

A brief introduction to exercise-based interventions for improving balance and preventing falls among community dwelling older adults

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Why is this important?

- Approximately 30% of community dwelling adults over 60 fall each year; adverse consequences of falls can include fractures, hospitalization, functional decline, and even death.¹⁻⁴
- There is consistent evidence that exercise can reduce the risk and rate of falls.⁵
- Exercise instruction provided by a PT may help to address some of the factors contributing to an increased risk of falls.^{1,5}
- Multifactorial interventions have been shown to reduce the rate of falls^{1,5}.
- A recent umbrella review of meta-analyses concluded that exercise is effective in reducing the rate and risk of falls and is a significant contributor to the reduction of falls risk from multifactorial interventions⁵.

Outcome Measures: Available at www.rehabmeasures.org

- Berg Balance Scale
- Timed Up and Go
- Gait Speed
- 30 Second sit to stand
- Functional Gait Assessment
- Activity specific Balance Confidence Scale
- Dual-task or Cognitive TUG

General take home messages

- Multi-component exercise programs appear to be the most beneficial type of exercise intervention for reducing risk and rate of falls.¹
- Recent Clinical guidance statement issued by the Academy of Geriatric Physical Therapy of the APTA recommends that “individualized exercise programs that include both balance training and strengthening should be implemented for those at risk of falls”.⁶
- Balance training should be of *sufficient challenge* to prevent falls.^{4,7,8}
- Minimum effective dose of exercise for preventing falls: 2 hours/week.⁸
- Interventions/programs should be ongoing and sustainable.^{7,8}
- **Exercise is just one component of fall prevention!**

Balance training

- Balance training is a crucial component of exercise interventions designed for fall prevention.^{1,4,8}
- Best practice recommendations for challenging balance include: reducing the base of support, reducing upper extremity support, activities that move the center of gravity or require weight shifting, and functional tasks.⁸

- Specificity of training suggests the use of balance training to improve balance and reduce falls/falls risk⁹.

Additional exercise based interventions

Dual-task balance training

- Dual-task balance training incorporates a balance task with a cognitive task (*aka* cognitive motor intervention).
- Limited evidence suggests that dual-task balance interventions are more effective at reducing the risk of falls as compared to a standard single task balance interventions.¹⁰
- Dual task practice appears to have greatest influence on dual task performance, suggesting a specific training effect.¹¹⁻¹⁴
- Incorporating dual task balance training into balance interventions in the clinic appears safe, can produce positive outcomes related to dual task balance, and may contribute to a decreased risk of falls.¹⁰

Resistance/strength training

- Weakness is a well-documented risk factor for falling and there are some *associations* made between strength and balance performance, however there is limited evidence that muscle weakness *contributes* to postural instability.³
- Only 22% of results included in a systematic review supported the use of progressive resistance training (PRT) as a **sole intervention** for improving balance among older adults.¹⁵
- A Cochrane review by Sherrington et al suggested strength training is not a necessary component of exercise interventions for fall prevention/balance⁸, however a more recent Cochrane review by Gillespie et al found multicomponent programs, where strengthening was often a component, to be most effective¹.
 - The OTAGO program, which has been shown to reduce fall rates by 35%, is an example of a multicomponent exercise program that incorporates strengthening exercises².
<http://www.med.unc.edu/aging/cgec/exercise-program>
- Additional benefits of PRT include: improvements in bone mineral density, functional status, and body composition.¹⁶

Core strength/stability training

- Theory: strong core musculature may contribute to postural stability and controlled mobility of the extremities.¹⁷
- Core stability training and Pilates have been used to promote trunk muscle strength, balance and functional performance, however the effect on falls/risk is unclear.¹⁷

- A systematic review by Granacher et al found small to medium correlations between trunk muscle strength and various outcomes related to balance, functional performance, and falls.¹⁷
- Core training may be best as an adjunct to other exercise.

Tai Chi

- Tai Chi significantly reduces the risk of falls.¹
- Tai Chi can improve performance on balance measures including: SLS, TUG, Berg Balance Scale.⁷

Overall considerations for home or community-based exercise programs

Adherence

- HEP adherence rates for fall prevention have are low (~21%).¹⁸
- HEP characteristics associated with improved adherence: a balance component included as part of exercise intervention, delivery of HEP by a PT, and regular interaction with a healthcare provider.¹⁸
 - The OTAGO program is an example of an effective multicomponent exercise program.^{2,8,18}
- LiFE study
 - Purpose: examined the effectiveness of incorporating balance and strength exercises into daily routine/activity
 - Results: 31% reduction in rate of falls compared to the control group.
 - Implications: Imbedding exercise into daily activity may help improve adherence.¹⁹

Safety

- Programs need to challenge balance in a safe manner
 - Home-based programs may potentially sacrifice intensity or challenge for safety.¹⁸
- Walking programs
 - May be part of a multi-component program, however they are not necessary and may present additional risk for individuals at high risk of falls.^{8,18}

Target population

- Older adults at high risk of falling^{5,8,20}
 - Goal: reduce risk and rate of falls
- General aging population or older adults at low risk of falling^{5,8,20}
 - Goal: maintain independent function and fall prevention

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