Physically active lessons & their effects on physical activity, education, health and cognition: A systematic review & meta-analysis

Dr Emma Norris

Research Fellow, Centre for Behaviour Change

@EJ_Norris emma.norris@ucl.ac.uk

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Physically active lessons

Jumping along when counting times tables….

Acting out movements in a story…

Making graphs from movements (e.g heart rate)

Learning dance of a studied country…

Why this review was needed

- First systematic review of physically active lessons found 11 studies (Norris et al., 2015). Not enough for firm conclusions.
- Since then, growing number of studies comparing physically active lessons to typical teaching
- Reviews explored classroom activity interventions collectively e.g active breaks and physically active lessons (e.g Daly-Smith et al., 2018; Watson et al., 2017)

- **No meta-analysis of studies testing physically active lessons compared to typical teaching**

Bringing together the evidence

Review

Physically active lessons in schools and their impact on physical activity, educational, health and cognition outcomes: a systematic review and meta-analysis

British Journal of Sports Medicine

With:

Dr Tommy van Steen, Leiden University

Dr Artur Direito, National University of Singapore

Prof Emmanuel Stamatakis, University of Sydney

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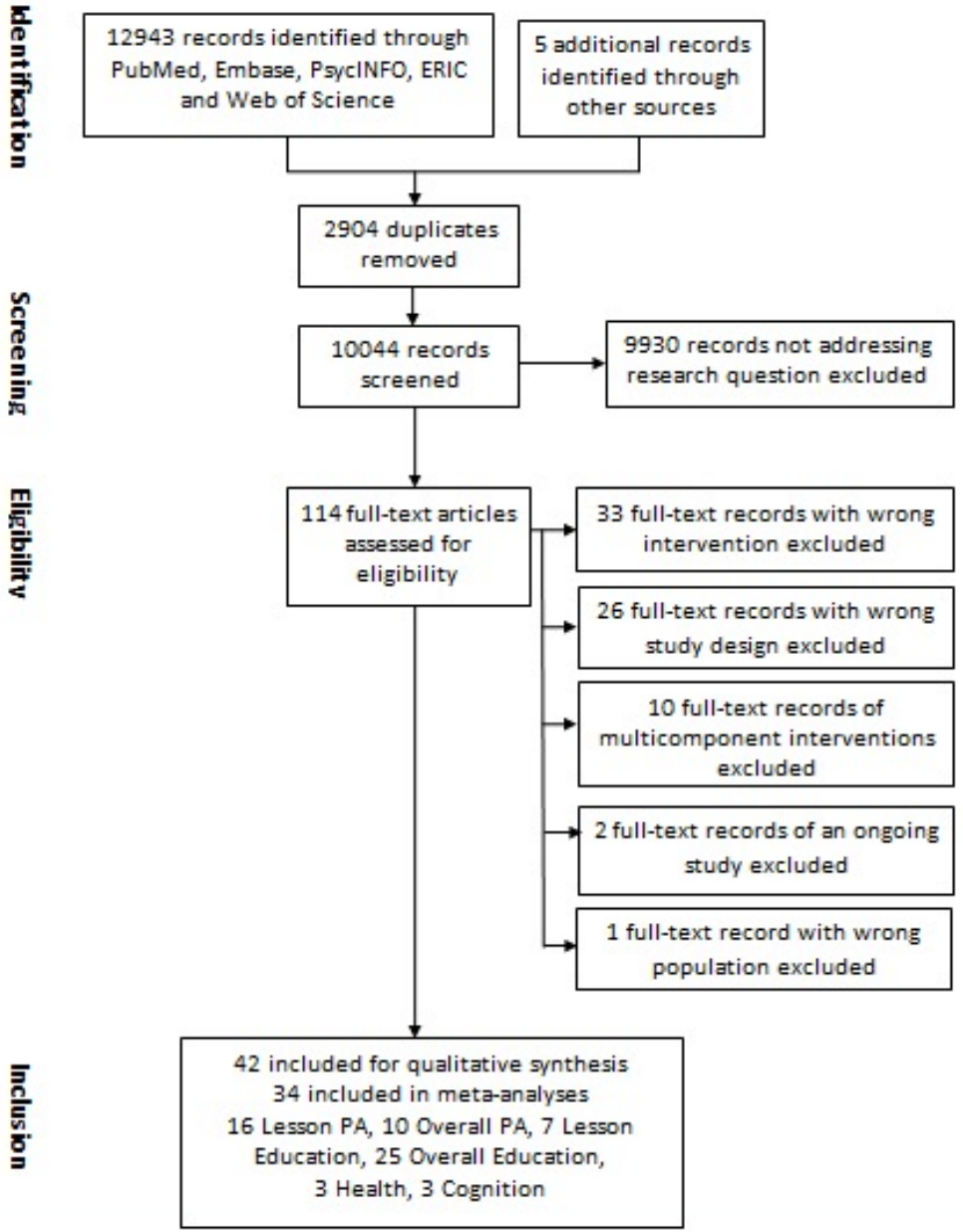
@EJ_Norris

emma.norris@ucl.ac.uk

How did we identify papers?



