, and ameliorate adverse health effects of many chronic conditions (Fiatarone Singh, 2002; Heath & Stuart, 2001). Despite the known benefits of physical activity, most older adults fail to meet existing physical activity guidelines (Agency for Healthcare Research and Quality, Centers for Disease Control, & U.S. Department of Health and Human Services, 2001). The primary-care setting might be an ideal environment for health-promoting activities, including physical activity counseling, because over 90% of older adults visit their primary-care provider at least once per year (National...
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Unfortunately, physical activity counseling often takes a back seat to other pressing health concerns. Primary-care providers, faced with caring for patients with multiple and often complicated conditions, find little time to counsel their patients in physical activity. Even those who routinely advocate increased physical activity often lack training, expertise, and time to adequately counsel a geriatric patient with multiple medical conditions (Chakravarthy, Joyner, & Booth, 2002; Morey & Sullivan, 2003). To complicate matters, the U.S. Preventive Services Task Force on behavior counseling in primary care to promote physical activity recently determined that there is insufficient evidence to conclude that counseling in the primary-care setting is effective; primarily because of a lack of rigorous, controlled physical-activity-counseling trials (Eden, Orleans, Mulrow, Pender, & Teutsch, 2002). The task force noted that multicomponent interventions, combining provider advice with behavioral interventions and follow-up, appeared to be most promising (U.S. Preventive Services Task Force, 2002). In contrast, the VA National Center for Health Promotion and Disease Prevention has recommended that primary-care clinicians continue to counsel patients to engage in physical activity, stating that the U.S. Task Force simply did not have enough evidence to recommend for or against counseling in the primary-care setting, an indication that additional research in this area is needed.

Most trials to date examining the effect of physical activity counseling were directed at healthy adults, with counseling aimed at improving cardiovascular-risk profile (Eden et al., 2002). The few studies that included older adults generally consisted of healthy elders (Eakin, 2001). To date there is a paucity of research aimed at physical activity counseling for adults with a complicated health status. We have found no studies directed at multicomponent physical activity counseling for this population. Having a provider advise patients to walk every day might be insufficient for functionally impaired geriatric patients. New approaches are needed to incorporate physical activity into this challenging patient population. The project we describe in this article is an initial effort at examining the effect of a multicomponent physical activity program targeted the functionally limited older adult.

For 20 years we have directed a hospital-based outpatient exercise program for older adults, many of whom have multiple chronic conditions (Morey, Crowley, Robbins, Cowper, & Sullivan, 1994; Morey, Pieper, Crowley, Sullivan, & Puglisi, 2002). We recently added a physical-activity-counseling program for patients who, because of poor health status or traveling constraints, were unable to attend our facility-based program. Our next step was to determine whether these activities could be incorporated into our geriatric and primary-care clinics in order to reach out to the broadest patient population possible. In this article we describe the results of a pilot study to determine change in physical activity among older veterans randomized to a 6-month program of intensive physical activity counseling compared with either attention control health counseling or usual care after receiving detailed physical activity counseling once in a clinic-based setting. For this study we created a partnership between primary-care providers, physical activity health counselors, and older, in some cases physically frail veterans. Secondary endpoints included changes in self-reported physical function, physical performance (gait speed, 6-min-walk time, and timed up-and-go), self-efficacy, health-related quality of life, vitality, and pain. Feasibility was assessed by our ability to get primary-care
providers to agree to undergo training and adhere to the requirements of our study and successfully recruit patients who most likely had multiple medical conditions and high levels of functional impairment.

**Methods**

Project LIFE — Leisure-time activity counseling to Improve Fitness in Elders — was conducted at the Durham Veterans Health Affairs Medical Center (VHAMC). The protocol for the study was reviewed and approved annually by the Durham VHAMC institutional review board.

**Design**

This randomized, controlled trial was designed to determine feasibility and evaluate changes in physical activity and other secondary endpoints among older veterans receiving three different amounts of physical activity counseling after receiving detailed physical activity counseling once in a clinic-based setting (see Figure 1). Patients were randomized, by computer-generated blocked assignment to receive one of three doses of counseling: baseline only (usual care), baseline plus nine counseling calls on disease management or prevention (attention control), or baseline plus nine counseling calls on increasing physical activity plus automatic provider endorsement and quarterly progress reports (high-intensity counseling).

