

**PRISMA 2009 Checklist**

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	The report is identified as a meta-analysis.	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.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3-4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	6
METHODS			
Protocol and registration	5	The protocol is described in the Methods. Registration does not apply	
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.	6
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.	5
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).	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.	8-9
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.	7
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	7
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



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Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	7
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	9
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	6-7
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7
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).	9
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	10-13
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	10-13
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	9
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	10-13
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	19-20
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	18-19
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	19
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic 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(6): e1000097. doi:10.1371/journal.pmed1000097

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

Supplementary File 2

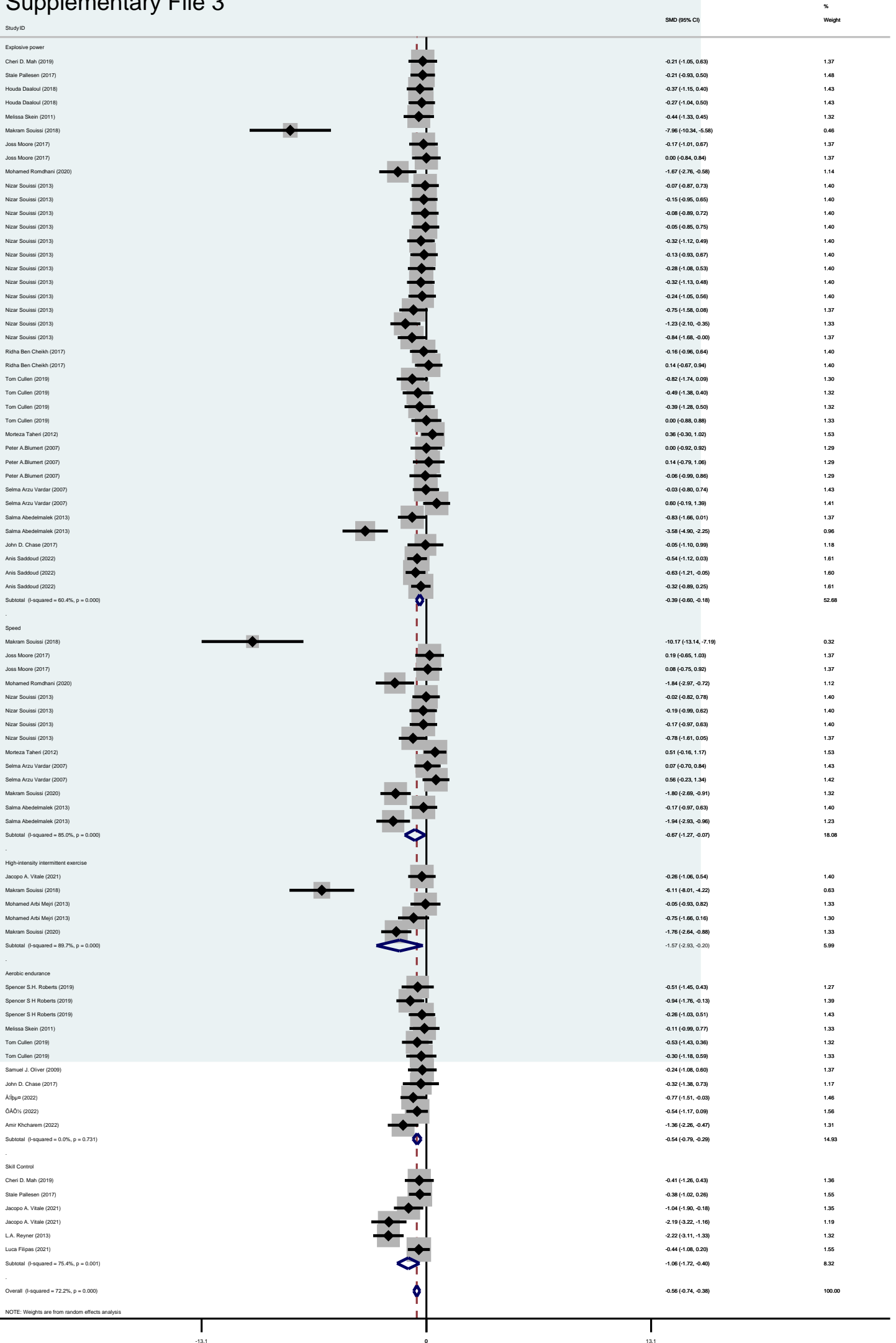
Table 1 PEDro Score of Included Studies

First author, year	Eligibility criteria specified	Random allocation	Concealed allocation to groups	Baseline comparability	Blinding of all subjects	Blinding of therapists	Blinding assessment of outcome measures	Blinding assessment of outcome measures	Blinding assessment of outcome measures	Blinding assessment of outcome measures	Blinding assessment of outcome measures	Blinding assessment of outcome measures
Mah CD 2019	1	1	1	1	1	0	0	1	0	1	1	7
Pallesen S 2017	1	1	1	1	0	0	0	0	0	1	1	5
Roberts SSH 2019	1	1	1	1	1	0	0	1	1	1	1	8
Daaloul H 2019	1	1	1	1	1	0	0	1	1	1	1	8
Vitale JA 2021	1	1	1	1	1	0	0	1	0	1	1	7
Roberts SSH 2019	1	1	1	1	1	0	0	0	1	1	1	7
Skein M 2011	1	1	1	1	1	0	0	1	1	1	1	8
Reyner LA 2013	1	1	1	1	0	0	0	1	0	1	1	6
Filipas L 2021	1	1	1	1	0	0	0	1	1	1	1	7
Souissi M 2018	1	1	1	1	0	0	0	0	0	1	1	5

Moore J 2018	1	1	1	1	0	0	0	0	0	1	1	5
Romdhani M 2020	1	1	1	1	1	0	0	0	1	1	1	7
Souissi N 2013	1	1	1	1	1	0	0	0	1	1	1	7
Ben Cheikh R 2017	1	1	1	1	0	0	0	1	0	1	1	6
Cullen T 2019	1	1	1	1	0	0	0	1	1	1	1	7
Taheri M 2012	1	1	1	1	0	0	0	0	0	1	1	5
Blumert PA 2007	1	1	1	1	1	0	0	1	0	1	1	7
Vardar SA 2007	1	1	1	1	0	0	0	1	1	1	1	7
Oliver SJ 2009	1	1	1	1	0	0	0	0	1	1	1	6
Mejri MA 2014	1	1	1	1	0	0	0	0	0	1	1	5
Souissi M 2020	1	1	1	1	1	0	0	1	0	1	1	7
Abedelmalek S 2013	1	1	1	1	0	0	0	0	0	1	1	5
Chase JD 2017	1	1	1	1	0	0	0	1	0	1	1	6

Niu XD 2022	1	1	1	1	0	0	0	1	0	1	1	6
Zhang Y 2022	1	1	1	1	0	0	0	1	1	1	1	7
Khcharem A 2022	1	1	1	1	0	0	0	1	0	1	1	6
Saddoud A 2022	1	1	1	1	0	0	0	1	0	1	1	6

