

**PICO Question:** For community-dwelling adults over the age of 65, is a multifactorial weekly, group fall prevention program more beneficial than weekly conventional PT for improving scores on the Berg Balance Scale?

Abbreviations: IG = intervention group, CG = control group, SF-36 = Short-Form 36 Health Status Questionnaire, PASE = Physical Activity Scale for the Elderly, LTC = long-term care, TUG = Timed Up and Go Test, BBS = Berg Balance Scale, PPT = Physical Performance Test, MMSE = Mini-Mental Status Exam, ADHC = adult day health center, ADFS = ankle dorsiflexor strength, FES = Falls Efficacy Scale, RG = resistance group, SG = seated group, POMI = Performance Oriented Mobility Index, NR = not reported

Title Authors (Year) Journal	Purpose	Design Participants	Intervention/ Structure of Classes	Outcomes/Results (p<0.05)	Authors' Conclusions	Comments/ Relevance to PICO Question
<p><i>"Community-based group exercise improves balance and reduces falls in at-risk older people: a randomized controlled trial"</i></p> <p>Barnett A., B. Smith, et al. (2003)</p> <p>Age and Ageing</p>	<p>To determine whether a weekly group exercise program designed by a PT and supplemented with a home exercise plan improves physical functioning, health status, and prevents falls in community-dwelling older adults over a one year period.</p>	<p><i>Randomized controlled trial;</i> N=163 subjects with at least one physical performance risk factor for falls, recruited from PT departments of clinics and hospitals in Australia; ♂=54, ♀=109; mean age = 74.9 yrs; N<sub>intervention</sub> = 83; N<sub>control</sub> = 80</p>	<p>IG attended hour long group exercise classes 1x/wk. Warm-up, exercises to improve balance, coordination, aerobic capacity, and muscle strength, functional exercises (sit-to-stands), and cool down. HEP to supplement class material. CG given written information about fall prevention.</p>	<p>IG performed significantly better than CG in 3 of 6 balance measures. After 6 months – groups did not differ on strength, reaction time, walking speed, fear of falling, SF-36, or PASE measures. Over 12 months, 40% reduction in falls for the IG, but result was not significant.</p>	<p>A group of at-risk older adults older than 65 can improve balance and decrease rate of falling through participation in a weekly group exercise program with HEP.</p>	<p>Community group exercise classes with HEP can be beneficial in improving some measures of balance such as postural sway and coordinated ability, but not strength, reaction time, or walking speed. Program was only 1x/week.</p>
<p><i>"Effectiveness of a Group Exercise Program in a Long-Term Care Facility: A Randomized Pilot Trial"</i></p> <p>Baum E.E., D. Jarjoura, et al. (2003)</p> <p>Journal of American Medical Directors Association</p>	<p>To examine if a strength and flexibility group program implemented in a LTC facility would improve function in the participating frail residents.</p>	<p><i>Randomized controlled semi-crossover trial;</i> N = 20 with ability to ambulate independently with AD or caregiver; ♂= 5, ♀= 15; mean age = 88 yrs; N<sub>intervention</sub> = 11; N<sub>control</sub> = 9</p>	<p>IG participated in group class 1 hour 3x/week. Warm-up, upper and lower body strengthening with portable inexpensive equipment, cool down. All exercises done sitting down. CG met 1 hr 3x/week for recreational therapy (drawing, puzzles). After 6 months, CG began exercises and the IG continued.</p>	<p>The IG showed significant improvements in all 4 outcome measures (TUG, PPT, BBS, MMSE) compared to CG. IG improved BBS scores by 4.8. Global effect size for intervention was 0.87.</p>	<p>Frail elderly residents in an LTC facility were able to benefit from a strength training program. The program provides beneficial recreational and therapeutic activity for the residents.</p>	<p>Sample size was very small. Even though all exercises were performed in a seated position, BBS scores still improved. Participants were not community-dwellers, but could ambulate independently.</p>

