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Feasibility of a Memory Clinic-based Physical Activity Prescription Program

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Abstract

Background—Effective programs for promoting physical activity are needed for those with cognitive impairment.

Objective—To test the feasibility of mobile Health (mHealth) technology-supported physical activity prescription from a tertiary care memory clinic.

Methods—This feasibility study was designed as a 16-week randomized, crossover trial of a physical activity prescription: 8 weeks of intervention, 8 weeks of baseline or maintenance phase data collection. We recruited 2 cohorts: 21 individuals with Alzheimer-related cognitive impairment (mean age 72.3 (5.2), 9 females), and 9 individuals with normal cognition (mean age 69.6 (5.8), 8 females). We gave each cohort an mHealth accelerometer-based physical activity prescription to double number of steps taken. Our primary outcomes were feasibility and safety. Our secondary outcomes were change in weekly steps taken, Dementia Quality of Life Scale, Self-efficacy Scale, 6-minute Walk, mini-Physical Performance Test.

Results—Set-up and use of the device was not a barrier to participation. However, only 62% of participants with cognitive impairment completed the intervention. The cohort with cognitive impairment did not change their weekly step count above Week 1. All participants in the cohort with normal cognition were able to set up and use their device and increased their weekly step count above Week 1. There were no differences between Week 1 and Week 8 for any secondary measures in either cohort.

Conclusions—Setup and daily use of mHealth technology appears to be feasible for a person with cognitive impairment with the help of a partner, but increasing daily step counts over 8 weeks was not achieved. Future work needs to assess alternative activity prescription goals or additional support for patients and their partners.

Keywords

mobile health; clinic activities; Alzheimer's disease; exercise

Introduction

There has been increased interest in the potential of mobile health (mHealth) technologies to enhance health care practice in recent years.[1] mHealth technologies connected to the Internet or wireless networks provide a means of monitoring physiology and behavior, communicating between clinician and patient, and increasing access to health information. Wearable mHealth devices hold considerable promise for rehabilitation professionals because of their ability to measure activity levels or biomechanics during “real-world” performance.[2, 3] Performance-based information can be delivered to the clinician in real time, outside of normal clinic interaction, allowing for continued monitoring of therapeutic goals and outcomes.

Perhaps the most well-known and potentially beneficial use of mHealth technology is in the monitoring and promotion of physical activity. Increasing physical activity is a cost effective strategy for promoting health and chronic disease management or prevention.[4] As recently noted,[5] mHealth technologies such as simple pedometer data provide increasingly reliable means of quantifying physical activity and encouraging compliance with prescribed exercise. Though pedometer-based activity programs have a mixed record of success, especially among clinical populations,[6] aggregate results suggest they are a useful means of motivating individuals to be more active.[7, 8]

Individuals in the early stages of Alzheimer's disease (AD) are an important group in which to apply mHealth technology for physical activity promotion. In America, one in nine people over 65 have AD and with our rapidly aging population, the number of people with AD is expected to nearly triple by 2050.[9] Physical activity has been shown to be a valuable tool for reducing disability, improving physical function and maintaining cognitive function associated with AD.[10–12] Further, individuals with AD are more likely to be inactive[13] and experience other systemic changes associated with morbidity and mortality.[14–16]

Walking programs in particular may hold promise as interventions for older adults with AD. From previous work, we know that walking is the most common form of exercise for older adults,[17] and walking programs are feasible for individuals with cognitive impairment.[18, 19] In addition, it is known that specific exercise prescription from a patient's primary care provider can lead to increased physical activity,[20, 21] especially when paired with objective activity feedback such as daily step counts.[22] Many dementia clinicians already recommend increased physical activity to their patients. However, these recommendations often lack specificity, contributing to poor follow through by the patient.[23, 24] Other barriers, such as lack of knowledge about exercise programs, conspire against those with cognitive impairment to limit physical activity.[25] Anecdotally, there is concern that individuals with AD will not tolerate or will frequently lose monitors and feasibility of mHealth monitoring in cognitively impaired populations has not previously been reported.

