Efficient and Innovative Physical Activity Interventions

Ben Singh, PhD
Alliance for Research in Exercise Nutrition and Activity (ARENA), University of South Australia

ARENA
ALLIANCE FOR RESEARCH IN EXERCISE, NUTRITION AND ACTIVITY

University of South Australia

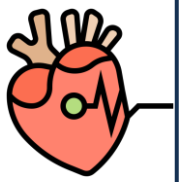
Benefits of exercise

- Reach or maintain a healthy weight

- Strengthen muscles and bones

- Improve heart and lung function

- Prevent or manage chronic health conditions (e.g., diabetes, heart disease)



Exercies & mental health

Systematic review

OPEN ACCESS

Effectiveness of physical activity interventions for improving depression, anxiety and distress: an overview of systematic reviews

Ben Singh [1], Timothy Olds,[1] Rachel Curtis,[1] Dorothea Dumuid [1], Rosa Virgara,[1] Amanda Watson,[1] Kimberley Szeto,[1] Edward O'Connor,[1] Ty Ferguson,[1] Emily Eglitis,[1] Aaron Miatke,[1] Catherine EM Simpson,[1] Carol Maher[2]

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[1]Allied Health & Human Performance, University of South Australia, Adelaide, South Australia, Australia
[2]Health and Use of Time (HUT) Group, University of South Australia, Adelaide, South Australia, Australia

Correspondence to
Dr Ben Singh, University of South Australia, Adelaide, South Australia, Australia;
ben.singh@unisa.edu.au

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ABSTRACT

Objective To synthesise the evidence on the effects of physical activity on symptoms of depression, anxiety and psychological distress in adult populations.

Design Umbrella review.

Data sources Twelve electronic databases were searched for eligible studies published from inception to 1 January 2022.

Eligibility criteria for selecting studies Systematic reviews with meta-analyses of randomised controlled trials designed to increase physical activity in an adult population and that assessed depression, anxiety or psychological distress were eligible. Study selection was undertaken in duplicate by two independent reviewers.

Results Ninety-seven reviews (1039 trials and 128 119 participants) were included. Populations included healthy adults, people with mental health disorders and people with various chronic diseases. Most reviews (n=77) had a critically low A MeaSurement Tool to Assess systematic Reviews score. Physical activity had medium effects on depression (median effect size=−0.43, IQR=−0.66 to −0.27), anxiety (median effect size=−0.42, IQR=−0.66 to −0.26) and psychological distress (effect size=−0.60, 95% CI −0.78 to −0.42), compared with usual care across all populations. The largest benefits were seen in people with depression, HIV and kidney disease, in pregnant and postpartum women, and in healthy individuals. Higher intensity physical activity was associated with greater improvements in symptoms. Effectiveness of physical activity interventions diminished with longer duration interventions.

Conclusion and relevance Physical activity is highly beneficial for improving symptoms of depression, anxiety and distress across a wide range of adult populations, including the general population, people with diagnosed mental health disorders and people with chronic disease. Physical activity should be a mainstay approach in the management of depression, anxiety and psychological distress.

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which is projected to increase to $6 trillion (USD) by 2030.[5] Depression is the leading cause of mental health-related disease burden,[6] while anxiety is the most prevalent mental health disorder.[3] Additionally, the COVID-19 pandemic has been associated with increased rates of psychological distress, with prevalence ranging between 35% and 38% worldwide.[7–9]

The role of lifestyle management approaches, such as exercise, sleep hygiene and a healthy diet, varies between clinical practice guidelines in different countries. In US clinical guidelines,[10] psychotherapy or pharmacotherapy is recommended as the initial treatment approaches, with lifestyle approaches considered as 'complementary alternative treatments' where psychotherapy and pharmacotherapy are 'ineffective or unacceptable'. In other countries such as Australia, lifestyle management is recommended as the first-line treatment approach,[11 12] though in practice, pharmacotherapy is often provided first.

There have been hundreds of research trials examining the effects of physical activity (PA) on depression, anxiety and psychological distress, many of which suggest that PA may have similar effects to psychotherapy and pharmacotherapy (and with numerous advantages over psychotherapy and pharmacotherapy, in terms of cost, side-effects and ancillary health benefits).[13–18] Despite the evidence for the benefits of PA, it has not been widely adopted therapeutically. Patient resistance, the difficulty of prescribing and monitoring PA in clinical settings, as well as the huge volume of largely incommensurable studies, have probably impeded a wider take-up in practice.[13 14 17]

Meta-reviews are systematic reviews of systematic reviews, offering a way of synthesising a vast evidence base. While there have been several meta-reviews of PA for depression, anxiety and psychological distress,[17 19–24] they have focused on specific population subgroups, particular conditions (eg, depression only) or on particular forms of PA. We set out to undertake the most comprehensive synthesis to date

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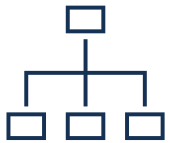
Umbrella review to summarise all existing systematic reviews on the effects of physical activity on depression and anxiety

Exercise & mental health



97 systematic reviews
1,039 RCTs
128,119 participants

Cancer n=27 (28%)
Depression n=11 (11%)
Dementia n=5 (5%)
Older adults n=5 (5%)

Various modes n=70 (72%)
Specific modes (e.g., aerobic only, yoga only) n=27 (28%)