- PubMed, Embase, PsycINFO, ERIC and Web of Science, grey literature and reference lists searched in December 2017 & April 2019

- **Inclusion criteria -** PA lessons compared to a control group, published after January 1997

- **Exclusion criteria -** PA lessons as part of multicomponent intervention, PE, active breaks, after-school or recess interventions; exclusively special populations (such as disabled or obese children), protocol, qualitative, process evaluation and review papers, Lab-based studies & non-English language studies

= 42 identified papers: 34 included in meta-analyses

Summary of the 42 identified papers

Sample size: Range: n=21 to n=2,493, *ntotal*=12,663

Intervention Setting:

- 18/42 USA, 7 Australia, 5 UK, 4 the Netherlands, 2 Denmark, 1 Croatia, China & Ireland, Israel, Portugal, Sweden

- **29/42 in elementary school**, 9 pre-school, 2 high school, 1 pre-school to elementary, 1 elementary to middle school

Dose of intervention: Median of 8 weeks length of intervention, range of one-off PA lesson to 3 year intervention

Source of intervention: 23/42 delivered by existing classroom teacher

Theory and Techniques used in studies

Use of theory: 2/42 applied COM-B/Behaviour Change Wheel. No other theories applied

Behaviour Change Techniques used: M=3.9 BCTs per paper

4.1: **Instruction on how to perform the behaviour** (31/42 studies)

e.g teacher training on how to deliver active lessons

12.5 **Adding objects to the environment** (27/42)

e.g USB stick of pre-prepared sessions, audio CD

2.3 **Self-monitoring of behaviour** (16/42)

e.g teachers logging when they deliver active lessons

2.2 **Feedback on behaviour** (10/42)

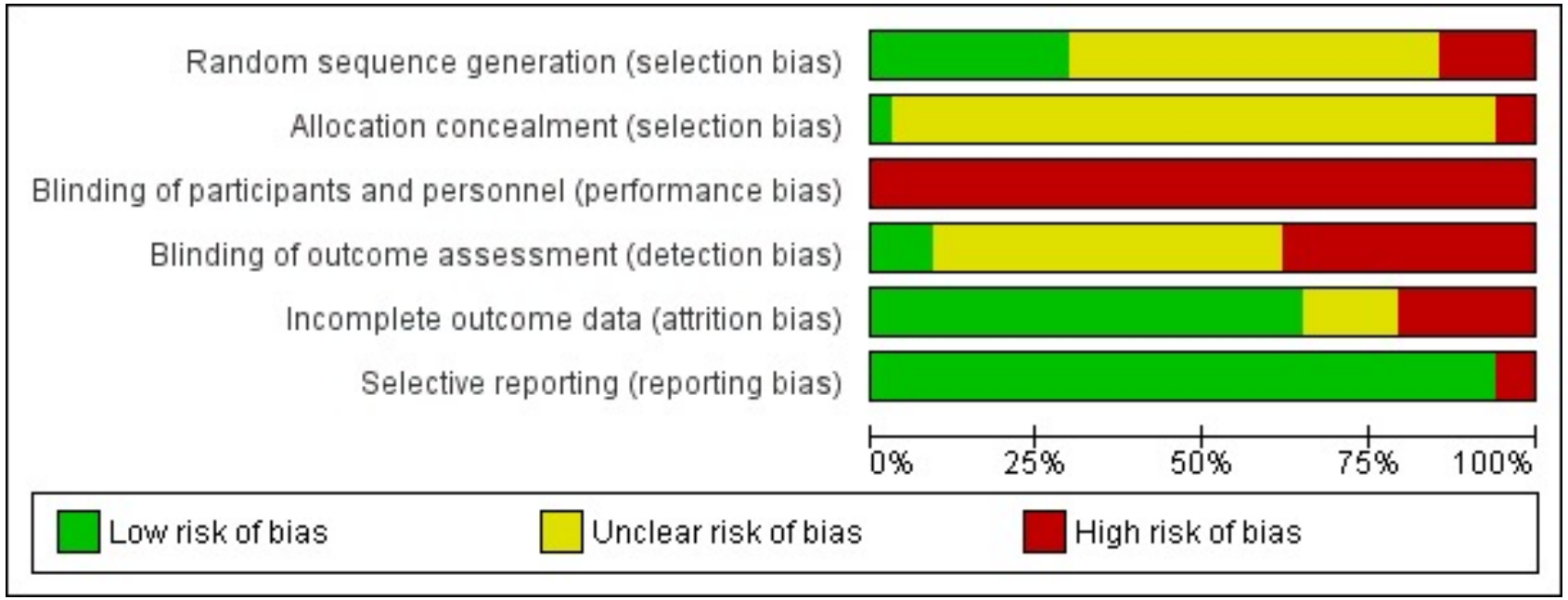
e.g staff or researchers observing and giving feedback to teachers

