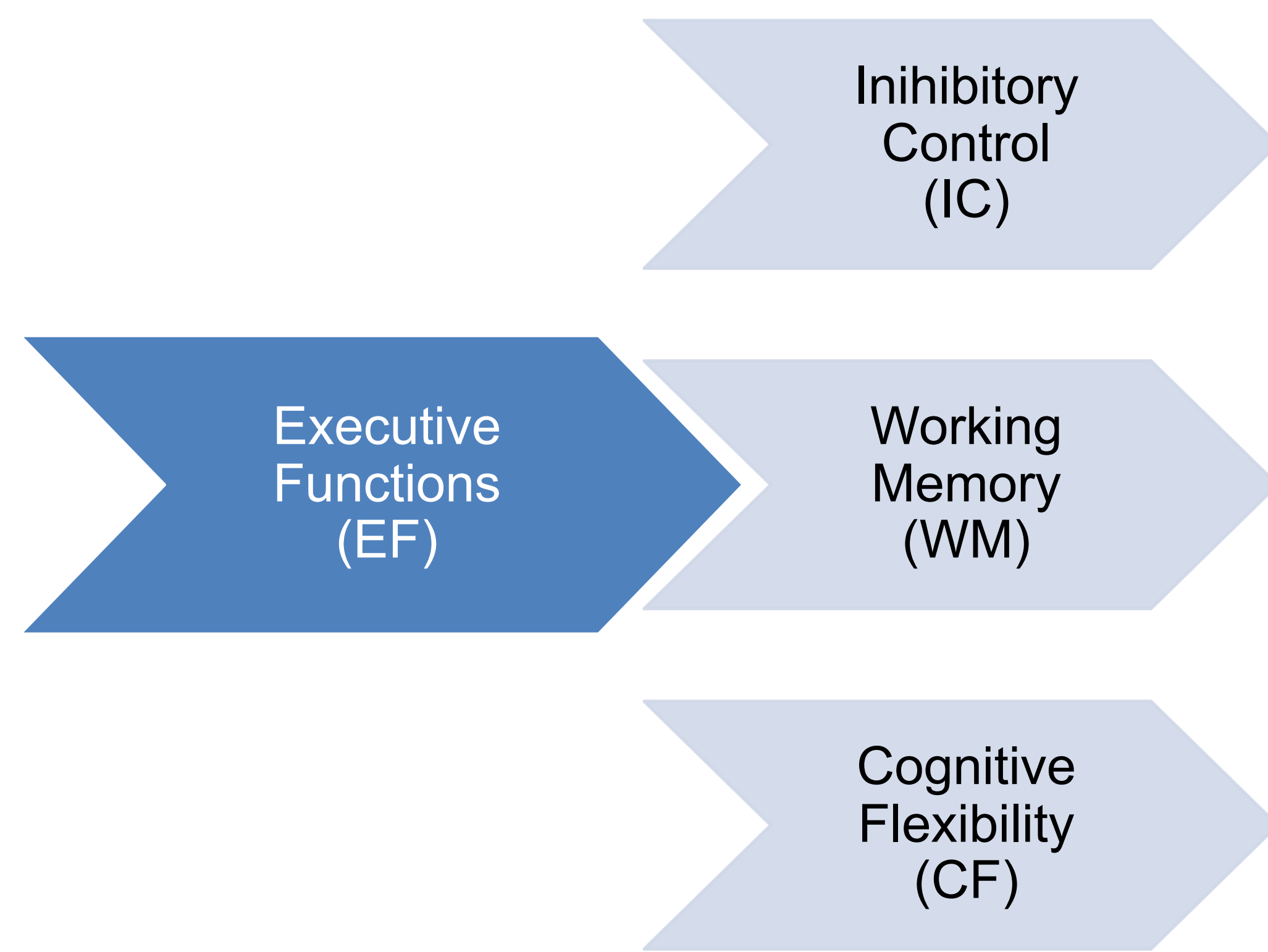


Executive functioning training in typically developing adolescents: data review from the last 10 years

INTRODUCTION



- ➔ Evidence shows that **EF impacts academic achievement**¹
- ➔ **EF relies on the prefrontal cortex (PFC)** and its complex connections to other brain regions²
- ➔ **The PFC matures across adolescence** and affects EF performance, maybe it's a good opportunity to training³
- ➔ **Most studies are with children and adults**⁴

Research questions:

What interventions enhance executive functions in adolescents?
Are there differences between computerized and non computerized training?

METHODS

We choose a **systematic review method**.

Protocol registered in PROSPERO database (CRD42022282498) for transparency and reproducibility purposes (scan the QR code).

How we selected studies?

- ✓ Participants are typical developing adolescents (13-19 years old);
- ✓ Interventions = training of core executive (IC, WM, CF).
- ✓ Published in English in a peer-reviewed journal between 2011 and 2021

How we excluded studies?

