



**Annual  
Doctor of Physical  
Therapy  
Research Presentations  
Friday, November 4, 2016  
6 PM to 9 PM  
DeNaples Center  
4<sup>th</sup> Floor Moskovitz Theater**

100% of the systematic reviews presented this year have been accepted by the APTA for presentation at the CSM in February 2017 in San Antonio, Texas.

The University of Scranton has pre-approved provider status with the PA State Board of Physical Therapy. The PA State Board of Physical Therapy has ultimate authority to the determination.

**This course is approved for 3 general contact hours. However, you must attend the entire session to receive credit.**

# Schedule of Events

## **Introduction: Dr. John Sanko**

### **Systematic Review of Selected Outcomes, Complications, and Postoperative Considerations Among Surgical Interventions for Scoliosis in Children with Cerebral Palsy**

James Lolli, Colleen McMahon, Jessica Merino, Megan Nevers, Dr. Debra Miller

### **Soft-Tissue Mobilization (ST) vs. Eccentric Exercise (ECC) For The Treatment of Tendinosis**

Nicholas Laurente, Jesse Myers, Robby Ondevilla, Dr. John Sanko

### **The Effect of Depression on Functional Mobility in Older Adults following Hip Fracture Surgery: A Systematic Review**

Daniel Dolphin, Katelyn Moyer, Robert Roncek, Steven Roughton, Dr. Dana Maida

### **The Effect of Virtual Reality Training on Balance, Gait and Mobility in Persons with Parkinson's disease: A Systematic Review**

Alexander Arrow, Joseph Martzen, Michael Montalbano, James Moser, Alexander Tomlinson, Dr. Renée Hakim

### **The Effect of Rhythmic Auditory Stimulation on Gait Outcomes in Adults with Non-Progressive CNS Diagnoses: A Systematic Review**

Jordan Cominsky, Coleen Joyce, Suzanne Leschen, Madeline Raab, Dr. Jennifer Schwartz

## **SHORT BREAK**

### **The Effect of Whole Body Vibration on Pain and Disability in Adults with Chronic Low Back Pain: A Systematic Review**

Travis Fahey, Corey Pasquarelli, Charles Lewis, Matthew Donaldson, Dr. Renée Hakim

### **The Impact of Osseointegrated Prostheses on Quality of Life in Patients with Transfemoral Amputation: A Systematic Review**

Kelly Kuzminski, Jennifer Lewis, Gabrielle Pierce, Samantha Russo, Dr. Barbara Wagner

### **The Effect of Fatigue on Balance and Fall Risk using Balance Outcome Measures in Community Dwelling Older Adults: A Systematic Review**

Nicholas Constantino, Daniel DiPaola, Kyle Kasman, James Leighty, Dr. Peter Leininger

### **The Effects of Physical Therapy on Quality of Life in Adult Patients on Hospice or Palliative Care: A Systematic Review**

Shannon Gilman, Jane Grenaldo, Dana Principe, Gianna Scarpelli, Dr. Tracey Collins

### **Patient Satisfaction in Older Adults Using Telerehabilitation in Home Health: A Systematic Review**

Dana Principe, Gabrielle Pierce, Dr. Tracey Collins

### **Physical Therapy Video Source for Visual Vertigo**

Gabrielle Pierce

## **Closing Remarks/ CEU information**

# All Evidence is not Created Equal

<http://www.orthopaedicprotocols.com/wp-content/uploads/2011/03/EBPRACT.pdf>

PEDro is a critical appraisal tool intended to identify methodological flaws in the physical therapy literature providing consumers of research evidence objective data regarding the strength of such evidence.

Study	1	2	3	4	5	6	7	8	9	10	11	Score
Grade												
<ol style="list-style-type: none"><li>1. Eligibility criteria were specified.</li><li>2. Subjects were randomly assigned to groups.</li><li>3. Allocation was concealed</li><li>4. Groups were similar at baseline.</li><li>5. Subjects were blinded.</li><li>6. Therapists who administered the treatment were blinded.</li><li>7. Assessors were blinded.</li><li>8. Measures of key outcomes were obtained from more than 85% of subjects.</li><li>9. Data were analyzed by intention to treat.</li><li>10. Statistical comparisons between groups were conducted.</li><li>11. Point measure and measures of variability were provided.</li></ol> <p>Criteria number 1 is not used to generate the total score. Therefore, the total maximum score is 10.</p>												

<http://www.pedro.org.au/english/downloads/pedro-scale/>

## Sackett Levels of Evidence

Level of Evidence	Description
1A	Systematic review of randomized controlled trials (RCTs).
1B	RCTs with narrow confidence intervals.
1C	All or none case series.
2A	Systematic review cohort studies.
2B	Cohort study/low quality RCT.
2C	Outcomes research.
3A	Systematic review of case-controlled studies.
3B	Case-controlled study.
4	Case series, poor cohort case-controlled study.
5	Expert opinion.

Fletcher and Sackett, working for the Canadian Task Force on Periodic Health Examination in 1979, are credited as the first to develop a level of evidence scoring scale. Sackett continued to develop the scale based on his own research with the use of anti-thrombotic agents.

[http://www.physio-pedia.com/Grades\\_and\\_Levels\\_of\\_Evidence](http://www.physio-pedia.com/Grades_and_Levels_of_Evidence)

# MINORS Scale:

**Table 2.** The revised and validated version of MINORS

Methodological items for non-randomized studies	Score <sup>†</sup>
<ol style="list-style-type: none"> <li>1. <b>A clearly stated aim:</b> the question addressed should be precise and relevant in the light of available literature</li> <li>2. <b>Inclusion of consecutive patients:</b> all patients potentially fit for inclusion (satisfying the criteria for inclusion) have been included in the study during the study period (no exclusion or details about the reasons for exclusion)</li> <li>3. <b>Prospective collection of data:</b> data were collected according to a protocol established before the beginning of the study</li> <li>4. <b>Endpoints appropriate to the aim of the study:</b> unambiguous explanation of the criteria used to evaluate the main outcome which should be in accordance with the question addressed by the study. Also, the endpoints should be assessed on an intention-to-treat basis.</li> <li>5. <b>Unbiased assessment of the study endpoint:</b> blind evaluation of objective endpoints and double-blind evaluation of subjective endpoints. Otherwise the reasons for not blinding should be stated</li> <li>6. <b>Follow-up period appropriate to the aim of the study:</b> the follow-up should be sufficiently long to allow the assessment of the main endpoint and possible adverse events</li> <li>7. <b>Loss to follow up less than 5%:</b> all patients should be included in the follow up. Otherwise, the proportion lost to follow up should not exceed the proportion experiencing the major endpoint</li> <li>8. <b>Prospective calculation of the study size:</b> information of the size of detectable difference of interest with a calculation of 95% confidence interval, according to the expected incidence of the outcome event, and information about the level for statistical significance and estimates of power when comparing the outcomes</li> </ol> <p><i>Additional criteria in the case of comparative study</i></p> <ol style="list-style-type: none"> <li>9. <b>An adequate control group:</b> having a gold standard diagnostic test or therapeutic intervention recognized as the optimal intervention according to the available published data</li> <li>10. <b>Contemporary groups:</b> control and studied group should be managed during the same time period (no historical comparison)</li> <li>11. <b>Baseline equivalence of groups:</b> the groups should be similar regarding the criteria other than the studied endpoints. Absence of confounding factors that could bias the interpretation of the results</li> <li>12. <b>Adequate statistical analyses:</b> whether the statistics were in accordance with the type of study with calculation of confidence intervals or relative risk</li> </ol>	

<sup>†</sup>The items are scored 0 (not reported), 1 (reported but inadequate) or 2 (reported and adequate). The global ideal score being 16 for non-comparative studies and 24 for comparative studies.