Michie et al., 2013.

Risk of bias of identified studies

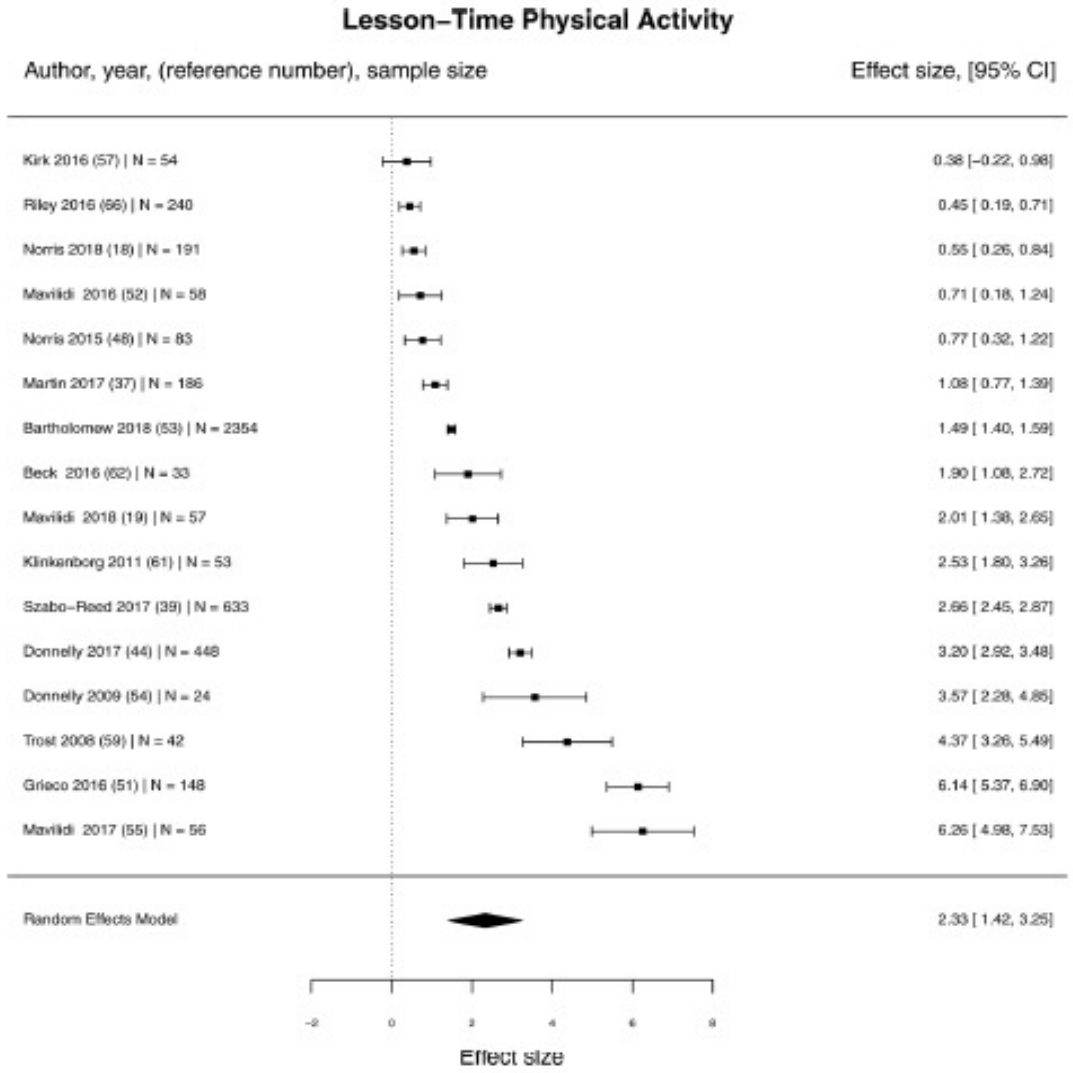
- Assessed using Cochrane Collaboration tool for assessing risk of bias
- All 42 studies high risk on at least one domain (blinding of participants & personnel)
  - Blinding not possible – common issue in behavioural interventions
- 25/42 having additional high risk of bias in at least one other domain

