

Supplemental Material

Appendix 1: Eligibility criteria

Inclusion criteria	Yes	No
<p><i>Study Design</i></p> <ul style="list-style-type: none"> Any study design published in peer-reviewed journal Published in English Available in full text Multiple intervention studies could be included where the effects of co-interventions could be partitioned from movement and exercise. 		
<p><i>Population</i></p> <ul style="list-style-type: none"> Diagnosis of Progressive Supranuclear Palsy (PSP) 		
<p><i>Intervention</i></p> <ul style="list-style-type: none"> Physical activity, exercise (strengthening, aerobic, mobility), gaze, eye movement exercises, movement strategies, falls prevention, balance, gait training, rehabilitation, aqua therapy, hydrotherapy, Tai chi, Pilates, dancing and other complementary therapies and physical activity, breathing exercises, swallowing exercises Complementary and alternative therapies 		
<p><i>Setting</i></p> <ul style="list-style-type: none"> Healthcare, clinical and community settings, gait laboratory 		
<p><i>Data</i></p> <ul style="list-style-type: none"> qualitative data that enables evaluation, such as thematic or content analysis or narrative summary quantitative data such as point measures to estimate effect 		
Exclusion criteria		
<ul style="list-style-type: none"> Non-invasive brain stimulation, electrotherapy, mixed populations where effects on PSP cannot be partitioned, PhD theses, editorials 		
INCLUDE	EXCLUDE	
To be included papers must be rated as yes for all inclusion criteria and have no exclusion criteria Proceed to data extraction and method quality assessment		

REASON FOR EXCLUSION:

Appendix 2: Example MEDLINE search strategy – PSP synonyms

1. exp Progressive supranuclear palsy [mh]
2. exp atypical Parkinson syndrome [mh]
3. exp Parkinson plus [mh]
4. exp Parkinson plus syndrome [mh]
5. exp Atypical parkinsonism
6. progressive supranuclear palsy [mh] AND rehabilitation [mh]
7. progressive supranuclear palsy [mh] OR rehabilitation [mh]
8. atypical Parkinson syndrome [mh] AND rehabilitation [mh]
9. atypical Parkinson syndrome [mh] OR rehabilitation [mh]
10. Parkinson plus [mh] AND rehabilitation [mh]
11. Parkinson plus syndrome [mh] AND rehabilitation [mh]
12. Parkinson plus syndrome [mh] OR rehabilitation [mh]
13. Progressive supranuclear palsy [mh] AND gait [mh]
14. Progressive supranuclear palsy [mh] OR gait [mh]
15. atypical Parkinson syndrome [mh] AND gait [mh]
16. atypical Parkinson syndrome [mh] OR gait [mh]
17. Parkinson plus [mh] AND gait [mh]
18. Parkinson plus [mh] OR gait [mh]
19. Progressive supranuclear palsy [mh] AND balance [mh]
20. Progressive supranuclear palsy [mh] OR balance [mh]
21. atypical Parkinson syndrome[mh] AND balance [m]

22. atypical Parkinson syndrome [mh] OR balance [mh]

23. Parkinson plus [mh] AND balance [mh]

24. Parkinson plus [mh] OR balance [mh]

Appendix 3: Method Quality Appraisal Instruments

A. PEDro scale (Randomised Controlled Trials) ^{30, 31}

1. Eligibility criteria were specified (not included in score) no _ yes _ where:
2. Subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received) no _ yes _ where:
3. Allocation was concealed no _ yes _ where:
4. The groups were similar at baseline regarding the most important prognostic indicators no _ yes _ where:
5. There was blinding of all subjects no _ yes _ where:
6. There was blinding of all therapists who administered the therapy no _ yes _ where:
7. There was blinding of all assessors who measured at least one key outcome no _ yes _ where:
8. Measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups no _ yes _ where:
9. All subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analysed by “intention to treat” no _ yes _ where:
10. The results of between-group statistical comparisons are reported for at least one key outcome no _ yes _ where:
11. The study provides both point measures and measures of variability for at least one key outcome no _ yes _ where:

