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The University of
Nottingham

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- Kapil Sayal and Joanne Tarver at Nottingham
- Edmund Sonuga-barke, Saskia Van der Oord, Marina Danckerts, Doepfner & Sam Cortese at EUNETHYDIS

Sonuga-barke et al (2013)

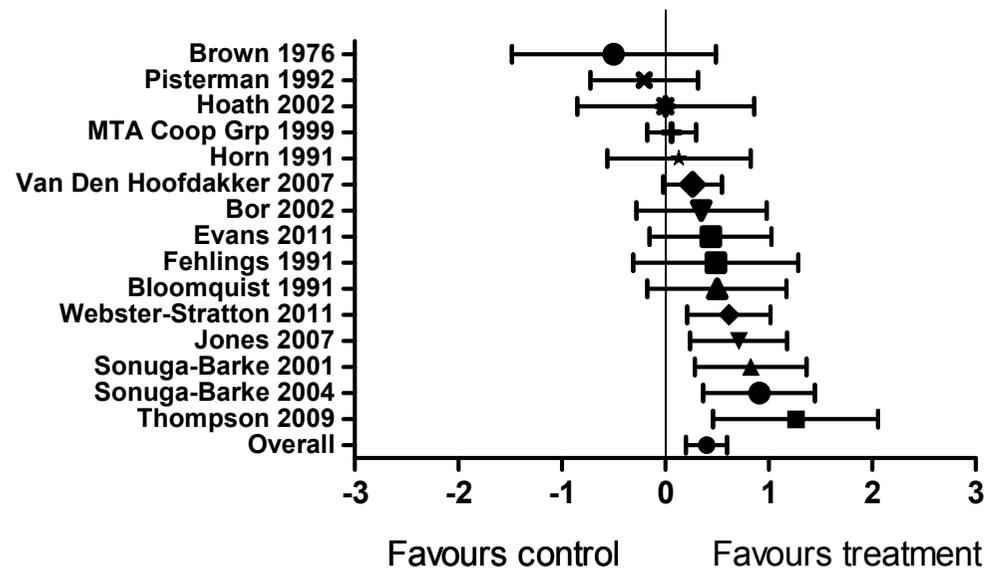
Sonuga-barke et al (2013) conducted a series of six parallel meta-analyses on non-pharmacological interventions for ADHD

- *Most proximal assessment. MPROX*
- *Probably blinded assessment PBLIND*
- Both analysis conducted on ADHD outcomes

MPROX ADHD Outcome

f. Behavioural Interventions

Standardised Mean Difference (SMD)
IV, Random, 95%CI



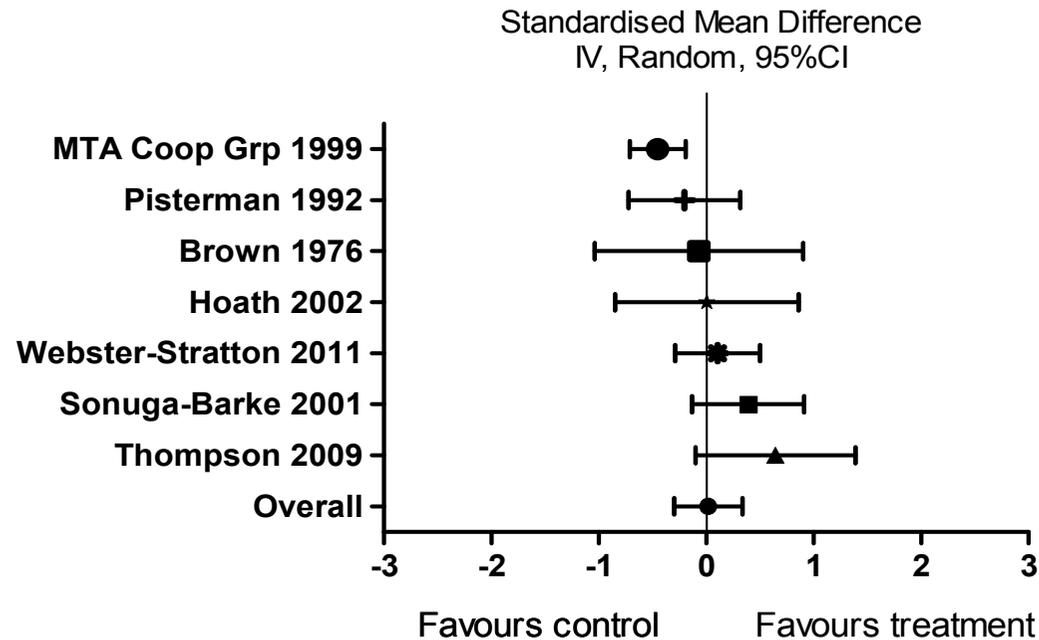
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Test for overall effect: $Z = 3.88$, $p = 0.0001$

Heterogeneity: $\chi^2 = 30.73$, $df = 14$, $p = 0.006$, $I^2 = 54\%$

PBLIND ADHD Outcome

f. Behavioural Interventions



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Interim conclusions

- Whilst parent reports of symptoms has obvious clinical significance, they should be supplemented with objective measures.
- Biases in reporting are probably present in previous studies that have reported the beneficial effects of behavioural interventions for ADHD (Fabiano et al 2009).

What might we expect from Behavioural Intervention?

- Important to remember that behavioural interventions are components of treatment with the potential to target other functional impairments associated with ADHD (Sonuga-barke et al 2006).
- Involving parents in interventions may also have benefits for the parents themselves, especially for parental depression and self-efficacy. Alizadeh et al 2007)

Where does ADHD come from?

- Before we can hope to intervene and remit or reduce ADHD symptoms
- We need to understand the processes that allow ADHD symptoms to *develop*, be *expressed* and be *maintained*.

What causes ADHD

- ADHD results from a gene X environment interaction.
- Children are born with a genetic risk for ADHD, not a fault on one single gene but tiny differences on lots of genes.
- Having the genetic risk doesn't mean the environment isn't important

Example – how tall we are

How tall we are is almost entirely determined by our genes.

Yet during the 20th century the population got much taller due to better nutrition
(environment!)



Environment

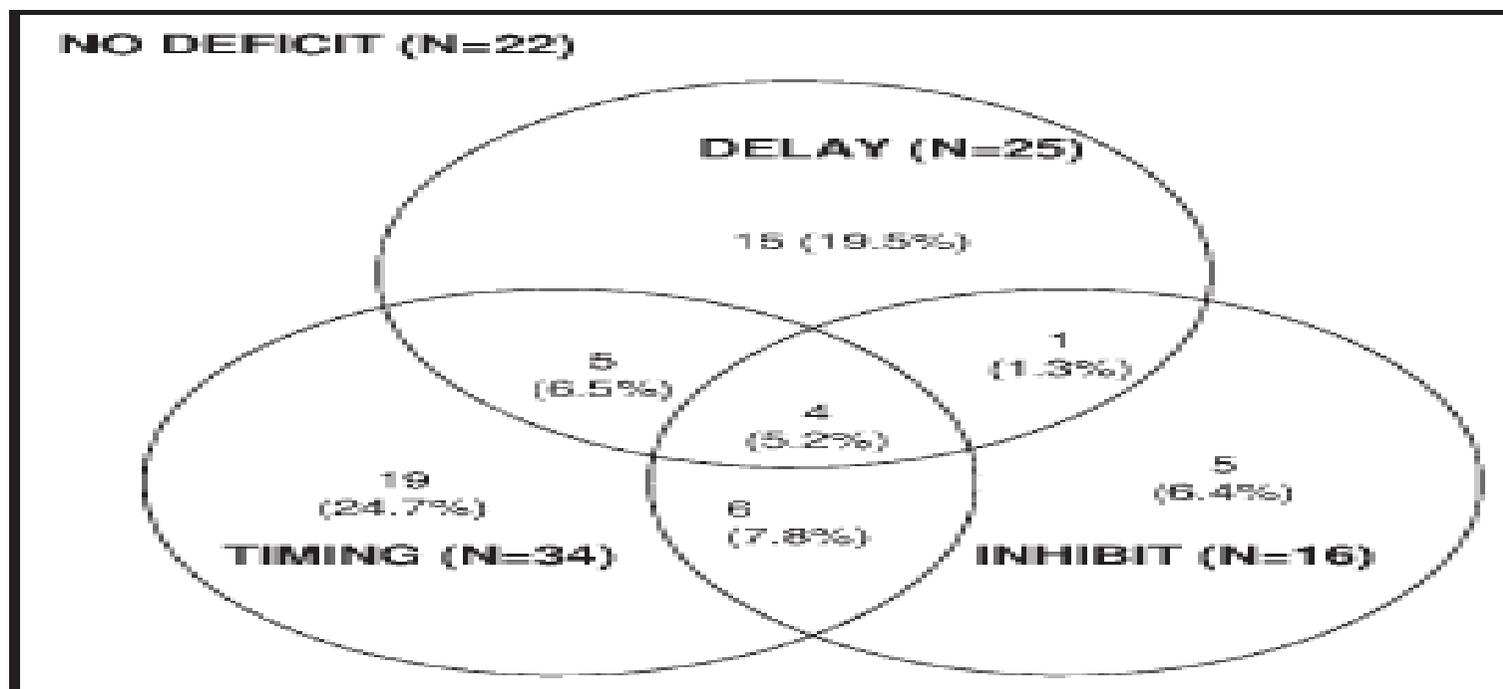
- So just because ADHD is mostly due to genetics doesn't mean that changing the child's environment can't have a dramatic impact.
- Parents play a key role in determining the early environment that their children experience.
- Teachers also have a role in determining the later environment that ADHD children experience.

