

## Supplementary Tables

**Table S1.** Systematic review searched keywords

<b>Keyword number</b>	<b>Keyword</b>	<b>Filter</b>	<b>Limiters</b>
1	“ccPAS”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews
2	“cPAS”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews
3	“PAS”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews
4	“cortico-cortical paired associative stimulation”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews
5	“corticocortical paired associative stimulation”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT	Articles and Reviews

		Agriculture NOT Biochemistry NOT Immunology NOT Engineering	
6	“paired associative stimulation”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews
7	“repetitive dual coil transcranial magnetic stimulation”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews
8	“repetitive dual-coil transcranial magnetic stimulation”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews
9	“repetitive dual coil TMS”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews
10	“repetitive dual-coil TMS”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT	Articles and Reviews

		Immunology NOT Engineering	
11	“repetitive paired pulse transcranial magnetic stimulation”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews
12	“repetitive paired-pulse transcranial magnetic stimulation”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews
13	“repetitive paired pulse TMS”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews
14	“repetitive paired-pulse TMS”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews
15	“repetitive ppTMS”	Human AND Psychology AND Neuroscience NOT Economics NOT Business NOT Agriculture NOT Biochemistry NOT Immunology NOT Engineering	Articles and Reviews

**Table S2. Moderator analysis of Motor-ccPAS (*Brain network*)**

<b>Network</b>	<b>Hedges</b>	<b>SE</b>	<b>CI</b>	<b>PI</b>
CB-M1	0.777	0.112	0.54 1.02	0.34 1.22
M1-M1	0.53	0.0894	0.34 0.72	0.11 0.95
PMv-M1	0.463	0.0623	0.33 0.59	0.07 0.86
PPC-M1	0.536	0.106	0.31 0.76	0.10 0.97
SMA-M1	0.298	0.146	-0.01 0.61	-0.19 0.78

**Table S3. Moderator analysis of PMv-M1 ccPAS (*Cognitive State*)**

<b>Cognitive State</b>	<b>Hedges</b>	<b>SE</b>	<b>CI</b>	<b>PI</b>
ACTIVE	0.593	0.085	0.40 0.78	0.32 0.86
CCPAS	0.741	0.0831	0.55 0.93	0.47 1.01
REST	0.309	0.0436	0.21 0.41	0.10 0.52

**Table S4. Moderator analysis of PMv-M1 ccPAS (*Tested Cortical Circuit*)**

<b>Circuit</b>	<b>Hedges</b>	<b>SE</b>	<b>CI</b>	<b>PI</b>
CORTICOSPINAL	0.36	0.0728	0.20 0.52	-0.07 0.79
INTRACORTICAL	0.388	0.0943	0.17 0.60	-0.06 0.84
PREMOTOR	0.544	0.0674	0.39 0.70	0.12 0.97

**Table S5. Moderator analysis of PMv-M1 ccPAS (*Timing*)**

<b>Timing</b>	<b>Hedges</b>	<b>SE</b>	<b>CI</b>	<b>PI</b>
POST_1	0.482	0.0615	0.35 0.62	0.04 0.92
POST_2	0.398	0.074	0.23 0.56	-0.05 0.85

**Table S6. Moderator analysis of PMv-M1 ccPAS (*Stimulation Intensity*)**

<b>Intensity</b>	<b>Hedges</b>	<b>SE</b>	<b>CI</b>	<b>PI</b>
90 %	0.492	0.0799	0.31 0.67	-0.03 1.01
110 %	0.42	0.137	0.11 0.73	-0.16 1.00

**Table S7. Moderator analysis of Visual ccPAS (*Timing*)**

<b>Timing</b>	<b>Hedges</b>	<b>SE</b>	<b>CI</b>	<b>PI</b>
POST_1	0.557	0.0669	0.34 0.77	0.11 1.01
POST_2	0.526	0.0559	0.35 0.70	0.09 0.96
POST_3	0.488	0.112	0.13 0.84	-0.04 1.02

### Supplementary Figures

**Fig. S1. Bias estimation Motor-ccPAS.** Bubble plot showing the relationship between the effect size magnitude and its adjusted sampling error (effective sample size based) for estimates in the Motor-ccPAS meta-analysis. Small studies (low precision) do not report large effect sizes.