The items are scored 0 (not reported), 1 (reported but inadequate), or 2 (reported and adequate).

MINORS is a valid instrument designed to assess the methodological quality of non-randomized studies, whether comparative or non-comparative.

## Update from the DPT Class of 2016:

### A Systematic Review of Predisposing Biological and Mechanical Factors Related to Non-Specific Low Back Pain in Adolescents

Daniel Sawyer, PT, DPT, Brendan Synan, PT, DPT, Michael Gaeta, PT, DPT, Vincent Signoriello, PT, DPT, Dr. Renée Hakim, PT, PhD, NCS  
Accepted for 2017 APTA CSM by the Research Section

# **Systematic Review of Selected Complications and Postoperative Considerations Among Surgical Interventions for Scoliosis in Children with Cerebral Palsy.**

James Lolli, SPT, Colleen McMahon, SPT, Jessica Merino SPT, Megan Nevers, SPT, Debra Miller, PT, DPT, MS

## **Abstract**

### **ABSTRACT BODY:**

**Purpose/Hypothesis:** To evaluate outcomes, complications and postoperative considerations among surgical interventions for scoliosis in children with cerebral palsy (CP).

**Materials/Methods:** A literature search of Google Scholar, CINAHL, PubMed, and ProQuest was conducted using search terms: (children or pediatric) AND (cerebral palsy or CP) AND (scoliosis or spinal curvature) AND (surgery or surgical interventions). Search limits: English, human subjects, children under 18 years and selection criteria: scoliosis, surgical interventions, and outcome measures of Cobb and pelvic obliquity angles. Two reviewers independently assessed each study for methodological quality and came to a consensus based on MINORS scale.

**Results:** A total of 3,849 titles were screened for eligibility. Following detailed appraisal, 6 retrospective cohorts met the criteria. MINORS scores ranged from 10-20/24 with a mean of 16.5/24. Sample sizes ranged from 27 to 157 subjects (396 total) with mean age of 13.7 years. The surgical procedures examined included anterior or posterior approach spinal fusions, using either custom rods, growing rods or Luque Galveston or Contrel Dubousset instrumentation. Outcomes measurements of Cobb and pelvic obliquity angles were taken pre-op, post-op, and at follow up (mean 4.68 years). The mean pre-op Cobb angle was 82.5° (70-100.84°), post-op the angle was 37.7° (31-59°) and the mean follow up was 34.1° (13-50°). The mean pre-op pelvic obliquity was 24° (15-23°), post-op mean was 20.88° (9-59°), and the mean at follow up was 11.2° (6-22°). Immediate post op results were not recorded in one study. In four studies, patients experienced infectious complications. In three studies, hardware was exchanged due to malformation. In three studies, patients experienced pulmonary complications. There was an overall blood loss mean of 1614 ml and mean hospital stay of 12.75 days.

**Conclusions:** There is moderate evidence in support of surgical interventions to improve Cobb and pelvic obliquity angles post-op and at follow up in pediatric patients with CP and scoliosis. The results suggest that parents and clinicians can expect a decrease in Cobb angle of 57.74% (36-86%) and pelvic obliquity decrease of 51.59% (18-89%) and a 12 day hospital stay. Limitations include lack of comparators for surgical procedures and lack of standardization with CP diagnoses. Future research is needed with specific CP diagnoses and better inclusion and exclusion criteria to determine effectiveness.

**Clinical Relevance:** As medical advances occur, there are more options for treatment of scoliosis in children with CP. It is important for clinicians to understand the expected outcomes of scoliosis surgery including possible complications for children with CP and to educate parents and caregivers. Though quality of life was not directly assessed, the long term outcomes may improve physical well-being and cosmesis.

<b>Minors</b>	<b>Nectoux</b>	<b>McElroy</b>	<b>Sponsellor</b>	<b>Teli</b>	<b>Furhop</b>	<b>Vialle</b>	<b>Beckmann</b>	<b>Average</b>
<b>Clearly Stated Aim</b>	2	2	2	2	2	2	2	
<b>Inclusion of patients</b>	2	2	2	2	2	2	2	
<b>Collection of data</b>	1	2	2	2	2	2	2	
<b>Appropriate endpoints</b>	2	2	2	2	2	2	2	
<b>Unbiased assessment</b>	0	1	0	1	0	0	0	
<b>Follow up period</b>	2	2	2	2	2	2	2	
<b>Loss of less than 5%</b>	1	1	2	2	2	0	0	
<b>Prospective calculation of study size</b>	0	1	0	2	0	2	2	
<b>Adequate Control Group</b>	0	0	2	0	1	0	0	
<b>Contemporary groups</b>	0	0	2	0	0	0	0	
<b>Baseline equivalence</b>	0	2	2	2	2	2	1	
<b>Adequate Statistical Analysis</b>	0	1	2	2	2	2	2	
<b>Totals</b>	10/24	16/24	20/24	19/24	18/24	16/24	16/24	16/24

# **Soft-tissue mobilization (ST) vs. eccentric exercise (Ecc) for the treatment of tendinosis**

Nicholas Laurente, SPT, Jesse Myers, SPT, Robby Ondevilla, SPT,  
Dr. John Sanko, PT, EdD

**Purpose/Hypothesis:** The purpose of this systematic review was to determine the effectiveness of soft-tissue mobilization compared to eccentric exercise in the treatment of tendinosis in terms of pain reduction and functional outcomes.

**Number of subjects:** N/A

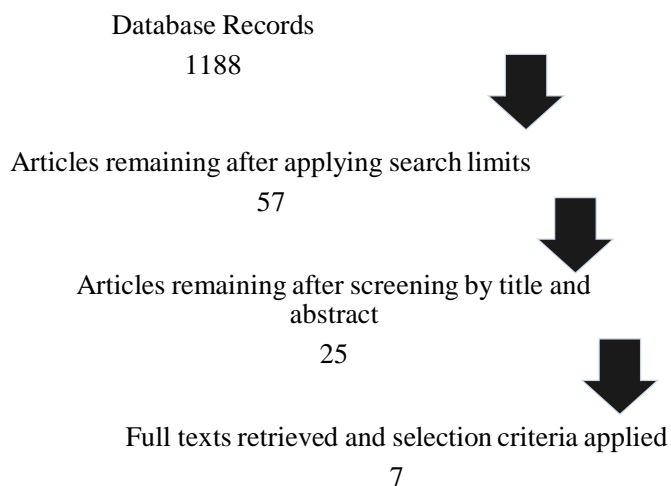
**Materials/Methods:** A literature search (2006-2016) of CINAHL, Medline, Web of Science, Science Direct, and PubMed using the search terms: (tendinosis OR tendinopathy) AND (ASTYM OR eccentric exercise). Selection criteria: RCTs, human subjects, and English language. Two reviewers independently assessed each article for methodological quality and came to consensus based on PEDro scoring guidelines.

**Results:** A total of 508 articles were screened for eligibility. Following detailed appraisals, 7 RCTs fulfilled criteria. PEDro scores ranged from 6-9/10 (avg=7.3). Samples ranged from 16 to 120 subjects (430 total) with chronic tendinopathy pathology in the shoulder, elbow, knee, and heel cord across all studies. Ecc was performed for 3 sets of 15 reps for 1.67 times per day, 2-7 days per week, averaging 9.67 weeks duration (4-12 wks). ST was performed for 2.33 times per week averaging 9.33 weeks duration (4-12 wks). Primary outcomes included the DASH, VISA-A, and VAS. No adverse events were reported. There were statistically significant between-group improvements noted in functional outcome measures (VISA-A and DASH) following Ecc & ST vs Ecc alone in 2 studies. There were statistically significant between-group improvements noted in pain (VAS) following Ecc vs concentric exercise in 1 study. There were statistically significant improvements noted in functional outcome measures (VISA-A) following Ecc in 1 study. There were no statistically significant between-group improvements noted in functional outcome measures (VISA) following Ecc vs surgery in 1 study. There were no statistically significant between-group improvements noted in functional outcome measures (VISA-A) following Ecc vs heavy slow resistance in 1 study. There were no statistically significant between-group improvements noted in pain (VAS) following ST vs Therapeutic Exercise in 1 study.