Where does ADHD come from?

- Why are children with ADHD
 - Impulsive
 - Hyperactive
 - Inattentive
 - *A neuroscience perspective*

All ADHD children are different

FIGURE 1 Proportion of Attention-Deficit/Hyperactivity Disorder cases (N = 77) with inhibition, timing, and delay-related problems and their degree of co-occurrence.



So where do those symptoms come from?

- There are three key explanations for why children with ADHD behave in the way that they do
- Executive functioning
- Motivational style
- Timing difficulties

Executive functioning

- Executive functioning are higher cognitive processes such as
- Planning
- Working memory
- Inhibitory control

Executive Functioning

- Poor inhibitory control means you can't modify your response to environmental cues – *impulsivity*
- Poor working memory means that you have lower storage and rehearsal capacity – *forgetful- poor attention*

What's my cell phone number?



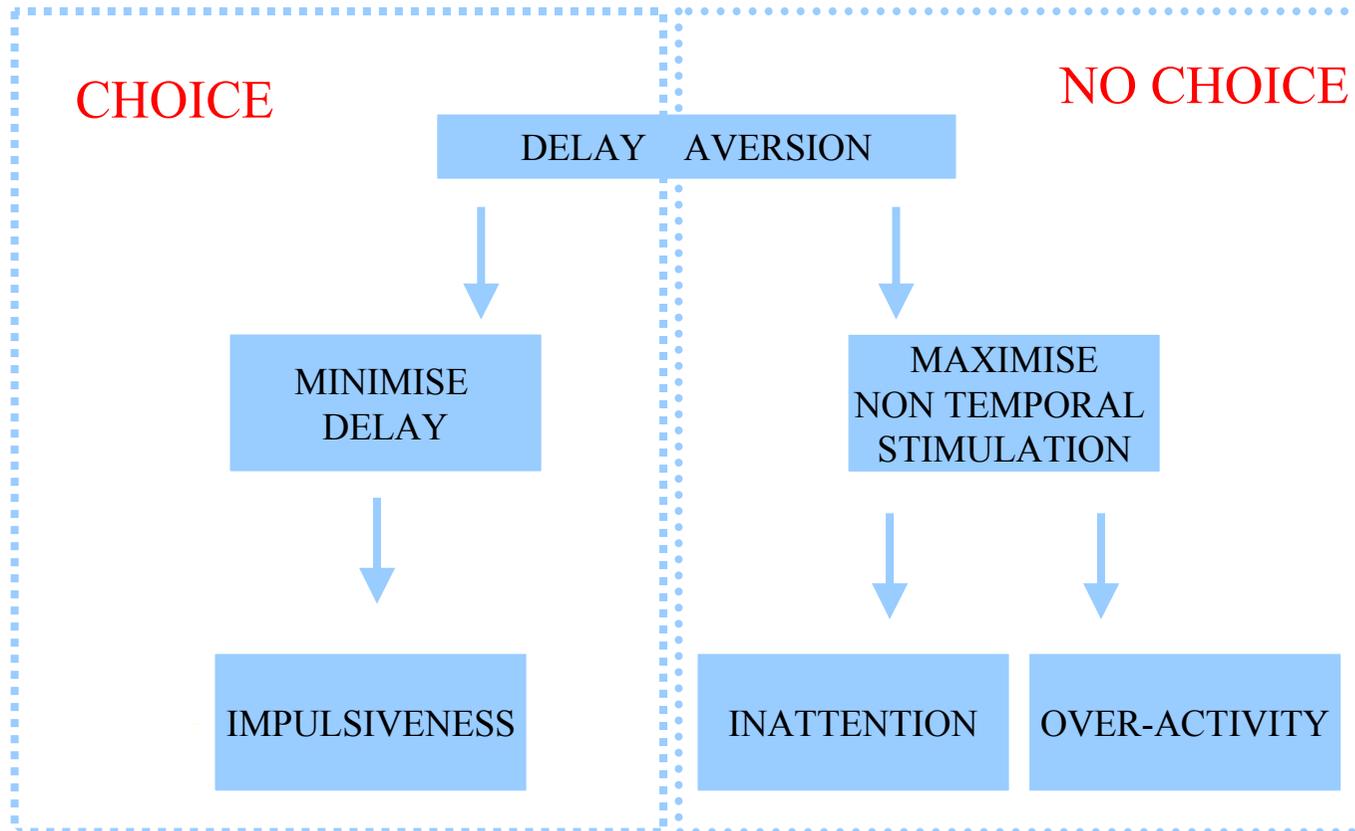
ADHD as a motivational style

- Sonuga-Barke (2002) argues that ADHD symptoms result from a motivational style
- Function rather than dysfunction
- Escape or avoidance of delay

Inhibition and waiting are related

- ADHD children can wait even when this does involve inhibition.
- ADHD children sometimes don't wait even when waiting doesn't involve inhibition.
- ADHD children will not wait if this increases overall delay.

The expression of delay aversion



ADHD and timing

- ADHD children also have difficulty with timing (Smith et al 2003)
- Both time estimation and time Reproduction. This means that ADHD children find it hard to estimate how long an interval of time actually is.

ADHD and timing

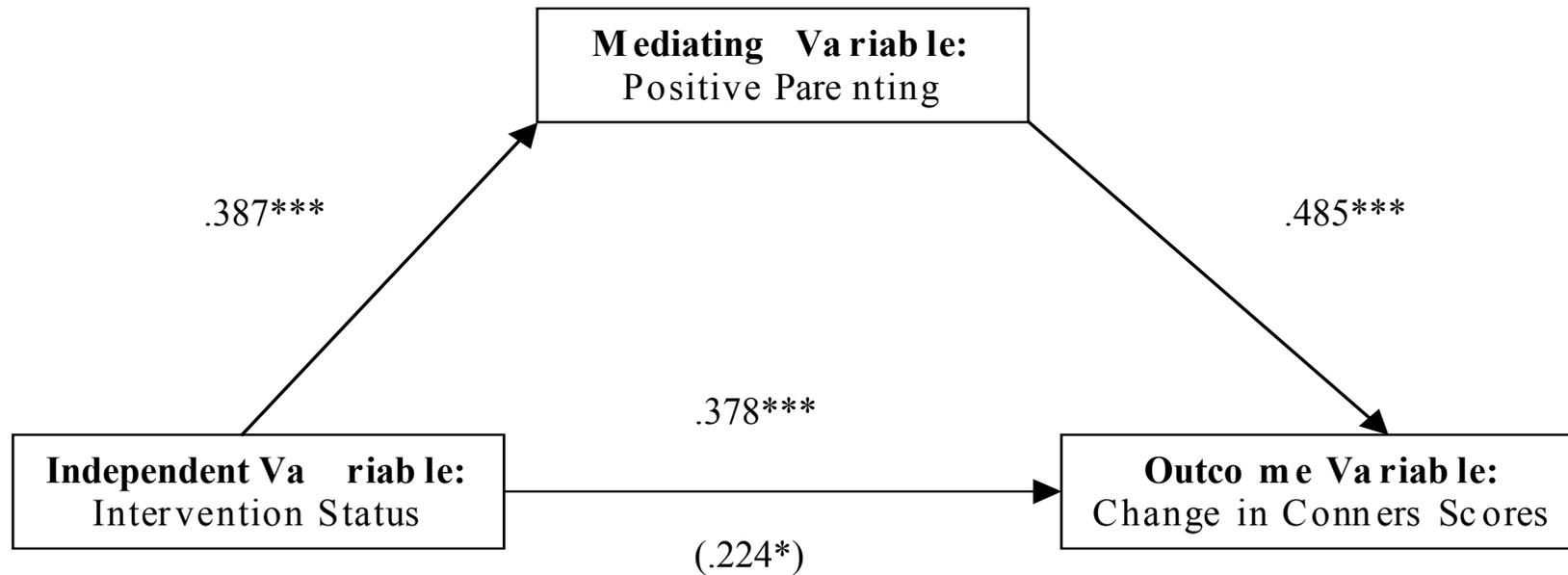


But it is not just about neuroscience

- Other factors are also important:
 - Parent–child interaction
 - Parental emotional relationships
 - Praise and social reinforcement

Mediating role of positive parenting

Daley, Jones., Hutchings, J & Whitaker, C. (in press).



Does Parental Expressed Emotion Moderate Genetic Effects in ADHD?

- Sonuga-barke et al (2008) examined the influence of expressed emotion on ADHD in a genome wide association scan study.
- Expressed Emotion moderated the effects of genes on ADHD severity and comorbid conduct disorder, implicating both novel and established candidate genes.

Hyper-responsiveness to social reward in ADHD

- Kohls Herpertz-Dahlman & Konrad (2009)
- Most studies examining role of reinforcement in ADHD has examined monetary reinforcers ignoring the power of social-emotional stimuli.

Kohls, Herpertz-Dahlman & Konrad (2009)

- Examined ADHD and control child performance in the go-no-go task using different rewards non-social (money) and social (positive facial expressions).
- Both types of reward improved inhibition accuracy in both groups.

Kohls, Herpertz-Dahlman & Konrad (2009)

- ADHD children displayed a particularly high response to social reward compared to controls.
- Cognitive control in ADHD children can be improved by social reinforcement.

