INPLASY PROTOCOL

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None declared.

Effects of physical activity on visuospatial working memory in healthy individuals: a systematic review and meta-analysis

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Review question / Objective: **P: Healthy individuals (including children, adolescents, adults, and seniors); I: Individuals who join various physical activities (including aerobic exercise, HIT, yoga, resistance training, Tai Chi, balance training, skill training, et al); C: Individuals who have no movement, do reading, or do same as normal activities; O: 1-Back Test, 2-Back Test, Trail Making Test-A, Trail Making Test-B, Digit Span Forward, Digit Span Backward; S: Randomized Controlled Trial (RCT).**
Condition being studied: **Healthy individuals without any cognitive disorders.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 15 August 2022 and was last updated on 15 August 2022 (registration number INPLASY202280053).

INTRODUCTION

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Rationale: **The improvement effect of exercise on VSWM has been confirmed by many studies, especially the positive effect on mild cognitive impairment (MCI) patient (Law et al., 2013), dementia patient (Cheng et al., 2014), schizophrenia patient (Fujii et al., 2020), depression population(Brondino et al., 2017; Greer et al., 2015) and attention**

deficit hyperactivity disorder (ADHD) children (Benzing et al., 2018; Bustamante et al., 2016) is more significant. Correspondingly, exercise regimens such as aerobic exercise (Tsai et al., 2014), Tai-Chi (Liao et al., 2021), open-skill exercise (Guo et al., 2016) , etc. However, it can be seen from the previous literature review that the improvement of VSWM ability is also necessary for healthy people. More importantly, whether these exercise programs can be transferred or extended to healthy individuals, and whether there are exercise programs for healthy people of different ages and genders, needs to be further summarized and analyzed.

Condition being studied: Healthy individuals without any cognitive disorders.

METHODS

Search strategy: "Exercise" [Mesh] (e.g., "Exercises" OR "Physical Activity" OR "Activities, Physical" OR "Activity, Physical" OR "Physical Activities" OR "Exercise, Physical" OR "Exercises, Physical" OR "Physical Exercise" OR "Physical Exercises" OR "Acute Exercise" OR "Acute Exercises" OR "Exercise, Acute OR Exercises, Acute" OR "Exercise, Isometric" OR "Exercises, Isometric" OR "Isometric Exercises" OR "Isometric Exercise" OR "Exercise, Aerobic" OR "Aerobic Exercise" OR "Aerobic Exercises" OR "Exercises, Aerobic" OR "Exercise Training" OR "Exercise Trainings" OR "Training, Exercise" OR "Trainings, Exercise") AND "Memory, Short-Term" [Mesh] (e.g., "Memories, Short-Term" OR "Memory, Short Term" OR "Short-Term Memories" OR "Short-Term Memory" OR "Memory, Short term" OR "Memories, Short term" OR "Short term Memories" OR "Short term Memory" OR "Working Memory" OR "Working Memories" OR "Memory, Immediate" OR "Immediate Memories" OR "Immediate Memory" OR "Memories, Immediate" OR "Immediate Recall" OR "Immediate Recalls" OR "Recall, Immediate" OR "Recalls, Immediate").

Participant or population: Healthy individuals (including children, adolescents, adults, and seniors).

Intervention: Various physical activities intervention (including aerobic exercise, HIT, yoga, resistance training, Tai Chi, balance training, skill training, et al).

Comparator: Individuals who have no movement, do reading, or do same as normal activities.

Study designs to be included: Randomized Controlled Trial (RCT).

Eligibility criteria: (1)participants with any age without cognitive neurological related disorders or relevant family history of genetic disorders; (2) participants with normal or corrected visual acuity and no brain damage; (3) interventions were various acute or chronic exercises, as well as mind-body exercises and so on; (4) all or some of outcome indicators were VSWM; (5) the control group included, but was not limited to, subjects who were sedentary, physically inactive, or otherwise non-exercise active, etc.; (6) the study had to report complete data results before and after the intervention; (7) research types were primarily RCT.

Information sources: Web of Science, MEDLINE, BIOSIS Previews, PubMed, China National Knowledge Infrastructure, Wan Fang Data (Chinese).

Main outcome(s): 1-Back Test, 2-Back Test, Trail Making Test-A, Trail Making Test-B, Digit Span Forward, Digit Span Backward.

Data management: Search result will be exported into EndNote to check for duplication of studies. Bibliographic records will be exported from EndNote into Microsoft Excel following the duplication to facilitate the management and selection of articles for inclusion. Eligibility questions and forms for the screening of the studies included for the review will be developed, piloted and refined subsequently.

Quality assessment / Risk of bias analysis: Quality assessment/risk of bias analysis Will be assessed using the Physiotherapy Evidence Data Base. (PEDro scale).

Strategy of data synthesis: The RevMan5.4 software provided by the Cochrane Collaboration and the Stata software were used for Meta-analysis of the extracted data. We used standard mean differences (SMD) for the continuous outcome.

Subgroup analysis: Subgroup analyses will be conducted on different types of physical activity, age, intensity and intervention duration to explore the robustness of the treatment effect of physical activity on our primary outcome.

Sensitivity analysis: Sensibility analyses will be performed to study the potential influence of significant heterogeneity which could be due to intervention types or comparator on the treatment effect direction. This will be done only when there are more than two studies with homogeneous subsets. This will be performed on the primary outcomes only.

Language restriction: English.

Country(ies) involved: China.

Keywords: physical activity; visuospatial working memory (VSWM); healthy; children; college students; seniors.

Dissemination plans: The study will be published.

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