**Conceptual Models Underlying the Intervention**

Project LIFE builds on tested conceptual models and intervention strategies that have been applied to a wide variety of health behaviors. We used the transtheoretical model and components of motivation interviewing. An important feature of the intervention is that it incorporates patients' stage of readiness for physical activity. The transtheoretical model has been demonstrated to be effective in motivating

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**Figure 1 — Study design.**
individuals to increase their level of physical activity (Marcus, King, Clark, Pinto, & Bock, 1996; Marcus, Rakowski, & Rossi, 1992). The transtheoretical model was the primary theoretical framework used by the primary-care providers in this study (Patrick et al., 1994). Tailored health communications are an important component of the intervention because they can foster behavioral changes conducive to health (Marcus et al., 1998). Although a generic physical activity intervention might improve adherence through reminders, a tailored intervention can address issues that are specifically relevant to a particular patient. These issues include improving inadequate knowledge and understanding of the effect of physical activity on a particular chronic condition, counseling on potential barriers, and attending to some concerns that are not discussed in a provider’s office given time constraints.

Once a patient’s stage of change has been identified, the health-care counselor can help facilitate the patient’s progression and movement through stages over time, as was the case for patients in our study randomized to receive high-intensity counseling. Motivational interviewing is a framework that can help facilitate this movement (McBride & Rimer, 1999; Resnicow et al., 2002). Motivational interviewing is not a discrete intervention strategy but an amalgamation of principles and techniques drawn from several theoretical paradigms. A key goal of motivational interviewing is to help individuals work through their ambivalence about behavior change. Motivational interviewing assumes that, rather than trying to convince patients to change, providers would be more effective if they elicited arguments for change from patients themselves.

A final theoretical construct underlying the intervention is that of self-efficacy. A component of social-cognitive theory, self-efficacy involves a “conviction that one can successfully execute the behavior required to produce the outcomes” (Bandura, 1977, p. 193); that is, individuals must believe that they possess the skills necessary to achieve goals. As applied to physical activity, self-efficacy therefore holds that improving physical activity requires active and effective patient participation in both care and goal setting for the disease (McAuley, 1993). Self-efficacy has been widely studied and applied to physical activity. It is considered one of the strongest determinants of physical activity and subsequently was a considered an outcome measure of interest (McAuley & Blissmer, 2000; McAuley, Courneya, & Lettunich, 1991).

**Participants and Recruitment Process**

All patients age 70 and older followed in the Durham VHMAC geriatric and primary-care clinics were screened for participation in this study. The participant recruitment and project flow, depicted in Figure 2, involved examining the medical records of age-eligible participants to rule out individuals with diagnoses indicating terminal disease, unstable angina, unresolved ventricular tachycardia, stroke with moderate to severe aphasia, active substance abuse, uncontrolled hypertension, chronic obstructive pulmonary disease requiring two or more hospitalizations within the preceding 12 months, or severe chronic pain that would preclude their ability to exercise. Patients reporting regular physical activity, 30 min or more on 5 or more days of the week for more than 6 months, were considered ineligible for an intervention designed to increase physical activity. All other medical conditions were considered acceptable for participation in this study. Of 1,385 medical records reviewed, 914 potential participants were deemed initially eligible.
Figure 2 — Patient recruitment flow.

The primary-care provider sent a letter informing their patients about the study and notifying potential participants that we would be contacting them. At that time, each provider had the opportunity to review our eligibility criteria and exclude individuals he or she deemed inappropriate for our study, independent of our chart review. The most common reason for provider exclusion was "too frail" or "too sick" as a result of the combined burden of multiple medical
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conditions. A recruitment package describing the study was mailed out approximately 1 month before a scheduled routine-care clinic visit. Of the initial 914 potentially eligible patients, 895 were sent a recruitment packet; 19 individuals did not have an appointment during our enrollment period. Among these, we were able to contact 639 patients by telephone or in person during a time period that coincided with a routine clinic visit; 89 were determined ineligible by exclusion criteria or because of severe visual or hearing impairment, 249 refused to be interviewed, 25 were unable to participate in the immediate future, and 276 provided oral consent and agreed to further screening. These potentially eligible patients reported to the clinic 90 min before a scheduled usual-care clinic visit. Of the 276 who had agreed to further screening, 64 did not give written consent because they did not come to their scheduled appointment, their appointment was canceled, they had a change in health status, or they refused. During this visit, written consent was obtained, stage of readiness for physical activity was identified (Patrick et al., 1994), and a brief physical-performance test was completed. Of the 212 who gave written consent, the provider deemed 5 ineligible, 28 were determined too physically active by self-report of physical activity 5 or more days of the week for more than 6 months and therefore also deemed ineligible, and 179 were randomized. Four individuals withdrew from the study immediately after randomization and consequently did not complete the baseline telephone survey.