Supplementary File 3



NOTE: Weights are from random effects analysis

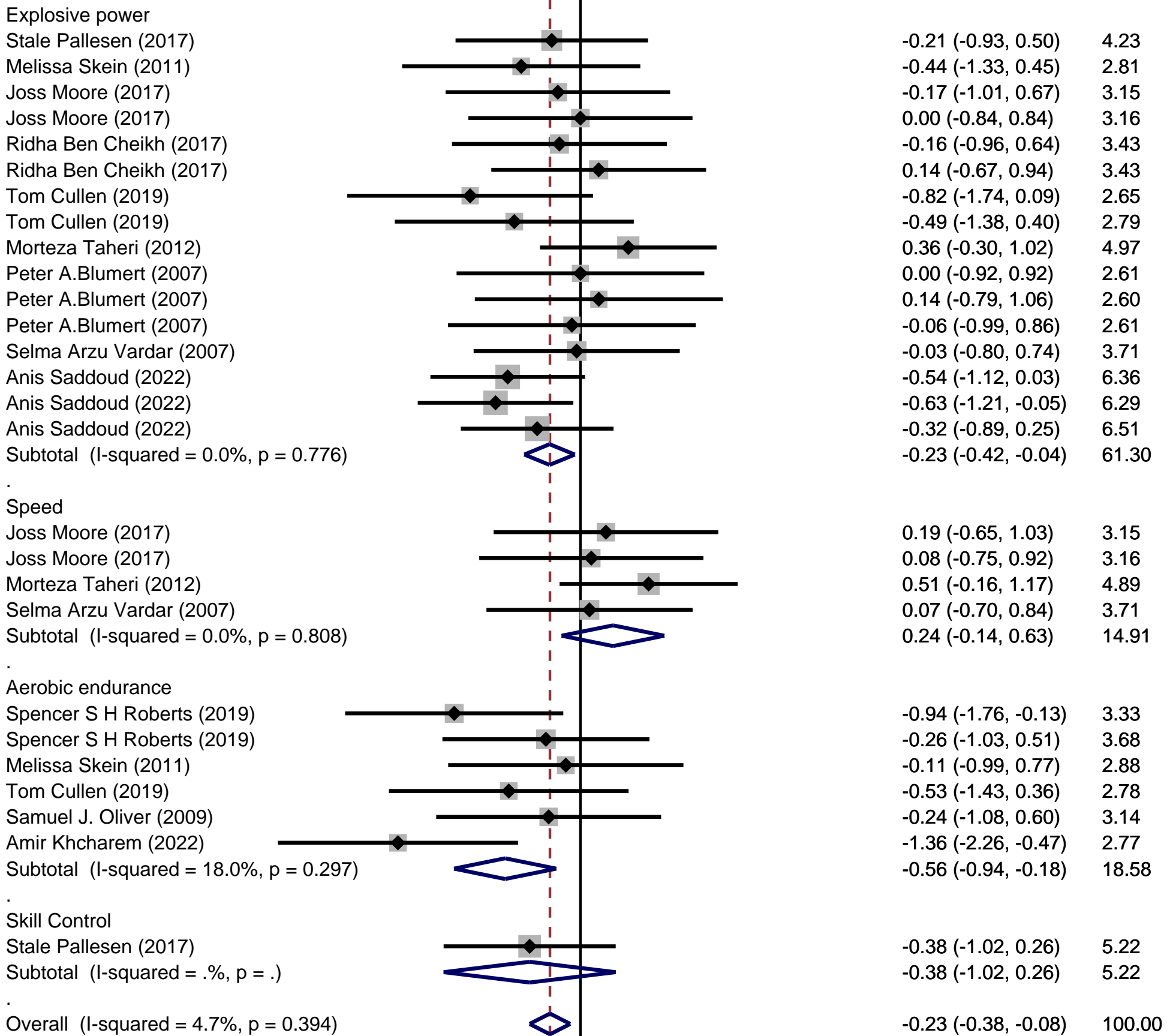
Supplementary Figure 1 Effects of acute sleep deprivation on athletes' sporting performance

Supplementary File 4

StudyID

SMD (95% CI)