Conclusions

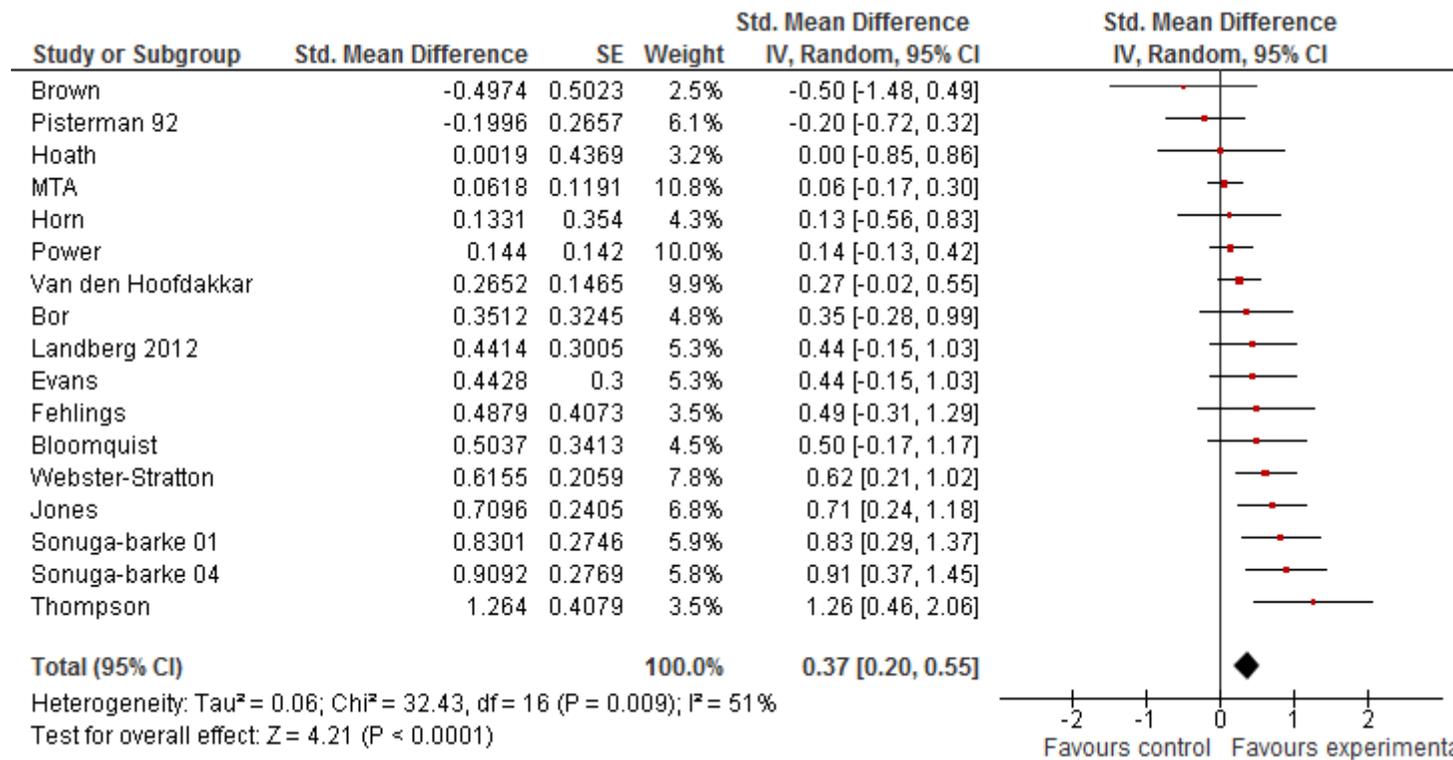
- Through altering the child's experience of interaction it may be possible to alter
- Parental interactional style which may impact on symptoms
- Emotional experiences which may impact on genetic expression and then symptoms.
- Reinforcement contingencies which may alter neuron firing and brain activation.
- The child's delay aversion and working memory capacity which may impact on functioning.

Daley et al (in preparation)

Extension of Sonuga-barke et al's (2013) meta-analysis focusing just on behavioural interventions but examining a wider range of outcomes beyond symptom control.

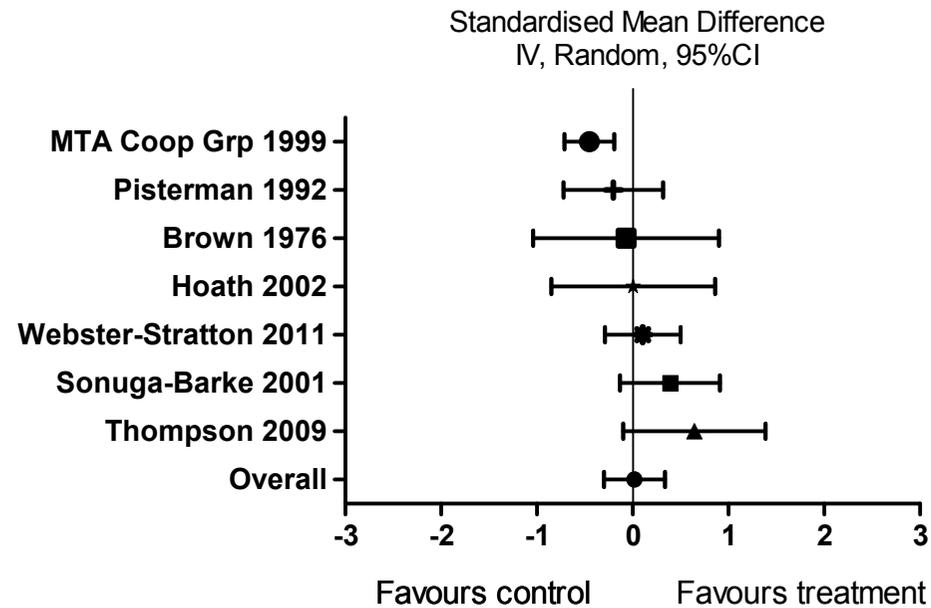
- *Most proximal assessment.*
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ADHD MPROX



