

**Optimizing Participation in *On the Move* Group Exercise Program to Prevent Walking Difficulty in At-Risk Older Adults**

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**PCORI Project ID:** CE-1304-6301

**ClinicalTrials.gov ID:** NCT01986647

**HSRproj ID:** 20143510

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## **Abstract**

**Background:** Exercise interventions to prevent walking difficulty in community-dwelling older adults have focused mainly on improving strength and endurance and have overlooked an important component of walking, namely the timing and coordination of movement. Based on previous research and with critical input from providers and older adults, the *On the Move* group exercise program was developed. The program includes timing and coordination components and focuses on improving walking.

**Objectives:** To compare the effectiveness and sustainability of *On the Move* against a Standard group exercise program consisting of seated strength, endurance, and flexibility exercises in community-dwelling older adults who reside in independent living facilities and senior apartment buildings, and who live elsewhere but regularly attend senior community centers. We will also explore the effectiveness of *On the Move* compared with a Standard program when taught by staff activity personnel, and the effectiveness of the *On the Move* program when delivered by staff activity personnel compared with delivery by exercise leaders (when feasible), using a quasi-experimental design. The acceptability and risks associated with exercise participation are also of interest.

**Methods:** The study was a cluster randomized, single-blind intervention trial that compared the effects on function, disability, and mobility of a Standard group exercise program and the *On the Move* group exercise program in community-dwelling older adults. Randomization to intervention was at the facility level. We had planned to examine the sustainability of the program by randomly assigning participants within each facility to either class 1, taught by an exercise leader, or class 2, taught by staff activity personnel. As we could not randomize to instructor in all facilities as planned, instructor assignment should be considered quasi-experimental. Exercise leaders were research staff who were physical therapists, physical therapist assistants, or exercise physiologists. Staff activity personnel were employees of the facilities themselves who were involved in providing services to the residents. They could be fitness staff, activity directors, social workers, outreach coordinators, care coordinators, or other employees with a similar role. At facilities that did not have staff activity personnel available, we identified (an) older adult(s) from the facility to be trained as a peer leader. Exercise classes were held twice weekly for 12 weeks and were delivered by study exercise leaders (class 1) or staff activity personnel (class 2). The Standard program consisted of warm-up, aerobic, strengthening, and stretching exercises all done while seated. The *On the Move* program consisted of warm-up, timing and coordination (stepping and walking patterns), strengthening, and stretching exercises completed

primarily while standing. The primary outcome of function and disability were the Late Life Function and Disability Instrument (LLFDI) overall function and disability frequency scores, and the primary outcomes of mobility were the 6-minute walk test (6MWT) and gait speed. Outcomes were assessed preintervention and postintervention. Thirty-two facilities were randomized, encompassing 424 individuals.

**Results:** The mean  $\pm$  standard deviation age of the participants was  $80.7 \pm 7.8$  years. The *On the Move* group had greater improvements than the Standard group in 6-minute walk distance ( $18.3 \pm 60.5$  versus  $1.9 \pm 55.8$  m; adjusted difference =  $15.3 \pm 6.7$ ;  $p = 0.0228$ ). There were no significant differences between groups in gait speed (the other primary measure of walking ability), self-reported function, and disability primary outcome or any of the secondary outcomes. When taught by an exercise leader, the *On the Move* group had greater improvements than the Standard group in the primary measures of mobility, the 6MWT ( $20.6 \pm 57.1$  versus  $4.1 \pm 55.6$  m; adjusted difference =  $16.7 \pm 7.4$ ;  $p = 0.0262$ ), and gait speed ( $0.05 \pm 0.13$  versus  $-0.01 \pm 0.11$  m/s; adjusted difference =  $0.05 \pm 0.02$ ;  $p = 0.0008$ ). The between-group differences were adjusted for the baseline value of the outcome and represent a small but meaningful difference. There were no significant differences in self-reported function and disability as measured by the LLFDI scores. Of the 32 facilities included in the study, we could identify staff activity personnel to train to lead the exercise class at fewer than half of the facilities ( $15/32 = 46.9\%$ ). We could not recruit suitable facility staff at all facilities as planned, thus making the sustainability model—the ability of the facility to continue the program once the research staff was gone—infeasible and the aim exploratory and quasi-experimental rather than randomized. When taught by staff activity personnel, only when we could identify and train someone at the facility, there were no greater gains in any of the primary or secondary outcomes from *On the Move* (all  $p > 0.10$ ). In both programs, attendance (20+ classes) was greater in the classes taught by the exercise leader compared with the staff activity personnel (65.1% versus 52.0%; 50.0% versus 24.5%). Overall satisfaction was greater in *On the Move* classes taught by exercise leaders than in those taught by staff activity personnel, as measured by: reporting benefit from class (68.4% versus 42.9%, OR = 2.29 [1.09, 4.82];  $p = 0.0294$ ); sufficient individualized instruction (84.2% versus 51.0%, OR = 11.55 [2.17, 61.63];  $p = 0.0042$ ); satisfaction with the class (84.2% versus 53.1%, OR = 9.62 [4.05, 22.88];  $p < 0.0001$ ); and likelihood of continuing the class if it were to be offered in the future (74.3% versus 53.1%, OR = 1.84 [1.29, 2.61];  $p = 0.0007$ ).

**Conclusions:** The *On the Move* group exercise program elicited greater improvements in mobility, as measured by the 6MWT, than the Standard group exercise program when both instructor types were considered together. When taught by exercise leaders, the *On the Move* group exercise program was

more effective at improving mobility than the Standard group exercise program, more safe, and well-liked by community-dwelling older adults, but differences between groups should be interpreted cautiously because we did not a priori plan or statistically power for testing for instructor type × intervention interaction effects and because assignment to an exercise leader or staff activity personnel was not randomized. The *On the Move* group exercise program did not improve self-reported function or disability. The small number of staff activity personnel, recruited and trained, were unable to sustain a similar level of effectiveness. Therefore, given the difficulty of identifying and training staff activity personnel to deliver the *On the Move* program and the lack of effectiveness when delivered by staff activity personnel, we believe *On the Move* is best delivered by an exercise leader. Other modalities of recruiting and training community personnel need to be considered and evaluated for wider dissemination, implementation, and sustainability of *On the Move*.

## **Background**

Disability is a common, costly condition in older adults. Walking difficulty in older adults contributes to the loss of independence, higher rates of morbidity, and increased mortality.<sup>1-5</sup> Mobility loss is also a sentinel predictor of other disabilities that restrict independent living.<sup>6,7</sup> Compared with older adults without self-reported walking difficulty, those who developed mild walking difficulty over 1 year had higher health care costs (mean \$1128 per person). Extrapolated to the estimated 22% of older adults who develop walking difficulty annually, the cost to society is an additional \$3.6 billion per year.<sup>8</sup> Therefore, preventing or delaying the onset of walking difficulty should have a substantial impact on older adults' independence and their health care costs.

Exercise is beneficial to physical and mental health, and it may prevent mobility disability.<sup>9,10</sup> Many of the exercise programs presently available to older adults are seated range-of-motion exercises that may not be appropriately challenging; consequently, this lack of challenge might contribute to low participation rates and satisfaction. Group exercise programs that have included a greater variety of exercises, including standing and walking activities, have had conflicting findings about their impact on mobility.<sup>11-13</sup> Often these interventions were compared with a nonexercise control group and were conducted in “young” older adults.<sup>11-13</sup> The 1 group exercise program that did improve mobility consisted of a very high dose of exercise (65 minutes a day, 5 days a week, for 24 weeks), which may not be acceptable to all older adults.<sup>11</sup> In addition, many programs exclude an important component of exercise that is critical to walking, namely the timing and coordination of movement.<sup>14-16</sup> National recommendations and interventions to prevent walking difficulty, such as the Lifestyle Interventions and Independence for Elders (LIFE) study, have also overlooked the timing and coordination of

movement.<sup>9,17</sup> The LIFE study examined a standard walking endurance, strength, static balance, and flexibility intervention on the prevention of disability in community-dwelling older adults. We have preliminary data to suggest that an exercise program that includes timing and coordination exercises is superior to a standard strength and endurance program for improving walking in older adults.<sup>18-21</sup> Therefore, we thought a program that is designed to address timing and coordination, and that is more challenging for participants, would promote independence in older adults.

Based on previous research<sup>18-20</sup> and with critical input from older adults, we developed an exercise program that includes timing and coordination and focuses on improving walking.<sup>22</sup> The program, entitled *On the Move*, differs from current group exercise programs in that (1) it contains timing and coordination exercises based on the biomechanics and motor control of walking, (2) the majority of the program consists of challenging standing and walking exercises, and (3) the exercises progress in difficulty over the course of the program. Pilot testing of *On the Move* established the initial feasibility of the program.<sup>22</sup> During pilot testing, several facilities expressed interest in the sustainability of the program and inquired about becoming trained in program delivery. Thus, training others to deliver the program to ensure the sustainability of *On the Move* over time is important to stakeholders and became a major aim of our research.

The main objective of this single-blind cluster randomized trial is to compare the effectiveness and sustainability of *On the Move* and a Standard group exercise program (based on usual care of the facilities included in the trial) in community-dwelling older adults who reside in independent living facilities and senior apartment buildings, and who live elsewhere but regularly attend senior community centers. We also evaluated the acceptability and risks associated with exercise participation. To accomplish the said objectives, our original specific aims were to (1) compare the effectiveness of the *On the Move* group exercise program with a Standard program on self-reported function and disability and walking ability in individuals when taught by an exercise leader; (2) assess both the effectiveness of *On the Move* compared with a Standard program when delivered by staff activity personnel and the sustainability of the *On the Move* program by examining the effectiveness of the *On the Move* program when delivered by exercise leaders compared with delivery by staff activity personnel; (3) compare the acceptability and the risks for the participants of the *On the Move* and Standard exercise programs delivered by (a) exercise leaders and (b) staff activity personnel; and (4) explore potential baseline individual predictors of benefits and risks of participation in the *On the Move* program to facilitate informed patient decision making. Partway through the trial, we realized that at some facilities we were

unable to identify anyone (staff activity personnel or peer leader) to teach the class. In these circumstances, the class was then taught by a study exercise leader. As we could not randomize to instructor in all facilities as planned, instructor assignment should be considered **quasi-experimental**. Consequently, we modified Aims 2 and 3 to be more exploratory and to represent the quasi-experimental design. The modified Aims 2 and 3 were as follows: (2) when feasible to be delivered by staff activity personnel, explore the effectiveness of the *On the Move* program compared with a Standard program and the sustainability compared with delivery by exercise leaders (when feasible); and (3) compare the acceptability and the risks of the *On the Move* and Standard exercise programs delivered by (a) exercise leaders and (b) staff activity personnel (when feasible). We hypothesized that (1) the *On the Move* program would produce greater gains in self-reported function and disability (Late Life Function and Disability Index, or LLFDI) and walking ability (6-minute walk test [6MWT] and gait speed) in participants when delivered by an exercise leader; (2) *On the Move* delivered by staff activity personnel (when feasible) would produce individual gains in the above outcomes that are greater than the Standard program and comparable to that delivered by an exercise leader; (3) *On the Move* would result in greater individual satisfaction and higher attendance rates than the Standard program, individual attendance rates and satisfaction would be similar for programs led by an exercise leader and staff activity personnel when feasible to recruit staff personnel, and participants' adverse event (falls, soft tissue injuries, muscle soreness, etc.) rates during exercise would be similar between the 2 groups and when it was feasible to recruit staff personnel; and (4) it would be possible to identify participant subgroups or combinations of baseline physical, psychosocial, and demographic factors associated with each of the treatment response and adverse event outcomes through post hoc exploratory analyses.

### **Stakeholder Involvement in the Design and Implementation of the Study [PC-1]**

Patient and provider stakeholders played a critical role in preparing and conducting this study. We included 2 main types of traditionally nonresearcher stakeholder investigators in our research: participants and providers. We had 2 provider stakeholders who were coinvestigators on the project: (1) a representative of senior management from University of Pittsburgh Medical Center health system (UPMC) Senior Communities department and (2) a lead geriatric outreach nurse also from UPMC Senior Communities. Our participant stakeholders were community-dwelling older adults who reside in independent living facilities or senior housing buildings or those who live in private residences of the community and regularly attend senior community centers. Participant stakeholders also contributed to

our pilot studies to develop the intervention<sup>22</sup> and were members of our community advisory boards (CABs). The CABs provided ongoing engagement of our participant and provider stakeholders. We created 2 CABs—1 representing the independent living facilities and 1 representing the senior housing buildings and senior community centers. We attempted to have a diverse representation on the CABs with the goal of including individuals' representative of different genders, races, types of facilities, participants, and providers. The CABs met twice a year throughout the study. The meetings were a means for 2-way engagement between investigators and stakeholders to provide ongoing input into the execution and translation phases as well as to be briefed on progress and challenges. Our stakeholders had significant input into the study aims, design, sample, intervention, outcomes, and operational considerations, which are described in detail in our recent manuscript.<sup>23</sup> Below we highlight a sample of our stakeholder involvement.

Our provider stakeholder was instrumental in developing the aims for the study. Initially, aims were limited to examining the effectiveness of the *On the Move* program using a simple 2-arm study design. In our pilot work, although the *On the Move* program was generally well received, a consistent complaint at the end of the pilot testing was that facilities personnel and participants were sad to see the *On the Move* program end. Based on this feedback, our provider stakeholders expressed interest in finding a way to sustain the *On the Move* program once the research was finished. The provider stakeholder suggested we train someone at each of the facilities to deliver the exercise program. Valuing the input of our stakeholders, we modified our study design and aims to include examining the sustainability of the program over time with facility staff and peer leaders.

Our participant stakeholders had significant input in participant selection for the study [PC-2]. Our initial pilot work was conducted in independent living facilities. The residents of the facilities were mostly older (mean age 85), white, and well educated, and they did not need to leave the building in which they lived to attend the exercise class. During our focus groups at the independent living facilities, the participant stakeholders encouraged us to include other participants from settings that were different from these facilities. Such input reinforced our belief that we needed broader inclusion in our sample, and with the help of our provider stakeholder (i.e., lead geriatric outreach nurse), we decided to include participants from low-income housing buildings (greater diversity) and senior community centers (greater diversity and people need to travel to the center). Our provider stakeholder (ie, lead geriatric outreach nurse) had an established rapport with people in these settings and was able to facilitate access to them.

Participant stakeholders also provided valuable input into the intervention protocol.<sup>22</sup> For example, the study team had initially selected the music to be played during exercise. The participants expressed a strong preference for music of their generation, and we incorporated music from the 1950s and 1960s into our intervention protocol. We believe such seemingly minor changes potentially contributed to improved exercise adherence and participant retention [MD-1]. Also, we worked with the provider stakeholders and the various facilities to define and operationalize the Standard group exercise program so it would be consistent among facilities and be based on current practice.

Our participant stakeholders identified maintaining independence as an important outcome [PC-3]. Given the time constraints of study funding (3 years), it was not feasible to use an outcome of loss of independence due to much larger sample size implications. Therefore, we focused on intermediate markers of independence inherent in our primary outcomes of function, disability, and mobility. The primary outcomes of function, disability, and walking ability are highly associated with independence and are extremely important to the older adult [RQ-6; PC-3].<sup>4,7</sup>

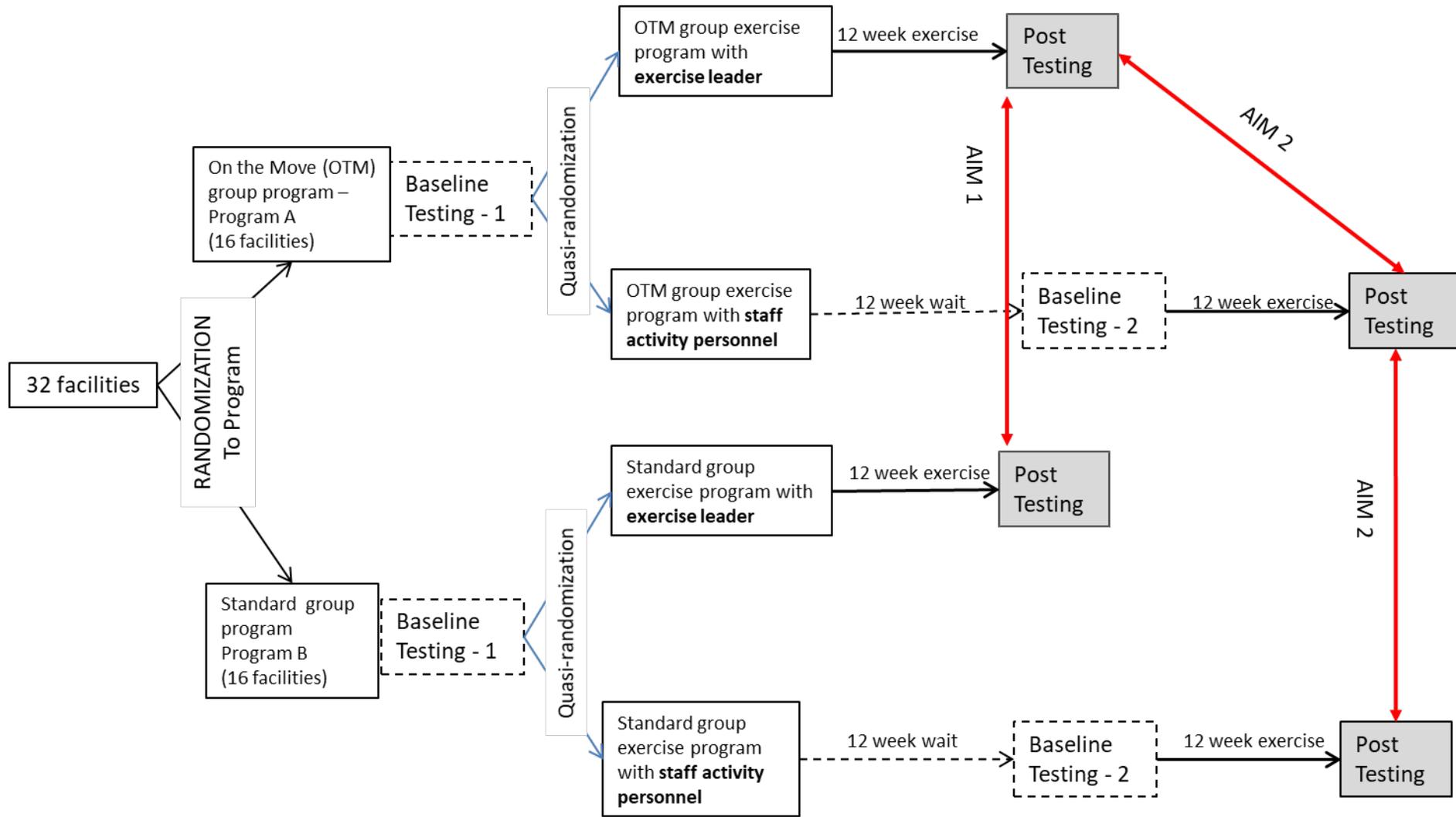
## Methods

### Methodology Standards

The Patient Centered Outcomes Research Institute (PCORI) methodological standards<sup>24</sup> represent requirements for sound scientific investigation, and we adhered to all relevant standards throughout the process of planning and conducting our study. We will indicate specific standard numbers within [brackets] throughout the present report and in the Appendix Table. Briefly, gaps in evidence have been described in the Background section with the supporting literature [RQ-1], as were the initial identification of target population as community-dwelling elderly [RQ-3], *On the Move* as the experimental intervention [RQ-5] and subgroup and heterogeneity of treatment effect in Aim 4 as exploratory [RQ-4; HT-1]. A formal study protocol was developed a priori [RQ-2] that includes an analysis plan to address the aims [IR-3]. The protocol was documented by registering it in [clinicaltrials.gov](https://clinicaltrials.gov) (NCT01986647) and is described below. Sustainability Aim 2 was in fact designed with a view toward implementation [PC-4]. We will publish the study results in professional journals and present at conferences for dissemination to the scientific community [PC-4]. In addition, the supporting dissemination and implementation of study results to the wider community and associated challenges are mentioned in the Conclusion section [PC-4]. Other standards for hypothesis-driven (confirmatory) heterogeneity of treatment effects [HT-2; HT-3; HT-4] may be partially applicable, and those pertaining

to data registries [DR-x], data networks and research-facilitating structures [DN-x], causal inference methods [CI-x], adaptive and Bayesian trials [AT-x], diagnostic tests [DT-x], and systematic reviews [SR-1] are not applicable to our study.

Figure 1: Study Design



## Study Design Overview

Figure 1 shows how the study was designed to address its aims. The study was a cluster randomized, single-blind intervention trial to compare the effects of a Standard group exercise program against the *On the Move* group exercise program on function, disability, and mobility in community-dwelling older adults who reside in independent living facilities and senior apartment buildings, and who live elsewhere but regularly attend senior community centers. Randomization to interventions was at the facility level, as necessitated by the group nature of the intervention, stratified by facility type. Independent living facilities were known in advance and stratified by socioeconomic status, affiliation, and county. Each of the other 2 facility types were randomized in the order of agreeing to participate. Group exercise classes were held twice weekly for 12 weeks and were delivered by study exercise leaders and facility staff activity personnel when available. Function, disability, and mobility were assessed preintervention and postintervention.

We planned to examine the sustainability of the program by randomly assigning participants within each facility to either class 1, taught by a study exercise leader, or class 2, taught by staff activity personnel. Study exercise leaders were research staff with training and experience in administering the exercise programs, and were exercise physiologists, physical therapists, physical therapy assistants, or from a similar background. Facility staff activity personnel were employees of the facilities themselves who were involved in providing services to the residents. They could be fitness staff, activity directors, social workers, outreach coordinators, care coordinators, or other employees with a similar role. At facilities that did not have staff activity personnel willing or able to be trained, we identified (an) older adult(s) from the facility to be trained as a peer leader. Partway through the trial, we realized that at some facilities we were unable to identify anyone (staff activity personnel or peer leader) to teach the class. In these circumstances, the class was then taught by a study exercise leader. As we could not randomize to instructor at all facilities as planned, instructor assignment should be considered **quasi-experimental**. Individuals randomized to class 1 exercised for the first 12 weeks at the facility with the exercise leader. During class 1, the exercise leader trained the staff activity personnel or peer leader, who then taught class 2 at the facility. At facilities with sufficient numbers of participants for 3 classes, 2 sections of class 1 were conducted. The study protocol was approved by the University of Pittsburgh institutional review board and signed informed consent was obtained from all participants. The study was registered in [clinicaltrials.gov](https://clinicaltrials.gov) (NCT01986647).

### Participants [RQ-3; PC-2]

Participants were enrolled between April 2014 and January 2016 and were recruited through informational sessions provided by the research staff at the participating facilities around the greater Pittsburgh, Pennsylvania, area. To be eligible for the study, participants were required to be (1) 65 years of age or older, (2) a resident/member of the participating facility, and (3) able to ambulate independently (with or without a straight cane) for household distances with a gait speed  $\geq 0.60$  m/s. Those who (1) were non-English speaking, (2) had impaired cognition (unable to follow a 2-step command or understand the informed consent process), (3) planned to leave the area for an extended period during the study period, (4) had a progressive neuromuscular disorder, (5) had any acute medical condition or illness that was not stable, or (6) had an inappropriate physiologic response to the 6MWT (exercise heart rate  $\geq 120$  beats per minute, exercise systolic blood pressure  $\geq 220$ , or a drop in systolic blood pressure  $> 10$  mmHg or diastolic blood pressure  $\geq 110$  mm Hg) were excluded. We attempted to make the inclusion criteria broad and exclusion criteria minimal, but we did need to consider the safety of the participants. Given the class format and content and the instructor-to-participant ratio of 1:10, we did not feel it was safe to include individuals with greatly impaired mobility. Participants were compensated \$50 for each testing session they completed to meet recruitment goals, improve adherence, and reduce dropout, thereby preventing missing data [MD-1].

### Randomization

The study statistician used the pseudo-random deviate generator in SAS<sup>®</sup> (Cary, NC: SAS Institute, Inc.) to randomize facilities to the 2 arms in a 1:1 ratio stratified by facility type. Once the facilities were randomized to an exercise program, we then attempted to randomize participants within each facility to classes run by a study exercise leader or a facility staff activity person. In the spirit of patient-centeredness in the research context [PC-1] and in an effort to improve adherence and prevent missing data [MD-1], couples (married, living together, dependent for transportation) were randomized as 1 to the same class but were treated as separate individuals from there on. Per a midtrial protocol change approved by the stakeholder advisory boards and PCORI, the second-level randomization to exercise leader or facility staff took place only if a facility staff member was available to conduct the class safely. As such, the sustainability aim, or the ability of the facility to continue the program once the research ended, was rendered exploratory, and aspects of the design related to the sustainability aim were rendered quasi-experimental.

### Training of Facility Staff

Facility staff identified to lead the second session of classes were encouraged to attend all exercise classes within the first session, with a minimum of 3 recommended (1 each at the beginning, middle, and end of the 12 weeks). Additionally, facility staff were provided with a printed binder that outlined the specific exercise routines, with recommendations for the progression of various components of the program. A member of the research team met with the facility staff twice prior to their exercise session, to review the program and answer any questions that staff might have. The research team assessed the fidelity to the exercise protocols via in-person facility visits or review of videotaped recordings of exercise sessions. Feedback and weekly support was provided to all exercise leaders.