Physical activity programs for those with cognitive impairment are relatively unexplored. The few studies of physical activity programs specifically targeting individuals with cognitive impairment report modest but meaningful results. For example, a 6-month walking program improved cognitive function, and neurotrophic measures.[12] In another trial, adherence was high and perceived health status improved in an 8-week exercise program that included pedometers but did not use them for individualized prescription.[25]

Given that increasing physical activity is one of the most beneficial things people can do for overall health, our long-term goal is to explore ways to help patients and their health care providers communicate about physical activity. Therefore, we designed a small, pilot study to test the feasibility of an mHealth technology-based physical activity program prescribed from a tertiary care memory clinic. We hypothesized that an individualized activity prescription with mHealth monitoring would be practical for patients and could be implemented from the clinic and followed at home. A secondary goal was to generate preliminary information on the efficacy of our prescription program for increasing physical activity (step count), quality of life,[26] or self-efficacy over 8 weeks.[27, 28] We also compared results of our intervention in a cohort of older adults with normal cognition to assess feasibility in a cohort that would be more likely to increase physical activity.

Methods

Design Overview

The present study was designed to assess the feasibility of a physical activity lifestyle intervention (Promoting Activity through Clinical Education and Reinforcement, PACER) for older adults. We specifically sought to test feasibility[29] of the PACER program as to its practicality (the ability to set up a mHealth accelerometer and wear it), implementation (the ability to complete the program) and safety. We also sought to conduct limited efficacy testing with the goal of powering a larger, future trial.

We originally planned for the study with a randomized crossover design. Figure 1 shows the trial design. All participants would wear the accelerometer for 16 weeks. During 8 of those weeks, participants would have individualized, increasing step count goals (the PACER intervention). Half would start the PACER intervention immediately (Immediate Start, IS) and half would wait until the 9th week to begin the intervention (Delayed Start, DS). We planned to compare the first 8 weeks of the IS and DS arms. Given our limited resources, we expected this crossover-style design would maximize the number of individuals exposed to the intervention for our primary feasibility assessment and provide information on habitual step-rates (first 8 weeks of DS arm) and maintenance of any increased physical activity (last 8 weeks of IS arm). As we will discuss, a high drop-out rate in our cohort with cognitive impairment limited the value of this design and we revised our analysis to feasibility and limited efficacy during the intervention period across both the IS and DS arms.

Setting and Participants

We recruited participants with cognitive impairment at routine patient visits to the University of Kansas Memory Care Clinic. Physicians and nurse practitioners approached individuals

for participation based on clinical judgment of safety and tolerability of increased physical activity. The memory clinicians provided standard of care education to increase physical activity and then suggested participation in the PACER program, immediately paging the research team. One member of the research team entered the clinic, screened the prospective participants and explained the study. All participants provided informed consent prior to initiation of the study.

Inclusion criteria were as follows: 1) age 60-85 at enrollment; 2) cognitive impairment possibly or probably related to Alzheimer's disease and not associated with stroke or major psychiatric diagnosis; 3) cognitive impairment severity considered very mild or mild by the referring clinician with reference to the Clinical Dementia Rating[30]; 4) not currently categorized as "Active" based on self-reported physical activity using the Rapid Assessment of Physical Activity[31]; 5) on stable doses of medication for the previous 30 days at the time of consent; 6) have computer or wireless device with Internet access; 7) have a study partner willing to answer survey questions and assist with the program. Potential participants were excluded if they had significant 1) systemic illness; 2) pain or limitation (neuromuscular, musculoskeletal, cardiovascular or respiratory) likely to affect the patient's safety during the study; 3) uncontrolled hypertension in the last 6 months; 4) history of cancer within the last 5 years (except non-metastatic basal or squamous cell carcinoma); 5) history of drug or alcohol abuse as defined by DSM-IV criteria in last 2 years; 6) insulin-dependent diabetes mellitus.