<p><i>“The Effectiveness of a Community-Based Program for Reducing the Incidence of Falls in the Elderly: A Randomized Trial”</i></p> <p>Clemson, L., R.G. Cumming, et al. (2004)</p> <p>Journal of American Geriatrics Society</p>	<p>To determine whether the multifaceted community-based program Stepping On is effective at reducing falls in at-risk, community-dwelling elderly people over the age of 70.</p>	<p><i>Randomized controlled trial</i>; N = 310 community-living residents who had a fall in the previous 12 months or who were concerned about falling; ♂= 80, ♀= 230; mean age = 78.4 yrs; N<sub>intervention</sub> = 157; N<sub>control</sub> = 153</p>	<p>IG attended 2 hour program conducted by an OT 1x/week for 7 weeks. Lower-limb balance and strength exercises, home and community safety strategies, regular vision screens encouraged, and medication review discussed. IG received booster session at 3 months and follow-up home session. CG received 2 social visits from OT students.</p>	<p>31% reduction in falls for IG. CG showed a significant decrease in confidence in their ability to avoid falls compared to IG. IG group demonstrated more protective behaviors for preventing falls. No difference in self-efficacy for ADLs or in the SF-36 was found between groups.</p>	<p>Stepping up is a clinically effective intervention for preventing falls in at-risk community-dwelling older adults. Cognitive-behavior learning in small group setting is effective for older adults.</p>	<p>The sample size was large and interventions were well-described. Booster session and home follow-up visit were most likely beneficial. However, the IG only received 7 group sessions and a total of 15.5 treatment hrs. Two hour classes might be arduous for some older adults.</p>
<p><i>“Impact of a Multifactorial Fall Prevention Program Upon Falls of Older Frail Adults Attending an Adult Health Day Care Center”</i></p> <p>Diener, D.D. and J.M. Mitchell (2005)</p> <p>Topics in Geriatric Rehabilitation</p>	<p>To determine whether a multifactorial assessment and intervention program carried out in an ADHC setting would help reduce the rate of falls for frail older adults.</p>	<p><i>Non-randomized treatment/control group trial</i>; N = 72 who attended the ADHC for at least 3 days per week; ♂= 28, ♀= 44; mean age = 77 yrs; N<sub>intervention</sub> = 46; N<sub>control</sub> = 26</p>	<p>PT assessment completed on those in the IG. IG participated in exercise program 3x/week for 12 weeks. Warm-up then conditioning, strengthening, and balance exercises. IG also received education about falls prevention, environmental and behavioral hazards were assessed too. CG received usual care at the ADHC, may have included PT or OT.</p>	<p>At 6 months, only 21.7% of IG were classified as fallers compared to 46.2% of CG. 57% of those in the IG who were fallers at baseline were no longer falling at follow-up. Significant decrease in environmental and behavioral hazards for IG. No significant differences were found between groups on the chair rise test, TUG, or gait velocity.</p>	<p>This prevention program was significantly associated with a decrease in falls for a group elderly adults attending an ADHC center. Physical performance was improved over a short period, but improvements were lost by 6 months. Multiple components were very beneficial for preventing falls.</p>	<p>Sample size was small and no significant differences in physical performance measures between groups were found during long-term follow up. Intervention sought to identify and address many fall risk factors. No true control group, but no significant differences between groups at baseline.</p>