**Fig. S2. P-curve Motor-ccPAS.** P-curve of significant findings included in the Motor-ccPAS meta-analysis. The observed p-curve includes 38 statistically significant ( $p < .05$ ) results, of which 33 are  $p < .025$ . There were 27 additional results entered but excluded from p-curve because they were  $p > .05$ .

**Fig. S3. Aggregate Forest Motor ccPAS.** Forest plot of aggregated estimates (Hedges'  $g$ ) from studies included in the equal-effect Motor-ccPAS meta-analysis. The pooled estimate and 95% confidence interval (red diamond) is reported and compared to null effect (dashed vertical line). The size of each black square indicates the weight of the effect size in the analysis with 95% CI (black lines). Studies are sorted according to the number of aggregated effect size (E.s.). Sample size of each study is also reported in a separate column.

**Fig. S4. Motor ccPAS moderator.** Forest plot distinguishing pooled effects for each brain network considered in the Motor ccPAS moderator analysis. Effect sizes with 95% CI (black squares and lines) are grouped depending on the moderator levels ( $n=3$ ) and compared versus null effect (dashed horizontal line). Random effect estimates for each subgroup are reported with 95% PI (red diamonds and dashed line). Overall sample size for each cluster is reported beside the respective network.

**Fig. S5. Bias estimation PreMotor-ccPAS.** Bubble plot showing the relationship between the effect size magnitude and its adjusted sampling error (effective sample size based) for estimates in the PreMotor-ccPAS meta-analysis. Small studies (low precision) do not report large effect sizes.

**Fig. S6. P-curve PreMotor-ccPAS.** P-curve of significant findings included in the PreMotor-ccPAS meta-analysis. The observed p-curve includes 29 statistically significant ( $p < .05$ ) results, of which 25 are  $p < .025$ . There were 21 additional results entered but excluded from p-curve because they were  $p > .05$ .

**Fig. S7. Aggregate Forest PreMotor ccPAS.** Forest plot of aggregated estimates (Hedges'  $g$ ) from studies included in the equal-effect PreMotor-ccPAS meta-analysis. The pooled estimate and 95% confidence interval (red diamond) is reported and compared to null effect (dashed vertical line). The size of each black square indicates the weight of the effect size in the analysis with 95% CI (black lines). Studies are sorted according to the number of aggregated effect size (E.s.). Sample size of each study is also reported in a separate column.

**Fig. S8. Forest M1-PMv ccPAS.** Forest plot of absolute effect sizes (Hedges'  $g$ ) for all studies included in the M1-PMv ccPAS meta-analysis. The pooled estimate and 95% confidence interval (red diamond) is reported with 95% prediction interval (dashed horizontal line) and compared to null effect (dashed vertical line). The size of each black square indicates the weight of the effect size in the combined analysis with 95% CI (black lines). Multiple effect sizes are reported for the studies.

**Fig. S9. Funnel M1-PMv ccPAS.** Funnel plot of raw effect sizes (Hedges'  $g$ ) versus inverse standard error in the second Premotor ccPAS meta-analysis (M1-PMv). Black circles represent effect sizes included. The contour-enhanced funnel plots display the significance of the effects from in this meta-analysis relative to their magnitude and precision. For estimates falling inside the white and light-blue region, the null hypothesis of null effect can be rejected at the 1% significance level ( $p < 0.01$ ) and 5% ( $p < 0.05$ ) respectively. For estimates in darker-blue regions, significance is above 5% and 10%.

**Fig. S10. Bias estimation M1-PMv ccPAS.** Bubble plot showing the relationship between the effect size magnitude and its adjusted sampling error (effective sample size based) for estimates in the M1-PMv ccPAS meta-analysis. A positive trend is visible between small studies (low precision) and large effect sizes.

**Fig. S11. P-curve M1-PMv ccPAS.** P-curve of significant findings included in the M1-PMv ccPAS meta-analysis. The observed p-curve includes 6 statistically significant ( $p < .05$ ) results, of which 5 are  $p < .025$ . There were 11 additional results entered but excluded from p-curve because they were  $p > .05$ .

