

THE EFFECTS OF IMMERSIVE VIRTUAL REALITY TRAINING ON PERCEPTUAL-COGNITIVE SKILLS IN HEALTHY ATHLETES: A SYSTEMATIC REVIEW ON SPORTS PERFORMANCE ENHANCEMENT

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Introduction

The aim of this review is to explore the effectiveness of virtual reality-based sports training in improving perceptual-cognitive skills in athletes, providing an overview of the targeted functions and their measures, and proposing a categorisation within cognitive domains.

Methods

A comprehensive literature search was conducted across PsycINFO, PubMed, Scopus, and Web of Science, following PRISMA 2020 guidelines. Studies were selected based on PICOS criteria, focusing on healthy athletes, virtual reality-based training, and perceptual-cognitive outcomes. Only quantitative intervention studies with inactive controls, alternative interventions, or within-subjects designs were included. Methodological quality was assessed using the Downs and Black checklist. Participant characteristics, sport, technology, training, perceptual-cognitive functions, outcome measures, and findings were extracted.

Results

A total of 5,976 records were identified from PsycINFO (n=240), PubMed (n=347), Scopus (n=3,367), and Web of Science (n=2,022). After removing 1,953 duplicates, 4,023 reports were screened by title/abstract; 3,975 were excluded, leaving 48 for full-text eligibility. Of these, 34 were excluded, resulting in 14 studies included. The most assessed domain was executive function (decision-making, inhibition, anticipation) (n=10), followed by attention (gaze control, visual search, selective attention) (n=3) and processing speed (reaction time) (n=2). Only 4 studies included cognitive measures: Stroop for inhibition, Vienna test for reaction time. Where reported, moderate to large effect sizes suggest that VR training is promising for enhancing perceptual-cognitive skills.

Conclusion

Heterogeneity in training frequency, duration, and outcome measures, along with study limitations, highlights the need for high-quality research to determine VR's effectiveness and its transfer to cognition by implementing cognitive tests.

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