**Conclusions:** There is moderate to strong evidence in support of an intervention that includes Ecc vs ST alone for improving pain and functional outcome scores in persons with chronic tendinopathy. Ecc & ST together have an advantage over Ecc or ST alone. Limitations included small samples and a lack of blinding participants. Future RCTs should focus on an optimal dose of Ecc as well as well-defined ST technique for treating chronic tendinopathy.

**Clinical Relevance:** The outcomes for Ecc and ST together appear superior compared to other forms of treatment for improving functional outcomes in adults with chronic tendinopathy. Effective treatment protocols use Ecc, for 3 sets of 15 reps, and ST 4-5 days per week for 9 weeks. Implementing interventions consisting of Ecc and ST are safe and feasible methods for treating chronic tendinopathy.

## PRISMA



## PEDro Scores

Criteria	1	2	3	4	5	6	7	8	9	10	11	Score
Bahr <sup>1</sup>	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y	7
Beyer, et al <sup>2</sup>	Y	Y	N	Y	Y	Y	Y	N	Y	Y	N	7
Mccormack, et al <sup>3</sup>	Y	Y	Y	N	Y	Y	N	N	Y	Y	Y	7
Senbursa, et al <sup>4</sup>	Y	Y	Y	N	Y	Y	N	N	Y	Y	Y	7
Sevier, et al <sup>5</sup>	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	8
Stevens, et al <sup>6</sup>	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9
Peterson, et al <sup>7</sup>	Y	Y	Y	N	N	Y	N	N	Y	Y	Y	6

# THE EFFECT OF DEPRESSION ON FUNCTIONAL MOBILITY IN OLDER ADULTS FOLLOWING HIP FRACTURE SURGERY: A SYSTEMATIC REVIEW PRESENTATION

Katelyn Moyer, SPT, Daniel Dolphin, SPT, Robert Roncek, SPT, Steven Roughton, SPT,  
Dr. Dana Maida, PT, DPT, GCS

**Purpose:** The purpose of this review was to determine the effect of depression on functional mobility in older adults following hip fracture surgery

**Methods:** A literature search of PubMed, SAGE, CINAHL, and ProQuest was conducted using search terms: elderly OR older adult, depression, AND hip fracture (fx). Search limits: English, humans, and peer reviewed (2006-2016). Selection criteria: adults 60+ years who sustained hip fx, underwent surgical repair, received post-op physical therapy, and were assessed for depression at minimum using the Geriatric Depression Scale (GDS) or Center for Epidemiological Studies Depression Scale (CES). Two reviewers independently assessed each study for methodological quality and consensus based on MINORS criteria.

**Results:** 1,650 articles were screened for eligibility, yielding 8 cohort studies. MINORS scores ranged from 11-13 in non-comparative studies (mean=12.5) and 17-22 in comparative studies (mean=19.33). Sample size ranged from 55- 804 subjects (n=1774). Outcomes included: depression, pain, cognition, and delirium assessments, ambulation time and distance, balance, and activities of daily living (ADL). Depression was reported as early as 1 week post-op, lasting through 6 or 12 month follow-up (4 articles) and had a significant negative impact on ambulation time and distance (6 articles) and ADL completion (5 articles). 2 articles correlated increased pain with depressive symptoms and 1 also reported a significant decrease in function. 3 articles reported cognitive impairment, comorbidities, and delirium correlated with negative functional outcomes. 1 article found persons with depression had significantly lower Berg Balance Scores and 3 found slower Timed Up and Go times, indicating higher fall risk.

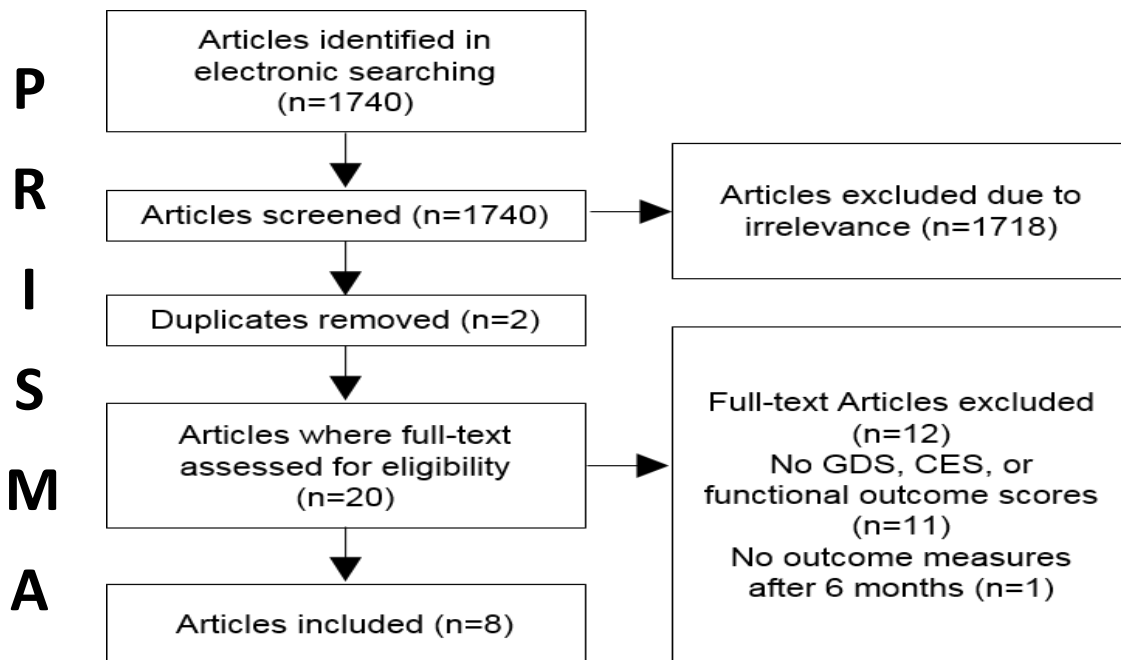
**Conclusions:** Moderate evidence suggests that depression in older adults after hip fracture surgery decreases functional mobility and increases fall risk. Depression was identified as early as 1 week post-op with duration of a year or greater. Impaired cognition and pain negatively impacted outcomes to a greater extent. Limitations included diverse outcome measures and heterogeneity of study methods. Future research should focus on assessment of depression and functional mobility using standardized outcome measures as well as determining the potential impact of exercise.

**Clinical Relevance:** Depressive symptoms are prevalent (~40%) and may persist over a year following hip fx surgery, further impacting return to functional independence. Depression may also correlate with impaired balance in a population that already demonstrates a high fall risk. In addition to early identification of post-op pain, anxiety, and subjective symptoms, clinicians should consider use of the GDS or CES as valid, self-report measures that take 5 minutes to complete. Following hip fx, early identification of depression and referral for psychological evaluation or counseling as part of a post-op plan of care may be beneficial in decreasing depression and maximizing functional mobility in older adults.