- Ratings across all studies: Unclear (33.45%), low risk (33.1%), high risk (33.45%)



Effects of PA lessons on Physical Activity

- 24/42 papers assessed physical activity
  - 17/24 used devices e.g. accelerometers/pedometers, 8 observations, 2 questionnaires

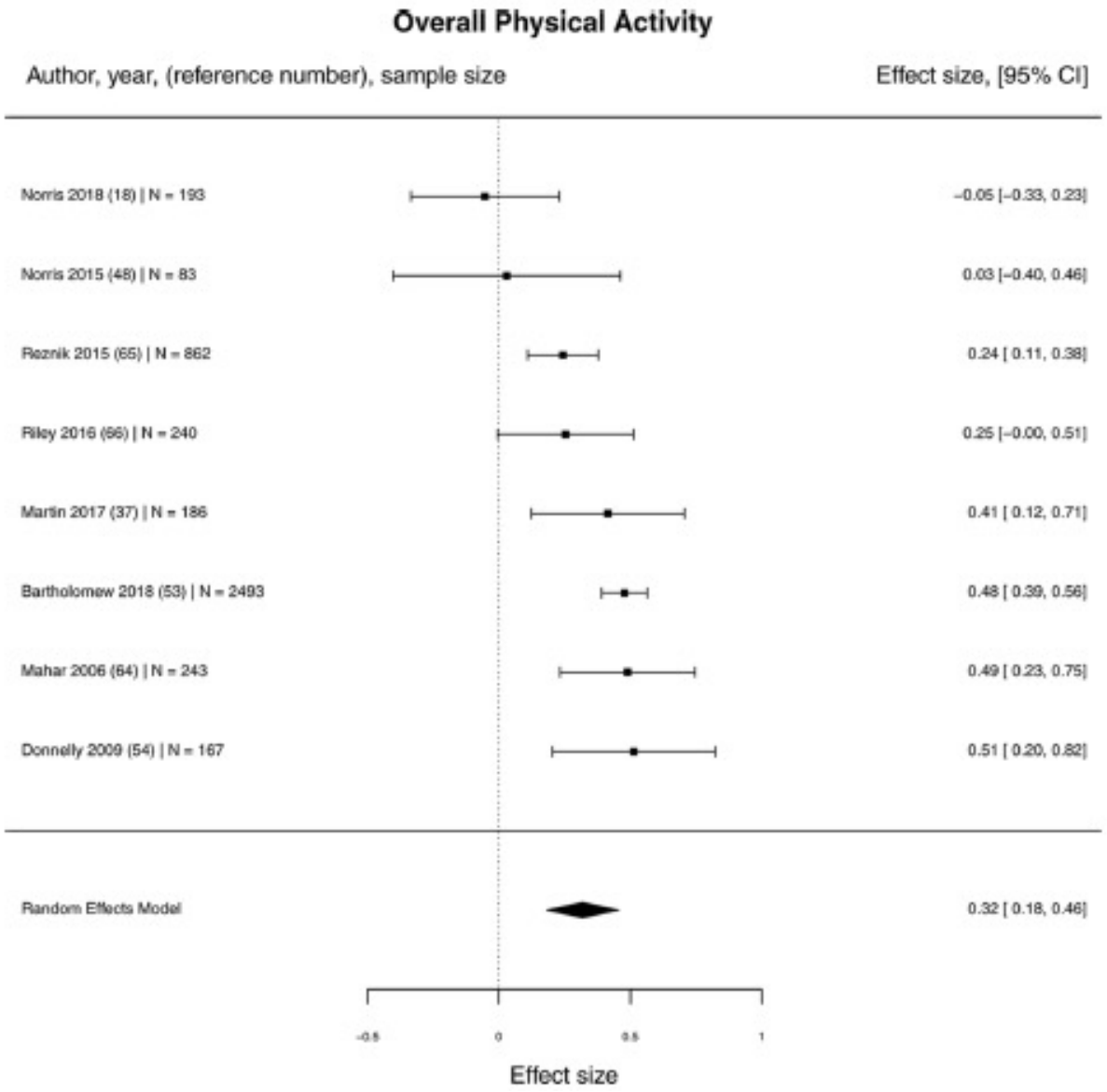


PA during lesson-time:
21 studies, *n*= 4660

d=2.33 (95% CI 1.42, 3.25)
= **large, significant positive effect** of PA lessons on lesson-PA