ADHD PBLIND

f. Behavioural Interventions

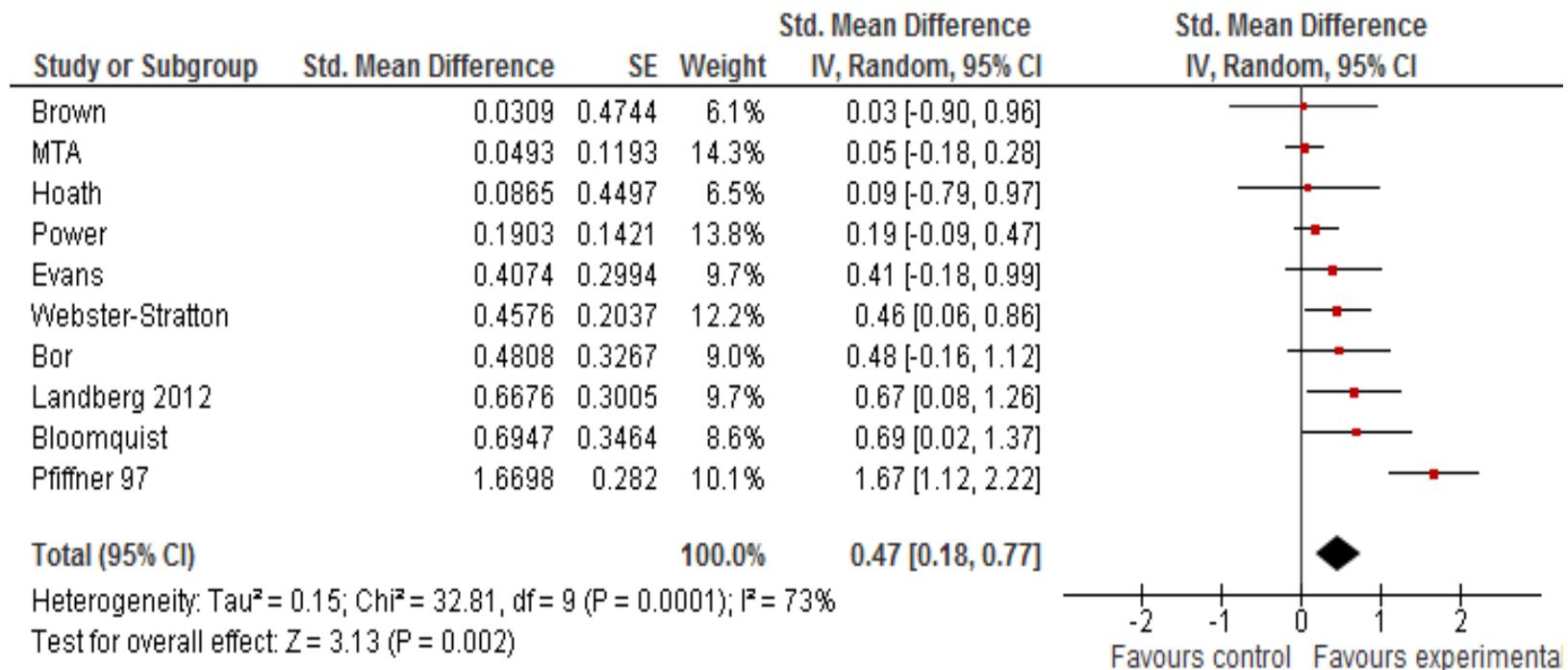


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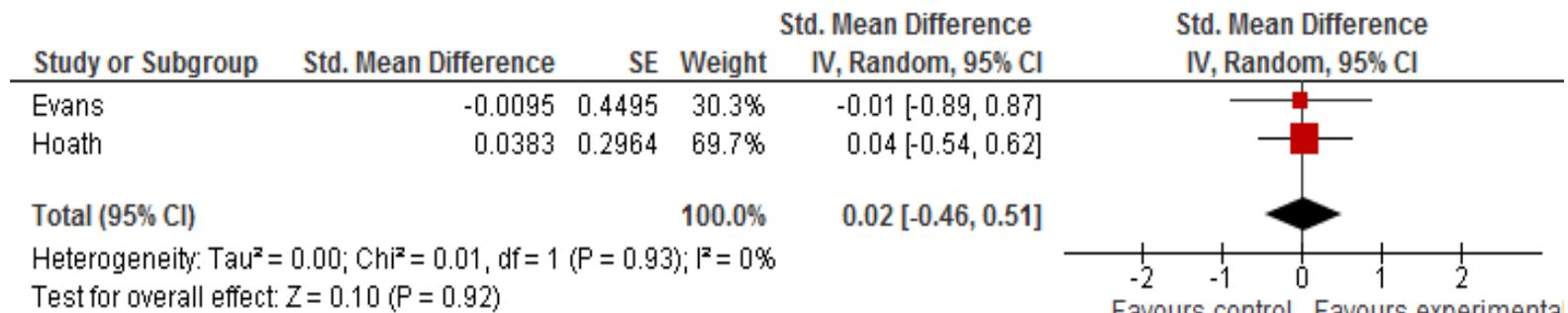
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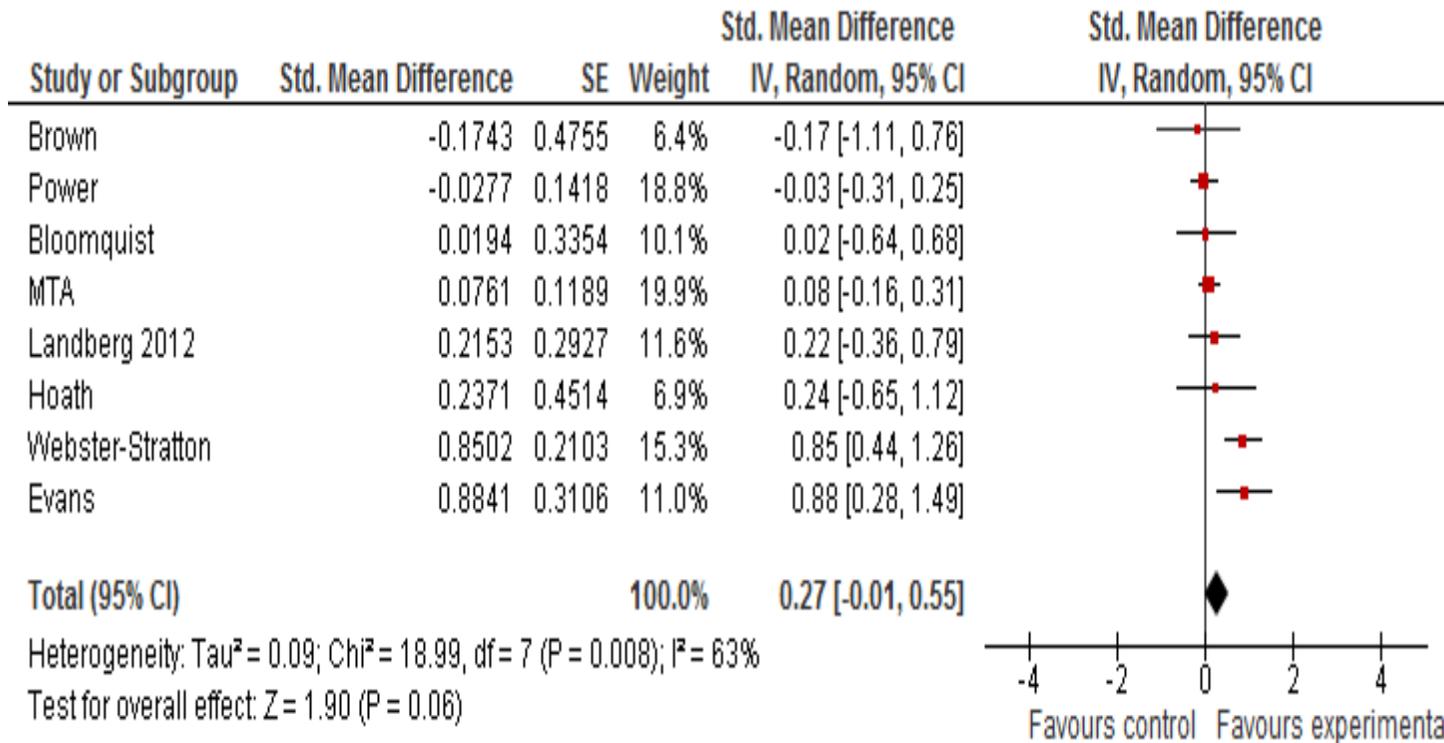
Inattention MPROX



