

TUG, TUGcog and TUGman improve after 12-week balance and mobility training with or without concurrent cognitive tasks in community-dwelling older adults

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Background/Rationale. The timed up-and-go (TUG) is a commonly used functional mobility assessment. Previous studies have shown that balance exercises improve functional mobility in older adults (e.g. Thiebaud, Funk & Abe, 2014; Ory et al., 2015). Surprisingly, cognitive dual-task training without physical exercise was found to improve postural control in older adults (Li et al., 2010). Can balance exercises improve functional mobility under dual task conditions? Would concurrent cognitive exercises during balance exercises improve further functional mobility, especially under dual task conditions?

Research Objectives. To compare the benefits of a 12-week balance and mobility training (BMT) and of a 12-week balance and mobility with concurrent cognitive training (BMCT) on the TUG, TUG with a concurrent cognitive task (TUGcog) and TUG with a concurrent manual task (TUGman) in older adults.

Relevance. In this study, two training programs were developed. They can be prescribed to improve functional mobility under single and dual task conditions in healthy older adults.

Design. This pilot study is a randomized-block, not blinded, clinical trial with a control group.



Participants. Forty-one healthy older adults (12 men and 29 women) with a score of 27 or greater on the MMSE and living independently in the community were enrolled. They were block-randomized by age to the BMT group (65-76 years old, n=15), BMCT group (60-77 years old, n=14) or control group who received no training (62-77 years old, n=12).

Training programs. Both BMT and BMCT involved 1-hour sessions, one-on-one with a trainer, 3 times per week for 12 weeks on a balance obstacle course. Participants performed static and dynamic exercises on a variety of unstable surfaces, while manipulating objects. Those in the BMCT group performed these exercises while completing a variety of cognitive tasks. The difficulty of both training programs was progressively enhanced as participants improved.

Data Collection. TUG, TUGcog and TUGman (3 trials of each) were timed with a stop watch at baseline, after the 12-week training, and after a 12-week follow-up. For all tests, participants were instructed to walk as quickly as possible. For TUGcog, they counted backwards by 3 from a random number between 20 and 100 and for TUGman, they carried a tray with a cup full of water.

Data Analyses. Trials were averaged and comparisons were made with 3-way repeated measure ANOVA (Session X TUG condition X Group).

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RESULTS





 Control Group
Balance & Mobility Training (BMT) Group
Balance & Mobility + Cognitive Training (BMCT) Group

> **Findings.** BMT and BMCT groups, but not the control group, had significantly shorter TUG, TUGcog, and TUGman after the 12-week training (p<.05) and at the 12-week follow-up (p<.05). No significant difference was found between the BMT and BMCT groups.

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Discussion.

Both the BMT and the BMCT group improved functional mobility after training, and maintained their improvements at the 12-week follow-up compared to the control group.

An average decrease in TUG of 0.8 ± 0.5 sec has been reported to be clinically significant (Thiebaud, Funk & Abe, 2014). Both the BMT (up to 1.5 sec) and BMCT group (up to 1.2 sec) exhibited clinically significant improvements in TUG, TUGcog and TUGman.

The addition of cognitive training to a balance and mobility training program (BMCT group) did not result in a larger improvement in TUGcog than in the BMT group.

- Perhaps the attentional demand was high in both training programs due to the simultaneous performance of multiple tasks. As a result, TUGcog was optimally improved with both training programs.

Adherence to both training programs was high (92 to 96% of training session attendance). It indicates that they were appreciated and enjoyed by participants, and that they are probably feasible in clinical settings.

Conclusion. Balance and mobility exercises with or without concurrent cognitive tasks improve the TUG performance, as well as the TUG under dual task conditions, i.e. TUGcog and TUGman.