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| Database | Search Terms | | | | |
|---|---|---|---|---|---|
| | Exercise | Obesity/overweight | Executive function | Randomized controlled trial | Note |
| Web of Science | ((((((((((TS=(exercise)) OR TS=(physical activity)) OR TS=(aerobic exercise)) OR TS=(moderate intensity continuous training)) OR TS=(resistance training)) OR TS=( resistance exercise)) OR TS=(strength training)) OR TS=(strength exercise)) OR TS=(strength exercise)) OR TS=(concurrent training)) OR TS=(high intensity interval training)) OR TS=(walking)) OR TS=(sports) | ((TS=(obesity)) OR TS=(overweight)) OR TS=(obese) | ((((((TS=(executive function)) OR TS=(working memory)) OR TS=(inhibitory control)) OR TS=(cognitive flexibility)) OR TS=(planning)) OR TS=(reasoning)) OR TS=(problem solving) | ((TS=(randomized controlled trial)) OR TS=(randomized)) OR TS=(placebo) | 2287<br>Review：244<br>Before 2000：78<br>No English: 30<br>No full text：84<br>Remain：1884<br>123 |
| PubMed | ((((((((((exercise[Title/Abstract]) OR (physical activity[Title/Abstract])) OR (aerobic exercise[Title/Abstract])) OR (moderate intensity continuous training[Title/Abstract])) OR (resistance training[Title/Abstract])) OR (resistance exercise[Title/Abstract])) OR (strength training[Title/Abstract])) OR (strength exercise[Title/Abstract])) OR (concurrent training[Title/Abstract])) OR (high intensity interval training[Title/Abstract])) OR (walking[Title/Abstract])) OR (sports[Title/Abstract]) | ((obesity[Title/Abstract]) OR (overweight[Title/Abstract])) OR (obese[Title/Abstract]) | ((((((executive function[Title/Abstract]) OR (working memory[Title/Abstract])) OR (inhibitory control[Title/Abstract])) OR (cognitive flexibility[Title/Abstract])) OR (planning[Title/Abstract])) OR (reasoning[Title/Abstract])) OR (problem solving[Title/Abstract]) | ((randomized controlled trial[Title/Abstract]) OR (randomized[Title/Abstract])) OR (placebo[Title/Abstract]) | |
| SPORTDiscus (SU) | exercise OR “physical activity” OR “aerobic exercise” OR “moderate intensity continuous training”OR “resistance training” OR “ resistance exercise”OR “strength training” OR “strength exercise”OR “concurrent training” OR “high | obesity OR overweight OR obese | “executive function” OR “working memory” OR “inhibitory control” OR “cognitive flexibility” OR planning OR reasoning OR “problem solving” | “randomized controlled trial” OR randomized OR placebo | 8 |

| | | | | | |
|---|---|---|---|---|---|
| | intensity interval training" OR walking OR sports | | | | |
| MEDLINE (SU) | exercise OR "physical activity" OR "aerobic exercise" OR "moderate intensity continuous training"OR "resistance training" OR " resistance exercise"OR "strength training" OR "strength exercise"OR "concurrent training" OR "high intensity interval training" OR walking OR sports | obesity OR overweight OR obese | "executive function" OR "working memory" OR "inhibitory control" OR "cognitive flexibility" OR planning OR reasoning OR "problem solving" | "randomized controlled trial" OR randomized OR placebo | 9 |
| CINAHL (title abstract keyword) | exercise OR "physical activity" OR "aerobic exercise" OR "moderate intensity continuous training"OR "resistance training" OR " resistance exercise"OR "strength training" OR "strength exercise"OR "concurrent training" OR "high intensity interval training" OR walking OR sports | obesity OR overweight OR obese | "executive function" OR "working memory" OR "inhibitory control" OR "cognitive flexibility" OR planning OR reasoning OR "problem solving" | "randomized controlled trial" OR randomized OR placebo | 24 |