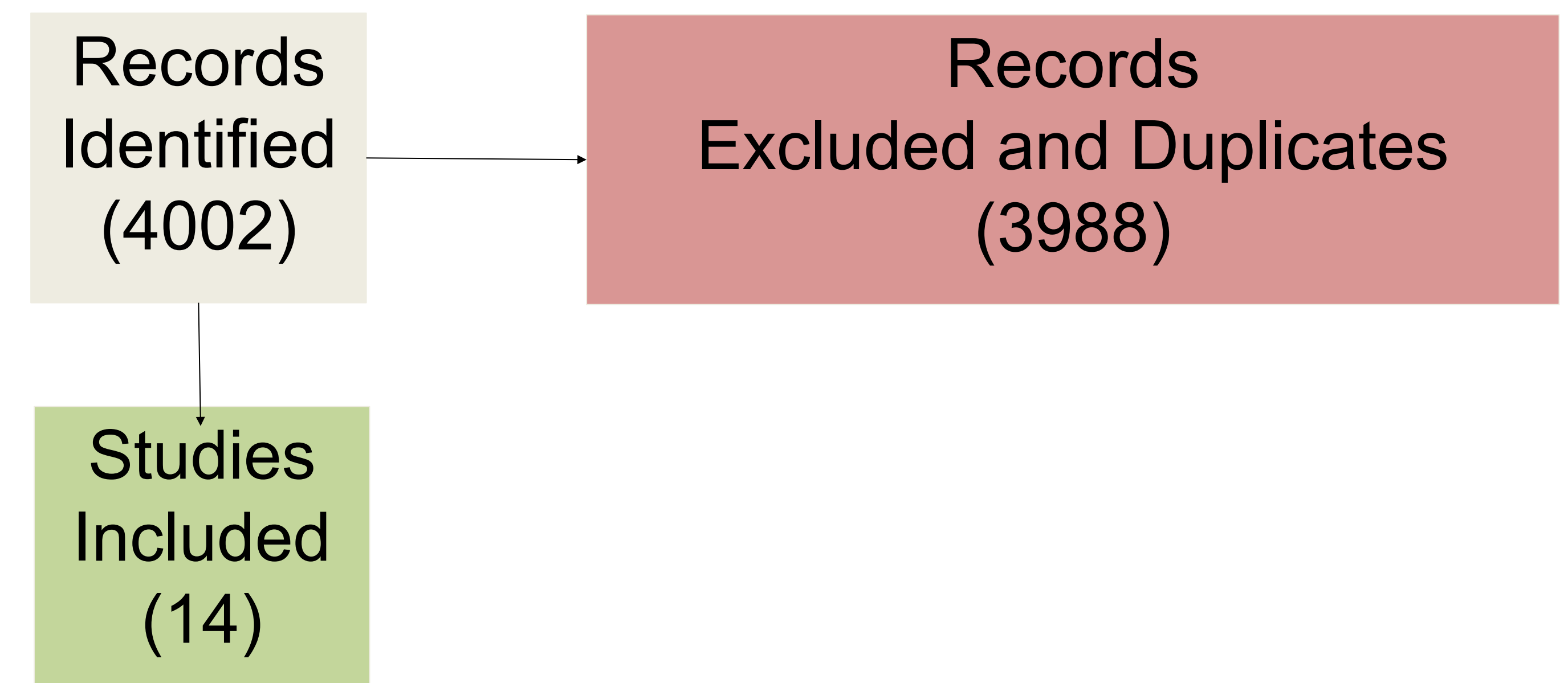
- ✗ Only one training session.
- ✗ Lack of control group,
- ✗ Absence of executive function measures.



Scan for Details

RESULTS

Add your information, graphs and images to this section.



DISCUSSION

Significant EF tasks changes were observed in both computerized and non-computerized training. No widely-used software or EF battery tests, like Cogmed or D-KEFS, were employed, posing a challenge for comparing data across studies and age groups. Task performance was the most common outcome measure, with reaction times only recorded in computerized tasks.

Our results corroborate the gap in understanding EF training effectiveness for typically developing adolescents, as noted in previous reviews. Limited evidence currently exists to develop robust EF training programs for adolescents, but our review suggests that EF can change with training during adolescence.

For future EF training in schools, we identified key points, such as adapting tasks by biological age and using game mechanics. Our systematic review has limitations, including a limited number of databases, reviewers, and language constraints.

The 14 studies showed no similarities in training protocols and measures, and risk of bias remains a concern. Future research should follow strict guidelines, register protocols, and promote open science practices.

DISCUSSION / CONCLUSION

In conclusion, our systematic review investigates EF training programs for typically developing adolescents, analyzing 14 studies from 2011-2021, categorized into computerized (7) and non-computerized (6) training. **Common training programs included physical exercises and meditation. Promising results were observed in non-computerized training and specific computerized tasks.**

Despite limited evidence, small to medium positive effects were found. We recommend a follow-up review in 5 years and further research focusing on study reproducibility, suggesting an open science methodology.

Our review highlights three patterns across studies:

- 1) There are few studies dedicated to study EF training effectiveness for adolescents;
- 2) No consistency in training protocols and selected measures of EF
- 3) Lack of detailed training reports and open-source materials for replication.

References

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