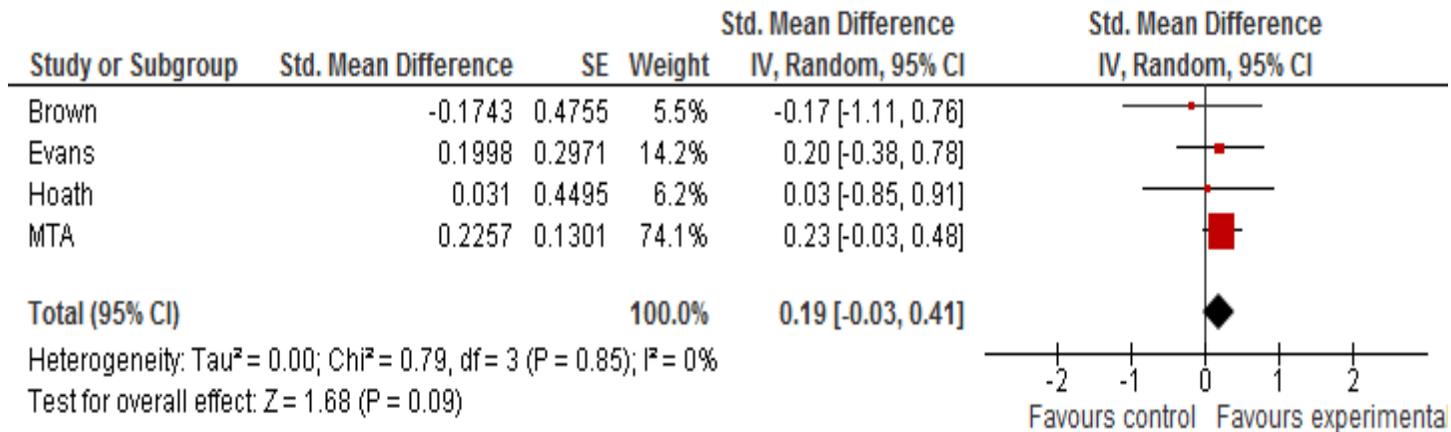
Inattention PBLIND



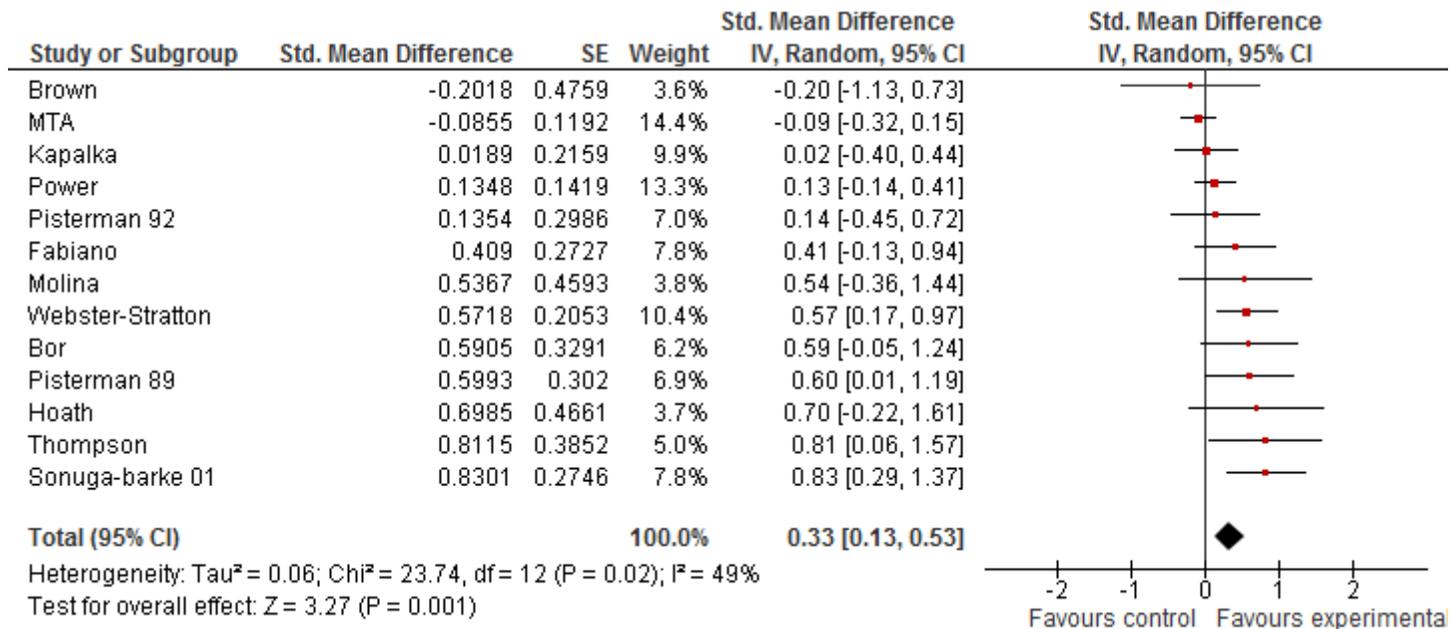
Hyp/Impulsive MPROX



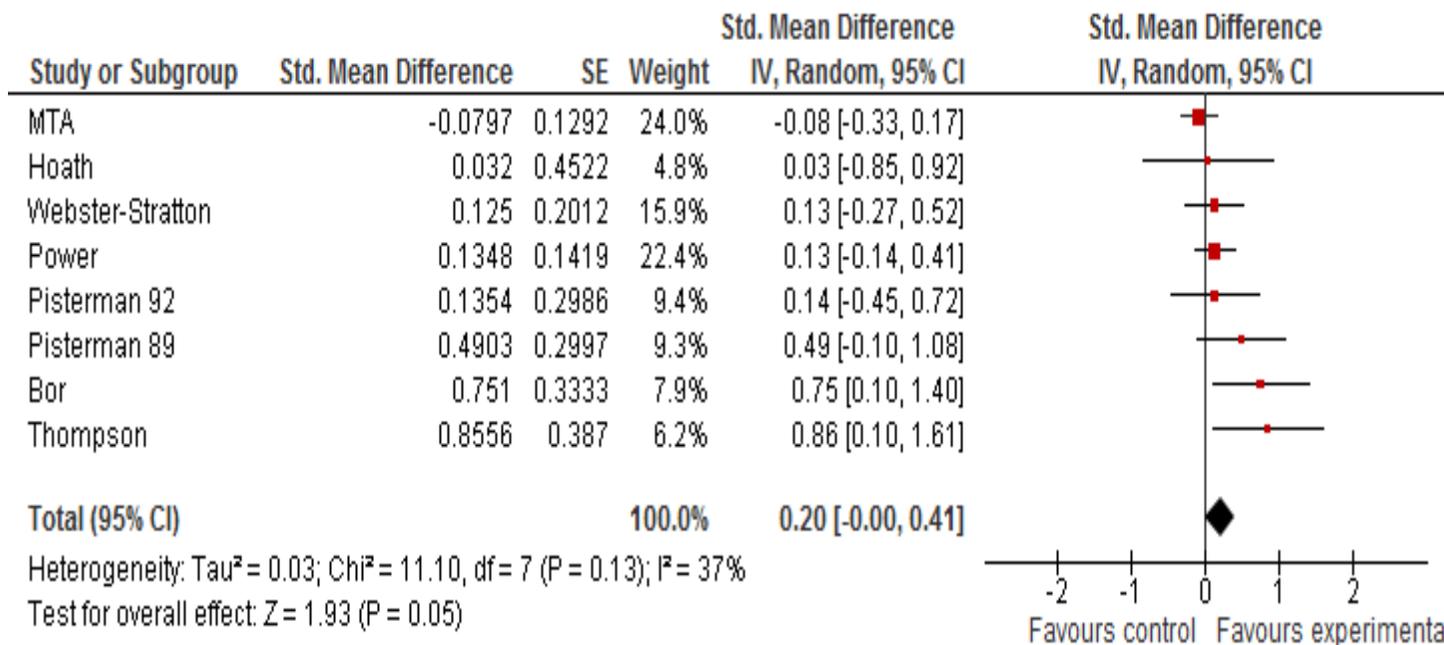
Hyp/Impulsive PBLIND



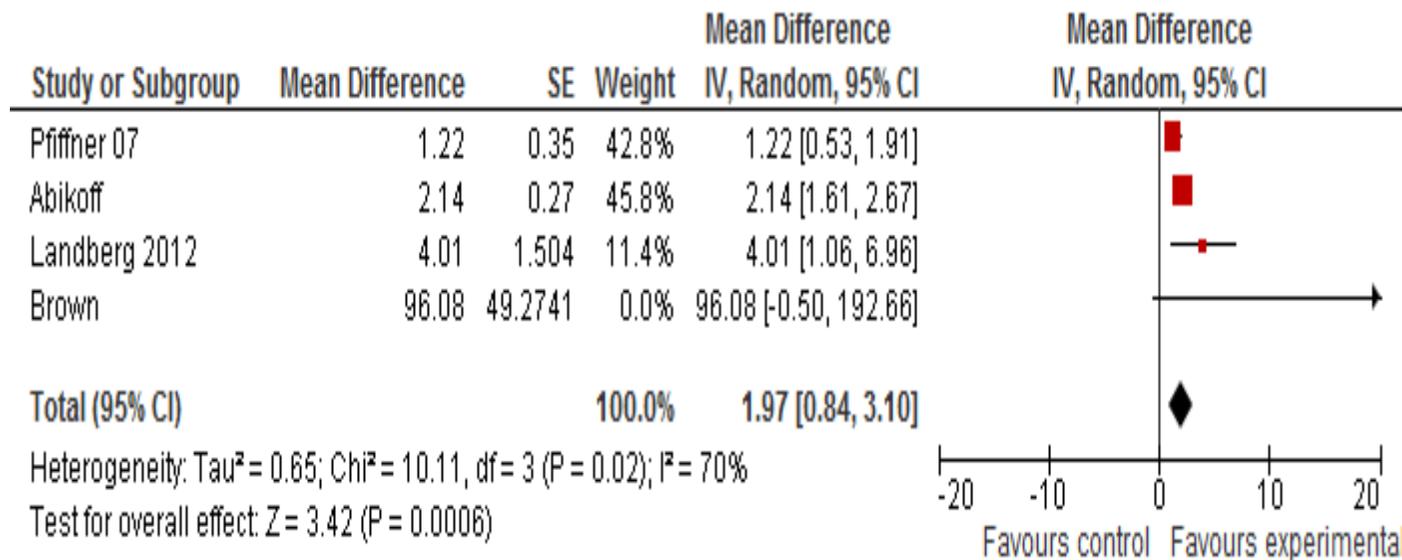
Conduct MPROX



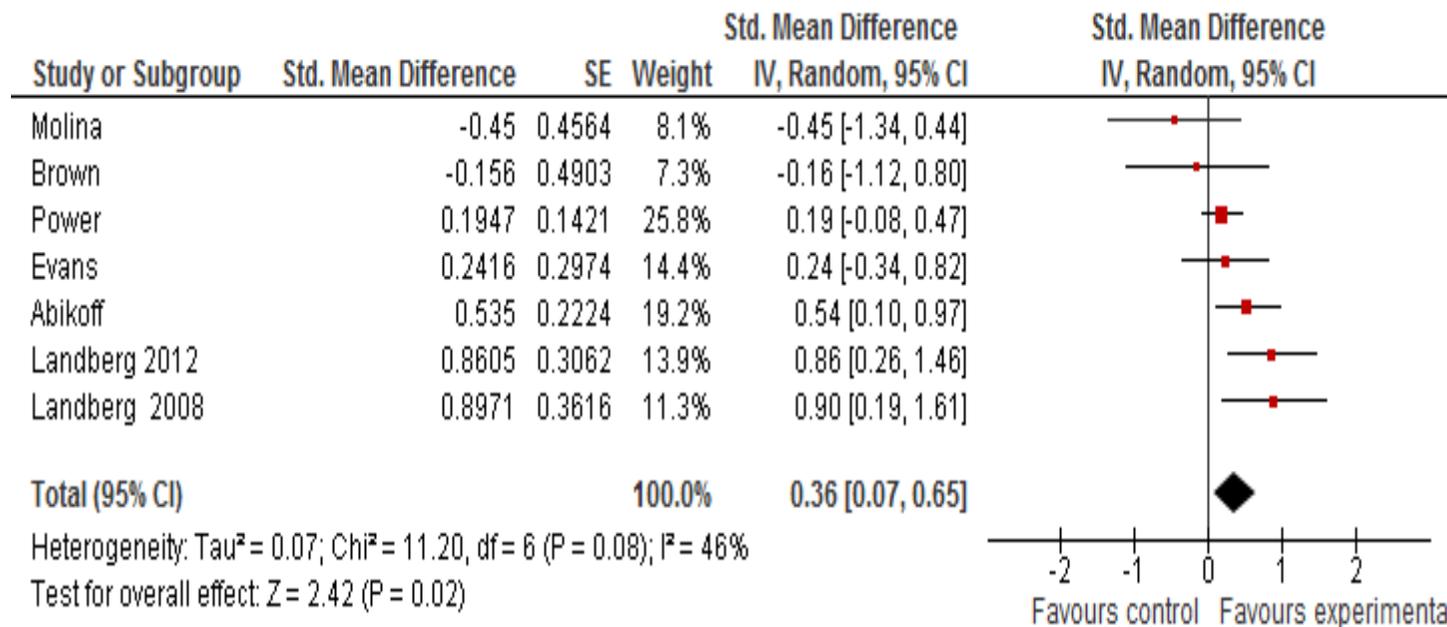
Conduct PBLIND



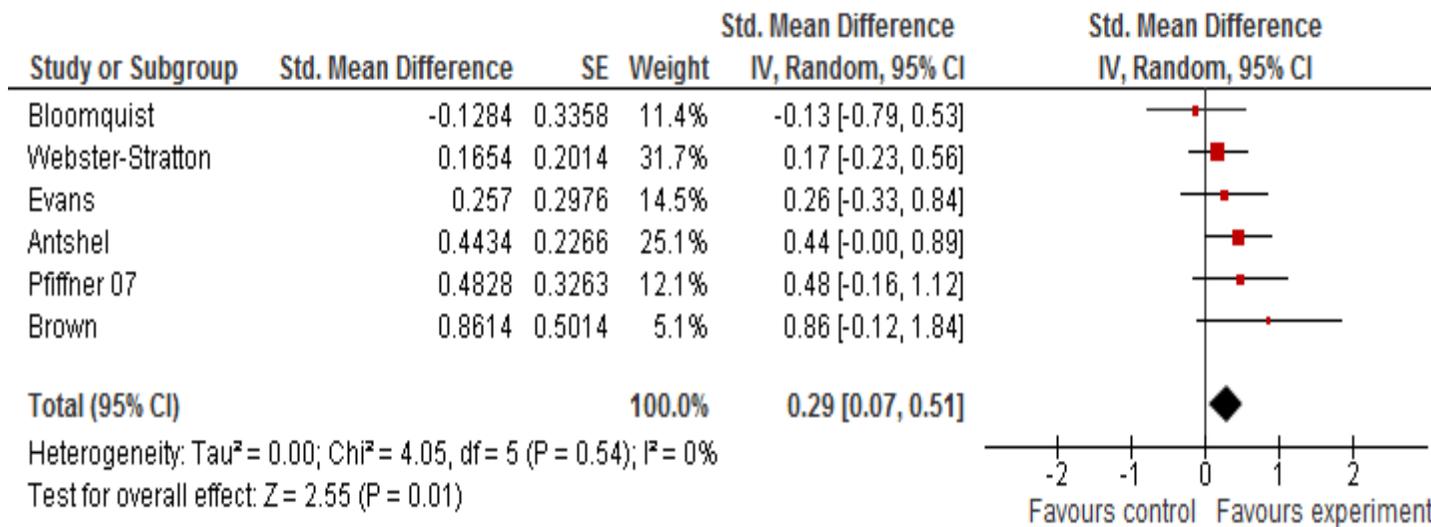
Child Cognitive Skills



Academic