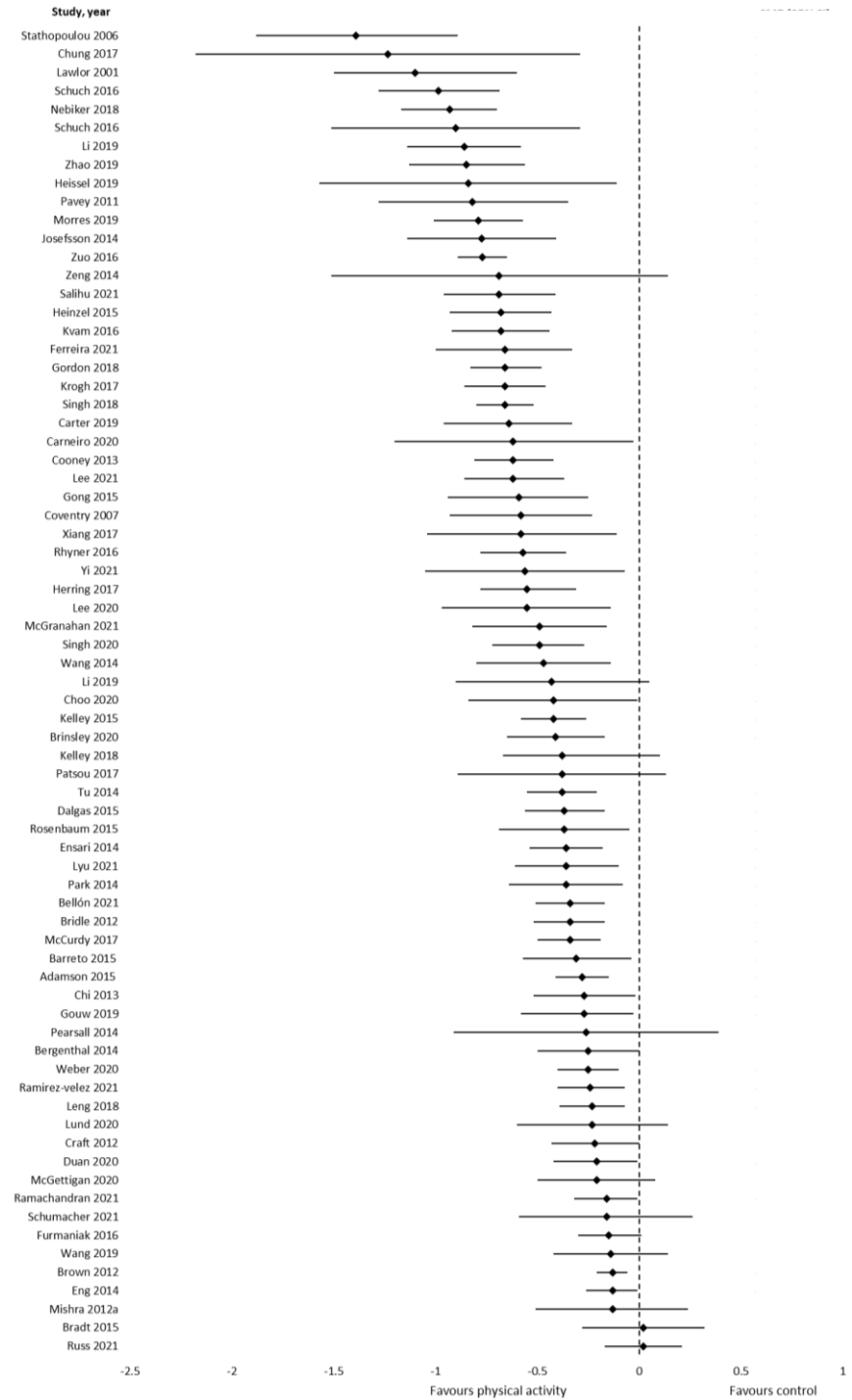
Exercise & depression

Depression (overall effect size): -0.43

Kidney disease: -0.85
HIV/AIDS: -0.84
COPD: -0.72
Healthy adults: -0.69

Resistance: –0.64
Mixed-mode: –0.47
Yoga: –0.46
Aerobic: –0.45

Effect size interpretation:
-0.2 = Small effect
-0.5 = Medium Effect
-0.8 = Large effect
COPD: Chronic obstructive pulmonary disease.

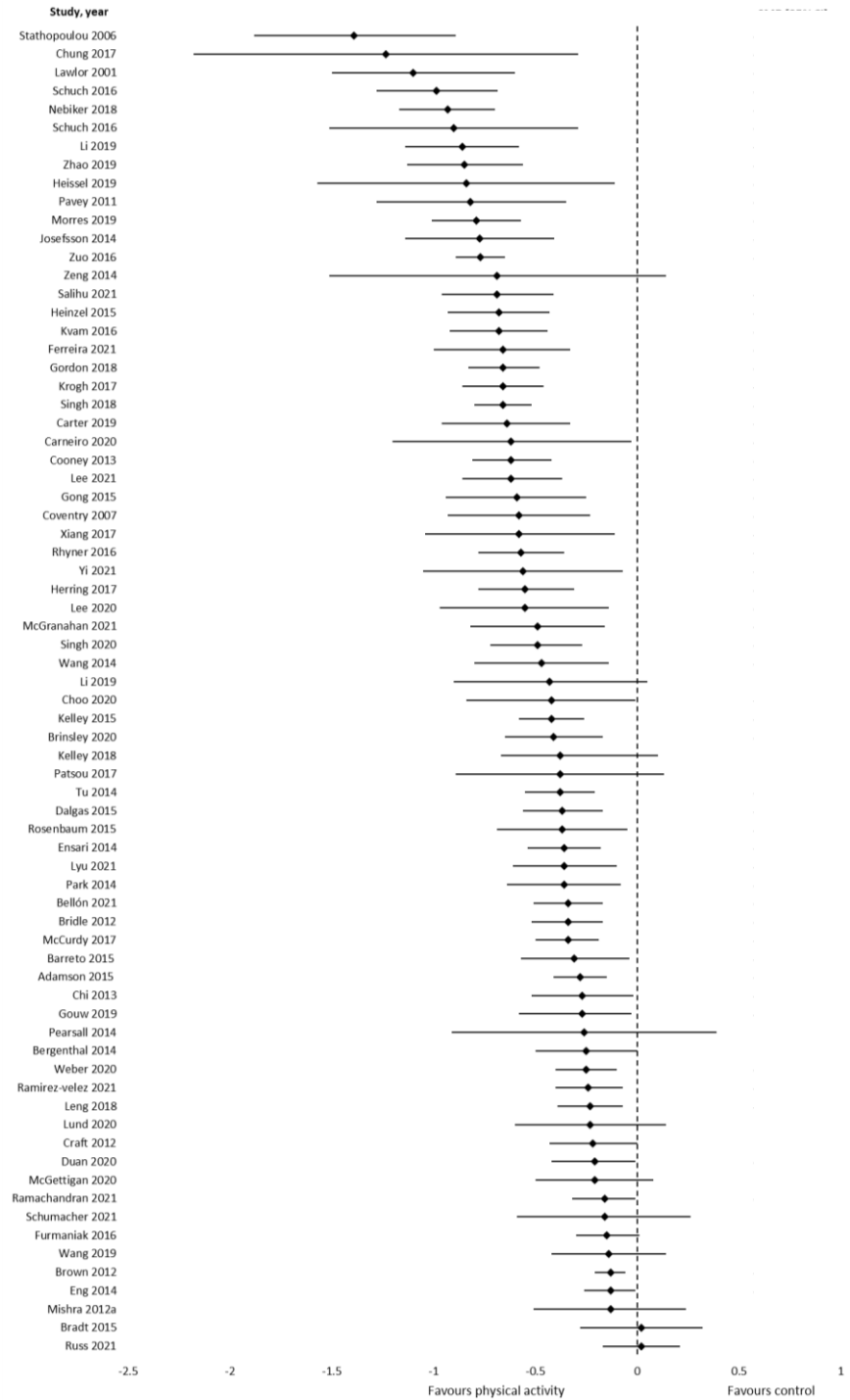


Exercise & depression

Exercise intensity
High: –0.70
Moderate: –0.56
Low: –0.22

Exercise duration
<12 weeks: –0.84
12-23 weeks: –0.46
≥24 weeks: –0.28

Effect size interpretation:
-0.2 = Small effect
-0.5 = Medium Effect
-0.8 = Large effect