**B. JBI Critical Appraisal Checklist for Quasi-Experimental Studies
(non-randomized experimental studies)³²**

Reviewer _____ Date _____

Author _____ Year _____

	Yes	No	Unclear	Not applicable
1. Is it clear in the study what is the ‘cause’ and what is the ‘effect’ (i.e. there is no confusion about which variable comes first)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were the participants included in any comparisons similar?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Was there a control group?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes of participants included in any comparisons measured in the same way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes measured in a reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

C. JBI Critical Appraisal Checklist for Cohort Studies³²

Reviewer _____ Date _____

Author _____ Year _____

	Yes	No	Unclear	Not applicable
10. Were the two groups similar and recruited from the same population?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Were the exposures measured similarly to assign people to both exposed and unexposed groups?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Was the exposure measured in a valid and reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Were confounding factors identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Were strategies to deal with confounding factors stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Were the outcomes measured in a valid and reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Was the follow up time reported and sufficient to be long enough for outcomes to occur?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Were strategies to address incomplete follow up utilized?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

D. JBI Critical Appraisal Checklist for Case Reports³²

Reviewer _____ Date _____

Author _____ Year _____

	Yes	No	Unclear	Not applicable
21. Were patient's demographic characteristics clearly described?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Was the patient's history clearly described and presented as a timeline?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Was the current clinical condition of the patient on presentation clearly described?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Were diagnostic tests or assessment methods and the results clearly described?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Was the intervention(s) or treatment procedure(s) clearly described?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Was the post-intervention clinical condition clearly described?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Were adverse events (harms) or unanticipated events identified and described?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Does the case report provide takeaway lessons?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

E. JBI Critical Appraisal Checklist for Case Series³²

Reviewer_____Date_____

Author_____Year_____

	Yes	No	Unclear	Not applicable
1. Were there clear criteria for inclusion in the case series?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Was the condition measured in a standard, reliable way for all participants included in the case series?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were valid methods used for identification of the condition for all participants included in the case series?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Did the case series have consecutive inclusion of participants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Did the case series have complete inclusion of participants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was there clear reporting of the demographics of the participants in the study?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Was there clear reporting of clinical information of the participants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were the outcomes or follow up results of cases clearly reported?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was there clear reporting of the presenting site(s)/clinic(s) demographic information?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Was statistical analysis appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