### Interventions [RQ-5]

Both exercise programs (*On the Move* and Standard) were delivered by trained exercise leaders (primary aim) or trained staff activity personnel/peer leaders (sustainability component). The frequency and duration of the programs were identical (50 minutes, twice a week, for 12 weeks) with a maximum of 10 participants in a class. The main difference between *On the Move* and the Standard group exercise programs was the program content described below.

The experimental intervention *On the Move* exercise program was based on principles of motor learning that enhance “skill” or smooth and automatic movement control.<sup>25-30</sup> The program contained a warm-up (5 minutes), stepping patterns (15 minutes), walking patterns (15 minutes), strengthening exercises (10 minutes), and cool-down exercises (5 minutes). The warm-up and cool-down contained gentle range-of-motion exercises and stretches for the lower extremities and trunk. The stepping and walking patterns were goal oriented and included progressively more difficult patterns, which promoted the timing and coordination of stepping, integrated with the phases of the gait cycle.<sup>26,27,29,30</sup> The goal of the stepping patterns was to facilitate a shifting of the center of pressure posterolateral and then forward, encouraging hip extension. Stepping patterns consisted of stepping forward and across the midline of the body with 1 foot for several repetitions followed by stepping forward and across the midline of the body with the opposite foot for several repetitions. A similar stepping activity was conducted with backward stepping, stepping backward and across the midline of the body, shifting the body weight in a posterolateral direction. Stepping was progressed from stepping on all 1 side, to alternating left and right steps, and then alternating forward and backward stepping. The goal of the walking patterns was to promote a shift of the center of pressure during medial stance and to promote the timing and interlimb coordination of muscle activations (i.e., abductors of the going-to-be-swinging

limb with the adductors of the stance limb). Patterns consisted of ovals, spirals, and serpentine patterns that were progressed by changing the amplitude of the pattern (i.e., narrower oval), altering the speed of walking, or increasing the complexity of the task (i.e., walking past other walkers or object manipulation while walking—bouncing a ball). Only 1 item—amplitude, speed, or complexity—was progressed or changed at a time. The strengthening program was conducted primarily while seated and focused on lower extremity muscle groups such as hip flexors, hip abductors, knee flexors, knee extensors, and ankle plantar flexors. Playground balls, the opposite extremity, and body weight were used to provide resistance to the movements. Much of the program was conducted in a standing position (40 minutes), with only a small portion conducted while sitting (10 minutes).

The comparator Standard group exercise program was based on those currently being conducted in the community-based facilities involved in the trial (i.e., Standard group exercise). We worked with our provider stakeholders and the various facilities to define and operationalize the Standard group exercise program so it would be consistent among facilities and be based on current practice (i.e., usual care). The Standard group program contained a warm-up (5 minutes), upper and lower extremity strength exercises (20 minutes), aerobic activities (20 minutes), and a cool-down (5 minutes). The warm-up and cool-down contained gentle range-of-motion exercises and stretches for the lower extremities and trunk. The strengthening program focused on both upper extremity and lower extremity muscle groups. Playground balls, the opposite extremity, and body weight were used to provide resistance to the movements. Aerobic activities included repeated movements of the lower extremities (marching, tapping, skiing) at various speeds. Upper extremity movements were added to increase the intensity of the activity. The entire program was conducted while sitting (50 minutes).

#### Measures [RQ-6; IR-4]

The primary outcome of function and disability was measured using the self-reported [PC-3] LLFDI overall function and disability frequency domains, and the primary outcomes of walking ability were the 6MWT and gait speed. Self-reported [PC-3] measures of confidence in walking (Gait Efficacy Scale), walking performance under challenging conditions (challenging gait tasks and figure-8 walk), and gait variability were collected as secondary outcomes of walking ability. All measures were collected at baseline prior to randomization, immediately prior to intervention in those randomized to class 2 (see Figure 1), and immediately following the 12-week intervention by research personnel who were blinded to group assignment. All testing was conducted on site at the facilities. Participants who used a cane for ambulation were permitted to use the cane during the testing.

The LLFDI contains a pair of self-report [PC-3] measures targeted to assess physical function and disability in older adults with acute or chronic problems and is designed to be more sensitive to change than similar measures.<sup>31,32</sup> The 2 components of the LLFDI correspond to the activity (LLFDI–function) and participation (LLFDI–disability) components of the World Health Organization’s International Classification of Function, Disability, and Health Model. The LLFDI function component has 32 items in 3 domains: basic lower extremity (BLE), advance lower extremity (ALE), and upper extremity (UE), and the LLFDI disability component has 16 items representing 2 domains: frequency of performance and limitation in performance of life tasks. The LLFDI was selected because the patient stakeholders thought disability was an important outcome, and (1) it measures both function and disability, which are critical components of independence; (2) it includes a wide variety of life tasks in various social areas, thus extending beyond the traditional focus of just activities of daily living; (3) the scale was designed with sufficient breadth of items and increments of rating to minimize ceiling and floor effects and maximize the scale’s ability to detect change over time; and (4) it is a continuous outcome, which gives us greater statistical power than a dichotomous outcome to detect change over time and make comparisons thereof. The analyses focus on the LLFDI function and disability dimension scores (ie, BLE function, ALE function, UE function, disability frequency, and disability limitation). The disability domain scores (social role, personal role, instrumental role, and management role) were also examined as secondary outcomes because they may provide insight into the impact of the disability on frequency of performance and perceived limitations.<sup>32</sup> The LLFDI function and disability scales have established known groups validity, and the test–retest reliability is moderate to high for the disability component (ICC = 0.68-0.82) and extremely high for the function component (ICC = 0.91-0.98) pursuant to [IR-4]. Scores range from 0 to 100; higher scores represent less difficulty and less disability.

The primary measures of walking ability were the 6MWT and gait speed. The 6MWT measures distance walked (meters) in 6 minutes, including time for rest as needed.<sup>33</sup> The 6MWT is (1) a performance-based measure of walking ability, which is an important component of independence; (2) an indicator of community ambulation (i.e., the ability to walk 300 m in 6 minutes)<sup>34,35</sup>; (3) a continuous outcome that provides greater statistical power than a dichotomous outcome to detect change over time<sup>36</sup>; and (4) a widely used measure of mobility that is included in the National Institute of Health (NIH) Patient Reported Outcomes Measurement Information System project to establish measures of clinical assessment [PC-3]. Pursuant to [IR-4], the 6MWT has established psychometric properties, excellent test-retest reliability (Pearson  $r = .95$ ) in older adults,<sup>37,38</sup> and construct validity for graded

exercise testing and functional classification.<sup>39</sup> Changes in the 6MWT of 20 m and 50 m are considered small but meaningful and substantial, respectively.<sup>40</sup>

The second main walking ability outcome was gait speed. Gait speed is a strong indicator and predictor of disability, morbidity, and mortality in the older adult.<sup>2,3,5,7</sup> Gait speed was assessed during usual walking using an instrumented walkway. After receiving instructions, participants completed 6 passes at their usual, self-selected walking speed. Gait speed was averaged over the 6 passes. Pursuant to [IR-4], the test–retest reliability of gait speed measured using instrumented walkways is excellent (ICC = 0.98).<sup>41</sup> Changes in gait speed of 0.05 m/s and 0.10 m/s are considered small but meaningful and substantial, respectively.<sup>40</sup>

Additional mobility measures included confidence in walking, walking performance under challenging conditions (narrow, obstacle, and figure-8 walk), and gait variability (stance time, step length, and step width standard deviation). To determine if interventions affected confidence in walking, confidence was assessed using the Gait Efficacy Scale [PC-3].<sup>42-44</sup> The scale items include a range of gait activities such as walking over different surfaces, stepping on and off curbs, and negotiating stairs. Each item is scored on a 10-point Likert scale, with the total score for the 10 items ranging from 0 to 100. A higher score represents greater confidence. The figure-8 walk was designed to measure motor skill in walking.<sup>45</sup> The test involves walking a figure-8 pattern around 2 markers placed 5 feet apart. Performance was scored based on the time needed to complete the figure-8 walk and the number of steps taken. Challenging gait tasks were used to examine participants' ability to adapt their gait to different environmental conditions.<sup>46</sup> Subjects completed 2, 12-meter trials of each challenging condition, obstacle, and narrow path. The time needed to complete each task, averaged over 2 trials, was the summary indicator of gait during challenging tasks. In a published sample of 40 community-dwelling older adults, the 1-week test–retest reliability of the timed measures was excellent (ICC = 0.70-0.94), satisfying [IR-4].<sup>45</sup> Gait variability, defined as fluctuations in gait characteristics from one step to the next,<sup>47</sup> is an important indicator of impaired mobility in older adults.<sup>48</sup> Gait variability was quantified using established measures of temporal and spatial gait characteristics including stance time, step length, and step width. Variability was calculated as the standard deviation of the set of steps/stances recorded over 6 passes on the instrumented walkway (described above). In general, lower variability is better.<sup>48,49</sup>

Satisfaction [PC-3], adherence, and adverse events were also measured and documented. Participant satisfaction was assessed using a satisfaction survey and in-depth interviews. The satisfaction

survey was administered to all participants at the conclusion of the exercise program. It included 5 items measured on a 5-point Likert scale, 6 items measured on a 3-point scale (changed a lot, changed some, or no change), and 2 open-ended questions. The items assessed degree of satisfaction with various components of the exercise program (ie, the exercises, safety, individualized instruction) and likelihood of continued participation. A series of yes/no questions were used to determine if the program met the participants' expectations, the perception of benefit from the program, and the likelihood of recommending the program to others. In-depth phone interviews were used to assess satisfaction in a random subsample. We systematically selected every fifth participant from a range of settings representing the different intervention arms (*On the Move*, Standard, exercise leader, activity staff personnel) and facility types (independent living facility, community center, and senior housing). The interview included a mixture of closed-ended and open-ended questions. Topics included in the interviews were perceived benefits and risks; satisfaction with the program, facilities, and instructor; and amount of individualized instruction.

A roster of participants was maintained for each class. At the beginning of each class, the instructor recorded attendance. The instructor also recorded reasons for missed classes, when available. Attendance rate ( $[\text{number of sessions attended by the participant} / \text{total number of classes offered, i.e., 24}] \times 100\%$ ) for each participant was the main indicator of adherence.

Adverse events that occurred during testing or intervention were recorded on a clinical event form. Adverse events other than muscle soreness (which was greater than anticipated) included labored breathing, chest pain, fall, or other injury. All adverse events were forwarded to the study consulting physician (NKN) for adjudication and direction.

Data from instrumented walkway testing, onsite physical performance testing, and self-report questionnaires were merged with the randomization and participant tracking databases by participant identification number and time point to create analytic data sets [IR-2]. All data, including outcomes and other participant characteristics, were collected specifically for the present study and thus meet standard [IR-1].

#### Sample Size Justification

We based the sample size on pilot studies<sup>18-20</sup> and the ability to detect clinically meaningful<sup>50</sup> or moderate effect sizes (Cohen's  $d = 0.5$ ).<sup>51</sup> The computations were based on 2-tailed  $\alpha = 0.05$  tests, an

attrition rate of 10% [MD-1], an anticipated class size of 10 participants, intracluster correlation of 0.1, published methodologies and commercially available sample size and power software (PASS 2002®. Kayesville, UT: Number Cruncher Statistical Systems). We estimated that 90 participants per arm would allow us, with 80% statistical power, to detect statistical significance of a difference as small as 3.1 points in LLFDI overall function change between the 2 interventions; 80 per arm for 3.2 points in LLFDI disability frequency; 140 per arm for 0.1 m/s in gait speed; and 40 per arm for 50 m in 6-minute walk distance. We estimated that 70 per arm receiving the *On the Move* intervention would allow us, with 95% statistical power, to detect a similar difference in LLFDI overall function change between the 2 types of instructors; 60 per arm for LLFDI disability frequency; 110 per arm for gait speed; and 30 per arm for 6-minute walk distance. We used 95% statistical power (rather than the customary 80%) in study planning for the sustainability hypothesis to reduce the likelihood of a type II error, thereby minimizing the chances of a finding in favor of sustainability because of lack of statistical power rather than because of an actual similarity. Therefore, 140 participants per arm, or a total of 560 participants, were deemed necessary to accommodate all primary outcomes and both Aims 1 and 2. We reached participant recruitment targets for exercise leader arms, meeting [IR-1], but not for facility staff arms. With the midstudy approval of stakeholder advisory boards and PCORI, the aims and hypotheses that involved facility staff were deemed exploratory and were based on a smaller number of participants due to safety and feasibility concerns outlined elsewhere in the report.

#### Data analysis

*Overview*—Analysis plans to address the aims were developed a priori [IR-3]. All statistical analyses were performed using SAS® version 9 (Cary, NC: SAS Institute, Inc.) and Salford Predictive Miner® (San Diego, CA: Salford Systems, Inc.) based on the **intention to treat**. Study facility and participant flow was summarized using a CONSORT diagram constructed according to published guidelines for cluster randomized trials [IR-6; MD-4].<sup>52</sup> Data were summarized by arm and time point as well as by preintervention-to-postintervention change using appropriate descriptive statistics. Next, we performed the modeling and inferential analyses to address the main hypotheses. First, we compared the baseline participant characteristics between the 2 arms. Any significant differences were noted and accounted for as covariates in the sensitivity analyses [IR-1; IR-5]. Second, we performed main analyses to address Aims 1-3 as outlined below [IR-3]. We used the 2-step protected test approach to control the overall type I error due to multiple outcomes, and we used multiple imputation<sup>53,54</sup> to account for any missing data in the main analysis [MD-2; MD-3]. Third, we performed an exploratory analysis to address Aim 4,

which focused on heterogeneity of treatment effects, using a data mining methodology [HT-1]. Finally, we performed a set of sensitivity analyses by including additional covariates, ignoring missing data, incorporating an additional parameter into the working correlation structure to account for potential correlation between members of the same couple, averaging data by facility and fitting a simpler analysis of covariance model with facility as the unit of analysis, or using immediate preintervention measures in a subset of participants (when available) instead of the prerandomization baseline to assess the robustness of our findings [MD-5; IR-5].

*Aim 1 Analysis [IR-3]*—As requested by the reviewers, we first describe an unplanned comparison of the 2 interventions with the 2 instructor types combined by fitting a series of linear mixed models<sup>55</sup> using the SAS<sup>®</sup> MIXED procedure with the baseline-to-follow-up change in each of the continuous outcomes (LLFDI function/disability, walking ability, other measures of mobility performance) as the dependent variable, intervention arm (Standard/*On the Move*) as the fixed effect of primary interest, the baseline value of outcome as a fixed effect covariate, and a facility random effect to account for greater similarity of participants from the same facility compared with different facilities and resulting nonindependence of observations within facility (ie, clustering). Next, we followed the a priori analysis plan. Using only the participants taught by exercise leaders, we performed a multivariate Hotelling *t*-test to simultaneously compare the baseline-to-follow-up change in the 4 primary outcomes between the arms to protect the type I error rate from repeated testing of 4 primary outcomes. If significant, we performed subsequent analyses without further multiplicity adjustment. If not, we performed subsequent comparisons with a conservative Bonferroni correction at the  $\alpha = 0.05/4 = 0.0125$  level. This protected test approach has been recommended in the statistical literature<sup>56</sup> and used in other exercise intervention trials with multiple outcomes.<sup>57</sup>

Second, we fit a series of linear mixed models<sup>55</sup> similar to those described above, but using only the participants taught by exercise leaders.

Third, we employed a similar strategy for dichotomous secondary outcomes, but instead used a generalized estimating equations (GEE) model<sup>58</sup> with a binomial distribution, logit link function, and exchangeable correlation structure to account for clustering.

*Aim 2 Analysis [IR-3]*—We fit a series of linear mixed models<sup>55</sup> with baseline-to-follow-up change in each of the continuous outcomes (LLFDI function/disability, walking ability, other measures of mobility performance) as the dependent variable; intervention arm (Standard/*On the Move*), delivery mode (by exercise leader/staff activity personnel), and their interaction as fixed effects of interest; baseline value of outcome as a fixed effects covariate; a facility-within-intervention random effect to account for clustering due to facility; and a Satterthwaite correction to the denominator degrees of freedom. We constructed appropriate means contrasts to estimate the difference in gains in the 2 interventions when delivered by staff exercise personnel (Aim 2 effectiveness hypothesis), and the difference in gains attributable to *On the Move* intervention when delivered by exercise leaders and staff activity personnel (Aim 2 sustainability hypothesis). Finally, we employed a similar strategy for dichotomous secondary outcomes, but instead used a GEE model with a binomial distribution, logit link function, and exchangeable correlation structure to account for clustering.

*Aim 3 Analysis [IR-3]*—We analyzed dichotomous adherence and safety outcomes using the same GEE modeling strategy described in Aims 1-2.

*Aim 4 Analysis [IR-3]*—Aim 4 is focused on heterogeneity of treatment effect with an exploratory philosophy [HT-1]. As such, all subgroup analyses were unplanned and chosen post hoc, and the standards [HT-2], [HT-3], and [HT-4] may be only partially relevant. For example, we present subgroup analysis results only when subgroup criterion  $\times$  intervention interaction terms are statistically significant [HT-3]. First, we performed a series of post hoc subgroup analyses by stratifying Aim 1 comparisons by adherence level, facility type, physical performance, comorbidity burden, and cognitive function. The subgroups were not prespecified a priori but selected post hoc based on our interest and face validity for plausibility for heterogeneous treatment effects [RQ-4]. Next, we performed exploratory analyses to identify combinations of baseline predictors of treatment response and risks of participating in the *On the Move* program. We did not anticipate differences in outcomes of the *On the Move* program based on instructor type when a suitable staff person could be trained (exploratory sustainability Aim 2) and thus had originally proposed to combine *On the Move* groups led by exercise leaders and staff activity personnel in the present analysis to maximize sample size and amount of information available for this analysis. However, upon observing such differences in Aim 2, and due to the smaller number of participants in *On the Move* taught by facility staff, we performed the analysis using only the participants in the *On the Move* intervention taught by exercise leaders. As a result, the analyses were

based on a smaller number of participants than anticipated, and the findings should be interpreted as preliminary rather than confirmatory.

We operationally defined a meaningful response to the intervention as an improvement of 0.05+ m/s in gait speed and compared baseline characteristics of responders and nonresponders using linear mixed or GEE models depending on the continuous/dichotomous nature of the baseline characteristic. We then fitted another series of GEE models with the response as the dependent variable; binomial distribution and a logit link. Each baseline measure was fitted one-at-a-time as the only predictor, and the models had an exchangeable correlation structure to account for clustering. Next, to potentially identify a parsimonious set of independent baseline predictors, we employed a forward selection approach with a  $p < 0.10$  for entry and a 10 events per predictor limit.<sup>59</sup> Finally, we employed a classification tree model in an attempt to identify an alternative, more intuitively appealing multivariate predictor of response. We first fit a random forest model to identify the most important predictors, and using only the predictors that were at least 25% important as the most important, fitted a classification tree model in which the maximum area under receiver operator characteristic curve from an internal 10-fold cross-validation was used as the criterion for final tree selection.<sup>60</sup>

## Results

Figures 2 and 3 show the flow of study facilities and participants throughout the study and the sources of missing data [IR-6; MD-4]. Of the 37 facilities (10 independent living facilities, 8 community centers, and 19 apartment buildings) contacted and invited to participate in the trial, 32 facilities participated. Five facilities were not interested in participating and 2 facilities had an insufficient number of people for a class. At the 32 facilities, 560 individuals (127 from community centers, 219 from independent living facilities, and 214 from senior apartments) were screened by phone for initial eligibility. Of those 560 people, 482 met the initial eligibility requirements and were scheduled for an in-person assessment (17 failed the screen: 5 used a walker, 5 were too young, and 7 failed for other reasons). Of the 482 scheduled for in-person testing, 476 completed the in-person screening (6 did not complete the in-person screening: 3 refused to sign the liability waiver and 3 changed their mind). Fifty-two people failed the in-person screening (37 had a gait speed  $< 0.6$  m/s and 15 had abnormal blood pressure or heart rate), leaving 424 individuals (92 from community centers, 176 from independent living facilities, and 156 from senior apartments) from 32 different facilities who were randomized. Of those 424 people, 72 were randomized as couples. Of the 32 facilities, 16 were assigned at random to receive the *On the Move* intervention (201 people) and 16 were assigned to receive the Standard

intervention (223 people). For the exercise classes taught by facility staff, 49 were randomized to *On the Move* and 77 people were randomized to the Standard intervention. The number of participants per facility (cluster size) ranged from 7 to 37, with a median of 16. The intracluster correlation for primary outcome 6 Minute Walking Distance (6MWD) was 0.08, LLFDI overall function was 0.01, LLFDI disability frequency was 0.20, and gait speed was 0.10.

Figure 2. Consort Flow Diagram—Part 1

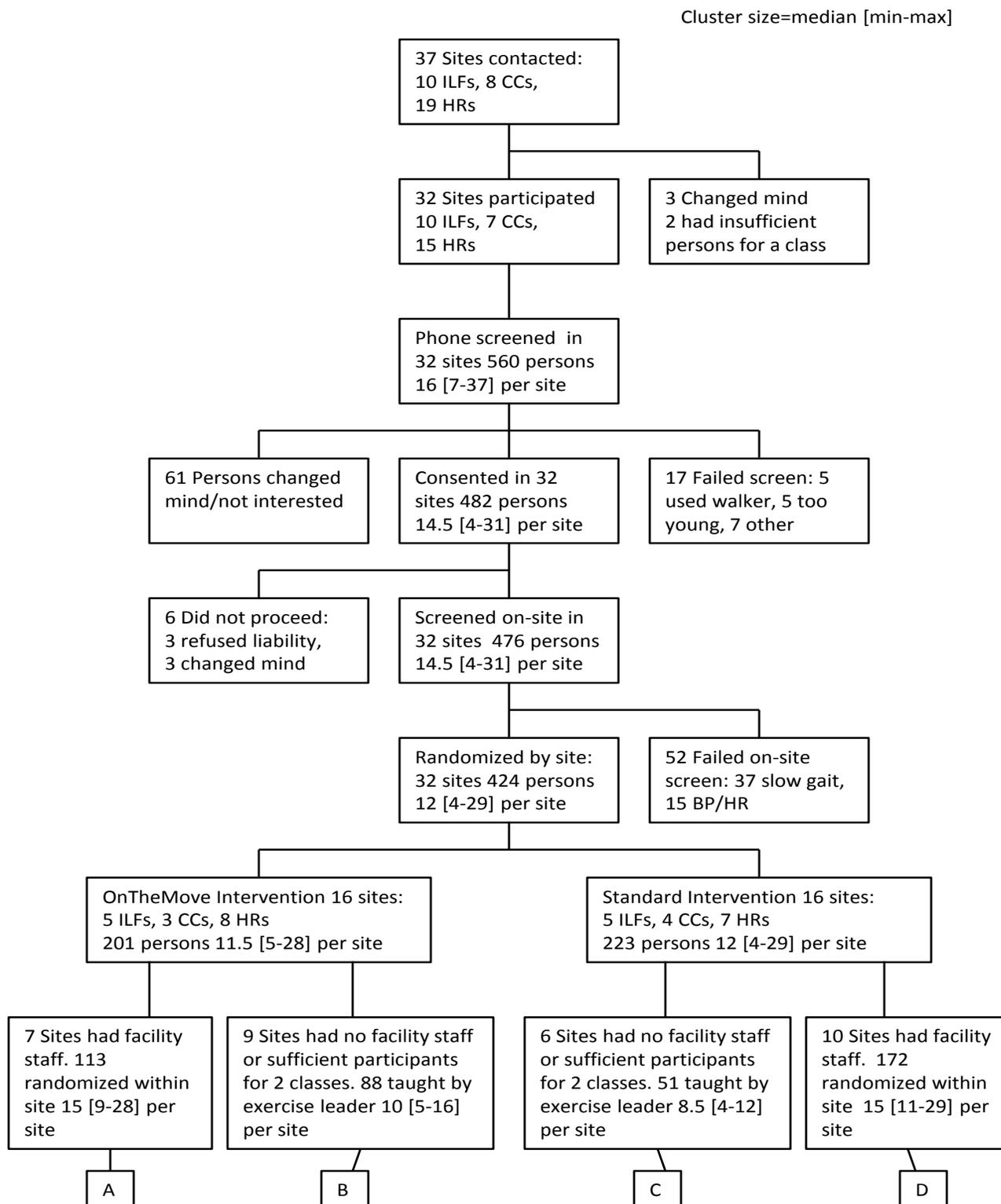
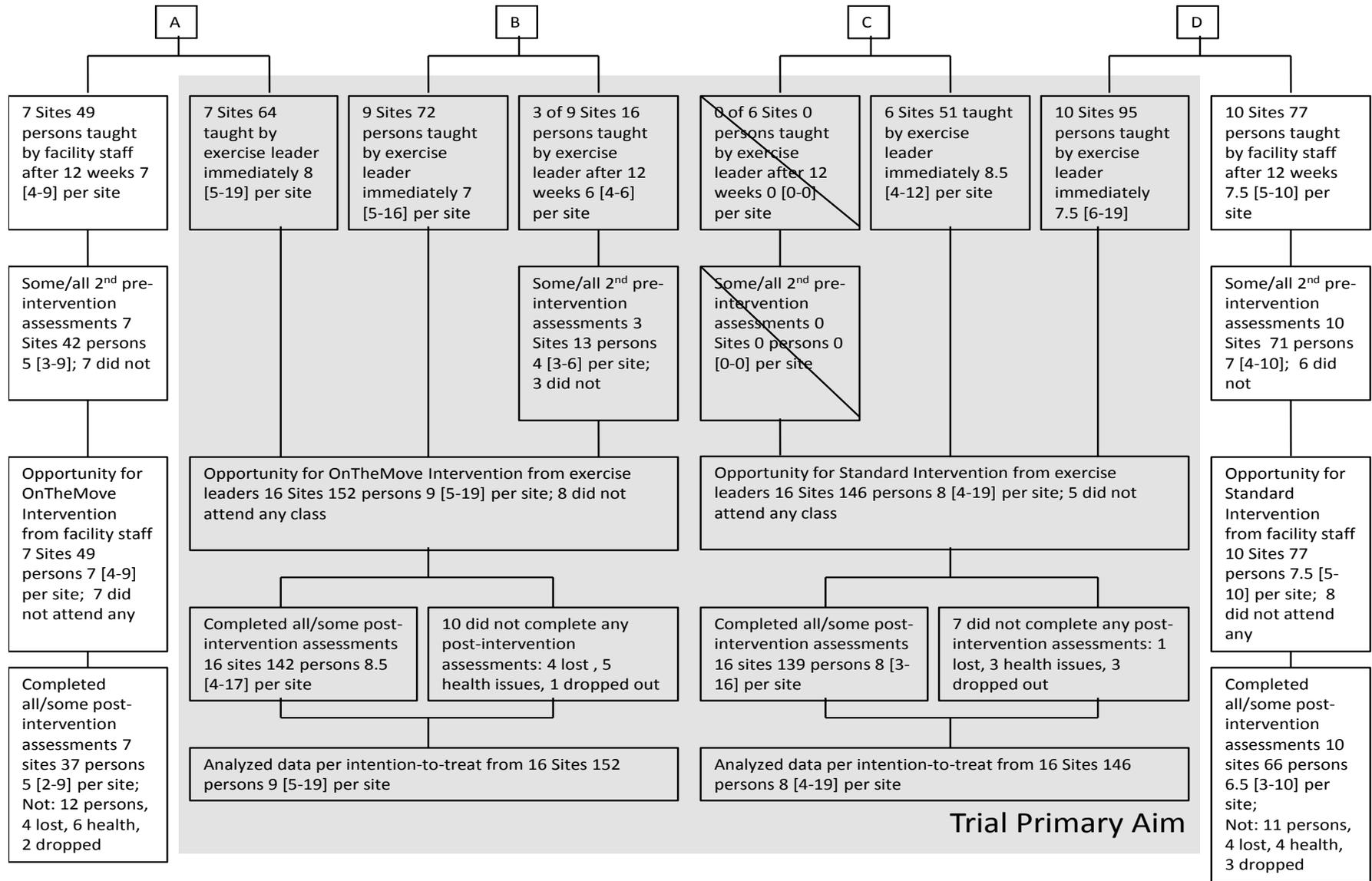