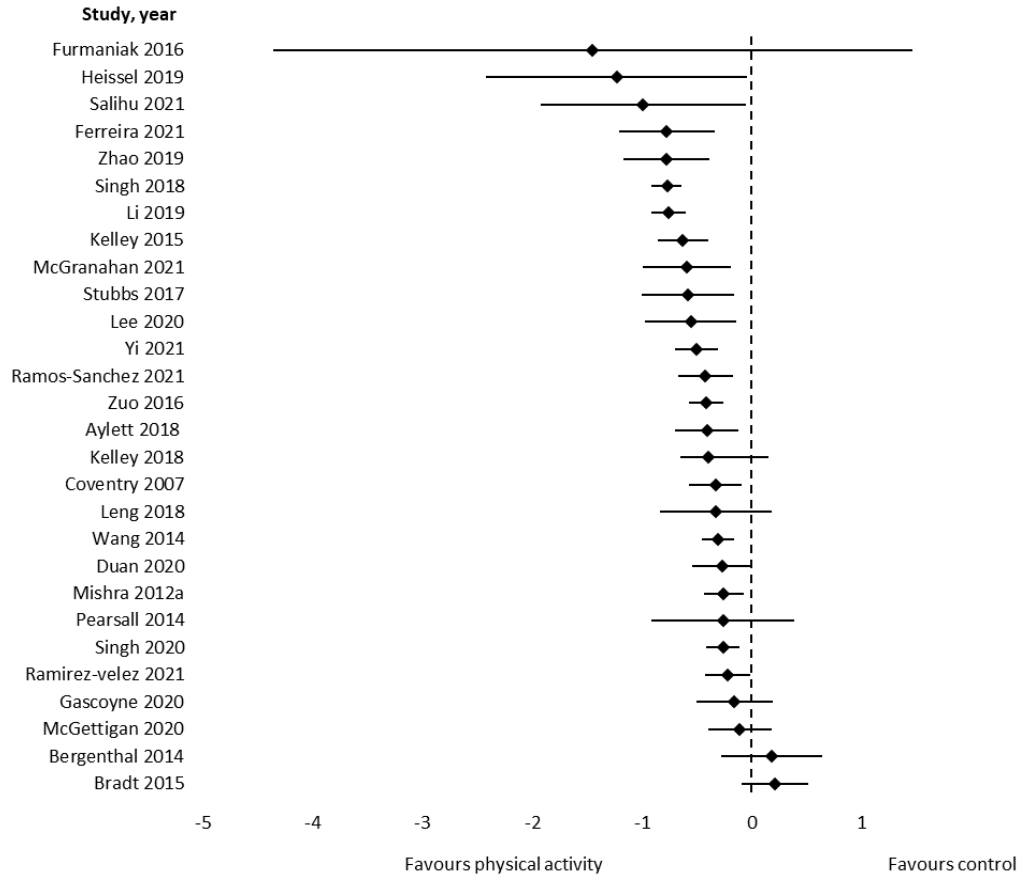


Exercise & anxiety

Anxiety (overall effect size): -0.42

HIV/AIDS: -1.23
Healthy adults: -0.85
Kidney disease: -0.78
Breast cancer: -0.53

Yoga & mind body: –0.42
Mixed-mode: –0.35
Aerobic: –0.29
Resistance: –0.23



Effect size interpretation:
-0.2 = Small effect
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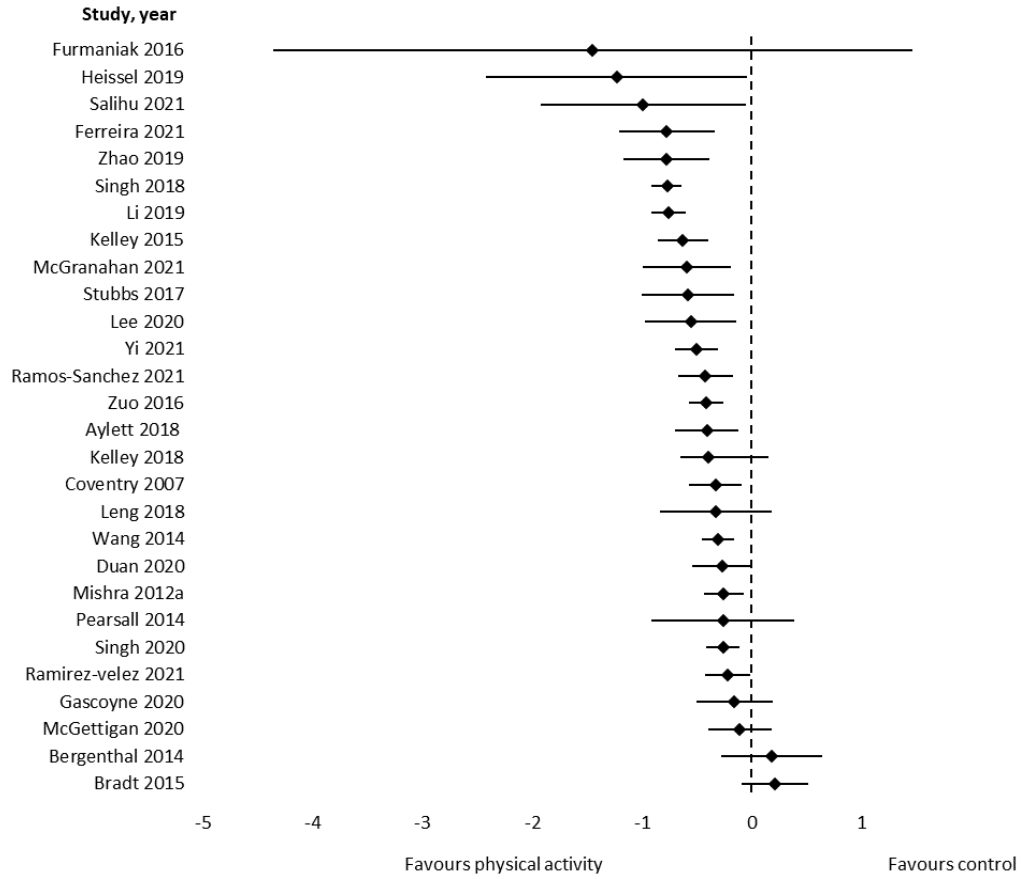
-0.8 = Large effect

Exercise & anxiety

Exercise intensity
Moderate: –0.47
High: –0.44
Low: –0.26

Exercise duration
<12 weeks: –0.55
12-23 weeks: –0.47
≥24 weeks: –0.15



Effect size interpretation:
-0.2 = Small effect
-0.5 = Medium Effect
-0.8 = Large effect

- All types of physical activity are beneficial.
- Greatest benefits in depression, healthy individuals, HIV & kidney disease.
- Higher intensity is more beneficial.
- Effects reduce over time.