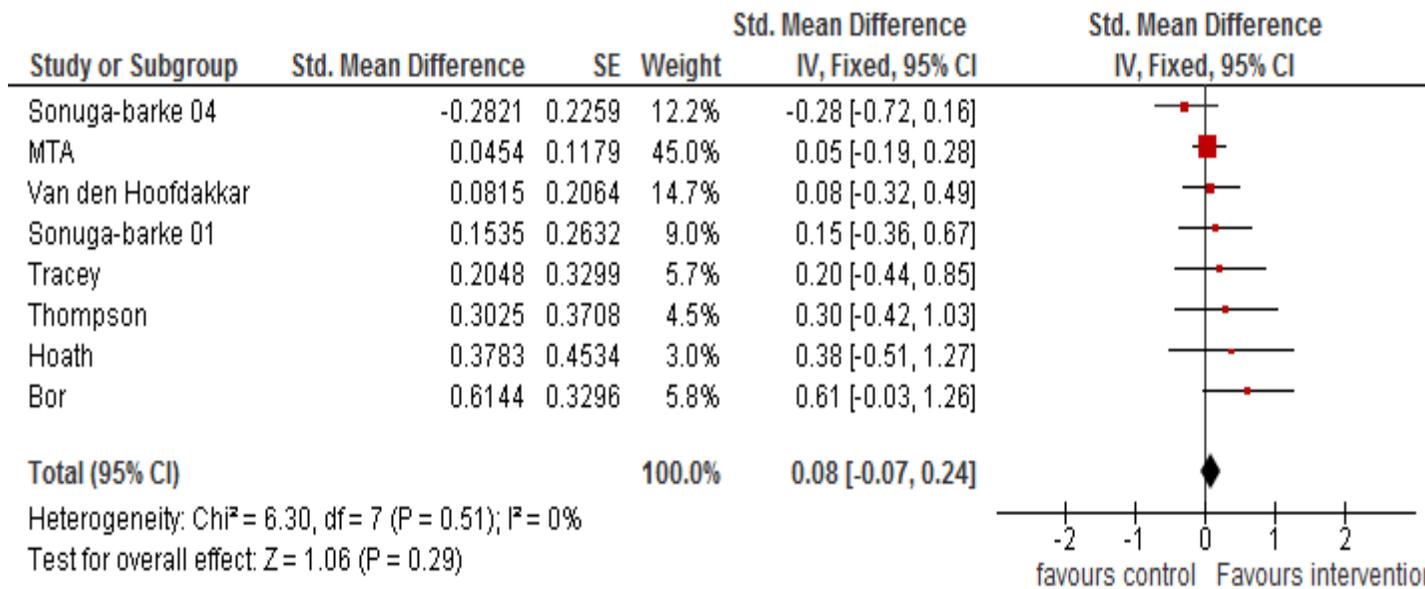
Child social Skills



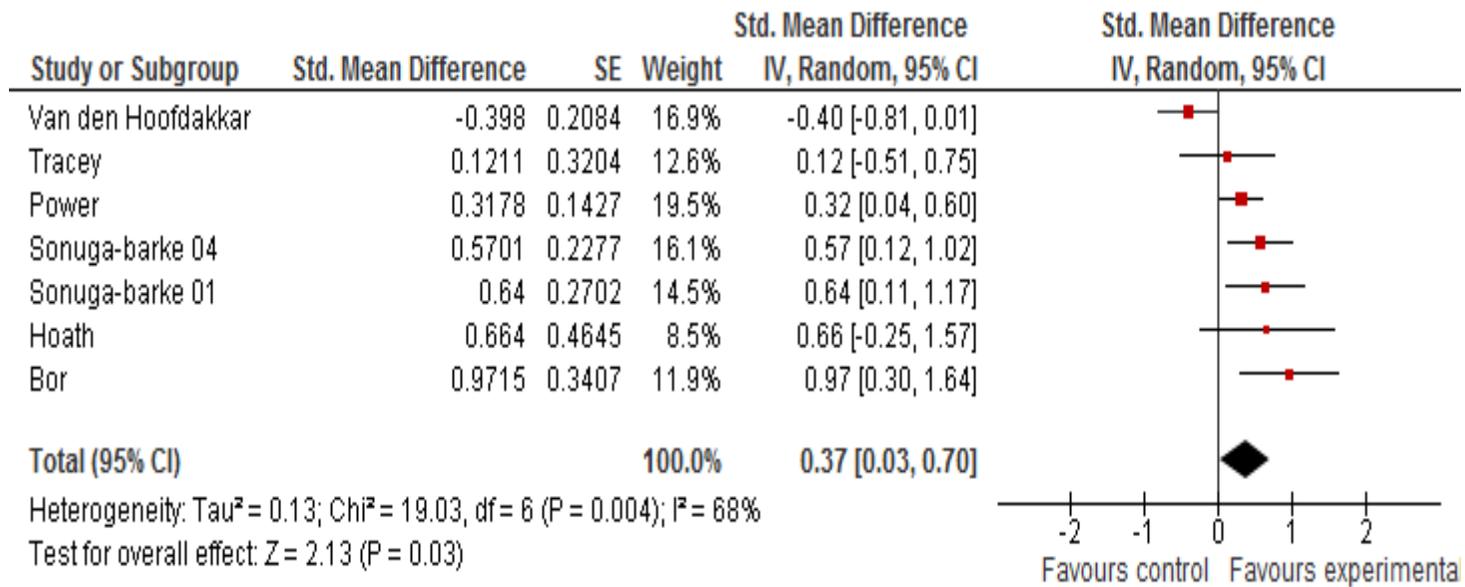
Interim summary Child outcomes

- Clear impact of behavioural interventions on MPROX ratings of symptoms but also conduct, academic, social and especially cognitive.
- Where available PBLIND ratings followed the same trend as in Sonuga-barke et al (2013) being considerably lower than MPROX and usually non-significant