**KEYWORDS:** older adults, hip fracture, depression.

## MINORS Scores:

Reference #	3	6	9	10	2	8	7	3
MINORS	13	11	11	13	19	17	22	13
Average	Noncomparative = 12.5/16				Comparative = 19.33/26			



Geriatric Depression Scale <i>Answer yes or no</i>	Center for Epidemiological Studies-Depression <i>Answers: ≤1 day, 1-2 days, 3-4, 5-7 or nearly every day for the last 2 weeks</i>
1. Are you basically satisfied with your life? 2. Have you dropped many of your activities and interests? 3. Do you feel that your life is empty? 4. Do you often get bored? 5. Are you in good spirits most of the time? 6. Are you afraid that something bad is going to happen to you? 7. Do you feel happy most of the time? 8. Do you often feel helpless? 9. Do you prefer to stay at home, rather than going out and doing new things? 10. Do you feel you have more problems with memory than most? 11. Do you think it is wonderful to be alive now? 12. Do you feel pretty worthless the way you are now? 13. Do you feel full of energy? 14. Do you feel that your situation is hopeless? 15. Do you think that most people are better off than you are?	1. My appetite was poor 2. I could not shake off the “blues” 3. I had trouble keeping my mind on what I was doing 4. I felt depressed 5. My sleep was restless 6. I felt sad 7. I could not get going 8. Nothing made me happy 9. I felt like a bad person 10. I lost interest in my usual activities 11. I slept much more than usual 12. I felt like I was moving too slowly 13. I felt fidgety 14. I wished I were dead 15. I wanted to hurt myself 16. I was tired all of the time 17. I did not like myself 18. I lost weight without trying to 19. I had a lot of trouble getting to sleep 20. I could not focus on the important things
<b>Total score:</b> (1 point for every answer indicating depression; cutoff 11+/16)	<b>Total score:</b> (0 for answers in column 1; 1 for those in column 2; 2 for those in 3; 3 for those in columns 4 or 5; cutoff 16+)

# **The Effect of Virtual Reality Training on Balance, Gait and Mobility in Persons with Parkinson's disease: A Systematic Review**

Alexander Arrow, SPT, Joseph Martzen, SPT, Michael Montalbano, SPT,  
James Moser, SPT, Alexander Tomlinson, SPT, Dr. Renée Hakim, PT, PhD, NCS

**Purpose/Hypothesis:** 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).

**Materials/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, 9RCTs 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 y/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, 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/Biodex, 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, gait and mobility outcomes in this population.

**Clinical Relevance:** Commercially 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.

## Summary of Article Findings

Article Number	Frequency	Duration	"On" time of Medication	Total time of Balance training	Types of VR	H&Y Stage
1	3x per wk	12 wks	<i>prime time 1 hr</i>	20 min	Biodex tilt board with external display	G1 is $2.84 \pm 0.66$  G2 is  $2.61 \pm 0.42$
2	2 x per wk	6 wks	<i>prime time 1 hr</i>	30 min	Stationary force plate with external display	All participants stages 2-3
3	2x per wk	6 wks	<i>Late phase 2 hr</i>	20 min	Dynamic tilt board with external display	G1: 2.6  G2: 2.4  G3: 2.6
4	2x per wk	5 wks	<i>prime time 1 hr</i>	45 min	Stationary force plate with external display	All participants stages 2-3 with an average of 2.5
5	2x per wk	6 wks	<i>no time listed</i>	20 min	Wii Fit +Balance board	Control: 1.9  TE: 2  VRWii: 2
6	5x per wk	6 wks	<i>prime time 1 hr</i>	30 min	Wii Dance game without balance board	Not specified
7	3x per wk	4 wks	<i>prime time 1 hr</i>	30 min	Wii ( No mention of exact game)	Wii group: $2.5 \pm 0.6$  Control group:  $2.4 \pm 0.7$
8	2x per wk	7 wks	<i>prime time 1 hr</i>	30 min	Wii Fit +Balance board	All participants stages 1-2
9	2x per wk	8 wks	<i>prime time 1 hr</i>	30min	Kinect sensor X-box gaming system	All participants stages 1-2

# **The Effect of Rhythmic Auditory Stimulation on Gait Outcomes in Adults with Non-Progressive CNS Diagnoses: A Systematic Review**

Jordan Cominsky, SPT, Coleen Joyce, SPT, Madeline Raab, SPT, Suzanne Leschen, SPT  
Faculty Advisor: Dr. Jennifer Schwartz PT, DPT, NCS, Dr. Renée Hakim, PT, PhD, NCS

**Purpose:** The purpose of this systematic review was to determine the effects of rhythmic auditory stimulation (RAS) on gait outcomes in adults with non-progressive CNS diagnoses.

**Number of Subjects:** N/A

**Methods:** A literature search (2006-2016) of Cochrane Library, CINAHL, ScienceDirect, MEDLINE/PubMed was conducted using search terms: (Rhythmic auditory stimulation OR auditory rhythm OR externally controlled stimulation OR mechanically controlled cueing OR music therapy) AND (gait training OR gait OR walking OR ambulation OR treadmill training) AND (non-progressive neurological diagnoses OR stroke OR cerebrovascular accident OR traumatic brain injury). Search Limits: English, human subjects, and peer reviewed RCTs. Selection criteria: adults 18 years and older with non-progressive CNS diagnoses, intervention including RAS training and a measure of gait outcomes. Two reviewers independently assessed each article for methodological quality and came to a consensus using PEDro guidelines.

**Results:** A total of 27 articles were screened for eligibility. Following detailed appraisals, 6 RCTs met the criteria. PEDro scores ranged from 5 to 7/10 (avg=6.5). Samples ranged from 16 to 155 subjects (total=272) with acute (200) and chronic stroke (72). Treatment parameters varied widely with durations ranging from 4 days to 6 weeks in clinical settings. RAS was delivered by means of a metronome in all 6 studies with 2 studies also using music. Primary outcome measures included gait parameters, Dynamic Gait Index (DGI), Timed Up and Go (TUG), and the 10 Meter Walk Test. Secondary outcomes included: Berg Balance Scale (BBS), standing balance (Biosway), Fugl-Meyer lower extremity scale, Stroke Specific Quality of Life (SS-QOL) Scale, and EMG recordings. Five out of the 6 studies were clinically and statistically significant in improving gait outcomes using RAS. Four of 6 studies found significant improvements in velocity, stride length, cadence, swing symmetry, double support, and step length. Two studies found significant improvements in DGI and TUG scores. Two studies found significant gains in BBS scores and standing balance. Additional benefits of utilizing RAS included increased EMG activity of the lower extremity, peak-to-peak joint angular displacement, and QOL.

**Conclusions:** There is moderate to strong evidence supporting the use of RAS in gait training for patients with non-progressive CNS disorders, in particular patients with acute and chronic stroke. Limitations included small sample sizes, lack of long-term follow-up, and short study durations. Future RCTs should focus on determining optimal mode and parameters for RAS training.

**Clinical Relevance:** Clinicians should consider the use of RAS gait training in patients with non-progressive CNS disorders to improve gait outcomes. RAS is feasible and easily implemented in the clinic in order to improve gait outcomes and recovery in functional ability. Improvements may be seen in as few as 4 days, but the literature most commonly suggested 30 minutes/day, 5x/week, for 3 to 6 weeks duration.