Shorter interventions (<8 weeks) showed larger effects

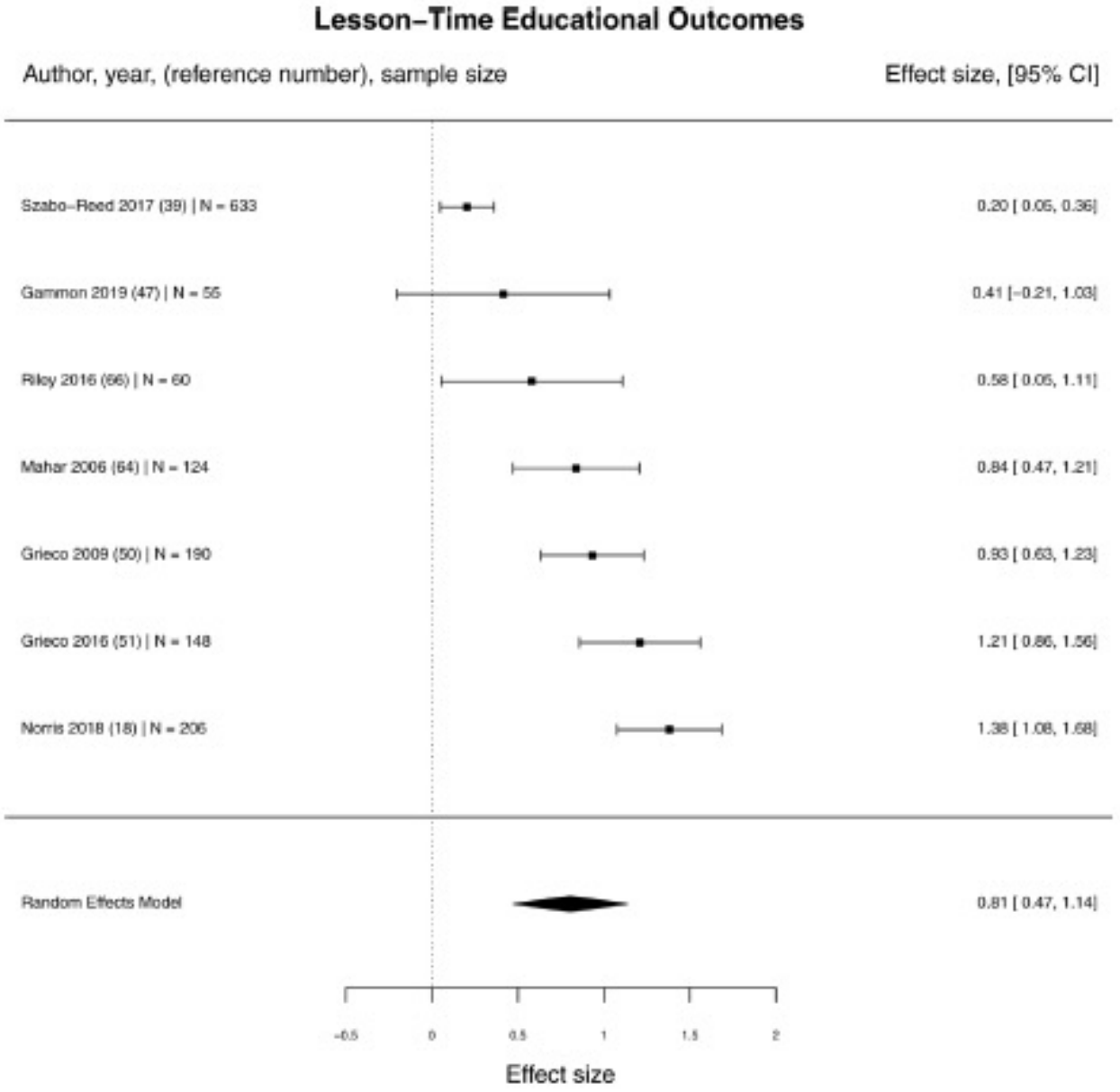
Effects of PA lessons on Physical Activity



Overall PA time:
8 studies, *n*=4467

d=0.32 (95% CI 0.18, 0.46)
= **small, significant positive effect** of PA lessons on overall PA

