

Effectiveness of exercise for improving cognition, memory and executive function: a systematic umbrella review and meta-meta-analysis



Implication for
clinical practice:
Systematic umbrella
review and meta-
meta-analysis.

Structured aerobic and resistance exercise can enhance cognition, memory and executive function.

Context

- To evaluate the effectiveness of exercise interventions on cognitive outcomes.
- To identify which types of exercise provide the most significant improvement in memory and executive function.

Methods

- Umbrella review of systematic reviews and meta-analyses.
- A total of 133 systematic reviews were included, with 2,724 RCTs involving 258,279 participants, both male and female adults aged ≥ 18 years.

Cognitive outcome measures

- MMSE, MoCA, and ADAS-Cog for general cognition.
- Wechsler Memory Scale and Verbal Learning Tests for memory.
- Digit Span and Trail Making Tests (TMT-A & B) for executive function.

Results

- Moderate improvements in global cognition, memory and executive function were observed following aerobic exercises.
- Resistance training (weight training using machines, free weights or body-weight exercises) showed particular benefits for executive function and working memory.
- Combined aerobic plus resistance programmes demonstrated greater overall cognitive improvements than single-modality exercise.
- Other modalities such as Tai Chi, yoga, dance, exergames and Baduanjin also produced positive effects, particularly for executive function and memory.
- Older adults (>60 years) experienced the most benefit.
- Multi-component exercise programmes were most effective, highlighting the importance of combining different types of exercise.

Reference

Fahm, Y. A., Hasan, I. W., Kabba, S., & Ragab, W. M. (2025). Artificial intelligence in healthcare and medicine: Clinical applications, therapeutic advances, and future perspectives. European Journal of Medical Research, 30(848).