Figure 3. Consort Flow Diagram—Part 2



**Aim 1: Effectiveness of *On the Move***

We first present the analysis results comparing the 2 interventions with both instructor types combined. This analysis was a priori not planned, but reviewers requested we precede with the planned analysis because of the failed randomization to instructor type. Sixteen sites with a total of 201 participants were randomized to receive the *On the Move* program taught by research or facility staff, and 16 sites with 223 participants were randomized to receive the Standard program taught by research or facility staff (Figures 2-3). Of the 201 participants in the *On the Move* group, 179 individuals (89.1%) completed some or all of the postintervention testing, and 22 did not complete any postintervention testing (8 were lost to follow-up, 11 had health issues, and 3 dropped out of the study). Of the 223 participants in the Standard intervention, 205 individuals (91.9%) completed some or all of the postintervention testing, and 18 did not complete any postintervention testing (5 were lost to follow-up, 7 had health issues, and 6 dropped out) [IR-6; MD-4]. Those who did not complete any postintervention testing had poorer 6MWT results (280.1 versus 245.0 m;  $p = 0.0187$ ), and a lower proportion of this group reported excellent/very good balance (32.3% versus 17.5%;  $p = 0.0119$ ; Table 1).

Overall, participants had a mean  $\pm$  standard deviation age of  $80.7 \pm 7.8$  years and were mostly female (82.3%) and white (83.1%). Participants reported  $2.8 \pm 1.4$  chronic condition domains on the comorbidity index. Participants walked slowly (gait speed =  $0.91 \pm 0.20$  m/s), and 56.4% walked less than community ambulation distance (i.e., 300 m) on the 6MWT. The intervention groups were similar on all baseline measures except facility type (Table 2).

The *On the Move* group had greater improvements than the Standard group in the 6MWT ( $18.3 \pm 60.5$  versus  $1.9 \pm 55.8$  m; adjusted difference =  $15.3 \pm 6.7$ ;  $p = 0.0228$ ). There were no significant differences between groups in gait speed, self-reported function and disability, or any of the secondary outcomes (Tables 3-4).

Table 1. Participant Characteristics of Classes Taught by Exercise Leaders and Facility Staff Stratified by Whether Completed or Dropped Out: Mean  $\pm$  Standard Deviation or *N* (%)

Characteristic	Exercise Leaders and Facility Staff Combined		
	Completed <i>N</i> = 384	Dropped Out <i>N</i> = 40	<i>p</i> -Value*
Recruitment and intervention setting**			0.4404
Community senior center	82 (21.4)	10 (25.0)	
Independent living facility	157 (40.9)	19 (47.5)	
Senior apartment complex	145 (37.8)	11 (27.5)	
Age	80.7 $\pm$ 7.8	81.2 $\pm$ 7.9	0.9563
Female gender	319 (83.1)	30 (75.0)	0.2908
White race	315 (82.0)	37 (92.5)	0.2154
Live alone	281 (73.2)	26 (65.0)	0.2631
Currently married	89 (23.2)	10 (25.0)	0.8906
College education	195 (50.9)	20 (51.3)	0.8214
Comorbidities			
Cardiovascular	70 (18.2)	6 (15.0)	0.7170
Neurological	29 (7.6)	4 (10.0)	0.7830
Musculoskeletal	315 (82.0)	32 (80.0)	0.8625
General	152 (39.6)	19 (47.5)	0.3622
Vision/hearing	287 (74.7)	29 (72.5)	0.7055
Diabetes	78 (20.3)	6 (15.0)	0.3837
Cancer	78 (20.3)	6 (15.0)	0.5135
Lung	81 (21.1)	12 (30.0)	0.1745
Duke comorbidity index	2.8 $\pm$ 1.4	2.9 $\pm$ 1.4	0.8499
Fear of falling	133 (34.6)	15 (37.5)	0.6201
Fall prior year	115 (30.0)	13 (32.5)	0.5660
Excellent/very good mobility	225 (58.6)	22 (55.0)	0.7255
Excellent/very good health	202 (52.6)	23 (57.5)	0.6014
Excellent/very good balance	124 (32.3)	7 (17.5)	0.0119
Height (m)	1.6 $\pm$ 0.1	1.6 $\pm$ 0.1	0.7109
Weight (kg)	73.7 $\pm$ 20.8	75.1 $\pm$ 17.4	0.6094
Body mass index (kg/m <sup>2</sup> )	28.9 $\pm$ 13.9	28.8 $\pm$ 7.1	0.9379
6-minute walk distance (m)	280.1 $\pm$ 88.8	245.0 $\pm$ 91.6	0.0187
6-minute walk distance category			
< 300 m	212 (55.2)	27 (67.5)	
300+ m	172 (44.8)	13 (32.5)	
Narrow walk time (s)	6.4 $\pm$ 2.8	6.5 $\pm$ 2.1	0.8001
Obstacle walk time (s)	9.2 $\pm$ 2.7	9.2 $\pm$ 1.3	0.9162
Digit-symbol substitution test	36.2 $\pm$ 10.6	36.3 $\pm$ 13.2	0.8333
Figure-8 walk			
Time to complete	10.4 $\pm$ 3.3	10.7 $\pm$ 2.8	0.7794
Number of steps	17.8 $\pm$ 4.2	18.7 $\pm$ 4.4	0.2568
Smoothness total category			0.5020
0-2	206 (53.9)	24 (61.5)	
3	176 (46.1)	15 (38.5)	

Gait efficacy scale	75.3 ± 14.5	74.4 ± 12.5	0.6934
Patient Health Questionnaire-9	2.4 ± 2.8	2.4 ± 2.6	0.9118
Late Life Function and Disability Index			
Overall function	59.6 ± 9.4	59.0 ± 9.3	0.7377
Upper extremity function	77.0 ± 11.9	79.6 ± 12.4	0.1843
Basic lower extremity function	73.0 ± 14.1	72.7 ± 14.0	0.9191
Advanced lower extremity function	48.1 ± 15.0	46.1 ± 14.1	0.4448
Disability frequency	52.8 ± 6.3	51.7 ± 7.0	0.6423
Social role	48.0 ± 8.1	47.1 ± 9.8	0.7228
Personal role	64.9 ± 16.2	60.9 ± 13.8	0.3526
Instrumental role	78.9 ± 15.6	77.0 ± 12.6	0.5039
Management role	91.3 ± 12.4	90.1 ± 13.2	0.8053
Disability limitations	79.0 ± 14.7	76.4 ± 11.8	0.3449
Instrumented walkway gait speed	0.92 ± 0.20	0.85 ± 0.18	0.1256
Instrumented walkway gait speed category			
< 0.8 m/s	108 (29.8)	15 (39.5)	
0.8-1.0 m/s	138 (38.0)	14 (36.8)	
1.0+ m/s	117 (32.2)	9 (23.7)	
Stance time standard deviation (s)	0.044 ± 0.022	0.047 ± 0.023	0.4870
Step length standard deviation (cm)	3.45 ± 1.04	3.81 ± 1.04	0.0476
Step width standard deviation (cm)	2.87 ± 2.02	3.16 ± 2.13	0.4094

\* Obtained using a linear mixed or generalized estimating equation model due to clustering by facility unless otherwise noted

\*\*  $p$ -Value obtained using chi-square or Fisher's exact test

Table 2. Participant Characteristics and Measures at Baseline by Intervention Group, *On the Move* and Standard Taught by Exercise Leaders and Facility Staff: Mean  $\pm$  Standard Deviation or *N* (%)

Characteristic	Exercise Leaders and Facility Staff Combined		
	<i>On the Move</i> Intervention <i>N</i> = 201	Standard Intervention <i>N</i> = 223	<i>p</i> -Value*
Recruitment and intervention setting**			0.0482
Community senior center	49 (24.4)	43 (19.3)	
Independent living facility	71 (35.3)	105 (47.1)	
Senior apartment complex	81 (40.3)	75 (33.6)	
Age	80.6 $\pm$ 7.9	80.9 $\pm$ 7.7	0.6536
Female gender	171 (85.1)	178 (79.8)	0.3368
White race	174 (86.6)	178 (79.8)	0.5854
Live alone	146 (72.6)	161 (72.2)	0.7006
Currently married	51 (25.4)	48 (21.5)	0.6068
College education	95 (47.3)	120 (54.3)	0.6732
Comorbidities			
Cardiovascular	34 (16.9)	42 (18.8)	0.6164
Neurological	12 (6.0)	21 (9.4)	0.1422
Musculoskeletal	169 (84.1)	178 (79.8)	0.2818
General	85 (42.3)	86 (38.6)	0.3858
Vision/hearing	148 (73.6)	168 (75.3)	0.9579
Diabetes	47 (23.4)	37 (16.6)	0.1591
Cancer	37 (18.4)	47 (21.1)	0.6216
Lung	41 (20.4)	52 (23.3)	0.4360
Duke comorbidity index	2.9 $\pm$ 1.4	2.8 $\pm$ 1.4	0.8052
Fear of falling	70 (34.8)	78 (35.0)	0.9493
Fall prior year	61 (30.4)	67 (30.0)	0.8911
Excellent/very good mobility	120 (59.7)	127 (57.0)	0.6298
Excellent/very good health	112 (55.7)	113 (50.7)	0.4411
Excellent/very good balance	61 (30.4)	70 (31.4)	0.9333
Height (m)	1.61 $\pm$ 0.12	1.62 $\pm$ 0.12	0.4978
Weight (kg)	75.0 $\pm$ 24.1	72.7 $\pm$ 16.5	0.4956
Body mass index (kg/m <sup>2</sup> )	29.6 $\pm$ 13.6	28.3 $\pm$ 13.2	0.4559
6-minute walk distance (m)	274.0 $\pm$ 88.0	279.2 $\pm$ 91.1	0.7565
6-minute walk distance category			
< 300 m	113 (56.2)	126 (56.5)	
300+ m	88 (43.8)	97 (43.5)	
Narrow walk time (s)	6.5 $\pm$ 2.9	6.4 $\pm$ 2.5	0.6262
Obstacle walk time (s)	9.3 $\pm$ 2.6	9.1 $\pm$ 2.6	0.5758
Digit-symbol substitution test	36.5 $\pm$ 10.6	36.1 $\pm$ 11.2	0.6926
Figure-8 walk			
Time to complete	10.4 $\pm$ 3.4	10.4 $\pm$ 3.2	0.8266
Number of steps	17.9 $\pm$ 4.4	17.9 $\pm$ 4.0	0.7821
Smoothness total category			0.0763

0-2	98 (49.5)	132 (59.2)	
3	100 (50.5)	91 (40.8)	
Gait efficacy scale	75.2 ± 14.4	75.3 ± 14.2	0.9478
Patient Health Questionnaire-9	2.3 ± 2.8	2.6 ± 2.8	0.3331
Late Life Function and Disability Index			
Overall function	59.1 ± 8.5	59.9 ± 10.2	0.3910
Upper extremity function	77.4 ± 11.6	77.1 ± 12.3	0.8183
Basic lower extremity function	73.0 ± 13.6	73.0 ± 14.5	0.9927
Advanced lower extremity function	47.0 ± 13.8	48.7 ± 15.9	0.2761
Disability frequency	53.4 ± 6.5	52.0 ± 6.2	0.2626
Social role	48.7 ± 8.1	47.2 ± 8.3	0.3499
Personal role	66.3 ± 16.8	63.0 ± 15.1	0.2527
Instrumental role	80.3 ± 15.0	77.4 ± 15.5	0.3485
Management role	92.9 ± 10.9	89.7 ± 13.7	0.2018
Disability limitations	80.2 ± 14.2	77.4 ± 14.6	0.3041
Instrumented walkway gait speed	0.90 ± 0.20	0.92 ± 0.21	0.3388
Instrumented walkway gait speed category			
< 0.8 m/s	66 (34.4)	57 (27.3)	
0.8-1.0 m/s	68 (35.4)	84 (40.2)	
1.0+ m/s	58 (30.2)	68 (32.5)	
Stance time standard deviation (s)	0.044 ± 0.022	0.045 ± 0.022	0.9231
Step length standard deviation (cm)	3.40 ± 1.08	3.57 ± 1.01	0.2931
Step width standard deviation (cm)	2.91 ± 2.23	2.90 ± 1.82	0.9376

\* Obtained using a linear mixed or generalized estimating equation model due to clustering by facility unless otherwise noted

\*\* *p*-Value obtained using chi-square test

Table 3. Baseline to Follow-up Change in Participant Primary Outcome Measures and Between-intervention Differences When Interventions Were Delivered by Exercise Leaders and Facility Staff: Estimate  $\pm$  Standard Error ( $p$ -Value)

Measure	Exercise Leaders and Facility Staff Combined		
	<i>On the Move</i> Intervention Baseline to Follow-up Change $N = 201$	Standard Intervention Baseline to Follow-up Change $N = 223$	Adjusted Difference With Multiple Imputation for Missing Data*
6-minute walk distance (m)	18.3 $\pm$ 60.5	1.9 $\pm$ 55.8	15.3 $\pm$ 6.7 (0.0228)
LLFDI overall function	0.07 $\pm$ 5.50	-0.49 $\pm$ 5.86	0.26 $\pm$ 0.55 (0.6267)
LLFDI disability frequency	-0.02 $\pm$ 4.71	0.86 $\pm$ 5.22	-0.19 $\pm$ 0.62 (0.7541)
Instrumented walkway gait speed	0.04 $\pm$ 0.13	0.00 $\pm$ 0.13	0.03 $\pm$ 0.01 (0.0803)

\* Obtained using a linear mixed model due to clustering by facility

6MWD = 6-minute walk distance

LLFDI = Late-Life Function and Disability Index

Table 4. Baseline to Follow-up Change in Participant Secondary Outcome Measures and Between-intervention Differences When Delivered by Exercise Leaders and Facility Staff: Estimate  $\pm$  Standard Error ( $p$ -Value)

Measure	Exercise Leaders and Facility Staff Combined		
	<i>On the Move</i> Intervention Baseline to Follow-up Change $N = 201$	Standard Intervention Baseline to Follow-up Change $N = 223$	Adjusted Difference With Multiple Imputation for Missing Data*
LLFDI upper extremity function	$-0.24 \pm 9.82$	$1.40 \pm 10.5$	$-1.64 \pm 1.00$ (0.1045)
LLFDI basic lower extremity function	$-0.13 \pm 10.61$	$-0.46 \pm 9.47$	$0.19 \pm 1.02$ (0.8539)
LLFDI advanced lower extremity function	$-0.52 \pm 9.83$	$-1.64 \pm 11.70$	$0.56 \pm 1.14$ (0.6227)
LLFDI disability limitations	$-0.57 \pm 13.90$	$0.97 \pm 14.89$	$0.09 \pm 1.46$ (0.9524)
Narrow walk time (s)	$-0.27 \pm 1.94$	$0.01 \pm 2.46$	$-0.15 \pm 0.36$ (0.6738)
Obstacle walk time (s)	$-0.14 \pm 1.71$	$-0.02 \pm 1.47$	$-0.15 \pm 0.26$ (0.5725)
Figure-8 walk completion time	$-0.56 \pm 2.04$	$0.18 \pm 3.41$	$-0.68 \pm 0.43$ (0.1146)
Gait efficacy scale	$-1.6 \pm 11.0$	$-2.3 \pm 12.0$	$0.35 \pm 1.09$ (0.7477)
Stance time standard deviation (s)	$0.003 \pm 0.028$	$-0.001 \pm 0.025$	$0.002 \pm 0.003$ (0.4528)
Step length standard deviation (cm)	$0.08 \pm 1.11$	$-0.07 \pm 1.08$	$0.01 \pm 0.10$ (0.9264)
Step width standard deviation (cm)	$-0.09 \pm 2.76$	$-0.16 \pm 2.34$	$-0.04 \pm 0.22$ (0.8360)

\* Obtained using a linear mixed model due to clustering by facility

LLFDI = Late-Life Function and Disability Index

We next present the a priori planned primary analysis results using only those taught by exercise leaders. Of the participants, 152 were randomized to receive *On the Move* taught by exercise leaders, and 146 were randomized to receive Standard taught by research staff (Figures 2-3). Of the 152 participants in the *On the Move* group, 142 individuals (93.4%) completed some or all of the postintervention testing, and 10 did not complete any postintervention testing (4 were lost to follow-up, 5 had health issues, and 1 dropped out of the study). Of the 146 participants in the Standard intervention, 139 individuals (95.2%) completed some or all of the postintervention testing, and 7 did not complete any postintervention testing (1 was lost to follow-up, 3 had health issues, and 3 dropped out) [IR-6; MD-4]. Those who did not complete any postintervention testing had poorer 6MWT results (279.5 versus 205.9 m;  $p = 0.0012$ ), gait speed (0.92 versus 0.80 m/s;  $p = 0.0290$ ), and LLFDI disability frequency (52.7 versus 48.4;  $p = 0.0110$ ; Table 1).

Table 5 shows participant characteristics by intervention group and by whether participants were taught by staff or exercise leaders. Participants had a mean  $\pm$  standard deviation age of  $80.0 \pm 8.1$  years and were mostly female (84.2%) and white (83.6%). Participants reported  $2.8 \pm 1.4$  chronic condition domains on the comorbidity index. Participants walked slowly (gait speed =  $0.91 \pm 0.21$  m/s), and 56.4% walked less than 300 m on the 6MWT, which has been proposed as a distance compatible with community ambulation.<sup>38,61</sup> The intervention groups were similar on all baseline measures except facility type (Table 5).

Table 5. Participant Characteristics and Measures at Baseline: Mean  $\pm$  Standard Deviation or *N* (%)

Characteristic	<i>On the Move</i> Intervention		Standard Intervention		<i>On the Move</i> Versus Standard Delivered by Exercise Leader <i>p</i> -Value*	On the Move Versus Standard Delivered by Facility Staff <i>p</i> -Value*
	Exercise Leader <i>N</i> = 152	Facility Staff <i>N</i> = 49	Exercise Leader <i>N</i> = 146	Facility Staff <i>N</i> = 77		
Recruitment and intervention setting**					0.0363	0.2778
Community senior center	36 (23.7)	13 (26.5)	29 (19.9)	14 (18.2)		
Independent living facility	42 (27.6)	29 (59.2)	61 (41.8)	44 (57.1)		
Senior apartment complex	74 (48.7)	7 (14.3)	56 (38.4)	19 (24.7)		
Age	79.6 $\pm$ 8.2	83.7 $\pm$ 6.2	80.5 $\pm$ 8.1	81.7 $\pm$ 7.0	0.7401	0.3240
Female gender	131 (86.2)	40 (81.6)	120 (82.2)	58 (75.3)	0.5489	0.2507
White race	129 (84.9)	45 (91.8)	120 (82.2)	58 (75.3)	0.6245	0.4710
Live alone	121 (79.6)	25 (51.0)	105 (71.9)	56 (72.7)	0.2995	0.2909
Currently married	29 (19.1)	22 (44.9)	30 (20.6)	18 (23.4)	0.8782	0.1259
College education	67 (44.1)	28 (57.1)	73 (50.7)	47 (61.0)	0.7703	0.8651
Comorbidities						
Cardiovascular	26 (17.1)	8 (16.3)	26 (17.8)	16 (20.8)	0.8714	0.5003
Neurological	10 (6.6)	2 (4.1)	13 (8.9)	8 (10.4)	0.3572	0.1554
Musculoskeletal	129 (84.9)	40 (81.6)	114 (78.1)	64 (83.1)	0.1850	0.9970
General	66 (43.4)	19 (38.8)	56 (38.4)	30 (39.0)	0.3310	0.9534

Vision/hearing	109 (71.7)	39 (79.6)	105 (71.9)	63 (81.8)	0.9206	0.8499
Diabetes	41 (27.0)	6 (12.2)	25 (17.1)	12 (15.6)	0.0641	0.5591
Cancer	27 (17.8)	10 (20.4)	28 (19.2)	19 (24.7)	0.7375	0.7218
Lung	30 (19.7)	11 (22.5)	32 (21.9)	20 (26.0)	0.6971	0.6952
Duke comorbidity index	2.9 ± 1.4	2.8 ± 1.3	2.7 ± 1.5	3.0 ± 1.3	0.4488	0.5087
Fear of falling	53 (34.9)	17 (34.7)	57 (39.0)	21 (27.3)	0.5259	0.3844
Fall prior year	45 (29.6)	16 (32.7)	41 (28.1)	26 (33.8)	0.8535	0.9987
Excellent/very good mobility	90 (59.2)	30 (61.2)	90 (61.6)	37 (48.1)	0.6296	0.1963
Excellent/very good health	80 (52.6)	32 (65.3)	75 (51.4)	38 (49.4)	0.8505	0.1506
Excellent/very good balance	47 (30.9)	14 (28.6)	51 (34.9)	19 (24.7)	0.4185	0.4684
Height (m)	1.61 ± 0.10	1.60 ± 0.17	1.61 ± 0.13	1.64 ± 0.10	0.9657	0.1418
Weight (kg)	75.28 ± 21.08	74.08 ± 31.98	71.89 ± 15.72	74.31 ± 17.99	0.3478	0.9626
Body mass index (kg/m <sup>2</sup> )	29.0 ± 7.6	31.4 ± 24.3	28.6 ± 15.8	27.6 ± 6.1	0.8583	0.1825
6-minute walk distance (m)	273.3 ± 88.0	276.2 ± 88.7	277.3 ± 95.5	282.8 ± 82.6	0.7715	0.6670
Narrow walk time (s)	6.55 ± 3.06	6.43 ± 2.59	6.32 ± 2.62	6.53 ± 2.37	0.4488	0.9404
Obstacle walk time (s)	9.22 ± 2.46	9.48 ± 2.89	9.16 ± 2.81	9.08 ± 2.26	0.7218	0.5757
Digit-symbol substitution test	36.23 ± 10.51	37.26 ± 10.85	34.43 ± 11.66	39.26 ± 9.48	0.2421	0.3814
Figure-8 walk						
Time to complete	10.34 ± 3.25	10.82 ± 3.85	10.52 ± 3.40	10.29 ± 2.75	0.7340	0.8003
Number of steps	17.73 ± 4.13	18.41 ± 5.28	17.99 ± 3.94	17.61 ± 4.12	0.9596	0.3847

Gait efficacy scale	74.8 ± 14.6	76.3 ± 13.8	74.8 ± 15.3	76.2 ± 11.9	0.8842	0.9572
Late Life Function and Disability Index						
Overall function	58.9 ± 8.5	59.6 ± 8.6	60.0 ± 10.5	59.8 ± 9.5	0.3430	0.9085
Upper extremity function	77.7 ± 12.2	76.2 ± 9.5	77.2 ± 12.4	76.9 ± 12.3	0.6852	0.7210
Basic lower extremity function	72.6 ± 13.9	74.5 ± 12.9	72.4 ± 14.5	74.0 ± 14.4	0.9963	0.8725
Advanced lower extremity function	46.8 ± 13.9	47.5 ± 13.7	49.0 ± 15.9	48.1 ± 16.1	0.2370	0.8369
Disability frequency	53.3 ± 6.5	54.0 ± 6.6	51.6 ± 5.8	52.6 ± 6.7	0.2379	0.3211
Disability limitations	80.0 ± 14.3	81.2 ± 14.0	76.8 ± 15.1	78.6 ± 13.8	0.2944	0.6763
Instrumented walkway gait speed	0.90 ± 0.20	0.91 ± 0.18	0.92 ± 0.21	0.91 ± 0.20	0.2756	0.6946

\* Obtained using a linear mixed or generalized estimating equation model due to clustering by facility unless otherwise noted

\*\* *p*-Value obtained using chi-square test

When examining the effectiveness of *On the Move* when delivered by an exercise leader, the 2 intervention groups had significantly different improvements when all 4 primary outcomes were simultaneously considered in a multivariate Hotelling test ( $p = 0.0164$ ). The *On the Move* group had greater improvements than the Standard group in the primary measures of walking ability, the 6MWT ( $20.6 \pm 57.1$  versus  $4.1 \pm 55.6$  m; adjusted difference =  $16.7 \pm 7.4$ ;  $p = 0.0262$ ), and gait speed ( $0.05 \pm 0.13$  versus  $-0.01 \pm 0.11$  m/s; adjusted difference =  $0.05 \pm 0.02$ ;  $p = 0.0008$ ). In total, 48.5% of *On the Move* participants showed a small but meaningful improvement in gait speed ( $0.05+$  m/s) compared with only 29.5% in the Standard intervention, resulting in a number-needed-to-treat of 5.2. There were no significant differences between groups in self-reported function and disability primary outcome or any of the secondary outcomes (Tables 6-7). Sensitivity analyses that adjusted for facility type as an additional covariate, including an additional parameter in the working correlation structure to account for a potential correlation between members of the same couple; that averaged data by facility and fitted a simpler analysis of covariance model with facility as the unit of analysis; that used an immediate preintervention measurement instead of the pre-randomization assessment; or that ignored missing data instead of multiple imputation, did not materially change the results [IR-5; MD-5].

