The Effect of Virtual Reality Training on Balance and Mobility in Adults with Moderate to Severe Traumatic Brain Injury: A Systematic Review
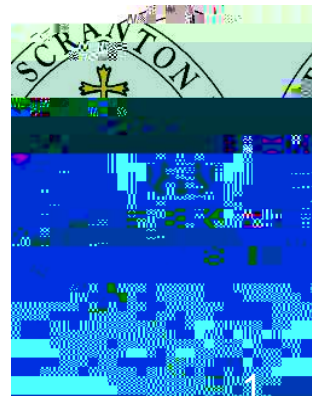
Maura McGowan, SPT
Cory Piening, SPT, LAT, ATC
Lindsay McGraw, SPT
Jamie Christensen, SPT
Renee Hakim PT, PhD, Board Certified Neurologic Specialist in Physical Therapy

Overview

Purpose

Definitions

Methods

PRISMA

PEDro scoring

Results

Conclusion

Limitations

Clinical Relevance

Recommendations

Acknowledgements

Definitions

Traumatic brain injury (TBI)[1]

Brain tissue damage caused by compression, shearing or a combination of both following acceleration, deceleration or rotational forces on the head due to an outside impact

Definitions cont.

eBaVIR - easy Balance Virtual Rehabilitation

Based on the Nintendo Wii Balance Board System

Does not use traditional commercial software

Weight transfers in seated and standing that actively involve the patient

Calibrates and adapts to the subjects range and impairments

Methods cont.

Search terms

("brain injury" OR "traumatic brain injury") AND
("virtual reality" OR gaming OR wii OR kinect) NOT
concussion

Methods cont.

Search limits

    Peer-reviewed

    Published between 2008-2018

    Adults aged > 18 years

Selection Criteria

    Virtual reality

    Moderate to severe TBI

    Randomized control trials

PEDro Scores

	Random Allocation	Concealed Allocation	Baseline Comparison	Blind Subjects	Blind Therapists	Blind Assessors	Adequate Follow Up	Intention to Treat	Between Group Comparison	Point Estimate Variability	Score
Straudi et al	Y	N	Y	N	N	N	Y	Y	Y	Y	**6/10**
Sessoms et al	Y	N	Y	N	N	N	Y	Y	Y	Y	**6/10**
Gil-Gomez et al	Y	N	Y	N	Y	Y	Y	Y	Y	Y	**8/10**
Cuthbert et al	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	**9/10**
McClanac han et al	Y	N	Y	N	Y	Y	Y	Y	Y	Y	**8/10**

Results

326 articles were screened for eligibility

    5 met the criteria for final inclusion[2-6]

Average PEDro score of 7.4

Sample sizes ranged from 11-26 subjects

Subjects range from 19 -75 years old

Studies occurred over 4-6 week time period

Treatment sessions ranged from 15-60 minutes

All five studies found improvements in balance and mobility scores[2-6]

Statistically significant improvements across studies included:

Conclusion

There is moderate to strong evidence that the use of VR as an adjunct intervention can improve balance and mobility in patients with TBI

The most clinically significant findings were found in the TUG and CB&M scores using eBaViR and WiiFit systems

Most effective outcomes were found with sessions greater than 20 minutes over the course of 6 weeks

Limitations

Small sample size

Varied use of outcome measures and protocols for balance and mobility

Not all of the subjects were exclusively patients with TBI

Of the 5 studies, 3 used commercially available equipment [2,4,6] and 2 used custom VR technology [3,5]

Commercial VR systems (i.e. Wii and Xbox Kinect) are readily available to clinicians

VR can be an effective adjunct intervention to improve balance and mobility performance in patients with TBI

Promote adherence to patient's plan of care and increased patient enjoyment

Recommendations
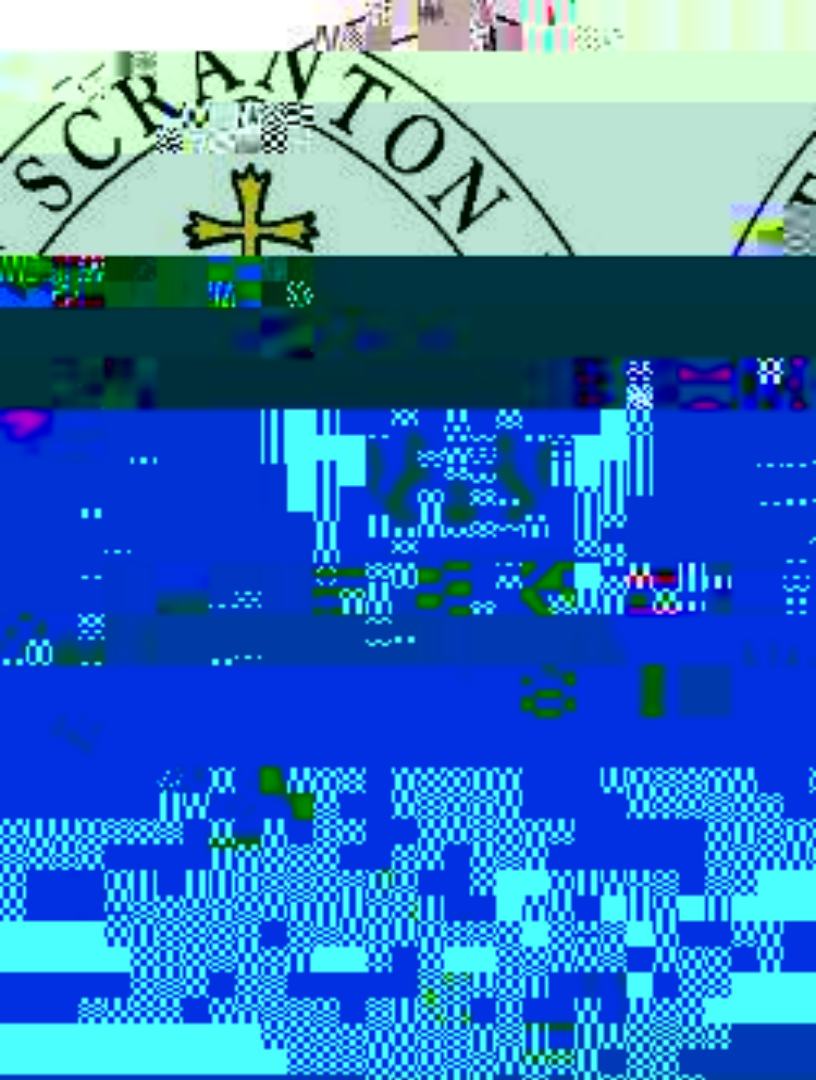
Future research should consider:

Larger sample sizes

Patients with exclusively TBI

More uniform tests and measures to determine optimum VR protocols

Thank You!
Questions?