PRISMA 2009 Checklist

Online Ressource 1. PRSIMA checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2-4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	5
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4-5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Online Resource 2
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5-6
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	6-7
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6-7
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	7-8
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	7-8

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Section/topic	#	Checklist item
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, s studies).
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if do pre-specified.
RESULTS		
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for ideally with a flow diagram.
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-u citations.
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12)
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for e effect estimates and confidence intervals, ideally with a forest plot.
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see
DISCUSSION		
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their (e.g., healthcare providers, users, and policy makers).
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete research, reporting bias).
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for futu
FUNDING		
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of f review.

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit: **www.prisma-statement.org**.

Online Ressource 2. Exemplary Search Strategy for PubMed Search

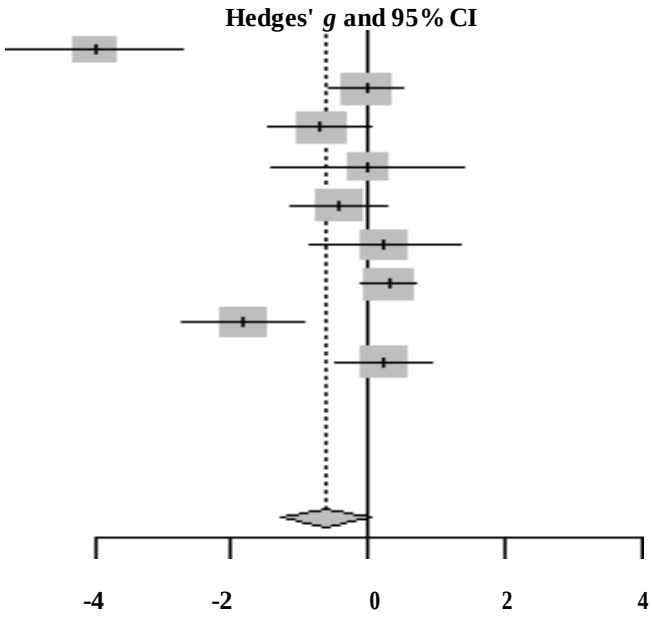
1	"Attention Deficit Disorder with Hyperactivity"[Mesh] OR Attention Deficit Disorders with Hyperactivity[tiab] OR Attention Deficit Hyperactivity Disorder*[tiab] OR Hyperkinetic Syndrome*[tiab] OR ADDH[tiab] OR ADHD[tiab] OR Attention Deficit Disorder*[tiab] OR ADD[tiab] OR Hyperactivit*[tiab] OR Inattention[tiab] OR Impulsivit*[tiab]
2	"Exercise"[Mesh] OR "Sports"[Mesh] OR Exercise*[tiab] OR Physical Activit*[tiab] OR Physical Exercise*[tiab] OR Isometric Exercise*[tiab] OR Aerobic Exercise*[tiab] OR Exercise Training*[tiab] OR Sport*[tiab] OR Movement[tiab] OR Workout*[tiab] OR Physical Training*[tiab] OR Energy expenditure[tiab] OR Athletic*[tiab]
3	"Child"[Mesh] OR "Adolescent"[Mesh] OR "Young Adult"[Mesh] "Minor"[Mesh] OR Adolescen*[tiab] OR Teen*[tiab] OR Teenager*[tiab] OR Youth*[tiab] OR "Minors"[Mesh] OR Minor*[tiab] OR "Child"[Mesh] OR Child*[tiab] OR Kid[tiab] OR Kids[tiab] OR Girl*[tiab] OR Boy*[tiab] OR Under age*[tiab] OR Underage*[tiab] OR Young people[tiab] OR young person[tiab] OR Prepubescen*[tiab] OR Pubescen*[tiab] OR Young Adult*[tiab]
4	#1 AND #2 AND #3

Supplement 3: Sensitivity Analyses

A. Seperate Analysis for Inattentive and Hyperactive Symptoms

Inattentive

	Control	*g*	95% CI
Bahram, 2014	Passive	-4.00	[-5.31; -2.70]
Benzing, 2019	Passive	-0.02	[-0.58; 0.53]
Choi, 2015	Passive	0.69	[-1.44; 0.05]
Davis, 2017	Passive	0.00	[-1.39; 1.39]
Felmet, 1998	Passive	-0.43	[-1.19; 0.25]
Garcia, 2016	Passive	0.24	[-0.86; 1.33]
Gelade, 2016	Active*	0.31	[-0.08; 0.71]
Kang, 2011	Passive	-1.84	[-2.74; -0.93]
Oh, 2015	Active	0.24	[-0.46; 0.93]
Pan, 2016	Passive		
Soori, 2020	Passive		
Overall Effect		**-0.60**	**[-1.26; 0.06]**
Heterogeneity	$Tau^2 = 0.82$; $Chi^2 = 56.4$;		