- Aim for at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity activity each week.
- Even a small amount of physical activity is better than none.
- Any type of physical activity is better than none.
- Find an activity that you enjoy and that fits into your lifestyle.

Exercise & mental health

Adults

Children & adolescents

Youth mental health

Children aged 3-17 years

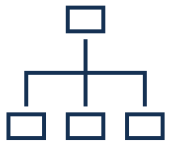
- 4.4% have depression[1]
- 9.4% have anxiety[1]
- Prevalence increased by 24% and 27% between 2016-2020[2]

[1]Centres for Disease Control and Prevention (2023).
[2] Lebrun-Harris, JAMA Pediatrics (2023)

Aim

Evaluate the effects of exercise on depression and anxiety symptoms in children and adolescents and identify the most effective exercise-based approaches

Exercise, children & mental health



21 Systematic reviews
375 RCTs
n=38,117

Healthy/general population n=7
Depression n=6
ADHD n=3
Other n=5

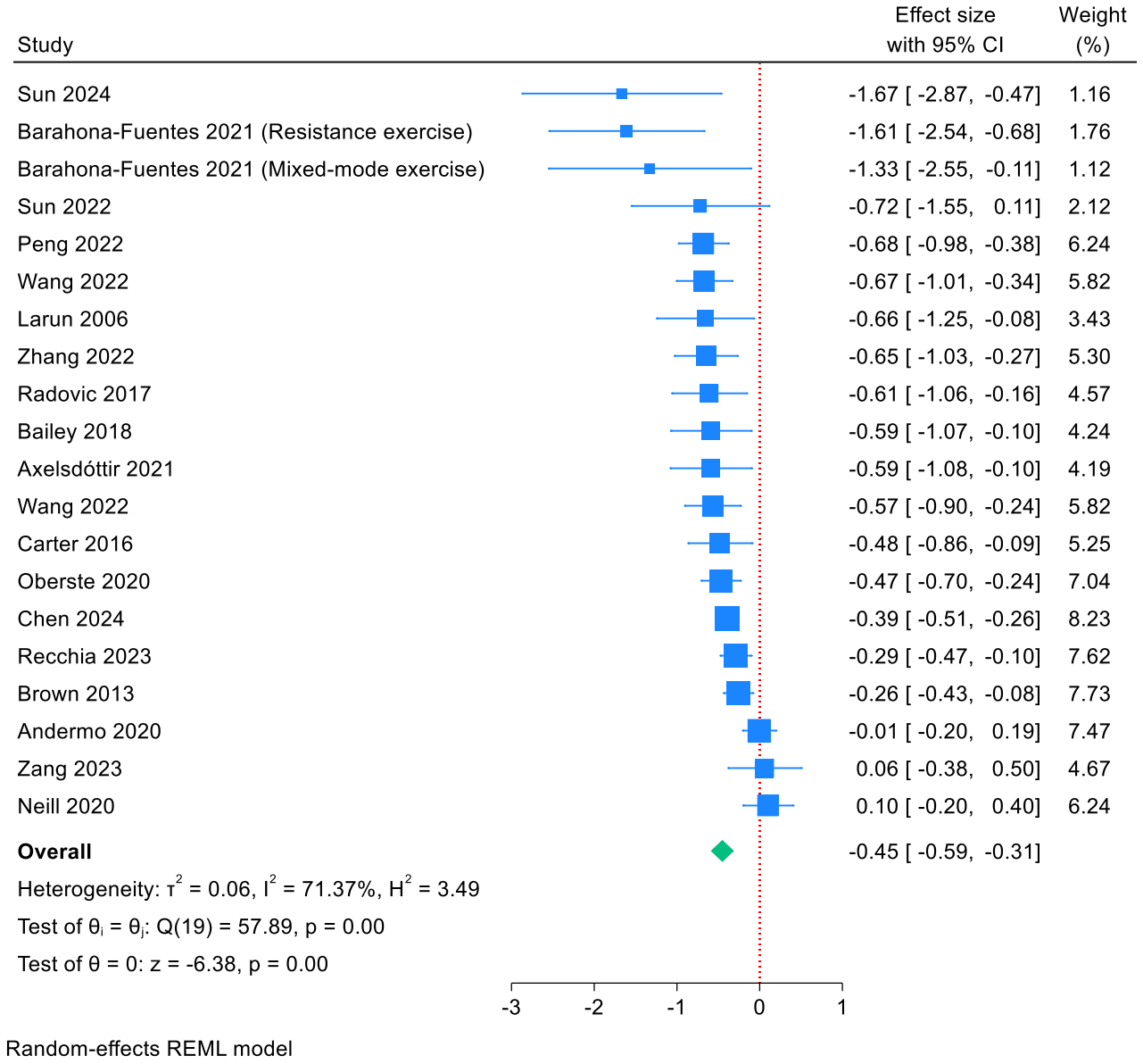
Mixed exercise n=20
Aerobic exercise n=1

Depression & children

Overall effect size: -0.45, p<0.01

ADHD: -1.09
Mental illness: -1.07
Other clinical: -0.43
Overweight/obese: -0.39
Healthy/general population: -0.11

Effect size interpretation:
-0.2 = Small effect
-0.5 = Medium Effect
-0.8 = Large effect
ADHD: Attention deficit hyperactivity disorder