## *PEDro Scores*

	1	2	3	4	5	6	7	8	9	10	PEDro Score
Cha et al. (2014)	Y	Y	Y	N	N	N	Y	Y	Y	Y	7/10
Thaut et al. (2007)	Y	Y	Y	N	N	Y	N	Y	Y	Y	7/10
Johannsen et al. (2010)	Y	Y	N	N	N	Y	Y	Y	Y	Y	7/10
Suh et al. (2014)	Y	Y	Y	N	N	N	Y	Y	Y	Y	7/10
Kim et al. (2011)	Y	N	Y	N	N	N	N	Y	Y	Y	5/10
Chouhan et al. (2012)	Y	Y	Y	N	N	N	Y	N	Y	Y	6/10

\*Eligibility not included in table

## *Intervention Protocols*

	Frequency	Outcome Measures	Type of RAS	Time
<b>Cha et al. (2014)</b>	5x/week for 6 weeks	BBS, SS-QOL, gait velocity, stride length, cadence	Metronome and Music	30 minutes/session
<b>Thaut et al. (2007)</b>	5x/week for 3 weeks	Gait velocity, stride length, cadence, swing symmetry	Metronome and Music	30 minutes/session
<b>Johannsen et al. (2010)</b>	3x/week for 6 weeks	Fugl-Meyer LE scale, 10 Meter Walk Test, step length	Metronome	45 minutes/session
<b>Suh et al. (2014)</b>	5x/week for 3 weeks	Gait velocity, stride length, cadence	Metronome	RAS group: 15 minutes/session NDT group: 30 minutes/session
<b>Kim et al. (2011)</b>	4 days	TUG, EMG recordings	Metronome	22 minutes/session
<b>Chouhan et al. (2012)</b>	3x/week for 3 weeks	DGI, stride length, cadence, step length	Metronome	2 hours/session

# **THE EFFECT OF WHOLE BODY VIBRATION ON PAIN AND DISABILITY IN ADULTS WITH CHRONIC LOW BACK PAIN: A SYSTEMATIC REVIEW**

Travis Fahey, SPT, Corey Pasquarelli, SPT, Charles Lewis, SPT,  
Matthew Donaldson, SPT, Dr. Renée Hakim, PT, PhD, NCS

**Purpose/Hypothesis:** The purpose of this systematic review was to determine the effectiveness of whole body vibration (WBV) therapy as a treatment of chronic low back pain (CLBP) in adults.

**Materials/Methods:** A literature search was conducted using Pubmed, CINAHL, Cochrane Library, and Google Scholar (2006-2016). Search limits included: English language, human subjects and peer-reviewed. Selection criteria included: (1) randomized controlled trials (RCT), (2) adults (>18 years) with reported CLBP, and (3) outcome measures of Oswestry Disability Index (ODI) and/or Visual Analog Scale (VAS). Two reviewers independently assessed each article for methodological quality and came to a consensus using PEDro guidelines.

**Results:** A total of 59 articles were screened for eligibility. Following detailed appraisals, 4 RCTs met the criteria. PEDro scores ranged from 5-7 with an average score of 6. Sample sizes ranged from 21-50 participants. Treatment parameters varied widely with durations ranging from 2 to 12 weeks. Two of 4 studies showed statistically significant improvements using WBV. Intervention of standing on a WBV platform alone (total of 6 min @20 Hz, 2x weekly x 12 wks) resulted in significant between-group improvements in both VAS ( $p=0.006$  and ODI ( $p=0.013$ ) scores vs. controls. Standing WBV (x 5min @18 Hz) followed by performance of spinal stabilization (SS) exercises (x 25 min; 3x weekly x 6 wks) resulted in significant between-group improvements in VAS scores ( $p<0.05$ ) vs. exercise only controls, as well as significant within-groups improvements in both VAS and ODI scores ( $p<0.01$ ). No statistically significant differences were found between or within groups on the VAS and/or ODI in 2 studies when WBV was performed concurrently with SS exercises (x 30-60 sec WBV @25-50Hz, 3x weekly x 20-35 min sessions x 2 - 8 weeks).

**Conclusions:** There is moderate evidence for WBV as a safe and effective method to decrease disability and pain scores in adults with CLBP when it is not performed concurrently with SS exercises. WBV performed alone or prior to SS exercise has shown positive results with significant reduction of pain and disability. Study limitations included small samples sizes, variable protocols, likelihood of co-interventions, and poorly operationalized SS exercise. Further research is needed to provide the most appropriate parameters for the optimization of WBV.

**Clinical Relevance:** WBV is a treatment option that may be used to decrease pain and disability levels in adults with CLBP. However, the use of a WBV device may be limited as resources may not be readily available in many clinics. If available, application of WBV is feasible as it does not require much time or effort for implementation. The most effective treatment parameters for WBV were 18-20 Hz x 5-6 minutes total per session for 6-12 weeks duration. If resources allow, physical therapists should consider the use of WBV therapy for patients with CLBP prior to SS exercises to optimize outcomes.

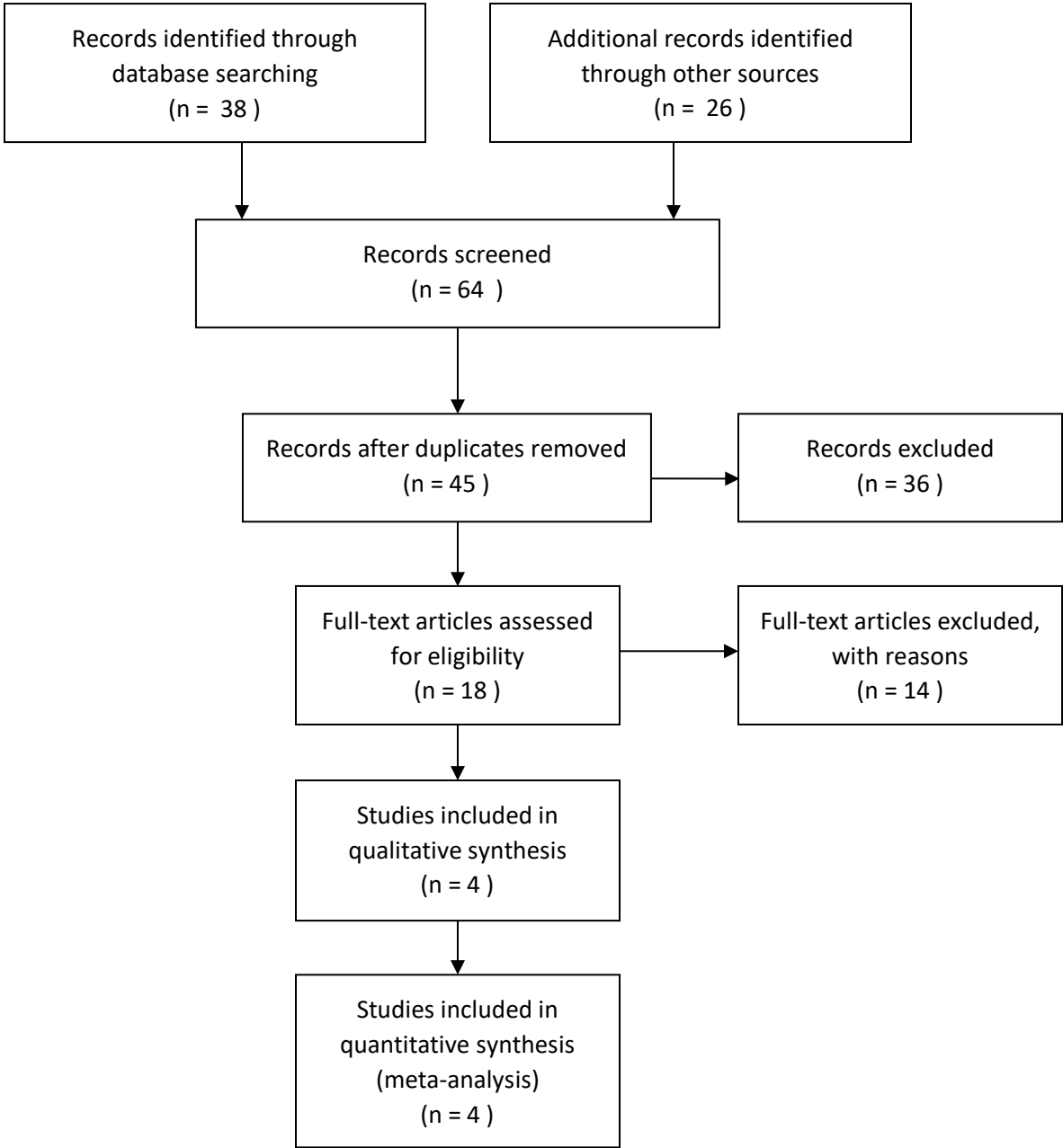
PEDro	1	2	3	4	5	6	7	8	9	10	11	Total
Baard	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	6/10
Del Pozo-Cruz	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	7/10
Torabi	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y	6/10
Yang	Y	Y	N	Y	N	N	Y	Y	N	Y	Y	5/10
TOTAL = 24/40						6/10						

Identification

Screening

Eligibility

Included



# **The Impact of Osseointegrated Prostheses on Quality of Life in Patients with Transfemoral Amputation: A Systematic Review**

Jennifer Lewis, SPT, Gabrielle Pierce, SPT, Kelly Kuzminski, SPT,  
Samantha Russo, SPT and Barbara Wagner, PT, DPT, MHA

**Purpose:** The purpose of this study was to examine the impact of osseointegrated prostheses (OIP) on quality of life (QOL) in patients with transfemoral amputation (TFA).