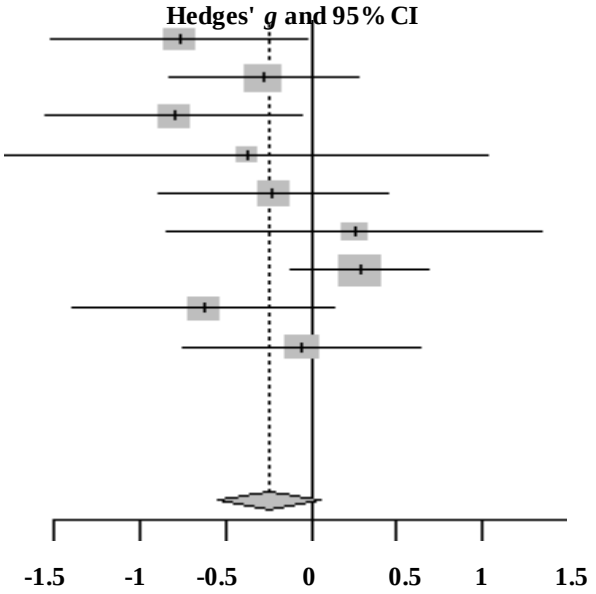


	df = 8 (p = 0.000); I^2 = 85.8%	**Favours MVPA Intervention**	**Favours Control**
Publication Bias	Egger's intercept = -4.22 (p = 0.070)		

Note. G = Hedges' *g* ; CI: Confidence Interval; *p: p* -Score; MVPA: moderate to vigorous physical activity

Hyperactive

	Control	*g*	95% CI
Bahram, 2014	Passive	-0.77	[-1.52; -0.03]
Benzing, 2019	Passive	-0.28	[-0.83; 0.28]
Choi, 2015	Passive	-0.81	[-1.56; -0.05]
Davis, 2017	Passive	-0.38	[-1.79; 1.03]
Felmet, 1998	Passive	-0.22	[-0.90; 0.45]
Garcia, 2016	Passive	0.25	[-0.85; 1.35]
Gelade, 2016	Active*	0.28	[-0.11; 0.69]
Kang, 2011	Passive	-0.63	[-1.40; 0.14]
Oh, 2015	Active	-0.06	[-0.75; 0.64]
Pan, 2016	Passive		
Soori, 2020	Passive		
Overall Effect		**-0.25**	**[-0.54; 0.05]**



Heterogeneity	*Tau* ^{2} = 0.07; *Chi* ^{2} = 12.58; df = 8 (p = 0.127); I2 = 36.4%	
Publication Bias	Egger's intercept = -1.91 (p = 0.145)	

Note. G = Hedges' *g* ; CI: Confidence Interval; *p: p* -Score; MVPA: moderate to vigorous physical activity

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B. Further Subgroup Analyses

		Effect size and				Heterogeneity				
	Subgroup	**n**	**g**	**95% CI**	**p**	**Tau²**	**Chi²**	**df**	**p**	**I² (%)**
Assessor	**blinded**	3	**-0.93**	[-1.45; -0.41]	**0.000**	0	1.96	2	0.375	0.0
	non-blinded	8	-0.16	[-0.44; 0.12]	0.259	0.06	10.77	7	0.149	35.0
Trainer	professional	6	-0.46	[-0.89; -0.03]	0.037	0.13	9.21	5	0.101	45.7
	parent/investigator	5	-0.18	[-0.60; 0.23]	0.386	0.11	8.36	4	0.079	52.2
Delivery	group-based	9	**-0.42**	[-0.72; -0.12]	**0.007**	0.06	11.52	8	0.174	30.5
	individual	2	-0.04	[-0.81; 0.73]	0.914	0.23	3.71	1	0.054	73.0

Note: n = number of studies; g = Hedges's g; CI = confidence interval, p = p-Score, df = degrees of freedom