Appendix 4: Included papers

First author Year	Title
Clerici 2017	Clerici I, Ferrazzoli D, Maestri R, Bossio F, Zivi I, Canesi M, Frazzitta G. Rehabilitation in progressive supranuclear palsy: Effectiveness of two multidisciplinary treatments. PLoS ONE. 2017; 12(2), e0170927.
Di Pancrazio 2013	Di Pancrazio L, Bellomo RG, Franciotti R, Iodice P, Galati V, D'Andreagiovanni A, Saggini R. Combined rehabilitation program for postural instability in progressive supranuclear palsy. NeuroRehabil. 2013; 32(4), 855-860.
Irons 2015	Irons SL, Brusola GA, Buster TW, Burnfield JM. Novel Motor-Assisted Elliptical Training Intervention Improves 6-Minute Walk Test and Oxygen Cost for an Individual With Progressive Supranuclear Palsy. Cardiopulmonary Phys Ther J. 2015; 26(2), 36-41.
Nicolai 2010	Nicolai S, Mirelman A, Herman T, Zijlstra A, Mancini M, Becker C et al. Improvement of balance after audio-biofeedback. A 6-week intervention study in patients with progressive supranuclear palsy. Z Gerontol Geriatr. 2010; 43: 224-228.
Sale 2014	Sale P, Stocchi F, Galafate D, De Pandis MF, Le Pera D, Sova I et al. Effects of robot assisted gait training in progressive supranuclear palsy (PSP): a preliminary report. Front Hum Neurosci. 2014; 8: 207.
Seamon 2017	Seamon B, DeFranco M, Thigpen M. Use of the Xbox Kinect virtual gaming system to improve gait, postural control and cognitive awareness in an individual with Progressive Supranuclear Palsy. Disabil Rehabil. 2017; 39(7), 721-726.
Suteerawattananon 2002	Suteerawattananon M, MacNeill B, Protas EJ. Supported treadmill training for gait and balance in a patient with progressive supranuclear palsy. Phys Ther. 2002; 82(5), 485-495.
Wallace 2013	Wallace R, Abbott C, Gibson-Horn C, Skubic, M. In-home measurement of the effect of strategically weighted vests on ambulation. Conf Proc IEEE Eng Med Biol Soc, 2013, 949-952.
Wittwer 2018	Wittwer JE, Winbolt M, Morris ME. A home-based, music-cued movement program is feasible and may improve gait in Progressive Supranuclear Palsy. Front Neurol. 2018 (<i>in press</i>)
Zampieri 2008	Zampieri C, di Fabio RP. Balance and eye movement training to improve gait in people with progressive supranuclear palsy: quasi-randomized clinical trial. Phys Ther. 2008; 88(12), 1460-1473.
Zampieri 2009	Zampieri C, Di Fabio RP. Improvement of gaze control after balance and eye movement training in patients with progressive supranuclear palsy: a quasi-randomized controlled trial. Arch Phys Med Rehabil. 2009; 90(2), 263-270.

Appendix 5: Excluded papers and reasons for exclusion

First author/Year	Title	Reason excluded
Di Fabio 2007	Di Fabio RP, Zampieri C, Tuite, P. (2007). Gaze-shift strategies during functional activity in progressive supranuclear palsy. <i>Experimental Brain Research</i> , 178(3), 351-362.	No therapy Intervention
Liao 2008	Liao K, Wagner J, Joshi A, Estrovich I, Walker M, Strupp M, Leigh R. (2008). Why do patients with PSP fall? Evidence for abnormal otolith responses. <i>Neurology</i> , 70(10), 802-809.	No therapy Intervention
Sosner 1993	Sosner J, Wall GC, Sznajder J. (1993). Progressive supranuclear palsy: clinical presentation and rehabilitation of two patients. <i>Archives of Physical Medicine & Rehabilitation</i> , 74(5), 537-539.	No data to analyse
Steffen 2007	Steffen TM, Boeve BF, Mollinger-Riemann LA, Petersen CM. (2007). Long-term locomotor training for gait and balance in a patient with mixed progressive supranuclear palsy and corticobasal degeneration. <i>Phys Ther</i> , 87(8), 1078-1087.	Mixed PSP & CBD
Steffen 2014	Steffen TM, Boeve BF, Petersen CM, Dvorak L, Kantarci K. (2014). Long-term exercise training for an individual with mixed corticobasal degeneration and progressive supranuclear palsy features: 10-year case report follow-up. <i>Phys Ther</i> , 94(2), 289-296.	Mixed PSP & CBD
Zampieri 2006	Zampieri, C. (2006). Rehabilitation of gaze control to improve mobility in progressive supranuclear palsy. (3240494 Ph.D.), University of Minnesota, Ann Arbor.	PhD thesis