Depression & children

Exercise mode

Mixed mode: -1.20

Resistance: -1.05

Aerobic: -0.43

Yoga: -0.12

Exercise intensity

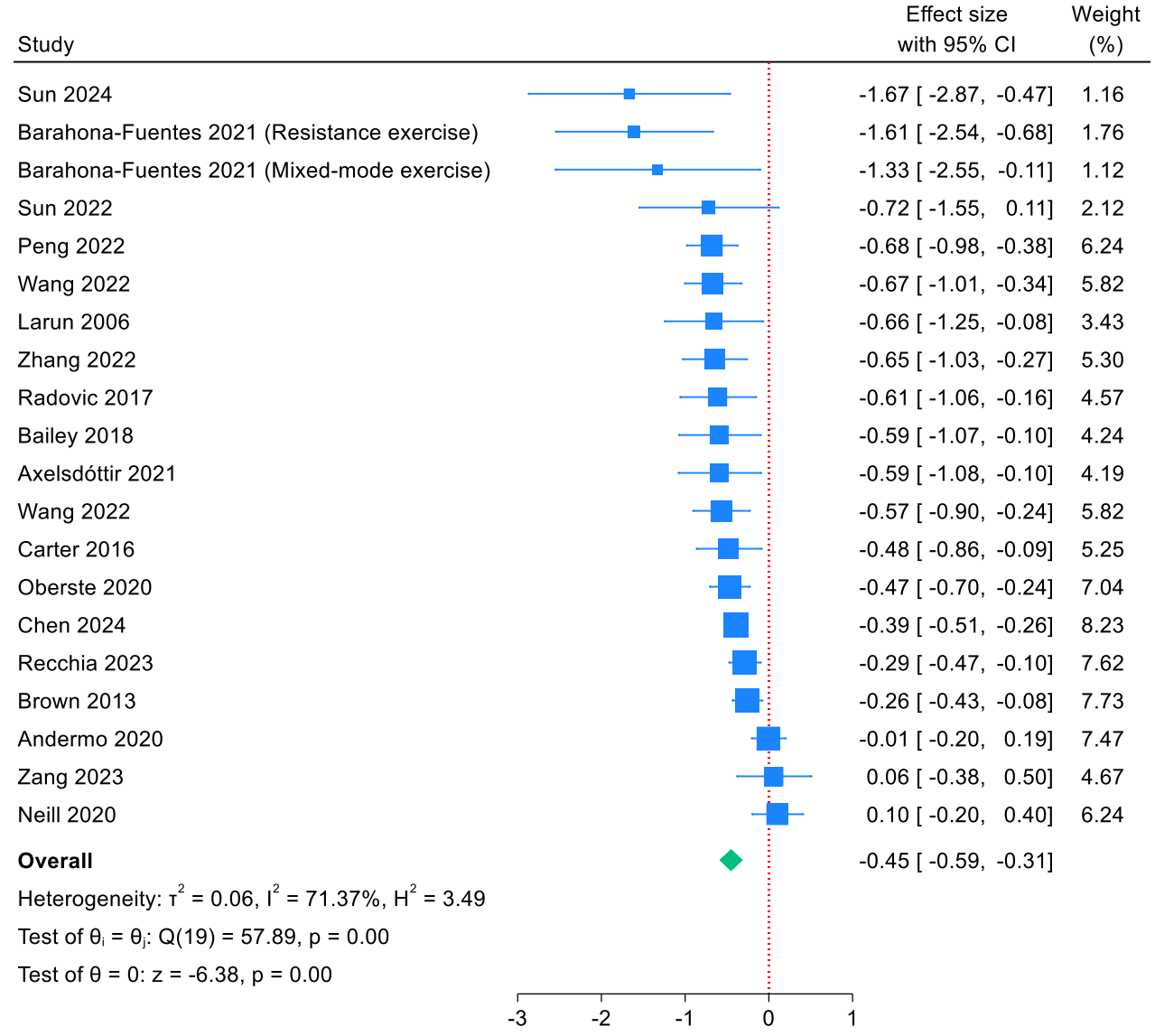
MVPA: -1.06

Moderate: -0.91

Vigorous : -0.38

Low: -0.20

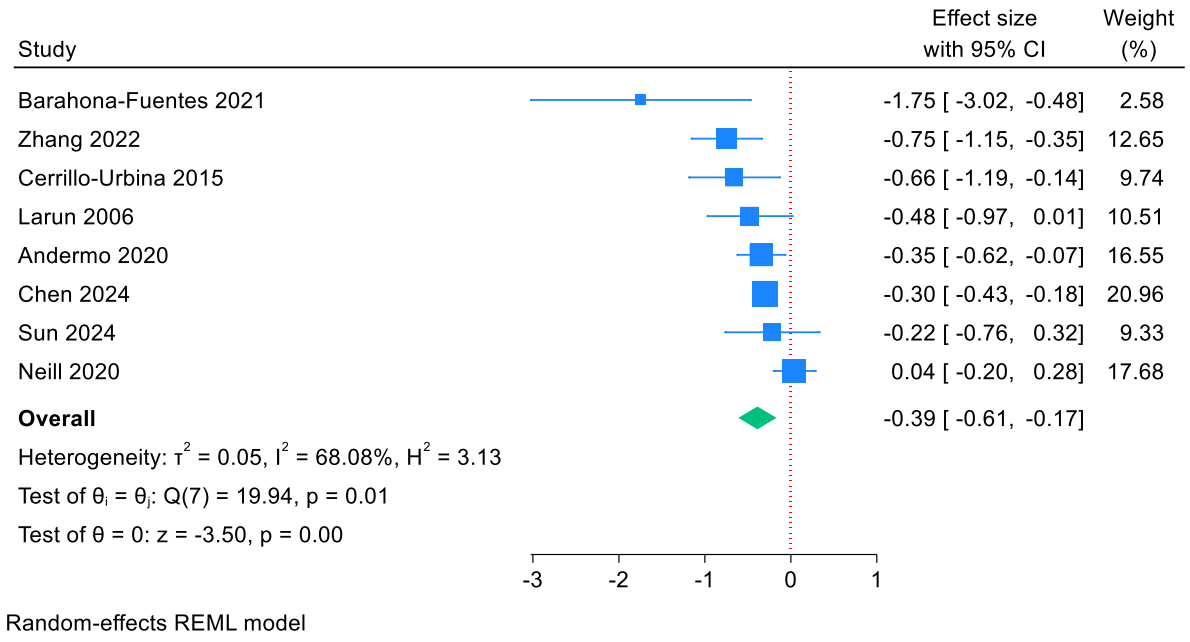
Effect size interpretation:
-0.2 = Small effect
-0.5 = Medium Effect
-0.8 = Large effect



Anxiety & children

Overall effect size: -0.39, p=0.01

Mental illness: -0.55
ADHD: -0.42
Obese/overweight: -0.30



Effect size interpretation:
-0.2 = Small effect
-0.5 = Medium Effect
-0.8 = Large effect