Provider Training

The VHAMC was in a transitional phase of expanding health-promotion activities during the implementation of this study. Because provider confidence and skill in physical activity counseling vary widely from provider to provider, we standardized key components of the physical activity counseling into our study design. All of the materials used for the baseline physical activity counseling were based on the Physician-Based Assessment and Counseling for Exercise (PACE) protocols, originally developed by Patrick et al. (1994) and modified for this study to address a geriatric population (Calfas et al., 1996). Different LIFE protocols (modified from PACE) were used based on an individual’s stage of readiness (transtheoretical model) for physical activity, and they incorporate elements of social-cognitive theory into an individualized counseling format (Project LIFE investigators, 2005). All geriatric and primary-care providers involved with this study received formal training in PACE counseling, which included training in interviewing techniques and assessment of stage of readiness. Developers of the PACE served as consultants to this project, approved all of the modifications to the protocols, and conducted the initial provider training.

Our concept of partnership was primarily between our health counselors, the providers, and the patients. In a sense the strongest partnering occurred between our health counselors and the providers because we gave them formal training in behavioral counseling that could be used not only for physical activity but also for other behaviors, and we took a significant time burden off the shoulders of the primary-care providers by doing the bulk of the counseling ourselves. Under this framework, the providers could spend very little time on physical activity counseling—a realistic expectation—and know that our staff would provide additional in-depth counseling to their patients. Furthermore, the patients, because we worked hand in hand with the providers, felt as if this counseling was a team effort.
**Prerandomization Physical Activity Counseling**

Each patient received baseline physical activity counseling from a health counselor that was tailored to his or her stage of readiness to engage in physical activity. One of three Project LIFE protocols, modified from the PACE, was used for the baseline counseling. The health counselor, who had extensive training in exercise and lifestyle counseling for older adults, helped each patient work through each item on the appropriate LIFE protocol. Individuals identified as precontemplators would receive primarily counseling pertaining to the benefits of physical activity. For those planning to initiate exercise (those in precontemplation or preparation), she helped patients think through and specify details pertaining to frequency, intensity, and duration of physical activity; barriers to exercise; sources of social support; and individually tailored benefits mostly related to improved physical function or reduced symptoms of chronic disease. For individuals already engaging in exercise (action), the counselor reviewed their programs and reinforced the Surgeon General’s guidelines for physical activity (U.S. Department of Health and Human Services, 1996). The LIFE protocol was appended to the patient’s medical record, and the primary-care provider reviewed it, incorporated specific tailored advice, endorsed the recommendations, and signed a contract with the patient, who agreed to follow the prescribed physical activity plan. During this clinic visit, the primary-care provider was given a final option to exclude the individual from subsequent study participation. The modifications of the PACE protocols and details of the baseline counseling are described elsewhere and include simplification of language, incorporating an emphasis on strength training, and refocusing the benefits and barriers for broader appeal to an older population (Ekelund et al., 2006).

**Intervention**

Immediately after the clinic visit, patients were randomly assigned to one of three groups described in this section. Group assignment occurred at a ratio of 2:1, such that 2 persons were assigned to high-intensity counseling for every 1 person assigned to each of the different “control” groups. All participants were given Project LIFE workbooks that looked identical on the outside but differed for each group assignment.

**High-Intensity Counseling.** Individuals randomized to the high-intensity counseling group received a workbook that included a photograph and contact information for the health counselor, a clear statement of our Project LIFE physical activity goal (to accumulate 30 min of moderate physical activity on 5 or more days of the week), a list of benefits of physical activity, the NIA workbook “Exercise: A Guide From the National Institute on Aging” (National Institute on Aging, 2001), a pedometer with instructions, a daily pedometer log, and a description of symptoms that should not be ignored. All patients whose baseline exercise prescription included walking were instructed in the use of the pedometer and asked to begin recording daily pedometer counts.

The health counselor called each patient biweekly for the first 3 months and once a month for the remaining 3 months, for a total of nine phone calls averaging approximately 18 min in length. The counseling built on the baseline physical activity plan discussed before randomization that had been endorsed by the primary-care provider during the baseline clinic visit. Each telephone call used a motivational
interviewing technique and followed a structured format based on the Activity Counseling Trial, which incorporated elements of social-cognitive theory, such as enhancing self-efficacy, cognitive reframing, and self-monitoring (King et al., 1998; McBride & Rimer, 1999), and included a systematic assessment of physical activity status, support and reinforcement for behavioral changes, a discussion of barriers and problem solving to overcome barriers, and creation of new or maintained physical activity goals. Thus the counselor employed client-centered motivational, behavioral, and cognitive techniques to encourage increased physical activity.

