

Results From the Healthy Moves for Aging Well Program: Changes of the Health Outcomes

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The Healthy Moves for Aging Well program piloted a home-based, low-intensity strength exercise program that targeted a nursing home certifiable, ethnically diverse sample of community-residing adults aged 65 and older. This study examined the effectiveness of the Healthy Moves program in reducing participants' number of falls, fear of falling, depression, and pain. Results indicated that participants (n = 338) had statistically significant declines in the number of falls and level of pain. These declines were found among participants who improved their exercise performance. This pilot suggests that a modest intervention that couples behavior change with seated exercise can have a positive outcome on a sample of older adults who have high levels of functional impairment and lack a regular exercise regime.

KEYWORDS *health outcome, Healthy Moves, older adults, physical activity*

The Healthy Moves project was funded by the Archstone Foundation, Grant Award #04-04-41, the California Endowment, Grant Award #20042848, and the Administration on Aging, Grant Award #90AM2778. We express our appreciation to Susan Enguidanos, PhD; Jon Pynoos, PhD; Mike Nichol, PhD; and Zachary Gassoumis for their comments in the development of an earlier version of this article.

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INTRODUCTION

Research suggests that it is never too late to begin an exercise program (U.S. Department of Health and Human Services, 1996). A growing body of evidence has shown that regular physical activity can benefit individuals during their entire life course, regardless of age. Of particular importance to older adults, physical activity has been demonstrated to be beneficial on a variety of health outcomes, such as reducing falls (American Geriatrics Society, British Geriatrics Society, and American Academy of Orthopaedic Surgeons Panel on Falls Prevention, 2001; Messier et al., 2000; Tinetti et al., 1994), fear of falling (Zijlstra et al., 2007), depression (Brosse, Sheets, Lett, & Blumenthal, 2002; Dunn, Trivedi, & O'Neal, 2001), and pain (American Geriatric Society Panel on Persistent Pain in Older Persons, 2002). To promote and maintain health, older adults are recommended to do moderate-intensity aerobic physical activity for a minimum of 30 minutes 5 days per week or vigorous-intensity aerobic activity for a minimum of 20 minutes 3 days per week (Nelson et al., 2007). Only a small percentage, however, of people aged 65 and older, currently meet this recommendation. For example, only 16% of individuals aged 65 to 74 reported participating in 30 minutes of moderate activity 5 or more days per week and only 12% of those 75 and older reported such exercise. Only 13% of individuals between the ages of 65 and 74 reported engaging in vigorous physical activity for 20 minutes 3 or more days per week, and only 6% of those 75 and older reported such exercise (U.S. Department of Health and Human Services, 2000).

Existing evidence suggests that physical activity programs may appeal to older adults, when they are tailored to individuals' preferences (American Association of Retired People et al., 2001) and include activities that are more moderate in intensity and simple and convenient to engage in (King, 2001). Studies have found positive outcomes in group-based exercise programs among both independent older adults living in the community (Van der Bij, Laurant, & Wensing, 2002) and more frail nursing home residents (Baum, Jarjoura, Polen, Faur, & Rutecki, 2003; Lazowski et al., 1999;). A majority of older adults, however, prefer programs that can be done on their own outside of structured classes or groups but with some level of instruction (King, 2001; Prohaska et al., 2006). Home-based programs allow individuals to exercise at their convenience in the comfort of familiar surroundings (Jette et al., 1999). Such programs are able to reach older adults who are unable or unwilling to participate in community-based group exercise (Etkin, Prohaska, Harris, Latham, & Jette, 2006).

Promising results have been found in some home-based programs for older adults. For example, Strong-for-Life, a home-based resistance exercise program, was effective in reducing physical disability among White older adults (Jette et al., 1999). For interventions utilizing both supervised center- and home-based formats among high-functioning older adults, greater

participating rates were found in the home-based program (Brawley, Rejeski, King, 2003). Most of the interventions, however, have not targeted or included substantial numbers of frail and ethnically diverse older adults (Glasgow, Lichtenstein, & Marcus, 2003; King, Rejeski, & Buchner, 1998; Marcus et al., 2006; Yancey et al., 2004).

Healthy Moves for Aging Well (Healthy Moves), a home-based, low-intensity strength training program, was developed to address this research gap by targeting nursing home certifiable older adults living in the community and participating in a Medicaid waiver program. The aim of the study was to assess the effectiveness of Healthy Moves in improving measures of health outcomes among the participants.