**Table S1.** Search strategy for Pubmed, Web of science, SPORTDiscus, MEDLINE and CINAHL.

| | Study;country/region | Jadad | | | | |
|---|---|---|---|---|---|---|
| | | Randomization | Concealment of allocation | Double blinding | Withdrawals and dropouts | Total |
| 1 | Abel et al.,2023;Spain[1] | 2 | 2 | 2 | 1 | 7 |
| 2 | Furlano et al.,2023;Canada[2] | 1 | 1 | 1 | 1 | 4 |
| 3 | Domal et al.,2023;India[3] | 2 | 2 | 2 | 1 | 7 |
| 4 | Chou et al.,2023;China[4] | 2 | 1 | 1 | 1 | 5 |
| 5 | Oliveira et al.,2022;Brazil[5] | 2 | 1 | 1 | 1 | 5 |
| 6 | Zhang et al.,2022;China[6] | 1 | 1 | 1 | 0 | 3 |
| 7 | Zlibinaite et al.,2021;Lithuanian[7] | 2 | 1 | 1 | 0 | 4 |
| 8 | Zlibinaite et al.,2020;Lithuanian[8] | 1 | 1 | 1 | 1 | 4 |
| 9 | chou et al.,2020;China[9] | 1 | 1 | 0 | 1 | 3 |
| 10 | Zhang et al.,2020;China[10] | 2 | 1 | 1 | 1 | 5 |
| 11 | inoue et al.,2020[11] | 1 | 1 | 1 | 1 | 4 |
| 12 | Quintero Gacharná et al.2018[12] | 1 | 0 | 0 | 1 | 2 |
| 13 | Liu et al.,2018;China[13] | 2 | 1 | 1 | 1 | 5 |
| 14 | Allom et al.,2018;Australia[14] | 2 | 2 | 1 | 1 | 6 |
| 15 | Chen et al.,2017;China[15] | 1 | 1 | 1 | 1 | 4 |
| 16 | Wennberg et al.,2015;Australia[16] | 2 | 2 | 2 | 0 | 6 |
| 17 | chen et al.,2016;China[17] | 2 | 1 | 1 | 1 | 5 |
| 18 | Dao et al.,2013;Canada[18] | 2 | 1 | 1 | 1 | 5 |
| 19 | Davis et al.,2011;USA[19] | 2 | 1 | 2 | 1 | 6 |
| 20 | Smith et al.,2010;USA[20] | 1 | 1 | 2 | 1 | 5 |

**Table S2.** Quality assessment of included studies.

Randomization:

0:not randomized or inappropriate method of randomization;

1: the study was described as randomized;

2:the method of randomization was described and it was appropriate.

Concealment of allocation:

0: Not describe the method of allocation concealment;

1: The study was described as using allocation concealment method;

2: The method of allocation concealment was described appropriately.

Double blinding:

0: No blind or inappropriate method of blinding;

1: The study was described as double blind;

2: The method of double blinding was described and it was appropriate.

Withdrawals and dropouts:

0: Not describe the follow-up;

1: A description of withdrawals and dropouts.

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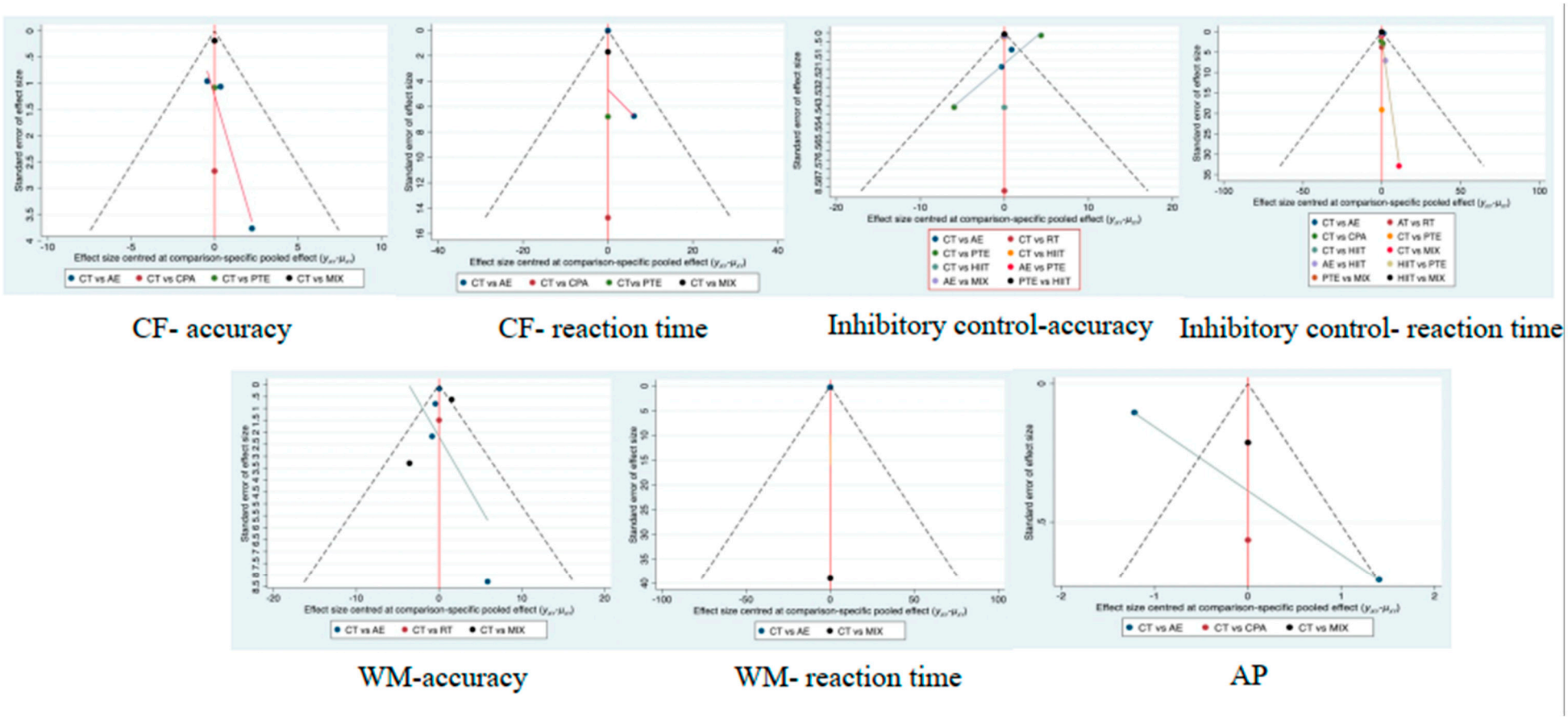