**Fig. S12. Aggregate Forest M1-PMv ccPAS.** Forest plot of aggregated estimates (Hedges'  $g$ ) from studies included in the equal-effect M1-PMv ccPAS meta-analysis. The pooled estimate and 95% confidence interval (red diamond) is reported and compared to null effect (dashed vertical line). The size of each black square indicates the weight of the effect size in the analysis with 95% CI (black lines). Studies are sorted according to the number of aggregated effect size (E.s.). Sample size of each study is also reported in a separate column.

**Fig. S13. Bias estimation Visual-ccPAS.** Bubble plot showing the relationship between the effect size magnitude and its adjusted sampling error (effective sample size based) for estimates in the Visual-ccPAS meta-analysis. Small studies (low precision) do not report large effect sizes.

**Fig. S14. P-curve Visual-ccPAS.** P-curve of significant findings included in the M1-PMv ccPAS meta-analysis. The observed p-curve includes 28 statistically significant ( $p < .05$ ) results, of which 27 are  $p < .025$ . There were 9 additional results entered but excluded from p-curve because they were  $p > .05$ .

**Fig. S15. Aggregate Forest Visual ccPAS.** Forest plot of aggregated estimates (Hedges'  $g$ ) from studies included in the equal-effect Visual-ccPAS meta-analysis. The pooled estimate and 95% confidence interval (red diamond) is reported and compared to null effect (dashed vertical line). The size of each black square indicates the weight of the effect size in the analysis with 95% CI (black lines). Studies are sorted according to the number of aggregated effect size (E.s.). Sample size of each study is also reported in a separate column.

