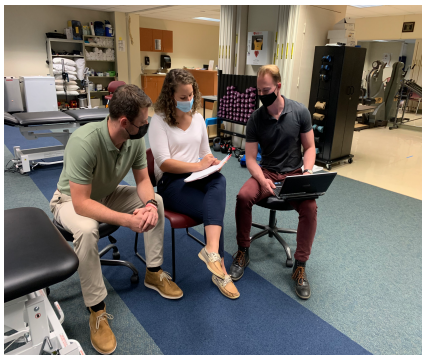
DPT Program
Annual Research Night

Saturday, November 12th, 2022
5:00 PM to 8:30 PM

- DeNaples Center, Moskovitz Theater -
& Live Webinar via Zoom

This course is approved for 3 general contact hours (CEUs). However, you must view the entire session to receive credit. 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 of the determination.

University of Scranton Physical Therapy:
http://www.scranton.edu/academics/pcps/physicaltherapy



Do you know anyone who is uninsured or underinsured and needs PT services?

Do know anyone who has exhausted their insurance coverage and would still benefit from skilled PT services?

LEAHY PT CLINIC

Student-Run ~ Pro Bono

The mission of the Leahy PT Clinic is to deliver patient-centered care grounded in the Jesuit tradition of educating "men and women for and with others" by providing pro bono physical therapy services to uninsured and underinsured residents of our local community through collaboration, peer-mentorship, and evidence-based practice. Our student administrative team manages all clinic operations with supervision and guidance from PT Faculty. Practice areas typically include orthopedics, neurology, geriatrics, and cardiopulmonary. Our peer-mentored DPT student groups provide skilled clinical management to address a wide range of issues including (but not limited to): musculoskeletal pain, post-surgical recovery, chronic conditions, balance and gait dysfunction, vestibular disorders, deconditioning, and post-COVID-19 complications.

For more information, please contact us and visit our website: www.scranton.edu/pcps/pt-leahy-clinic.

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Open Tuesdays & Thursdays
3:00pm-6:00pm

Schedule

5:00pm
Introduction: Dr. Renée M. Hakim, Chair/Program Director

Group 1:
Title: Impact of Standard vs. Modified Sternal Precautions on Function Following Median Sternotomy: A Systematic Review
Authors: Bobbi Bailey, Diana Bonilla, Alexis Coval, Christina Haddican, Dana Maida, Janette Scardillo

Group 2:
Title: Prenatal Lead Exposure and Health Outcomes Among Infants and Children in Bangladesh: A Systematic Review
Authors: Briana Abrams, Alexa Cardella, Alesia Heimes, Meghan Nally, Dr. Lori Walton, Dr. Nicholas Rodio

Group 3:
Title: The Impact of Family-Centered Care on Motor Function in Preterm Infants: A Systematic Review *Authors:* Lauren Byrne, Diana Franceschelli, Laura Iobst, Hailey Kenyon, Dr. Nicholas Rodio

Group 4:
Title: Virtual Reality for Gait and Balance in Adults with Unilateral Amputation: A Systematic Review
Authors: Jessica Book, Kerri Breznak, Karllo Pozo, Hannah Woodeshick, Dr. Renée M. Hakim

Group 5:
Title: Clinical Applications of Virtual Reality in Adults with Concussion: A Systematic Review
Authors: Sarah Gordon, Erin Putnam, Alyssa Canone, Nicholas Zenga, Dr. Renee Hakim, Dr. Jennifer Schwartz

Group 6:
Title: Effect of Music on Stress and Anxiety in Healthcare Students During Examinations: A Systematic Review
Authors: Claire Cardillo, Makenna Enslin, Joshua Perez, Jacob Sacher, Dr. Anthony Carusotto

---------- **BREAK** (20 minutes) ----------

7:00pm

Group 7:
Title: Impact of Mind-Body Interventions on Physical and Psychological Outcomes in Adult Refugees: A Systematic Review
Authors: Maria Almodovar, Emily Burns, Amanda Kinback, Emily Loftus, Dr. Jennifer Schwartz

Group 8:
Title: Impact of Service on Cultural Competency and Social Responsibility in DPT Students: A Systematic Review

Authors: Taylor Baloga, Carli Tetla, Matthew Schreck, Kameron Matthews, Dr. Dana Maida, Dr. Janette Scardillo

Group 9:
Title: Impact of Blood Flow Restriction Therapy on VO_2max in Elite Athletes: A Systematic Review
Authors: Eric Bartlett, Brendan Betti, Lucas Hackett, Michael McGuire, Dr. Joshua Prall, Dr. Peter Leininger

Group 10:
Title: The Impact of COVID-19 Pandemic on Trends in Home Health Physical Therapy
Authors: Sarah Gordon, Dr. Tracey Collins

Group 11:
Title: The Impact of Vestibular Rehabilitation Therapy Post-Concussion in Adolescents: A Systematic Review
Authors: Amanda Kinback, Matthew Moran, Dr. Jennifer Schwartz, Dr. Lori M. Walton

Group 12:
Title: The Impact of Assistive Technology on Quality of Life of Home-Dwelling Individuals with Parkinson's: A Scoping Review
Authors: Alexa Cardella, Dr. Tracey L. Collins, Sarah Gordon

Group 13:
Title: The Impact of Exercise on Physical Health Outcomes in Incarcerated Women: A Systematic Review
Authors: Alexa Cardella, Diana Franceschelli, Sarah Gordon, Dr. Dylan Kane, Dr. Nick Linko, Dr. Mark Merli, Dr. Dana Maida, Dr. Nicholas Rodio, Dr. Jennifer Schwartz

Components of Evidence-Based Practice

Adapted from: APTA Open Access; https://www.apta.org/patient-care/evidence-based-practice-resources/components-of-evidence-based-practice

Evidence-based practice includes the integration of best available evidence, clinical expertise, and patient values and circumstances related to patient and client management, practice management, and health policy decision-making.

All three elements are equally important.

Best Available Evidence

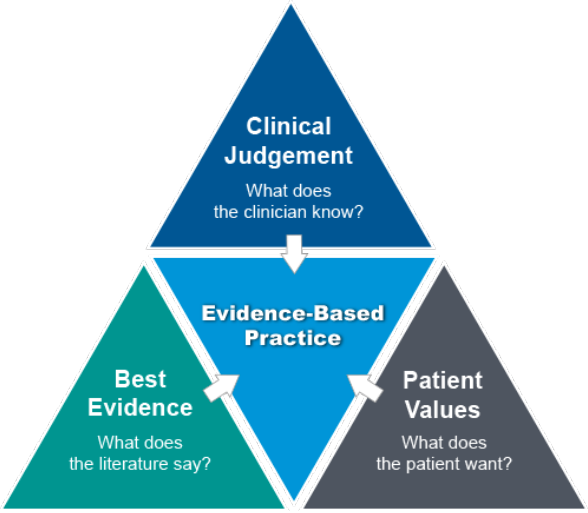
Decision-making is optimized by emphasizing the use of evidence from well-designed and well-conducted research. Although evidence-based practice encompasses more than just applying the best available evidence, many of the concerns and barriers to using evidence-based practice revolve around finding and applying research.

Clinical Expertise

The physical therapist and physical therapist assistant's knowledge and skills are a key part of the evidence-based process. This personal scope of practice consists of activities undertaken by an individual physical therapist that are situated within a physical therapist's unique body of knowledge where the individual is educated, trained, and competent to perform that activity. Using clinical decision-making and judgment are critical.

Patient Values

The patient's wants and needs are a key part of evidence-based care. Incorporating a patient's cultural considerations, needs, and values are necessary to provide best practice services.



https://www.mcg.com/blog/2019/06/28/mcg-certification-and-the-commitment-to-evidence-based-practice/

All Evidence is Not Created Equal

Sackett Levels of Evidence / OCEBM (2009)

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

Oxford Centre for Evidence-Based Medicine 2011 Levels of Evidence

Question	Step 1 (Level 1*)	Step 2 (Level 2*)	Step 3 (Level 3*)	Step 4 (Level 4*)	Step 5 (Level 5)
How common is the problem?	Local and current random sample surveys (or censuses)	Systematic review of surveys that allow matching to local circumstances**	Local non-random sample**	Case-series**	n/a
Is this diagnostic or monitoring test accurate? (Diagnosis)	Systematic review of cross sectional studies with consistently applied reference standard and blinding	Individual cross sectional studies with consistently applied reference standard and blinding	Non-consecutive studies, or studies without consistently applied reference standards**	Case-control studies, or "poor or non-independent reference standard**	Mechanism-based reasoning
What will happen if we do not add a therapy? (Prognosis)	Systematic review of inception cohort studies	Inception cohort studies	Cohort study or control arm of randomized trial*	Case-series or case-control studies, or poor quality prognostic cohort study**	n/a
Does this intervention help? (Treatment Benefits)	Systematic review of randomized trials or *n*-of-1 trials	Randomized trial or observational study with dramatic effect	Non-randomized controlled cohort/follow-up study**	Case-series, case-control studies, or historically controlled studies**	Mechanism-based reasoning
What are the COMMON harms? (Treatment Harms)	Systematic review of randomized trials, systematic review of nested case-control studies, *n*-of-1 trial with the patient you are raising the question about, or observational study with dramatic effect	Individual randomized trial or (exceptionally) observational study with dramatic effect	Non-randomized controlled cohort/follow-up study (post-marketing surveillance) provided there are sufficient numbers to rule out a common harm. (For long-term harms the duration of follow-up must be sufficient.)**	Case-series, case-control, or historically controlled studies**	Mechanism-based reasoning
What are the RARE harms? (Treatment Harms)	Systematic review of randomized trials or *n*-of-1 trial	Randomized trial or (exceptionally) observational study with dramatic effect			
Is this (early detection) test worthwhile? (Screening)	Systematic review of randomized trials	Randomized trial	Non -randomized controlled cohort/follow-up study**	Case-series, case-control, or historically controlled studies**	Mechanism-based reasoning

*** Level may be graded down on the basis of study quality, imprecision, indirectness (study PICO does not match questions PICO), because of inconsistency between studies, or because the absolute effect size is very small; Level may be graded up if there is a large or very large effect size.**

**** As always, a systematic review is generally better than an individual study.**

Oxford CEBM Levels (2011) cover the entire range of clinical questions, in the order (from top row to bottom row) that the clinician requires. While most ranking schemes consider strength of evidence for therapeutic effects and harms, the OCEBM system allows clinicians and patients to appraise evidence for prevalence, accuracy of diagnostic tests, prognosis, therapeutic effects, rare harms, common harms, and usefulness of (early) screening.

PEDro Scale 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												

1. Eligibility criteria were specified.
2. Subjects were randomly assigned to groups.
3. Allocation was concealed 4. Groups were similar at baseline.
5. Subjects were blinded.
6. Therapists who administered the treatment were blinded.
7. Assessors were blinded.
8. Measures of key outcomes were obtained from more than 85% of subjects.
9. Data were analyzed by intention to treat.
10. Statistical comparisons between groups were conducted.
11. Point measure and measures of variability were provided.

Criterion number 1 is not used to generate the total score. Therefore, the total maximum score is 10.