Table S1: Method quality appraisal of included studies

Randomised Controlled Trial (PEDro Scale) ^{30, 31}											
Author	Random allocation	Concealed allocation	Baseline - similar	Blinded participant	Blinded therapist	Blinded assessor	Measures for >85% sample	ITT	Between group analysis	Outcome measure data	Score /10
Clerici 2017 ³⁵	Y	N	Y	N	N	Y	Y	N	Y	Y	6
Zampieri 2008 ³⁶	N	N	Y	N	N	N	Y	Y	Y	Y	5
Zampieri 2009 ³⁷	N	N	Y	N	N	N	Y	Y	Y	Y	5
Quasi-experimental study (JBI Appraisal Tool) ³²											
Author	Cause - effect	Participants similar	Comparisons - similar	Control group	Multiple measures	Follow-up	Consistent measurement	Reliable measurement	Statistical analysis	Score /9	
Nicolai 2010 ⁴⁰	Y	Y	Y	N	Y	Y	Y	Y	Y	8	
Sale 2014 ⁴¹	Y	Y	Y	N	Y	N	Y	Y	Y	7	
Cohort study (JBI Appraisal Tool) ³²											
Author	Intervention equivalent	Intervention – valid, reliable measurement	Confounders identified	Confounder strategy	Eligibility criteria	Outcomes – valid, reliable measurement	Adequate follow-up	Loss to follow-up	Unequal follow-up	Appropriate statistics	Score /10
Di Pancrazio 2013 ³⁸	N	Y	N	N	N	Y	Y	N	N	Y	4
Case study (JBI Appraisal Tool) ³²											
Author	Demographic data	Participant history	Clinical condition	Tests & measures	Intervention described	Post intervention condition	Adverse events reported	Take home messages	Score /8		
Irons 2015 ³⁹	Y	N	Y	Y	Y	Y	N	Y	6		
Seamon 2017 ⁴²	Y	Y	Y	Y	Y	Y	N	Y	7		
Suteerawattananon 2002 ⁴⁵	Y	N	Y	Y	Y	Y	N	Y	6		
Wallace 2013 ⁴³	N	N	N	Y	Y	N	N	Y	3		
Case series (JBI Appraisal Tool) ³²											
Author	Eligibility criteria	Standard measures	Diagnostic criteria	Consecutive inclusion	Complete inclusion	Demographic data	Clinical data	Results reported	Setting	Statistical analysis	Score /10
Wittwer 2018 ⁴¹	Y	Y	Y	N	N	Y	N	Y	Y	N	6

Legend: Y=yes N=No

Table S2: Study characteristics

First author, year, location, setting	PSP diagnostic criteria; disease duration (years)	Therapy, Dose, Frequency	Study design, sample size, ethics	Mean age, Sex	Medication	Co-morbidities	Dependent variables Outcome measures
Clerici 2017 ³⁵ Italy, Rehabilitation hospital	NINDS-SPSP International Criteria; I: 4.0 ± 1.2 C: 4.1 ± 1.4	Aerobic, multidisciplinary, intensive, motor-cognitive, goal based rehabilitation. Treadmill vs Lokomat robotic treadmill device. A 4-week program with four daily one hour sessions, five days per week.	RCT, n= 24 Ethics approval, prior informed consent	I: 72.5 ± 6.1 years C: 69.9 ± 5.2 years I:58% M C:41% M	Levodopa	Not reported	Disability, gait, falls - baseline, 4 weeks (median, lower & upper quartile); within group mean change Primary - total PSP Rating Scale (PSPRS), limb & gait sub scores Secondary - Berg Balance Scale - BBS Six Minutes Walking test (6MWT) Number of falls (number & timing)
<u>Di Pancrazio 2013</u> ³⁸ Italy, Rehabilitation hospital	NINDS-SPSP International Criteria; Duration not reported	Weight relieving harness whilst a person walks on a treadmill (SPAD) plus vibratory sensory stimulation (VISS) 3x week for 8 weeks	Cohort study – single group pre & post, n=10 ethics approval, prior informed consent given	69 +/- 7 years M=7 F=3	Not reported	Not reported	Postural alignment, postural stability, gait, quality of life – baseline, weekly, 4 weeks post intervention (mean, SD) PSPRS. BBS, Gait speed, Step length, QOL – PDQ-39
<u>Irons 2015</u> ³⁹ USA Hospital outpatient	Not reported; 1.5 years	Weight relieving harness whilst a person walks on a treadmill type elliptical walker/trainer. 3 days a week for a total of 24 sessions (8 weeks).	Case study n=1 Ethics approval	67 years M: 1	Niacin, benazepril hydrochlorothiazide furosemide, dabigatran etexilate, digoxin, ropinitole hydrochloride, levodopa, donepezil hydrochloride	Atrial fibrillation, hypertension, hyperlipidemia, obesity, dizziness, leg edema, syncope, anxiety, Rtotal hip replacement, bilateral cruciate ligament tears	Walking speed, Freezing of gait, Oxygen cost – baseline, 8weeks, 4 weeks f/up 6MWT Freezing of Gait Questionnaire VO2max