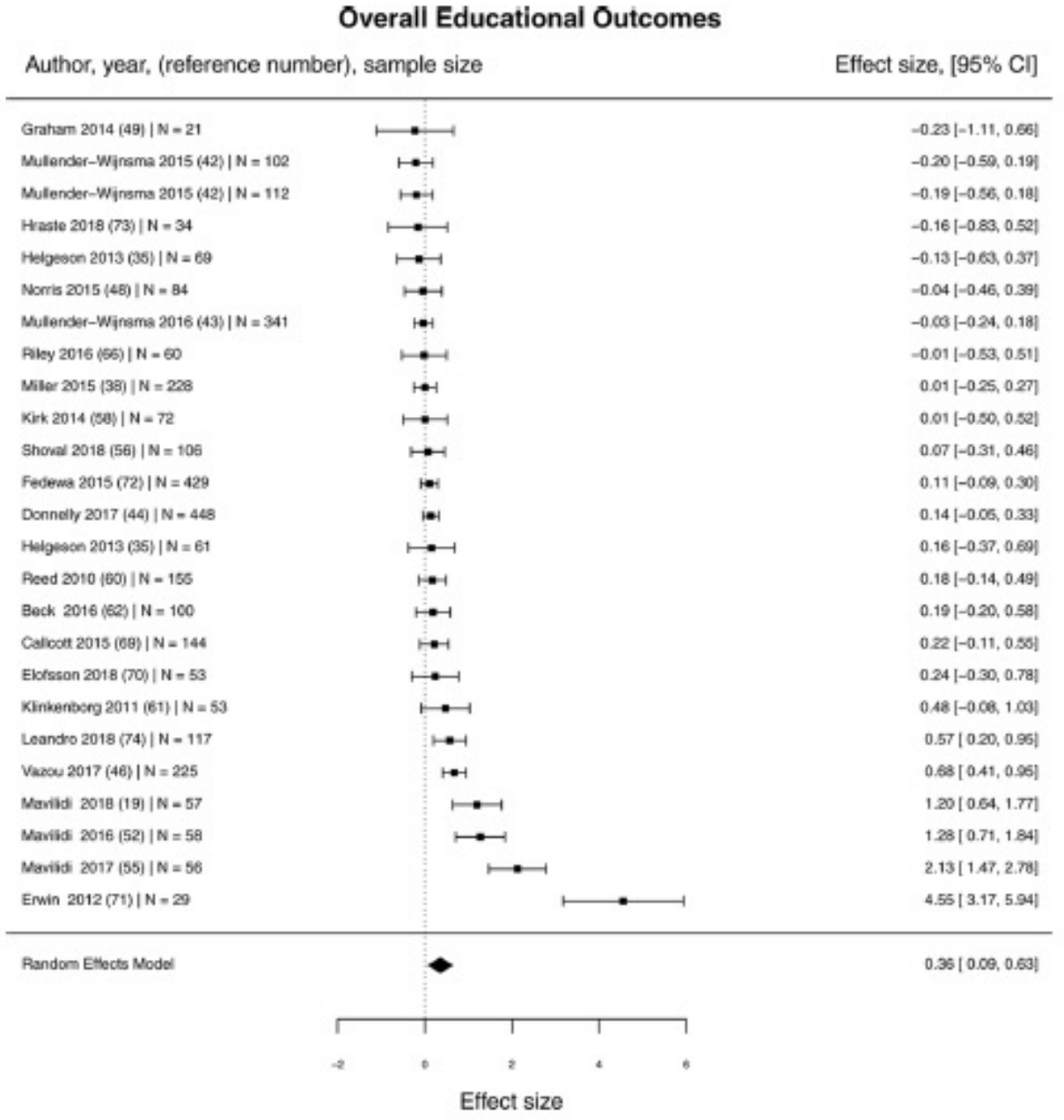
Effects of PA lessons on Educational Outcomes



Education during lesson-time (on-task behaviour):
7 studies, *n*=1416

d=0.81 (95% CI 0.47, 1.14)
= **large, significant positive effect** of PA lessons on lesson-time education