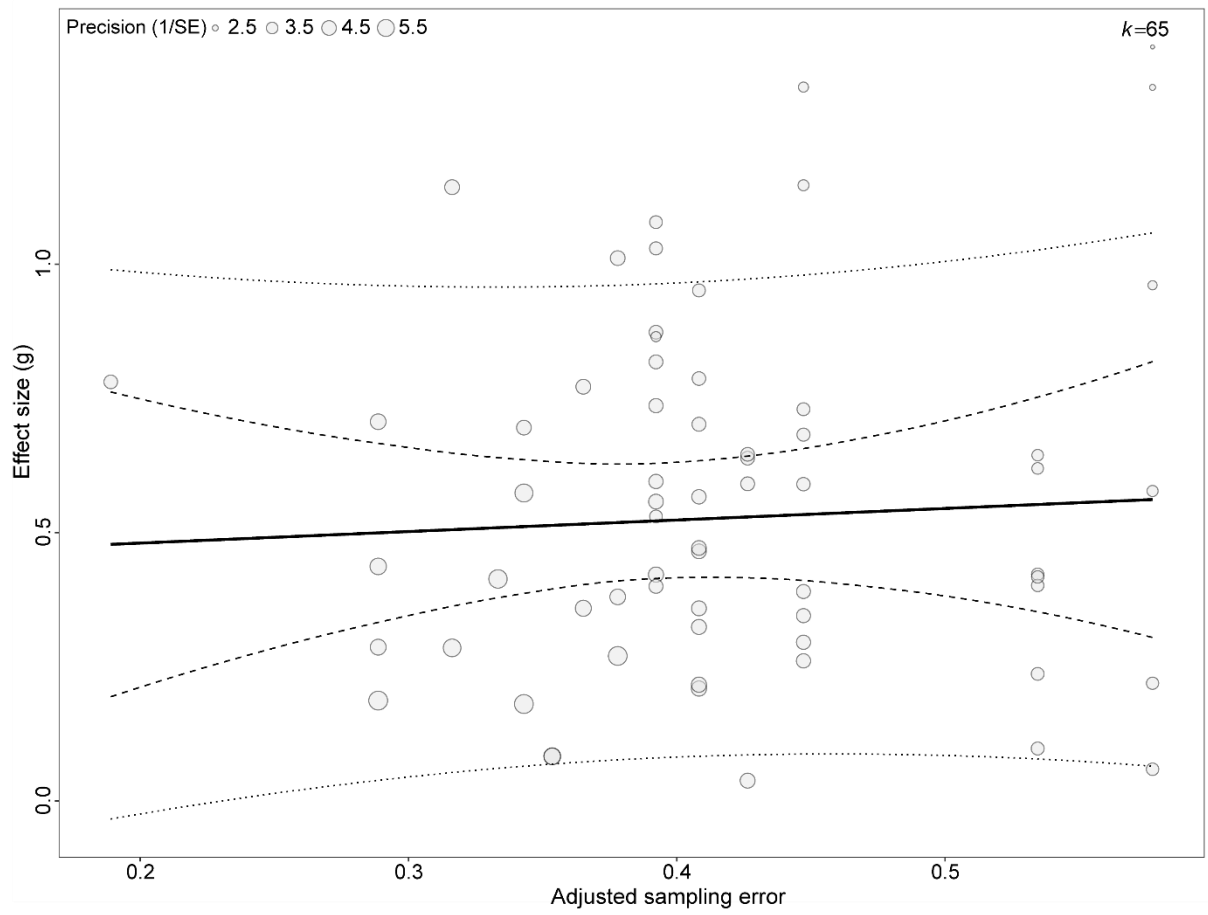


Figure S 1



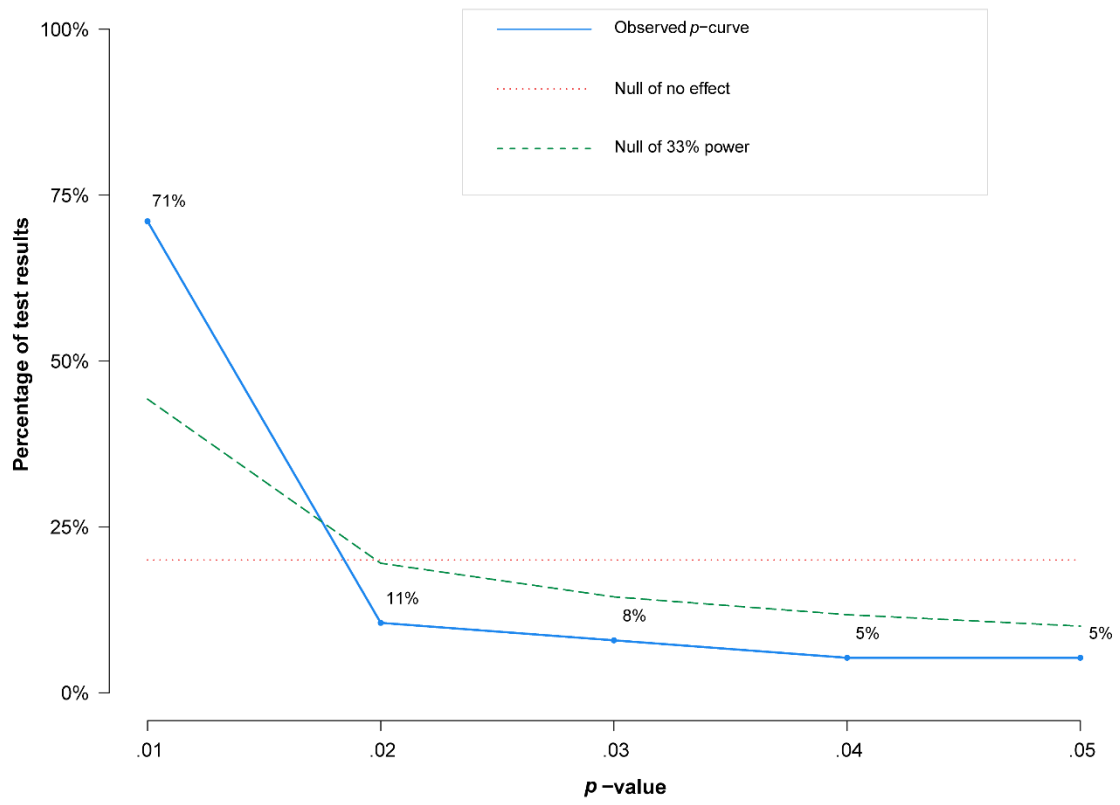