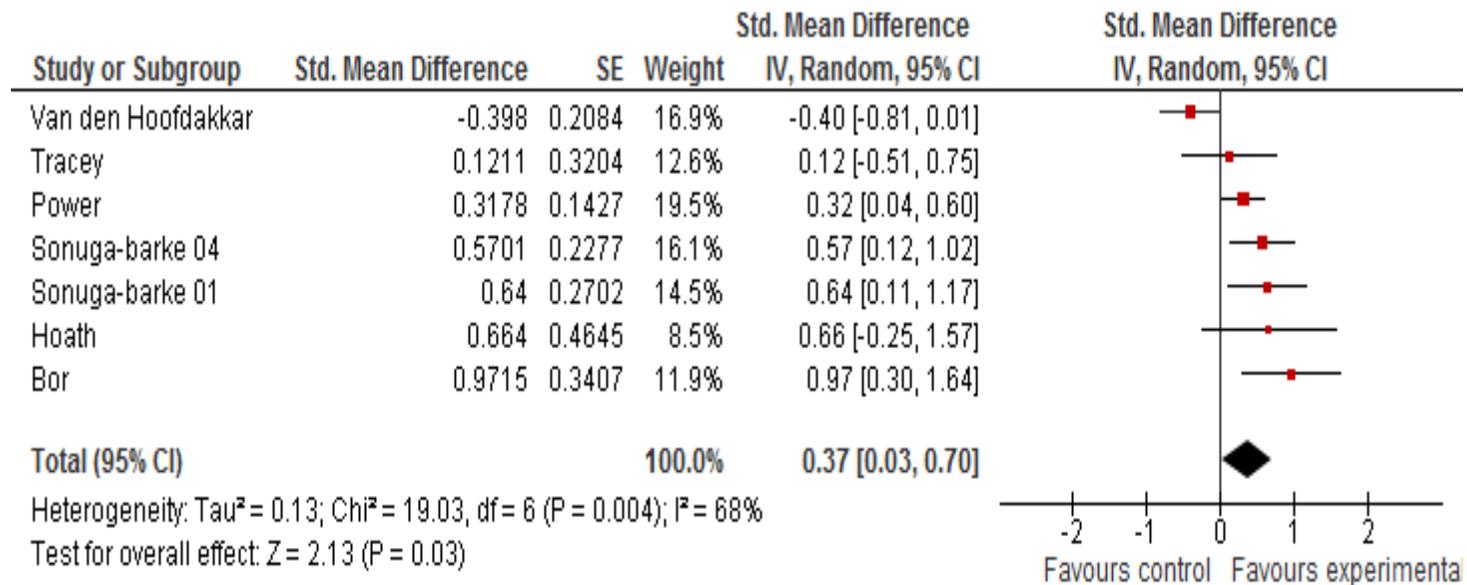
Parental Mental Health MPROX



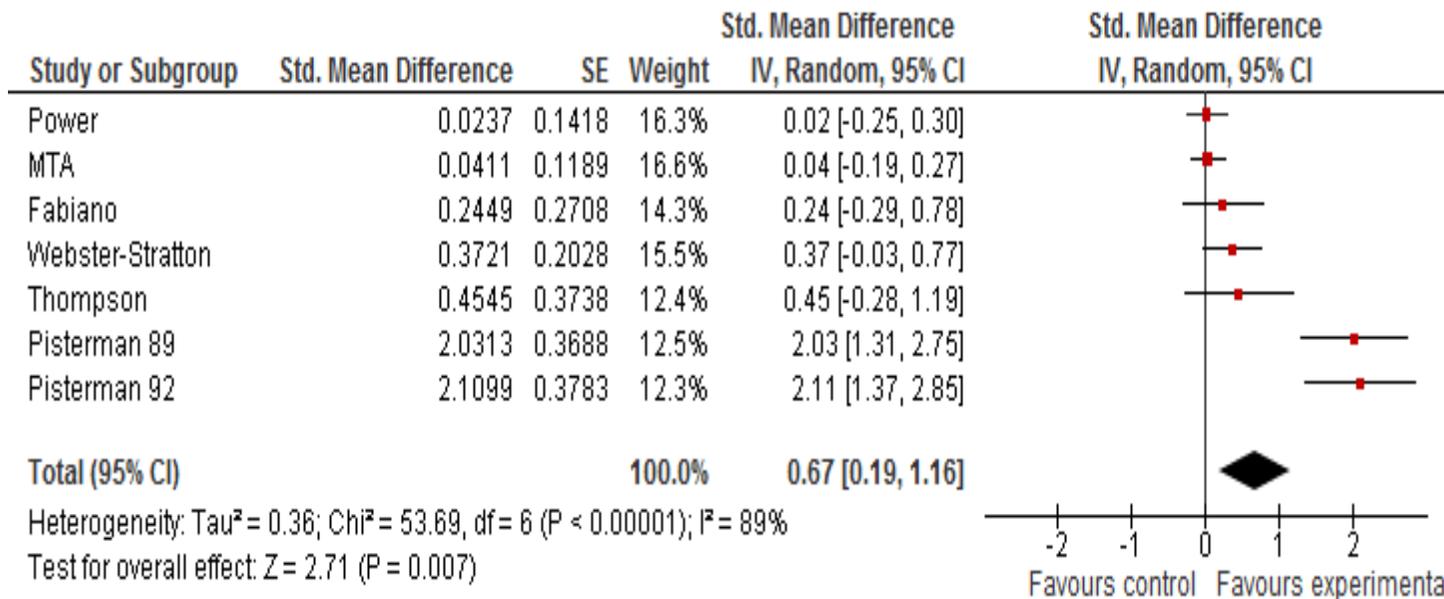
Parental self-concept



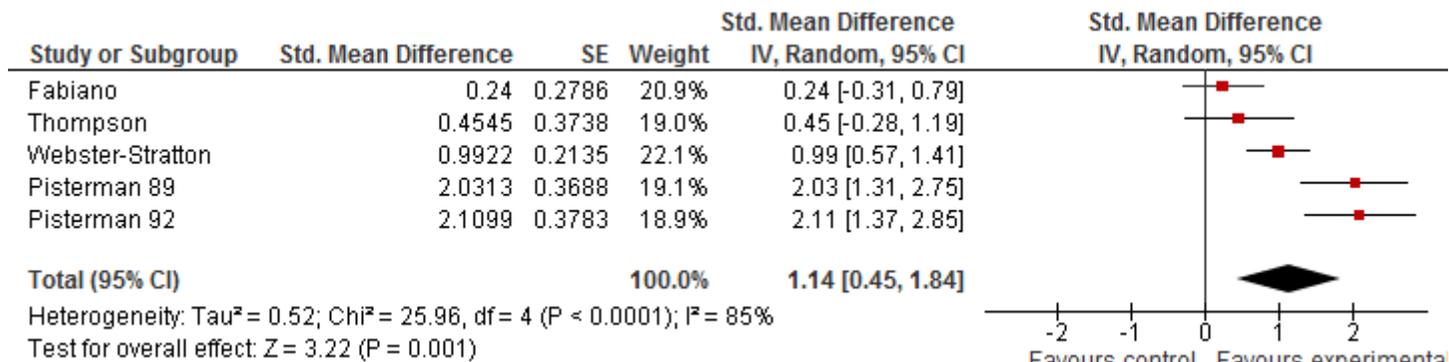
Family Functioning



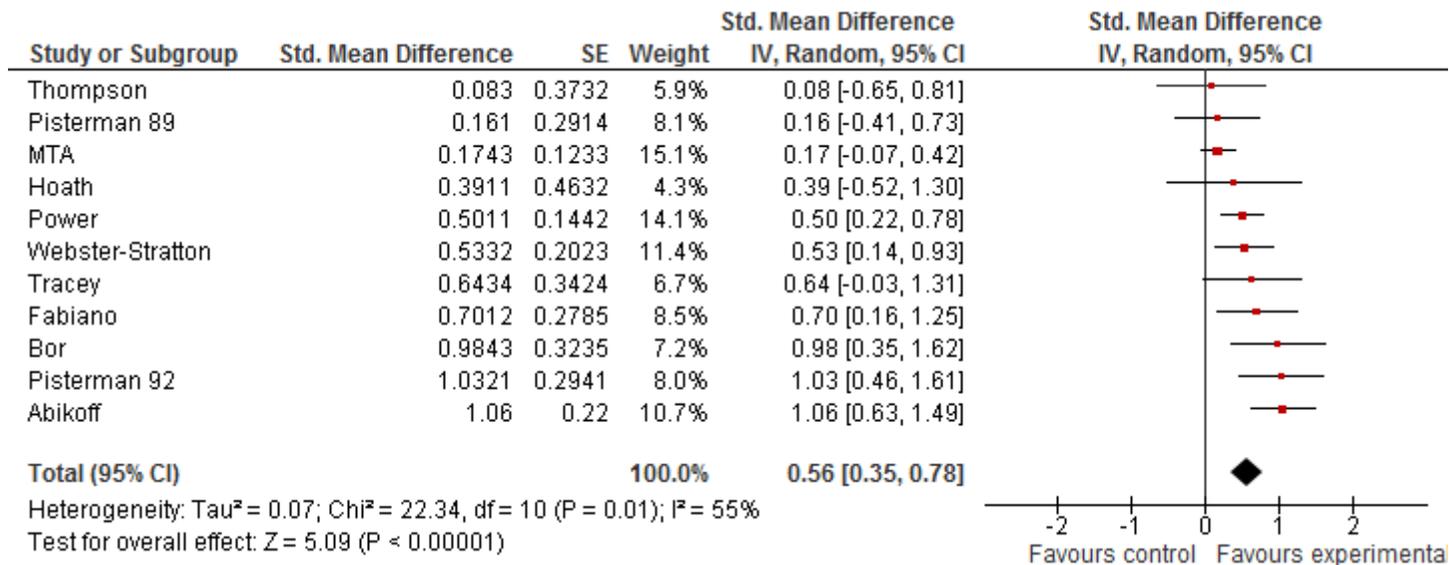
Positive Parenting MPROX



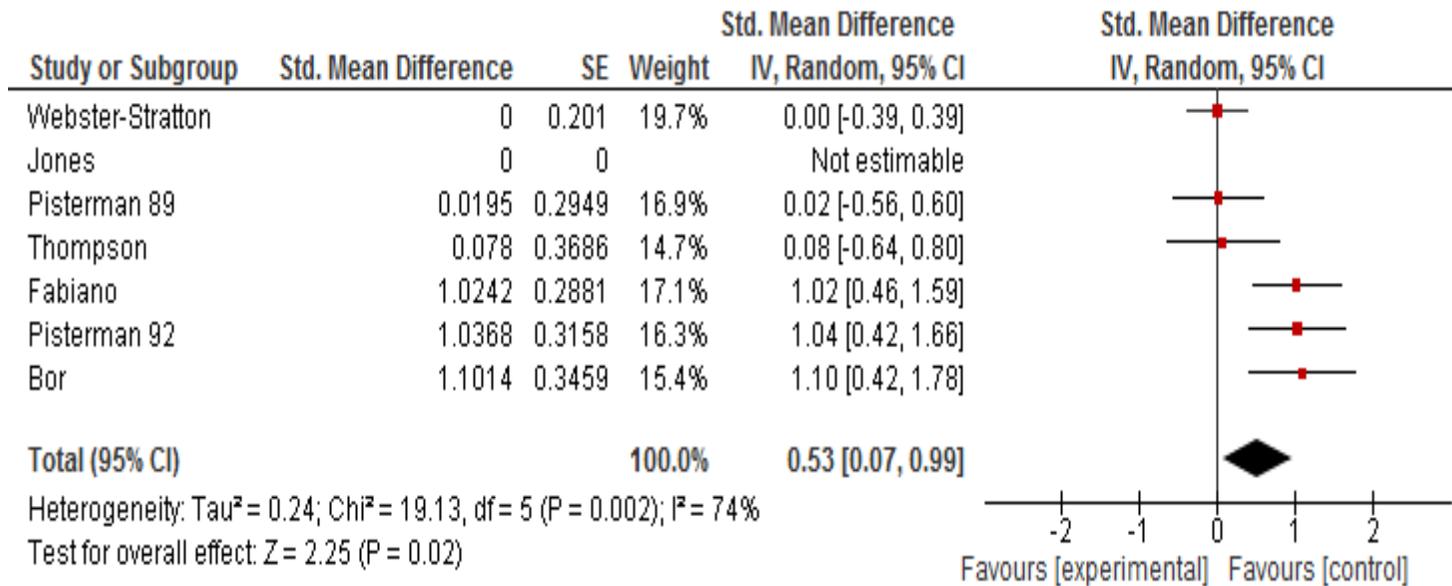
Positive Parenting PBLIND



Negative Parenting MPROX



Negative Parenting PBLIND



Interim Summary Parental Outcomes

- No impact of behavioural interventions on parental mental health, but some impact on family functioning and Self-concept all at MPROX.
- Greater improvement on positive and negative parenting on MPROX ratings and these findings remain on PBLIND outcomes

Conclusions

- Underlying aetiology of ADHD and its myriad of associated impairments requires behavioural intervention as medication is less effective in improving functioning deficits (Langberg & Becker 2012; Nijmeijer et al 2008)
- Behavioural intervention is not just about improving parenting, but about helping parents to change their child's environmental experience.

Take home messages!

- While behavioural interventions are beneficial at targeting child symptoms the lack of agreement between MPROX and PBLIND raters is a concern.
- It is reassuring that behavioural interventions improve parenting practices and that those improvements are evident to PBLIND raters.