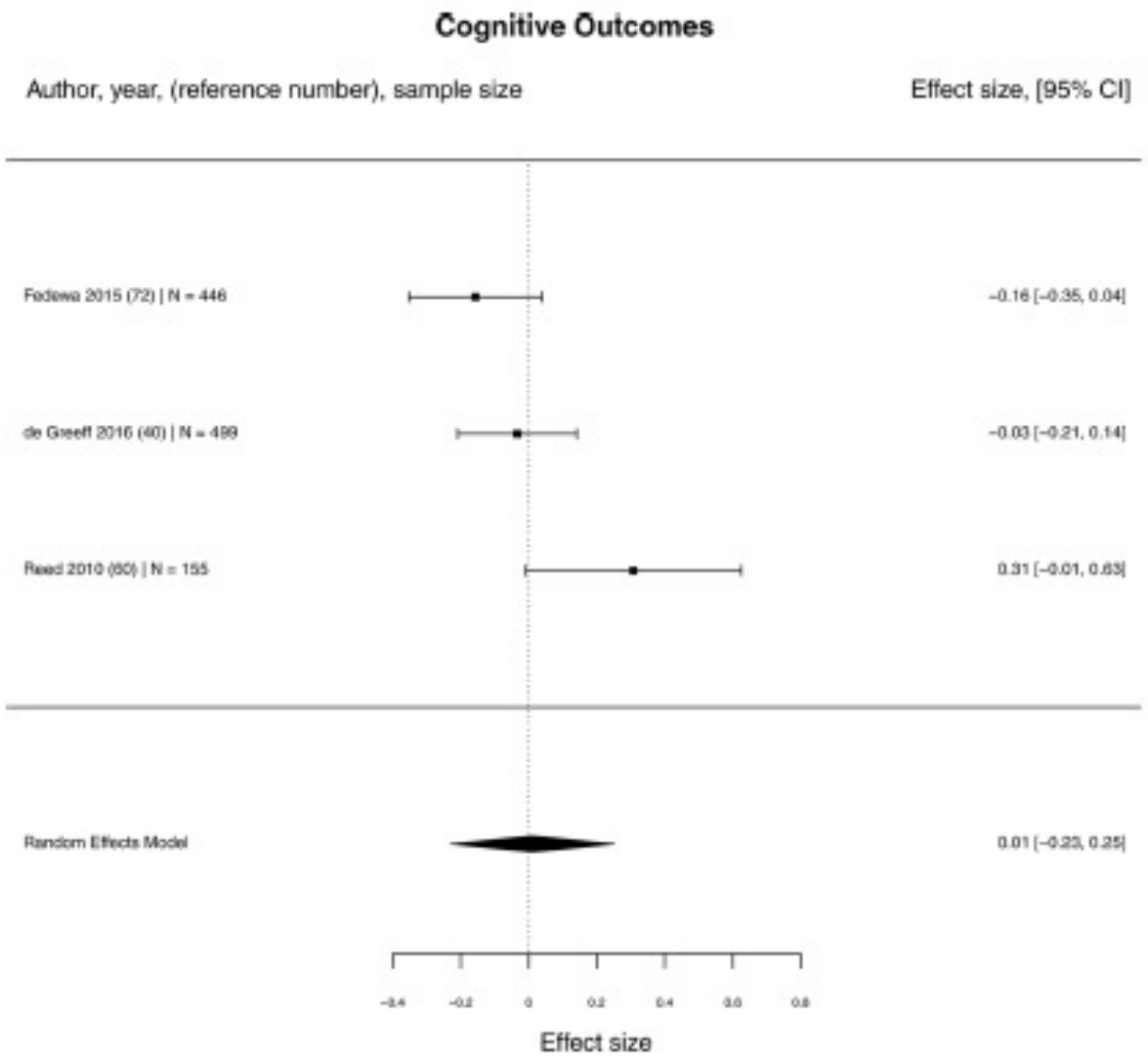
Effects of PA lessons on Educational Outcomes

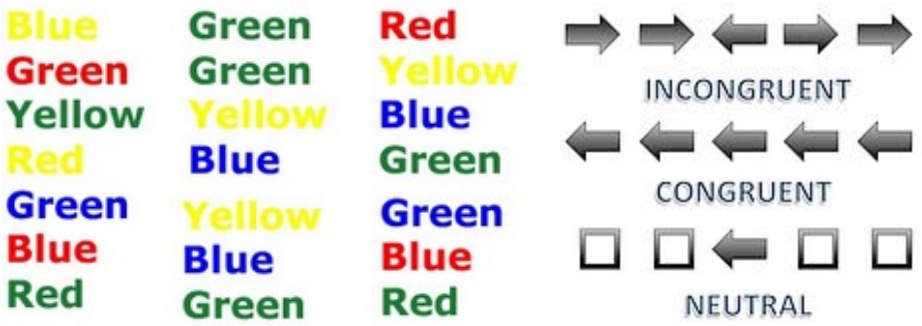


Overall Education (standardised tests):
25 studies, *n*=3214

d=0.36 (95% CI 0.09, 0.63)
= **small, significant positive effect** of PA lessons on overall education