**Attention Control Health Counseling.** Individuals randomized to the attention control group received a workbook that included a photograph and contact information for the health counselor and a series of pamphlets and written material on nine topics unrelated to physical activity. Two thirds of the materials were selected from the National Institute on Aging *Age Pages* (National Institute on Aging, n.d.). The health counselor called each patient biweekly for the first 3 months and once a month for the remaining 3 months. The counselor followed a structured script that addressed each health topic and made no efforts at behavior modification. The total number and average length of calls were identical to those of the calls made to participants in the high-intensity counseling group.

**Usual Care.** Individuals randomized to the usual-care group received a workbook containing senior-citizen resource information, an *Age Page* from the National Institute on Aging (“Exercise: Feeling Fit for Life” [2005]), and a listing of services available through the VHAMC social workers. As described previously, we standardized “usual care” for this study with the end result being an enhanced form of usual care. Consequently, the initial prerandomization baseline physical activity counseling was more structured and detailed than the norm. Few providers are likely to devote this level of detail and time to physical activity counseling. We expected, because of competing chronic-disease management demands on the primary-care providers, that any follow-up on physical activity in the subsequent 6 months would be minimal and vary from provider to provider.

**Measures**

Participants completed a comprehensive battery of physical-performance and self-reported measures at baseline and at 3 and 6 months. Baseline physical performance was assessed during the initial screening visit, with telephone assessment of self-report measures completed within 1 week. Although the follow-up of self-reported measures was completed on a fixed schedule, the timing of the physical-performance testing was coordinated with other patient-related hospital visits, within 2 weeks of the scheduled date, so as to minimize travel burden. Trained individuals blinded to randomization status administered all the outcome-measure assessments.

**Physical Activity**

The primary outcome was increased self-reported physical activity, which was assessed using the Community Healthy Activities Model Program for Seniors (CHAMPS) activities questionnaire for older adults (Stewart, Sepsis, King, McLellan, & Ritter, 1997). The CHAMPS questionnaire provides two scores
for analysis: frequency per week of all physical activities and calories per week expended in all physical activities. The CHAMPS has been well validated as a tool for intervention studies and is sensitive to change (Stewart et al., 2001). Because the CHAMPS does not assess minutes of physical activity as a continuous variable and because our physical activity goal was to accumulate 30 min of physical activity on 5 or more days of the week, we examined number of minutes of physical activity as a secondary analysis by multiplying the midpoint of each category of hours per week by 60 for total physical activity, moderate physical activity, and moderate or fast walking or stationary biking in order to track our stated goals. We also examined, secondarily, reported pedometer step counts among individuals randomized to the high-intensity physical-activity-counseling group.

**Self-Reported Physical Function**

Change in self-reported physical function was assessed using several measures with known reliability, validity, and sensitivity to change. The physical-function subscale of the Short-Form 36 (SF-36) is a 10-item self-report of functional status with reliability coefficient estimates exceeding .90 (Ware & Sherbourne, 1992). Eight questions of self-reported difficulty in performing daily activities derived from Nagi and Rosow-Breslau’s studies of disability and modified for use in the Established Populations for Epidemiologic Studies of the Elderly were also used (Cornoni-Huntley, Brock, & Ostfeld, 1986; Nagi, 1976; Rosow & Breslau, 1966). Reliability coefficients for the Rosow-Breslau approximate .80 (VanSwearingen & Brach, 2001).

**Physical Performance**

We administered four physical-performance tests: 10-m-walk time, 30-s chair stands, 8-foot up-and-go time, and 6-min-walk time. Ten-meter-walk time was recorded in seconds as the mean of two trials for individuals walking at their usual walking speed along a 10-m course with a two- to four-step start-up. Time to walk 10 meters was converted to meters per second for comparative purposes. The other three tests were administered according to the standardized methods of Rikli and Jones (1999).