<p><u>Nicolai 2010</u>⁴⁰</p> <p>Germany</p> <p>Outpatient clinic specialising in Parkinsonism</p>	<p>NINDS-SPSP International Criteria;</p> <p>6.2 (SD 4.0) years</p>	<p>Predefined exercises from six posture and balance categories with increasing difficulty and complexity: (1) sitting (2) standing (3) transfers (4) sway (5) reaching or stepping one direction (6) multi direction stepping with added limb movement. 6 weeks, 3/week for 45 mins</p>	<p>Single group pre- post</p> <p>Convenience sample: n=8</p> <p>Ethics approval</p>	<p>66.4 (6.1) years</p> <p>F: 6 M: 2</p>	<p>Not reported</p>	<p>Not reported</p>	<p>Balance control, postural stability, Dynamic balance – baseline, 8 weeks, one month f/up (medians, ranges)</p> <p>6MWT VO2 Oxygen consumption & cost FOGQ</p>
<p><u>Sale 2014</u>³⁹</p> <p>Italy</p> <p>Setting not reported</p>	<p>UK Brain Bank PSP Criteria</p>	<p>Program of robot-assisted walking sessions (on walkway force platform) for 20 – 45 min, 5 times a week for 4 weeks.</p>	<p>Single group pre- post</p> <p>Convenience sample: n=5</p> <p>Ethics approval</p>	<p>Median: 67.8 ± 11.71 years</p> <p>F: 2 M: 3</p>	<p>Not reported</p>	<p>Not reported</p>	<p>Gait velocity, cadence, step length, step width, patient satisfaction – baseline, end intervention (4 weeks) (mean, SD)</p> <p>PSPRS 3-dimensional motion analysis Perceived workload Perceived satisfaction</p>
<p><u>Seamon 2017</u>⁴²</p> <p>USA</p> <p>Outpatient clinic, retirement village</p>	<p>Not reported;</p> <p>5 year history</p>	<p>Xbox Kinect virtual gaming “YourShape” and mini games.</p> <p>12 one hour sessions over 6 weeks</p>	<p>Single case study n=1</p> <p>Ethics not reported</p>	<p>65 years</p> <p>F: 1</p>	<p>carbidopa/levodopa – does not help</p>	<p>‘unremarkable’</p>	<p>Quality of life, fear of falling, falls, functional gait, dynamic stability, walking speed, balance, mobility with/without dual tasks – baseline, 3 weeks, end of intervention (6 weeks). MDC (Meaningful Difference Changes)</p> <p>BBS, TUG, 10 MWT, PDQ-39, FFABQ (fear of falling avoidance beliefs questionnaire)</p>