A convenience sample of individuals with normal cognition was also recruited as an active control cohort from a registry of older adults interested in participating in research on brain aging. We included this cohort to test whether our intervention protocol was feasible and showed limited evidence of efficacy in a cohort with normal cognition who would be expected to more readily adopt a physical activity prescription. Inclusion and exclusion criteria were identical to those with cognitive impairment except they could not have evidence of cognitive impairment as identified by the Clinical Dementia Rating scale[30] and Uniform Data Set neuropsychological test battery[32] within last 12 months. A study partner was not required for these individuals. We planned no direct comparison of this cohort and the cohort with cognitive impairment.

Outcome Measures

Our primary measures of feasibility were practicality, implementation and safety regardless of arm assignment. We assessed practicality as percentage of enrollees who were able to set up and use the mHealth accelerometer. We measured implementation as the completion rate for the 8-week intervention period. We measured safety as the number of adverse events recorded. We defined adverse events as any untoward medical occurrence reported by study participants or their study partners. Each event was rated for severity using the National Cancer Institute Common Terminology Criteria for Adverse Events (CTCAE) v3.0.[33]

Our secondary physical and psychosocial measures were chosen to assess limited efficacy of the PACER intervention. Our measure of increased physical activity was change in weekly step count, indexed as the change in step count from the first to the last week of the intervention period. Other secondary physical measures included the 6-minute Walk Test

(6MW)[34], a measure of functional walking capacity, and the mini-Physical Performance Test (mPPT), a short battery of timed physical tasks that serves as a measure of physical performance on basic activities of daily living and is sensitive to early AD-related physical change.[35] Secondary psychosocial measures included the Quality of Life – AD (QoL-AD) scale[36] and the General Self-Efficacy Scale (GSES)[28] as rated by the participant. We also assessed safety as adverse event occurrences.

The 6MW was performed in a quiet hallway 60 yards long with cones at each end for participants to walk around. Timing began on the vocal command of the administrator to begin. The mPPT, QoL-AD and GSES was performed in an exam room. Following the assessments, participants were randomized into the IS or DS arms. Participants were then provided a accelerometer with the digital face masked (Zip, FitBit Inc., San Francisco, CA) and instructed to wear it during waking hours at hip level near the anterior superior iliac spine. Participants took the accelerometer home and set it up according to a provided instruction manual. A 24-hour hotline was provided for technical questions. Participants were asked to bring their accelerometer near their computer once a day to allow activity data to be uploaded. Additional assessments were made at regular intervals (see Figure 1). All activities were the same for the cohort with normal cognition except that measures were not conducted in the clinic but in a separate area of the same building.

PACER Program

Six Doctor of Physical Therapy students were trained as study coaches at an initial staff orientation. Coaches learned the study protocol, how to setup and use the accelerometers, and received scripts for phone calls. The study team met monthly to discuss progress and ensure that phone contact with participants was consistent among coaches.

Each participant was assigned one study coach who made bi-weekly phone calls to the participant to encourage exercise, problem-solve barriers to exercise, and provide technical support. Study coaches monitored physical activity daily and made additional phone calls to remind participants to wear or upload data if no activity was seen for 3 consecutive days.

Intervention

Prior to study initiation a random allocation sequence was created using a two-arm allocation table developed at www.randomizer.org by a member of the study team (EDV). The table was immediately uploaded to the data management tool (REDCap, project-redcap.org).[37] After consent, arm assignment was made by a study coach through an allocation module in REDCap. The allocation module conceals the allocation table and allows only a single instance of allocation to a study arm for a participant without replacement or reassignment.

