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Effect of Stroboscopic Glasses Usage in Training and Rehabilitation: A Systematic Review and Meta-Analysis Protocol

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ADMINISTRATIVE INFORMATION**Support** - The authors received no financial support for the research, authorship, and/or publication of this article.**Review Stage at time of this submission** - The review has not yet started.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202570075**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 18 July 2025 and was last updated on 18 July 2025.**INTRODUCTION**

Review question / Objective What is the effect of stroboscopic glasses on physical performance during training and on functional outcomes in the rehabilitation of individuals with musculoskeletal problems, compared to conventional training or rehabilitation methods? The aim of this systematic review and meta-analysis is to evaluate the effects of stroboscopic glasses on physical performance during training and on functional outcomes in the rehabilitation of individuals with musculoskeletal problems, in comparison to conventional methods.

Rationale Stroboscopic glasses, which intermittently block visual input, are emerging as a novel tool to challenge the visual and sensorimotor systems during physical training and rehabilitation. By inducing visual perturbation, they are thought to

enhance neuromuscular control, proprioception, and cognitive engagement, potentially leading to improved outcomes in both athletic performance and recovery from musculoskeletal injuries. Musculoskeletal problems often impair coordination, balance, and functional movement, which are key targets in rehabilitation. While some studies suggest that integrating stroboscopic glasses into training or rehab protocols may accelerate recovery and enhance performance, the evidence is currently limited and scattered. Therefore, this meta-analytic study will focus on synthesising evidence related to the use of stroboscopic glasses in training and musculoskeletal rehabilitation settings.

Condition being studied This review investigates the use of stroboscopic glasses in the context of physical training and the rehabilitation of musculoskeletal conditions.

METHODS

Search strategy Cochrane Library (Central), ProQuest, PubMed and Web of Science databases will be searched using a combination of the following groups of key terms:

- a) "Stroboscopic " OR Strobe OR "Intermittent Visual Stimulation" OR "Flicker Training" OR "Visual Occlusion" OR "Intermittent visual occlusion" OR "Visual perception disruption" OR "Shutter glasses" OR "Intermittent vision"
- b) "Exercise"[Mesh] OR "Rehabilitation"[Mesh] OR "Physical Therapy Modalities"[Mesh] OR Training* OR Exercis*

Participant or population Humans.

Intervention Training and rehabilitation with stroboscopic glasses.

Comparator Control groups and standard rehabilitation or training groups.

Study designs to be included Randomised controlled trials.

Eligibility criteria The PICOS framework will be used for determining the inclusion criteria: Population: Humans; Intervention: usage of stroboscopic glasses in training or rehabilitation; Comparator: Control groups and standard rehabilitation or training groups; Outcome: Health and performance-related outcomes; Study designs: Randomised controlled trials (RCTs). Moreover, being written in the English language and published in a peer-reviewed academic journal were considered as additional inclusion parameters.

Information sources Cochrane Library (Central), ProQuest, PubMed, Web of Science databases and reference lists of included studies.

Main outcome(s) Health and performance-related outcomes.

Data management Reviewers will screen the citations and extract data from the included studies in a blinded manner. During the evidence synthesis, EndNote X21, Rayyan, RevMan, GRADEPro GDT, Microsoft Excel, and Microsoft Word software will be used.

Quality assessment / Risk of bias analysis The Cochrane Collaboration's risk of bias assessment tool for parallel group RCTs will be used to classify individual risk of bias in included studies. In quantitative data synthesis, the overall evidence

level will be classified using the GRADE approach (the Grading of Recommendations Assessment, Development, and Evaluation).

Strategy of data synthesis In a possible meta-analysis scenario, the Review Manager (RevMan) of the Cochrane Collaboration will be used to perform the meta-analyses. The GRADEpro GDT software will be employed to grade the level of the body of evidence.

Subgroup analysis Subgroup analyses will be conducted based on the population, intervention, and outcome differences or across the risk of bias tables in the case of high heterogeneity.

Sensitivity analysis If a meta-analysis detects high or substantial heterogeneity between studies, a sensitivity analysis will be performed according to the methodological features of the included studies.

Language restriction English.

Country(ies) involved Republic of Türkiye and Japan.

Keywords Stroboscopic glasses, stroboscopic training, visual perturbation, musculoskeletal rehabilitation, musculoskeletal injuries, physical training, injury recovery.

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