Figure S 2

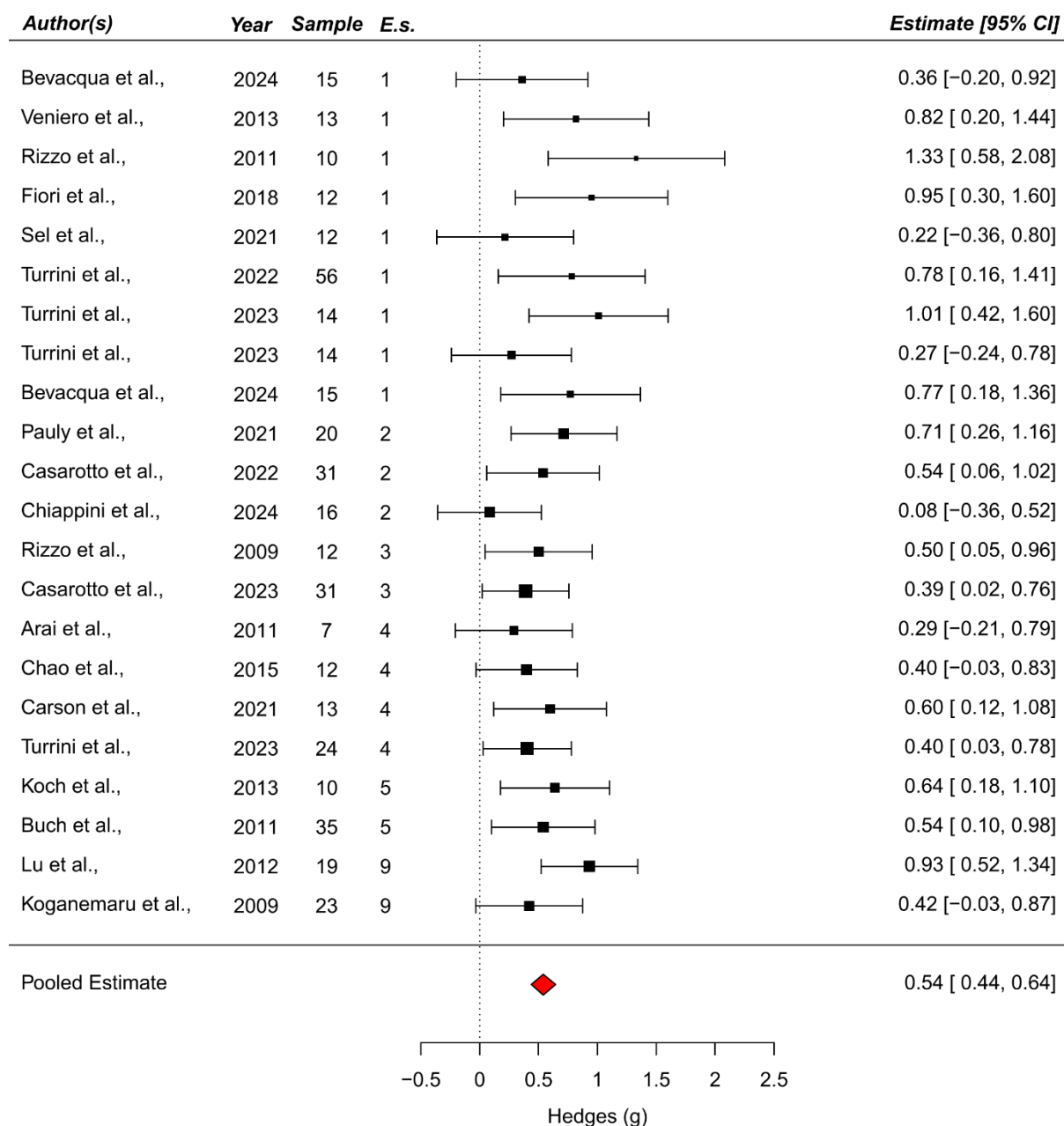