%
Weight



NOTE: Weights are from random effects analysis

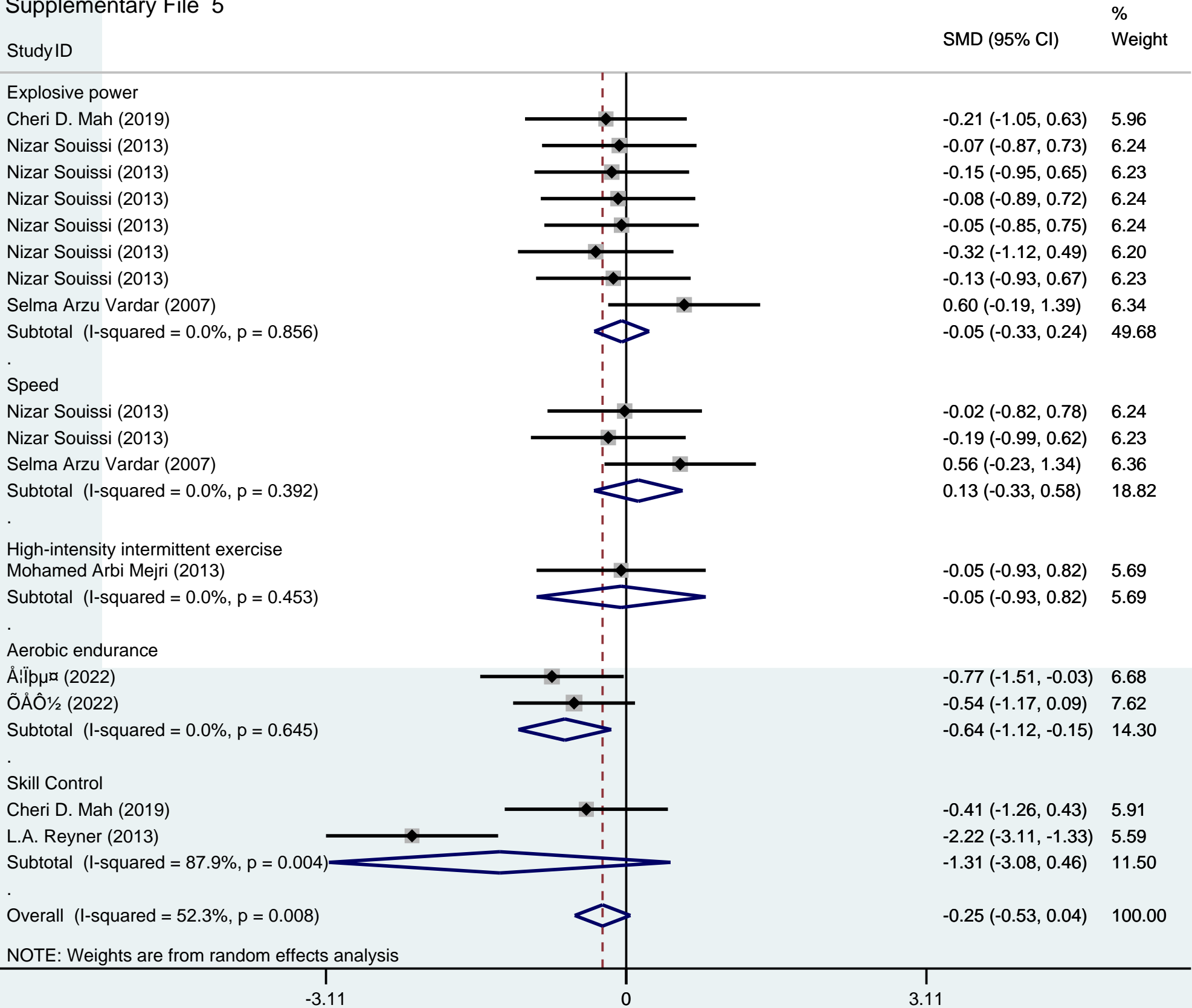
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0