METHODS

Healthy Moves was designed and piloted by the Partners in Care Foundation, a nonprofit organization with an extensive history in testing, adapting, and disseminating evidence-based models. It was evaluated by an outside evaluation team at the University of Southern California. Healthy Moves began on July 1, 2004, and was completed on January 31, 2008.

Study Participants

Healthy Moves targeted low-income, nursing home certifiable individuals dually eligible for Medicare and Medicaid from four California's Multipurpose Senior Services Program (MSSP) sites. MSSP is a Medi-Cal (California's term for Medicaid) waiver program that provides care management and purchase of services to eligible disabled, low-income older adults aged 65 and over. MSSP participants are community-dwelling older adults who have demonstrated significant functional impairment to qualify as nursing home certifiable as evidenced by (a) impairments in two or more activities of daily living (ADL) or (b) at least one ADL deficiency and cognitive impairment (Alkema, Wilber, Simmons, Enguidanos, & Frey, 2007). "Nursing home certifiable" refers to Medicaid regulations that allow individuals who qualify for nursing facility level of care to be served in the community (Eng, Pedulla, Eleazer, McCann, & Fox, 1997).

To be eligible for Healthy Moves, participants had to be able to consent to participate and be cognitively capable of following instructions and learning the simple exercises. Therefore, participants were excluded if they were assessed as bed-bound or severely cognitively impaired by their usual care case managers during regular assessment interviews. Caregivers in the home were not required; however, participants who lived alone or had no caregiver available needed to be able to stand and to exercise alone safely.

Study Design and Procedures

The Healthy Moves evaluation included a pretest, and a 3-month posttest. The study was approved by the institutional review boards at Partners in Care Foundation and by the university conducting the outside evaluation. In addition, all study participants completed a written informed consent form.

As few of the existing physical activity programs have targeted high-risk, nursing home certifiable populations in home-based settings, no optimal types of physical activity or exercise have been recommended for this population. For Healthy Moves, two simple low-intensity exercises—arm curl and seated step-in-place, adapted from the Senior Fitness Test (SFT; Rikli & Jones, 1999)—were used to improve participants' upper and lower body strength. Due to the frailty and safety concerns about falls, participants performed the arm curls using a 1-pound weight and the steps-in-place exercise in the seated position. Participants were encouraged to complete the exercises three to five times a week on their own at home or in the company of their caregiver or family member, 5 to 10 minutes for each time, twice per day, in the morning and in the afternoon (see the Appendix for a description of how these exercises are performed).

Healthy Moves used a combination of cognitive and behavior change strategies to help participants develop behavioral skills needed to build the low-intensity physical activity into their daily lives. A behavior change counseling method called brief negotiation (Runkle, Osterholm, Hoban, McAdam, & Tull, 2000) was used to evoke and support participants' internal motivation to change. The central tenet of the brief negotiation model is that health care providers cannot change clients' behavior until clients decided for themselves to change (Runkle et al., 2000). The brief negotiation model offers a strategy for providers to lower resistance by explaining and encouraging participants' readiness to change and providing personal supports. Readiness to change was measured using a ruler scaled 0 to 10, where 0 is not ready and 10 is very ready. In addition, feedback, social supports, and helping participants set realistic goals, such as walking in the home without falling, pouring a drink from a carton, and getting to the toilet, were used to maximize participants' adherence to the intervention.

Volunteer coaches were recruited and trained to deliver the counseling and to motivate participants to change their behavior. Potential volunteer coaches were selected based on their interests, ability to participate in the 2-day training session, commitment to complete the program, and perceived ability to lead and motivate participants. Background in health or fitness was not required. Strategies employed in recruiting coaches included word of mouth, Internet postings, newspaper articles, agency newsletters, and through the volunteer pool at the four participating sites. No financial incentives or complimentary rewards were given to the volunteer coaches. A total of 97 volunteer coaches were recruited.