**Other Measures**

Other measures that are important predictors of physical activity behavior or covariates included self-efficacy (How confident are you that you can engage in exercise or physical activity for 15, 20, 25, 30 minutes on 3 or more days of the week?); general self-rated health, which we assessed by using Question 1 of the SF-36 (Ware & Sherbourne, 1992); and the pain and vitality subscales also derived from the SF-36 (Ware & Sherbourne). These measures have known validity and reliability, with reliability coefficients generally exceeding .80. In addition, at each follow-up we assessed change in health status in an open-ended fashion by asking if the participant had had any injuries, falls, or changes in health during the preceding 3 months. All affirmative responses were coded as positive for change in health status, with the exception of responses that reported beneficial changes in health status.
Statistical Analyses

We employed a three-arm randomized repeated-measures design, with measurements at baseline and at 3 and 6 months. Because participants were randomized, this was a two-factor model, with group serving as the between-persons factor and time serving as the within-person factor. As a first step, the distribution of each score for each of the measures was assessed. To allow for dropouts, to assess the impact of intervention, a mixed model (Laird & Ware, 1982) was implemented using SAS system software (SAS, 1988) wherein the group-by-time interaction provided the test of the intervention effect. The tests for primary (physical activity frequency) and secondary variables were performed without adjustment of the overall Type I error rate for multiple tests with significance declared at the .05 level. Because this was a pilot study, the goal was to derive parameter estimates and variances for our proposed follow-up study and, secondarily, to perform strictly controlled hypothesis tests. For our secondary analysis of pedometer counts among those randomized to the high-intensity counseling group, we used all available data, that is, any report of pedometer use collected by the health counselor during her telephone counseling session, by finding the average number of steps per day per call. Across nine calls, the change in the average number of steps was assessed using a mixed-model analysis with a single within-person factor, time.

Results

One hundred sixty-five older adults ranging in age from 70 to 94 years (mean age 78.3) who had a baseline and at least one follow-up measure were included in this study. There were no significant differences between the three groups on any characteristics (see Table 1). The majority were men, indicating the relatively low proportion of women veterans in the recruited age bracket. The sample reported an average number of 5.2 morbidities, range 0–15. The prevalence of medical conditions was higher than that reported in national surveys (Federal Interagency Forum on Aging-Related Statistics, 2004); the most common conditions reported were arthritis (67%), hypertension (65%), heart disease (53%), circulatory conditions of the arms or legs (46.3%), cataracts (39%), sleep problems (34%), and diabetes (30%). In a subanalysis comparing the health status of individuals who consented to participate in the study with those who refused to participate because of poor health, few differences in prevalence of chronic conditions were noted, and we observed no differences in Charlson comorbidity-index scores between the two groups (p = .97, data not shown; Charlson, Pompei, Ales, & MacKenzie, 1987; Pearson et al., 2004). Most participants reported difficulty in performing basic physical tasks. Pain and vitality subscale scores were lower, indicating more pain and less vitality, than the reported average for men over age 65 (Ware, Snow, Kosinski, & Gandek, 2000). No individuals classified as precontemplators for exercise readiness volunteered for the study; 86% were staged as contemplators or in preparation. Once enrolled, attrition was very low; only 5 individuals (3%) withdrew from the study over the ensuing 6 months. There were five deaths during the course of this trial, and none was attributable to physical activity.
As indicated in Table 2, we observed a significant increase in physical activity frequency over time (omnibus test of Group \( \times \) Time, \( p = .041 \), 2 df). Individual pairwise comparisons of high-intensity counseling versus control groups and attention control group versus usual care did not reach statistical significance (\( p = .078 \) and \( .083 \), respectively). Careful examination of the group trajectories over time, depicted in Figure 3, indicate that some individuals in the usual-care group increased physical activity frequency, at least for the short-term, which might have attenuated the overall effect of the comparison between high-intensity counseling and the two control groups. This suggests that the one-time prerandomization counseling all individuals received was sufficient over the short term to motivate some study participants to become more physically active. Nonetheless, the high-intensity group sustained higher physical activity frequency over a longer duration than did the control groups. Our second measure of physical activity, caloric expenditure, tended to improve over time (omnibus test of Group \( \times \) Time, \( p = .054 \)). For this measure, however, the individual contrast of high-intensity counseling versus usual
Table 2  Physical Activity Outcomes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline, M (SD)</th>
<th>3 month, M (SD)</th>
<th>6 month, M (SD)</th>
<th>( p ), omnibus Group ( \times ) Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Endpoints</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency, weekly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>high intensity</td>
<td>16.0 (10.0)</td>
<td>21.1 (10.6)</td>
<td>19.0 (10.0)</td>
<td>.041</td>
</tr>
<tr>
<td>attention control</td>
<td>15.8 (9.4)</td>
<td>16.1 (9.4)</td>
<td>16.5 (9.3)</td>
<td></td>
</tr>
<tr>
<td>usual care</td>
<td>15.7 (9.2)</td>
<td>19.5 (10.4)</td>
<td>14.7 (9.5)</td>
<td></td>
</tr>
<tr>
<td>Caloric expenditure, weekly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>high intensity</td>
<td>2,628.7 (2,007.5)</td>
<td>3,393.3 (2,254.4)</td>
<td>3,045.3 (2,231.0)</td>
<td>.054</td>
</tr>
<tr>
<td>attention control</td>
<td>2,579.0 (2,136.5)</td>
<td>2,814.8 (2,159.0)</td>
<td>2,947.6 (2,053.9)</td>
<td></td>
</tr>
<tr>
<td>usual care</td>
<td>2,662.9 (2,312.5)</td>
<td>3,694.0 (3,173.5)</td>
<td>2,367.7 (1,863.4)</td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated total minutes, weekly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>high intensity</td>
<td>616.4 (446)</td>
<td>759.8 (488)</td>
<td>685.2 (455)</td>
<td>.045</td>
</tr>
<tr>
<td>attention control</td>
<td>595.7 (496)</td>
<td>630.4 (493)</td>
<td>696.9 (516)</td>
<td></td>
</tr>
<tr>
<td>usual care</td>
<td>600.0 (466)</td>
<td>815 (596)</td>
<td>542.6 (377)</td>
<td></td>
</tr>
<tr>
<td>Estimated moderate minutes, weekly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>high intensity</td>
<td>183.7 (233)</td>
<td>278.0 (295)</td>
<td>210.4 (253)</td>
<td>.17</td>
</tr>
<tr>
<td>attention control</td>
<td>144.5 (210)</td>
<td>190.7 (236)</td>
<td>172.3 (229)</td>
<td></td>
</tr>
<tr>
<td>usual care</td>
<td>222.1 (294)</td>
<td>309.0 (406)</td>
<td>144.2 (163)</td>
<td></td>
</tr>
<tr>
<td>Estimated walk/bike minutes, weekly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>high intensity</td>
<td>54.7 (88)</td>
<td>91.5 (116)</td>
<td>66.6 (111)</td>
<td>.67</td>
</tr>
<tr>
<td>attention control</td>
<td>58.8 (85)</td>
<td>95.1 (138)</td>
<td>90.0 (135)</td>
<td></td>
</tr>
<tr>
<td>usual care</td>
<td>61.4 (112)</td>
<td>87.4 (103)</td>
<td>49.0 (80)</td>
<td></td>
</tr>
</tbody>
</table>