Table 6. Baseline to Follow-up Change in Primary Outcomes and Between-intervention Differences: Estimate  $\pm$  Standard Error ( $p$ -Value)

Measure	<i>On the Move</i> Intervention		Standard Intervention		<i>On the Move</i> Versus Standard When Delivered by Exercise Leader	<i>On the Move</i> Versus Standard When Delivered by Facility Staff	Exercise Leader Versus Facility Staff When Delivering <i>On the Move</i>
	Exercise Leader <i>N</i> = 152	Facility Staff <i>N</i> = 49	Exercise Leader <i>N</i> = 146	Facility Staff <i>N</i> = 77	Adjusted Difference*	Adjusted Difference*	Adjusted Difference*
LLFDI overall function	0.45 $\pm$ 5.66	-1.37 $\pm$ 4.68	-0.60 $\pm$ 5.79	-0.32 $\pm$ 6.03	0.77 $\pm$ 0.68 (0.2602)	-1.25 $\pm$ 1.14 (0.2758)	1.89 $\pm$ 1.02 (0.0647)
LLFDI disability frequency	0.36 $\pm$ 4.13	-1.45 $\pm$ 6.34	0.66 $\pm$ 5.00	1.26 $\pm$ 5.66	0.31 $\pm$ 0.60 (0.6050)	-2.33 $\pm$ 1.08 (0.0333)	1.87 $\pm$ 0.89 (0.0370)
6-minute walk distance (m)	20.6 $\pm$ 57.1	9.3 $\pm$ 72.4	4.1 $\pm$ 55.6	-3.24 $\pm$ 56.48	16.7 $\pm$ 7.4 (0.0262)	13.5 $\pm$ 13.49 (0.3211)	10.6 $\pm$ 11.3 (0.3501)
Instrumented walkway gait speed	0.05 $\pm$ 0.13	-0.01 $\pm$ 0.13	-0.01 $\pm$ 0.11	0.02 $\pm$ 0.16	0.05 $\pm$ 0.02 (0.0008)	-0.04 $\pm$ 0.03 (0.2532)	0.05 $\pm$ 0.03 (0.0578)

\* Obtained using a linear mixed model due to clustering by facility

6MWD = 6-minute walk distance

LLFDI = Late-Life Function and Disability Index

Table 7. Baseline to Follow-up Change in Participant Secondary Measures and Between-intervention Differences: Estimate  $\pm$  Standard Error (*p*-Value)

Measure	<i>On the Move</i> Intervention		Standard Intervention		<i>On the Move</i> Versus Standard When Delivered by Exercise Leader	<i>On the Move</i> Versus Standard When Delivered by Facility Staff	Exercise Leader Versus Facility Staff When Delivering <i>On the Move</i>
	Exercise Leader <i>N</i> = 152	Facility Staff <i>N</i> = 49	Exercise Leader <i>N</i> = 146	Facility Staff <i>N</i> = 77	Adjusted Difference*	Adjusted Difference*	Adjusted Difference*
LLFDI upper extremity function	-0.22 $\pm$ 10.10	-0.30 $\pm$ 8.81	1.41 $\pm$ 10.84	1.40 $\pm$ 9.75	-1.53 $\pm$ 1.15 (0.1850)	-2.26 $\pm$ 1.96 (0.2482)	0.68 $\pm$ 1.76 (0.7007)
LLFDI basic lower extremity function	0.19 $\pm$ 10.19	-1.32 $\pm$ 12.13	-0.20 $\pm$ 9.16	-1.01 $\pm$ 10.13	0.15 $\pm$ 1.21 (0.9018)	-0.57 $\pm$ 2.06 (0.7811)	1.67 $\pm$ 1.80 (0.3553)
LLFDI advanced lower extremity function	0.27 $\pm$ 10.14	-3.48 $\pm$ 8.02	-1.78 $\pm$ 12.16	-1.37 $\pm$ 10.78	1.53 $\pm$ 1.35 (0.2604)	-2.40 $\pm$ 2.18 (0.2714)	3.88 $\pm$ 1.96 (0.0484)
LLFDI disability limitations	0.19 $\pm$ 13.48	-3.51 $\pm$ 15.24	1.04 $\pm$ 15.14	0.83 $\pm$ 14.49	0.82 $\pm$ 1.50 (0.5867)	-3.44 $\pm$ 2.78 (0.2196)	3.77 $\pm$ 2.40 (0.1185)
Narrow walk time (s)	-0.25 $\pm$ 2.04	-0.35 $\pm$ 1.47	-0.04 $\pm$ 2.39	0.14 $\pm$ 2.64	-0.11 $\pm$ 0.44 (0.7982)	-0.56 $\pm$ 0.56 (0.3205)	0.11 $\pm$ 0.49 (0.8264)
Obstacle walk time (s)	-0.22 $\pm$ 1.62	0.21 $\pm$ 2.09	0.12 $\pm$ 1.42	-0.41 $\pm$ 1.53	-0.27 $\pm$ 0.35 (0.4446)	0.94 $\pm$ 0.47 (0.0473)	-0.52 $\pm$ 0.40 (0.1913)

Figure-8 walk time	-0.67 ± 2.02	-0.13 ± 2.09	0.11 ± 3.15	0.33 ± 3.94	0.64 ± 0.46 (0.1656)	-0.31 ± 0.71 (0.6635)	-0.70 ± 0.53 (0.1895)
Gait efficacy scale	-0.61 ± 10.72	-5.3 ± 11.6	-1.51 ± 12.11	-4.13 ± 11.51	0.51 ± 1.42 (0.7228)	-1.36 ± 2.31 (0.5559)	4.48 ± 2.07 (0.0314)
Stance time standard deviation (s)	0.002 ± 0.030	0.006 ± 0.020	-0.000 ± 0.027	-0.001 ± 0.022	0.001 ± 0.004 (0.7644)	0.003 ± 0.006 (0.6749)	0.001 ± 0.005 (0.9042)
Step length standard deviation (cm)	-0.04 ± 1.09	0.61 ± 1.06	-0.10 ± 1.04	-0.00 ± 1.17	-0.03 ± 0.12 (0.7882)	0.36 ± 0.22 (0.1076)	-0.46 ± 0.19 (0.0179)
Step width standard deviation (cm)	0.14 ± 2.36	-1.16 ± 3.99	-0.10 ± 2.47	-0.31 ± 2.02	-0.03 ± 0.25 (0.8942)	-0.15 ± 0.40 (0.7097)	0.24 ± 0.36 (0.5093)

\* Obtained using a linear mixed model due to clustering by facility

6MWD = 6-minute walk distance

LLFDI = Late-Life Function and Disability Index

## **Aim 2: Exploration of Sustainability of *On the Move* When Facility Staff Is Available to Teach**

Of the 32 facilities included in the study, we could identify a member of the staff or a peer to train to lead the exercise class at fewer than half of the facilities (15/32 = 46.9%). As we could not randomize to instructor as planned in all facilities, instructor assignment should be considered **quasi-experimental** and results treated as exploratory. We were more likely to identify someone to train at the independent living facilities (9/10 or 90%) than at the community facilities (6/22 or 27.3%). Forty-nine individuals were randomized to receive *On the Move* taught by facility staff and 77 individuals to receive the Standard intervention delivered by facility staff (Figures 2-3). Of the 49 randomized to receive *On the Move*, 37 people completed some or all of the postintervention testing, and 12 people did not complete any postintervention testing (4 were lost to follow-up, 6 had health issues, and 2 dropped out). Of the 77 randomized to receive the Standard intervention taught by facility staff, 66 people completed some or all of the postintervention testing and 11 individuals did not complete any postintervention testing (4 were lost to follow-up, 4 had health issues, and 3 dropped out) [IR-6; MD-4].

The 4 groups defined by the intervention × instructor combinations were similar at baseline on most demographic, health status, function, disability, and mobility measures (Table 5). The groups differed on facility type, presence of diabetes, and results of digit-symbol substitution testing ( $p < 0.05$ ).

When taught by facility staff personnel, no greater gains were attributable to *On the Move* than to the Standard program in any of the primary or secondary outcomes of function, disability, and mobility (all  $p > 0.10$ ; Tables 6-7). However, the sample size used in these comparisons was limited. Sustainability of the *On the Move* program was also examined by comparing outcomes of the *On the Move* program when taught by an exercise leader with those when taught by facility staff personnel. Some evidence showed that facility staff elicited smaller gains with *On the Move* than exercise leader in LLFDI overall function (AD =  $1.89 \pm 1.02$ ;  $p = 0.0647$ ), figure-8 walk number of steps (adjusted difference = AD =  $-1.25 \pm 0.55$ ;  $p = 0.0224$ ), gait efficacy scale (AD =  $4.5 \pm 2.1$ ;  $p = 0.0314$ ), LLFDI advanced lower extremity function (AD =  $3.88 \pm 1.96$ ;  $p = 0.0484$ ), LLFDI disability frequency (AD =  $1.87 \pm 0.89$ ;  $p = 0.0370$ ), LLFDI social role (AD =  $2.30 \pm 1.21$ ;  $p = 0.0576$ ), LLFDI management role (AD =  $4.18 \pm 2.03$ ;  $p = 0.0402$ ), gait speed (AD =  $0.05 \pm 0.03$ ;  $p = 0.0578$ ), and step length variability (AD =  $-0.46 \pm 0.19$ ;  $p = 0.0179$ ). However, given the difference in sample size between the groups, these results should be interrupted cautiously. We found no such differences in the other measures (Tables 6-7).

Sensitivity analyses that adjusted for facility type, presence of diabetes, and digit symbol substitution test performance as additional covariates, using an immediate preintervention

measurement instead of the prerandomization assessment or ignoring missing data instead of multiple imputation, did not materially change the results [IR-5; MD-5].

### **Aim 3: Acceptability and Risks of the 2 Programs When Delivered by Exercise Leaders and Staff**

#### **Activity Personnel**

As requested by the reviewers, we examined the acceptability and the risks of the 2 programs regardless of instructor type. Individuals in *On the Move* were less likely than those in the Standard class to attend  $\geq 20$  classes (43.8% versus 60.5%; odds ratio [95% confidence interval] OR = 0.51 [0.33, 0.78];  $p = 0.0021$ ; Table 8). More than half of the individuals in both programs (*On the Move* and Standard) felt (1) they benefited from the class, (2) the classes were at least somewhat challenging, (3) they received just enough or more personalized instruction, and (4) safe or very safe while doing the exercises. In both groups, more than half of the participants (*On the Move* = 76.6% and Standard = 82.1%) were satisfied or very satisfied with the programs.

When taught by the exercise leaders, individuals in *On the Move* were less likely than those in the Standard class to attend  $\geq 20$  classes (50.0% versus 65.1%; odds ratio [95% confidence interval] OR = 0.55 [0.30, 0.90];  $p = 0.0418$ ); Table 8). When taught by an exercise leader, the vast majority of individuals in both programs (*On the Move* and Standard) felt (1) they benefited from the class, (2) the classes were at least somewhat challenging, (3) they received just enough or more personalized instruction, and (4) safe or very safe while doing the exercises. In both groups, the majority of the participants (*On the Move* = 84.2% and Standard = 86.3%) were satisfied or very satisfied with the program and the majority said they would likely continue with the same program if it were offered in the future (74.3% versus 74.0%; OR = 1.16 [0.65, 2.05];  $p = 0.6167$ ).

When the *On the Move* and the Standard programs were taught by staff activity personnel, individuals in *On the Move* were less likely to attend  $\geq 20$  classes than those in the Standard program (24.5% versus 52.0%; OR = 0.28 [0.08, 0.93];  $p = 0.0384$ ; Table 8). Approximately half of the participants in each group felt they benefited from the exercise classes taught by staff activity personnel (42.9% versus 53.3%; OR = 0.83 [0.42, 1.65];  $p = 0.5915$ ). However, compared with participants in the Standard program taught by staff activity personnel, participants in *On the Move* taught by staff activity personnel were less likely to report that they felt safe (55.1% versus 75.3%; OR = 0.27 [0.07, 1.04];  $p = 0.0574$ ), that they were satisfied with the program (53.1% versus 74.0%; OR = 0.29 [0.11, 0.79];  $p = 0.0153$ ), or that they would continue in the same program if it was offered in the future (53.1% versus 72.7%; OR = 0.31 [0.13, 0.72];  $p = 0.0066$ ).

Last, we compared adherence to and satisfaction with *On the Move* when it was taught by exercise leaders and staff activity personnel. Attendance (20+ classes) was greater in the classes taught by the exercise leader compared with the facility staff personnel (50.0% versus 24.5%; OR = 3.38 [1.10, 10.38];  $p = 0.0333$ ; Table 8). Individuals in the classes taught by exercise leaders attended on average  $16.0 \pm 7.9$  classes, while those in the classes taught by facility staff personnel attended on average  $11.7 \pm 9.0$  classes. Overall satisfaction was greater in *On the Move* classes taught by exercise leaders than in those by staff activity personnel. Participants reported benefit from class (68.4% versus 42.9%; OR = 2.29 [1.09, 4.82];  $p = 0.0294$ ), sufficient individualized instruction (84.2% versus 51.0%; OR = 11.55 [2.17, 61.63];  $p = 0.0042$ ), satisfaction with the class (84.2% versus 53.1%; OR = 9.62 [4.05, 22.88];  $p < 0.0001$ ), and likelihood of continuing the class if it were to be offered in the future (74.3% versus 53.1%; OR = 1.84 [1.29, 2.61];  $p = 0.0007$ ). Finally, individuals in *On the Move* classes taught by exercise leaders were much more likely to report feeling safe during the exercise class than those taught by staff activity personnel (86.2% versus 55.1%; OR = 33.42 [4.05, 275.80];  $p = 0.0011$ ).

Few adverse events occurred, indicating that *On the Move* as currently designed was well tolerated. Throughout the study, 7 reported adverse events occurred during the intervention. The majority of the events occurred during the *On the Move* classes ( $n = 6$ ; 3 falls, 2 fatigue, and 1 pain), with only 1 event (chest pain) occurring during the Standard class. Of the 6 events that occurred during *On the Move* classes, 4 occurred during classes taught by exercise leaders and 2 occurred during classes led by staff activity personnel. Of the events, only the chest pain event was classified as serious. The participant who experienced chest pain was referred for medical attention, had a stent placed, and eventually returned to the exercise program without further incident.

Table 8. Comparisons of Follow-up Measures of Exercise Attendance and Satisfaction: *N* (%) and Odds Ratio [95% Confidence Interval] (*p*-Value)

Measure	Exercise Leader and Facility Staff Combined			<i>On the Move</i> Intervention		Standard Intervention		<i>On the Move</i> Versus Standard When Delivered by Exercise Leader	<i>On the Move</i> Versus Standard When Delivered by Facility Staff	Exercise Leader Versus Facility Staff When Delivering <i>On the Move</i>
	<i>On the Move</i> <i>N</i> = 201	Standard <i>N</i> = 223	<i>On the Move</i> Versus Standard	Exercise Leader <i>N</i> = 152	Facility Staff <i>N</i> = 49	Exercise Leader <i>N</i> = 146	Facility Staff <i>N</i> = 77			
<b>Attendance:</b>										
20+ classes	88 (43.8)	135 (60.5)	0.51 [0.33, 0.78] (0.0021)	76 (50.0)	12 (24.5)	95 (65.1)	40 (52.0)	0.55 [0.30, 0.98] (0.0418)	0.28 [0.08, 0.93] (0.0384)	3.38 [1.10, 10.38] (0.0333)
<b>Satisfaction:</b>										
Benefited from class										
A good bit/somewhat	125 (62.9)	146 (65.5)	0.96 [0.58, 1.58] (0.8659)	104 (68.4)	21 (42.9)	105 (71.9)	41 (53.3)	0.88 [0.49, 1.60] (0.6817)	0.83 [0.42, 1.65] (0.5915)	2.29 [1.09, 4.82] (0.0294)
Class was challenging										
At least somewhat	115 (57.2)	127 (57.0)	1.15 [0.75, 1.78] (0.5176)	92 (60.5)	23 (46.9)	94 (64.4)	33 (42.9)	0.88 [0.56, 1.38] (0.5745)	1.87 [0.86, 4.05] (0.1151)	1.10 [0.61, 2.00] (0.7457)

Individualized instruction										
At least just enough+	153 (76.1)	177 (79.4)	1.07 [0.43, 2.63] (0.8903)	128 (84.2)	25 (51.0)	124 (84.9)	53 (68.8)	1.55 [0.44, 5.40] (0.4938)	0.47 [0.12, 1.75] (0.2578)	11.55 [2.17, 61.63] (0.0042)
Feeling of safety										
Safe/very safe	158 (78.6)	185 (83.0)	0.76 [0.26, 2.21] (0.6148)	131 (86.2)	27 (55.1)	127 (87.0)	58 (75.3)	3.06 [0.36, 25.71] (0.3032)	0.27 [0.07, 1.04] (0.0574)	33.42 [4.05, 275.80] (0.0011)
Overall satisfaction										
Satisfied/very satisfied	154 (76.6)	183 (82.1)	0.62 [0.27, 1.43] (0.2638)	128 (84.2)	26 (53.1)	126 (86.3)	57 (74.0)	0.99 [0.28, 3.58] (0.9935)	0.29 [0.11, 0.79] (0.0153)	9.62 [4.05, 22.88] ( $< 0.0001$ )
Continue exercise afterwards										
Definitely/probably will	139 (69.2)	164 (73.5)	0.84 [0.50, 1.39] (0.4894)	113 (74.3)	26 (53.1)	108 (74.0)	56 (72.7)	1.16 (0.65, 2.05) (0.6167)	0.31 [0.13, 0.72] (0.0066)	1.84 [1.29, 2.61] (0.0007)

### **Aim 3: In-depth Phone Interviews**

A complete report of the in-depth phone interviews can be found in the Appendix. Fifty-one individuals completed the phone interviews. Distribution by study arm was as follows: *On the Move* taught by exercise leader,  $n = 10$ ; Standard taught by exercise leader,  $n = 21$ ; *On the Move* taught by staff activity personnel,  $n = 9$ ; and Standard taught by staff activity personnel,  $n = 11$ . The feedback received by the phone surveys was in general very positive. The findings from the interviews mirrored the quantitative findings. Briefly, all participants who were interviewed stated they felt safe while attending the exercise classes. The majority of the participants reported that they experienced a small to a great change in their walking ability. Some of the changes reported were improved walking; walking better, faster, farther, and for longer periods of time; and less reliance on a cane for walking. We found no appreciable differences in the responses given by the participants in the *On the Move* compared with the Standard program. However, participants in exercise leader–led classes tended to mention more positive outcomes than the staff activity personnel–led classes. An unexpected benefit of the exercise program mentioned by several participants was the positive nature of the group experience. Several mentioned the social benefits and the camaraderie of the group as a benefit of the group exercise program. In fact, more than two-thirds mentioned the social aspects of participating in a group activity as what they liked most about the exercise class, namely the feeling of community and companionship.

“I guess one thing that I really enjoyed about it was the feeling of community that we had. We really enjoyed each other as well as enjoying the exercise together. That was a real plus for me.”  
[WF/ILF/OTM/SAP]

Another interesting finding from the surveys was that the Standard program was likely a much better exercise program than the normally offered standard seated program. Some of the comments included, “Even if it was a seated program it was quite a workout”; “it was not the same old, same old program”; and “it was in general more demanding and organized than the seated programs at their facility.”

A few of the participants who were interviewed expressed concern with the staff activity personnel. Only 3 participants (2 in *On the Move* and 1 in Standard, all taught by staff activity personnel) expressed some reservations about the way their exercise instructor conducted the class.

“ . . . the instructor. She was the most disappointing. The instructor was not well qualified, could not do some of the exercises and show you.” [WF/SC/OTM/FS]

Several of those interviewed found the *On the Move* program either too easy or too challenging. Participants suggested offering different levels of the *On the Move* program, such as a beginner and an advanced class, so that individual differences and capabilities could be addressed.