Figure S1. The funnel plot graphics of EFs. CF cognitive flexibility, WM working memory, AP academic performance.

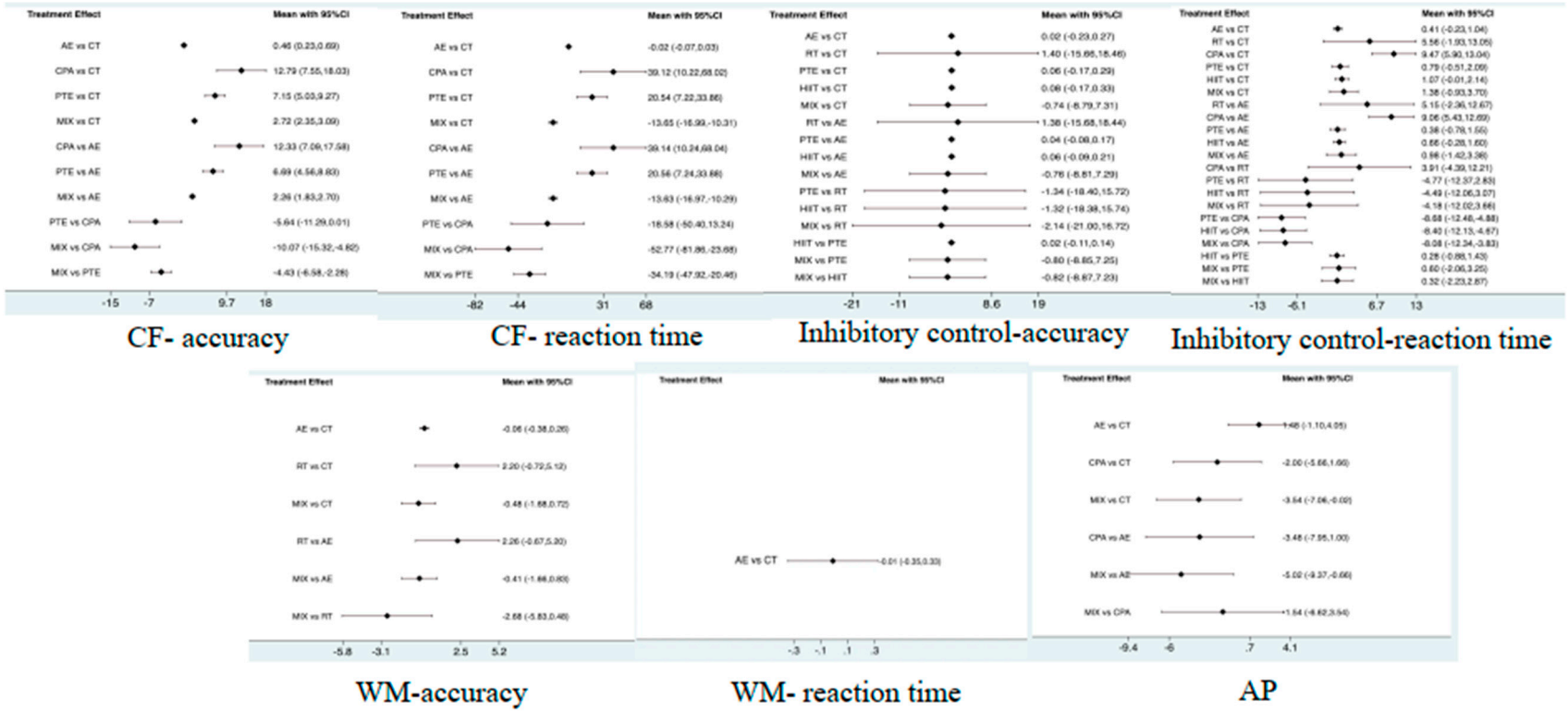


Figure S2. Plot of Forest for all included interventions' eligible comparisons in the conducted analysis. CF cognitive flexibility, WM working memory, AP academic performance.