<u>Suteera-wattananon 2002</u> ⁴⁵ USA Gait lab	Not reported	Pacer treadmill with a body weight support unloading system to allow supported gait. 1.5 hour sessions, 3 days a week for 8 weeks	Single case study n=1 Ethics approval	62 years M: 1	Not reported	Previous neuropathy	Walking speed, Turning, Stepping Functional Mobility, Reaching, Balance, Falls – raw scores, mean, SD – baseline, 8 weeks 15.2metre (50 ft) walk (s) 360° turn (s) Get Up & Go Test (s) 5-step test (s) Functional Reach Test (cm) Foam standing (s) Berg Balance Scale, Falls
<u>Wallace 2013</u> ⁴³ USA In-home	Not reported; Not reported	Weighted vest, with motion-capture technology, to improve movement and posture. Intervention duration was approximately 120 days	Single case study n=1 Ethics approval	Age not reported	Not reported	Not reported	Entropy and asymmetry of movement & gait– baseline, every 2 weeks Gait analysis – vest on & vest off
<u>Wittwer 2018</u> ⁴⁴ Australia In-home	Diagnosis of probable PSP made by a neurologist using the consensus criteria	Gait training program and rhythmic auditory cues (RACs). Two home visit sessions per week (no more than 60 minutes each) for four weeks. Cued exercises in sitting, standing, walking.	Case series: n=5 Ethics approval, prior informed consent	Range 54-74 years F: 3 M: 2	Range of 1 - 4 medications. Names and dosage not reported	Two participants pre-obese. Other comorbidities not reported	Baseline function and falls 12 months Before/after - Addenbrooke's Cognitive Examination (ACE), Geriatric Depression Score (GDS), gait – stride variability

<p><u>Zampieri 2008</u>³⁶ Italy</p> <p>Movement Disorders Assessment Laboratory</p>	<p>NINDS-SPSP International Criteria;</p>	<p>Balance vs balance + eye movement A common set of exercises performed by both groups included tandem stance practice with eyes open and closed, turning 360° while marching in place, and sit-to-stand and stand-to-sit practice on a chair. The treatment group received eye movement plus visual awareness training</p> <p>One hour, 3 times per week for 4 weeks</p>	<p>Quasi-RCT; N=19</p> <p>Ethics approval</p>	<p>I: 71.2 (5.28) years C: 67.55 (7.28) years</p> <p>F: 9 M: 10</p>	<p>Not reported</p>	<p>Not reported</p>	<p>Gait analysis, Walking speed, Walking function - baseline, end of intervention (4 weeks) (mean, SD, Effect Size)</p> <p>Stance duration (s) Swing time (s) Step length (cm) 8 foot walk test TUG</p>
<p><u>Zampieri 2009</u>³⁷ Italy</p> <p>Movement Disorders Assessment Laboratory</p>	<p>NINDS-SPSP International Criteria;</p>	<p>Balance vs balance + eye movement A common set of exercises performed by both groups included tandem stance practice with eyes open and closed, turning 360° while marching in place, and sit-to-stand and stand-to-sit practice on a chair. In addition the treatment group received eye movement plus visual awareness training</p> <p>One hour, 3 times per week for 4 weeks</p>	<p>Quasi-RCT N=19</p> <p>Ethics approval</p>	<p>I: 71.2 (5.28) years C: 67.55 (7.28) years</p> <p>F: 9 M: 10</p>	<p>Not reported</p>	<p>Not reported</p>	<p>Gaze control, - baseline, end of intervention (4 weeks) (mean, SD, Effect Size)</p> <p>Gaze error index Vertical gaze fixation score.</p>

Legend

PSP: Progressive Supranuclear Palsy NINDS-SPSP: National Institute of Neurological Disorders and Stroke and the Society for PSP
 RCT: Randomised Controlled Trial I: Intervention C: Control NR: not reported

Table S3: GRADE evidence summaries

Question: Virtual gaming (XBox Kinect) compared to usual care for people living with a diagnosis of PSP

Setting: Primary and residential care, community settings

Bibliography: Seamon et al 2017⁴²

Certainty assessment							Impact	Certainty	Importance
No of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Berg Balance Scale (follow up: mean 6 weeks)									
1	observational studies	serious ^{a,b}	very serious ^c	not serious	not serious	all plausible residual confounding would reduce the demonstrated effect	There was no change in the BBS at the end of the intervention. There was an 11 point positive change in the Parkinson's Disease Questionnaire (PDQ39) score and this is regarded as above the minimal detectable change	⊕○○○ VERY LOW	IMPORTANT