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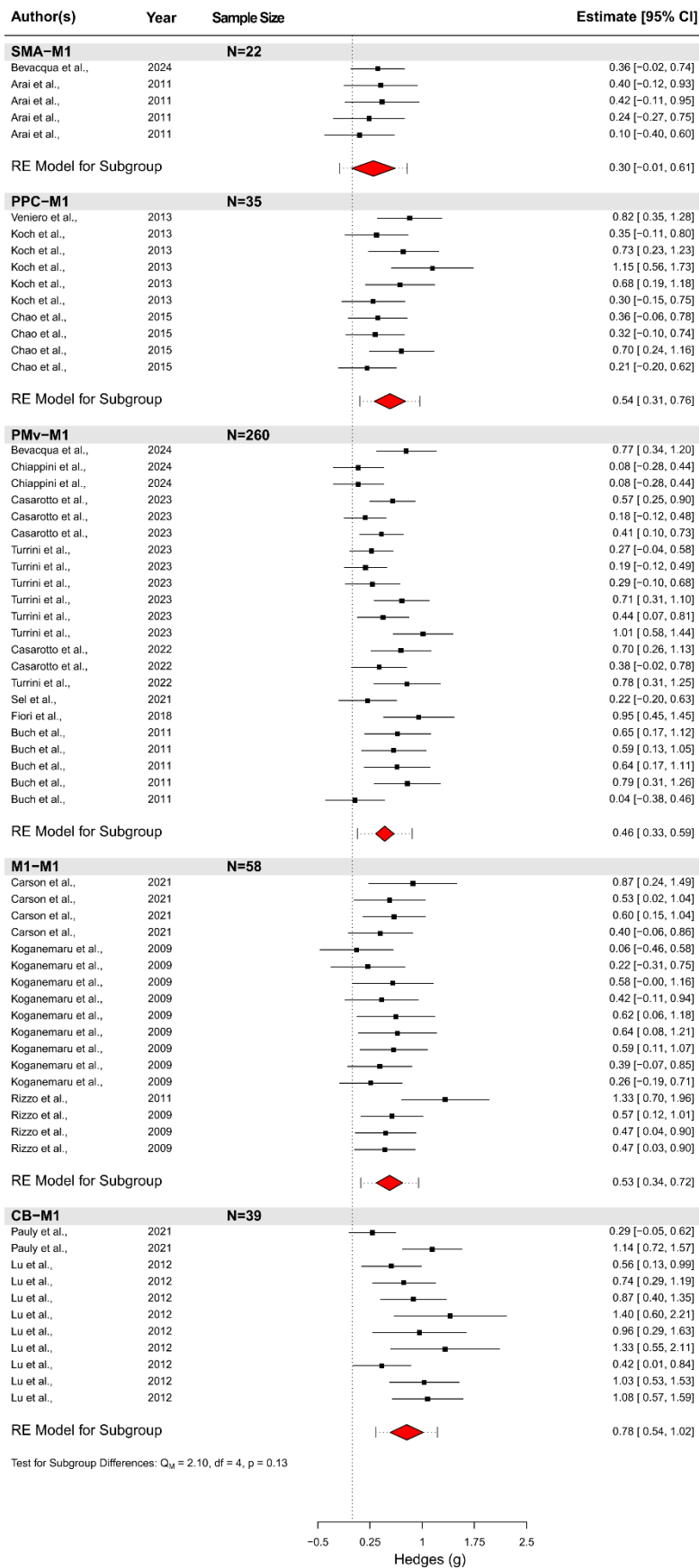