Immediate Start (IS)—Baseline step count was considered the 3-day average of Week 1 with high and low daily step counts removed. After baseline step count measurement, participants were mailed an exercise prescription booklet. The exercise prescription booklet set daily goals for the participant, increasing their goal step count by 20% each week, ultimately doubling steps taken by Week 6 of the intervention then maintaining this level in

Weeks 7 and 8. Participants were familiarized with this booklet at enrollment. At Week 2, participants were instructed to unmask the accelerometers by removing an opaque cover from the face. Participants were also asked to record their step counts from the accelerometer each night in the prescription booklet to compare their totals to the goal for that day. We chose a goal of doubling the Week 1 step count rather than setting an arbitrary goal (e.g. 10,000 steps a day) to accommodate individuals with varying levels of daily activity and to set gradual and attainable increases.

After Week 8, participants returned for 6MW, mPPT, QoL-AD and GSES follow-up assessment. Participants were asked to continue wearing their accelerometer for an additional 8 weeks (weeks 9-16) to assess maintenance of any increase in physical activity. No further telephone support or encouragement or activity prescription was provided and no additional exercise prescription was made. Study coaches made calls every three weeks to assess adverse events only.

Delayed Start (DS)—Participants in the DS arm were asked to wear their masked accelerometer for 8 weeks. Study coaches made phone calls to remind individuals to wear the accelerometer if no activity was being recorded but did not provide feedback regarding the amount of physical activity being done during this period. At Week 9, participants returned for assessment of the 6MW, mPPT, QoL-AD and GSES to establish a pre-intervention baseline following the same protocol as described for Weeks 1–8 of the IS arm (week 9–16 for the DS group).

mHealth Technology

We chose an mHealth device (Zip, Fitbit Inc., San Francisco, CA) with a tri-axial accelerometer and Bluetooth wireless transmission capability. Fitbit Inc. uses a proprietary algorithm to determine daily step counts that are displayed in real-time when the accelerometer is tapped, and an automated program interface that allows electronic acquisition of data. We provided the Zip accelerometer, WiFi receiver dongle for their personal computer, an anonymous Fitbit account, and a manual developed in-house by an older adult volunteer before sending them home. Coaches showed the participants how to wear the accelerometer near the anterior superior iliac spine. When the accelerometer and proprietary software are successfully installed, steps are recorded automatically on a central Fitbit server and accessible by anyone with an account password. Because study staff held the de-identified account password, physical activity data was both anonymous and accessible at all times through a central web portal, a web application, or via an automated program interface. If study coaches did not see step counts within 48 hours of providing the accelerometer, they placed calls and assisted participants or their study partners through setup of the device on their personal computer.

Data Analysis

Step counts were acquired from [Fitbit.com](https://www.fitbit.com) using open-source software (Cran-R v3.1.1, Vienna, Austria and the “fitbitScraper” package, cran.rproject.org/web/packages/fitbitScraper/index.html). Previous work has shown that 3-day averages accurately reflect

weekly step counts.[38] We used the mean of 3 days of data for each week as a daily average for the week, throwing out the two highest and lowest measures from the week.

Determination of feasibility included practicality as measured by the number of individuals who were able to setup and use the device, implementation as measured by the number of individuals completing the study, and safety as the number of adverse events. A priori thresholds for feasibility measures were not set.

We also performed analyses on our secondary measures to inform future intervention protocols. To assess change in weekly step count we initially planned to compare Week 1 to Week 8 step count change of the IS and DS arms. However, large withdrawal rate by individuals with cognitive impairment necessitated pooling of intervention periods from both the IS and DS arms to allow for large enough sample sizes for analysis. Data from cognitively impaired and control participants were kept separate. We therefore used single sample t-tests to test change in our secondary outcome measures over the intervention period.

Secondary outcome measures were subjected to paired t-tests. We calculated estimated effect sizes as Cohen's d corrected for repeated measures. Due to the small sample sizes, no comparisons were planned between cohorts with and without cognitive impairment.

