INPLASY

The effects of virtual reality interventions on pain catastrophizing in people with chronic pain: A systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 21 August 2024 and was last updated on 21 August 2024.

INTRODUCTION

*R*eview question / Objective To analyze the effect of virtual reality interventions on pain catastrophizing in persons with chronic pain.

Rationale Pain is the leading cause of consultation in health services worldwide, and chronic pain has garnered increasing clinical and epidemiological interest. Catastrophizing plays a central role not only in the development but also in the maintenance of chronic pain over time. Virtual reality (VR)-based interventions have emerged as a valid, novel, accessible, and low-cost alternative to address chronic pain conditions. While the impact of VR interventions on catastrophizing in individuals with chronic pain has been explored in some studies, it has often been considered a secondary outcome and analyzed inadequately. Additionally, there is significant heterogeneity in study designs, intervention modalities, and result reporting, underscoring the need to systematize existing information. To date, and the best of the authors' knowledge, no systematic reviews have thoroughly examined the effects of VR (in all its forms) on pain catastrophizing in individuals with chronic pain.

Condition being studied Several factors can influence the transition from acute to chronic pain (pain that lasts or recurs for at least three months), and in many cases, chronic pain can become the dominant or primary clinical problem. Chronic pain has even been subclassified based on the absence or presence of a condition or cause that can explain it (primary or secondary chronic pain, respectively). Various models have been proposed to explain the chronification of painful musculoskeletal conditions, among which the "fear-avoidance model" is particularly notable. This model suggests that there are different pathways through which painful conditions can become chronic and disabling, with negative appraisals of pain leading to catastrophic thoughts being a key factor. Pain catastrophizing is a multidimensional

construct characterized by an exaggerated and negative mental disposition during an actual or anticipated painful experience. It is described by three components: rumination (the cognitive tendency to focus attention on the pain and its consequences), magnification (the tendency to exaggerate the severity and threat of the pain), and helplessness (the belief of being unable to cope with the painful experience). Catastrophizing plays a central role not only in the development but also in the maintenance of chronic pain over time.

METHODS

Search strategy The search terms linked by Boolean operators (OR and AND) and organized according to the key elements of the question were: (i) Population: Musculoskeletal Pain (Mesh); Chronic Pain (Mesh), (ii) Intervention: Virtual Reality (Mesh); Video games (MeSH); Exergaming (Mesh), (iii) Outcomes: Catastrophization (Mesh); Pain Catastrophizing. The electronic databases Pubmed, CINAHL, Scopus, Web of Science, and PEDro were used without filter settings.

Participant or population People with chronic pain.

Intervention Virtual reality (immersive and non-immersive).

Comparator Control group: Any condition.

Study designs to be included Randomized controlled trials (RCTs).

Eligibility criteria 1) Inclusion: Population: Adults with chronic painful musculoskeletal conditions (cause of pain is primary); intervention: interventions based on VR (immersive and non-immersive VR); active or passive interventions in which the participants do or do not do physical activities, respectively; comparison: no intervention, interventions without VR, standard treatment, usual care, placebo, or control; outcome: pain catastrophizing; study design: RCTs and pilots RCTs. 2) Exclusion: Adults with locomotor system prostheses, adults with chronic pain associated with non-musculoskeletal conditions (e.g., oncologic, migraine), application of virtual reality with the sole purpose of distracting the patient during another health procedure; abstracts, conference posters, and grey literature.

Information sources Pubmed, CINAHL, Scopus, Web of Science, and PEDro were used without filter settings.

Main outcome(s) Any specific measurement relative to pain catastrophizing.

Additional outcome(s) None.

Data management Records obtained from the databases were imported into the Rayyan electronic platform. After eliminating duplicates, records were screened by titles and abstracts to identify studies that potentially met the inclusion criteria. Then, the full texts of the remaining studies were retrieved to assess their eligibility. Two reviewers performed this process independently, and selection discrepancies were resolved by consensus.

Quality assessment / Risk of bias analysis According to the Cochrane ROB2 tool for assessing individual and overall risk of bias.

Strategy of data synthesis Studies were meta-analyzed (Review Manager® 5.4.1) according to the comparator, and subgroups were generated according to the type of intervention and control group. Effect size was expressed as the standardized mean difference using a random-effects model due to the diversity of measurement techniques and statistical heterogeneity. Heterogeneity was evaluated using the inconsistency index (I^2), classified as might not be important (0 % – 4 0 %), moderate (30% – 60%), substantial (50%-90%), and considerable heterogeneity (75%-100%). For ES (Hedges' g) calculation, the experimental and control groups' mean, standard deviation, and post-treatment sample size were used and classified as: 0.20-0.49 small, 0.50-0.79 moderate, and ≥0.80 high.

Subgroup analysis Subgroups were generated according to the type of intervention and control group.

Sensitivity analysis None.

Language restriction No restrictions.

Country(ies) involved Chile.

Other relevant information None.

Keywords Pain, Chronic Pain, Pain Catastrophizing, Virtual Reality.

Dissemination plans Peer-reviewed indexed journal.

Contributions of each author

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