EFFECT OF VIRTUAL REALITY TRAINING ON BALANCE, GAIT AND MOBILITY IN PERSONS WITH PARKINSON’S DISEASE: A SYSTEMATIC REVIEW

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PURPOSE
The purpose of this systematic review was to determine the effect of virtual reality (VR) on improving balance, gait and mobility in adults with Parkinson’s Disease (PD).

METHODS
A literature search of MEDLINE/PubMed, Science Direct, SpringerLink, Google Scholar, and CINAHL was conducted (2006-2016). Search terms included: (Parkinson’s Disease OR Parkinson’s OR PD) AND (virtual reality OR visual augmented feedback OR VR) AND (balance OR gait OR mobility). Search limits: English, humans, and peer-reviewed. Selection criteria: diagnosis of PD, intervention included VR, outcomes of balance/gait/mobility, and RCT. Two reviewers independently assessed each study for methodological quality and came to consensus based on PEDro guidelines.

RESULTS
A total of 1,112 articles were screened for eligibility. Following detailed appraisals, 9 RCTs met the selection criteria. PEDro scores ranged from 5/10 to 8/10 (mean = 6.8). Sample sizes ranged from 20-44 participants (276 total); avg, age 66.5 yrs/o with mild-moderate PD (H&Y Stages I-III). Treatment parameters varied at 2-5 sessions/wk (30-60 min) with 6.5 wks average duration (range 4-12 wks). Seven studies used VR systems with a force plate (FP) and external display [4 of 6 fixed (2 Wii Fit), 2 dynamic], one used a handheld controller with no force plate (Wii) and one used a body position sensor (Kinect). Training was administered by a PT during the “on” phase of medication for all participants. Primary outcomes included: standing balance (SOT, rhythmic weight shifts, BBS, CRT, FRT, SLS, LOS), gait (DGI, TUG, 10MWT, tandem gait, obstacle crossing) and mobility/ADLs (MBI, STS, PDQ-39, UPDRS2). Statistically significant improvements were found between the experimental groups vs. the control groups for balance in 4 studies (Wii Fit, dynamic FP, Wii, Kinect), gait in 2 (Wii Fit, dynamic FP) and mobility in 2 (Wii Fit, Wii). Statistically significant improvements were found within both groups for balance in 4 studies (fixed FP, dynamic FP, Wii, Kinect), gait in 1 (fixed FP), and mobility in 2 (Dynamic FP/Blodex, Wii).

CONCLUSIONS
Findings are mixed as to whether VR is superior to traditional PT, however there is moderate evidence that VR combined with exercise and/or treadmill training improves balance, gait and/or mobility in persons with mild-moderate PD. Limitations included widely variable treatment parameters and outcomes, small sample sizes and complex equipment used in some studies. Future research is needed to define VR treatment parameters to optimize balance and gait and mobility outcomes in this population.

CLINICAL RELEVANCE
Commerically available VR systems (i.e., Wii, Wii Fit, Kinect) were equally as effective as other dynamic and fixed FP systems to enhance balance, gait and mobility in patients with mild-moderate PD. Effective protocols included VR combined with exercise and/or treadmill training for 20-30 mins, 2-3X/wk for 6-12 weeks duration. Based on the evidence, clinicians should consider the use of VR (Wii or Wii Fit or Kinect) as a safe, feasible adjunct to the treatment of patients with PD in clinical and home settings.

REFERENCES