<p><i>“Comparison of the Effectiveness of Two Programmes on Older Adults at Risk of Falling: Unsupervised Home Exercise and Supervised Group Exercise”</i></p> <p>Donat, H. and A. Ozcan (2007)</p> <p>Clinical Rehabilitation</p>	<p>To compare the effectiveness of unsupervised home exercises with supervised group exercises on reducing the risk factors for falling in elderly adults living in a nursing home.</p>	<p><i>Randomized controlled trial</i>; N = 32 Turkish nursing home residents who were independently ambulatory and relatively independent in caring for themselves; ♂= 12, ♀= 20; mean age = 80 yrs; N<sub>group exercise</sub> = 17; N<sub>home exercise</sub> = 15</p>	<p>Both groups did the same exercises 3x/week for 8 weeks. Balance training, strengthening and stretching LEs, postural exercises, and functional activities. All subjects were asked to walk 10 mins/day. PT demonstrated exercises, discussed progression, and observed participants in home exercise group at baseline, 2 and 4 weeks.</p>	<p>Both groups showed significant increases for tandem and one-leg stance, BBS, flexibility, and mobility. BBS scores improved by an average of 5 points in the supervised group, 3 in the unsupervised group. Leg strength and position sense improved significantly in the supervised group only. No change in fear of falling.</p>	<p>Supervised group exercises are more beneficial for decreasing risk factors related to falling in geriatric patients living in a nursing home when compared to unsupervised home exercises. However, unsupervised home exercises may be more feasible and economical.</p>	<p>BBS scores did improve with both groups. Home exercises were not completely unsupervised as participants in this group met with a PT at baseline and during the 2<sup>nd</sup> and 4<sup>th</sup> weeks.</p>
<p><i>“Multifactorial Fall Prevention for Pairs of Frail Community-Dwelling Older Fallers and their Informal Caregivers: A Dead End for Complex Interventions in the Frailest Fallers”</i></p> <p>Faes, M., M.F. Reelick, et al. (2011)</p> <p>Journal of American Medical Directors Association</p>	<p>To evaluate whether a multifactorial fall prevention program designed to reduce the rate of falls, fear of falling, and decrease caregiver burden was more effective than usual geriatric care in frail community-dwelling elderly participants.</p>	<p><i>Randomized controlled trial</i>; N = 33 pairs of Dutch patients and their primary caregivers. Participants had fallen once in the last six months and could walk independently; ♂= 14, ♀= 19; mean age = 65.8 yrs; N<sub>intervention</sub> = 18; N<sub>control</sub> = 15</p>	<p>Group training sessions conducted by a geriatric PT and psychologist with 5 or less pairs per 2 hour sessions 2x/week for 5 weeks. 2 hour booster session 6 weeks after completion of initial sessions. Caregivers were educated on ways to better help the elderly participants. No mention of what “usual care” entailed for the CG.</p>	<p>Rate of falls directly after intervention and during long-term follow-up was higher in the IG compared to the CG, but this was not statistically significant. No significant differences in secondary outcome measures. Higher sense of mastery in the IG, but increased fear of falling, anxiety, and depression. No differences in caregiver outcomes.</p>	<p>Authors concluded that a program such as this and really any intervention targeted to improve fall related outcomes in the frail elderly may be too intensive and ineffective. This program was also not beneficial for decreasing caregiver burden.</p>	<p>Results of falls rate between the groups were not significant and the sample size was very small. Only 11 total sessions. Even though the IG showed an increase in fear, anxiety, and depression, their sense of mastery significantly increased which could be beneficial in treating their impairments.</p>

<p><i>“Comparison of Two Exercise Programs Using the Falls Efficacy Scale, Berg Balance Scale and Ankle Dorsiflexor Strength in Older Adults”</i></p> <p>Lui, H., J. Rainey, et al. (2007)</p> <p>Physical &amp; Occupational Therapy in Geriatrics</p>	<p>To determine the effects of a resistance exercise program including resistance, strength, balance, and gait compared to seated exercises including seated ROM and gait training on the FES, BBS, and bilateral ankle dorsiflexor strength.</p>	<p><i>Randomized controlled trial</i>; N = 22 seniors residing in an independent living community who considered themselves “lower level” in mobility; ♂= 8, ♀= 14; mean age = 80.7 yrs; N<sub>resistance group</sub> = 11; N<sub>seated group</sub> = 11</p>	<p>Both groups performed exercises in the same activity room lead by 2 PTs and 2 PT students for 60 minute sessions 3x/week for 12 weeks. RG – warm-up, strengthening exercises, balance exercises. SG – sitting ROM exercises for 45 minutes. Both groups walked on the same level surface for 10-15 minutes following sessions.</p>	<p>Pre- and post- data revealed that both groups improved significantly on all variables, but the RG showed a greater change in all scores. Average 13.19 gain on the BBS for RG, 4.18 gain for the SG. Results showed the BBS moderately correlated to the FES and ADFS.</p>	<p>Both the RG and SG showed improvements in fear of falling, balance, and ADFS. Relationship does exist between the FES, BBS, and ADFS in the geriatric population.</p>	<p>The sample size was extremely small. This program had a greater frequency and longer duration compared to most other studies. The mean age was also slightly higher. Results show that scores on the BBS can be improved with seated ROM exercises and walking.</p>
<p><i>“Effects of a Group Exercise Program on Strength, Mobility, and Falls Among Fall-Prone Elderly Men”</i></p> <p>Rubenstein, L., K.R. Josephson, et al. (2000)</p> <p>Journal of Gerontology</p>	<p>To determine the effects of a group exercise program on strength, endurance, mobility, and fall rates in elderly men at risk for falls.</p>	<p><i>Randomized controlled trial</i>; N = 59 community-dwelling men with specific fall risk factors like leg weakness, impaired gait or balance, and previous falls; ♂= 59, ♀= 0; mean age = 74 yrs; N<sub>intervention</sub> = 31; N<sub>control</sub> = 28</p>	<p>The IG participated in 90 minute exercises sessions 3x/week for 12 weeks lead by an exercise physiologist graduate student. Classes focused on improving strength, endurance, balance, and mobility. CG simply continued regular activities.</p>	<p>IG showed significant strength increases in 8 out of 12 measurements where the CG only showed improvements in 4. IG also improved on the 6-minute walk test and on the POMI gait score. Falls per 1000 hours of activity: 6.0 for IG and 16.2 for CG</p>	<p>This program for older males with chronic impairments and risk factors was effective in improving muscle endurance and functional mobility. Increased physical activity was also correlated with reduced fall rates.</p>	<p>Only men were used in the sample. No mention of why CG showed improvements. Overall rate of falls did not decrease significantly. However, when adjusted for unit of activity, those in the intervention group showed a decreased rate of falls</p>