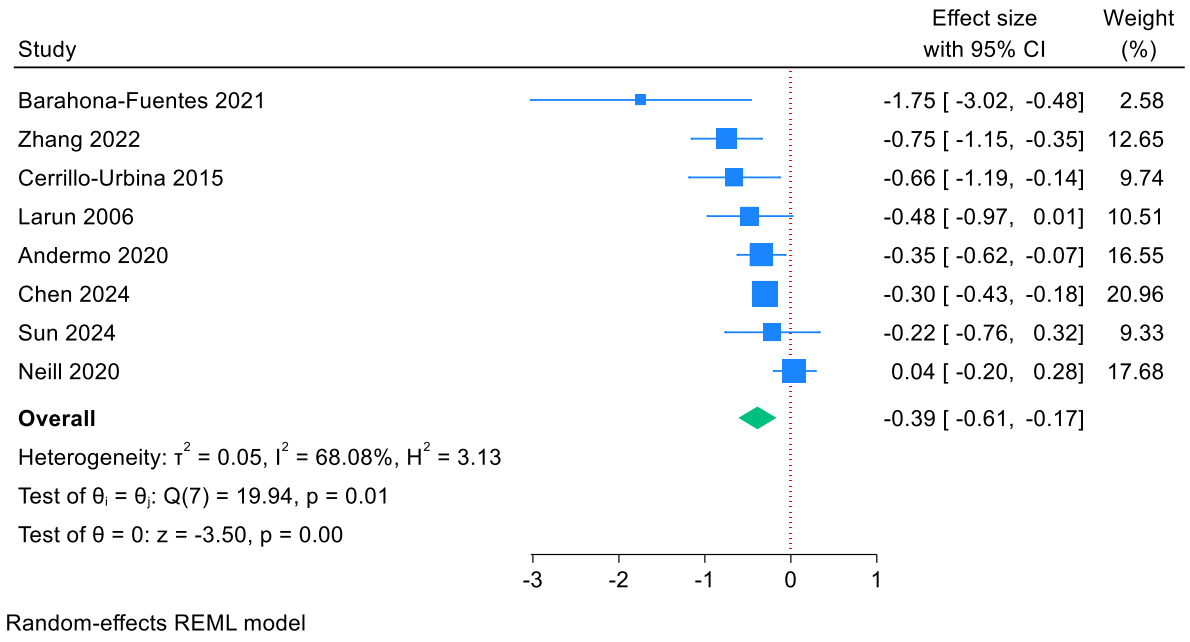
Anxiety & children

Exercise mode
Resistance: -0.90
Aerobic: -0.19

Intervention duration
>8 weeks: -1.87
≤8 weeks: -0.64

Session duration
>30 mins: -1.21
≤30 mins: -0.15

Frequency
>3/week: -1.35
1-3/week: -0.70

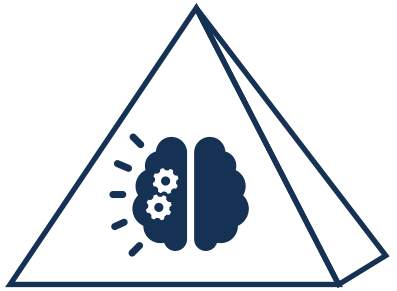


Depression & anxiety

- Mixed mode & resistance exercise
- ADHD & mental illness
- Moderate & MVPA
- >8 weeks, >30 minutes & >3x per week

Exercise & mental health

Cognitive function



Adults

Children & adolescents

Cognitive impairment & dementia

Median prevalence of 19% in adults aged 50+ globally[1].

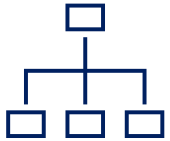
Global prevalence of dementia is projected to reach 82 million by 2030 and 152 million by 2050[1].

[1]Keramat et al. *Qual of Life Research*. 2023; 32: 2911-2924

Research aim

Umbrella review to summarise all existing systematic reviews on the effects of exercise on general cognition & memory.

Exercise & cognition



133 systematic reviews
2,742 RCTs
258,279 participants

Older adults n=72
Adults n=47
Children n=11
Children & adults n=3

Various modes n=103
Aerobic n=7, resistance n=5,
Tai Chi n=5, dance n=5,
exergames n=4, Yoga n=2,
Baduanjin n=2

Cognitive function

Cognitive function (overall effect size): 0.42

Population

Healthy adults: 0.47

Dementia: 0.44

Chronic diseases: 0.41

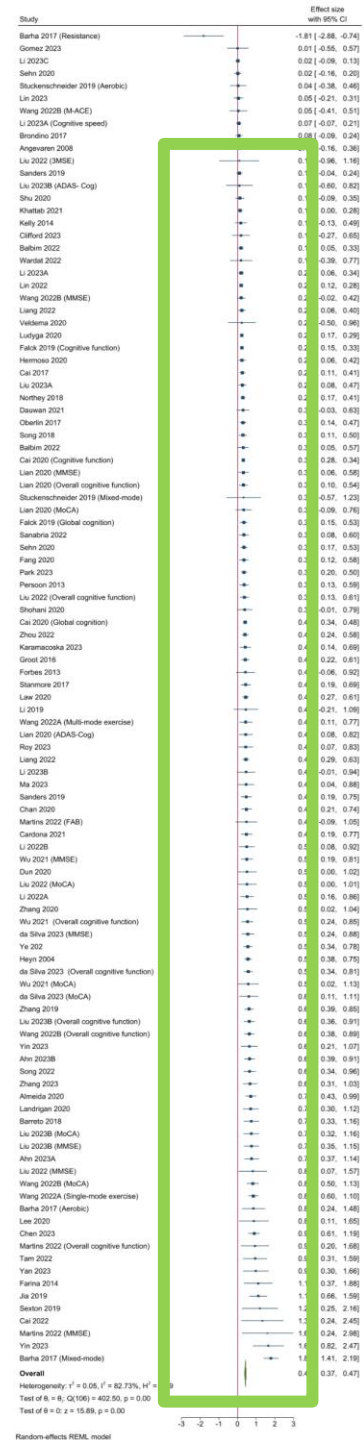
Age group

Older adults: 0.42

Adults: 0.40

Children: 0.28

Effect size interpretation:
0.2 = Small effect
0.5 = Medium Effect
0.8 = Large effect