Prior to the implementation of Healthy Moves, care managers at the four participating MSSP sites and volunteer coaches attended a mandatory training workshop to learn fundamental issues related to the program, such as instructions about the exercise, safety guidelines, barriers to behavior change, and techniques for using the brief negotiation. Two types of volunteer coaching strategies were used to encourage and motivate participants: (a) a combination of face-to-face, on-site instruction and phone coaching (face-to-face); and (b) telephone coaching only (phone). Face-to-face volunteer coaches taught the participants the exercises in person and made home visits or phone calls on scheduled appointments. Where phone coaching was used, participating site care managers taught the exercises and volunteer coaches made motivating phone calls without any face-to-face contacts with the participants. Both types of volunteer coaches were asked to contact participants weekly for the first 2 months and biweekly for the third month. During each contact, the coach monitored the participant's progress with the exercises, engaged participants in goal-setting discussions to support adherence, encouraged the participant to come up with solutions to challenges, offered social support and recommendations when appropriate, and built confidence in the participants' ability to make positive changes. Volunteer coaches and participants were matched based on their cultural and language backgrounds. Seven different languages were used in the intervention: English, Spanish, Russian, Korean, Armenian, Chinese, and Farsi.

Outcome Measures

Participants completed the pretest and the 3-month posttest assessments at their home. For participants who used face-to-face coaching, the volunteer coaches administered their assessments. For participants who used phone coaches only, care managers administered their assessments. The present study included the following outcome measures: exercise performance measured by the number of arm curls in 30 seconds and number of seated steps-in-place in 2 minutes, number of falls during the past 3 months, fear of falling, depression, and pain. The number of falls at the pretest and the posttest were not normally distributed. Fear of falling and depression were measured by scores on a three-point Likert rating with responses ranging from 1 = none of the time to 3 = most or all of the time. Pain was measured with a 10-point scale, with a higher number indicating a higher level of pain.

Change Analysis

To address the changes from pretest to posttest in the number of falls, fear of falling, and depression, nonparametric Wilcoxon–signed rank tests were first employed to analyze the unadjusted changes. A paired *t* test was conducted to analyze the unadjusted mean changes of pain level from pretest to posttest.

Repeated measures ANCOVAs using SAS PROC GLIMMIX (SAS 9.2) were then conducted to measure the adjusted changes controlling for age, gender, race, and functional status measured by number of limitations in ADL (Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963) and instrumental ADL (IADL; Lawton & Brody, 1969). The ADL included dressing, eating, bathing, toileting, transferring from bed to chair, and grooming. The IADL included using the telephone, laundry, transportation, shopping, preparing meals, housekeeping, taking medications, and handling finances. Missing values for ADL (9.45%) and IADL (8.85%) were imputed by matching the response patterns of persons with complete data to persons with missing data.

To determine if there was any association between the two low-intensity exercises and the changes of health outcomes, these changes of were further analyzed respectively among participants who had improvement, no change, and decline in performance of both exercises.

RESULTS

Participant Retention and Characteristics

As shown in Figure 1, 827 participants were recruited into the study; 119 who did not meet the inclusion criteria were excluded. Among these, 118 were receiving occupational therapy and physical therapy, and 1 was bed-bound. Of the individuals who were eligible for the study ($n = 708$), 190 declined to participate and 518 participants (73.2%) were included in the pretest analysis.

Of the 518 participants who enrolled, 338 (65.3%) completed the study. Among those who did not complete follow-up, 24.4% ($n = 44$) were no longer interested; 22.2% ($n = 40$) could not be reached; 21.7% ($n = 39$) identified health problems including pain, heart surgery, and stroke; 12.2% ($n = 22$) left because of staff turnover; 10.0% ($n = 18$) were terminated from the MSSP program; 3.0% ($n = 7$) died; and 2.7% ($n = 5$) were placed in nursing facilities (see Figure 1). Table 1 shows selected sociodemographic characteristics of participants at the pretest. The mean age was 80 years; 84% were female; more than 40% were Hispanic. Almost half of the participants were widowed. Compared to those who completed the intervention, participants who did not complete the study were more likely to be Hispanics and had more ADL and IADL limitations.

Changes of Health Outcomes

Table 2 shows the unadjusted mean scores of health outcomes at pretest and posttest among participants who completed the study. The number of falls significantly declined from the pretest to 3-month posttest. About one in eight or 13% of the participants fell once during the 3 months prior to completing the