2.26

Supplementary Figure 2 Effects of SD on athletes' sporting performance

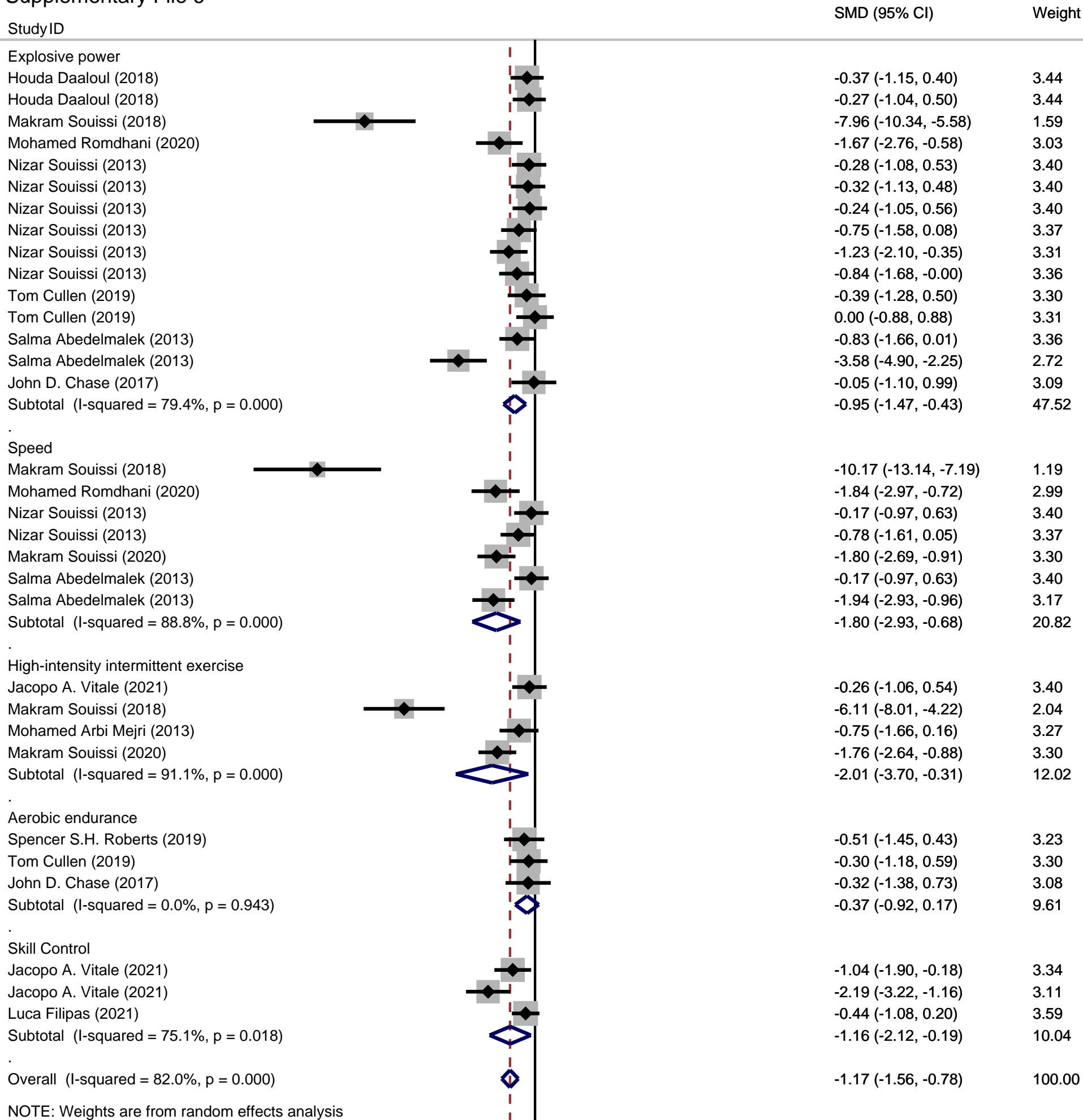
Supplementary File 5



NOTE: Weights are from random effects analysis

