INPLASY PROTOCOL

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Considering the Causes of Virtual Reality Cybersickness in Rehabilitation: Evidence from a Systematic Review and Meta-Analysis

Li, X[1]; Luh, DB[2].

Review question / Objective: This paper aims to make discussion about the influencing factors that casuse cybersickness in virtual rehabilitation. The systematic literature review and meta-analysis were utilized to make judgement about the causes of discomfort in virtual rehabilitation. Simulator Sickness Questionnaire (SSQ) was used as the formal models that computing the factors associated with cybeisickness. The systematic literature review was applied based on PRISMA guidelines. Totally twenty-eight papers in the past few years were computed, showing 862 subjects with age ranged from 19-95 and containing over 49% female.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 09 January 2023 and was last updated on 09 January 2023 (registration number INPLASY202310019).

INTRODUCTION

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Rationale: With the development of medical conditions, there is an increasing demand for better rehabilitation measurements. As a revolutionary technology, virtual reality (VR) has become more and more popular in rehabilitation. many users suffer from sickness symptom in the virtual rehabilitation process. This kind of illness is different from motion or simulator sickness, it is based on the user's interaction with virtual and augmented reality products and is called "Cybersickness." As usual, human factors, device software, and hardware are the aspects that determine the level of cybersickness.

Condition being studied: There are now more virtual reality applications for cognitive training and rehabilitation than ever before thanks to the democratization of virtual reality use. Even with this expansion, the fundamental mechanisms of the effects of virtual rehabilitation remain little known. The majority of systematic reviews and meta-analyses in the field emphasize the importance of undertaking high-quality research that enables complete comprehension of virtual rehabilitation's operating mechanisms and how interventional effects last over time. There are now more virtual reality applications for cognitive training and rehabilitation than ever before thanks to the democratization of virtual reality use. Even with this expansion, the fundamental mechanisms of the effects of virtual rehabilitation remain little known.

METHODS

Participant or population: Not reported.

Intervention: Not reported.

Comparator: Not reported.

Study designs to be included: Systematic review & Meta-analysis.

Eligibility criteria: Not reported.

Information sources: Web of Science, Pubmed, Scopus, Google Scholar.

Main outcome(s): Researcher in ths area mainly focus on different aspects about cybersickness such as internal causes and external causes. So far, there still lack of the systematic review and meta-analysis in recent years. This article aim to do calculation based on Simulator Sickness Questionnaire (SSQ) model with four attributes respectively are nausea, oculomotor, disorientation and total scores. The main user symptoms are physical inactivity, brain injuries and cognitive impairment. In detail, the review summarize participants age range, user symptoms, usage condition for demographic. And the time, content, locomotion, control, display types of VR device are also considered.

Quality assessment / Risk of bias analysis: We utilized the Cochrane Collaboration's RoB Tool to evaluate the methodological quality of the included studies. RoB assessment was independently performed by two paired reviewers.

Strategy of data synthesis: Results from the different trials were pooled using Comprehensive Meta Analysis.

Subgroup analysis: Apart from Total Score, the nausea, oculomotor, disorientation are also included

Sensitivity analysis: papers are selected based on EI Serial standard.

Country(ies) involved: China (Guangdong University of Technology) .

Keywords: cybersickness, virtual reality, rehabilitation, Simulator Sickness Questionnaire(SSQ), systematic review, meta-analysis.

Contributions of each author:
Author 1 - Xin Li.
Author 2 - Ding-Bang Luh.