care was not significant \( (p = .463) \), whereas attention control versus usual care was significant \( (p = .028) \), indicating that the short-term increased physical activity in the usual-care group had an impact on the overall test of Group \( \times \) Time change.

The secondary analyses of time spent in physical activity followed similar patterns. All three groups increased physical activity minutes, moderate-activity minutes, and walk/bike minutes. We observed unexpectedly high numbers of reported total physical activity minutes and moderate physical activity minutes for this study sample. Most of these were based on high estimates of numbers of hours spent gardening, which is quite common in this region, and housework. Among
patients in the high-intensity counseling group, pedometers were given to everyone during initial counseling (n = 75), but over time pedometer use diminished to 42 and 24 individuals at 3 and 6 months, respectively. On average, daily pedometer counts increased by 100.1 steps at each counseling call (p = .0099), ranging from an average baseline mean of 2,865 steps per day to 3,780 steps per day at 6 months. People most often stopped using the pedometer because of forgetfulness or feeling overburdened by having to record daily pedometer steps.

**Secondary Outcomes**

There were no significant changes over time in the functional outcomes by treatment group. When, however, we examined functional changes among those individuals (in all three groups combined) who reported dedicated exercise (walking and cycling) at the national guidelines of 150 min or more per week, we observed an increase in physical function of 7.4 points (95% CI 3.2–11.7, p = .0012) on the SF-36 physical-function subscale. An improvement in physical function of this magnitude is considered clinically and socially significant (Ware, Bayliss, Rogers, Kosinski, & Tarlov, 1996).