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

Methodological Index for Non-Randomized Studies (MINORS)

Table 2. The revised and validated version of MINORS

Methodological items for non-randomized studies	Score†
1. **A clearly stated aim:** the question addressed should be precise and relevant in the light of available literature	
2. **Inclusion of consecutive patients**: 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)	
3. **Prospective collection of data**: data were collected according to a protocol established before the beginning of the study	
4. **Endpoints appropriate to the aim of the study**: 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.	
5. **Unbiased assessment of the study endpoint**: blind evaluation of objective endpoints and double-blind evaluation of subjective endpoints. Otherwise the reasons for not blinding should be stated	
6. **Follow-up period appropriate to the aim of the study**: the follow-up should be sufficiently long to allow the assessment of the main endpoint and possible adverse events	
7. **Loss to follow up less than 5%**: 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	
8. **Prospective calculation of the study size**: 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	
Additional criteria in the case of comparative study	
9. **An adequate control group**: having a gold standard diagnostic test or therapeutic intervention recognized as the optimal intervention according to the available published data	
10. **Contemporary groups**: control and studied group should be managed during the same time period (no historical comparison)	
11. **Baseline equivalence of groups**: 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	
12. **Adequate statistical analyses**: whether the statistics were in accordance with the type of study with calculation of confidence intervals or relative risk	

†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 JOANNA BRIGGS INSTITUTE

JBI Critical Appraisal Checklist for Qualitative Research

Reviewer_____Date_____

Author _____Year_____Record Number_____.

		Yes	No	Unclear	Not applicable
1.	Is there congruity between the stated philosophical perspective and the research methodology?	☐	☐	☐	☐
2.	Is there congruity between the research methodology and the research question or objectives?	☐	☐	☐	☐
3.	Is there congruity between the research methodology and the methods used to collect data?	☐	☐	☐	☐
4.	Is there congruity between the research methodology and the representation and analysis of data?	☐	☐	☐	☐
5.	Is there congruity between the research methodology and the interpretation of results?	☐	☐	☐	☐
6.	Is there a statement locating the researcher culturally or theoretically?	☐	☐	☐	☐
7.	Is the influence of the researcher on the research, and vice- versa, addressed?	☐	☐	☐	☐
8.	Are participants, and their voices, adequately represented?	☐	☐	☐	☐
9.	Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	☐	☐	☐	☐
10.	Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?	☐	☐	☐	☐

Overall appraisal: Include ☐ Exclude ☐ Seek further info ☐

Comments (Including reason for exclusion)

Mixed Methods Appraisal Tool (MMAT), version 2018

Category of study designs	Methodological quality criteria	Responses			
		Yes	No	Can't tell	Comments
Screening questions (for all types)	S1. Are there clear research questions?				
	S2. Do the collected data allow to address the research questions?				
	Further appraisal may not be feasible or appropriate when the answer is 'No' or 'Can't tell' to one or both screening questions.				
1. Qualitative	1.1. Is the qualitative approach appropriate to answer the research question?				
	1.2. Are the qualitative data collection methods adequate to address the research question?				
	1.3. Are the findings adequately derived from the data?				
	1.4. Is the interpretation of results sufficiently substantiated by data?				
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?				
2. Quantitative randomized controlled trials	2.1. Is randomization appropriately performed?				
	2.2. Are the groups comparable at baseline?				
	2.3. Are there complete outcome data?				
	2.4. Are outcome assessors blinded to the intervention provided?				
	2.5 Did the participants adhere to the assigned intervention?				
3. Quantitative non-randomized	3.1. Are the participants representative of the target population?				
	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?				
	3.3. Are there complete outcome data?				
	3.4. Are the confounders accounted for in the design and analysis?				
	3.5. During the study period, is the intervention administered (or exposure occurred) as intended?				
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?				
	4.2. Is the sample representative of the target population?				
	4.3. Are the measurements appropriate?				
	4.4. Is the risk of nonresponse bias low?				
	4.5. Is the statistical analysis appropriate to answer the research question?				
5. Mixed methods	5.1. Is there an adequate rationale for using a mixed methods design to address the research question?				
	5.2. Are the different components of the study effectively integrated to answer the research question?				
	5.3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?				
	5.4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?				
	5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?				

SIGN	Methodology Checklist 3: Cohort studies

Study identification (*Include author, title, year of publication, journal title, pages*)

Guideline topic:	Key Question No:	Reviewer:

Before completing this checklist, consider:

1. Is the paper really a cohort study? If in doubt, check the study design algorithm available from SIGN and make sure you have the correct checklist.
2. Is the paper relevant to key question? Analyse using PICO (Patient or Population Intervention Comparison Outcome). IF NO REJECT (give reason below). IF YES complete the checklist..

Reason for rejection: 1. Paper not relevant to key question □ 2. Other reason □ (please specify):

Please note that a retrospective study (i.e., a database or chart study) cannot be rated higher than +.

Section 1: INTERNAL VALIDITY

	In a well conducted cohort study:	***Does this study do it?***	
1.1	The study addresses an appropriate and clearly focused question.[1]	Yes □ Can't say □	No □
SELECTION OF SUBJECTS			
1.2	The two groups being studied are selected from source populations that are comparable in all respects other than the factor under investigation.[2]	Yes □ Can't say □	No □ Does not apply □
1.3	The study indicates how many of the people asked to take part did so, in each of the groups being studied.[3]	Yes □	No □ Does not apply □
1.4	The likelihood that some eligible subjects might have the outcome at the time of enrolment is assessed and taken into account in the analysis.[4]	Yes □ Can't say □	No □ Does not apply □
1.5	What percentage of individuals or clusters recruited into each arm of the study dropped out before the study was completed.[5]		
1.6	Comparison is made between full participants and those lost to follow up, by exposure status.[6]	Yes □ Can't say □	No □ Does not apply □

ASSESSMENT			
1.7	The outcomes are clearly defined.[7]	Yes □ Can't say □	No □
1.8	The assessment of outcome is made blind to exposure status. If the study is retrospective this may not be applicable.[8]	Yes □ Can't say □	No □ Does not apply □
1.9	Where blinding was not possible, there is some recognition that knowledge of exposure status could have influenced the assessment of outcome.[9]	Yes □ Can't say □	No □
1.10	The method of assessment of exposure is reliable.[10]	Yes □ Can't say □	No □
1.11	Evidence from other sources is used to demonstrate that the method of outcome assessment is valid and reliable.[11]	Yes □ Can't say □	No □ Does not apply□
1.12	Exposure level or prognostic factor is assessed more than once.[12]	Yes □ Can't say □	No □ Does not apply □
CONFOUNDING			
1.13	The main potential confounders are identified and taken into account in the design and analysis.[13]	Yes □ Can't say □	No □
STATISTICAL ANALYSIS			
1.14	Have confidence intervals been provided?[14]	Yes □	No □
Section 2: OVERALL ASSESSMENT OF THE STUDY			
2.1	How well was the study done to minimise the risk of bias or confounding?[15]	High quality (++) □ Acceptable (+) □ Unacceptable – reject 0	
2.2	Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, do you think there is clear evidence of an association between exposure and outcome?	Yes □ Can't say □	No □
2.3	Are the results of this study directly applicable to the patient group targeted in this guideline?	Yes □	No □
2.4	**Notes.** Summarise the authors conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.		

Research Abstracts
and
Supplemental Material

Group 1

Title: Impact of Standard vs. Modified Sternal Precautions on Function Following Median Sternotomy: A Systematic Review*

Authors: Bobbi Bailey, Diana Bonilla, Alexis Coval, Christina Haddican, Dr. Dana Maida, Dr. Janette Scardillo

Purpose: Experts in the field have questioned the continued use of standard sternal precautions due to the impact on functional outcomes. The purpose of this systematic review was to determine the functional impact of standard sternal precautions (SSP) compared to modified sternal precautions (MSP) on mobility in adults following median sternotomy.

Methods: A literature search using PubMed, CINAHL, ScienceDirect, and APTA EBSCOhost was conducted using search terms: ("coronary artery bypass graft" OR CABG OR sternotomy) AND (function OR ADL OR "activities of daily living") AND (modified OR restrictive) AND precaution. Search limits: Human subjects, peer reviewed, English language. Selection criteria: adult (18+), median sternotomy. Two reviewers independently assessed each study for methodological quality and came to a consensus based on OCEBM Levels of Evidence (2011).

Results: 21 reports were assessed for eligibility. After detailed appraisals, 4 studies met selection criteria. All articles ranked as OCEBM Level 2 evidence (1 RCT, 1 quasi-experimental design, 1 observational study and 1cross-sectional design). Sample size ranged from 72-1,104(n=1,744; avg age 64.96 yrs). SSP prohibited lifting, pushing, pulling >5 lbs(4), driving(2), reaching behind back(2), reaching overhead(2), leaning forward with head below heart(1), arm use with sitting or standing(1) and required splint chest during coughing(2). MSP was defined as "keep your move in the tube" (3) or "less restrictive" (1). Function was assessed through Short Physical Performance Battery (SPPB), Health Assessment Questionnaire (HAQ), level of assistance for bed mobility and transfers, and functional self-report. 2 studies concluded no statistically significant differences between groups (SPPB at 4 weeks MD 1.0 point, 95%, CI –0.2 to 2.3; at 12 weeks MD 0.4 point, 95% CI –0.9 to 1.6; and self-report with $p=0.14$). 2 studies found significant improvements for MSP groups with greater return to function (HAQ $p<0.001$) and decreased functional assistance required($p<0.001$). 2 adverse events unrelated to sternal precaution adherence occurred in both the SSP (1) and MSP(1) groups.

Conclusions: Moderate levels of evidence indicated either equally effective or more favorable outcomes with use of MSP as compared with SSP. Limitations included non-standardized and varied functional outcome measures, and multiple sternal precaution protocols. Future research should include standardization of functional outcome measures and well-defined precautions to justify the use of MSP as a means to improve functional outcomes.

Clinical Relevance: Experts suggest SSP may inadvertently impede recovery when compared to patient-specific sternal precautions which may facilitate more favorable outcomes. Inconsistencies in reported sternal precaution protocols contribute to insufficient evidence in support of their universal use. With a lack of evidence to support adherence to SSP, clinicians should advocate to the medical team for incorporating MSP in standard sternotomy care. Permitting activity with MSP may improve functional outcomes and optimize discharge destination.