Supplementary Figure 3 Effects of PSDB on athletes' sporting performance

Supplementary File 6



NOTE: Weights are from random effects analysis

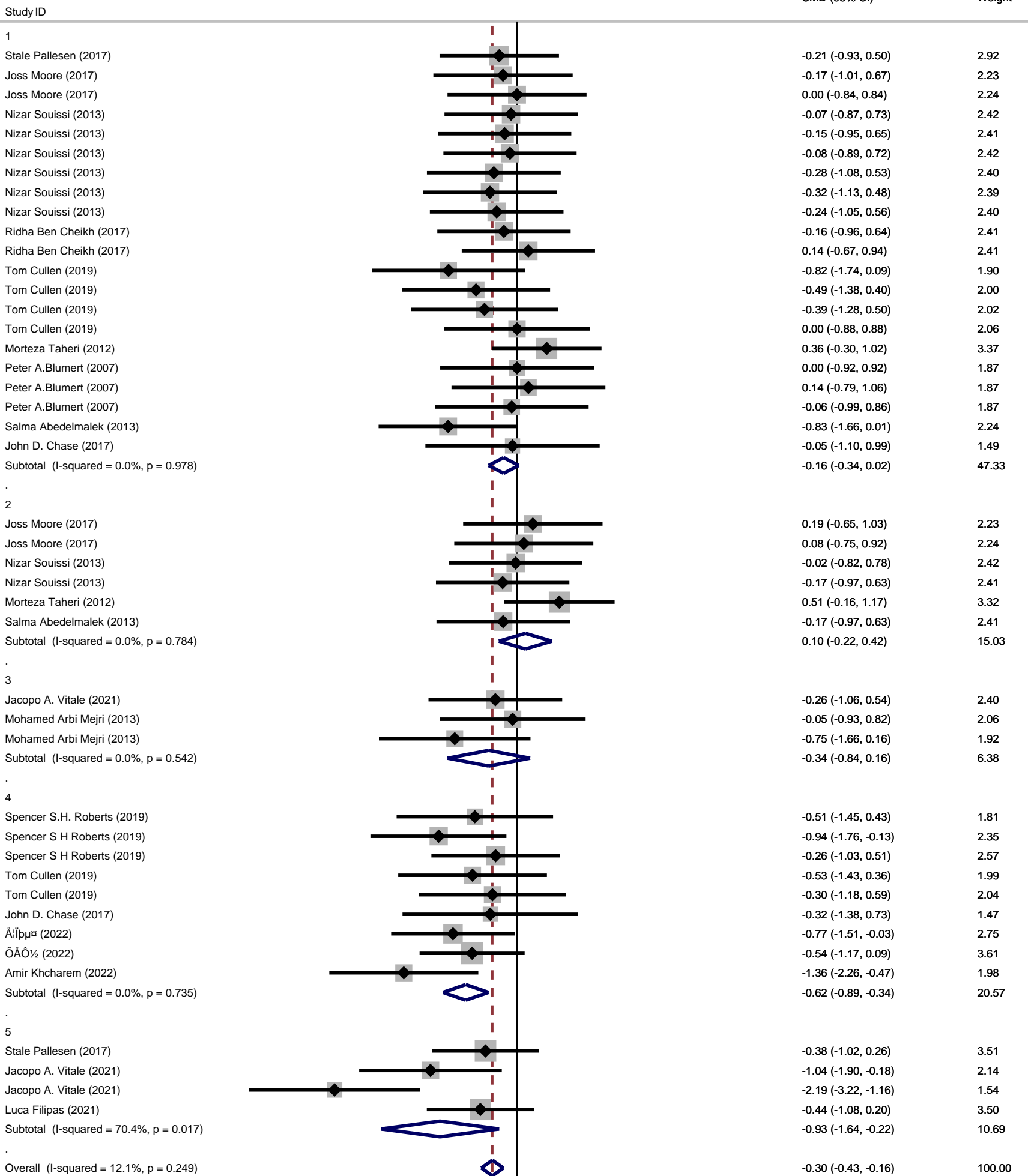
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13.1

