

Physical Activity: Home-based Exercise Interventions for Adults Aged 65 Years and Older

Community Preventive Services Task Force Finding and Rationale Statement Ratified July 2022

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CPSTF Finding and Rationale Statement

Context

Adults aged 65 years and older gain substantial health benefits from regular physical activity. Physical activity can preserve physical function and mobility, which may help maintain independence longer and delay the onset of major disability (U.S. Department of Health and Human Services 2018). Exercises for muscle strength and balance combined with aerobic activities, such as walking, are important components of an overall weekly routine for older adults to reduce physical inactivity and maintain fitness (U.S. Department of Health and Human Services 2018).

Isolation in response to heightened risk for community-acquired infectious disease may reduce opportunities for older adults to be physically active and increase the amount of time they spend in sedentary behaviors (Ammar et al. 2020). Training and supporting older adults in establishing regular exercise routines at home may help them limit physical inactivity and improve or maintain fitness during periods of time when they are advised to stay home (Chaabene et al. 2021).

Intervention Definition

Home-based exercise interventions for adults aged 65 years and older aim to instruct and motivate independent living adults to engage in regular bouts of physical activity in home settings to improve physical fitness. Interventions must include the following:

- Specific exercises, initial instruction on routines, and limited or periodic supervision
- Exercise sessions two or more times per week
- Exercises targeting improvements in strength (e.g., muscle strength, muscle power, and muscle endurance), balance, or both (i.e., multimodal)
- Low-cost equipment for exercises (e.g., hand weights, mats, towels) or exercises that make use of resources already in the home (e.g., chairs)

Interventions may do the following:

- Use physiotherapists, physical therapists, peer mentors, nurses, or trained intervention providers for training and supervision
- Provide training face to face or through educational materials or digital formats (e.g., video programs)
- Conduct monitoring and feedback using participant diaries, exercise logs, or telephone calls
- Include exercises to improve flexibility
- Encourage participants to also engage in aerobic activities such as walking

CPSTF Finding (July 2022)

The Community Preventive Services Task Force (CPSTF) recommends home-based exercise interventions based on sufficient evidence of effectiveness in improving measures of physical fitness (i.e., muscle strength, muscle power, muscle endurance, balance) among adults aged 65 years and older. These interventions, which are focused on improving fitness measures, may complement support for aerobic activities, such as walking, to help older adults achieve a multicomponent physical activity regimen as recommended by the Physical Activity Guidelines for Americans, 2nd edition (U.S. Department of Health and Human Services 2018).

Rationale

Basis of Finding

CPSTF selects and evaluates recently published systematic reviews to provide program planners and decision-makers with effective intervention options. A team of specialists in systematic review methods and subject matter experts in physical activity selected and evaluated the following published review:

Chaabene H, Prieske O, Herz M, et al. Home-based exercise programmes improve physical fitness of healthy older adults: a PRISMA-compliant systematic review and meta-analysis with relevance for COVID-19. *Ageing Research Reviews* 2021;67:101265.

The team also abstracted information from the included studies and conducted additional analyses. The CPSTF finding is based on results from the published meta-analyses, additional analyses of data from studies included in the meta-analyses, and expert input from the review team and CPSTF.

The Chaabene et al. meta-analysis included 17 studies (search period through December 2020) that evaluated home-based exercise interventions requiring only limited training and supervision for adults aged 65 years and older. Studies evaluated intervention effectiveness for one or more of the following outcomes: muscle strength, muscle power, muscular endurance, and balance. Participants in control arms received no intervention or basic instructions without training or support. Results of the meta-analysis are summarized in Table 1.

Table 1. Intervention Effects on Physical Fitness

Outcome	Number of Studies	Effect Estimate Cohen’s D (95% CI), p-value	Direction of Effect
Muscle strength	10	0.30 (0.12 to 0.48) p < 0.01	Favors intervention
Muscle power	4	0.43 (0.01 to 0.85) p = 0.04	Favors intervention
Muscular endurance	4	0.28 (0.14 to 0.42) p < 0.01	Favors intervention
Balance	14	0.28 (0.07 to 0.48) p < 0.01	Favors intervention

CI: Confidence interval

CPSTF examined additional outcomes reported in included studies, though few studies provided data. These outcomes were not systematically considered in the Chaabene et al. review. Interventions were shown to increase time spent in physical activity (2 studies) and reduce falls and fall-related outcomes (5 studies). Results were mixed for outcomes

related to quality of life (5 studies) and aerobic activity (2 studies), and they showed no change for mental health outcomes (2 studies).

Applicability and Generalizability Issues

CPSTF assessments on applicability included results from the meta-analysis and meta-regression conducted by Chaabene et al. and additional data from the included studies.

Intervention settings

The seventeen included studies were conducted in the United States (4 studies), Japan (3 studies), and the United Kingdom (2 studies); one study each came from Canada, Denmark, Finland, Germany, Greece, Italy, Taiwan, and Iran. Studies conducted in the United States showed median results similar to overall effect estimates for muscle strength (Cohen's $D=0.59$) and balance (Cohen's $D=0.42$).