* Accepted for platform presentation at APTA Combined Sections Meeting (CSM), San Diego, CA, February 2023; Cardiovascular & Pulmonary Section

Citation	OCEBM Level	Standard Sternal Precautions (SSP)	Modified Sternal Precautions (MSP)	Functional Outcome Measures
1	Level 2: Randomized Clinical Trial	• No lifting > 5-10 lbs • No reaching behind back • No pushing or pulling through B UE • No reaching overhead (> 90) with B UE • No Driving	**Modified or Less Restrictive Precautions** • Use pain and discomfort as the safe limits for UE limb use during daily activities • Avoid pushing or pulling with one UE	**SPPB** • No statistically significant differences in SPPB scores between the groups at 4 weeks and 12 weeks post op
2	Level 2: Quasi Experimental Design	• No lifting, pushing, pulling ○ >5-10 lbs • No driving • Limit UE use with sitting or standing • Splint chest while moving or coughing	**KYMITT** • Prevent outstretch of UEs • UEs remain close to body • Modified WB movements with UE close to body • Continue until patient is able to move with no pain or discomfort	**HAQ** • KYMITT reported significantly lower HAQ Disability Index indicates greater return to function vs. SSP group
3	Level 2: Observational Study	• No pushing, pulling, or lifting > 5 lbs • No leaning forward with the head below the heart • No reaching behind the body	**KYMITT** • Lifting and WB guided by pain • Pay attention to how sternum and wound feel with movement • Change position to eliminate pain • Too soon to perform activity if pain cannot be eliminated	**Functional assistance required on bed mobility or transfers** • KYMITT group achieved independent or modified independent by final PT session • SSP group did not achieve these statuses
4	Level 2: Cross Sectional Design	• Do not raise B UEs overhead simultaneously • Do not push, pull or lift ○ > 5-20 lbs with UEs • Protect sternum: splint with pillow for coughing or sneezing	**KYMITT** • Unrestricted, unweighted UE movement with no increase in pain or feelings of instability in the sternum • Weighted movements that keep elbows against the body allowed • Protect sternum: splint with a pillow when coughing or sneezing	**Functional mobility & Self-care tasks (not further defined)** • No significant differences between KYMITT vs conservative precautions for functional mobility and self-care tasks

Key: B= Bilateral, WB= weight bearing, UE=upper extremity, HAQ=Health Assessment Questionnaire, SPPB=Short Physical Performance, KYMITT=*Keep Your Move in the Tube*, SSP=Standard Sternal Precautions

1. Katijjahbe MA, Granger CL, Denehy L, et al. Standard restrictive sternal precautions and modified sternal precautions had similar effects in people after cardiac surgery via median sternotomy ('SMART' trial): a randomised trial. *J Physiother.* 2018;64(2):97-106. doi:10.1016/j.jphys.2018.02.013
2. Park L, Coltman C, Agren H, et al. "In the tube" following sternotomy: a quasi-experimental study. *Eur J Cardiovasc Nurs*. 2021;20(2):160-166. doi: 10.1177/147451512095198
3. Gach R, Triano S, Ogola GO, et al. "Keep your move in the tube" safely increases discharge home following cardiac surgery. *PM&R*. 2021;1– 9. doi: 10.1002/pmrj.12562
4. Holloway C, Pathare N, Huta J, et al. The impact of a less restrictive poststernotomy activity protocol compared with standard sternal precautions in patients following cardiac surgery. *Phys Ther.* 2020; 100 (7):1074-1083. doi: 10.1093/ptj/pzaa067

Group 2

Title: Prenatal Lead Exposure and Health Outcomes Among Infants and Children in Bangladesh: A Systematic Review*

Authors: Briana Abrams, Alexa Cardella, Alesia Heimes, Meghan Nally, Dr. Lori Walton, Dr. Nicholas Rodio

Background: Mothers and children living in industrial and urban areas in developing nations are more susceptible to lead toxicity. Bangladesh is a low to middle resource country, with a high vulnerability to lead exposure due to the lack of environmental regulation and heightened occurrence of malnutrition. Malnutrition and micronutrient deficiencies compound the adverse effects of lead. Metal exposure is particularly concerning for pregnant women and children that is directly related to the consumption of local produce and fish from surrounding lead-polluted land and bodies of water. In pregnant women, lead readily passes to the placenta and reaches the fetus. Even at very low levels, this can impact physical and cognitive health outcomes of the developing child.

Purpose: The purpose of this study was to analyze the impact of prenatal lead exposure on physical and cognitive health outcomes of infants and children across Bangladesh.

Methods: A literature search of ProQuest, ScienceDirect, PubMed, and CINAHL was conducted using the search string: ("prenatal" OR "pregnant" OR "antenatal" OR "fetal") AND ("children" OR "infants") AND ("lead exposure" OR "lead toxicity") AND "Bangladesh". Search limits: peer-reviewed; research articles (ScienceDirect); articles (Springer Link); published from 2011-2022. Selection criteria: (1) Male and female infants, aged birth to 2 years, and children, aged 2-12, who were exposed to lead during fetal development in Bangladesh; (2) physical and/or health outcomes assessed during infancy or childhood; (3) prospective cohort studies. Studies were independently evaluated for methodological quality by two blinded reviewers using the Scottish Intercollegiate Guidelines Network (SIGN): Cohort Studies Tool.

Results: A total of 450 (N=450) articles were screened for eligibility. Seven (N=7) met selection criteria. Levels of evidence were acceptable (+) to high quality (++). A total of 12,617 mothers and 8,874 infants/children were included. Two studies from Matlab, Bangladesh and five studies from Sirajdikhan and Pabna, Bangladesh were included. Mean age at time of health assessment was birth to age 5. Studies assessed child's fetal lead exposure via mother's urinary lead levels at delivery (N=1), infant/child fingerstick blood (N=4) and/or birth umbilical cord lead levels (N=4) with follow-up. Primary outcome measures were infant/child anthropometric and child cognitive data. One study found significant negative associations between blood lead concentrations and Bayley Scale of Infant Development (BSID) cognitive scores ($p<=005$). Another study found significant associations between stunting at 4.5 years of age and blood lead at 14 and 30 weeks gestation ($r_s=0.64$, $p<0.001$). A 1-unit μg/dL increase in natural log cord blood lead in the presence of stunting was associated with a 2.10 decrease in cognitive scores. There was a significant inverse association between prenatal lead exposure in late gestation and kidney volume in females at preschool age ($p=0.041$).

Conclusions: Acceptable to high quality evidence supports the associations between prenatal lead exposure and: (1) infantile/childhood stunting; (2) lower cognitive scores. Limitations included: (1) inconsistent lead exposure measurements and outcome measures; (2) recruitment from two primary cohorts. Further research is needed to identify any further impacts that lead exposure has on the body and the age at which lead exposure affects stunting and cognition the most.

Clinical Relevance: PTs in Bangladesh should be aware of potential lead exposure and effects on a child's physical and cognitive abilities and provide community-based education on lead exposure and prevention during pregnancy. Additionally, PTs should screen children for stunting and cognitive delays at a young age to mitigate delays in achieving developmental milestones.

* Accepted for poster presentation at APTA Combined Sections Meeting (CSM), San Diego CA, February 2023; Pediatrics Section

Study	Assessment Measure	Outcome Measure	SIGN Score
Gleason et al. (2020)[1]	- Infant/Child fingerstick blood - Birth umbilical cord lead levels	- Birth weight - Birth height - Stunting - BSID	High Quality (++)
Skröder, et al. (2016)[2]	- Infant/Child fingerstick blood	- Childhood height & weight - Stunting - Kidney Volume	High Quality (++)
Gleason et al. (2016)[3]	- Infant/Child fingerstick blood - Birth umbilical cord lead levels	- Birth weight - Birth height - Stunting	High Quality (++)
Rodrigues et al. (2016)[4]	- Infant/Child fingerstick blood	- Birth weight - BSID - Head circumference	High Quality (++)
Gardner et al. (2013)[5]	- Mothers' urinary lead levels at delivery	- Birth weight - Birth height - Infantile height & weight	Acceptable (+)
Valeri et al. (2017)[6]	- Birth umbilical cord lead levels	- BSID - Head Circumference	Acceptable (+)
Wang et al. (2017)[7]	- Birth umbilical cord lead levels	- Birth weight - BSID - Head Circumference	Acceptable (+)

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Group 3

Title: The Impact of Family-Centered Care on Motor Function in Preterm Infants: A Systematic Review

Authors: Lauren Byrne, Diana Franceschelli, Laura Iobst, Hailey Kenyon, Dr. Nicholas Rodio

Purpose: The purpose of this study was to evaluate the current literature on the effectiveness of family-centered care on motor performance in preterm infants compared to standard care.

Methods: A literature search was conducted of CINAHL (EBSCO), Proquest Health and Medical Collection, Pubmed MedLine, and Wiley Online Library and registers using the search terms ("parent-administered" OR "family-centered" OR "parent education" OR "home based") AND ("physical therapy" OR "exercise") AND ("preterm infants" OR "premature infants"). Search limits: English, journals, human subjects, and 2012-2022. Selection criteria: preterm infants born less than 37 weeks, of no specific gender or diagnosis, and an intervention that included the parents in any setting. Each study was independently assessed by two reviewers for methodological quality based on the Oxford Levels of Evidence (2011).

Results: 538 studies were screened for eligibility. After appraisal, 14 met selection criteria with levels of evidence ranging from 2-3 with sample size ranging from 16-251 (N total=1,375). Treatment parameters ranged from 32 weeks postmenstrual age to 18 months corrected age, follow up outcomes varied from 1 month to 1 year post intervention, and all studies used motor performance as a primary outcome. Sessions ranged from 10-60 minutes for 1-14 times per week. Statistically significant improvements in motor outcomes were reported in 12 of the studies included. Examples of these improvements ranged from 4.8 - 5.2 points on the Alberta Infant Motor Scale (AIMS) after 4 weeks of intervention and from 5.5 - 18.0 points over the course of 4 weeks - 18 months on the Infant Motor Profile (IMP). Scores increased by 26.4 points after 3 weeks of intervention on the Test of Infant Motor Performance (TIMP) and by 11.6 points after 12 months of intervention on the motor domain of the Bayley Scale of Infant Development (BSID-III). Fine motor skills as measured by the Ages and Stages Questionnaire (ASQ-3) improved by 2 points over 8 months. No adverse events were reported.

Conclusions: There is moderate to high level evidence that family-centered care leads to improved motor performance in preterm infants. The amount of change on various motor outcomes described above demonstrates meaningful, functional improvements in preterm infants who received an intervention over the course of 3 weeks to 18 months. Limitations included varied sample size and interventions that were inconsistent between studies, short intervention duration and lack of follow-up, variable parental compliance, intervention cost, and lack of blinding of subjects and therapists. Future research involving larger sample sizes is necessary to produce more definitive intervention and outcome measure recommendations.

Clinical Relevance: Parent involvement is a critical component of physical therapy interventions for premature infants, as those in intervention groups that received family-centered care had overall better motor performance outcomes when compared to standard care. Early parent education focused on home-based exercises, such as positioning and toy-based activities completed for a minimum of 10 minutes twice a day over 3 weeks, can promote improvements in motor development for premature infants. These improvements can be assessed using objective outcome measures such as the TIMP, IMP, AIMS, ASQ-3 and BSID-III.

Study Name	OCEBM Level	Intervention	Outcome Measure(s)	Key Findings[+]
Sgandurra et al,, 2016	Level 3	CareToy System	IMP AIMS	- Intervention > Control on IMP by 2.7 points - Intervention > Control AIMS by 2.2 points
Sgandurra et al., 2017	Level 2	CareToy System	IMP AIMS	- Intervention > Control on IMP by 1.7 points - Intervention > Control on AIMS by 0.9 points
Ustad et al., 2016	Level 2	Postural control with picture booklet	TIMP	- Intervention > Control by 3.3 points
Ochandorena-Acha et al., 2022	Level 2	Positioning, prone play, object exploration	ASQ-3	- Control > Intervention on Fine Motor Scale of ASQ-3 by 10.6 points
Øberg et al., 2020	Level 2	Postural Control	TIMP	- Intervention > Control but no change values provided.
Yu et al., 2019	Level 2	Family-Centered Intervention Program (FCIP)	Neonatal Neurobehavioral Examination	- Intervention > Control on tone and motor patterns scale by 0.7 points
Yu et al., 2017	Level 2	Family-Centered Intervention Program (FCIP)	Neonatal Neurobehavioral Examination	- Intervention > Control on tone and motor patterns scale by 0.7 points
Flierman et al., 2016	Level 3	ToP Program	BSID-III	- Intervention > Control on BSID-III by 6.7 points
Cioni et al., 2017	Level 2	CareToy System	IMP AIMS	- Intervention > Control on IMP by 1.7 points - Intervention > Control on AIMS by .9 points
Finlayson et al., 2020	Level 3	SPEEDI	TIMP	- Intervention > Control by .78 points on BSID
Akhbari et al., 2021	Level 2	COPCA	IMP	- Intervention > Control by 4 points
Elbasan et al., 2017	Level 3	NDT Principles	BSID-III	- Control > Intervention by .9 points*

[+]Key findings represent the amount of change between groups from initial examination to final examination.