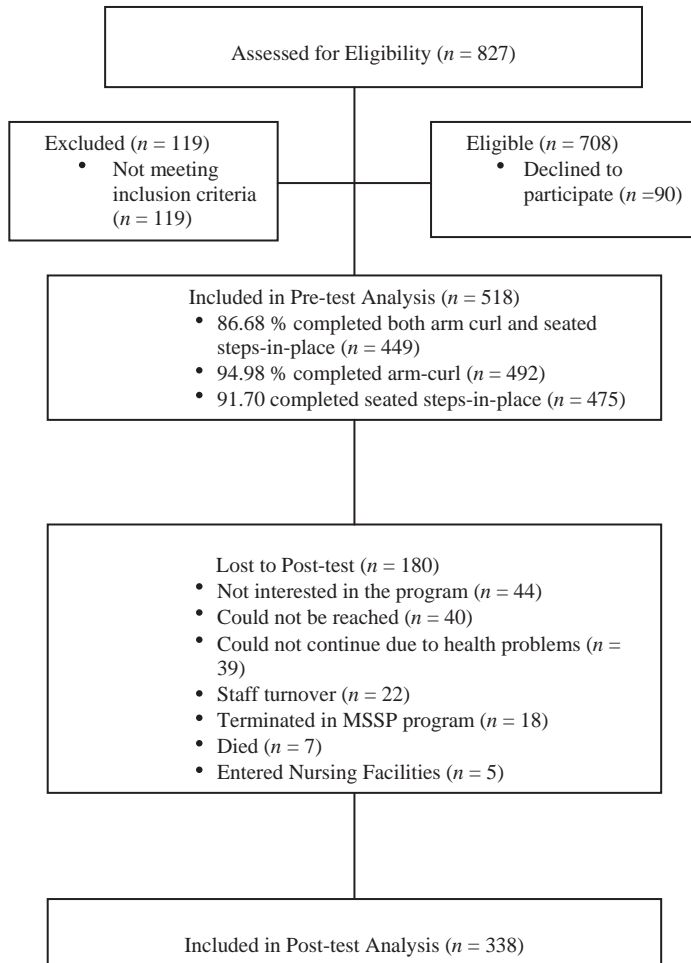


FIGURE 1 CONSORT Diagram of Healthy Moves.

pretest of the study. Approximately 7% had more than one fall prior to pretest. After participating in the program, 3-month posttest results showed that the percentage that had one fall decreased slightly to 11% and the percentage who had more than one fall decreased to 3% at posttest. A significant decline was also found in participants' average pain level during the 3-month intervention. Although fear of falling and depression also declined from pretest to posttest, the changes were not statistically significant. Similar results were found from the adjusted mean changes from pretest to posttest, after controlling age, gender, race/ethnicity, ADL, and IADL (see Table 3).

The changes in health outcomes were further analyzed based on participants' exercise performance (table not shown). Number of falls and average pain level significantly declined among participants who improved their exercise performance. No statistically significant changes, however, were found

TABLE 1 Sample Characteristics at Pretest

Characteristics	Total (<i>n</i> = 518)	Completers (<i>n</i> = 338)	Noncompleters (<i>n</i> = 180)	<i>p</i> -value*
Age in years, mean (<i>SD</i>)	80.1(7.25)	80.4(7.3)	79.79 (7.3)	.36
Gender, %				
Men	16.23	14.5	19.4	.15
Women	83.78	85.5	80.6	
Race/ethnicity, %				
White	25.48	24.9	26.7	<.001
African American	22.20	27.8	11.7	
Hispanic	40.54	36.7	47.8	
Other	8.11	6.8	10.6	
Unknown	3.67	3.9	3.3	
Marital status, %				
Married	21.24	19.5	24.4	.57
Not Married	74.13	76.1	70.6	
Unknown	4.63	4.4	5.0	
Limitations in ADL, %				.03
0–3	9.65	11.5	6.1	
4	14.09	16.0	10.6	
5	37.84	38.8	36.1	
6	28.96	25.7	35.0	
Unknown	9.46	8.0	12.2	
Limitations in IADL, %				
0–5	9.26	11.3	5.5	<.001
6	11.39	14.5	5.6	
7	27.99	28.7	26.7	
8	41.51	37.3	49.4	
Unknown	9.85	8.3	12.8	

Note. *Significant difference between completers and noncompleters.

among participants who had no change or decline in exercise performance. This finding suggests that the low-intensity exercises were associated with the decline in the number of falls and pain level among high-risk participants.

In addition, no significant coaching effects were found on changes of health outcomes. However, as reported elsewhere, face-to-face coaching compared to those motivated by phone coaching alone did result in significantly better exercise performance at 3-months posttest (Yan, 2009).