Table 9. Comparisons of Baseline Characteristics Between Those Responding to *On the Move* Intervention Taught by Exercise Leaders and One-at-a-Time Baseline Predictors of a 0.05+ m/s Gain in Gait Speed: *N* (%), Mean  $\pm$  Standard Deviation or Odds Ratio (95% Confidence Interval) [*p*-Value]

Baseline Characteristic	No Meaningful Improvement (< 0.05 m/s) in Gait Speed <i>N</i> = 67	At Least a Small Meaningful Improvement (0.05+ m/s) in Gait Speed <i>N</i> = 64	Comparison <i>p</i> -Value*	Odds Ratio (95% Confidence Interval) [ <i>p</i> -Value***]
Recruitment and intervention setting**			0.6920**	[0.6439]
Community senior center	15 (22.4)	16 (25.0)		1.10 (0.51-2.36) [0.8079]
Independent living facility	19 (28.4)	14 (21.9)		0.68 (0.33-1.40) [0.2934]
Senior apartment complex (reference)	33 (49.3)	34 (53.1)		1.00
Age (5 years)	79.2 $\pm$ 8.0	79.3 $\pm$ 8.3	0.5681	1.01 (0.81-1.25) [0.9397]
Female gender	58 (86.6)	56 (87.5)	0.9086	1.11 (0.49-2.48) [0.8061]
White race	54 (80.6)	54 (84.4)	0.3372	1.39 (0.65-2.98) [0.3902]
Live alone	54 (80.6)	52 (81.3)	0.9513	1.04 (0.49-2.23) [0.9125]
Currently married	14 (20.9)	9 (14.1)	0.1515	0.62 (0.32-1.21) [0.1605]
College education	26 (38.8)	31 (48.4)	0.0919	1.50 (0.89-2.53) [0.1299]
Comorbidities				
Cardiovascular	15 (22.4)	7 (10.9)	0.1297	0.42 (0.18-1.02) [0.0541]
Neurological	3 (4.5)	5 (7.8)	0.2502	1.81 (0.64-5.14) [0.2665]

Musculoskeletal	57 (85.1)	56 (87.5)	0.7380	1.23 (0.53-2.84) [0.6256]
General	34 (50.8)	26 (40.6)	0.3047	0.67 (0.32-1.40) [0.2849]
Vision/hearing	46 (68.7)	47 (73.4)	0.4968	1.27 (0.63-2.59) [0.5016]
Diabetes	21 (31.3)	16 (25.0)	0.4989	0.73 (0.29-1.84) [0.5043]
Cancer	15 (22.4)	7 (10.9)	0.1014	0.43 (0.20-0.93) [0.0312]
Lung	17 (25.4)	7 (10.9)	0.0643	0.36 (0.16-0.84) [0.0173]
Duke comorbidity index	3.1 ± 1.4	2.7 ± 1.3	0.0447	0.79 (0.61-1.01) [0.0559]
Fear of falling	23 (34.3)	24 (37.5)	0.7147	1.14 (0.52-2.48) [0.7391]
Fall prior year	20 (29.9)	21 (32.8)	0.7313	1.14 (0.56-2.32) [0.7113]
Excellent/very good mobility	42 (62.7)	38 (59.4)	0.6823	0.87 (0.45-1.68) [0.6803]
Excellent/very good health	35 (52.2)	35 (54.7)	0.9939	1.12 (0.65-1.93) [0.6823]
Excellent/very good balance	25 (37.3)	19 (29.7)	0.3643	0.70 (0.34-1.45) [0.3423]
Height (0.1 m)	1.6 ± 0.1	1.6 ± 0.1	0.7078	1.07 (0.82-1.38) [0.6209]
Weight (5 kg)	77.9 ± 24.0	72.4 ± 18.1	0.0921	0.94 (0.86-1.02) [0.1095]
Body mass index (kg/m <sup>2</sup> )	30.6 ± 9.4	27.7 ± 5.1	0.0130	0.94 (0.90-0.98) [0.0066]
6-minute walk distance (10 m)	277.0 ± 90.9	280.6 ± 79.1	0.9106	1.01 (0.98-1.03) [0.6943]
Narrow walk time (s)	7.1 ± 3.4	6.0 ± 2.6	0.1331	0.87 (0.75-1.00) [0.0578]

Obstacle walk time (s)	9.3 ± 2.9	9.1 ± 2.1	0.9761	0.95 (0.82-1.10) [0.4972]
Digit-symbol substitution test	35.0 ± 10.6	37.0 ± 9.1	0.6352	1.02 (0.99-1.06) [0.2243]
Figure-8 walk				
Time to complete	10.4 ± 3.3	10.1 ± 3.0	0.8853	0.97 (0.87-1.08) [0.6046]
Number of steps	18.2 ± 4.2	17.0 ± 3.6	0.1335	0.91 (0.83-0.99) [0.0376]
Gait efficacy scale	73.4 ± 16.2	75.8 ± 14.1	0.4099	1.01 (0.99-1.03) [0.3436]
Short Physical Performance Battery	9.7 ± 1.7	9.4 ± 1.7	0.2445	0.89 (0.73-1.08) [0.2311]
Patient Health Questionnaire-9	2.3 ± 3.3	2.5 ± 2.9	0.7728	1.02 (0.91-1.14) [0.7569]
Late Life Function and Disability Index				
Overall function	59.4 ± 9.6	58.6 ± 7.8	0.6234	0.99 (0.94-1.04) [0.6877]
Upper extremity function	77.2 ± 13.1	76.7 ± 11.3	0.9310	1.00 (0.97-1.03) [0.8187]
Basic lower extremity function	73.2 ± 14.4	72.5 ± 13.9	0.7317	1.00 (0.97-1.03) [0.8075]
Advanced lower extremity function	47.5 ± 15.2	46.4 ± 13.4	0.6986	0.99 (0.97-1.02) [0.7087]
Disability frequency	52.4 ± 5.4	55.1 ± 6.5	0.0133	1.08 (1.02-1.15) [0.0051]
Social role	46.5 ± 7.0	50.6 ± 8.2	0.0037	1.08 (1.03-1.12) [0.0007]
Personal role	67.8 ± 17.2	68.5 ± 15.7	0.8950	1.00 (0.98-1.03) [0.8148]
Instrumental role	79.8 ± 15.8	81.6 ± 15.0	0.5223	1.01 (0.98-1.03) [0.5122]
Management role	92.1 ± 11.0	95.3 ± 8.9	0.0757	1.03 (0.99-1.08) [0.1237]

Disability limitations	80.0 ± 15.0	82.0 ± 13.9	0.4213	1.01 (0.99-1.03) [0.4155]
Instrumented walkway gait speed (0.1 m/s)	0.93 ± 0.19	0.88 ± 0.20	0.0635	0.87 (0.75-1.01) [0.0651]

\* Obtained using a linear mixed model or a generalized estimating equations model due to clustering by facility unless otherwise noted

\*\* *p*-Value obtained using a chi-square test

\*\*\* Obtained using a generalized estimating equations model due to clustering by facility unless otherwise noted

**Aim 4: Who Is Likely to Benefit From *On the Move* Taught by Exercise Leaders?**

Post hoc exploratory subgroup analyses using only those taught by exercise leaders showed significant treatment by class attendance ( $p = 0.0112$ ) and facility type ( $p = 0.0443$ ) interactions with respect to the outcome of the 6MWD. From a hypothesis-generating perspective for subsequent studies, we feel those attending 20+ classes (6MWD improvement 31.8 m;  $p = 0.0016$ ) or those attending community centers (48.9 m;  $p = 0.0051$ ) may derive greater benefits from the *On the Move* program than from the Standard program.

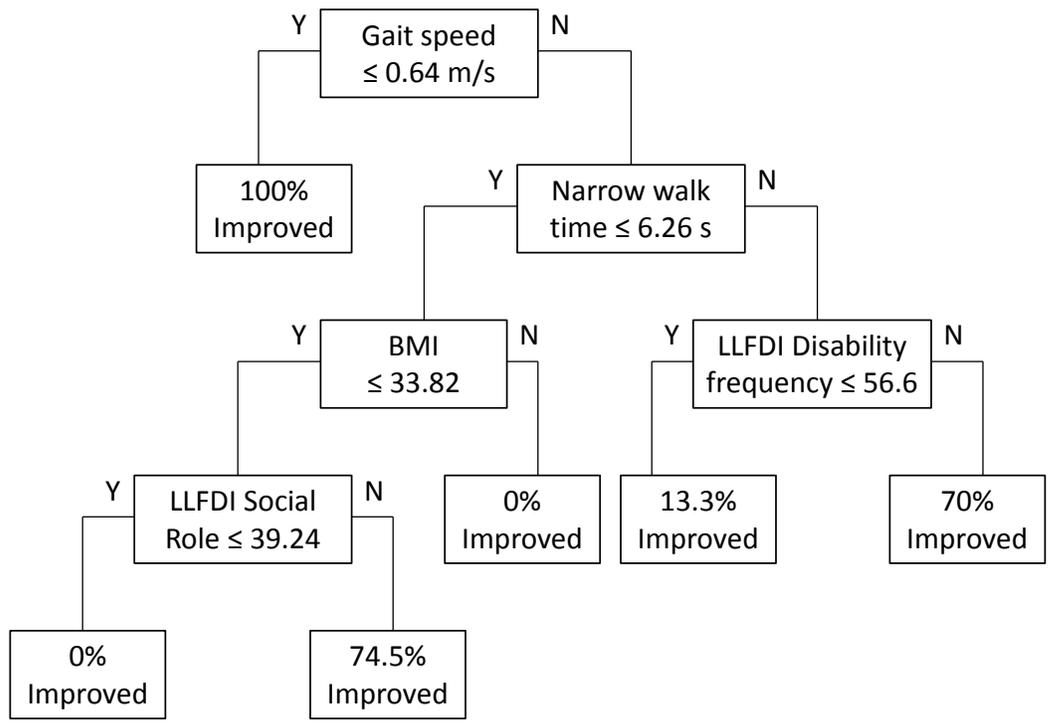
Our responder versus nonresponder comparisons are based on a smaller number of participants due to the unanticipated staff recruitment difficulties and significant differences between exercise leaders and facility staff personnel. As such, the results should be considered preliminary and hypothesis generating, rather than confirmatory. Comparisons of baseline characteristics between responders (gait speed gain of 0.05+ m/s) and nonresponders to *On the Move* when taught by an exercise leader (Table 9) showed that responders tended to have a lower body mass index (BMI) ( $27.7 \pm 5.1$  versus  $30.6 \pm 9.4$ ;  $p = 0.0130$ ) and greater scores on LLFDI disability frequency ( $55.1 \pm 6.5$  versus  $52.4 \pm 5.4$ ;  $p = 0.0133$ ) and social role ( $50.6 \pm 8.2$  versus  $46.5 \pm 7.0$ ;  $p = 0.0037$ ). Further, those with a lower BMI (OR = 0.94 [0.90-0.98];  $p = 0.0130$ ) and greater LLFDI scores for disability frequency (OR = 1.08 [1.02-1.15];  $p = 0.0051$ ) and social role (OR = 1.08 [1.03-1.12];  $p = 0.0007$ ) were more likely to respond to *On the Move* when taught by an exercise leader. We attempted to find a parsimonious set of independent baseline predictors through forward selection (Table 10); we found that having had cancer (OR = 0.20 [0.07-0.56];  $p = 0.0022$ ), a lower BMI (OR = 0.91 [0.82-1.00];  $p = 0.0527$ ), a greater score on the LLFDI social role (OR = 1.15 [1.07-1.24];  $p = 0.0002$ ), and a faster gait speed (OR = 0.50 [0.33-0.76];  $p = 0.0011$ ) were associated with a likelihood to respond to *On the Move*. The random forest and classification tree analysis (Figure 4) showed largely similar results, splitting on performance measures of walking ability, BMI, and LLFDI disability frequency and social role as important baseline predictors with an AUROC of 0.869 in the analyzed sample and 0.738 in internal cross-validation.

Table 10. Independent Baseline Predictors of a 0.05+ m/s Gait Speed Gain From *On the Move* Intervention Taught by Exercise Leaders, Identified Through Forward Selection

Baseline Characteristic	Odds Ratio	95% Confidence Interval	<i>p</i> -Value*
Cancer	0.20	0.07-0.56	0.0022
Body mass index (kg/m <sup>2</sup> )	0.91	0.82-1.00	0.0527
Narrow walk time (s)	0.75	0.58-0.98	0.0333
Figure-8 walk number of steps	0.88	0.71-1.08	0.2098
Late Life Function and Disability Index social role	1.15	1.07-1.24	0.0002
Instrumented walkway gait speed (OR unit 0.1 m/s)	0.50	0.33-0.76	0.0011

\* Obtained using a generalized estimating equations model due to clustering by facility unless otherwise noted

Figure 4. Classification Tree Analysis for Identifying Potential Responders (as defined by a 0.05+ m/s gain in gait speed) to *On the Move* Intervention Taught by Exercise Leaders



## Discussion

Decisional context: The *On the Move* group exercise program elicited greater improvements in mobility as measured by the 6MWT than the Standard group exercise program when the exercise leaders and facility staff arms were combined. Combining the 2 instructor types was deemed necessary by the reviewers as we could not randomize participants to the instructor as we had originally planned, due to the difficulty of identifying and training staff activity personnel to deliver the *On the Move* program. Therefore, we believe *On the Move* is best delivered by an exercise leader. When taught by an exercise leader, the *On the Move* group exercise program, which was designed to target the timing and coordination of movement important for walking, elicited greater improvements in mobility than the Standard group exercise program. The gains in mobility were both statistically significant and clinically meaningful.<sup>50</sup> The adjusted difference of gains between groups in the 6-minute walk distance of 20 m and the adjusted group difference between groups in gait speed of 0.05 m/s have been described as small but meaningful changes in mobility.<sup>50</sup> The results translate to a very favorable number-needed-to-treat of only 5.7. Interestingly, the greater improvements in mobility in *On the Move* compared with the Standard group occurred even though adherence to the exercise program was lower in *On the Move* than in the Standard program. Our findings support the idea that timing and coordination exercises should be included in exercise programs to improve mobility in older adults.

Study results in context: Group exercise programs for older adults that have included standing and walking activities have had conflicting findings about their impact on mobility.<sup>11-13</sup> Often these interventions were compared with a nonexercise control group and were conducted in “young” older adults.<sup>11-13</sup> The 1 group exercise program that did improve mobility consisted of a very high dose of exercise (65 minutes a day, 5 days a week, for 24 weeks), which may not be acceptable to all older adults.<sup>11</sup> In addition, many programs exclude an important component of exercise that is critical to walking, namely the timing and coordination of movement.<sup>14-16</sup>

In our study, the *On the Move* group exercise program, which was designed to target the timing and coordination of movement important for walking, elicited greater improvements in mobility than the Standard group exercise program. We compared the *On the Move* program with the Standard group exercise program instead of comparing it with a nonintervention control. Many of the previous research reports on community-based group exercise programs have compared a group exercise program with a nonexercise control.<sup>11-13</sup> We compared the effectiveness of *On the Move* against a more challenging Standard program [RQ-5]. The comparison group received an exercise program that was not only active

but also well taught by trained exercise professionals. Despite being held to a more challenging Standard program, the *On the Move* exercise program participants demonstrated a greater improvement in mobility. Also, the participants in this study sample constituted a somewhat frail group of adults of advanced age who are not usually included in exercise intervention studies. The mean age of these participants was greater than 80 years and they had multiple chronic conditions, impaired mobility, fear of falling, and a history of falls. However, it is important to note that, to participate in the study, the older adults had to have a certain level of mobility (i.e., gait speed  $\geq 0.60$  m/s) and be able to ambulate with no more than a straight cane. Therefore, the findings cannot be generalized to older adults with greater mobility limitations. Finally, the *On the Move* program consisted of a lower dose of exercise (ie, 50 minutes twice a week for 12 weeks) than the previous study (65 minutes a day, 5 days a week, for 24 weeks), which was shown to improve mobility.

Implementation of study results: We demonstrated the effectiveness of the *On the Move* program *on site* in 3 different settings—independent living facilities, community centers, and apartment buildings. All testing and interventions were delivered at the facilities, thus indicating the program can be conducted in various community locations and supports the implementation in a variety of settings.

To examine the facility's ability to maintain the program after the research project had ended, we attempted to identify and train staff at the various facilities to lead the exercise programs. We had great difficulty identifying staff activity personnel to teach the group exercise programs, especially at the senior apartment buildings and community centers, where we were able to identify and train someone only at less than 30% of the facilities. Therefore, in a way, the question about the facility's ability to maintain the exercise program, as asked, was mostly answered through the feasibility aspect during the process of conducting the study. Because the randomized assignment to instructor could not be accomplished as planned, the analytic results for our sustainability aim should be considered to be of the quality of a quasi-experimental study, and lesser than those from a fully randomized trial. Subject to this limitation, the individuals who were trained to lead the exercise programs were unable to get the same improvements in participants' mobility with the *On the Move* program as the exercise leaders. In fact, participants were more satisfied when the staff activity personnel taught the Standard program. Participants were not as satisfied and did not feel as safe when the staff activity personnel taught the *On the Move* program compared with the Standard program. Therefore, we currently believe, given the difficulty in identifying and training staff activity personnel to lead the exercise classes and the present

preliminary findings about effectiveness, that the *On the Move* program is best taught by an exercise leader who is a health professional.

It is important to note that the *On the Move* program was designed based on a task-specific motor skill program that is delivered 1-on-1 by a physical therapist. Although the improvements were smaller for the *On the Move* group class than for the 1-on-1 task-specific exercise program, the improvements are still significant and clinically meaningful. The group exercise class format is a more efficient way to deliver the exercise and could be a valuable option for community-based health and wellness programming.<sup>12</sup> However, trained staff activity personnel who were primarily lay individuals without an exercise or physical therapy background were unable to get the same improvements in mobility when they taught the *On the Move* class, thus indicating that the *On the Move* program should be taught by someone with physical therapy or exercise physiology training. Some potential explanations for the lack of success with staff activity personnel delivering the *On the Move* program include (1) inadequate training, (2) lack of interest in teaching the program, (3) lack of baseline knowledge of exercise principles, and (4) participants' unwillingness to recognize the staff activity personnel as having exercise expertise.

As stated earlier, adherence to the *On the Move* program was lower than it was for the Standard exercise program when it was taught by exercise leaders (median number of classes attended was 19.5 versus 21.0). Participants were equally satisfied with either program (84% versus 86% satisfied or very satisfied), and they felt safe in both programs (86% versus 87%) when taught by exercise leaders. The *On the Move* program is conducted primarily in the standing position and was designed to be a more challenging program than the Standard exercise class. One potential explanation for the lower adherence could be that individuals who had a change in health status during the 12-week program may have been more likely to be able to continue in the Standard program, which is performed primarily while sitting.

**Generalizability:** As our sample was representative of the Pittsburgh area (more than 80% white), it was fairly racially homogeneous and did not represent the entire spectrum of the older adult population. However, our study participants did represent a wide range of living settings—such as independent living facilities, senior high-rise apartments, and those residing in private homes and attending community centers—and a range of physical function abilities.

Subpopulation considerations: To facilitate informed patient decision making, we explored heterogeneity of treatment effect in post hoc [HT-1] analyses and attempted to generate hypotheses about baseline predictors of who would benefit the most from participation in the *On the Move* program. Given the exploratory nature of these analyses, the findings should be interpreted with caution. Based on these exploratory analyses, we speculate that those able to be adherent and those with some level of intact walking speed, endurance, and cognitive function will benefit more from *On the Move* than from the Standard program. And among those in *On the Move*, those with somewhat lower levels of physical performance of mobility, which signals room for improvement, and greater levels of social function and desire for interaction, are more likely to benefit. In subgroup analyses, individuals with lesser mobility impairment, lower comorbid burden, and better processing speed had greater improvements in mobility with the *On the Move* program, suggesting that individuals need a certain level of mobility and health to reap greater benefits from the *On the Move* program compared with a Standard program. Individuals with impaired mobility demonstrated similar improvements in walking endurance with the 2 programs. Individuals with impaired mobility may benefit from first participating in a Standard program to improve endurance so that they could later elicit greater benefits from the *On the Move* program.

Study limitations: When interpreting the results, some limitations should be considered. First, we had difficulty identifying staff activity personnel to train to lead the exercise class. Therefore, we could not randomize participants to instructors at all sites as we had originally planned, leading the reviewers to request analyses combining both instructor types. The staff activity personnel whom we did identify had various backgrounds and levels of training and exercise experience. We did not attempt to measure or quantify the staff activity personnel's level of education or exercise experience. Second, participant attrition was greater in the facility staff study arm than in the exercise leader study arm (13.5% versus 5.7%). Given the study design, it is difficult to determine if the difference in attrition was due to a lack of satisfaction with the intervention arm or to changes in participants' health status. The 2 exercise session study arms (exercise leader and staff activity personnel) were not taught at the same time but in sequence. The study was so designed that during the first session, which was taught by an exercise leader, we could train the staff activity personnel to lead the second exercise session. However, it also meant that participants randomized to the staff activity personnel class had to wait an extra 12 weeks before starting their exercise session. The additional waiting time in the study could potentially expose the participants to additional adverse health events and lead to potential disappointment later upon

learning that they would be taught by someone other than the professionally trained exercise leader. When we examined reasons for dropping out of the study, the percentage of those who dropped out due to health concerns was indeed greater in the staff activity personnel arm (staff activity personnel 10/126 or 7.9% and exercise leader 8/298 or 2.7% dropped out for health reasons). Third, in this comparative effectiveness trial, we compared the *On the Move* program with a Standard program that was similar to usual care for the facilities included in the study, based on input from our participant stakeholders. The Standard program that was completed primarily in a seated position would, in theory, be less likely to affect mobility outcomes such as gait speed than a program that included walking activities. However, in other high-profile studies—such as the LIFE-P, which included a physical activity intervention with a goal of completing 150 minutes of walking a week—the change in gait speed was minimal (ie, 0.01 m/s),<sup>9</sup> thus indicating that interventions that include walking do not necessarily improve walking speed. Fourth, we did not exclude participants based on their cognitive status. To participate in the trial, participants had to be able to follow a simple 2-step command. It is possible that some participants had mild cognitive impairment, which may have affected the self-reported outcomes. Last, we measured outcomes only immediately following the intervention, so we cannot comment on the long-term sustainability of mobility improvements.

Regarding other methodological limitations, when planning the study we did not expect to find differences in gains elicited by exercise leaders and facility staff with *On the Move* and had proposed to combine them in exploring baseline participant characteristics predictive of likelihood of benefit. Because of the unanticipated differences we found in Aim 2, and the smaller numbers taught by facility staff due to feasibility concerns, we were able to conduct the said exploration only with those taught by the exercise leader. The resulting reduced sample size thus limited our analyses to definitively identify participants most likely to benefit from *On the Move*.

Future research including dissemination and implementation: We plan to prepare and submit an Aging and Disability Evidence-Based Programs and Practices (ADEPP) application to the Administration for Community Living, US Department of Health and Human Services, to have the *On the Move* program evaluated and designated as an evidence-based program. The ADEPP's goal is to improve access to information on evidence-based interventions, with the ultimate goal of reducing the lag time between the creation of scientific knowledge and its practical application in the field. Interventions that have undergone an ADEPP review have met the highest-level criteria for Title IIID funding of the Older Americans Act. Many community sites are looking for evidence-based programs to offer at their

facilities. Obtaining the designation of an evidence-based program is an important first step in translating *On the Move* into widespread use in the community.

We also plan to develop a website to house information about the *On the Move* program. The website will be the comprehensive resource that contains all information about the *On the Move* program. The following information may be included on the website: a description of the program, evidence to support the program, research opportunities, training materials, resources for instructors, and participant testimonials. We will also meet with local stakeholders, such as the UPMC Senior Communities Area Agency on Aging and various other agencies that provide resources for older adults (Life Span Resources and Services for Seniors, Senior Care Network, The Hill House Association, Presbyterian Senior Care), to finalize the research questions and develop a research plan to study the implementation and sustainability of the *On the Move* program in the real world.

## **Conclusions**

When taught by exercise leaders who were health professionals, the *On the Move* group exercise program was more effective at improving mobility than a Standard seated group exercise program. The *On the Move* program was also safe and well-liked by community-dwelling older adults. Our findings support the idea that the timing and coordination exercises, which were a critical component of the *On the Move* program, should be included in exercise programs to improve mobility in older adults. The small number of recruited and trained staff activity personnel were unable to achieve a similar level of effectiveness with the *On the Move* program as the exercise leaders. Other modalities of recruiting and training community personnel need to be considered and evaluated for wider dissemination, implementation, and sustainability of *On the Move* [PC-4].

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Appendix Table: Patient-Centered Outcomes Research Institute Methodology Standard Adherence

Standard Number	Methodology Standard	Standard Met
<u>Standards for Formulating Research Questions</u>		
RQ-1	Identify gaps in evidence	Yes
RQ-2	Develop a formal study protocol	Yes
RQ-3	Identify specific populations and health decision(s) affected by the research	Yes
RQ-4	Identify and assess participant subgroups	Yes
RQ-5	Select appropriate interventions and comparators	Yes
RQ-6	Measure outcomes that people representing the population of interest notice and care about	Yes
<u>Standards Associated With Patient-Centeredness</u>		
PC-1	Engage people representing the population of interest and other relevant stakeholders in ways that are appropriate and necessary in a given research context	Yes
PC-2	Identify, select, recruit, and retain study participants representative of the spectrum of the population of interest and ensure that data are collected thoroughly and systematically from all study participants	Yes
PC-3	Use patient-reported outcomes when patients or people at risk of a condition are the best source of information	Yes
PC-4	Support dissemination and implementation of study results	Yes
<u>Standards for Data Integrity and Rigorous Analyses</u>		
IR-1	Assess data source adequacy	Yes
IR-2	Describe data linkage plans, if applicable	Yes
IR-3	A priori, specify plans for data analysis that correspond to major aims	Yes
IR-4	Document validated scales and tests	Yes
IR-5	Use sensitivity analyses to determine the impact of key assumptions	Yes
IR-6	Provide sufficient information in reports to allow for assessments of the study's internal and external validity	Yes
<u>Standards for Preventing and Handling Missing Data</u>		
MD-1	Describe methods to prevent and monitor missing data	Yes
MD-2	Describe statistical methods to handle missing data	Yes
MD-3	Use validated methods to deal with missing data that properly account for statistical uncertainty due to missingness	Yes
MD-4	Record and report all reasons for dropout and missing data, and account for all patients in reports	Yes
MD-5	Examine sensitivity of inferences to missing data methods and assumptions, and incorporate into interpretation	Yes
<u>Standards for Heterogeneity of Treatment Effects (HTE)</u>		

HT-1	State the goals of HTE analyses	Yes
HT-2	For all HTE analyses, prespecify the analysis plan; for hypothesis-driven HTE analyses, prespecify hypotheses and supporting evidence base	Not Applicable
HT-3	All HTE claims must be based on appropriate statistical contrasts among groups being compared, such as interaction tests or estimates of differences in treatment effect	Partially Applicable
HT-4	For any HTE analysis, report all prespecified analyses and, at minimum, the number of post hoc analyses, including all subgroups and outcomes analyzed	Partially Applicable
<u>Standards for Data Registries</u>		
DR-1	Requirements for the design and features of registries	Not Applicable
DR-2	Selection and use of registries	Not Applicable
DR-3	Robust analysis of confounding factors	Not Applicable
<u>Standards for Data Networks as Research-Facilitating Structures</u>		
DN-1	Requirements for the design and features of data networks	Not Applicable
DN-2	Selection and use of data networks	Not Applicable
<u>Standards for Causal Inference Methods</u>		
CI-1	Define analysis population using covariate histories	Not Applicable
CI-2	Describe population that gave rise to the effect estimate(s)	Not Applicable
CI-3	Precisely define the timing of the outcome assessment relative to the initiation and duration of exposure	Not Applicable
CI-4	Measure confounders before start of exposure and report data on confounders with study results	Not Applicable
CI-5	Report the assumptions underlying the construction of propensity scores and the comparability of the resulting groups in terms of the balance of covariates and overlap	Not Applicable
CI-6	Assess the validity of the instrumental variable (i.e., how the assumptions are met) and report the balance of covariates in the groups created by the instrumental variable for all instrumental variable analyses	Not Applicable
<u>Standards for Adaptive and Bayesian Trial Designs</u>		
AT-1	Specify planned adaptations and primary analysis	Not Applicable
AT-2	Evaluate statistical properties of adaptive design	Not Applicable
AT-3	Specify structure and analysis plan for Bayesian adaptive randomized clinical trial designs	Not Applicable
AT-4	Ensure clinical trial Infrastructure is adequate to support planned adaptation(s)	Not Applicable
AT-5	Use the CONSORT statement, with modifications, to report adaptive randomized clinical trials	Not Applicable
<u>Standards for Studies of Diagnostic Tests</u>		
DT-1	Specify clinical context and key elements of diagnostic test study design	Not Applicable

DT-2	Study design should be informed by investigations of the clinical context of testing	Not Applicable
DT-3	Assess the effect of factors known to affect diagnostic performance and outcomes	Not Applicable
DT-4	Structured reporting of diagnostic comparative effectiveness study results	Not Applicable
DT-5	Focus studies of diagnostic tests on patient-centered outcomes, using rigorous study designs with preference for randomized controlled trials	Not Applicable
<u>Standards for Systematic Reviews</u>		
SR-1	Adopt the Institute of Medicine standards for systematic reviews of comparative effectiveness research, with some qualifications	Not Applicable

**Appendix Report:**

**Report of Interviews With Participants in the Study of *On the Move* Effectiveness and Sustainability**

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## Background

It is well documented that exercise is especially beneficial to the overall physical and mental health of at-risk older adults and contributes to the prevention of walking problems and disability; thus, it results in promoting and maintaining function and independence among this population. The group exercise programs offered to older adults in the community are mainly seated range-of-motion exercises—often based on videos—and appear to not be challenging enough, have little impact on walking ability, and show low levels of participant satisfaction, retention, and interest.