**Number of Subjects:** N/A

**Methods:** A literature search of CINAHL, ProQuest Health & Medical Complete, Google Scholar, PubMed/MEDLINE, and Science Direct was conducted using search terms: (osseointegrated prostheses) and (transfemoral amputation) and (quality of life or QOL).

Inclusion criteria: published within the last 10 years, English, human subjects, peer reviewed, examined patients with TFA and OIP, and assessed QOL in the form of a questionnaire. Studies that were case studies, case series, article reviews, or pilot studies were excluded. Two reviewers independently assessed each study for methodological quality and came to a consensus based on MINORS criteria.

**Results:** 465 articles were screened for eligibility. Six studies met the criteria for inclusion. MINORS scores for the studies examined ranged from 12/16 for non-comparative studies to 21/24 for comparative studies. Sample sizes ranged from 16 to 100 participants (252 total). Treatment parameters varied based upon the type of surgical procedure and the rehabilitation protocol post-op. The primary outcome assessed was QOL as measured by the Questionnaire for Persons with Transfemoral Amputation (Q-TFA). Four studies also measured QOL via the Short-Form 36 Health Survey (SF-36). Secondary outcome measurements included: walking ability (distance and speed), energy cost, and O<sub>2</sub> consumption. Adverse events including infection were reported. Although one study reported a 54.9% participant rate of infection, another study reported that rate of infection was not a major limiting factor in terms of QOL. One study specifically reported overall improvements in QOL in 69% of participants. 87% of all study participants reported an increase in daily OIP use. Statistically significant increases were seen in: prosthetic use, mobility, and global Q-TFA subscales; physical function, role functioning from a physical perspective, bodily pain, and physical component score SF-36 subscales; and walking ability. Statistically significant decreases were seen in energy cost, O<sub>2</sub> consumption, and the problem Q-TFA subscale.

**Conclusion:** There is moderate evidence in support of the use of OIP for patients with TFA to improve overall QOL. Limitations include: sample size, study design, and inadequate duration of follow-up. Future studies should focus on long-term assessment of functional outcomes.

**Clinical Relevance:** The use of OIP for patients with TFAs occurs throughout Australia, Chile, and most of Europe. Due to successful outcomes associated with QOL, walking ability, energy cost, and O<sub>2</sub> consumption, the FDA has since approved the use of OIP prostheses in the USA as of July 16, 2015. Based on the likelihood of increased prevalence, physical therapists in the USA should be educated regarding the overall duration (16-24 weeks) and unique aspects of care (i.e., progressive weight-bearing activities from quadruped to standing and wound care considerations) associated with post-surgical rehabilitation for OIP.

## OUTCOME MEASURES

### Questionnaire for Persons with Transfemoral Amputation (Q-TFA)<sup>6</sup>

- A condition specific outcome measure which reflects current prosthetic use, mobility, problems, and global health
- Primarily designed for non-elderly persons utilizing transfemoral prostheses
- Developed to examine outcomes related to OIP utilization
- The results of the Q-TFA are represented in four subscales:
  - Prosthetic Use (2 items): a score of 100 indicates the prosthesis is worn  $\geq 15$ -hours/day
  - Prosthetic Mobility (19 items): constitutes the average of three sub-scores (use of walking aids, prosthetic capability, and walking habits outdoors); a higher score (0-100) indicates greater prosthetic mobility
  - Problem (30 items): used to assess the extent of perceived problems related to the amputation, the prosthesis, and their impact on QOL during the previous four weeks; a higher score (0-100) indicates a reduction in QOL (reversed score)
  - Global (3 items): addresses the subject's general perception of function, problems with the current prosthesis, and the subject's perception of the amputation; a higher score (0-100) indicates a greater overall situation

### Short-Form 36 Health Survey (SF-36)<sup>6</sup>

- A general health-related QOL questionnaire
- Consists of eight subscales and two summary measures
  - Subscales:
    1. Physical Functioning (PF)
    2. Role functioning from a Physical Perspective (RP)
    3. Bodily Pain (BP)
    4. General Health (GH)
    5. Vitality (VT)
    6. Social Functioning (SF)
    7. Role functioning from an Emotional perspective (RE)
    8. Mental Health (MH)
  - Summary measures:
    1. The Physical Component Score (PCS)
    2. The Mental Component Score (MCS)
- A higher score (0-100) within each subscale indicates a greater overall QOL

# **The Effect of Fatigue on Balance and Fall Risk using Balance Outcome Measures in Community Dwelling Older Adults: A Systematic Review**

Nicholas J. Constantino, SPT, Daniel J. DiPaola, SPT, Kyle S. Kasman, SPT,  
James F. Leighty, SPT, and Peter M. Leininger, PT, Ph.D., OCS

**Purpose/Hypothesis:** To investigate the impact of fatigue on balance ability and fall risk in older adults, recorded through the use of both clinical and laboratory/instrumented balance tests.

**Number of Subjects:** N/A

**Materials/Methods:** The search was limited to human subjects and studies conducted between 2006 and 2016. Search engines used included: CINAHL, ProQuest Health and Medical Complete, Science Direct, Google Scholar databases. The primary search terms included “fatigue,” OR “exhaustion,” AND “balance,” AND “elderly,” OR “older adults,” OR “senior,” OR “geriatric,” AND “falls.” These search terms yielded 8,935 articles from the four databases. Using inclusion and exclusion criteria, a total of 8 non-randomized cohort studies were selected to review. Our selection criteria was community dwelling older adults >60 y/o, balance measures and level 2 evidence or higher. Five out of the 8 studies were comparative studies which scored a mean of 18/24 on the MINORS Scale. Three out of the 8 studies were non-comparative studies which scored a mean of 13.33/16 on the MINORS Scale.

**Results:** Concerning clinical outcome measures, one study found a significant decrease in Berg Balance Scale scores in the older adults after fatigue; one study found a decrease in the Single Leg Stance Time Test, Lower Extremity Reach Test, and modified Functional Reach Test in the older adults after fatigue. Studies that used laboratory/instrumented tests of older adults to look at the effects of fatigue, demonstrated a significant increase in sway, step length, mediolateral trunk acceleration, step length variability, lead limb vertical loading rate. Scores were significantly decreased when using the Modified Clinical Test of Sensory Integration and Balance test. All of these differences were found to be statistically significant;  $p < .05 - .001$ .