*Control improved by a greater value than the intervention group but the intervention performed better overall than the control group based on scores on BSID-III.

Results that were not statistically significant in Fjørtoft et al., 2017 (GMA), Ochandorena-Acha et al., 2022 (AIMS), Poggioli et al., 2016 (BSD-III), Finlayson F, 2020 (BSID-III), and Flierman et al., 2016 (ASQ-3) were not included in the table above.

Group 4

Title: Virtual Reality for Gait and Balance in Adults with Unilateral Amputation: A Systematic Review*

Authors: Jessica Book, Kerri Breznak, Karllo Pozo, Hannah Woodeshick, Dr. Renée M. Hakim

Purpose: The purpose of this systematic review was to investigate the clinical applications of Virtual Reality (VR) for balance and gait in adults with unilateral lower extremity (LE) amputations.

Methods: A literature search of CINAHL, ProQuest, PubMed and SpringerLink was conducted using search terms: ("virtual reality" OR VR) AND (amputation OR amputee OR amputees OR "limb loss") AND (gait OR walking OR ambulation OR mobility OR balance). Search limits: English, peer-reviewed, human subjects, 2011-2022. Selection criteria: Adults ≥ 18 y/o, unilateral LE amputation, use of immersive or non-immersive VR, ≥1 outcome for balance and/or gait. Methodological quality was assessed by 2 independent reviewers who came to consensus using Oxford CEBM Levels of Evidence (LoE) (2011).

Results: Total of 466 articles were screened for eligibility and 13 articles met selection criteria. LoE ranged from 3-4. Nine distinct samples were used with sizes ranging from 1-34 (N=271) participants with chronic (> 6 mo.) unilateral transtibial (TTA, n=122) or transfemoral (TFA, n=18) amputations (age range 21-63 yrs) and healthy controls (HC; n=136; age range 19-63 yrs). VR systems included CAREN (High-End=7; Extended=5) and Kinapsys™(1). Four exam studies (LoE 3) using the CAREN found significant impairment of TTA vs. HC for stability during ML platform perturbations (n=3), temporal-distance parameters (n=2), and gait kinematics (n=1). No between group differences noted with visual perturbations. Six exam studies (LoE 3) using CAREN found TTA groups had significantly decreased gait speed and step time vs. HC for level, ML translation, rolling hills, and cross-slopes while TFA groups had significantly increased step width and decreased gait speed vs. HC for downhill, uphill and cross slope terrains. Of 3 intervention studies, one (LoE 3) found statistically significant between group differences for VR group (Kinapsys™) compared to traditional rehab in balance (BBS, TUG) and complex gait (DGI) post 3x/wk for 6 wks. Two case studies (LoE 4) using CAREN for real-time feedback (30 min, 4x/wk x 3 wks) or surface perturbations (2x/wk x 4 wks) reported improved gait kinematics (n=2) and gait speed (n=1).

Conclusions: Low to moderate evidence (LoE 3-4) supports use of VR systems to examine/identify impairments and provide interventions for balance and/or gait in adults with LE amputations. Limitations included small, heterogeneous samples, widely varied VR applications and limited availability. Future research should evaluate the effects and clinical utility of VR for both exam and intervention in persons with LE amputation.

Clinical Relevance: Clinicians may consider application of exam evidence from complex VR systems to target key impairments following LE amputations such as sensory organization and adaptability in destabilizing environments. VR training may improve postural stability, gait kinematics, and complex gait using real-time feedback, surface perturbations and gaming scenarios. While clinical research is limited, future advances in VR may reduce cost, increase accessibility, and enhance care of adults with chronic unilateral LE amputations.

* Accepted for poster presentation at APTA Combined Sections Meeting (CSM), San Diego, CA, February 2023; Academy of Neurologic PT/Balance and Falls Special Interest Group (SIG)

Authors and Year	Methods	Outcomes	Significant Findings
Abbas et al., 2021	**Intervention** Kinapsys™	Stability and Gait	- VR demonstrated significant superior effects only on the balance markers, TUG test, DGI, and BBS ($P < 0.05$)
Beltran et al., 2014	**Exam** CAREN-HE	Stability	- TTA had greater mean margins of stability than HC during PLAT. ($p<0.05$)
Beurskens et al., 2014	**Exam** CAREN-HE	TS and Stability	- TTA had greater step width variability compared to HC during PLAT. ($p=0.01$) - TTA had greater trunk movement variability compared to HC during PLAT. ($p=0.04$)
Beurskens et al., 2014	**Exam** CAREN-HE	Stability	- TTA had greater local instability of the shank segment compared to HC during PLAT and VIS. ($p<0.05$) - TTA had less orbital instability of the ML foot movements compared to HC during PLAT. ($p=0.05$)
Darter et al., 2011	**Intervention** CAREN-HE	Kinematics	- 12 sessions of VR-based gait training produced more normalized overground gait biomechanics. - Improvements in frontal-plane trunk, pelvis, and hip kinematics post-training compared to pre-training.
Gates et al., 2012	**Exam** CAREN-HE	TS	- TTA took longer steps on their intact limb when walking on the treadmill than walking over-ground ($p = 0.016$). - Both TTA ($p = 0.029$) and HC ($p = 0.004$) exhibited increased step width variability on the treadmill compared to overground.
Hak et al., 2013	**Exam** CAREN-HE	TS	- TTA had slower gait speed compared to HC for NOP. ($p=0.015$) - TTA had lower step frequency compared to HC for NOP. ($p<0.01$) - TTA had larger SW compared to HC for all conditions. ($p=0.015$)
Sinitski et al., 2022	**Exam** CAREN-E	TS and Kinematics	- TTA had slower gait speeds than HC for all conditions. ($p<0.001$) - TTA had longer SL than HC for all conditions when controlled for speed. ($p<0.012$) - TTA had greater SL compared to HC asymmetries for cross-slope walking. ($p<0.035$)
Sinitski et al., 2015	**Exam** CAREN-E	TS	- TTA had slower gait speed compared to HC for level and DS. ($p<0.03$), ($p<0.001$)
Sinitski et al., 2019	**Exam** CAREN-E	TS and Kinematics	-TTA had slower gait speeds compared to HC for all conditions expect rocky. ($p<0.03$) -TTA had greater DST on the intact limb compared to HC for all conditions. ($p<0.005$)
Sheehan et al., 2015	**Exam** CAREN-E	TS and Kinematics	-TTA participants walked slower ($P < 0.001$) with longer ST ($P < 0.013$) and similar SL ($P = 0.111$), compared to HC participants. -When considering treadmill speed as a covariate, TTA SL was significantly different than HC ($P < 0.012$) suggesting that the TTA SL were longer at the slower walking speed. -On cross-slopes, TTA participants had greater SL limb asymmetries ($P <0.035$) when compared to HC participants.
Sheehan et al., 2016	**Intervention** CAREN-HE	TS	- The patient decreased his functional stepping test time by 13% from the pretraining evaluation - Increased his self-selected walking speed by 0.09 m/s, from 1.21 m/s to 1.30 m/s, a change greater than the 0.05 m/s MDC - SW decreased by more than the condition-specific MDC for all conditions. - The patient's SW variability was reduced by more than the condition specific MDC
Sturk et al., 2019	**Exam** CAREN-E	TS and Kinematics	-TFA had slower gait speed compared to HC for all conditions. ($p=0.010$) -TFA had greater step width for uphill, MLT, and RO conditions compared to level walking. ($p<0.001$) -TFA had lower DST of prosthetic limb compared to intact limb for DS and US walking. ($p<0.008$) -TFA had higher ML MoS for the prosthetic limb compared to HC nondominant limb for DS, US, and BCS conditions. ($p<0.04$)

Abbreviations Defined: (Define any abbreviations used above)

- BBS = Berg Balance Scale
- BCS = Bottom-Cross Slope
- CAREN = Computer Assisted Rehabilitation Environment
- CAREN-HE = Computer Assisted Rehabilitation Environment High End
- CAREN-E = Computer Assisted Rehabilitation Environment Extended
- DST = Double Support Time
- DGI = Dynamic Gait Index
- DS = Downhill Slope
- HC = Healthy Control
- ML = Medial/Lateral
- MLT = Medial-Lateral Translations
- NOP = No Perturbations
- PLAT = Platform Perturbations
- RO = Simulated Rocky
- SL = Step Length
- ST = Step Time
- SW = Step Width
- TFA=Transfemoral Amputation
- TS = Temporal Spatial
- TTA = Transtibial Amputation
- TUG = Timed Up and Go
- US = Uphill Slope
- VIS = Visual Perturbations

Group 5

Title: Clinical Applications of Virtual Reality in Adults with Concussion: A Systematic Review*

Authors: Sarah Gordon, Erin Putnam, Alyssa Canone, Nicholas Zenga, Dr. Renee M. Hakim, Dr. Jennifer Schwartz

Background and Purpose: Concussions are a prevalent injury resulting in problems with concentration, memory, balance, and coordination. Despite these symptoms, current concussion examination relies heavily on a subjective report of symptoms. The purpose of this systematic review was to examine the applications of Virtual Reality (VR) in the clinical management of adults with concussions.

Methods: A literature search was conducted in ProQuest, PubMed, ScienceDirect, and Springerlink using search terms: ("Virtual Reality" OR VR) AND (assessment OR evaluation) AND concussion AND treatment. Search limits: English, peer-reviewed, human subjects, adults (18+) and 2012-2022. Selection criteria: adults with concussion, immersive and non immersive virtual reality, quantitative study design, and motor or cognitive variables. Each study was independently assessed by two reviewers for methodological quality using the Oxford Centre for Evidence-Based Medicine Levels of Evidence (2011).