- It is also reassuring that behavioural interventions appear to improve core impairments such as academic, social and cognitive difficulties for which there is less theoretical and empirical evidence of impact.

Take home messages II

- The lack of any impact on parental mental health is a considerable limitation.
- This is all the more striking given the small impacts on family functioning and parental self-efficacy (**although not necessarily in the same studies**)
- Clearly behavioural interventions need to consider parental characteristics such as mental health and Parental ADHD which is a known mediator of intervention but could not be tested in this analysis
- Before we can use the parent as the agent of change to help their child

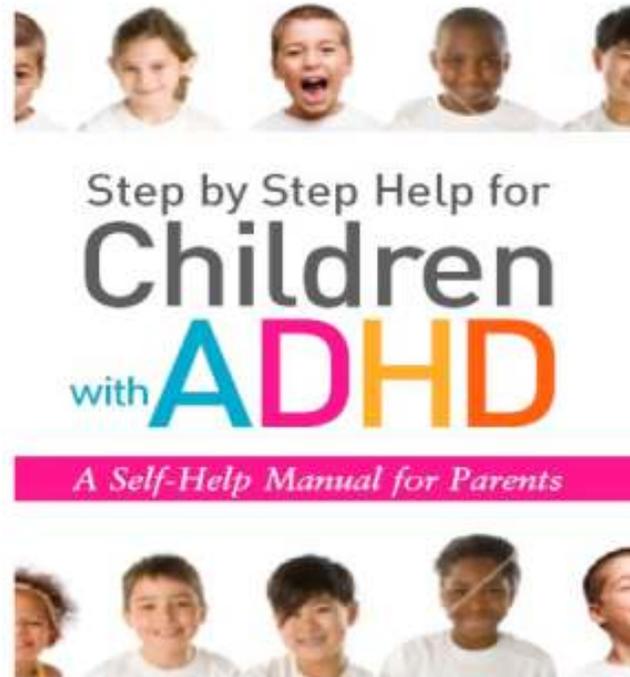
Thank you

Q

New Forest Parent Training Programme

- 8 one hour individual sessions
- **Psycho-education about ADHD**
- Mother-child relationship, simple games with no set up time, snap, pairs, I went to market
- **Attention training and delay re-structuring, enforcing short periods of delay before treats.**
- Behaviour training, calm down rather than time-out, giving limited choices, praise

New Forest Parent Training Programme



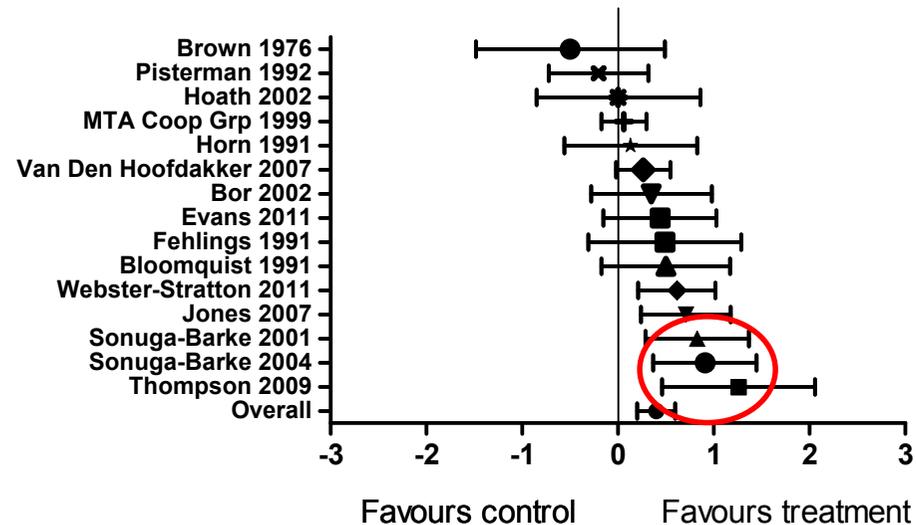
Cathy Laver-Bradbury, Margaret Thompson, Anne Weeks,
David Daley and Edmund J. S. Sonuga-Barke

- 
- Insert self-help data here

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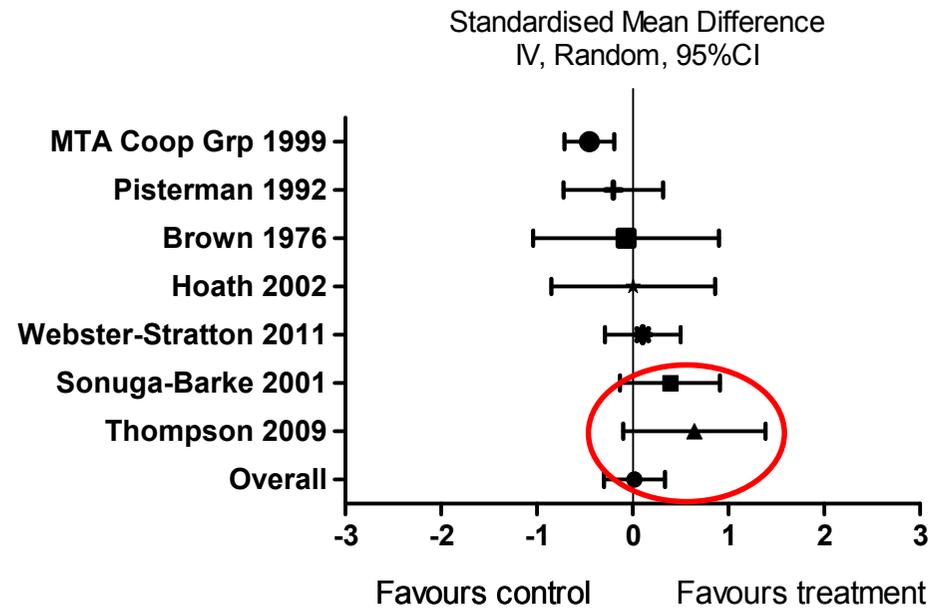
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