Cognitive function

Exercise type

Exergames: 0.61

Yoga: 0.44

Dance: 0.43

Mixed mode: 0.42

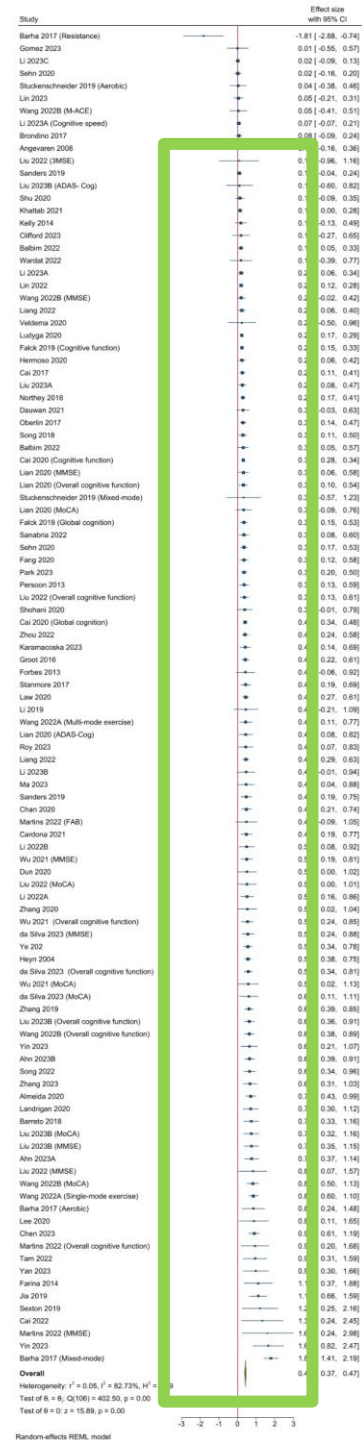
Resistance: 0.30

Aerobic: 0.20

Exercise intensity

No significant differences between low, moderate, MVPA and vigorous intensity.

Effect size interpretation:
0.2 = Small effect
0.5 = Medium Effect
0.8 = Large effect



Memory

Memory (overall effect size): 0.26

Population

Healthy adults: 0.38

Neurological disorders: 0.29

Dementia: 0.20

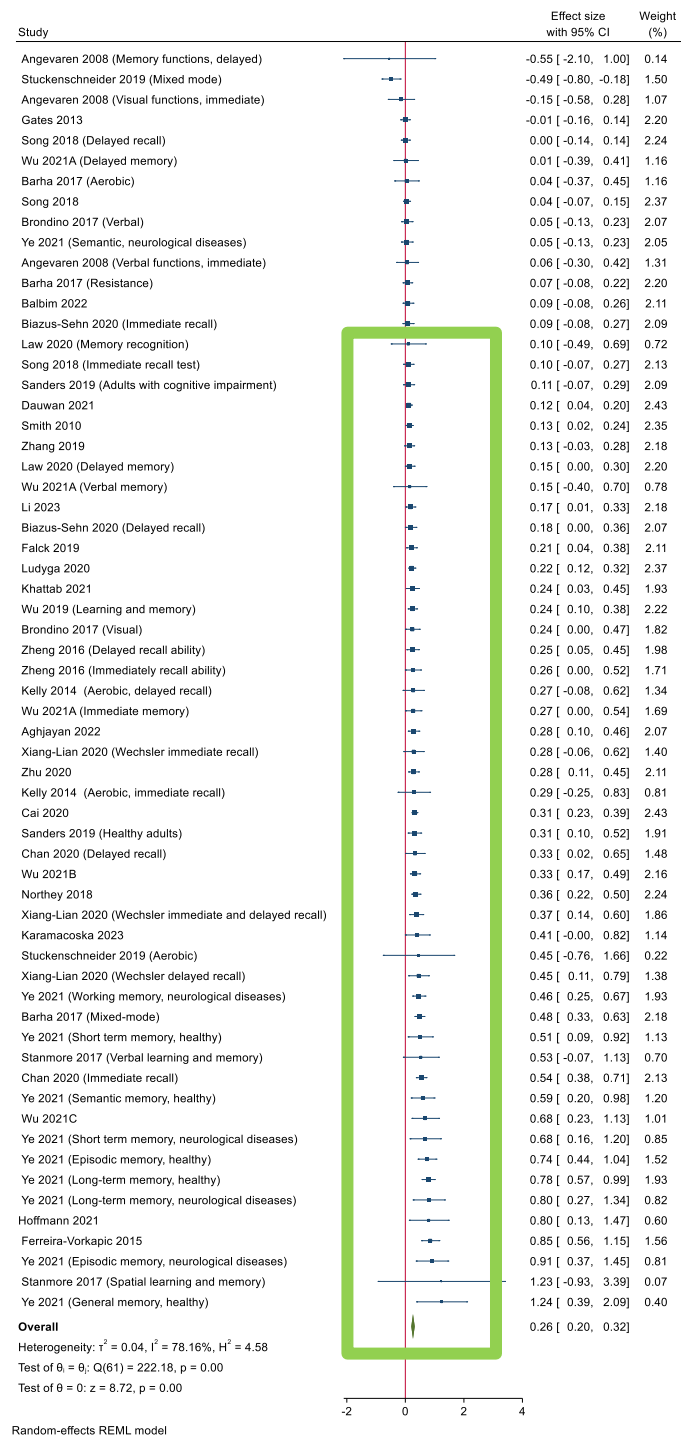
Age group

Children: 0.85

Older adults: 0.27

Adults: 0.20

Effect size interpretation:
0.2 = Small effect
0.5 = Medium Effect
0.8 = Large effect