Participants from the studies were recruited from community (10 studies) and clinical (6 studies) settings. Exercises were conducted in homes (16 studies) and in both homes and a resident care center (1 study). Three studies reported the community setting (1 urban, 1 rural, 1 rural and urban); most studies did not report on the community setting of study participants (14 studies).

The CPSTF finding is applicable to interventions set in the homes of adults aged 65 years and older in the United States. It is likely applicable to interventions delivered in urban, suburban, and rural communities.

Population characteristics

The median age of participants was 73 years. A subset of studies recruited participants 75 years and older and reported estimates of improvements in muscle strength and balance that were smaller in magnitude than those of the overall body of evidence. Studies recruited both men and women and reported a greater distribution of women (67%) than men (43%).

Included studies reported little or no information about participants' race, ethnicity, or socioeconomic status. Only two studies reported information about race (100%, 85% White). One study that reported information about education, found 12.9% of participants had less than high school education, and none of the studies reported information about income levels. None of the studies provided stratified assessments of effectiveness by these characteristics.

The CPSTF finding is applicable for women aged 65 years and older and likely applicable for men. CPSTF finds the absence of information about intervention effectiveness for participants from racial and ethnic minority communities and for participants with varying education and income levels to be important applicability concerns highlighting the need for additional studies.

Intervention characteristics

Interventions were delivered by physiotherapists and physical therapists (6 studies), trained intervention providers (6 studies), peer mentors (1 study), and nurses (1 study). In four studies, the type of implementer was not reported. Studies delivered training or instruction face-to-face (15 studies), through printed educational materials (11 studies), or through digital resources (e.g., videotape; 1 study). Training, supervision, and monitoring included home visits (8 studies), telephone calls (9 studies), training logs or diaries (15 studies), or other types of communication (e.g., lab or clinical visits; 3 studies).

Equipment used for the exercise interventions included chairs or tables already in participants' home (7 studies), low-cost equipment (e.g., hand weights, bottles, balls; 9 studies), and special equipment (e.g., rocking chair; 1 study); three studies did not report information about equipment. Study interventions also reported engaging participants in walking (8 studies), flexibility exercises (4 studies), and other types of activities such as gardening (2 studies).

Results from meta-regressions conducted by Chaabene et al. were used to inform CPSTF applicability assessments and conclusions. Studies were categorized by intervention characteristics for comparison.

Differences in muscle strength and balance outcomes did not vary significantly by intervention duration (measured as ≤ 8 weeks [6 studies], 9-16 weeks [3 studies], or >16 weeks [8 studies]).

Studies examined effectiveness of multimodal (e.g., strength and balance exercises; 11 studies) or single mode exercise interventions (strength only, 5 studies; balance only, 1 study). Single mode strength training resulted in larger effects on both muscle strength (Cohen's $D=0.51$) and balance (Cohen's $D=0.65$) than multimodal interventions.

Participants engaged in training sessions three or less times per week (13 studies) or more than three times per week (4 studies). Exercise interventions with more than 3 weekly sessions produced larger effects on muscle strength (Cohen's $D=0.45$) and balance (Cohen's $D=0.37$). Sessions were 30 minutes or less (7 studies) or more than 30 minutes (5 studies); 5 studies did not report session length.

The CPSTF finding is applicable for interventions across the range of intervention characteristics evaluated in the review. These include intervention duration, number of exercise sessions per week, duration of each exercise session, and whether the interventions focused on strength or included exercises for both strength and balance.

Data Quality Issues

The CPSTF assessment adopted the data quality methods and findings from the Chaabene et al. review. Included studies were restricted to randomized controlled trials. Study quality was evaluated using the Physiotherapy Evidence Database scale (Maher et al. 2003) with 10 risk of bias domain assessments. The most common domains assessed as high risk of bias were randomized allocation (10 studies), blinding of participants (17 studies), and blinding of therapists (17 studies). None of the studies were excluded from analyses, in either the published review or the CPSTF assessment, based on assigned risk of bias rating.

Potential Benefits

Chaabene et al. did not report on any additional benefits of home-based exercise interventions. Included studies did not describe or evaluate any potential additional benefits. CPSTF did not postulate any additional benefits of home-based exercise interventions.

Potential Harms

Chaabene et al. did not evaluate potential harms of home-based exercise interventions. Seven studies included in the review reported on exercise-related injuries. In five studies, participants did not report any injuries over the intervention period. In the remaining two studies, one to two participants reported minor injuries that temporarily affected their ability to complete exercise activities. Two published reviews summarized evidence on physical activity-related injuries in older adults.

- Garcia-Hermoso et al. (2020) found that across 93 trials of long-term exercise programs, exercise did not influence the risk of study dropout in older adults due to health issues or mortality. Exercise was associated with fewer falls, fall-associated injuries, and reduced mortality risk among older adults participating in clinical trials.
- Stathokostas et al. (2013) summarized findings from 43 studies identified in a scoping review of injuries among older adults participating in physical activity. They found older adults did not have an increased risk of injury from participating in physical activities but noted data for older subgroups was limited and additional studies were needed.