Based on previous research and with the input of participants (pilot study and focus groups), researchers from the Department of Physical Therapy at the University of Pittsburgh developed *On the Move*, a group exercise program that specifically targets walking difficulty and includes critical timing and coordination exercises designed to improve walking—elements that are typically overlooked in programs designed for older adults. Researchers partnered with provider and participant stakeholders to implement an intervention trial to determine the effectiveness and sustainability of the *On the Move* exercise program by comparing it with a standard group exercise program (Standard of Care) among community-dwelling older adults who reside in independent living facilities and senior housing buildings, and who attend senior community centers.

Randomization to either exercise program was done at the facility level. Participants, after completing the baseline assessment and eligibility process, were randomly assigned within each facility to either a first or second exercise session. The first session was conducted by trained exercise leaders (research staff) and the second session (with a 3-month delay) was conducted by facility staff activity personnel or volunteer participant older adults. Facility personnel and older adult volunteers were trained during the first exercise session by the study exercise leader. Both exercise programs were conducted twice a week for 12 weeks. At the conclusion of the 3-month exercise program, participants were reevaluated to obtain comparative values to the baseline assessment.

The final results after comparing the 2 different types of exercise program (*On the Move* versus Standard of Care exercise program) would assess differences in function, disability, and mobility in participants based on preintervention and postintervention testing and provide evidence on the effectiveness of the *On the Move* exercise program. Comparing the 2 different modes of delivery (exercise leaders versus staff personnel and volunteer participants) would offer insight on the program's sustainability.

An integral part of the research was the creation of 2 community advisory boards (CABs), whose members were drawn from the pool of provider and participant stakeholders. One CAB represented the independent living facilities; the other represented the senior high-rises and senior community centers. The CABs would provide ongoing input and feedback in the design and implementation of *On the Move*.

The *On the Move* intervention was implemented across 32 different sites. To obtain sufficient statistical power, 560 subjects needed to be assessed for exercise program eligibility. After screening and completing baseline testing, 424 eligible subjects were randomized to the 2 arms of the intervention—

298 participated in exercise leader–conducted programs and 126 participated in facility personnel–led or volunteer-led exercise programs. Of these 2 arms, 281 and 104 participants, respectively, completed posttesting.

### **THE PARTICIPANT INTERVIEW COMPONENT**

To better understand the value to and impact on *On the Move* participants, members of the Institute for Evaluation Science of the Department of Behavioral and Community Health Sciences, Graduate School of Public Health, University of Pittsburgh, interviewed study participants to obtain feedback about their experience in their respective exercise program. The in-depth, open-ended interviews addressed topics such as participants' goals in taking part in the exercise program, their perception of risks taken and benefits obtained, their general satisfaction with the program and willingness to continue, and their thoughts about participating in research.

### **METHODOLOGY**

Although researchers initially planned to conduct 100 interviews, they determined that a random 20% subsample would be sufficient to obtain representative feedback, which added up to 112 interviews. Every fifth participant would be systematically selected from the 3 different site types (independent living facilities, senior high-rises, and community senior centers), from both exercise programs (*On the Move* and Standard of Care) and both delivery modes (exercise leader and facility staff/volunteer participant). The researchers aimed to obtain a diversity of interview participants in both gender and ethnicity.

As is often the case with qualitative research, after completing about 20 interviews, evaluation researchers found that participant responses were being repeated. The researchers decided that 50 completed interviews would be sufficient to obtain the desired participant feedback. In all, 51 interviews were completed. Of these, 19 of the participants interviewed had been randomized to the *On the Move* exercise program—10 led by study exercise leaders and 9 led by facility staff or participant volunteers. The other 32 interviewed participants had been randomized to the Standard of Care exercise program—21 led by study exercise leaders and 11 led by facility staff or participant volunteers. See Table A1.

**Table A1. *On the Move* Participant Interview Summary**

<b>Exercise Program and Delivery Mode*</b>	<b>Independent Living Facilities (10**)</b>	<b>Senior High-Rises (15**)</b>	<b>Community Senior Centers (7**)</b>	<b>Total</b>
<b>OTM – EL</b>	6	3	1	<b>10</b>
<b>OTM – FS</b>	5	2	2	<b>9</b>
<b>STD – EL</b>	12	5	4	<b>21</b>
<b>STD – FS</b>	6	2	3	<b>11</b>
<b>Total</b>	<b>29</b>	<b>12</b>	<b>10</b>	<b>51</b>

\* OTM: *On the Move* exercise program; STD: Standard of Care exercise program;

EL: study exercise leader; FS: facility staff or participant volunteers

\*\* Number of facilities participating in the study

### **SUBSAMPLE PARTICIPANT DEMOGRAPHICS**

The average age of study participants was 80. Independent living facility resident participants were 100% Caucasian, 12 males and 17 females. The participants interviewed from the senior high-rises were more ethnically diverse—7 Caucasian and 5 African American, of which 2 were male and 10 were female. Of the 4 male and 6 female community senior center participants, 3 were Caucasian, 6 were African American, and 1 was Native American. See Table A2.

**Table A2: Interview Participant Demographics**

Exercise Program	Ethnicity			Gender		Facilities Represented by Interview Subsample
	Caucasian	African American	Native American	Male	Female	
<b>Independent Living Facilities (10**)</b>	29			12	17	<b>10</b>
<b>Senior High-Rises (15**)</b>	7	5		2	10	<b>7</b>
<b>Community Senior Centers (7**)</b>	3	6	1	4	6	<b>4</b>

\*\* Number of facilities participating in study

Interviews were completed with 29 resident participants from independent living facilities; 12 resident participants from senior high-rises; and 10 participants attending community senior centers.

Interviews with participants were completed over the phone, were audiorecorded, and lasted an average of 30 to 45 minutes. Notes were transcribed and the qualitative analysis began with the coding of responses. The codes were entered into coding charts, which revealed clusters of responses that in turn reflected common themes. To ensure interrater reliability, a second member of the evaluation team repeated the coding, followed by discussion until agreement was reached.

## **FINDINGS**

Responses to the study participant interviews will be presented for each question. Differences in responses by participants according to site, randomized program, exercise leader, and demographic

variables will be mentioned when applicable. A select number of responses will be presented as examples.

As Table A2 shows, the majority of participants interviewed for the project were female (33 females versus 18 males). In general, female responders were more outspoken, tended to elaborate on their responses, and were more apt to praise instructors. Males, on the other hand, were less talkative; more to the point; more likely to voice disappointment or complaints; and, for the most part, did not care to elaborate on their responses.

### **Question 1. Why did you join the exercise program?**

On the whole, participants' responses to this question addressed exercise, physical fitness, improving walking ability, and strength and balance issues as the main reasons for their participation in the *On the Move* project. Some said they participated in the pilot study because they realized the importance and benefits of exercise for older adults and the need to keep active and moving, and that participating in group exercise can be an important motivator. Three people added pain relief to their initial response. A few others thought the exercise would act as physical therapy because of a previous fall or broken bone. Participants also mentioned support of and interest in research. The following were among the representative responses to Question 1:

“. . . looking forward to involve some exercises, because we are both quite old and we wanted to make sure that our future years would be rewarding to us and we wanted to make sure that our physical conditions would hold up, because here so many of the people are disabled in some way, and fortunately my wife and I are not disabled and we're still are getting around and so we wanted to participate in the program hopefully that it would help us prolong our good living style. . . ." WM/ILF-STD-EL1

"We like taking exercise; we feel that it helps us a lot; we don't want to sit around and become stagnant." WM/ILF-STD-EL2

"I'm a Pitt graduate and I believe in research. So I thought, "Hey we're supposed to support these people." I'm interested in research and I support research." 26-109-WM/ILF-OTM-FS

"Because I exercise when I'm in a class and I'm motivated. On my own I don't do it." WF/ILF-STD-EL1

". . . was attending Silver Sneakers [at SC]; they came over and told us about it. We just felt that it would help us, give us energy, help our balance, maintain weight. . . ." WF/SC-OTM-FS

### **Question 2. Prior to starting the exercise class, what exercises did you think you would be doing in the class?**

Most respondents in both the *On the Move* and Standard of Care exercise programs, irrespective of site, exercise leader, gender, or ethnicity, said they “had no idea,” “did not really know,” or had “no expectations” about the type of exercise they thought they would be doing in the program. Those randomized to the *On the Move* program were not surprised that the class involved exercising while standing and a fair amount of walking. However, many of the participants randomized to the Standard of Care program said that they expected exercises that involved more standing and walking, as well as exercises that addressed balance issues. They did not expect a program where all exercises were done in a seated position. They thought that the program was too similar to the one they participated in at their own facilities. A few felt they had been misled about the exercises they would be doing. These expectations, we believe, were based on the exercises performed during the baseline testing, the experience of those who participated in the pilot study, and a misunderstanding of the randomization process.

Some of these participants acknowledged that, given the age group and mobility issues of some older adults, less strenuous exercises could be preferred and that some of the participants in the Standard program would have found it very difficult to keep up with the walking and some of the other exercises of the *On the Move* program. One male who had participated in the pilot and was randomized to the Standard of Care exercise program dropped out after the first class because he thought the pace was much faster than it had been in the pilot and believed he would be unable to keep up.

Even if many of the participants in the Standard of Care class would have preferred the “walking program,” nearly everyone who completed the “seated program” stated that it had been a good program and that, in the end, “You really felt it, it was a workout.” They also said they benefited from the exercise:

“Well, . . . before I started the class, I assumed that there would be some activities standing, or moving, or walking. I was really surprised to learn that [in] the program you were sitting in the chair the entire program. I thought that I expected to go through some other exercises, standing, or bending, and that sort of thing, but there weren’t any, as I said it was completely while sitting. (I would suggest more of that) . . . but I do know that in several instances there were several people that they probably could not have tolerated standing and doing extensive exercises, so that would have been a problem for them if they’d had standing or walking exercises.” WM/ILF-STD-EL1

“I thought there would be more for balance. The sitting, I felt the program was very good, but I would have enjoyed a little bit more for balance. Older people lose their balance.” WF/ILF-STD-FS

“More or less what we did in the class. I was impressed with the class because we did it at a higher level and she came up with some different moves. We have an excellent Wellness Instructor here, but you’re doing the same old thing over and over again. [In *On the Move* class]

when we said, 'Oh this is hard,' she didn't stop, she just continued giving us more exercises. We were not coddled; we performed them the way we could, but if we were struggling with it, it just went on and you just continued. You weren't allowed to drop out. You really felt it, it was a workout." WF/ILF-STD-EL1

"I had no idea. Well, I was in the second class, and the first class, some of the women there already talked about some of the stuff they were doing, but until you do it you're not aware of what some of the stuff is that they were talking about. They did say there was a lot of walking. . . . There was other things too, you had to step over those big boards. The people in the first class talked about that, 'cause they couldn't do that, but it didn't scare me." WF/HR-OTM-FS

**Question 3. Was the exercise class challenging for you? (If yes, can you describe an exercise that was challenging for you?)**

Significantly, about half (16 Standard, 10 *On the Move*, mostly the older adults who walked and/or exercised frequently) of the telephone interview participant subsample said that they did not find the exercise program overly challenging and would have enjoyed more strenuous exercises. Some mentioned that the exercises were similar to the ones that they participated in at their facilities. A couple participants found it difficult to commit to the program's 3-month duration, noting that they had to rearrange appointments. Others felt that the exercises were challenging at the beginning of the class, but very soon they became familiar with the exercise routine—once they got over the initial soreness in expected and unexpected places—and as they developed strength and endurance, they were able to follow without difficulty.

Of those participants who found the exercises quite challenging or could not do them at all during the first few weeks, many were pleased to report that by the end of the program they were able to do the exercises with greater ease.

Participants commented that certain elements of the classes' presentation proved to be challenging throughout the 3 months of participation, including following the instructor and keeping up with the rhythm/pace/speed of the exercises. Some participants did not find the program's exercises that difficult, but they had a hard time with the number of repetitions that were expected, and with keeping up continuous movement with virtually no breaks for almost an hour.

In the seated Standard of Care exercise program, the exercises that participants found most challenging and difficult were "walking or marching" while seated, balancing the ball, coordinating feet and hands, punching out with their fist, balancing, extending their arm above their head and shoulders, extending their legs, getting up out of a chair without pushing off, and crossing 1 leg over the opposite knee.

Some of the *On the Move* program challenges related to the walking exercises, such as keeping up the pace, speeding up and slowing down, weaving in and out between the cones, walking and solving math

questions at the same time, and walking for 20 minutes nonstop. Other challenging exercises included getting up out of a chair without pushing off, crossing 1 leg over the other, and the balance exercises, such as walking between 2 lines.

The impact of comorbidities, which impose limitations on performance, needs to be addressed given the participants' age group. Many have pain from osteoarthritis in their knees, hips, back, and shoulders, which affects their ability to exercise. Some said they worked through the pain as they exercised and found that exercising helped reduce the pain. Others have had knee or hip replacements, or use a cane or walker to ambulate, which limits their range of motion. Many participants said they tire easily, which made the continuous pace of the exercise class quite challenging. Regardless of their limitations, participants felt confident that they could modify a difficult exercise, interrupt an exercise, or rest and sit for a moment if necessary, all under the close direction and supervision of the exercise leader.

“In the beginning, maybe the first 2 [classes], after that it got much easier because my muscles got more used to it. I thought it was very good. . . . Only when they [the exercises] were continuous, it didn't matter what it was, but when it was going a little bit more of an extended period it got a little bit harder, but when they were changing off a little more often it was okay.”  
WF/ILF-STD-FS

“At first a little . . . keeping up with the speed; at first getting used to the different exercises and making sure that I was up to speed with it and didn't make a mistake.” ILF-STD-FS

“Yeah, some of it. When we were walking . . . speed up, slow down . . . they had cones and we had to weave in and out of them when we were walking, that was pretty challenging. We were allowed to sit down; there were times I'd just sit down and then get back up and continue. That exercise I actually liked, but some of the people would get mixed up with the instructions as to what to do . . . wasn't that difficult to follow the instructions . . . people made mistakes about what direction they were going. . . . Flexibility in my leg isn't that great, so I couldn't cross my 1 leg over the other leg . . . so I did that differently, I'd grab my knee and bring it up to my chest . . . I was told to modify it.” WM/ILF-OTM-EL1

“Yes, it was too much. Too fast and too furious. Almost everything; the leader seemed like he was in a hurry all the time. We had a group of 7. There were 2 people for whom the exercise, rapidity, and extent was about right. I was at the bottom of the list as far as disability was concerned and I finally just had to ignore what [the instructor] was doing and do the exercises just at my own speed, at half of the speed he was going or less. . . . He could see what I was doing, he did not comment. I held on for the 3 months. FS has said he is going to include some OTM stuff in the regular exercise class.” WM/ILF-OTM-FS

“No, it wasn't. It was very easy. We lost quite a few people that were coming in to try it out, but as there was no challenge at all and so they dropped out. But because I had committed to this, because there were certain rules and stipulations that we could only miss maybe 3

appointments with them. They were very strict in the beginning. We had a very large showing, 30 or so . . . but a lot of them left because they felt that they were not being challenged. I stayed, because I had committed to the program as it was being newly developed.” WF/ILF-OTM-FS

“Yes, it was challenging and yet it was fun. . . . There were a few that I could not do, but I modified it. I found a way that I could do it if I modified it. . . . It was after about 3 weeks that I realized there was a difference. Sometimes you felt really sore; you know you’re doing it and you know you’re getting the results from it. I think the music had a lot to do with it too. If I did it to the beat it was easier for me, felt like I was dancing. . . . She was very, very thorough: If it bothers you too much, if hurting and in pain, modify it. . . . I modified the exercises and leader agreed. If we couldn’t do it she showed us a different way to do it, and it worked out perfect, perfect.” WF/HR-STD-EL1

“Somewhat. It wasn’t overchallenging. It was just challenging to do that whole hour. I never did really a whole hour of exercise. It wasn’t hard . . . one of my main problems is getting out of a chair. If it is a low chair I need both arms on the seat of the front of the chair and get up, but towards the end of this exercise if I was in a higher chair, I could get up without any help at all. . . .” BF/SC-OTM-EL1

#### **Question 4. Did you feel safe while participating in the exercise class?**

Fortunately, all interviewed participants said they felt safe while attending the exercise class. For those in the Standard of Care class, the main reason participants offered for feeling safe was that they were seated as they exercised. The presence of other people as well as the presence of the instructor also made participants feel safe. For those residing in the facility where the exercise program was offered (in particular, the high-rises), being in familiar surroundings and with people whom they knew was important to their feeling of safety. Participants also felt that their facility managers would make sure that everything was satisfactory with the program before endorsing it.

Those in the *On the Move* program also mentioned that having other people around as well as the exercise leader increased their feeling of security. For the standing exercises, being able to hold on to a chair if necessary provided a feeling of safety, and when walking, there was somebody always there to help.

The participants felt it was important that the exercise leader instructed them to tune into their body’s needs. Being told not to do an exercise if it was too difficult for them or if it caused pain, and knowing that they could stop and rest and/or sit if they tired, contributed to their feeling of safety. They felt the instructor knew exactly how to lead them in doing the exercises and was there to correct them and help them when necessary.

“Oh absolutely, yes! Our instructor was very considerate about the things that we could do. The class had a little bit more challenged people, so they weren’t able to do as much as some of the

others of us that were a little bit more flexible, or whatever. But she was very considerate about not overdoing . . . which is hard, I think, when you have a diverse group, age group like we had. . . I'm 88, thinking that I am about 60 I think sometimes, and so many of the people here are in their 90s and they're doing so well really, but I'm able to do a little bit more than they can."

WF/ILF-STD-EL2

"Oh yeah! For one thing, we were seated; I felt no problem with that, with falling or losing balance. It seemed that everybody knew what to tell us to do. I don't know, I felt very safe and not a problem." WF/ILF-STD-FS

"Oh yes, very! Our instructor was very confident. She was very helpful, she'd explain different muscle groups that we were working, and she also emphasized all along: 'If you're not able to do it, don't. If you have to work at a slower pace, do.' She was kind of addressing all our individual levels of capacity, which was useful." WF/HR-STD-EL1

"Oh yes. . . . We did it at our own facility and if there were any precautions we knew ahead of time what we were in for. The people in our building, we knew that they would make sure that everything was satisfactory; otherwise they would not have committed us to take it." WF/HR-OTM-EL

#### **Question 5. Have you noticed any changes in your walking since starting the exercise class?**

The general consensus of the majority of participants was that they experienced small to great changes in their walking ability and other exercise side effects. They mentioned the act of walking and related activities, as well as other effects of improved walking. The changes to their walking since starting the exercise program included improved walking; walking better, faster, farther, and for longer periods of time; stronger legs; feeling more limber; having more energy, strength, and endurance; ability to climb stairs; performing household tasks better; and reduced cane use and increased ability to walk without assistance. Better balance was mentioned by both cohorts, as was less stumbling and stronger walking pace. Other related effects of exercise participation reported by both groups were all-around improvement, better posture, less tired in general, don't tire as easily, not as winded, better breathing and circulation, and less pain. Several participants spoke about feeling more sure of themselves and more confident as they walked, and feeling better about themselves and more mindful of their walking. There were no appreciable differences in the responses given by participants in the Standard of Care program compared with the *On the Move* program. However, participants in research staff-led exercise classes tended to mention more positive outcomes than the facility staff-led or volunteer-led classes.

"I think it actually has improved my walking slightly. I never was a person of perfect balance, and anyway I wasn't walking as good as I should, and I think the exercising has helped and I think I will continue exercising, I'll just stay here at the facility and I think I'm doing pretty good right now." WM/ILF-STD-EL2

“ I feel a little bit more confident walking now, and again it might have been, I had just finished the PT [physical therapy] for my knee. . . . But I feel a lot more confident now having had the class and a little bit more stability, my balance is better. And again, I don’t know whether it was because of the PT . . . but I’m sure the exercises really helped. I had no more knee problems at all, but I think I was just doing things too quickly, turning too quickly, or doing things too fast, and now I am more cognizant of that, I am slowing down. . . . I watch where I step now, I watch when I turn around, particularly going down steps.” WF/ILF-STD-EL2

“Number 1, my balance is much better, and 2, that’s because my legs are far better exercised, they’re more limber than what I was and stronger.” WF/ILF-STD-FS

“Balance improved, some improvement in most things. Some things were very easy for me to do, that didn’t change too much. Some of the things that were more difficult for me to do improved a little bit.” WM/ILF-OTM-FS

“I’m walking better and keeping on the move. I’m not trying to go too fast. I don’t try to rush it, don’t do more than I can. When I walk to the Hill House I don’t stop, keep on going at my own pace, but keep on going. When I get there I sit down for a little while.” NAM-SC-STD-FS

**Question 6. How did participation in the *On the Move* program affect you? (We are interested in both positive and negative impact). Changes in mood, sleeping, eating habits . . .**

The responses of the majority of participants can be clustered into 2 main categories: (1) changes related to the physical impact of the exercise program, and (2) changes related to attitudes and beliefs brought about by participating in the program.

The most referred to change in the first category is improved walking ability (better, faster, farther, longer) followed by improvement in endurance, tolerance, stamina, strength, and energy, coupled with the development of stronger muscles and more bulk. Six participants mentioned improved balance specifically in the context of this question, and another 12 added feeling confident and secure in their walking. Feeling better overall was a common response, and some participants mentioned less shortness of breath and better breathing and circulation. Only 2 mentioned less pain as a result of exercising. Participants mentioned becoming more flexible and limber as important because it helped in performing certain activities of daily living such as getting dressed more easily and being able to bend down and reach their feet to put on and pull up socks.

The vast majority of respondents reported no changes in sleeping and eating habits. Eight said they were sleeping better; fewer than 5 mentioned having increased appetite due to exercise. One male confessed to eating a lot and enjoying junk food, but also watching his diet and exercising at his wife’s insistence. Two participants mentioned losing weight as an added benefit and unintended side effect of going through the exercise program. Another mentioned increased muscle tone, which made her clothes fit better.

The second category of responses addressed different changes in attitudes and beliefs that resulted from participation in the exercise program. Confidence in walking was mentioned above, but in this context, confidence in self is quoted, feeling comfortable and not afraid, having more self-esteem, and feeling better about self. Mindfulness was also found to be an effect of exercise participation, expressed in increased focus and increased awareness of personal movement and surroundings. Several study subjects found themselves motivated to continue exercising, following the program exercises at home, engaging in more extensive walking, participating in other exercise programs offered at their facilities, and, to the delight of many, taking part in an *On the Move*–based continuation program provided by facility staff. Some participants felt motivated by the group experience. They felt that being a part of an exercise group or program served as motivation to actively participate in exercise, enabling them to commit to a class and attend, rather than trying to exercise on their own—efforts that can be easily derailed. Participants also mentioned the social benefits and camaraderie of exercising in a group.