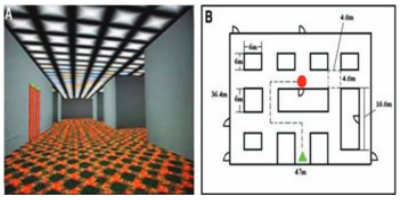
Results: A total of 631(680) studies were screened for eligibility. After detailed appraisal, 5 met selection criteria. All were non-randomized controlled cohort studies (Level 3). Sample sizes ranged from 21 to 152 concussed (n=101) and healthy participants (n=382). Immersive VR systems included the VisMini (3/5 studies) and CAREN (1/5), and non-immersive included the VTC Open GL Developing Kit (1/5) and VETs (1/5). All studies conducted single-day testing with no follow-up. 2 of 5 studies using VisMini established Sensitivity (Sen) and Specificity (Spe) with cut-off scores (0-10 pts) to indicate impaired reaction time (95.2% Sen, 89.1% Spe, 6.75 pts), memory (95.8% Sen, 91.4% Spe, 7.50 pts), balance (85.7% Sen, 87.8% Spe, 8.25 pts), and attention (54.2% Sen, 30.5% Spe, 9.50 pts). 1 of 5 studies using VETs determined 81.8% Sen and 85.7% Spe when examining sensory organization conditions to identify concussion deficits. Statistically significant between-group differences were found with the concussed groups performing lower in the areas of visuospatial navigation ($p<0.001$), detection of sway/reaction time ($p<0.001$), and steady state balance ($p<0.01$). 1 of 5 studies using CAREN found greater discrimination of those with concussion using perturbations during walking (accuracy 0.90) with more frequent use of hip strategy and less variability than controls.

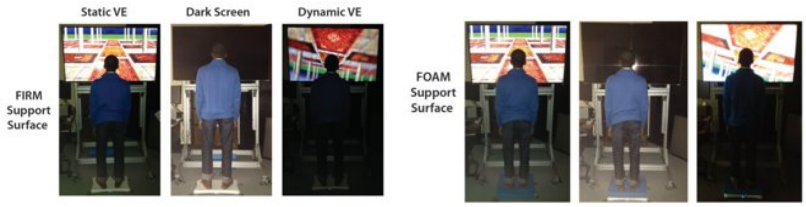
Conclusions: Moderate evidence suggested effective use of VR to identify motor and cognitive impairments related to concussions in adults, particularly for postural control. Limitations include small sample sizes, high cost of some VR systems, same lead author for 3 of 5 studies, and short-term outcomes for all studies.

Clinical Relevance: Physical therapists should consider using VR for examination of patients with concussions to obtain objective, predictive data on residual impairments. VisMini and VETs assessments yielded higher sensitivity and specificity than current gold standard assessments such as BESS and SOT. If a VR system is not available, diagnostic findings from recent research may be useful for clinical applications to target areas such as postural control, reaction time, motor strategy, and perturbations during gait. Additionally, VR may be used in return to sport protocols with better sensitivity to detect residual deficits than current clinical assessments.

* Accepted for poster presentation at APTA Combined Sections Meeting (CSM), San Diego, CA, February 2023; Academy of Neurologic PT/Brain Injury SIG

Types of Virtual Reality Systems from Systematic Review

Immersive VR Systems	Fully immersed and interact with the virtual environment (3D devices)
CAREN	
VisMini (3D Projection System)	

Non-Immersive VR Systems	Not fully immersed within the virtual environment (2D devices)
Virtual Environment TBI Screen (VETS)	

Summary of Results

Author, Year	**OCEBM Level And Design**	**Key Findings** ** Bolding indicates statistical significance**
Rao et al., 2020[1]	Level 3 Non-Randomized Controlled Cohort	Features from **sensorimotor perturbations are effective in detecting mTBI balance impairments** as compared to standard clinical tests.
Teel et al., 2016[2]	Level 3 Non-Randomized Controlled Cohort	Developed cutoff scores, specificity, and sensitivity for determining lingering balance deficits using VisMini.
Teel et al., 2016[3]	Level 3 Non-Randomized Controlled Cohort	Determined cutoff scores, sensitivity, and specificity for determining spatial **navigation/memory**, attention, **whole body reaction time**, and **VR neuropsychosocial battery** deficits using VizMini and VTC Open GL Developing Kit.
Teel et al., 2015[4]	Level 3 Non-Randomized Controlled Cohort	VR balance balance model using VizMini **validly measures postural stability** and is capable of determining balance deficits post-concussive injury.
Wright et al., 2017[5]	Level 3 Non-Randomized Controlled Cohort	**VETs is an accurate and valid measure for determining balance impairments following mTBI.**

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Group 6

Title: Effect of Music on Stress and Anxiety in Healthcare Students During Examinations: A Systematic Review*

Authors: Claire Cardillo, Makenna Enslin, Joshua Perez, Jacob Sacher, Dr. Anthony Carusotto

Purpose: The purpose of this systematic review was to determine the effect of music on stress and anxiety in healthcare students during examinations.

Methods: A literature search of Proquest, ScienceDirect, PubMed, and CINAHL was conducted with the search terms: Students AND (examinations OR objectively structured clinical examinations OR OSCE) AND music AND ("testing anxiety" OR "examination anxiety"). Selection criteria included randomized control trials with a sample population of any healthcare profession student, undergraduate or graduate, male or female, and over 18 years old. Interventions in the study consisted of listening to music before or during objectively structured clinical examinations (OSCE) or written examinations compared with not listening to music. Outcome measures included any reliable measure of stress or anxiety. Each study was independently assessed for methodological quality by two reviewers who came to consensus using PEDro guidelines.

Results: 173 studies were screened for eligibility, 7 RCTs met the selection criteria. PEDro scores ranged from 7/10 to 10/10 (avg. 8.6). Samples ranged from 38-125 (N= 522) healthcare students (100% nursing majors). Intervention protocols varied widely, with some administering music either during or before examinations. Music sessions ranged from 15-60 minutes, single intervention to 5 days per week, with a variety of genres including classical, Turkish, light instrumental music and rhythmic design. Primary outcome measures utilized were the Spielberger State Anxiety Inventory (STAI-state), Revised Test Anxiety Scale, Situational Anxiety Scale, and the Visual Analog Stress Scale (VASS). In comparison to the control groups, 5 out of 7 studies showed statistically significant decreases in stress and anxiety levels for music groups where music was administered before examination (4) and during examination (1) on the VASS (n=1, -2.3pts), STAI-state (n=5, -4pts, -1.65, 4.25pts, -11.61, -3.01pts,), and Revised Test Anxiety Scale (n=2, -0.41pts, 1.75).

Conclusion: There is strong evidence from the majority of the search yield (5/7) in support of using music before and/or during written examinations and objectively structured clinical examinations (OSCEs) in to reduce stress and/or anxiety in healthcare students. Limitations included small sample sizes, lack of uniformity in music protocols, and the participants consisting only of first and second-year nursing students. Further research is needed to determine the effectiveness of music on level of stress and anxiety in other allied healthcare students in an examination environment.

Clinical Relevance: Music, provided either before or during examination, provides a feasible option for reducing health profession students' level of stress and anxiety. While the findings are specific to nursing students, there are a variety of health profession students who may benefit from music intervention to reduce stress and anxiety.

* Accepted for a platform presentation at APTA Combined Sections Meeting (CSM), San Diego, CA, February 2023; Education Section

Study	Intervention	Key Findings	Outcome Measures
Gebhart et al.	(1) Body percussion (music therapy): 45-60 min prior to exam (2) Therapy dog: 45-60 min prior to exam *Compared with control group*	No difference between groups in measures of perceived stress and anxiety	STAI VASS IgA levels for cortisol
Eyüboğlu et al.	Music therapy: five sessions, 2x/week, 60 minutes *Compared with control group*	No difference in perceived stress and anxiety Music group: lower blood pressure both pre and post OSCE	STAI Vital signs: heart rate, blood pressure, pulse oximetry OSCE Skills Checklist
Son et al.	(1) Aromatherapy (AT): sweet orange scents (20 min, 1x/prior to test) (2) Music therapy (MT): Beethoven (20 min, 1x/prior to test) (3) Combined AT and MT (20 min, 1x/prior to test) *No control group comparison*	The combined AT and MT group was associated with a significant decrease in all outcome measures compared to MT and AT alone	Revised Test Anxiety Scale Spielberger State Anxiety Inventory-Y Numeric Rating Score (NRS)
Inangil et al.	(1) Music Therapy: traditional Turkish music (15 min, 1x/prior to assessment) (2) Emotional Freedom Technique (EFT): consisting of reflection, self-assessment, and affirmations (15 min, 1x/prior to assessment) *Compared with control group*	There was no significant difference in anxiety levels following the interventions between groups	Situational Anxiety Scale Vital Signs
Lai et al.	(1) Music Therapy: listened to Mozart during a 40-minute exam (2) Silence group: completed the exam in silence. *Groups changed intervention after 1 week*	Significant reduction in anxiety for the music group compared to the silence group	Music Preference Examination Anxiety State Anxiety Finger Temperature Pulse Rate
Mojarrab et al.	Intervention group: anxiety coping program with light instrumental music (6x/ 30 min, prior to assessment) *Compared with control group*	Intervention group: decreased stress, improved performance Control group: increased stress, decreased performance	STAI Exam performance
Gosselin et al.	Intervention group: Classical music prior to clinical simulation (1x/ 30 min, prior to assessment) Compared with control group	Significant reduction in anxiety levels for the experimental group compared to the control group.	STAI Generalized Self-Efficacy Scale Nursing Simulation Performance Vital signs

Group 7

Title: Impact of Mind-Body Interventions on Physical and Psychological Outcomes in Adult Refugees: A Systematic Review*

Authors: Maria Almodovar, Emily Burns, Amanda Kinback, Emily Loftus, Dr. Jennifer Schwartz

Purpose: The purpose of this systematic review was to evaluate the impact of mind-body interventions
(MBI) on physical and psychological outcomes in adult refugees.

Methods: A literature search of CINAHL, ProQuest, PubMed, ScienceDirect and 4clinical trial registers was conducted with search terms (refugee* OR "displaced person*") AND ("mind body practice*" OR "mind body therapy" OR "mindfulness-based physical activity" OR "mindfulness-based exercise*" OR yoga OR "tai chi" OR "body awareness" OR breath* OR mindful*). Search limits: English, peer-reviewed, human subjects, 2012-2022. Selection criteria: refugees 18+ who received MBI. 2 reviewers independently assessed methodological quality and came to consensus using Mixed Methods Appraisal Tool (MMAT).

Results: 194 studies were screened; 16 met selection criteria: 10 quantitative, 4 qualitative, 2 mixed methods. MMAT scores ranged 40-100% quality criteria met (QCM) (avg=66.25%). Samples ranged from 1-825 subjects (n=2953). MBI types: cognitive behavioral therapy (CBT, 5 studies), basic body awareness therapy (BBAT, 3 studies), social-emotional wellbeing with psychoeducation/breathing/yoga(SEW, 2 studies),dance/movement therapy (DMT, 1 study), acupressure and breathing (AB, 1 study), sport/exercise (SE 1 study), physiotherapy activity and awareness (PAAI, 1 study), mindfulness-based trauma recovery (MBTR, 1 study) and guided self-help (GSH, 1 study). Impairment-level outcomes significantly improved with MBTR (n=1), SEW (n=2), CBT (n=5), GSH (n=1) and BBAT (n=2); most commonly depression/anxiety/PTSD (n=7), PTSD (n=6) and mood (n=3). Strongest evidence with $p<0.001$ (n=2) supports SEW for anxiety (HSCL-25: avg -6.25pts) and stress (PSS: avg.-3.85pts). Qualitatively, SEW (n=1), BBAT (n=2), DMT (n=1) and AB (n=1) improved pain (n=2), stress (n=3), body awareness (n=3) and self-efficacy (n=3). Functional-level outcomes significantly improved with BBAT (n=1), CBT (n=3) and GSH (n=1), with greatest improvements (p range 0.0001-0.0348) with BBAT (GAF-F: +2.13pts; GAF-S: +2.76pts) and GSH (WHODAS: -8.6); qualitative improvements in sleep function using PAAI (n=1), AB (n=1) and BBAT (n=1). Participation-level outcomes significantly improved ($p<0.001$) QOL and wellbeing with BBAT and GSH [WHO-5: +6.7 pts, +4.6 pts respectively] with qualitative improvements noted for social relationships (n=5) following BBAT (n=2), SEW (n=1), AB (n=1), PAAI (n=1) and DMT (n=1). Personal factors significantly improved ($p<0.0001$) with SEW for coping (CSI-SF: avg. +17.8 pts) No adverse events were reported.

