# Effects of Dual Task Training on Balance and Mobility in Persons with Parkinson’s Disease: A Systematic Review

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## INTRODUCTION

Parkinson’s disease (PD) is a progressive neurological disorder that affects the planning and execution of movement due to the loss of dopamine. A dual task (DT) is the ability to perform a motor task while simultaneously engaging in a cognitively demanding task. The capacity to perform DT relates to safety, quality of movement, and efficiency during walking and most activities of daily living. The difficulty with DT is associated with PD.

## PURPOSE

The purpose of this systematic review was to determine the effects of DT training on balance and/or mobility in adults with PD.

## METHODS

A literature search was conducted using MEDLINE/PubMed, CINAHL, ProQuest, ScienceDirect and hand-searching. Search terms included (dual task* OR multiple task* OR multi task* OR secondary task* OR concurrent task*) AND (Parkinson*). Search limits included peer-reviewed studies (2005-2015), English and human subjects. Selection criteria required adults at least 18 with PD, DT training, balance and/or mobility outcomes, and a control or comparison group. Two reviewers independently assessed each article for methodological quality and came to consensus using PEDro guidelines.

## RESULTS

A total of 320 articles were screened for eligibility and 7 articles met selection criteria. PEDro scores ranged from 5 to 9/10 (avg=7.0). Samples ranged from 12 to 223 participants (943 total) with mild to severe PD (H&Y stages I-IV). All DT training included simultaneous performance of a motor (e.g., walking, video gaming) and a cognitive task (e.g., math, spelling, talking on the phone). Program parameters varied widely from 1 to 30 sessions (30-120 min) over 1 day to 10 weeks duration for 1 to 5 times/week. Outcome measures assessed balance (e.g., BBS, BESTest, ABC, dual-task TUG), gait (velocity, step length, cadence), PD-specific function (UPDRS, PDAQ-39), and cognition (e.g., MOCA, SCOPA-COG, BADS, GAS).

All studies found statistically significant improvements in balance and/or mobility after DT training. Six of 7 studies found DT training outcomes were significantly better than a control or comparison group, while 5 studies found significant within-group gains; however, no between-group differences were found for Nintendo Wii Fit DT training compared to standard balance training. Four out of 7 studies showed significant gains in PD-specific functional outcomes after DT training. Three out of 7 studies used instructions to focus on attention (focused, alternating, divided) during DT training, which all showed significant improvements. One study found that combined multimodal cognitive and motor DT training resulted in significant improvements of cognition and goal attainment (e.g., planning, decision-making, recall) compared with cognitive or transfer training alone.

## CONCLUSIONS

There is moderate evidence in support of both short (one session) and longer term (3-10 weeks) DT training to improve balance and/or mobility in patients with mild to severe PD. Limitations included small samples, varied protocols/measures and a lack of long-term follow-up. Future RCTs should focus on determining the optimal mode and parameters for DT training.

## CLINICAL RELEVANCE

Clinicians should consider the use of DT training in patients with PD to improve balance and mobility during increased cognitive load.

Instructions to focus (take big steps), alternate (alternate between postural control and cognitive tasks), or divide (between postural control and a cognitive task) attention can provide task-specific training under DT conditions indoors or outdoors. DT training is feasible and easily implemented in the clinic or home setting to better prepare persons with PD to meet real world functional demands.

## References


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