Results

Demographics and Clinical Characteristics

Twenty-one individuals with mild cognitive impairment[39] or cognitive decline possibly or probably related to AD [39, 40] enrolled. Twelve individuals with cognitive impairment were randomized into the Delayed Start (DS) arm and 9 were randomized into the Immediate Start (IS) arm. An additional 9 individuals with normal cognition were enrolled, four into the DS arm and 5 into the IS arm. All participants were community dwelling. Tables 1 and 2 summarize demographics of the participants with and without normal cognition regardless of intervention arm assignment.

Feasibility—Delivery of the PACER program from the clinic proved to be practical. Participants and their study partners were comfortable with the setup and use of the Internet-connected accelerometer; only 2 participants in the cognitively impaired cohort or their study partners (10%) cited discomfort with the technology and setup problems as a reason for withdrawing. Some assistance with setup was required for all individuals to ensure the accelerometer would transmit step counts to the computer. Device setup took approximately 30 minutes per participant via a phone call. Once setup was completed, scheduled and *pro re nata* staff phone calls to participants averaged 8 minutes.

Implementation of the physical activity prescription in the cohort with cognitive impairment was less successful. In addition to the 2 individuals who withdrew due to discomfort with the technology, an additional 7 of the 21 enrollees with cognitive impairment withdrew from the study. Two individuals were lost to follow-up for unknown reasons. Two participants were withdrawn when their study partner withdrew after beginning the intervention citing

time concerns or potential for interpersonal friction in trying to achieve target step goals. Two participants withdrew due to medical concerns; 1 individual withdrew in Week 1 due to fear of exacerbating chronic back pain (though no exacerbation was reported), another experienced a fall during the delayed start period. One participant withdrew due to time concerns. One participant in the normal cognition cohort was lost to follow-up for unknown reasons.

Three accelerometers were lost (all by participants with cognitive impairment) during the study period. Upon learning of a lost accelerometer, study staff mailed replacements to participants and assisted them with setup of the new accelerometer via a phone call.

The PACER program also appeared to be safe. In total there were 7 adverse events. Six events were rated as being of mild severity (knee pain, vertigo, loss of balance in bathroom, infected finger, sinus infection, diverticulitis). Of these 6, only the knee pain was considered possibly related to the intervention. One event was rated as being of moderate severity and possibly related to the intervention: a fall walking home from the store that resulted in bruising and residual soreness.

Secondary Outcomes—Our outcome measure to test preliminary efficacy of the PACER program was change in Week 1 to Week 8 step count. The cohort with cognitive impairment did not significantly change their weekly step count above Week 1 ($t=1.3$ [11], $p=0.21$, CI $[-0.2$ 0.7]). The estimated effect size was $d=0.1$ (95% CI $[-1.0$ 1.3]). The cohort with normal cognition did increase their weekly step count above Week 1 ($t=2.4$ [7], $p=0.05$, 95% CI $[0$ 0.8]). The estimated effect size was $d=0.8$ (95% CI $[-0.6$ 2.3]). Figure 2 shows percent change in weekly steps normalized to the number of steps taken in Week 1 of the Intervention period for the purposes of comparing across individuals. For reference, we have also shown the first and last week of the delayed start and maintenance phases. The dashed line provides the goal as prescribed to each participant. Tables 1 and 2 shows mean change of all secondary outcome measures. There were no differences between Week 1 and Week 8 for any other secondary measures in either the cohort with cognitive impairment or those with normal cognition ($p>0.05$).

Discussion

We piloted a memory-clinic based physical activity prescription program (PACER) for individuals with cognitive impairment. We also enrolled a cohort of individuals with normal cognition to serve as an active control. We hypothesized that an mHealth accelerometer and physical activity prescription would be feasible and safe in a population with cognitive impairment. We also tested the potential of the PACER program to increase the number of steps individuals would take in a week with possible changes in measures of quality of life and self-efficacy.