Conclusions: Low to high level evidence supports using MBI with adult refugees to improve physical/psychological outcomes. Limitations included widely varied outcome measures and protocols. Further research is warranted to determine optimal treatment parameters.

Clinical Relevance: MBI are safe, feasible and beneficial for adult refugees. PTs may incorporate MBI within the scope of practice such as BBAT, DMT, breathing, sport/exercise, and PAAI as part of a comprehensive POC. PTs may provide education and referrals for MBI to enhance refugee QOL and physical/mental health across ICF domains.

* Accepted for poster presentation at APTA Combined Sections Meeting (CSM) San Diego, Ca, February 2023; Leadership & Innovation

Summary of Mind-Body Intervention Findings

MBI	Description	Key Findings
Cognitive Behavioral Therapy (CBT)[1-5]	• Acceptance/commitment • Exposure & re-association • Meditation & mindfulness • Psychoeducation • Stretching & yoga	• Improved **trauma symptoms, depression, anxiety, mental wellbeing**, **quality of life, emotional regulation** & **social functioning**
Mindfulness Based Trauma Recovery for Refugees (MBTR-R)[6-7]	• Body scanning • Breathing • Home & safe place practices • Inquiry-based discussion • Loving-kindness & self-compassion • Meditation • Mindful movement • Psychoeducation	• Elevated **self-compassion** & **subjective wellbeing** • Decreased levels of **PTSD, depression, anxiety** & **self-criticism**
Social & Emotional Well-being (SEW)[8-9]	• Breathing • Education • Problem solving & communication • Sharing & encouragement • Yoga	• Improved **depression, anxiety, perceived stress, emotional** & **social wellbeing, social support, self-efficacy** & **conflict resolution**
Basic Body Awareness Therapy (BBAT)[10-12]	• Slow guided movements	• Improved sleep, **depression**, relaxation, relationships, coping, energy, happiness, body-awareness & pain
Physiotherapy Awareness and Activity Intervention (PAAI)[13]	• Active movements • Chair & proprioceptive exercise • Grounding • Lying down & relaxation • Mindfulness	• Improved **pain** & **general mental health** • Equipped participants with tools to apply in everyday life • Participants appreciated the sessions
Sport & Exercise[14]	• Body awareness • Dance • Grounding • Modified sports & games • Respiration & relaxation	• Improved motivation, attention/focus, coping & body-awareness
Acupressure & Breathing[15]	• Acupressure • Mindful breathing	• Improved general mood, stress, pain & sleep
Dance/Movement Therapy (DMT)[16-17]	• Movement for self-expression, self-awareness & communication	• Improved feelings of safety, trust, support, togetherness, body-awareness, emotional stability, relaxation, confidence, wellbeing, energy, creativity, spontaneity & religion/spirituality
Guided Self-help[18]	• Compassion • Grounding • Self-help book • Mindfulness • Psychoeducation • Values clarification	• Improved **PTSD**, **anger**, **depression**, **psychological flexibility**, **disability** & **quality of life**

Group 8

Title: Impact of Service on Cultural Competency and Social Responsibility in DPT Students: A Systematic Review

Authors: Taylor Baloga, Kameron Matthew, Matthew Schreck, Carli Tetla, Dr. Dana R. Maida, Dr. Janette Scardillo

Purpose: Research suggests that service participation fosters professional behavior in students. Subsections of professional behavior include cultural competency (CC) and social responsibility (SR). The purpose of this systematic review was to determine the impact of service on CC and SR professional behaviors of DPT students.

Methods: A literature search of PubMed, EBSCO, CINAHL, and ScienceDirect, was conducted using search terms:(Professionalism OR "professional development" OR "professional behavior") AND ("physical therapy student" OR "PT student") AND(service OR volunteer OR "community based learning" or "community-based learning" OR "service learning"). Selection criteria: US DPT students, all study designs, and a professionalism assessment focused on CC and/or SR. Search limits: 1996-2022, English, peer reviewed. 2 reviewers independently assessed each study for methodological quality using the Mixed Methods Appraisal Tool (MMAT).

Results: 445 articles were screened. 9 research articles met selection criteria [3 qualitative, 2 quantitative, 4 mixed methods (MM)]. MMAT scores ranged from 40-100% (avg 80%) quality criteria met. Service of varied duration (45 min-129 hrs) completed by students(n=375) included community-based learning (CBL, 1), pro bono clinics (3), international service learning (ISL, 3), and domestic service learning (2). Data collection on CC and SR included: written reflection (4), surveys (3 qualitative, 2 quantitative), Cross-Cultural Adaptability Index (CCAI, 1), focus groups/interviews (5), Clinical Performance Instrument (CPI, 1), and Core Value Assessment Tool (CVAT, 1). 5 articles addressed SR (3 qualitative, 1 quantitative, 1 MM). Key qualitative themes included patient advocacy (2), desire to serve others (2), civic identity (2), and increased awareness of impact on others/community (3). Although insignificant, quantitative findings on the CVAT showed positive impacts on SR following CBL. 6 articles (1 qualitative, 2 quantitative, 3 MM) addressed CC with qualitative themes of increased interest in learning about culture and language (2), increased competency in working with diverse populations (1), and recognition of cultural commonalities in spite of differences (3). Quantitative improvements included CCAI($P<0.01$) and CPI cultural competency($P=.047$). Student survey responses denoted positive influence on CC (87.6%), and increased desire to learn Spanish (74%) and about different cultures (91%).

Conclusion: Moderate levels of evidence support use of service to improve DPT student CC and SR. No negative effects were identified. Limitations include absence of control groups, lack of longitudinal studies, and variability in measures. Future research should include control groups and development of a valid/reliable measure to assess CC and SR.

Clinical Relevance: Professionalism content of CC and SR is a requirement in DPT programs. Service may be effective in impacting these areas outside of the classroom. Research shows that providing service to local communities or internationally results in positive gains in CC and SR and programs should provide such opportunities as a means of fostering these behaviors in students.

References	Study Type	MMAT score	Mode of service	Methods of Data Collection	Qualitative results	Quantitative results
Collins J, Clark E, Chau C, Pignataro R. Impact of an Internatio+B4:B7nal Service Learning Experience in India for DPT Students: Short- and Long-Term Benefits. *J Allied Health*. 2019;48(1):22-30.	MM	80%	ISL	-CCAI -Written Reflection -Interviews	-Recognition of commonalities with Indian culture -Connection and building trust with Indian people -Whole person care, relationships, and appreciation for way of being	-Significant difference pre and post CCAI ($p < 0.01$)
Furze J, Black L, Peck K, Jensen GM. Student perceptions of a community engagement experience: Exploration of reflections on social responsibility and professional formation. *Physiother Theory Pract.* 2011;27(6):411-421.	Qual.	100%	SL	-Qual survey -Focus group -Interview	-Awareness of impact on others -Contemplating change by means of service -Recognizing self-capacity to serve -↑ awareness on the rewards of community service	N/A
George L, Bemenderfer S, Cappel M, et al. A Model for Providing Free Patient Care and Integrating Student Learning and Professional Development in an Interprofessional Student-Led Clinic. *J Phys Ther Educ.* 2017;31(2):54-66.	Qual.	100%	PBC	-Qual survey	-Civic identity -Philanthropy -Positive impact on community -Appreciation for treating whole person	N/A
Gilles J, Bishop M, McGehee W, Lulofs-MacPherson K, Dunleavy K. Impact on Clinical Performance of Required Participation in a Student-Run Pro Bono Clinic. *J Phys Ther Educ* (Lippincott Williams & Wilkins). 2019;33(3):209-214.	Quant.	100%	PBC	-CPI	N/A	-Midterm CPI: CC ↑ ($p=.007$) -Final CPI: CC ↑ ($p = .047$)
Hayward LM, Li Li, Venere K, Pallais A. Enhancements to an International Service-learning Model: Integration of Program Alumni and Global Stakeholder Feedback. *J Phys Ther Educ.* 2015;29(2):43-53.	MM	40%	ISL	-Quant Survey	N/A	- 91% ↑ interest in varied cultures - 74% learning Spanish
Johnson AM, Howell DM. International service learning and interprofessional education in Ecuador: Findings from a phenomenology study with students from four professions. *J Interprof Care*. 2017;31(2):245-254.	Qual.	100%	ISL	-Interviews -Focus groups -Written Reflections	-Gratitude for patient & acknowledging appreciation -Making a difference, yet not doing enough -Challenged cultural expectations, humanly similar regardless of differences	N/A
Lattanzi JB, Campbell SL, Dole RL, Palombaro KM. Students Mentoring Students in a Service-Learning Clinical Supervision Experience: An Educational Case Report. *Phys Ther.* 2011;91(10):1513-1524.	MM	60%	SL	-Written Reflection	-Patient advocacy & social responsibility -Desire to serve community in future as a student or PT -See past cultural stereotypes	N/A
Porretta D, Black J, Palombaro K, Erdman E. Influence that service in a pro bono clinic has on a first full-time physical therapy clinical education experience. *Internet J Allied Health Sci Pract*, January 2017;15(1), Article 11.	MM	80%	PBC	-Reflection -Quant survey -Qual survey -Focus groups	-↑ competency in working with diverse populations -Navigating language barriers & different health care beliefs/practices	- 88% say positive influence on CC
Wise HH, Yuen K. Effect of community-based service learning on professionalism in student physical therapists. *J Phys Ther Educ.* 2013;27(2):58-64.	Quant.	60%	CBSL	-Core Value Self-Assessment	N/A	-↑ core value for altruism ($p = .009$) - ↑ core value for SR ($p = .114$)

Abbreviation Key

MM= Mixed Methods Study
Qual.= Qualitative Study
Quant.= Quantitative Study
ISL= International Service Learning
SL= Service Learning

PBC= Pro-Bono Clinic
CBSL= Community Based Service Learning
CCAI= Cross Cultural Adaptability Index
CPI= PT Clinical Performance Instrument
↑= Increase in…

N/A= Not applicable

CC= Cultural Competency

SR= Social Responsibility

Group 9

Title: Impact of Blood Flow Restriction Therapy on VO_2max in Elite Athletes: A Systematic Review

Authors: Eric Bartlett, Brendan Betti, Lucas Hackett, Michael McGuire, Dr. Joshua Prall, Dr. Peter Leininger