Overall, participants felt that they had not experienced mood changes as a result of their *On the Move* participation. Approximately one-third of those interviewed (17) thought the class had a positive influence on their lives in that they had a better mental attitude, felt more alive and energetic, and wanted to “do things.” Some expressed the opinion that exercise “makes you positive,” promotes “more joy within,” and was “complete enjoyment.”

Most participants thought the *On the Move* program had no negative effects “other than my missing a class,” said 1 participant. One male said a negative aspect had been having to reschedule appointments to accommodate the program. One other participant said she found the exercise class boring because of multiple repetitions and walking for 20 minutes at a time, which would be fine for 2 or 3 weeks, but not months. She understood the reasoning behind the exercises and could not think of any ways the program could be changed.

Two additional participants voiced a negative effect from their participation. A male participant said he was happy with the stronger muscles and more bulk developed in his thighs and calves, but then he discovered that his ankles had weakened and mentioned he was seeing a chiropractor about the problem. A female participant mentioned that going around in circles in the same direction during the walking part of the exercise session had made her knee hurt; the problem was solved by switching directions.

“Well it gave me a feeling of confidence . . . the fact that I was able to eventually do all the exercises and I got better at it as I did them. I’ve always been a good sleeper, and I’ve always been in a fairly good mood. I love being with people . . . that was good too, because it was a very good, friendly group . . . no one complained; most of the people stayed in the group . . . very few dropped out. . . . With older people, they get sick, or fall, or just find that the exercises are too strenuous.” WF/ILF-STD-EL1

“As I said, it gave me more confidence in the fact that I could walk without any kind of assistance and it got me back to a faster pace than I have been using, because walking there we would

speed up and slow down, so my pace has picked up in just generally walking back and forth (between buildings). . . . No other changes. No negative impact.” WF/ILF-OTM-EL

“It helped build my self-esteem. I feel more confident. I’m going to be 80. I feel a whole lot better, I felt real different after I [finished] the exercises. I felt more confident, more secure, I really did. She gave us a printout of the things that we could do at home after the program was over . . . and if you wanted to do them at home, you could. Since I’ve been out of it, I have sat in a chair and done some of them. . . . I like exercise, it helps me wear my clothes, I don’t have to go out and buy more . . . clothes fit better, it built muscle. I really noticed [different things]. I lost inches, if I didn’t lose pounds . . . but I lost 5 pounds and I attribute it to the exercises. . . . I sleep better, my mood has changed. I’m not a real mean person, but I think my mood changed, I’m a . . . livelier person and I laugh more. With the group, I like to be with people. It was only 6 of us and we became more friendly toward each other. . . . It brought on more communication, we had something to talk about, we could relate to what we did. Some people around here don’t want to do anything. Socializing was good for me. . . .” BF/HR-STD-EL

“It was a positive thing that we are going to continue it. The group is still going to get together with the lady that’s directing it. She is the leader trained for the second group, so this is something that we are going to continue. So it was a positive thing, the exercise and all was very positive. Just the participation in the group, you look forward to it, something that mentally you look forward to getting out and being with people and actually participating with other people that are really almost in the same position that you are. **Mood?** Yes, yes. The rest of the day was very uplifting, something you look forward to. **Sleeping?** Not really. **Eating?** I have poor eating habits anyway, that didn’t change. Nothing negative. The instructor was so positive in everything that we were doing.” BF/HR-STD-FS

“Yeah, I was able to walk longer. I enjoyed every minute of it. I think we need a program to continue on like that. . . . Oh yes, I felt more energetic and felt much more alive, I felt like doing more things, like going out or just in general doing more than I usually do. That’s why I didn’t miss any sessions, ’cause I enjoyed it so much, I felt so much better when I was done. I was surprised how much more energy I had when I finished.” WF/HR-OTM-FS

“More stamina, you don’t get out of breath as . . . before. It was a big help to me. It’s helping me. No changes in eating or sleeping habits, or mood.” BF/SC-STD-EL

### **Question 7. What did you like most about the exercise class?**

It was difficult for most study participants to favor 1 thing over the other in the exercise class. More than two-thirds most liked the social aspects of participating in a group activity, namely the feeling of community, companionship, and camaraderie, as well as the instructor (caring, positive, upbeat) and how the class was conducted. Participants also mentioned being part of a group as motivation to exercise in this context.

Doing the exercise and liking to exercise was important. Some respondents described the effects of exercise as such: makes you feel better, relaxes you, makes you more alert, feel improved, more flexible, limber, and move around better. Some participants also mentioned that they liked doing the exercise to music. A few participants preferred specific exercises, such as the walking exercises over the seated ones, the use of paper plates and balls, the leg strengthening, and the arm exercises. A handful simply said they liked “everything.”

“I guess associating with people, get to meet some new people, and, of course, we are still . . . exercising, which was our main idea originally anyway, so that exercise and meeting these people and so forth all combined.” WM/ILF-STD-EL2

“I liked the walking exercises more than the stationary exercises . . . liked the one weaving in and out of the cones better.” WM/ILF-OTM-EL1

“To be honest with you, I liked the whole program. There wasn’t anything I didn’t like. I loved the instructor, she was wonderful, she was just great. I just liked the whole program; there wasn’t anything I disliked.” WF/ILF-STD-EL1

“I guess 1 thing that I really enjoyed about it was the feeling of community that we had; we really enjoyed each other as well as enjoying the exercise together. That was a real plus for me. I am pretty gregarious, but it was the fact that we were doing this together twice a week and we would see each other more frequently than we would otherwise, that was definitely a plus.” WF/ILF-OTM-FS

“The instructor . . . was just wonderful. She had a very positive influence on us. She is positive and upbeat, just a joy to deal with. Also, a camaraderie developed among the people involved, [and we] got to know each other well and enjoyed each other.” WM/ILF-OTM-EL

“I enjoyed the simple new exercises, both mentally and physically. Was disappointed that it does not continue, so that I could continue to improve in balance and cognitive area. Don’t know what the plan is for activity on this campus. Our instructor [FS] has incorporated some of the exercises from OTM, 3 times a week.” WF/ILF-OTM-FS

“To tell you the truth, I liked every bit of it from the beginning to the end, so I can’t pick out 1 thing in particular that I liked better, because the walking and then the sitting with stretching your legs and different things like that—there wasn’t 1 part I liked better than the other. The whole program all together, it was just fantastic.” WF/HR-OTM-FS

#### **Question 8. What did you like the least about the exercise class?**

More than one-half of the interview sample (20 from the Standard of Care, 7 from the *On the Move* intervention) said that they could not point to something they specifically did not like about the exercise

program. They either “liked everything” or could think of nothing negative to say about the *On the Move* project.

Of the remaining responses, some addressed the length of the program: too short or too long in months, too long in hours, or too late in the day. Others referred to issues related to the exercise activity itself, such as keeping up with the rhythm, the pace being too fast or too slow, too much sitting, and multiple repetitions of a single exercise. Some subjects mentioned specific exercises they had difficulty with—ie, movements with arms over head; heel-to-toe movements; punching, kicking, and ball exercises; and putting a leg over the opposite knee. One interview respondent mentioned difficulty maintaining his own walking pace because other participants walked at different paces and he would have to pass others or be passed.

Examples of other responses to this question were being unhappy with the exercise location, having to give up other activities, too much sitting, exercise routine too boring, chair was uncomfortable for seated exercises, and being the only man in the group.

“No, she started out slow with it. Each time she’d start slow and gradually work up to exercises that were more strenuous. She was very good about her instruction, no complaints about her at all. I felt lucky to have her.” WF/ILF-STD-EL1

“The number of months that it took . . . seemed to be a little bit long.” WM/ILF-STD-EL2

“I think it was having to arrange my time, not having to go out on that day. Just being held to the regular time. I knew that would happen, it came as no surprise. That’s the way it was to be, so I’m not complaining. There were some occasions when there was something else I’d rather been doing, should have been doing. No big hardship, but if there is something I didn’t like, it was that.” WF/ILF-OTM-EL1

“I enjoyed the walking if I had some control over it. What I liked least was the fast pace, the whole class being run sort of like it’s an aerobics class or Pilates, and that speed (reminded me of the Army and the yelling of the top sergeant).” WM/ILF-OTM-FS

“Oh, I thought maybe it was just a little too long. Instead of an hour, I thought maybe 45 minutes might have been better, but don’t forget, this program there was no age restriction, so there would be people in the program that were maybe 20 years younger than you. You’re doing the same thing that they were doing, it made no difference what your age was, you just had to keep up with what everybody was doing. . . . I just thought that maybe it was just a little too long. . . .” WF/SC-OTM-FS

“I thought it was a lot of sitting and doing the exercises, which was good to start out with . . . but I was thinking, there could have been a little bit more with the standing and walking, or things like that. . . . I’ve been to some where you would throw the ball around and participate that

way, or just even marching or walking through the building or the exercise area, a little bit more walking or things like that, that may be a little bit better than always sitting there.” BF/SC-OTM-EL1

“Probably the instructor. She was the most disappointing. The instructor was not well qualified; could not do some of the exercises and show you. She did the best she could. Kept up with Silver Sneakers 3 times a week (about 30 people in class). Great instructor. Seated and standing exercises. Much more demanding than OTM. . . . Were led to believe that they would have a PT as an instructor. Sounded really interesting. Some people dropped out because there was too much walking, went to 1 or 2 classes and dropped out. One came back to be tested.” WF/SC-OTM-FS

**Question 9. If you could change 1 thing about the exercise class, what would you change?**

The majority of suggestions for changes to the exercise program cluster around 2 responses, most of them coming from participants in the Standard of Care exercise program. Nineteen participants, more than one-third (13 Standard of Care, 6 *On the Move*), could not think of anything to change or said they would “not change a thing.” Fourteen other participants (9 Standard of Care, 5 *On the Move*) suggested, in particular for the Standard of Care program, adding walking, standing, and bending exercises to the mix. *On the Move* participants suggested changes to the “walking program” that included adding more variety to the exercises while standing and also while walking, and adding more exercises to improve balance. Participants mentioned specific exercises for change, such as throwing the ball instead of passing it, and walking backward and sideways. Reducing the amount of time spent walking was recommended, as was shortening the class to 45 minutes. Some suggested playing livelier music and picking up the pace of the exercises to make the class more demanding. Another recommendation was to encourage instructors to modify the exercises to accommodate differences in ability. Other *On the Move* participants expressed an interest in continuing the exercise class after the study period; some said that this had actually come to pass at some facilities.

The balance corresponds to participants in the Standard of Care program who had individual recommendations similar to their *On the Move* counterparts. Examples of these suggestions are to add brain games, eliminate music, add a break, modify exercises to fit individual needs, eliminate seated jumping jacks, reduce the duration of class, and reduce the number of repetitions by switching back and forth to different exercises.

“Well, I think . . . before I started the class I assumed that there would be some activities standing, or moving, or walking. I was really surprised to learn that the program you were sitting in the chair the entire program. I thought that I expected to go through some other exercises, standing, or bending, and that sort of thing, but there weren’t any, as I said it was completely while sitting. (Would suggest more of that) . . . but I do know that in several instances there were several people that they probably could not have tolerated standing and doing extensive exercises, so that would have been a problem for them if they’d had standing or walking exercises.” WM/ILF-STD-EL1

“ . . . I would include standing exercises with your program as well as seated, standing partly, a mixture. . . . The standing helps with the balance; at least it helped me somewhat with my balance.” WM/ILF-STD-EL2

“No, just in the beginning the first 2 classes were hard, because it seemed that our muscles weren’t ready for that. They needed to change. Instead of going for 10 or 15 times at a time, I would have rather see it go maybe half that, change, go to something different, and go back to it. . . . If you have to do it 20 times that’s okay, but break it up. When they did change, the pain went away and we were able to get back up to speed right away.” WF/ILF-STD-FS

“I don’t know, I thought it was well developed, I can’t think of anything I could improve on. (Maybe there was something) on the days I missed, I might change that. In general, I can’t think of anything I would change. Sometimes class was cancelled because the leader couldn’t come. The leader, that was not her primary job, and had to go somewhere else. That was disappointing, maybe that is something they could change, someone to fill in. . . .” WM/ILF-OTM-FS

“I would have it done like FS is doing now. That people who can do more, do more, and people who can’t, they would maintain what they can do. Two or 1 person can do a little more a little strenuously without hurting himself, I think that’s the way it should be run, because people at different levels benefit differently. I have a hard time doing push-ups on the floor, getting down on the floor, but with the chair . . . I can do 12 or 13 of them in succession, where the older women there they can’t do that. FS tells people, ‘Always do what you can do.’” WM/HR-STD-FS

“I think I would cut down on the walking some. She allowed us to sit down if we got tired, it wouldn’t make any difference, just less walking.” BF/HR-OTM-EL

“Nothing! I wouldn’t change anything, all of it is very helpful. It’s really nice, it’s not hard, it’s a good thing. I would suggest it to anyone, instead of staying home doin’ nothin’. Get your bones working. If you do nothing, you get stiff, get old and [get] arthritis. Since I’ve been doing this exercise I haven’t had any [pain], arthritis doesn’t bother me.” BF/SC-STD-EL

“Making it a little more demanding. Exercise harder, stretching harder. . . .” WF/SC-OTM-FS

**Question 10. How is this exercise class different from other exercise classes you have taken?**

Twelve of the interviewed participants claimed they had never taken an exercise class before (10 Standard of Care, 2 *On the Move*)—they were “walkers” or did exercises at home on their own or on facility machines. Responses from the remaining participants can be clustered into 2 categories: (1) those who addressed the differences in exercise classes they had participated in previously and, (2)

those who spoke about what characterized the *On the Move* exercise program. A handful referred to exercises specific to physical therapy sessions and 2 referred to participation in a falls prevention study.

Exercises practiced in previously taken programs were characterized as follows: exercises while standing only; use of weights, bands, and other tools; more like aerobics, more actual exercises; faster and more active; less advanced and demanding; low key and more limited design for frail older adults; not continuous, with more interruptions; and larger groups and less camaraderie. Those who participated in the *On the Move* intervention program mentioned “no walking” as a major difference from other exercise programs. A few respondents who had participated in the pilot study and had been assigned to the Standard of Care program mentioned “more walking” as a difference from the present program.

Participants in the seated Standard of Care program characterized *On the Move* as an exercise program where participants were mainly seated, doing more of a variety and more inclusive movements delivered at a faster uninterrupted pace. They said the exercises were incremental and expectations were higher, but at the same time it was more personalized and exercises were modified to fit individual needs. Participants also noted the absence of weights, bands, and other tools. Participants pointed out coordination by working the brain and body together as important and different from other programs.

Some respondents spoke of the similarities of the Standard of Care program to the Sit and Be Fit program offered at their facility, and to some of the seated programs offered on television.

Subsample participants in the *On the Move* intervention program pointed out the emphasis on walking and balance and dealing with the lower limbs rather than the upper body, including exercises such as the “stepping challenges.” This group also mentioned that the program presented cognitive challenges and that it was more social and personal, offering a camaraderie not found in other exercise programs. The group mentioned commitment, joviality, and caring of research staff exercise leaders in particular multiple times throughout the interviews. Other differences compared with other exercise programs that participants mentioned were the length of the study in terms of weeks as well as the duration of 1 hour of the exercise sessions. One subject mentioned possible payment and the introduction of “water breaks,” which was later offered as a suggestion for all exercise programming.

Another program that participants mentioned in this context was Silver Sneakers, which, compared with the *On the Move* program, they saw as more active and demanding.

“The fact that it was a sit down one. I’ve seen the one on the ‘In-House TV,’ which didn’t look very appealing to me. But this one was little bit more upbeat than the one on TV exercise day. I have (taken other classes), but they’ve been more like aerobics, where you’re jumping around and everything, but I haven’t done that for several years, so . . . I’ve been more subdued.”

WF/ILF-STD-EL2

“I really haven’t taken too many. I think it’s the variety of the different moves that we did. I think that is key; that is very important. It was exercises, coordination, getting our brain to work

with our body. Mainly the (other) classes are for maybe more delicate residents here, more physically handicapped, that's why they're starting this advanced class for us. . . ." WF/ILF-STD-FS

"I think the pace of it and the fact that it was expected that we would do a little more each time and maybe it was geared at a higher level than some of the other programs they have here. You have people in much worse shape . . . it was the pace of it that was so good. If we were doing something with our arms, we were supposed to be marching high with our legs, so we were never let off the hook. You could drop out and not do it, but the expectation was there, if you can possibly do it . . . you do this and keep doing it." WF/ILF-STD-EL1

"It was fast. Usually they're kind of on the slow side, but this was fast. I enjoyed to keep moving, just keeping on the go. We had a break for drinking, but it was continual. Some of the past classes were not as intense as this one. I loved it." WF/ILF-STD-EL1

"This one was the longest I've ever taken, 12 weeks and each one an hour or more. It was more, and more to it. We were challenged somewhat, like in the walking I'd get a sweat on my forehead. . . . I haven't had much exercise to help with my balance, which is what we did in this class." WM/ILF-OTM-EL1

"Much more focused on balance and learning how to walk properly. I think the intensive work to develop balance and to develop correct walking, use of the feet and legs in walking, heels and toes, I think that's very good. I have not had any other thing that worked as well as OTM as far as the program itself and its design. I think it's excellent." WM/ILF-OTM-FS

"It seems a little more personal. It was a nice group. We got to know each other, laugh at each other if unable to grasp the steps, and help each other. Nice social group. . . . One thing that was different from other classes, was the stepping challenges, and introducing the cognitive part of it, 2 things at 1 time." WF/ILF-OTM-FS

"Haven't taken any others except Silver Sneakers . . . there we do a lot more demanding things . . . use weights, ball, rubber band. Makes you feel like you are doing something; heart rate gets up, break out in a sweat, but not in *On the Move*. It could be just the instructor." WF/SC-OTM-FS

### **Question 11. Did the exercise class meet your expectations? (Why?)**

Of the 51 program participants interviewed, 23 (13 Standard of Care, 10 *On the Move*) stated they had no expectations for the exercise class when they began the program. The remaining subsample subjects agreed that the exercise program had met their expectations for a variety of reasons, chief among them that it had been a good exercise class and a good workout, something interesting and stimulating that had helped them, and something they enjoyed, which gave them a feeling of accomplishment. Other reasons subjects gave for meeting their expectations were related to the benefits they derived from

program participation: It made them feel better and stronger, it improved their balance and walking ability, it built their confidence, it was something different, and they learned exercises they could do on their own.

The main reason given by those few, about 6% (4 Standard of Care, 5 *On the Move*), for whom the program did not meet their expectations was that they did not think the program was challenging enough and that they had expected more exercises. One participant, who had also been part of the pilot study, felt that the *On the Move* program was too challenging and that the facility staff instructor was not trained to modify exercises to fit individual abilities.

“ . . . Would have preferred at least a combination of exercises, standing and sitting. And I said I think we were a little bit misled in the initial session, because . . . that evaluation involved all exercises, all your movements were standing, except in 1 of the exercises . . . they would have you sit in a chair and had to get up and down, and up and down for 4 or 5 times, to see if you could do that, and then the walking exercise, and then another movement was walking a straight line and that entire test was while we were standing and I expected that they'd be working on some of those movements in the session, but then as I said everything we did was sitting in a chair.” WM/ILF-STD-EL1

“Absolutely, yes! . . . I was afraid I wouldn't be able to handle it, but the fact that she started slowly and worked up to more strenuous exercises, and once the hard ones that she gave us at the beginning, she just gave us maybe a couple of them to gradually increase the difficult ones. She didn't start with a lot of hard exercises at first, she worked up to them.” WF/ILF-STD-EL1

“Yes. I didn't think that for an older group of people it would be that much, that strenuous, especially being seated. I thought, 'Oh I'm sorry I joined this, it's not going to help me, I'm just wasting my time.' But after the first class I changed my mind.” WF/ILF-STD-FS

“No. I was expecting more, more exercises, and we didn't get it as far as I'm concerned. Don't get me wrong, the instructor was good, she was good. She did what she was supposed to do, but as far as I'm concerned, not enough. But I can understand you people, you're working with people that are our age, and apparently I have a little better health than most people, so [you've] got to take that into consideration. I can do a little bit more than a lot of people, there was no challenge.” WM/ILF-OTM-EL

“No, it did not. I hate to say that, but it's the truth. Because I just couldn't keep up with what was going on. It was too difficult for me given where I am physically. I don't think that's the program itself, I think it's the way it was presented. Would have been different if the *On the Move* physical therapist had been the instructor. OTM instructor from pilot, she could observe us and tell when we needed to sit down and when we needed to stop. I don't think he'll ever get that. I don't think he has the concept or the abilities to recognize what is going on with the people that he's working with.” WM/ILF-OTM-FS

“Yes. I didn’t know what to expect. Like I said, I was in the second class, and the women did talk [about what] was in the first class. So I did expect to step over those boards and what have you, and they said sometimes there was a lot of walking, well that didn’t (bother) me, but I didn’t know what to expect. . . . Didn’t really have any expectations. . . .” WF/HR-OTM-FS

**Question 12. If this exercise program was offered again, would you participate?**

Overall, the response to this question was an unequivocal “yes.” A few made their affirmative response conditional to their physical condition at the time the exercise program was introduced, scheduling (if earlier and shorter), if a different leader, if at a next level, and if paid, and 1 subject was unsure. A small number of subjects (5) said they would not participate again unless it was at a more advanced level and not seated. One believed the *On the Move* program was a virtual duplication of an exercise program already offered at his facility and another felt the *On the Move* program was too demanding.

“Sure! Even if it was just the seated one, because sometimes people need discipline to go to these things, and if you have a class to go to, you do it.” WF/ILF-STD-FS

“At the next level, yes I would. I mean, I wouldn’t do the same one again. As I said before, I think I need to be in another, more challenged group, which I understand is given to another facility.” WF/ILF-STD-EL2

“That’s a tough question. If the same program were offered again, it’s kind of simple. I DK whether I would stop going to my class that I’m going to take this . . . they’re both good, so I can’t say. . . . If they didn’t have something similar here, yes I would sign up for it. Here (they have something similar) 2 levels of it I call them Jr chair and Big chairs, that one has a bit more cardio, the other, she doesn’t push you as much. Don’t know if they plan to have the OTM class, seems to me that it would almost be duplication of what is going on. Seems to me that it would be overlap, it would be great if we didn’t have it, but we have the ones here. . . .” WM/ILF-OTM-FS

“Most definitely yes!” WF/HR-STD-EL1

“Yes. We are going to continue. We were going to start last week but the instructor had health issues. We’re going to see how many attend, once a week to begin with. They had 6 people in the group, now the people from the first group and other people from the building will be able to participate.” BF/HR-STD-FS

“Yes. In a minute.” WF/HR-OTM-FS

“Yes, we are doing it right now, same people and all.” BF/SC-STD-FS

“Yes, I would. I would give it another try with another instructor.” WF/SC-OTM-FS

**Question 13. How likely would you be to recommend the exercise class to a friend? (Definitely would, probably would, neutral, probably would not, definitely would not)**

Significantly, virtually all of those interviewed said they would definitely recommend *On the Move* and many said they had been recommending it to others throughout their participation. Although 2 independent living facility *On the Move* participants stated “probably” in response to the question, they said they would encourage others and would recommend the program.

“I definitely would. . . . I’d tell them they should feel better. . . . You get up to the golden age you have to keep moving.” WM/ILF-STD-EL1

“Yes. Without even a question, I would.” WF/ILF-STD-FS

“I would highly recommend it. I think it would benefit anyone in this age group.” WF/ILF-OTM-EL1

“Oh definitely. I would suggest it to anybody. Yes, anybody, I would really recommend it. . . . It’s a very good program, it keeps you moving even if you can’t get up and do things.” WF/HR-STD-EL1

“I would, I have. Yes, I would, definitely would. We’re trying to get more people in there, ’cause we have 6 right now. Word of mouth (best way to encourage people) and I think they will. They come down and they see what’s going on and then they want to **join, 2 [have] already, we’re up to about 8 now.**” BF/SC-STD-FS

“(Definitely) I have already told a lot of friends about it. I talked to them about it. Pitt trained somebody to give the class, after the study is over he will continue the class.” NAM-SC-STD-FS

**Question 14. What was your overall impression of participating in the research study? (This includes the consent process, scheduling of sessions, baseline testing, payment, interactions with research staff, etc)**

The results to this question will be grouped in different segments following the responses to the question probes:

(a) References to research: More than half of participants made direct references to the *On the Move* program as research. Many had a good grasp about the research process and final objectives of the program. Many professed to like, be familiar with, or be interested in research and were pleased that universities are doing this kind of research. Of these, some mentioned helping others in the future. For example, one said, It is important and worthwhile to make people aware of the need for senior people to exercise; research is good; I’m happy to dedicate the time and do my best to give data they want and need; I did it for others, don’t really like to do these things, but this is helpful to other seniors, we need exercise as we age. Others spoke of being excited to be part of research and about what researchers may find out and report about the effects of walking and exercise on people’s ability to function; along

this vein, people expressed an interest in giving their opinion and having that be part of the data, and that by participating they felt they were contributing in some way to developing the program. For example, one person mentioned “A personal interest, doing it to help research, but it helped me too.” For some, it was the first time they had participated in a research project and they were interested and curious in the things they would be doing in the program. Yet others simply said they enjoyed it, it was a good experience, they joined for the exercise and forgot about the research, and it was something that was going to help them. The general consensus throughout was that the *On the Move* program (both Standard of Care and *On the Move*) had in fact been very helpful and a great program, especially for older people.

