The Impact of Exercise Interventions on Executive Functioning in Individuals with ADHD: A Scoping Review

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Introduction:

Executive Functioning (EF):
Skills employed in goal-directed behaviour[1]

- Individuals with ADHD → EF deficits[2]
- Exercise enhances EF in the general population and in individuals with ADHD[3,4]
- Disagreement among previous reviews on EF domains impacted by exercise interventions[4]
- Impact of various characteristics of exercise (e.g., type, cognitive demand, duration, frequency) on EF skills poorly understood [4]

Objective:

- Investigate the impacts of specific characteristics of exercise on specific domains of EF
- Provide an overview of the literature and identify gaps in the literature

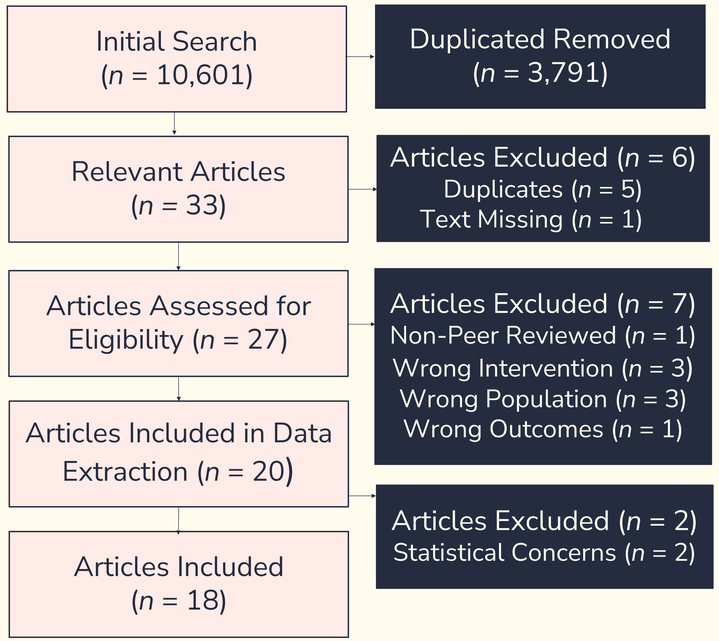
Expected Results:

- EF will be most enhanced by high intensity, cognitively demanding, and frequently repeated exercise [4]

Method:

- PRISMA-ScR Guidelines; narrative approach
- Initial search terms (broader review): “EF”, “exercise”, “intervention”, ”NOT animal”
- Databases: PsychInfo, CINAHL, SPORTDiscus, SCOPUS, PubMed, Embase

Selection of Sources of Evidence:



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Characteristics of Sources of Evidence:

- 8 Countries:
  - Germany, Taiwan, USA, Iran, Brazil, Canada, Tunisia, Netherlands
- Total of 668 participants (26% female)
- Various Study Designs
- Age Groups:
  - Children & Adolescents: 15 studies
  - Adults: 3 studies
- Types of Interventions:
  - 5 Sports Interventions
  - 2 Recreational Activity (e.g., yoga) Interventions
  - 8 Simple Cardiovascular Interventions
  - 3 Motor Coordination Interventions

Results:

Figure 1: Proportion of Studies Finding EF Enhancement by Intervention Type

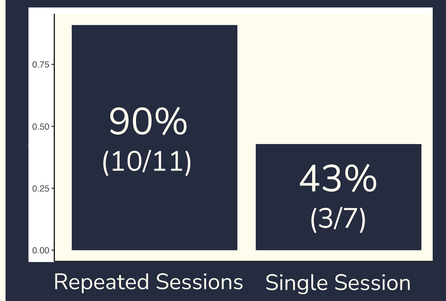


Figure 2: Domains of EF Enhanced Following Exercise

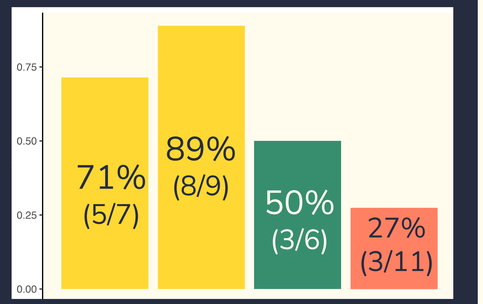
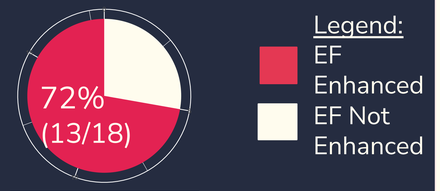


Figure 3: Proportion of Studies Finding EF Enhancement Following Exercise:



Gaps in the Literature:

- Adult Research
- Long Term Effects

Limitations:

- Evidence selection
- Statistical concerns

Findings:

- 72% of studies found exercise enhanced EF
- Repeated session impact > single session impact
- Inhibitory control and attention most impacted
- No impact of cognitive demand
- Intensity impacts unknown

Key References:

1: Diamond, A. (2013). Executive Functions. Annual Review of Psychology, 64(1), 135–168. https://doi.org/10.1146/annurev-psych-113011-143750
2: Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD. Psychological Bulletin, 121(1), 65–94. https://doi.org/10.1037/0033-2909.121.1.65
3: Verburgh, L., Königs, M., Scherder, E. J., & Oosterlaan, J. (2014). Physical exercise and executive functions in preadolescent children, adolescents and young adults: a meta-analysis. *British journal of sports medicine*, *48*(12), 973-979. http://dx.doi.org/10.1136/bjsports-2012-091441
4: Welsch, L., Alliott, O., Kelly, P., Fawkner, S., Booth, J., & Niven, A. (2021). The effect of physical activity interventions on executive functions in children with ADHD: A systematic review and meta-analysis. Mental Health and Physical Activity, 20, 100379. https://doi.org/10.1016/j.mhpa.2020.100379