Explanations:

- a. no control intervention;
- b. sample size - n=1;
- c. no replication studies

Question: Body weight supported treadmill training compared to usual care for people living with a diagnosis of PSP

Setting: Primary and residential care and community settings

Bibliography: Dio Pancrazio 2013³⁸ Irons 2015,³⁹ Suteerawattananon 2002⁴⁵

Certainty assessment							No of patients		Effect		Certainty	Importance
No of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	body weight supported treadmill training	usual care	Relative (95% CI)	Absolute (95% CI)		
Berg Balance Scale (follow up: mean 4 weeks)												
3	observational studies	serious ^{a,b}	very serious ^{c,d}	not serious	not serious ^e	strong association all plausible residual confounding would reduce the demonstrated effect		not pooled	-	see comment	⊕○○○ VERY LOW	IMPORTANT

Explanations:

- a. single case studies with sample sizes n=1;
- b. no control intervention;
- c. heterogeneous variables and outcome measures;
- d. one study - 4.5% improvement on Berg Balance Scale; one study - 10% improvement on BBS;
- e. no short, medium and long term follow-up measures - only end of intervention

Question: Balance and eye movement training compared to **balance training alone for people living with a diagnosis of PSP**

Setting: Primary and residential care, community settings

Bibliography: Zampieri 2008³⁶

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	balance and eye movement training	balance training alone	Relative (95% CI)	Absolute (95% CI)		
Timed Up and Go												
1	randomised trials	serious ^a	not serious	not serious	very serious ^{b,c}	all plausible residual confounding would reduce the demonstrated effect	10	9	-	SMD 0.42 SD higher (0.49 lower to 1.33 higher)	⊕⊕○○ LOW	IMPORTANT

CI: Confidence interval; SMD: Standardised mean difference

Explanations:

- a. PEDro score of 5/10;
- b. imputation of scores from graphs and not numerical data;
- c. 95% CI crosses zero

Question: Treadmill gait training compared to robotic gait training (Lokomat) for people living with a diagnosis if PSP

Setting: Primary and residential care and community settings

Bibliography: Clerici 2017³⁵

Certainty assessment							Nº of patients		Effect		Certainty	Importance
Nº of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	treadmill gait training	robotic gait training (Lokomat)	Relative (95% CI)	Absolute (95% CI)		
PSP Rating Scale (follow up: mean 4 weeks; Scale from: 0 to 100)												
1	randomised trials	serious ^a	serious ^b	serious ^c	serious ^d	strong association all plausible residual confounding would reduce the demonstrated effect	12	12	-	SMD 0.55 SD higher (0.28 lower to 1.35 higher)	⊕⊕○○ LOW	IMPORTANT
Berg Balance Scale (follow up: mean 4 weeks; Scale from: 0 to 56)												
1	randomised trials	serious ^a	serious ^b	serious ^c	serious ^d	strong association all plausible residual confounding would reduce the demonstrated effect	12	12	-	SMD 0.61 SD lower (1.4 lower to 0.23 higher)	⊕⊕○○ LOW	IMPORTANT
Number of Falls (follow up: mean 4 weeks)												
1	randomised trials	serious ^a	serious ^b	serious ^c	serious ^d	strong association all plausible residual confounding would reduce the demonstrated effect	12	12	-	SMD 0 SD (0.8 lower to 0.8 higher)	⊕⊕○○ LOW	IMPORTANT

CI: Confidence interval; SMD: Standardised mean difference

Explanations: a. only one study and no replication; b. small sample size and PEDro method score of 6/10; c. outcomes measured at end of intervention and no short or medium term follow-up; d. 95% CI crosses zero