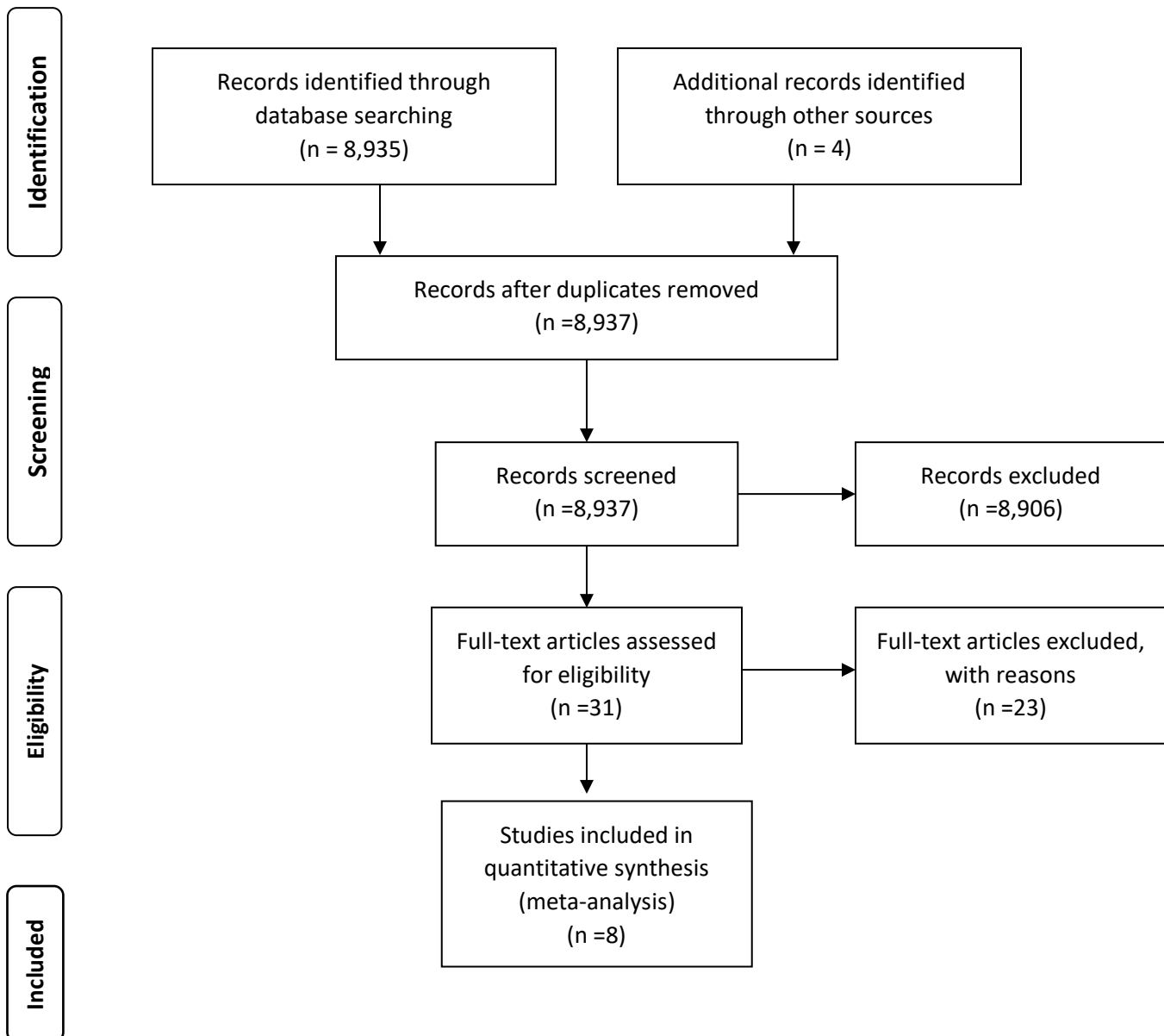
**Conclusions:** Fatigue has a statistically and clinically significant effect on the performance of older adults on both clinical and laboratory/instrumented balance tests. These results included both lower scores on balance tests and an increase in kinematic gait deviations associated with increased fall risk. This conclusion indicates that fall risk assessment may be more representative of real-life situations when performed with the subject in a fatigued state. Limitations of the systematic review include varied fatiguing protocols and outcome measurements.

**Clinical Relevance:** Fatigue impacts older adult’s performance on balance tests conducted to determine fall risk. Healthy older adults not determined to be a risk for fall via clinical and laboratory balance testing might, in actuality be at risk for fall when tested in a fatigued state. Walking tests, such as the 6min walk test, may be a useful functional fatigue protocol, as every outcome measurement done in these studies directly relates to gait and balance while walking. Future studies should be conducted focusing on the effect of fatigue during functional tasks to determine what tasks are the most common causes of fatigue that could result in an increase in fall risk.

**KEYWORDS:** Fatigue, Balance, Older adults.

### Minors Scale:

Article	1	2	3	4	5	6	7	8	9	10	11	12	total
Alias et al 2014	2	2	2	2	0	2	2	1	N/A	N/A	N/A	N/A	14/16
Bellew et al 2006	2	2	2	2	1	2	0	2	N/A	N/A	N/A	N/A	13/16
Islami et al 2012	2	2	2	2	0	2	2	1	N/A	N/A	N/A	N/A	13/16
Hatton et al 2012	2	1	2	2	0	2	1	2	2	1	2	2	19/24
Helbostad et al 2007	2	2	2	2	0	2	1	2	2	0	2	2	19/24
Mademli et al 2008	2	1	2	2	0	2	1	2	1	0	2	2	17/24
Morrison et al 2016	2	2	2	2	0	2	0	2	0	2	2	2	18/24
Nagano et al 2014	2	1	2	2	0	2	0	2	0	2	2	2	17/24



# **THE EFFECTS OF PHYSICAL THERAPY ON QUALITY OF LIFE IN ADULT PATIENTS ON HOSPICE OR PALLIATIVE CARE: A SYSTEMATIC REVIEW**

Shannon Gilman, SPT, Jane Grenaldo, SPT, Dana Principe, SPT, Gianna Scarpelli, SPT  
Faculty Advisor: Dr. Tracey Collins, PT, PhD, MBA, GCS

**Purpose/Hypothesis:** The purpose of this study was to determine the impact of PT intervention on QOL in adult patients receiving palliative or hospice care.

**Number of Subjects:** N/A

**Materials/Methods:** A literature search of PubMed, CINAHL, ProQuest Health and Medical Complete, and Science Direct was conducted using search terms: physical therapy AND hospice AND palliative AND quality of life. Search limits: peer-reviewed, 2006-2016, scholarly journals, English, adults age  $\geq 18$ , and human subjects. Selection criteria: subjects receiving hospice or palliative care, intervention delivered by a physical therapist, and an outcome measure of quality of life. Two reviewers independently assessed each study for methodological quality and came to a consensus based on PEDro guidelines.

**Results:** A total of 62 articles were screened for eligibility. Following detailed appraisals, 4 records met the criteria. PEDro scores ranged from 3-6/10 with an average of 3.75. Sample sizes ranged from 34-144 subjects (294 total). There were 99 subjects who dropped out, 78 of those due to death. Treatment parameters varied widely with durations ranging from 20-50 mins, 2-3x/wk for 3-12 wks in palliative and hospice care settings. PT interventions included gait and transfer training, circuit training, stretching, muscle strengthening, standing balance, and aerobic endurance. Outcome measures to assess QOL included: Rotterdam Symptom Checklist (RSCL), European Organization for Research and Treatment of Cancer Core Quality of Life Questionnaire (EORTC QLQ-C30), EuroQol-5 Dimensions (EQ-5D), Edmonton Functional Assessment Tool 2<sup>nd</sup> Edition (EFAT-2). None of 4 studies found statistically significant increases in QOL while using PT as an intervention. 2 of 4 studies reported that QOL remained stable over the course of PT treatment, and 1 of these 2 studies reported a decline in QOL in the control group. 1 study reported an insignificant increase in QOL overall (EQ-5D) with a significant increase in 1 of the 5 dimensions (health state status).