<p><i>“Effect of a Risk-Based Multifactorial Fall Prevention Program on the Incidence of Falls”</i></p> <p>Salminen, M.J., T.J. Vahlberg, et al (2009)</p> <p>Journal of American Geriatrics Society</p>	<p>To determine whether a multifactorial fall prevention program including geriatric assessment, counseling, guidance, hazard assessment, group physical and home exercise, and psychosocial groups was effective in reducing falls in community-dwelling elderly participants.</p>	<p><i>Randomized controlled trial</i>; N = 589 community-dwelling older adults living in Finland with at least one fall in the previous 12 months; ♂ = 93, ♀ = 496; mean age = NR; N<sub>intervention</sub> = 293; N<sub>control</sub> = 298</p>	<p>IG received geriatric assessment with a geriatrician, counseling, guidance in fall prevention, home hazard assessment, home exercises as well as exercise, education, and psychosocial treatment in groups. Classes conducted by PT: warm-up, brisk walk, UE ROM, balance exercises, muscle strengthening, cool down. CG one-tie counseling about fall prevention.</p>	<p>IG did not significantly reduce the incidence of falls. Subgroup analysis showed that falls were significantly reduced in those subjects with at least 3 previous falls, higher depressive symptoms, and higher perceived risk of falling.</p>	<p>This program was not effective in decreasing overall falls in a population of elderly people who had sustained at least one fall in the past. However, authors concluded this program is effective at reducing falls in those who had sustained 3 or more falls and in those who had depressive symptoms.</p>	<p>The sample size was large, but it included fairly healthy and younger participants. The program contained multiple aspects to reduce the risk of falling and proved to be effective in reducing falls in certain subgroups.</p>
<p><i>“Effectiveness of a Community-Based Multifactorial Intervention on Falls and Fall Risk Factors in Community-Living Older Adults: A Randomized, Controlled Trial”</i></p> <p>Shumway-Cook, A., I.F. Silver, et al. (2007)</p> <p>Journal of Gerontology</p>	<p>To evaluate the feasibility and effectiveness of a year-long multifactorial program focused on reducing falls and fall risk-factors on community-living older adults.</p>	<p><i>Randomized controlled trial</i>; N = 453 elderly community-dwelling, volunteers who were independent ambulators and were not participating in regular exercise; ♂ = 105, ♀ = 348; mean age = 75.6 yrs; N<sub>intervention</sub> = 226; N<sub>control</sub> = 227</p>	<p>IG participated in group exercises classes for 1 hour 3x/week for 12 months. 30 minutes of moderate-intensity aerobic conditioning, 20 minutes of progressive strength training, and 10 minutes of exercises to improve balance and flexibility. IG attended 6, 1 hour educational classes on fall risk and fall prevention. CG given two fall prevention brochures.</p>	<p>Although not statistically significant, those in the IG did show a 25% reduction in falls over the 12 month follow up. Small but significant improvements were found in the IG for leg strength, balance, and mobility.</p>	<p>This multifactorial fall prevention program was successful in improving modifiable risk factors for falls such as strength, balance, and mobility, but was not successful in significantly reducing the rate of falls in this population.</p>	<p>The study was large with very complete data due to small dropout rate. Results can be generalized to those older adults who live in the community and who do not have significant health conditions.</p>

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