Memory

Exercise type

Exergames: 0.58

Yoga: 0.51

Dance: 0.41

Mixed mode: 0.42

Aerobic: 0.14

Resistance: 0.13

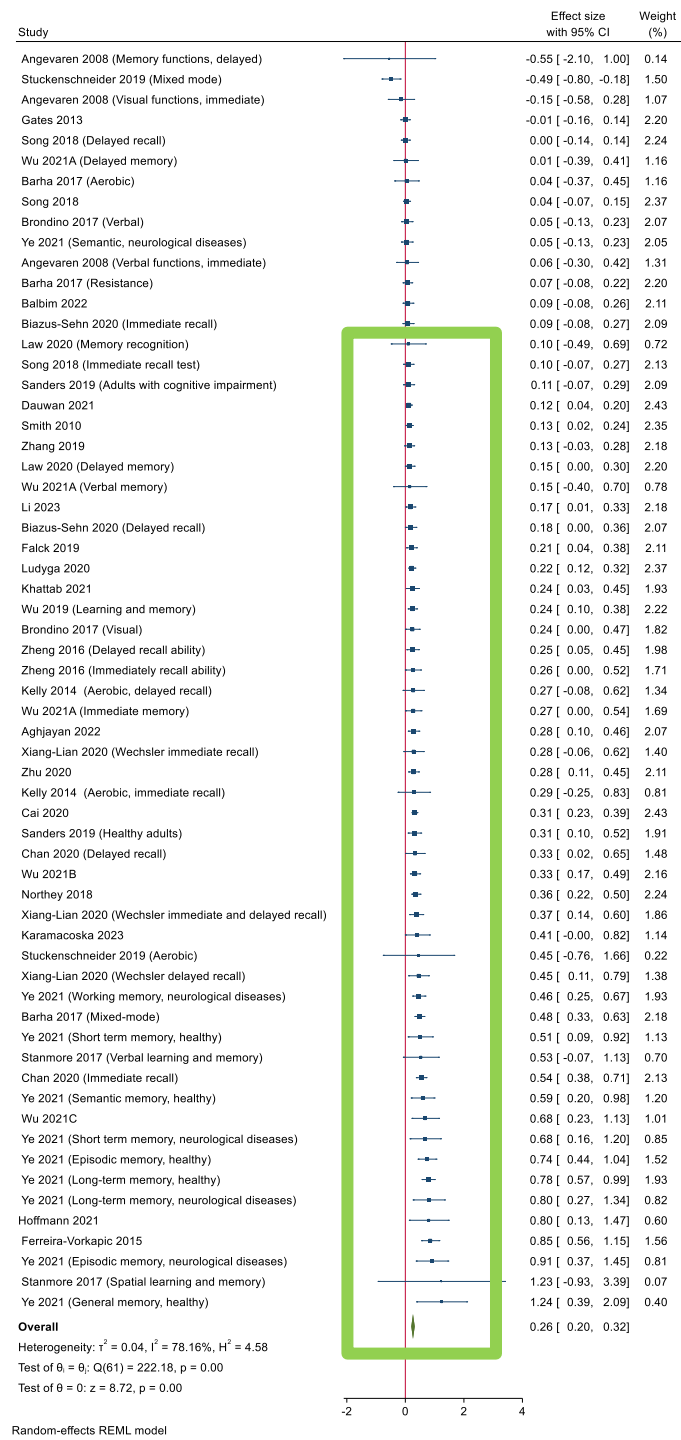
Exercise intensity

Moderate: 0.41

Vigorous: 0.23

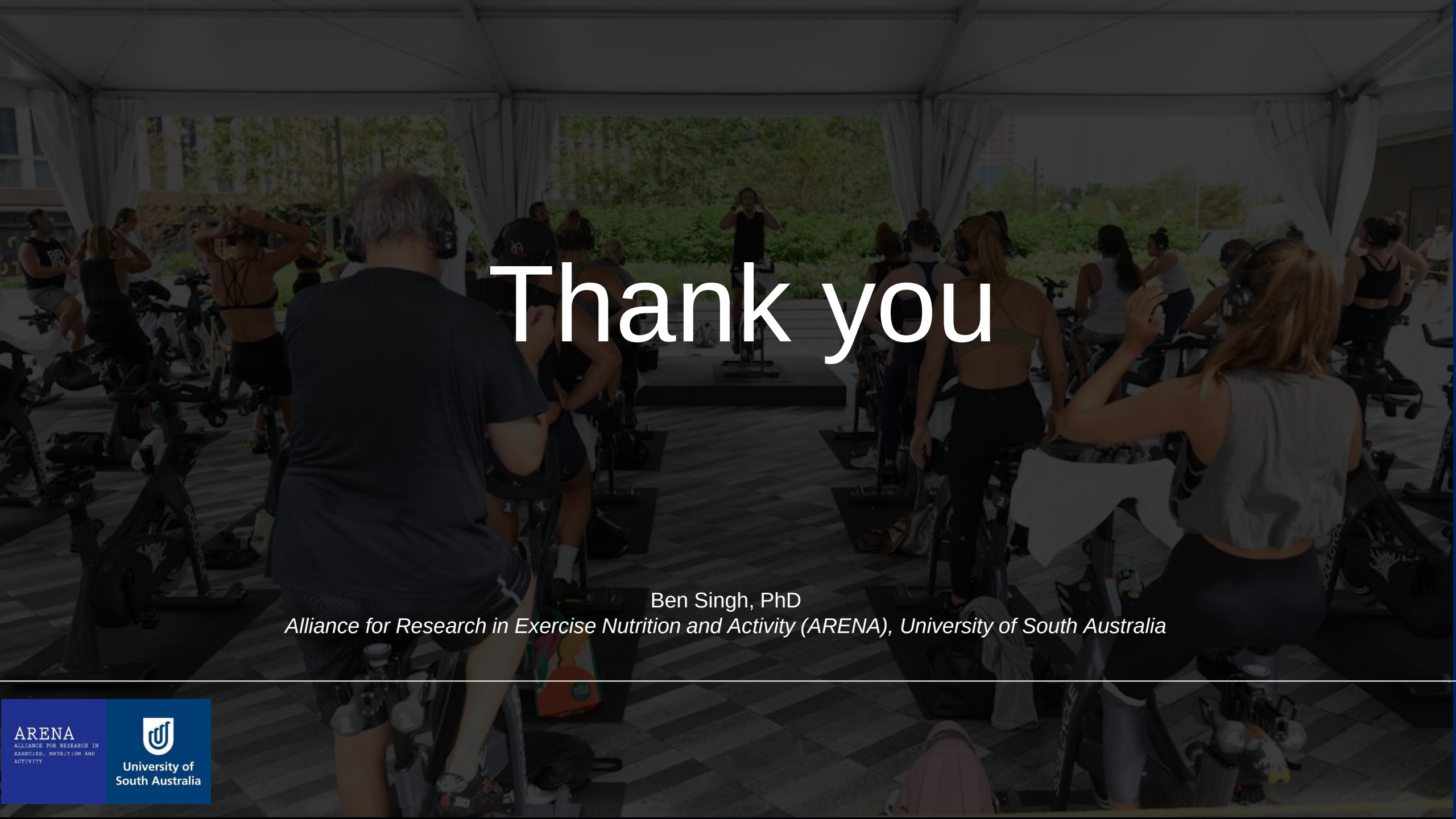
Low: 0.15

Effect size interpretation:
0.2 = Small effect
0.5 = Medium Effect
0.8 = Large effect



Exercise, cognition and memory

- Improved cognition & memory across all ages & health conditions.
- Exergaming & mind-body exercise show particularly strong benefits.
- Even light-intensity can enhance cognitive function, making it accessible for diverse populations.



Thank you

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