Supplementary Figure 4 Effects of PSDE on athletes' sporting performance

Supplementary File 7



NOTE: Weights are from random effects analysis

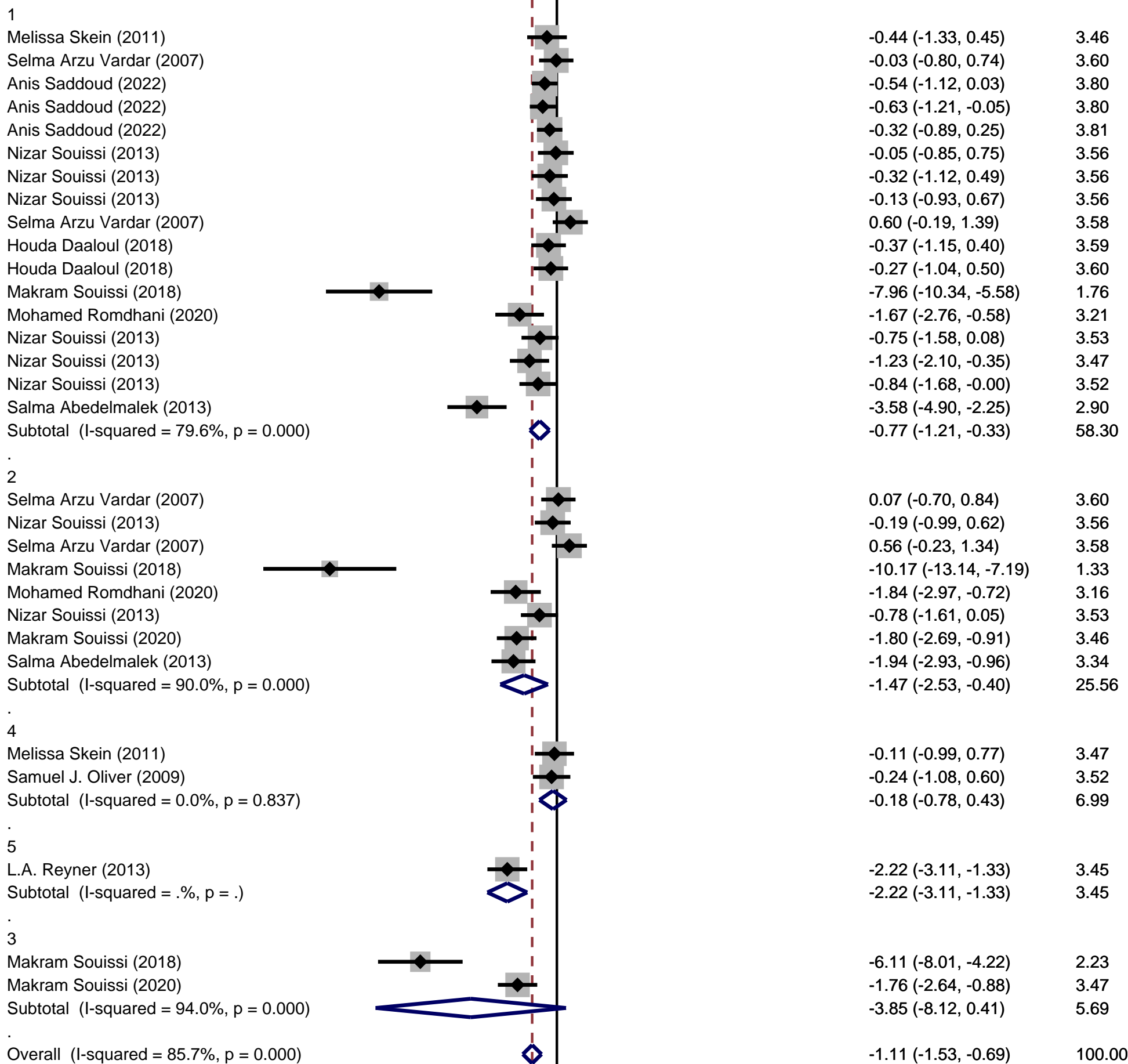
Supplementary Figure 5 Effects of sporting performance in AM after acute sleep deprivation

Supplementary File 8

StudyID

SMD (95% CI)

%
Weight



NOTE: Weights are from random effects analysis

Supplementary Figure legends

Supplementary Figure 1 Effects of acute sleep deprivation on athletes' sporting performance

This study comprehensively examined 75 sporting performance indicators, revealing an overall effect size of acute sleep deprivation on athletes' sporting performance ($d=-0.56$, $P<0.001$, $95\%CI=[-0.74, -0.38]$).

Supplementary Figure 2 Effects of SD on athletes' sporting performance

Examining various subtypes of acute sleep deprivation reveals distinct effects on athletes' sporting performance. Within the SD group, comprising 27 indicators, the effect size (d) was -0.23 ($P=0.003$, $95\%CI = [-0.38, -0.08]$).

Abbreviations: SD, Whole night sleep deprivation.

Supplementary Figure 3 Effects of PSDB on athletes' sporting performance

The PSDB group encompassing 16 indicators, exhibited an effect size (d) of -0.25 , with a $95\%CI = [-0.53, 0.04]$.

Abbreviations: PSDB, partial sleep deprivation in the beginning of the night.

Supplementary Figure 4 Effects of PSDE on athletes' sporting performance

The PSDE group including 32 indicators, demonstrated a substantial effect size (d) of -1.17 ($P<0.001$, $95\%CI= [-1.56, -0.78]$).

Abbreviations: PSDE, partial sleep deprivation at the end of the night.

Supplementary Figure 5 Effects of sporting performance in AM after acute sleep deprivation

In the AM test group, encompassing a total of 43 indicators, the overall effect size was $d=-0.30$ ($P<0.001$, $95\%CI= [-0.43, -0.16]$).

Abbreviations: AM, Ante Meridiem, morning.

Supplementary Figure 6 Effects of sporting performance in PM after acute sleep deprivation

The PM test group, comprising 30 indicators, exhibited an overall effect size of -1.11 ($P<0.001$, $95\%CI= [-1.53, -0.69]$).

Abbreviations: PM, Post Meridiem, afternoon.