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Virtual Reality (VR) for Mental Skills Training in Elite Athletes: A Quasi-Experimental Study

Francisco Tomas. Gonzalez-Fernandes[1], Mahdi. Fahimi[2*], Seifeddine. Brini[3]

[1] Department of Physical Education and Sports, Faculty of Sport Sciences, University of Granada,18071 Granada, Spain
[2] Department of Sport Science, Faculty of Human Sciences, University of Qom. Qom, Iran
[3] Research Unit, Sportive Sciences, Health and Movement, High Institute of Sports and Physical Education of Kef, University of Jendouba, 7100 Kef, Tunisia

*** Corresponding author email address**: m.fahimi@qom.ac.ir

1. Round 1

1.1 Reviewer 1

Reviewer:

This paragraph introduces AI but does not clearly link it to the VR mental training focus of the study; a bridging sentence is needed to integrate AI discussion with the VR intervention rationale.

The cited metrics are discussed in isolation; it would strengthen the argument to explicitly connect these markers to VR's potential to train regulation skills.

This is compelling, but including recent prevalence data specific to elite athletes in competitive environments would enhance the justification for the study.

The HRV description focuses on validation against ECG; include more detail on calibration procedures during the study to ensure accuracy in athletic testing conditions.

The VR progression is well-described, but the PETTLEP model control condition could benefit from more detail on how scenarios were matched to ensure content equivalence across groups.

Add the actual follow-up mean scores and standard deviations to quantify this claim more transparently.

In Table 1, include confidence intervals for mean changes to better assess precision and overlap between groups.

This limitation could be expanded to acknowledge that cognitive load and attentional demands vary not only by sport but by competitive context (e.g., national vs. international matches).

Author revised the manuscript and uploaded the updated document.

1.2 Reviewer 2

Reviewer:

The term “double-blind” is used; however, in VR interventions with sport-specific coaching, full blinding may not be possible. Clarify how blinding was implemented and whether it applied to participants, assessors, or data analysts.

Please provide the block size and details on how allocation concealment was maintained to reduce selection bias.

While hardware specifications are detailed, include justification for why the Meta Quest Pro was chosen over other VR systems in terms of fidelity, comfort, or athlete-specific needs.

Consider providing the minimal clinically important difference (MCID) for SMTQ to contextualize whether observed changes were not only statistically but also practically meaningful.

The description of Figure 2 could be enhanced by reporting effect sizes for the sport-specific improvements, not just p-values.

Specify which neurocognitive theories (e.g., embodied cognition, context-dependent learning) and cite primary theoretical sources for accuracy.

Provide the full citations for these studies within the discussion to allow readers to directly compare methodologies.

Author revised the manuscript and uploaded the updated document.

2. Revised

Editor’s decision after revisions: Accepted.

Editor in Chief’s decision: Accepted.

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