Effects of PA lessons on Cognitive testing



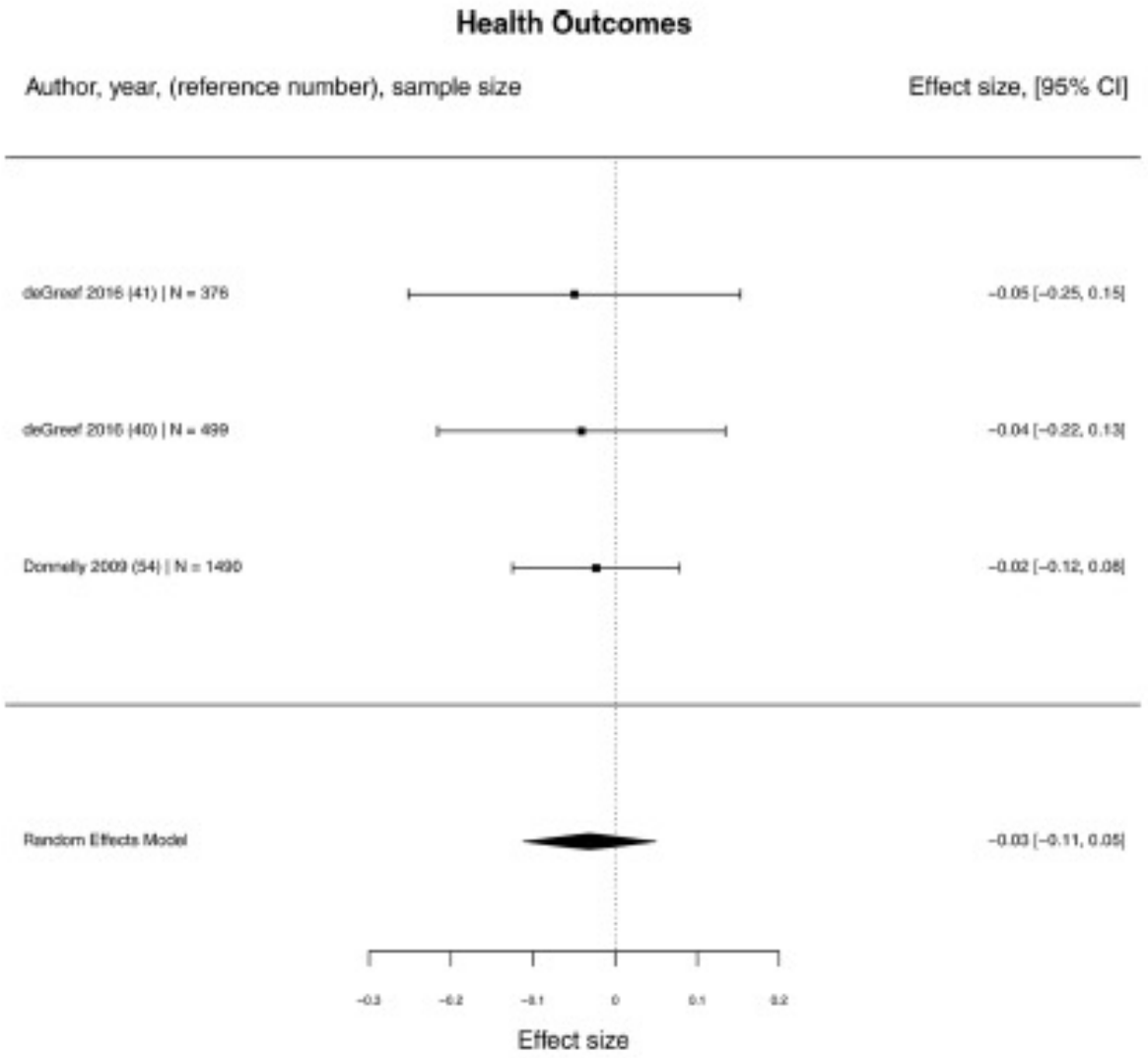


3 studies, *n*=1100

d=0.01 (95% CI -0.23, 0.25)
= **no change** to cognitive testing

Few studies, important to schools?

Effects of PA lessons on Health



Fitness testing/ BMI

3 studies, *n*=2365

d=-0.03 (95% CI -0.11, 0.05)
= **no change** in health

Few studies, PA lessons alone sufficient?

Conclusions

- **No downsides to implementing physically active lessons**
- No evidence that PA lessons reduce behaviour or learning = key concern of teachers
- To address children's health, should be provided as part of whole-school approach

Future work for physically active lesson research

- More extensive outcome assessment
  - Post-intervention follow-up needed
  - Assess activity beyond school-time
    - Only 2 studies assessed activity beyond school time

- Need for theory & specified mechanisms of action for change
- More diverse samples (Neelon et al. 2016)
- Secondary school samples?
- **Need for effective integration of PA lesson training across CPD and initial teacher training**

Thank you for listening! Questions / Discussion

Thanks to co-authors:
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