We found that intervening health events were a significant predictor (data not shown) of subsequent physical function. Study participants reported 133 intervening health events over the 6-month period. Of these, 11% were severe enough to require hospitalization and included events such as myocardial infarction, gall bladder surgery, and pneumonia. Thirty-three events (25%) required a doctor visit. There were 29 reported falls or injuries that did not require physician intervention. These were incurred mostly in the course of daily activities such as yard work, walking around the house, and getting up at night in the dark. Twenty percent of events were
musculoskeletal in nature and primarily a result of preexisting medical conditions, and 8% were viral. The distribution of intervening health events was not different between the three treatment groups \( (p = .83) \). Pain and vitality derived from the SF-36 subscales did not change over time. On average, there was a trend toward modest change over time in health-related quality of life (omnibus test of Group \( \times \) Time, \( p = .077 \)). Individuals receiving the high-intensity physical activity counseling maintained their health-related quality of life throughout the study period, whereas individuals in the other two groups reported modest reductions. Although self-efficacy did not appear to change over time, baseline self-efficacy was highly predictive of time-varying changes in both physical activity frequency \( (p < .001, \beta = 0.58) \) and physical activity caloric expenditure \( (p < .001, \beta = 162.5) \).

**Feasibility**

From a feasibility standpoint, this study was a success. Our intervention efforts were seamlessly incorporated into the primary-care and geriatric clinics, and we were successfully able to recruit patients for this study despite the health status of study participants. We had no difficulty in obtaining provider buy-in. All of the providers we contacted agreed to participate in this study. We surveyed a subsample (one-third) of providers who participated in Project LIFE for at least 1 year. They all rated the initial training session higher than “somewhat helpful” or “very helpful.” In addition, the overall impression of Project LIFE was rated “somewhat beneficial” or higher by all of the providers surveyed. The providers “strongly agreed” that the counseling materials were easy to use and made counseling patients easy. Using the counseling materials allowed the providers to counsel patients in less than 3 min. One provider commented that she learned that her previous method of physical activity counseling was too global and realized, through Project LIFE, the value of providing very specific details to enhance the quality of her counseling.

**Discussion**

The main findings of this study are that, compared with usual approaches, a program of tailored, high-intensity counseling to improve physical activity among older adults with multiple chronic diseases (a) is feasible, (b) can be incorporated into the VHAMC primary-care and geriatric clinics successfully, and (c) results in sustained increases in physical activity over a 6-month period. In VHA clinics, physical activity counseling has traditionally been bundled with other chronic-disease-management or disease-prevention services during a single visit, which might dilute the effect of physical activity counseling. Although our structured baseline counseling—combining clinic-based counseling with in-depth individualized physical activity counseling—was somewhat effective, we note that continued counseling appeared necessary for sustainability of effect.

In a design somewhat similar to ours with a younger healthier sample, Green and colleagues (2002) found that sustained physical activity was significantly higher among individuals who received PACE counseling supplemented with three sessions of telephone counseling than among individuals who received baseline PACE counseling only. Among a group of older veterans age 60–80 years enrolled in primary-care clinics, Dubbert, Cooper, Kirchner, Meydrech, and Bilbrew (2002)
reported increased walking frequency among those who received nurse-initiated personal and automated telephone calls compared with individuals who did not receive telephone calls. Our study and that of Dubbert et al., conducted primarily on men, stand in contrast to the ACT trial, in which women but not men were most responsive to continued counseling for sustained physical activity (Simons-Morton et al., 2001). We speculate that the poor health status of the men in this study might have increased their receptivity to sustained counseling.

Our study is unique in that we successfully recruited older, chronically ill veterans, who are typically underrepresented in studies of physical activity intervention. The vast majority of the studies of home-based exercise counseling have been conducted on relatively healthy adults. Our sample is substantially older than participants in the studies cited herein, and veterans have more chronic disease than comparable non-VA patients (Ashton, Peterson, Wray, & Hong-Jen, 1998). We note that the estimated number of daily pedometer steps among a subset of our study participants, 2,865 at baseline, is considerably lower than estimates published in the literature (4,000 steps/day) for individuals living with disabilities and chronic illness (Tudor-Locke, 2002). To our knowledge, no one has investigated the effects of one-time in-person counseling supplemented with follow-up telephone counseling in a group of older adults with multiple chronic conditions and poor functional status.

We observed rather substantial increases in minutes of reported physical activity; the total sample average increased about 22% at 3 months. Given a reported average of 734 min of total physical activity during the week, or 259 min of moderate physical activity per week, one would hope to see a diminution of functional limitations. It might be important that only approximately 90 of these minutes are dedicated “exercise” minutes. Individuals who reported 150 min or more of “exercise” physical activity experienced a substantial improvement in physical function.

We observed some changes in reported physical activity in the two control groups. Individuals in the usual-care group, who received initial prerandomization counseling only, became more physically active for the short term but returned to below baseline levels at 6 months. In contrast, individuals in the attention control group, who also received initial physical activity counseling, appeared to increase physical activity marginally over the entire study period. This is consistent with other studies using the stage-of-readiness modules developed for PACE, which report short-term increases in physical activity after health-care-provider counseling (Calfas et al., 1996).