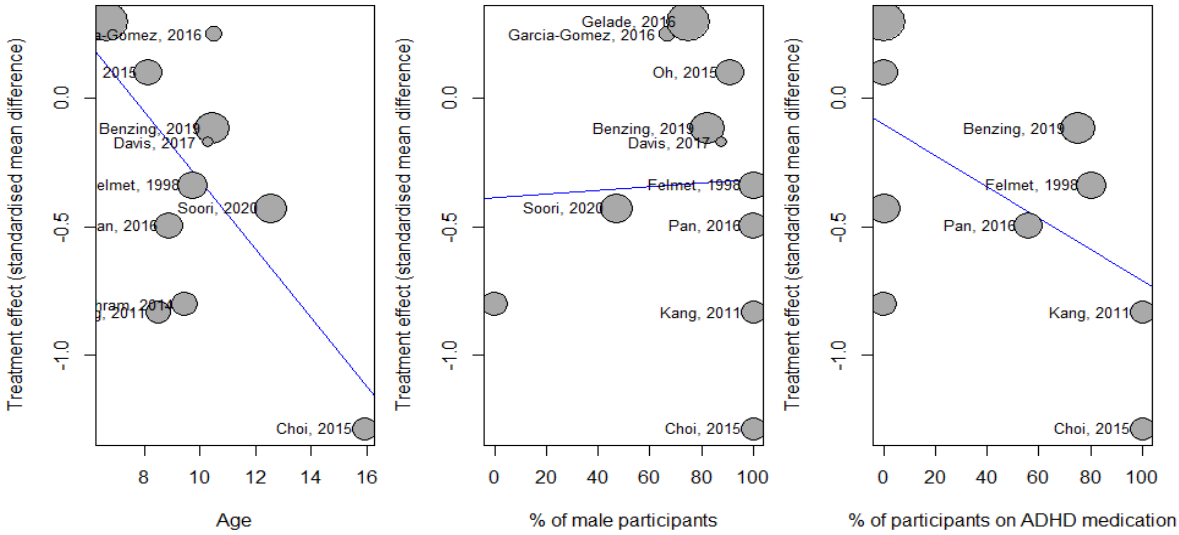
* significantly different to comparison group: confidence intervals do not overlap

C. Meta Regression inlcluding Age, Sex and Medication Status

		beta	SE	95% CI	z	p	n	QM	df	R^2
Age	Intercept	1.02	0.45	[0.15; 1.90]	2.28	0.022				
	age	-0.13	0.05	[-0.23; -0.05]	-2.96	0.003				
	Model Fit					0.003	11	8.77	1	88.67%
Gender	Intercept	-0.39	0.44	[-1.30; 0.52]	-0.84	0.403				
	gender (% male)	0.00	0.01	[-0.01; 0.01]	0.13	0.895				
	Model Fit					0.895	11	0.017	0.00%	
Medication	Intercept	-0.10	0.21	[-0.52; 0.32]	0.47	0.639				
	% medicated	-0.01	0.00	[-0.01; 0.00]	-1.69	0.09				
	Model Fit					0.09	9	2.85		38.80%

Key to abbreviations. SE: standard error; z: z-score; p: p-score; n = number of included effect sizes; df: degrees of freedom

Plots of univariate meta-regressions:



Univariate meta-regression analysis: removed data-point with high leverage (Choi et al., 2015)

		beta	SE	95% CI	z	p	n	QM	df	R^2
Age	Intercept	0.74	0.63	[-0.50; 1.99]	1.17	0.243				
	age	-0.10	0.07	[-0.24; 0.03]	-1.51	0.130				
	Model Fit					0.130	10	2.29	1.00	55.07%

Key to abbreviations. SE: standard error; z: z-score; p: p-score; n = number of included effect sizes; df: degrees of freedom

Supplement 4: Studies included in meta-analyses Cerrillo-Urbina et al. (2015); Zang (2019), but excluded in this systematic review and meta-analysis

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Exclusion due to non-randomized design:

- Verret, Gardiner, and Beliveau (2010) (+ acute exercise intervention)
- Verret, Guay, Berthiaume, Gardiner, and Beliveau (2012)
- McKune, Pautz, and Lombard (2003)

Exclusion due to implementation of single bouts of MVPA:

- Chang, Liu, Yu, and Lee (2012)
- Fritz and O'Connor (2016)Pontifex, 2013
- Tantillo, Kesick, Hynd, and Dishman (2002)

Exclusion due to lack of outcome measure of ADHD core symptoms:

- Chou and Huang (2017)
- Pan, Chang, Tsai, and Chu (2014)
- Da Silva et al. (2019)
- Memarmoghaddam, Torbati, Sohrabi, Mashhadi, and Kashi (2016)

Exclusion due to lack of fulfilled clinical diagnosis of full ADHD symptom criteria:

- Hoza et al. (2015)

Exclusion du to intervention provided less than twice per week:

- Jensen and Kenny (2004)

Exclusion due to lack of adequate control group:

- Kadri, Slimani, Bragazzi, Tod, and Azaiez (2019)

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Chang, Y. K., Liu, S. Y., Yu, H. H., & Lee, Y. H. (2012). Effect of acute exercise on executive function in children with attention deficit hyperactivity disorder. *Archives of Clinical Neuropsychology, 27*(2), 225-237. doi:10.1093/arclin/acr094

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C., Gardiner, P., & Beliveau, L. (2010). Fitness level and gross motor performance of children with attention-deficit hyperactivity disorder. *Adapt Phys Activ Q, 27*(4), 337-351. doi:10.1123/apaq.27.4.337

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Y. (2019). Impact of physical exercise on children with attention deficit hyperactivity disorders: Evidence through a meta-analysis. *Medicine (Baltimore), 98*(46), e17980. doi:10.1097/MD.0000000000017980