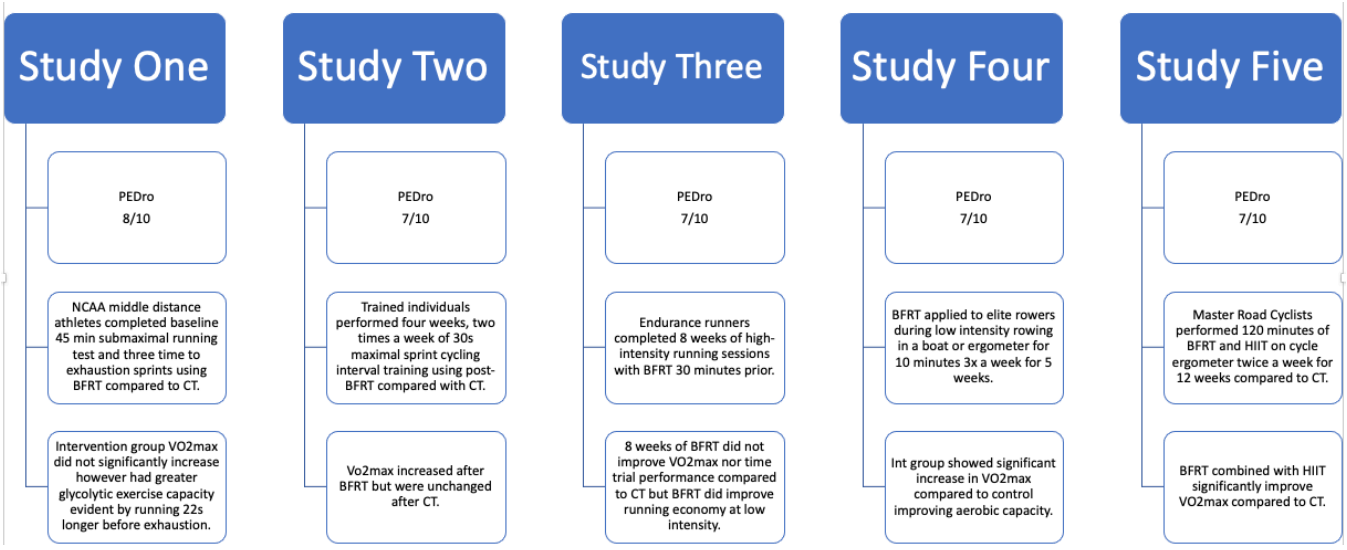
Purpose: The purpose is to determine the impact of blood flow restriction therapy (BFRT) on VO_2max in comparison to traditional training in athletes.

Methods: A literature search was conducted using Cochrane Library, EBSCOHost, ProQuest Central, PubMed for RCTs (2011 to 2022) using the following search terms ("Blood flow restriction" OR "Blood flow occlusion" OR Kaatsu OR "vascular occlusion" OR Ischemia OR "restricted blood flow" OR "occlusion training" OR "ischemic preconditioning") AND (athlete OR "student athlete" OR "elite athlete" OR "well-trained") AND (VO_2max OR "VO_2 max"). Selection criteria were adults 18 years and over, nonsmokers, elite athletes with VO_2max $\geq$ 51.70 mL/kg/min and healthy (free from illness and injury). Methodological assessment using PEDro Scale was independently performed by two researchers.

Results: Five RCT met inclusion criteria with an average PEDro score of 7.20 (7-8). Participants were 25.98 $\pm$2.10 years old (total sample of 134, 118 men and 16 women) with a mean VO_2max score of 61.84 $\pm$2.83 mL/kg/min who participated in running, rowing, or cycling. Primary outcome measure analyzed was VO_2max. Due to heterogeneity of training parameters amongst the studies, there were widely varied techniques used with respect to cuff pressure, time of application, and training methods. Statistically significant between group differences were found for two of the five studies when comparing BFRT groups to controls. The meta-analysis for BFRT groups demonstrated improved overall mean difference (MD) from pre to post-training (5 groups, MD = 2.23, 95% CI [0.22, 4.24]). There was an added benefit when combining BFRT with high intensity interval training (HIIT) training.

Conclusions: There is mixed evidence supporting BFRT for elite athletes to elicit improvements in VO_2max in two out of five studies when compared to traditional training. Some limitations of the current review include the small yield of qualified RCT, lack of homogeneity of the BFRT protocol, relatively small sample sizes and lack of follow up. Due to the nature of the intervention, double blinding was not possible. Further research with optimal BFRT parameters is necessary to optimize protocols and results. Oxford Centre Level of Evidence Level Ia.

Clinical Relevance: Elite athletes are always searching for ways to refine their training in order to optimally enhance performance. Although an overall positive MD change in VO_2max of 2.23 mL/kg/min was found across BFRT groups, the clinical significance of this aerobic capacity outcome remains unclear. Existing evidence supports BFRT to improve performance outcomes such as time to exhaustion, time-trial performance, running economy, as well as cross-sectional area associated with hypertrophy. Clinicians, such as Physical Therapists and Athletic Trainers, who work closely with elite athletes, may consider the use of BFRT to enhance performance in elite athletes, although the benefits for VO_2max require further research.



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Group 10

Title: The Impact of COVID-19 Pandemic on Trends in Home Health Physical Therapy*

Authors: Sarah Gordon, Dr. Tracey Collins

Background: In March of 2020, the World Health Organization declared COVID-19 a pandemic and hospital admissions began to decline due to cancelation of elective procedures and patient deferral of health services.[1,2] For patients in acute-care settings, an emphasis was placed on home care discharge due to the rise in COVID-19 related illnesses/deaths that were being reported in post-acute care (PAC) facilities and overall health care limitations due to shortages of personal protective equipment and staffing.[1,3,4] The implications of the pandemic on the disruption of all health care services and quality of patient rehabilitation has yet to be determined.[2,5]

Purpose: The purpose of this literature review is to identify the impact of the COVID-19 pandemic on trends in home health physical therapy in adults.

Methods: A literature search was conducted in CINAHL, PubMed, ProQuest, and Wiley using the following search terms: (COVID OR "COVID-19 Pandemic") AND ("physical therapy" OR PT) AND ("home health" OR "home-based" OR "home-based rehabilitation") AND (treatment OR intervention OR utilization) AND trend. Search limits: peer-reviewed articles, English, human subjects, and publication between 2019-2022. Selection criteria: adults (18+) and trends in home health during the COVID-19 pandemic.

Results: Two articles met the selection criteria. The first article examined national multi-payer claims data sets for Jan. 2019 to Oct. 2020 for trends in post-hospital discharge locations and spending for adults (65+). In 2020, the percentage of patients discharged home with home health increased from 20% (2019) to 21% in Oct. 2020, however not significant. By Oct. 2020, the use of home health increased to 72% of the pre-pandemic rate. Total monthly spending for home health declined 41% from $28 million/month in 2019 to $16.5 million/month in Oct. 2020. However, as a percentage of all post-acute care spending, home health increased from an average of 26% in 2019 to 27% in Oct. 2020. The second article compared data of publicly funded home care in Ontario, Canada from March 2020-Sept. 2020 with data from March 2019-Feb. 2020 for adults (18+). At the start of the pandemic, admissions into home care decreased by 10.2% in March and 37.8% in April. During the pandemic, physical therapy services declined by 11.9% in March and 40.2% in April. For patients with potential rehab needs, those receiving therapy services decreased from 21.1% pre-pandemic average to 15.4% in April 2020. Average amount of therapy also decreased from 1.8 hours/month to 1 hour/month in April 2020. For patients with high rehab needs, those receiving therapy services decreased from 64.9% pre-pandemic average to 60.4% in April 2020. Average amount of therapy also decreased from 2.6 hours/month to 2.3 hours/month in April 2020.

Conclusions: There is limited research available relevant to the impact of the COVID-19 pandemic on trends in home health physical therapy in adults. The lack of evidence found in this literature review indicates the need for further research.

Clinical Relevance: The shifts in physical therapy home health services during the COVID-19 pandemic may have lasting effects on the recipients. Dependent on severity and presentation, some patients may not have received sufficient care, resulting in worse outcomes and increased caregiver burden.

* Accepted for platform presentation at APTA Combined Sections Meeting (CSM) February 2023; Home Health Section

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Group 11

Title: The Impact of Vestibular Rehabilitation Therapy Post-Concussion in Adolescents: A Systematic Review

Authors: Amanda Kinback, Matthew Moran, Dr. Jennifer Schwartz, Dr. Lori M. Walton

Purpose: The purpose of this systematic review was to determine the impact of vestibular rehabilitation therapy (VRT) on adolescents post-concussion.

Methods: A literature search of CINAHL, ProQuest, PubMed, Science Direct, Wiley and 4 clinical trial registers was conducted with search terms (adolescent* OR teen* OR "young adult*" OR youth* OR pediatric*) AND (concussion OR "mild traumatic brain injury" OR "mild tbi" OR mtbi) AND ("vestibular rehabilitation" OR "vestibular therapy"). Search limits: English, peer-reviewed, human subjects, 2012-2022. Selection criteria: adolescents (10-24 years), post-concussion, and VRT. Two independent reviewers assessed the studies for methodological quality and agreed on Oxford Levels of Evidence through a process of consensus (OCEBM 2011).

Results: A total of 151 articles were screened for eligibility. Five articles met selection criteria: 4 retrospective cohort studies and 1 RCT. OCEBM scores ranged from 2-3. Samples ranged from 23-109 adolescents (n=289) with concussion and vestibular/oculomotor symptoms. Training varied widely in intensity (individual tolerance or 80% symptom free heart rate [SFHR]), frequency (1-3x daily) and duration (4-12wks or individualized to symptom resolution), with HEP primarily focused on habituation, gaze stability, oculomotor, and balance. No adverse events reported. VRT significantly improved balance (p=0.001-0.01), with decreased overall BESS scores (n=1; avg.-12.1) and errors (n=1; -52%), and 63% improvement on backward tandem gait with eyes open/closed (n=1). VRT significantly improved ocular function via total VOMS (n=1;), horizontal VOR (n=2, 3.78±0.56; dec. symptom provocation 46%;), vertical VOR (n =2, 4.44±0.63, dec. symptom provocation 43.7%), and saccades (horizontal: avg. inc. 12.3 reps, dec. symptom provocation by 58.1%; vertical: avg. inc. 13.3 reps, dec. symptom provocation by 62.3%). VRT improved self-reported symptoms with statistically significant decreased PCSS scores (n=1; avg.-9.1). Initiating PT earlier (≤30 days after injury, n=1) achieved faster symptom resolution (54 vs 121.5 days) and earlier return to play (avg.79 days). VRT significantly improved maximum SFHR achieved on graded exercise testing (n=1, 23%).

Conclusions: There is moderate-high level evidence supporting the use of VRT for adolescents, post-concussion. Limitations included use of retrospective analysis, and lack of control groups and detailed/standard interventions. Further research should include prospective analysis with large sample sizes and detailed/standard interventions to determine an optimal VRT protocol.

Clinical Relevance: VRT may be a safe and effective intervention for adolescents, post-concussion, to improve balance, ocular function, self-reported symptoms, time to symptom resolution and return to play, and SFHR. Clinically meaningful changes were demonstrated in balance, oculomotor function, and self-reported symptoms, which exceeded the MCID for mBESS (MCID=1), DHI (MCID=3), VOR VOMS (MCID=1), and PCSS (MCID=4). Due to lack of standardized protocols, individualized clinical decision making regarding VRT treatment parameters is recommended.