Based on this information, and additional guidance provided in *Physical Activity Guidelines for Americans, 2nd edition* (U.S. Department of Health and Human Services 2018), CPSTF finds the benefits from physical activity for most adults aged 65 years and older outweigh the risks for exercise-associated injuries.

Considerations for Implementation

The following considerations for implementation are drawn from studies included in the existing evidence review, the broader literature, and expert opinion as noted below:

- [Physical Activity Guidelines for Americans \(2nd edition\)](https://health.gov/sites/default/files/2019-09/Physical_Activity_Guidelines_2nd_edition.pdf) [https://health.gov/sites/default/files/2019-09/Physical_Activity_Guidelines_2nd_edition.pdf] recommends multicomponent physical activities for older adults. Multicomponent activities include more than one type of physical activity (e.g., aerobic, muscle strengthening, balance training). Multicomponent physical activity can be done at home or in a community setting as part of a structured program that includes a combination of balance, muscle strengthening, and aerobic physical activity, and may include gait, coordination, and physical function training (U.S. Department of Health and Human Services 2018).
- Chaabene et al. focused on studies evaluating the effectiveness of exercise training and support for muscle strengthening and balance. These interventions can complement additional promotion and support for aerobic activities such as walking to achieve the recommended multicomponent approach for older adults (U.S. Department of Health and Human Services 2018).
- The following CPSTF recommendations may be used to support or complement the use of home-based exercise interventions:
 - [Digital Health Interventions for Adults 55 Years and Older](https://www.thecommunityguide.org/findings/physical-activity-digital-health-interventions-adults-55-years-and-older.html) [https://www.thecommunityguide.org/findings/physical-activity-digital-health-interventions-adults-55-years-and-older.html]
 - [Park, Trail, and Greenway Infrastructure Interventions when Combined with Additional Interventions](https://www.thecommunityguide.org/findings/physical-activity-park-trail-greenway-infrastructure-interventions-combined-additional-interventions.html) [https://www.thecommunityguide.org/findings/physical-activity-park-trail-greenway-infrastructure-interventions-combined-additional-interventions.html]
- Although not examined in this review, digital technologies may enhance home-based activities by providing social contact and support typically available in face-to-face and group-based activities (Parker et al. 2021; Lindsay Smith et al. 2017).

Several publicly available resources provide guidance on the implementation of exercise and physical activity interventions for older adults.

- [CDC's Active People, Healthy NationSM](https://www.cdc.gov/physicalactivity/activepeoplehealthynation/index.html) [https://www.cdc.gov/physicalactivity/activepeoplehealthynation/index.html] provides community-level guidance on strategies to improve physical activity and tools for action.
- [The Otago program](https://www.med.unc.edu/aging/cgwep/courses/exercise-program/) [https://www.med.unc.edu/aging/cgwep/courses/exercise-program/] provides guidance for 17 strength and balance exercises and a walking program, designed to be performed three times a week in home settings.
- [Community Healthy Activities Model Program for Seniors \(CHAMPS\)](https://champs.ucsf.edu/) [https://champs.ucsf.edu/] outlines an individually-tailored program appropriate for older adults with a range of health levels to increase physical activity.
- [Active Choices](https://med.stanford.edu/healthyaging/active-choices-program.html) [https://med.stanford.edu/healthyaging/active-choices-program.html] includes implementation guidance for a 6-month individualized physical activity program that helps individuals incorporate preferred physical activities in their daily lives.

Evidence Gaps

CPSTF identified several areas that have limited information. Additional research and evaluation could help answer the following questions and fill remaining gaps in the evidence base.

CPSTF identified the following questions as priorities for research and evaluation:

- How effective are home-based exercise interventions for participants from historically disadvantaged racial and ethnic populations?
- How effective are home-based exercise interventions for participants with lower incomes?

Remaining questions for research and evaluation identified in this review include the following:

- How does effectiveness vary by age for participants aged 65 years and older?
- How do risks for exercise-associated injuries vary by age for participants aged 65 years and older?
- How does effectiveness vary for participants with physical or cognitive disabilities?
- What strategies are effective to increase recruitment of men in home-based exercise interventions?
- Assessment of other home-based exercise outcomes was limited by the focus of the Chaabene et al review on fitness measures. Follow-up systematic reviews or additional intervention studies can address the following research question: Are home-based exercise interventions effective for improving the following outcomes?
 - Falls prevention
 - Mental health outcomes
 - Quality of life outcomes
 - Morbidity and mortality

References

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Stathokostas L, Theou O, Little RM, et al. Physical activity-related injuries in older adults: a scoping review. *Sports Medicine* 2013; 43(10):955-63.

U.S. Department of Health and Human Services. Physical Activity Guidelines for Americans, 2nd edition. Washington, DC: U.S. Department of Health and Human Services; 2018.

Disclaimer

The findings and conclusions on this page are those of the Community Preventive Services Task Force and do not necessarily represent those of CDC. Task Force evidence-based recommendations are not mandates for compliance or spending. Instead, they provide information and options for decision makers and stakeholders to consider when determining which programs, services, and policies best meet the needs, preferences, available resources, and constraints of their constituents.

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