**Conclusions:** There is weak evidence in support of using PT as an intervention to maintain or increase QOL in adults receiving palliative or hospice care. Limitations include: small samples, varied outcome measures, lack of long-term follow up, and dropout rate secondary to poor health status or death. Further research is needed on larger sample sizes to determine the optimal mode and parameters for PT intervention in palliative and hospice care.

**Clinical Relevance:** PT interventions may improve or maintain QOL in patients on hospice or palliative care. It is important for health care professionals on the hospice or palliative care team to be educated on including PT in the patient's plan of care. Physical therapists practicing in these settings should advocate for the importance of individualizing treatments based on patient diagnosis and personal goals.

**KEYWORDS:** Physical Therapy, Hospice, Palliative, Quality of Life.

**PEDro Scores:**

<b>Author, Year</b>	<b>1*</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>Final Score</b>
Buss et. al., 2010	Y	N	N	Y	N	N	N	Y	N	Y	N	<b>3/10</b>
Oldervall et. al., 2006	Y	N	N	N	N	N	N	Y	Y	N	Y	<b>3/10</b>
Jones et. al., 2012	Y	Y	Y	N	N	N	N	Y	Y	Y	Y	<b>6/10</b>
Cobbe et. al., 2012	Y	N	N	Y	N	N	N	N	Y	N	Y	<b>3/10</b>

0 = NO (N)

1 = YES (Y)

**Outcome Measures Defined**

- **Rotterdam Symptom Checklist (RSCL)** - 39-item tool used to measure symptoms reported by cancer patients participating in clinical research such as physical symptom distress, psychological distress, activity level and overall global life quality
- **European Organization for Research and Treatment of Cancer Core Quality of Life Questionnaire (EORTC QLQ-C30)** - An integrated system for assessing the health related quality of life (QoL) of cancer patients participating in international clinical trials
- **EuroQol-5 Dimensions (EQ-5D)** - Generic health-related quality of life measure intended to be a simple, self-administered questionnaire. Consists of five dimensions: Mobility, self-care, usual activities, pain/discomfort, anxiety/depression
- **Edmonton Functional Assessment Tool 2<sup>nd</sup> Edition (EFAT-2)** - Designed to evaluate functional performance of patients with advanced cancer over time and to document the degrees of functional performance of patients throughout the terminal phase

# **Patient Satisfaction in Older Adults using Telerehabilitation in Home Health: A Systematic Review**

Dana Principe, SPT, Gabrielle Pierce, SPT

Faculty Advisor: Dr. Tracey Collins, PT, PhD, MBA, GCS

*The University of Scranton*

**Purpose/Hypothesis:** The purpose of this study was to determine how satisfied older adults are with the use of telerehabilitation in home health.

**Number of Subjects:** N/A

**Materials/Methods:** A literature search of PubMed, ProQuest, Science Direct, and CINAHL (2006-2016) was conducted to identify studies reporting on patient satisfaction of telerehabilitation. Search terms included: Telerehab\* AND Older Adults OR Elderly OR Geriatrics AND Patient Satisfaction. Search limitations included: peer-reviewed, 2006-2016, and English language. Inclusion criteria included: mean age of subjects  $\geq 65$  y/o, telerehab administered by a PT, and a measurement of patient satisfaction. Two reviewers independently assessed each study for methodological quality and came to a consensus using PEDro guidelines.

**Results:** The search produced 81 titles and abstracts for review. 40 articles were selected for further evaluation through the abstract review process. Following a detailed appraisal, 6 studies fulfilled the inclusion/exclusion criteria and were included in the systematic review. PEDro scores ranged from 2 to 7 with a mean of 4.33. Sackett LOE of all the articles was a B. Sample sizes ranged from 21-236 with a total of 514 subjects. There were 72 drop outs with 4 due to patient difficulty with technology. Outcomes used to assess patient satisfaction included: qualitative interviews, French version of the Healthcare Satisfaction Questionnaire, and researcher-developed satisfaction evaluation questionnaires (Likert-type and VAS scales). None of the outcomes measures reported reliability or validity testing. Results of patient satisfaction showed an overall value ranging from 82-90/100%, 5-7/7, >9/10. Subjective findings report that patients were “comfortable with technology regardless of prior exposure to technology”.

**Conclusion:** There is weak to moderate evidence to support the use of telerehab to satisfy older adults. The findings showed positive reports of satisfaction when using telerehab. Technology may be a barrier to telerehab but there was not a significant loss in subjects due to technology problems. Limitations include varied outcome measures, lack of comparable data on patient satisfaction between groups, and drop-outs secondary to patient difficulties with technology. Further research is needed to compare patient satisfaction between the intervention and control group rather than just reporting on intervention group.

**Clinical Relevance:** Telerehab has been shown to satisfy patient’s PT expectations. Telerehab is an efficient method for delivering PT care in the home without the cost of travel for the therapist.

**KEYWORDS:** Telerehabilitation, Older Adults, Satisfaction

<b>PEDro Scores</b>												
<b>Author, Year</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>Total</b>
<b>Russel et. al., 2011</b>	1	1	1	0	0	0	1	1	1	1	1	<b>7/10</b>
<b>Tousignant et. al., 2011</b>	1	1	0	1	0	0	0	1	0	1	1	<b>5/10</b>
<b>Crotty et. al., 2014</b>	1	0	0	0	0	0	0	1	1	0	0	<b>2/10</b>
<b>Tousignant et. al., 2014</b>	1	0	0	0	0	0	0	1	1	0	1	<b>2/10</b>
<b>Paneroni et. al., 2014</b>	1	0	0	1	0	0	1	1	1	1	1	<b>6/10</b>
<b>Benvenuti et. al., 2014</b>	1	0	0	1	0	0	0	1	0	1	1	<b>4/10</b>

<b>Sackett Levels of Evidence</b>	
Russel et. al., 2011	1B
Tousignant et. al., 2011	1B
Crotty et. al., 2014	2C
Tousignant et. al., 2014	2C
Paneroni et. al., 2014	2C
Benvenuti et. al., 2014	2B
<b>Overall Level of Evidence</b>	<b>B</b>

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## Optokinetic Stimulation Home Exercise Program

Gabrielle Pierce, SPT

- Watch selected video/s for as long as you can tolerate 1-2 x per day.
- Stop watching the video if you have a 2 point increase in level of headache or dizziness
- All videos can be found on YouTube by typing the following titles into the search bar on (youtube.com).

- ☐ Busy Grocery Store: Optokinetic Training (3:30)
- ☐ Driving Down a Hill: Optokinetic Training (3:31)
- ☐ Driving in Light & Shadows: Optokinetic Training (1:31)
- ☐ Driving in Reverse: Optokinetic Training (2:30)
- ☐ Driving on a Curvy Road: Optokinetic Training (7:52)
- ☐ Driving on a Hill in Reverse: Optokinetic Training (0:52)
- ☐ Driving Over a Bridge: Optokinetic Training (0:43)
- ☐ Driving Tacony Palmyra Bridge: Optokinetic Training (0:44)
- ☐ Driving Walt Whitman Bridge: Optokinetic Training (1:36)
- ☐ Grocery Store Walk Through Optokinetic Training (2:41)
- ☐ Home Decor Shopping: Optokinetic Training (3:50)
- ☐ Italian Market: Optokinetic Training (2:23)
- ☐ OC Boardwalk: Optokinetic Training (2:04)
- ☐ Outdoor Art Exhibit: Optokinetic Training (3:38)
- ☐ Walking Around a Hardware Store (3:51)
- ☐ Walking Downtown: Optokinetic Training (4:15)
- ☐ Walking in a Library: Optokinetic Training (2:02)
- ☐ Walking on a BoardWalk: Optokinetic Training (1:32)

**University of Scranton**  
**Department of Physical Therapy**  
**Department Web Page:**

<http://www.scranton.edu/academics/pcps/physicaltherapy/>

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**Thank you!**