“I think it’s a wonderful idea. They’re trying to find out more and more, and more about the elderly lifestyle and what is good for the elderly to be doing, because the elderly is a group of people that have more time on their hands. . . . We have a very large elderly population in Pittsburgh, more than in most cities . . . and anything that the city or the county wants to do to help people have better programs, I think that’s great. . . . Our population is a more working-class population . . . they are more hardy. It’s important for programs like OTM be developed for the elderly . . . programs (have to be based) on the initial people that are actually out there. I would highly recommend the program to any group that was thinking about putting something in for (them to do). It’s very beneficial not only for the participants, but to the rest of society. . . .” WF/ILF-OTM-FS

“I was excited about being part of your research study and also excited about what the researchers might find out and be able to report, and affect exercise, walking, and people’s ability to function, the ability to help that for future individuals.” WM/ILF-OTM-FS

“I think it’s very worthwhile. I think it’s great that people are getting more aware of the need for the senior people to get out and move around.” WF/ILF-STD-EL

“My personal interest, I think I got something out of it. I was pleased to hear that all these colleges and universities across the country are doing some things like this. At [the] doctor’s office this morning I saw that there is another program like this offered, no exercise, but similar to this and offered by Pitt.” WM/ILF-OTM-FS

“From the get-go I really liked the program. Never taught anything too difficult, nothing that we could not accomplish. That’s important, because if it’s too difficult, people get discouraged and they quit. I don’t see anybody quitting our program. Everybody that started out is still there. That’s a good barometer, program is good.” WF/ILF-OTM-FS

(b) Consent process: Most subjects did not have a problem with the consent process. They expected it and considered it a normal part of research, and understood the need for it. Some did complain about the copious paperwork and expressed concern about giving out their Social Security number, but they felt

reassured by researchers' guarantee of security. Only 1 subsample participant was advised by her executor to not give out her Social Security number, and she was aware of forfeiting a portion of the money allotted to her on her gift card. She added, "I never thought of the money. I enjoyed it, only thought of the benefit for me." Participants also appeared not to mind obtaining medical consent from their doctors.

"I had no problems with that. I realize the laws, but to have all this privacy stuff and it causes a lot of unnecessary paper work. (About) the Social Security number, what are they going to do, how are they going to label this stuff, need some identification on it. I didn't have any problem with that." WM/ILF-OTM-FS

"I had no problem with giving personal information and I had no objection to it at all. I was interested in participating and anxious for it to start and I was pleased and when we finished it, except as I said before, I would have liked to have had some exercises while we were standing." WM/ILF-STD-EL1

"I didn't let it bother me, as long as I know it is not being used improperly, there was a particular reason to help other seniors, see what they could do to improve their situation as they get older in Pittsburgh. . . . I was doing anything I could to help that, sure, but it was helping me." WM/ILF-OTM-FS

(c) Scheduling the *On the Move* programs was reported to be a problem both at the facility level and at the participant level because it had to accommodate other scheduled activities. However, most subjects said they did not have a problem with scheduling in the exercise class, but several admitted to missing 1 or 2 classes due to medical appointments, hospital stays, sickness, or other appointments or activities. Scheduling for 3 months was a hardship for some, especially when trying to accommodate doctors' appointments, which were considered a priority. Other facility activities also competed with *On the Move* scheduling. Some participants gave up those activities during the study period and others were able to coordinate different scheduled activities and participated in more than 1. One senior center participant was happy to report that she was able to coordinate *On the Move* with the Silver Sneakers program offered at her facility, and went to the senior center 5 days a week to take advantage of both programs. Another subject reported that she was pleased that in her facility the exercise class was offered twice in a day, because of participant overflow, and if she happened to miss the class she was assigned to, she was able to make it up by going to the other class that followed. The waiting period of 3 months between exercise session 1 and exercise session 2 was pointed out by a session 2 participant as problematic, especially when dealing with this study's participant age average, because many things can happen over a period of 3 months and many were unable to join the program.

"We actually had a couple of doctors' appointments and then we were away for 2 weeks, but they told us that's all right, just come back in when you can. I noticed being away for 2 weeks from my regular exercises, plus this, it was a bit challenging for the first few times . . . [you've] got to keep at it. They told us if you have doctor's appointments keep them, you say 3 months . . . you're dealing with older folks they're going to have doctor's appointments . . . so you stretch

it out. If you knew everybody was going to be there, you could have done it in a shorter period.”  
WM/ILF-OTM-FS

“Many activities at facility, so time isn’t always good. Tuesday class was at 10:00 am, which was fine, but Thursday was at 1:00 after lunch and it isn’t much fun to go out there when you’re sleepy. It would be much nicer if it were in the morning. The regular exercise group meets in the morning 3 days a week. Afternoon classes not the best.” WF/ILF-OTM-FS

“What I liked about it, they had one from 1 to 2 o’clock and then they had one from 2 to 3 o’clock and sometimes that I had a doctor’s appointment or something else came up at the 1 o’clock and I couldn’t make it, I could come to the 2 o’clock . . . it was flexible.” WF/ILF-STD-EL1  
“No, it’s really nice, twice a week and the time is excellent, 10 to 11:30.” WF/ILF-OTM-FS

(d) Pretesting and posttesting was understood as a necessary part of research. Participants pointed out that baseline testing was an important measure to have beforehand and understood the need of posttesting to discover improvements or changes in performance. The great majority of subjects in both cohorts said they felt more secure at the time of the posttest and felt they performed better and noticed improvement compared with the baseline testing. They received and welcomed oral feedback from researchers about how they performed on different measures, and all expressed a desire to receive a written report that showed the results of the posttest. At the time of the interview, most participants had not yet received a written “report card” that indicated the differences between pretests and posttests.

“I think it was good. It’s a good idea to check somebody out before they exercise, blood pressure, heart rate, and stuff like that, and I think it’s a good idea that they do it at the end too, to see if there’s any improvement in your physical health. If they noticed improvement in my ability to do what I did 12 weeks (compared to) the beginning . . . I did much better. . . . I enjoyed it, I really enjoyed it and my wife enjoyed it too.” WM/HR-STD-FS

“Oh definitely, I would say you should measure a person before you start working on ’em. Some people look technically normal, but they can’t operate, so you should know that ahead of time.”  
WF/ILF-STD-EL1

“That was OK, and they allowed me to use my cane to do the walking and that was a help, because I have a little trouble with my walking . . . and the ladies were very nice, who did the testing. It was easier the second time, I felt more confident. . . .” WF/ILF-STD-EL1

(e) In general, participant payment was not a requirement. Subjects said they would have participated regardless of payment because they did it to contribute to research, or to help other older adults. Some mentioned that although they did not do it for the money or did not need the money, it was “found”

money, a bonus they were grateful for and glad to know they would receive. To them, compensation was a nice way to be acknowledged and to show that their participation was appreciated. Many of those interviewed said they were waiting until the end of the project to use the card for the full amount. The use of the gift card was not a problem for most, but some had issues using their card at ATM machines or at the bank; some were not able to withdraw the full amount; and some found the card empty. Any issues with gift cards, once reported, were promptly resolved by the *On the Move* project coordinator.

There may have been some rancor among the ranks regarding payment. One subject observed that some people in his group were disappointed because they had understood they would be receiving \$100 for their participation. When the *On the Move* program was introduced, it was mentioned that some participants would receive “up to” \$100 depending on the number of activities they participated in for the program. He suggested, “Why even mention \$100? Some people fixated on that and were disappointed.”

“When we began the class, we had no idea that we were going to be paid for this. I guess it came about when they received the grant to develop the program, but I did not do this in order to be paid, just did it for research.” [Was part of the pilot]. WF/ILF-OTM-FS

“Whatever they give, that’s fine with me, it’s found money.” WM/HR-STD-FS

“Nice to get a payment . . . shows you appreciate our efforts.” WF/ILF-STD-EL1

“Yes, last time when they put in the last amount, I went to the bank and tried to withdraw. The way it was set up at PNC, I couldn’t withdraw from a teller. Went to ATM, had to do it in increments ending in 0, so there was a small balance, which hopefully I will get. . . .” WM/ILF-OTM-FS

(f) When referring to their interactions with *On the Move* staff as a whole, participants said it had been good from beginning to end. All staff are very friendly and professional, they all work well together, are very efficient, know what they are doing, and did a good job. Overall, the comments about instructors were very positive, especially when referring to study exercise leaders. For instance, some abbreviated comments include the following: “They were wonderful; all very friendly, nice to talk to, easy and a joy to work with; very good; knew what they were doing; all very affirming, very encouraging; caring, watched out for us, took care of us; they made you relax and feel comfortable.” Three people mentioned different issues about facility staff instructors. One did not like how the instructor conducted the program, saying it was “too fast and too furious”; another said that the leader had been trained by PITT staff during the first session and although she was a very good instructor, she often had to interrupt or cancel the exercise class because of other duties. The third commented that the facility staff “leader was younger than the class participants, but had more health problems. Though she tried to do as best she could, but was not up to it. She was not an instructor.”

“They were a wonderful group of people. I think we were all totally enamored of [leader]. She’s easy to work with and so willing to share of her own personal life . . . so it was not like a formal

type of thing, it was very informal and friendly. If there had been a lot of technicality, I think that we would have been much more aware that we were in a research thing; we would have performed, but there was not that kind of atmosphere at all. Although she made us go through our paces, with humor.” WF/ILF-OTM-EL

“Every one of them seems very enthusiastic about the program, so then I feel that I am contributing in some way to develop the program.” WF/ILF-OTM-FS

“Very friendly and professional. I thought they all did quite well.” WM/ILF-STD-FS

“I talked to the instructors. I was really well pleased that they would have me. Love to dance and have the opportunity to learn new moves. I would be very accepting of all the new things we were taught. We had a very nice group, enjoyed each other, it was such fun, no one felt intimidated, everybody felt . . . at ease. Our instructor was . . . pleasant and . . . nice. That is important because if you have somebody that is critical and making bad comments that hurt your feelings, that chills the group. She was very, very supportive of all of us. She did a . . . good job. We even have 3 or 4 guys in the group. Men are very much more hesitant to join something like that, but we have about 4 guys that come every week and participate. Women are more adventurous. . . .” WF/ILF-OTM-FS

“It was all handled very efficiently. I did research all my career, so I was sympathetic to this kind of thing.” WM/ILF-OTM-EL

## SUMMARY AND DISCUSSION

In general, participants’ main goal in the *On the Move* project was to engage in some sort of physical activity to improve fitness, walking ability, and balance. Many were aware of the benefits of exercise for older adults and recognized the need to keep active. Most study subjects had no expectations about the type of exercise they would be doing during the program. However, those randomized to the Standard of Care class expected more than “seated” exercises, even if most admitted to having benefited from the program and feeling that the class was a “good workout.” Of those who found a series of different exercises challenging, most comments came from research staff–led classes from both the *On the Move* and the Standard of Care programs. All sample subjects stated that they felt “safe” throughout their study participation, mainly due to instructors’ care and close monitoring.

The great majority of those interviewed acknowledged improvement in their walking ability and a positive impact on both their physical well-being and their life in general, with observations ranging from the camaraderie that developed in participating in group exercise to unintended side effects such as weight loss. Most subjects found it difficult to specify what they liked the most or the least about their exercise class. They either “liked everything” or could think of nothing negative to say about either *On the Move* programs.

More than two-thirds mentioned the social element as a salient outcome of participating in group exercise. Twelve of the interviewed participants claimed they had never taken an exercise class before

*On the Move*. Of the remaining, those who participated in the Standard of Care noted the absence of tools, the uninterrupted pace, and body–brain coordination as different from other exercise programs. *On the Move* participants pointed out walking and balance exercises and focus on lower limbs, as well as cognitive challenges. All participants agreed that exercises for both project programs were more individualized, exercises were modified to fit individual needs, and the whole experience was more personal and social than other exercise programs they had participated in. Sixteen of the 51 participants said they had no expectations for the *On the Move* programs. Five admitted that the program they participated in did not meet their expectations because they did not find it challenging enough. For the majority, however, expectations were fulfilled because of the benefits they derived from program participation.

Notwithstanding some complaints about the exercise program not completely fulfilling expectations, overall, participants responded with an unequivocal “yes” when asked if they would participate if program were offered again. Five participants (3 from the Standard of Care program) said they would not participate again unless the new program was more challenging or not seated. Virtually all sample subjects said they would definitely recommend *On the Move* and would encourage others to participate.

Most participants had a good grasp of the research process and objectives and understood that the need to sign consent forms and perform pretesting and posttesting was, for the most part, necessary parts of research. Although some participants found scheduling exercise classes for a 3-month period to be somewhat burdensome, most *On the Move* subjects did not have a problem scheduling the class. However, some missed 1 or 2 sessions due to previously scheduled medical appointments, which were considered a priority. The use of the gift card was not an issue for most; payment was considered unnecessary by many, but they felt it was a bonus and it showed appreciation from research personnel. Overall, interactions with research staff were very positive. Participants seemed to have thoroughly enjoyed the study staff instructors and said that, on the whole, researchers were very friendly, professional, and efficient people who worked well together and were easy to work with.

Although study subjects made insightful comments throughout the interview, participants’ ideas about changes in their walking ability, the general impact that the exercise program had on them, suggested changes to the program they participated in, and met expectations from class, provide the greatest insight into the qualitative study outcomes (see summary for questions 5, 6, 9, and 11 above).

Improved balance and improved walking ability are identified by both the *On the Move* and the Standard of Care participants in more or less equal numbers. For all other variables (increased endurance and stamina, less pain and shortness of breath, more confidence and self-esteem, a better mental attitude, feeling more alive and energetic, and feeling more motivated to continue exercising), overall, most positive comments about exercise program impact came from the Standard of Care cohort.

Participants expressed overall satisfaction with their experience in the exercise class and claimed a multitude of benefits and overall improvement from having participated in the *On the Move* programs. Aside from the physical benefits of improved walking, better balance, and more energy, strength,

endurance, and stamina, many participants reported feeling more confident and secure in their walking, increased self-esteem, feeling better overall, and the ability to perform ADLs with greater ease. Participants (mostly from the Standard of Care) who felt that the exercise sessions had not had a significant impact on their physical or walking ability, or who did not find the class challenging, still admitted to other such benefits as the social interaction and camaraderie that had developed from participating in group exercise. This was also mentioned by other subjects as a positive side effect.

Both programs were initially taught by research staff physical therapists. They also trained the facility staff and volunteer participants who went on to instruct the second session of each program. The Standard of Care program as instructed by both types of leaders was likely a much better exercise program than the Standard of Care seated program normally offered at independent living facilities, high-rises, and senior centers. This is evidenced by such participant comments as “even if it was seated, it was quite a workout”; it was not the “same old program”; and it was in general more demanding, well organized, and better led than the seated programs that are usually taught at these facilities. The end result is that the Standard of Care exercise program offered as part of the research compared favorably with the *On the Move* intervention program, notwithstanding a number of participant complaints about the seated nature of the program. Benefits obtained from the Standard of Care exercise classes were comparable and, judging by participant comments, in some cases greater than from the *On the Move* program.

The differences observed between respondents from different facilities are likely a reflection of the number of participants from each. The variety of responses is greatest among independent living facility participants, followed by high-rise and senior center participants. No appreciable differences could be inferred from participant responses based on gender or ethnicity.

In addressing the second research objective, which was to determine the sustainability of the exercise programs by comparing the 2 different modes of program delivery, some differences in participant responses were observed based on the type of instructor they had.

The *On the Move* instructor implementation process encountered some barriers. Identifying and training exercise leaders to take on the second session of the *On the Move* program from among facility staff or volunteers proved to be more difficult than anticipated. Training staff leaders was successful at the independent living facilities, but not at many of the other participating community sites.

For the most part, participants were very satisfied with their exercise instructor, and they were particularly impressed by the study exercise leaders. In general, participants felt the exercise instructors made them feel comfortable and safe, were caring and encouraging, helped them, and were attentive to their individual needs. A few voiced disappointment, saying they were led to believe that physical therapists would be class leaders. Only 3 participants (2 *On the Move* and 1 Standard of Care, all from facility staff-led classes) expressed some reservations about the way their exercise instructor conducted the class.

“I enjoyed the walking if I had some control over it. What I liked least was the fast pace, the whole class being run sort of like it’s an aerobics class or Pilates, and that speed (reminded me of the Army and the yelling of the top sergeant).” WM/ILF-OTM-FS

“. . . the instructor. She was the most disappointing. The instructor was not well qualified; could not do some of the exercises and show you. She did the best she could . . . People in the class were about the same age, between 70 and 76. Instructor was younger, but with more health problems. She tried to do as best she could, but was not up to it. She was not an instructor.” WF/SC-OTM-FS

“Instructor was very good. She was the exercise director from the facility, but she had to interrupt or call off class because of her other duties.” WF/ILF-STD-FS

A number of research subjects had participated in the original pilot study and compared that experience to their experience in the *On the Move* project. If they were part of the Standard of Care cohort, they expressed disappointment at the lack of walking and balance exercises, although this feeling was widespread in this group. Of those in the *On the Move* program, some felt that it was not challenging enough, others thought it was too challenging. A couple others in an *On the Move* facility staff–led group felt that the instructor was not sensitive to individual needs, which was different from the pilot, and which would not have happened if class had been led by research staff.

*On the Move* participants were definitely interested in continuing the exercise program after the research was completed. Several expressed disappointment that the class would not be continued at their facility. Others commented that the program would in fact be continued in their facility with staff personnel as instructors, and they planned to join the new exercise group. One independent living facility participant remarked that the staff instructor planned to incorporate some of the *On the Move* program exercises into the regular exercise class offered at his facility. Six facilities—4 senior centers, 1 high-rise, and 1 independent living facility—established an exercise class based on the *On the Move* program taught at that facility—1 modeled after the *On the Move* program and 5 modeled after the Standard of Care program.

## RECOMMENDATIONS

*On the Move* participants’ willingness to participate, the benefits derived from participation, their overall satisfaction with the exercise programs, and the stated interest in the continuation of *On the Move* clearly demonstrate the desire and need for exercise programs that target improving walking ability and balance among older adults.

The observations, suggestions, and concerns expressed by participants in both the *On the Move* and the Standard of Care programs can be combined to result in general recommendations that should inform the further development of the *On the Move* program for future implementation. These recommendations can be grouped into 3 main categories:

## 1. Recommendations that address the organization and presentation of the *On the Move* program

- Several *On the Move* participants found the programs either too challenging or not challenging enough: A recommendation that would address both issues would be to have 2 exercise classes. Divide exercise groups according to participant ability, have 2 different levels of exercise intensity, 1 more advanced and 1 less advanced, to allow individual differences and capabilities to be addressed.
  - “I was expecting more, more exercises, and we didn’t get it as far as I’m concerned. Don’t get me wrong, the instructor was good, she was good. She did what she was supposed to do, but as far as I’m concerned, not enough. But I can understand you people, you’re working with people that are our age, and apparently I have a little better health than most people, so you got to take that into consideration. I can do a little bit more than a lot of people, there was no challenge.” WM/ILF-OTM-EL
  - “It was very easy. We lost quite a few people . . . a lot of them left because they felt that they were not being challenged. I stayed, because I had committed to the program as it was being newly developed.” WF/ILF-OTM-FS
  - “. . . but I was all the time trying to keep out of other people’s way or going a different route, or walking by myself. That was not what I expected. Instructor tried to adjust, but finally I just sat it out.” WM/ILF-OTM-FS
  - “At the next level, yes I would. I mean, I wouldn’t do the same one again. As I said before, I think I need to be in another, more challenged group, which I understand is given to another facility.” WF/ILF-STD-EL2
  - “When we were doing the walking around in circles, set your own pace, but could not go at own pace because some walk faster, especially some women are much shorter they can’t walk as fast, or sometimes people would walk past you because they wanted to walk faster.” WM/ILF-OTM-FS
  - “. . . Some people dropped out because there was too much walking, went to 1 or 2 classes and dropped out. One came back to be tested.” WF/SC-OTM-FS
  - “Yes, it was too much. Too fast and too furious. Almost everything; the leader seemed like he was in a hurry all the time.” WM/ILF-OTM-FS

- “. . . didn’t get enough as far as I’m concerned . . . of the exercise itself. I wasn’t too happy with the exercise. I expected more, of course I know that age has a lot to do with it. . . .” WM/ILF-OTM-EL
  - “A . . . little faster wouldn’t hurt.” BF/HR-STD-EL
- Have a substitute available if the instructor has to cancel.
  - Emphasize the benefits of *On the Move* versus other programs offered at the facilities where *On the Move* will be offered.
    - “*On the Move* has the reputation of being too easy and not challenging enough. Everyone needs to know more about the goals of this exercise program, which the developers are learning. Easier than the other class offered at the facility. The other class are sitting down exercises, but there are standing up exercises with weights. . . .” WF/ILF-OTM-FS
    - “Haven’t taken any others except Silver Sneakers . . . there we do a lot more demanding things . . . use weights, ball, rubber band. Makes you feel like you are doing something; heart rate gets up, break out in a sweat, but not in *On the Move*. It could be just the instructor.” WF/SC-OTM-FS

## 2. Recommendations that address the role of the exercise leader

- Point out the objective of each exercise. This is particularly important when following certain exercise routines that are seen as “boring” to class participants or too demanding. This includes exercises that involve multiple repetitions or walking for long periods of time.
  - “. . . it’s like a gradual buildup, but I DK, to me just bouncing the ball and circling for what? Ten minutes or whatever. To me, you know what it is? It’s me being bored doing that. There’s nothing the matter with the exercises. . . . It wasn’t just the walking, it was the circles . . . and it’s continuous, and that took so long I started humming. It wasn’t hard doing it, it was just so much repetition. . . .” WF/SC-STD-EL1
- Train exercise instructors to identify individual needs and to be able to modify exercises accordingly.
  - “. . . she was very, very thorough: If it bothers you too much, if hurting and in pain, modify it. . . . I modified the exercises and leader agreed. If we couldn’t do it she showed us a different way to do it, and it worked out perfect, perfect.” WF/HR-STD-EL1

- “I guess the major thing I would change would be to have a leader who has the ability to relate to people, to see where they are and help them grow from where they are. . . .” WM/ILF-OTM-FS
  - “. . . That people who can do more, do more, and people who can’t, they would maintain what they can do. Two or 1 person can do a little more a little strenuously without hurting himself, I think that’s the way it should be run, because people at different levels benefit differently. I have a hard time doing push-ups on the floor, getting down on the floor, but with the chair . . . I can do 12 or 13 of them in succession, where the older women there they can’t do that. Instructor tells people, ‘Always do what you can do.’” WM/HR-STD-FS
- The instructor should be aware of the music’s beat—make it faster to match the exercise, or adjust exercises according to the music. Include more livelier music.
- “I don’t know . . . a little bit more lively music. That would be about it. There’s nothing, I can’t complain about anything. Like I said, I enjoyed it completely. What I would change? There is nothing, like I said the workout was very good. The music, some was lively and some was more to the dull side and that would be about the only thing I’d want to change, is the music and even that wasn’t too bad. Some I could keep in step with and some I couldn’t, it was just too slow.” WF/HR-OTM-FS

### 3. Recommendations that address additions/modifications to the exercise routine

- Adjust music volume. Older people tend to have hearing problems. It is hard for them to hear instructions over the music and loud sounds in general can be confusing.
- “What I have heard, regarding the music, though it is pleasant for me, but very disturbing for people with hearing problems. Sometimes the radio is too loud and you can’t hear the instructor. Don’t know how it can be changed, sometimes the music was too loud. . . . For those of us who appreciate the music, the music adds something, but for others. . . .” WF/ILF-OTM-FS
- When exercises require multiple repetitions, they are easier to perform if exercises are switched more often. If the number of consecutive repetitions are necessary to achieve the best results from exercise, explain the intention.
- To increase the impact of physical and cognitive exercise, some participants suggested the addition of brain games.
- Reduce class or exercise length of time.

- “Oh, I thought maybe it was just a little too long. Instead of an hour, I thought maybe 45 minutes might have been better . . . this program there was no age restriction, it made no difference what your age was, you just had to keep up with what everybody was doing. . . . I just thought that maybe it was just a little too long, the hour . . . especially when you’re walking and different things. . . .” WF/HR/OTM-EL
- “I think I would cut down on the walking some. She allowed us to sit down if we got tired, it wouldn’t make any difference, just less walking.” BF/HR-OTM-EL

For future implementation, *On the Move* should emphasize its “evidence-based” advantages by explaining how the exercise program can improve walking ability and balance, the importance of maintaining independence for older adults, and how the program contributes to this capability.

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*Acknowledgement:*

*Research reported in this report was [partially] funded through a Patient-Centered Outcomes Research Institute® (PCORI®) Award (CE-1304-6301).*