We found that while enrolling individuals from the clinic and setup of the device are feasible, the PACER program would need significant revision to change physical activity levels in those with cognitive impairment. We saw little evidence of increased physical activity over the course of 8 weeks as measured by steps. We also had a high number of

individuals withdrawing from the study. Reasons for withdrawal were varied, but it was evident that a supportive partner or caregiver, committed to increasing the participant's physical activity was essential for success. In contrast, we found that individuals with normal cognition showed potential for increasing their weekly steps (though they did not meet our goal of doubling step counts). These results are in line with prior reports that accelerometer-based programs can have modest positive effects on physical activity levels in older adults.[7]

Neither the individuals with cognitive impairment nor those with normal cognition showed evidence of changing their physical function, self-efficacy or quality of life over the study time period. Previous research has indicated that increasing physical activity can improve quality of life, mood and perception of health status,[10, 41–43] while other studies have shown no effect.[44] Improving or maintaining quality of life is an essential component of successful aging, and physical activity plays an important role.[45] For older adults, physical activity may improve quality of life through a sense of agency or self-efficacy.[27] There is limited evidence that physical activity results in improved quality of life for individuals in the earliest stages of cognitive decline and AD. For example, a randomized controlled trial involving 60 minutes of exercise a week combined with caregiver training in participants with AD (n = 153), increased levels of physical activity, and improved perception of physical health that was maintained for 24 months.[46] In another randomized controlled trial of physical activity versus Vitamin B12 versus placebo, both interventions resulted in improved perception of self-esteem and belonging, in a cognitively impaired cohort.[19, 42]

It is possible that doubling the number of steps taken over 8 weeks is not realistic or the intervention period was too short. We chose this goal to individualize the prescription rather than setting an arbitrary goal. From preliminary work we expected underactive individuals to average 3000-5000 steps per day and that the final goal of 6000-10000 would be attainable by most individuals. Our cohort with cognitive impairment averaged 3865 steps a day at baseline and did not consistently change their step count over the 8-week period. Our cohort with normal cognition was more active, averaging 6670 steps per day at baseline. Setting a goal to double this step count steps in 20% increments may have been too ambitious in the 8-week intervention period, given that even the cohort with normal cognition only averaged a 39% increase their daily step count.

We also note the wide variability in step counts and change over time. We saw variation from less than a few hundred steps per day to over ten thousand steps per day. This variation could represent poor adherence, evidence of a Hawthorne effect, or a truly wide variability in physical activity levels of older adults. Our sample is too small to assess potential reasons for variability, but this finding is perhaps best viewed as both a limitation on interpretation and an opportunity for future study.

Our program may have benefitted from greater focus on caregivers. Research has shown that physical activity is one way caregivers can better cope with the emotional, physical and financial burdens of caregiving and improve mental and physical health.[47] The majority of AD caregivers do not engage in regular exercise and this number increases as the care burden increases.[48] Further, we have shown that individuals with AD are even less active

than their peers with normal cognition.[16] Thus, there is a need for an effective, convenient, and practical way to increase physical activity in caregiver/person-with-dementia dyad. Approaching physical activity intervention from a dyadic perspective may be key to maximizing effectiveness in the patient.[49] That is, if a caregiver or partner is invested in increasing their own physical activity, the physical activity of the person they care for may increase collaterally with joint activity such as walks after dinner. Further, we allowed each dyad to decide who would interact with the study coach and record their data in the exercise log booklet, and that person may have changed based on situational factors of that day. In the future, it may be preferable to engage the caregiver specifically with study coach interaction.