* Accepted for poster presentation at APTA Combined Sections Meeting (CSM) San Diego, Ca, February 2023; Neurology/Brain Injury SIG

Summary of Vestibular Rehabilitation Therapy (VRT) Findings

Article	Interventions	Significant Findings

Ahluwalia R, et al.[1]	• Exercises to address:
	  ○ Oculomotor function (e.g., convergence insufficiency, saccadic eye movement disorder, accommodative dysfunction)
	  ○ Gaze stabilization
	  ○ Visual motion sensitivity
	• Exercises primarily included:
	  ○ Adaptation
	  ○ Substitution with habituation
		• Earlier therapy initiation (≤30 days post injury) resulted in faster symptom resolution (54 vs 121.5 days) (p=0.02)
		• Earlier therapy initiation resulted in quicker return to play (31 vs 110 days) (p=0.04)

Alsalaheen B, et al.[2]	• Exercises to address:
	  ○ Gaze stability
	  ○ Postural stability
	  ○ Oculomotor control
	  ○ Habituation
	  ○ Aerobic fitness
	• Canalith repositioning if indicated
		• Improved oculomotor function (near point convergence) (6→3cm) (p<0.001)
		• Reduced proportion of participants with a positive symptom provocation (smooth pursuit [25→4%], horizontal [34→4%]/vertical [39→6%] saccades, convergence [38→6%], horizontal [44→5%]/vertical [36→4%] VOR, visual motion sensitivity [58→6%]) (p<0.001)

Grabowski P, et al.[3]	• Subsymptom cardiovascular exercise:
	  ○ Walking/jogging/cycling
	  ○ Vestibular/oculomotor training and habituation exercise:
	  ○ Static/dynamic balance
	  ○ Gaze stabilization
	  ○ Convergence training
	• Cervicothoracic interventions:
	  ○ Joint/soft tissue mobilization
	  ○ Stretching & strengthening
	• Sport-specific training
	• Canalith repositioning if indicated
		• Maximum SFHR increased 23% (p<0.01)
		• 88% of patients reported improvement in symptoms (p<0.01)
		• 24% of patients reached a symptom free state (p<0.01)
		• Balance errors decreased 52% (p<0.01)

Kontos AP, et al.[4]	• Individualized VRT exercises • Behavioral management strategies	• Improved horizontal VOR (-3.78pts) (p=0.04) • Improved vertical VOR (-4.44pts) (p=0.01)

Storey EP, et al.[5]	• Exercises to promote:
	  ○ Habituation & adaptation
	• Exercises designed to target deficits related to:
	  ○ Dizziness
	  ○ Balance
	  ○ Vision
		• Improved horizontal (78.1→20% symptom provocation)/vertical (82.3→20% symptoms provocation) saccades (p<0.0001)
		• Improved horizontal (52.7→6.7% symptoms provocation)/vertical (51.6→7.9% symptoms provocation) gaze stability (p<0.0001)
		• Improved backward tandem gait eyes open (47.4→6.3% symptoms provocation)/closed (76.8→14.1% symptom provocation) (p<0.0001)
		• Improved oculomotor function (accommodation [34.1→5% symptom provocation]) (p<0.0001)
		• Decreased average balance errors (33.8→21.7 errors) (p<0.0001)

Group 12

Title: The Impact of Assistive Technology on Quality of Life of Home-Dwelling Individuals with Parkinson's: A Scoping Review*

Authors: Alexa Cardella, Dr. Tracey L. Collins, Sarah Gordon

Purpose: To analyze the impact of assistive technology on quality of life (QoL) of home-dwelling individuals with Parkinson's Disease (PD).

Methods: A literature search of ProQuest, Cochrane, PubMed, and EBSCO was conducted using search terms: ("Assistive technology" OR "assistive technologies" OR "assistive device" OR "assistive devices" OR "technology" OR "technologies" OR "smart home" OR "smart homes" OR "home automation" OR "domotics" OR "smart technology") AND (home OR "home environment" OR "home-based" OR "home health") AND (Parkinsons OR "Parkinson's Disease" OR "Parkinson Disease" OR "parkinsonism") AND "quality of life". Search limits: published 2012-2022; peer-reviewed (ProQuest, EBSCO); "anywhere except full text" (ProQuest); "title abstract keyword" (Cochrane). Selection criteria included: home-dwelling people with Parkinson's (PwP); assistive technology that can be used at home daily; QoL outcomes (physical/cognitive); qualitative or quantitative studies. Each study was independently evaluated for methodological quality by 2 blinded reviewers using the Mixed Methods Appraisal Tool.

Results: A total of 156 articles were screened for eligibility. Six met selection criteria, including mixed methods (n=1), quantitative (n=4), and qualitative (n=1) studies. Levels of evidence were scored as a percentage of quality criteria met, from 60% to 100%. Sample sizes ranged from 13 to 290 subjects (n=452). Interventions spanned between 1 sitting and 1 year, incorporating home monitoring devices (n=3) or home assistive devices (n=3) via focus groups, patient monitoring, simulated training, and a survey. The primary outcome measure was QoL. Using home assistive devices resulted in statistically significant increases in QoL ($p<0.001$; $z=-3.92$). Though speech was a reported issue, participants in a study noted success with voice assisted technologies (VAT); 63.5% of participants in another study used the speech-to-text functions to cope with symptoms, like tremors. Using home monitoring devices was associated with a statistically significant improvement of walking ($p=0.02$) and 79.9% of participants in a study either strongly agreed or agreed that it helped improve mobility, especially during freezing of gait.

Conclusions: Evidence supports the use of assistive technology including VAT, home automation and home monitoring devices in the home setting, promoting QoL for PwP. Limitations include the use of simulations and variability in treatment parameters. Further research is needed to measure the impacts home-based assistive technology has on PwP's QoL and on PD-related symptoms, as well as to identify which devices are ideal.

Clinical Relevance: Assistive technology is an option of support for PwP struggling at home due to their PD-related symptoms impacting QoL. Physical therapists, particularly those in the home health setting, should be knowledgeable of these supportive devices, as they can be involved in introducing and educating their patients on these options.

* Accepted for platform presentation at APTA Combined Sections Meeting (CSM), San Diego CA, February 2023; Home Health Section

Summary of Articles

Author (Year)	MMAT Score & Design	Type of Device	Intervention
Duffy et al. (2021)[1]	100% Mixed Methods	Voice-Assisted Technology (VAT)	*Survey* on attitudes towards the use of VAT.
McNaney et al. (2020)[2]	100% Qualitative	Assistive technologies (AT) in home (general)	*Focus group* about challenges of PD, non-clinical interventions, and current use of AT in the home.
Latella et al. (2021)[3]	80% Quantitative	Home Automation (HA)	*Simulated training* within a HA room with specialized adaptive devices.
Motolese et al. (2020)[4]	80% Quantitative	Smartphone app	*Monitoring* compliance, outcomes, and satisfaction with a neurological test-based app.
Amini et al. (2018)[5]	60% Quantitative	Home-based monitoring system	*Focus group* that discussed a home-based system designed to give visual cues, detect freezing of gait and to detect falls.
Cubo et al. (2017)[6]	60% Quantitative	Home-based motor monitoring system	*Monitoring* motor function with wireless motion sensor technology.

= Home assistive devices

= Home monitoring devices

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Group 13

Title: The Impact of Exercise on Physical Health Outcomes in Incarcerated Women: A Systematic Review*

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Purpose: Current research indicates a lack of physical activity programs available for female inmates, contributing to reduced physical health outcomes and decreased quality of life. The purpose of this systematic review was to assess exercise interventions that promote physical wellness for women in prison.

Methods: A literature search was conducted of CINHAL, Cochrane, ProQuest, PTNow, Pubmed, and ScienceDirect using the search terms: (exercise AND "physical activity") AND (prison OR prisoner OR jail OR inmates) AND health AND intervention. Search limits: English, peer-reviewed, humans, adults (18+), 2009-2021. Selection criteria: women in prison; exercise interventions; outcomes: primary physical health/wellness, secondary mental health. Two reviewers independently assessed each study for methodological quality based on the Oxford Levels of Evidence 2011 (OCEBM) or Johanna Briggs Institute (JBI).

Results: 3,632 studies were screened for eligibility. 5 studies met selection criteria (1 RCT, 1 non-randomized control cohort, 1 case control, 1 pilot study, and 1 qualitative study). OCEBM scores ranged from 2-4 for quantitative studies and the qualitative study scored 8/10 on the JBI. Sample sizes ranged from 12-33 subjects (n=119). Programs took place over 6-12 weeks consisting of structured (mindfulness activities, aerobic exercise programs, and sports; 4 studies) or continuous recreational monitoring formats (pedometer self-reporting; 1 study) plus nutritional content (2 studies). Physical health outcome measures: body mass index, waist-to-hip ratio, bust and waist circumference, and overall physical health. Statistically significant reductions were seen in body mass index (x=0.4, p=0.042, 1/3 studies) and bust size (x = -0.99in, p=0.002, 1 study). Statistically significant improvements were found in secondary health outcomes using Likert-scales for sleep (0.96, p=0.01, 1/2 studies), mental health (guilt: -0.94, p=0.002; hopelessness: -0.72, p=0.006; nail biting: -0.35, p=0.002, 1/2 studies), and outlet for anger and frustration (-0.35, p=0.007, 1 study). 1 qualitative study highlighted improved overall physical and mental health, energy level, mood, anger management, and decreased stress/anxiety. No adverse events reported.

Conclusions: Varied levels of evidence supports use of exercise interventions to improve physical and mental health outcomes in incarcerated women. Limitations included small sample sizes, variability in interventions and parameters, and varied outcome measures. Further research is needed addressing women's health concerns in prison, specifically related to measuring the impact of exercise on physical and mental health.

Clinical Relevance: A well-rounded interdisciplinary program is necessary to address the complex health and wellness needs facing incarcerated women. Such programs should include structured or unstructured physical activity to address health outcomes and quality of life. Physical therapists are uniquely qualified to develop and provide exercise programs and educate on the benefits of regular physical activity which may contribute to improving life-long physical health in this population.

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Summary of Results

Quantitative Results:

Author, Year	OCEBM Level and Design	Intervention	Key Findings
Sumter et al.[1] (2009)	Level 2 Randomized Controlled Trial	Meditation and Mindfulness Activities	**Decrease in sleeping difficulty, aggressive emotions, nail biting behavior, guilt, and hopelessness.** Decrease in visual, ache, numbness, and chest pain symptoms
Güney et al.[2] (2021)	Level 3 Non-Randomized Control Cohort	Jogging, Squats, Pilates, Walking	Decrease in BMI, waist circumference. Increase in happiness and resilience.
Elwood Martin et al.[3] (2013)	Level 4 Case Control	Group Circuit Classes, Individual Program, and Nutrition Education	**Decrease in chest size**, waist-hip ratio, weight, and BMI. Improvement in energy level, sleep, and stress level.
Johnson et al.[4] (2018)	Level 4 Pilot Study	Pedometer, MyPlate and Education	**Decrease in BMI** and increase in resilience scores

Qualitative Results:

Author, Year	JBI and Design	Intervention	Key Findings
Gallant et al.[5] (2015)	8/10 Qualitative design	Softball Program	Improvement in mental health, overall physical health and mood. Reduction in stress and anxiety. Outlet of anger and frustration

***Bolding in key findings represents statistical significance.**

References:

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