DISCUSSION

This study suggests that a home-based, low-intensity strength exercise program offers a promising strategy for achieving physical activity-related health benefits among functionally impaired nursing home certifiable older adults. Through the use of cognitive and behavior strategies delivered by volunteer coaches, a high completion rate was achieved among a sample of

TABLE 2 Unadjusted Changes of Health Outcomes from Pretest to 3-Month Posttest

Outcome	Pretest	3-month posttest	<i>P</i> -value*
Number of falls in the past 3 months (<i>n</i> = 328), %			
0	80.5	85.4	.01
1	12.5	11.6	
2+	7.0	3.0	
Fear of falling (<i>n</i> = 332), %			.19
None of the time	30.1	32.2	
Some of the time	45.2	45.8	
Most or all of the time	24.7	22.0	
Depression (<i>n</i> = 306), %			.28
None of the time	48	53.3	
Some of the time	44.5	38.2	
Most or all of the time	7.5	8.5	
Pain (<i>n</i> = 325), (Mean, <i>SD</i>)	5.5(2.8)	5.1(2.9)	.02

Note. For persons with complete data at baseline and 3-month follow-up. *N*'s vary because of variation in the number of persons who answered each question completely at baseline and 3-month posttest.

*Significant change from pretest to 3-month posttest.

TABLE 3 Adjusted Mean Pre- and Post-Test Scores With Standard Errors

Outcome	Pretest		Posttest		<i>P</i> -value*
	Mean	<i>SE</i>	Mean	<i>SE</i>	
Number of falls in the past 3 months (<i>n</i> = 315)	0.28	0.15	0.17	0.15	.03
Fear of falling (<i>n</i> = 320)	1.94	0.18	1.87	0.18	.15
Depression (<i>n</i> = 295)	1.69	0.12	1.64	0.12	.20
Pain (<i>n</i> = 313)	6.05	0.55	5.70	0.55	.03

Note. **p* is for changes from pretest to posttest. All means and standard errors for the total sample were adjusted for age, gender, race/ethnicity, ADL, and IADL.

high-risk older adults, with more than 65% of the participants completing the study. Results suggested that Healthy Moves benefited its participants by significantly reducing their number of falls and pain level among participants who improved their exercise performance.

Because the Healthy Moves intervention is extremely modest, it is impressive that it produced such promising results. The success of the program may hinge on being able to build participants' confidence and capacity during the 3 months of participation. The intervention was tailored to participants' preference and the exercises used in the program were specially designed to be simple and safe to engage in. Through the use of the behavior-change counseling brief negotiation model delivered by volunteer coaches, the program was able to keep the participants engaged in doing the exercises. Furthermore, considering the diversity of language and cultural

background of the participants, all the program handouts were translated into seven different languages including English, Spanish, Russian, Korean, Armenian, Chinese, and Farsi. Volunteer coaches and participants were matched based on their cultural and language backgrounds.

It is important to recognize several limitations in the study. First, Healthy Moves is a community-developed pilot study that used a single study group. Therefore, the intervention needs further testing using a randomly controlled trial to control for extraneous factors that may have influenced the change in health status and functioning. This study was conducted among diverse frail elders enrolled in a Medicaid waiver program in a large urban city and may not be generalizable to other populations and settings. Although the change in pain level was statistically significant, this change may not represent a clinically meaningful decrease in pain; thus, these findings need to be interpreted cautiously. Another limiting factor is in the collection of data. Some outcome data (exercise performance measures) were collected by those conducting the intervention in the case of face-to-face coaches, which can potentially introduce bias. Future studies should include independent measures of performance by an outside evaluation team. Finally, the exercises used were adapted from the SFT (Rikli & Jones, 1999) originally developed as a fitness measure and not as an exercise program. These measures were reviewed by an expert panel, which determined they were appropriate for use with this population. Next steps should include a program that adds additional exercises over time as performance improves. This pilot study suggests that a home-based, low-intensity strength exercise program can benefit high-risk, ethnically diverse older adults, coupling with behavior-change counseling services. Based on this initial success, the program should be further developed and rigorously tested.

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APPENDIX: DESCRIPTION OF HEALTHY MOVES EXERCISES

Arm Curl: Sit in a comfortable position. Place a 1-pound weight (soup can, water bottle) in your right hand. Resting your elbow at your hip, bend at the elbow and touch the soup can to your shoulder. Slowly lower the weight, returning the hand to its starting position. Repeat with your left arm.

Seated Steps-in-Place: Sit in a stable chair and move your legs by slowly marching them in place. You only have to lift them an inch off the ground.