Our study has several limitations of note. First, it was designed as a feasibility trial with limited efficacy testing and should not be considered definitive. Second, we employed a crossover design originally intending to capitalize on the additional information on feasibility when individuals in the delayed start arm received the intervention in a secondary analysis. In retrospect, withdrawal rates negated this benefit and required us to focus solely on our secondary analyses. The small sample size and large withdrawal rate further complicates even our limited efficacy assessment and effect size estimates, given the considerable loss of follow-up data. Third, our study recruited directly from a memory clinic. Referral to the study may have been biased by a clinician's perception of a patient's willingness to become more physically active. It is possible that our intervention period was too short or the prescription too aggressive. Researchers have made use of mHealth devices for providing regular feedback to both participant and clinician with various protocols. Our 8-week intervention was commensurate with several previous studies.[7] However, the requirement that individuals have access to a wireless network may have introduced a socioeconomic bias. Finally, many of our secondary outcomes were subjective ratings and were subject to potential reporting biases.

This trial of a memory-clinic based physical activity prescription demonstrated potential opportunities and challenges for health care providers and researchers working with individuals with cognitive impairment. mHealth technologies such as internet-connected accelerometers can be used to measure physical activity in real time and report those measures regularly to an observer such as a physician. Loss of devices and confusion may not be a significant barrier provided the participant has an engaged study partner. However, increasing physical activity likely requires more structure and support or greater focus on the caregiver. Future investigations may wish to consider prescribing physical activity for both the patient and their partner/caregiver.

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Figure 1.
CONSORT Diagram

Footer *Only one individual with normal cognition withdrew. This individual was in the Immediate Start group stopped contact with study staff for unknown reasons.

Figure 2.

Percent change from the initial intervention Week 1 for individuals with cognitive impairment (light gray) and with normal cognition (dark gray). Bookending the intervention weeks (Int. Week 1-8) are percent difference from Intervention Week 1 step count for the delayed start period (n=8 with cognitive impairment, n=4 normal cognition), as well as the maintenance period (n=4 with cognitive impairment, n=4 normal cognition). The goal for all individuals during the intervention period is shown by the dashed black line. The graph demonstrates a modest maintained increase in weekly steps by the arm with normal cognition and variable performance by the cohort with cognitive impairment.

Table 1

Demographics and performance measures of individuals with cognitive impairment.

	Baseline	Change from Week 1 to Week 8
Age, y	72.3 (5.2)	–
Sex, % Female	43%	–
Race	19 White 2 African-American	–
Body Mass Index	29.4 (3.8)	–
Living Situation	All community dwelling: 3 Home alone 17 Home with spouse 1 With daughter	–
Mini Physical Performance Test	12.8 (2.1)	0.4 (1.7)
6-minute walk, yds	380 (122)	–4 (123)
QoL-AD ⁹	42.0 (5.5)	0.0 (3.9)
Self-Efficacy ¹⁰	31.4 (4.0)	–0.8 (3.7)
Average Weekly Step Count	27058 (21661) [2746 – 84334]	1284 (12976) [–1467 – 45236]

Values are mean (sd) unless other wise noted. Baseline data are from all 21 individuals enrolled. Performance and subjective test change measures are from only those the 12 individuals who did not withdraw from the study (Immediate Start = 4, Delayed Start = 8).

Table 2

Demographics and performance measures of individuals without cognitive impairment.

	Baseline	Change from Week 1 to Week 8
Age, y	69.6 (5.8)	–
Sex, % Female	89%	–
Race	9 White	–
Body Mass Index	27.8 (4.3)	–
Living Situation	All community dwelling	–
Mini Physical Performance Test	14.4 (1.5)	0.4 (1.1)
6-minute walk, yds	472 (52)	18 (7)
QoL-AD ⁹	45.0 (3.7)	–0.9 (3.2)
Self-Efficacy ¹⁰	33.3 (3.8)	–0.3 (3.1)
Baseline Average Weekly Step Count	46690 (21016) [29108 – 94362]	15530 (18950) [–24682 – 24003]

Values are mean (sd) unless other wise noted. Baseline data are from all 9 individuals enrolled. Performance and subjective test change measures are from only those the 8 individuals who did not withdraw from the study (Immediate Start = 4, Delayed Start = 4).