**Study Limitations**

One limitation of CHAMPS is that data are collected as categorical data. We wish that we had collected CHAMPS exercise minutes for estimates of caloric expenditure as a continuous variable rather than as a categorical variable. Our caloric-expenditure outcomes are difficult to interpret. We note increases in caloric expenditure among all groups but think that the categories were not sensitive to modest increases in caloric expenditure likely experienced in a functionally limited population. For example, an individual with an initial exercise prescription to walk 5 min twice a day on 6 days of the week could double his or her exercise prescription to
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10 min twice a day on 6 days of the week and still fall within the same 1- to 2.5-hr/week category. As a categorical variable, a 100% increase in minutes of exercise would not be reflected. This is particularly true in our sample, which contained many people who were wheelchair dependent or in some cases amputees. Initial exercise prescriptions were very low, and exercise progression occurred quite gradually. The limitations imposed by categorical analyses likely attenuated changes we might have observed in the high-intensity counseling group.

Another limitation in this study was a relatively high number of missing values for the 3-month physical-performance testing. One caveat of this pilot study was that we were uncertain at the outset how many people would be willing to come to the VA for a special visit for functional testing. Ultimately, we realized that this would not be an issue, but in the interim we did not emphasize enough the importance of the functional testing, and as a consequence we had many missing values at the 3-month follow-up, which most likely had a negative impact on our physical-performance outcomes.

Implications for Research and Practice

We learned several valuable lessons about what to incorporate into future work. First and foremost is the need to eliminate any possibility of contamination by not offering in-depth counseling before randomization. Our attempt to standardize counseling by enhancing provider training and partnering with an expert exercise counselor is certainly much more than the norm and had an impact. Second, we strongly advocate increasing efforts to incorporate strengthening activities into the basic exercise prescription if one hopes to observe a greater functional benefit. Third, we advise using two groups (treatment vs. control) instead of a three-armed approach because our primary focus is to distinguish between the effect of our enhanced physical activity counseling and that which patients normally receive. Finally, recruitment efforts must be an ongoing process with an individual dedicated to that function. In this feasibility study, we underestimated the volume of recruiting effort. We advise our research colleagues to budget for a dedicated recruiter for this type of research.

As a feasibility study, we generated sample sizes for future studies, which we include here for the convenience of others. We calculated sample sizes needed to produce statistically and clinically meaningful changes for three variables: physical activity, physical function, and gait speed. Using the formulas published by Cohen (1987), setting the variances to those observed in our sample, assuming a randomized design with equal-size groups with the same mean at baseline, and assuming an alpha level .05 and power of .80, we would require the following sample sizes to detect clinically defined differences: (a) Physical activity using a between-groups difference of 750 kcal/week as indicative of following the surgeon general’s recommendations of 30 min of moderate physical activity on 5 or more days of the week would require 128 per group (U.S. Department of Health and Human Services, 1996); (b) physical function using a between-groups difference of 6.5 points, which has been cited in the literature as a clinically meaningful difference in physical function, would require 261 per group (Ware et al., 1996); and (c) gait speed using a between-groups difference of 0.1 m/s, which has been found to be clinically meaningful, would require 107 per group (Purser, Pieper, Poole,
& Morey, 2003). These numbers would need to be inflated modestly to adjust for attrition.

Through Project LIFE we demonstrated that older veterans with multiple chronic illnesses followed in primary-care and geriatric clinics could successfully be counseled to improve their physical activity. As advice for practical implementation in a clinic, we think that the most functionally impaired individuals require someone trained in exercise science to assist with the counseling process, that counseling and encouragement must be a continual process, and that the primary-care setting is a useful arena for counseling, providing additional follow-up is provided. Training primary-care providers in effective physical activity counseling is useful, but providers are unlikely to spend much time on physical activity counseling; therefore, it must be supplemented with other components of personalized counseling. A limitation of this approach would be the cost of having specialized exercise counselors available for consultation. The VA National Center for Health Promotion and Disease Prevention has recommended that primary-care clinicians continue to counsel patients to engage in physical activity. We have provided initial evidence of a multicomponent approach that can be successful. A future step would be to carefully examine the cost benefit of such an approach. Managed-care systems that structure care in a manner similar to that of the VHA clinics might also find this approach feasible. Given the potential health benefits of physical activity that can be achieved at any age, it is important to prioritize physical activity as a primary component of health-promoting activities.

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