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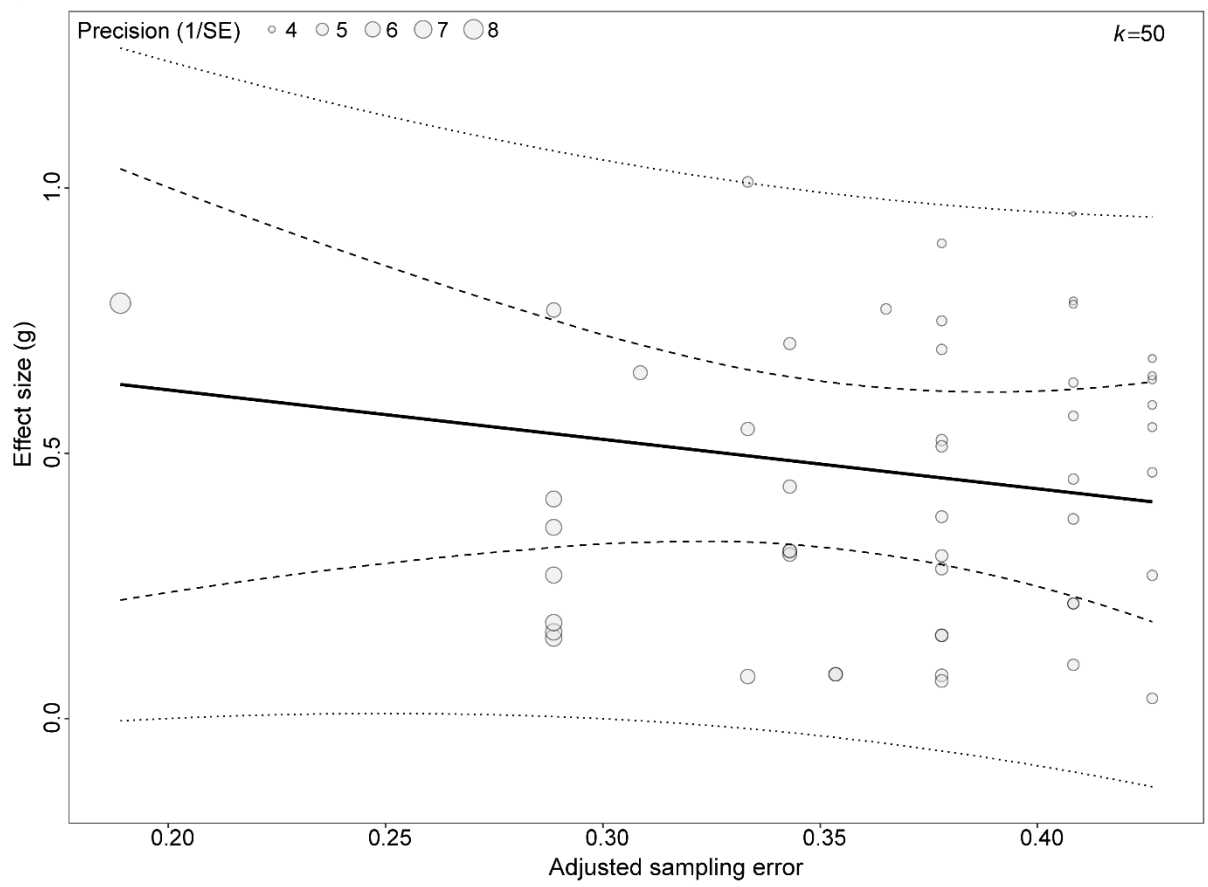


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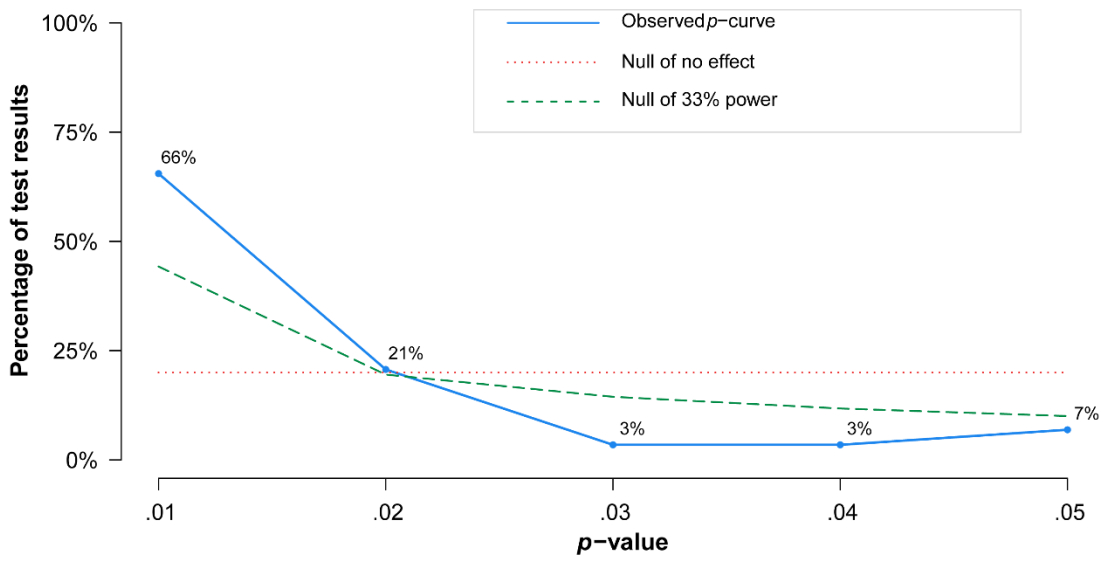


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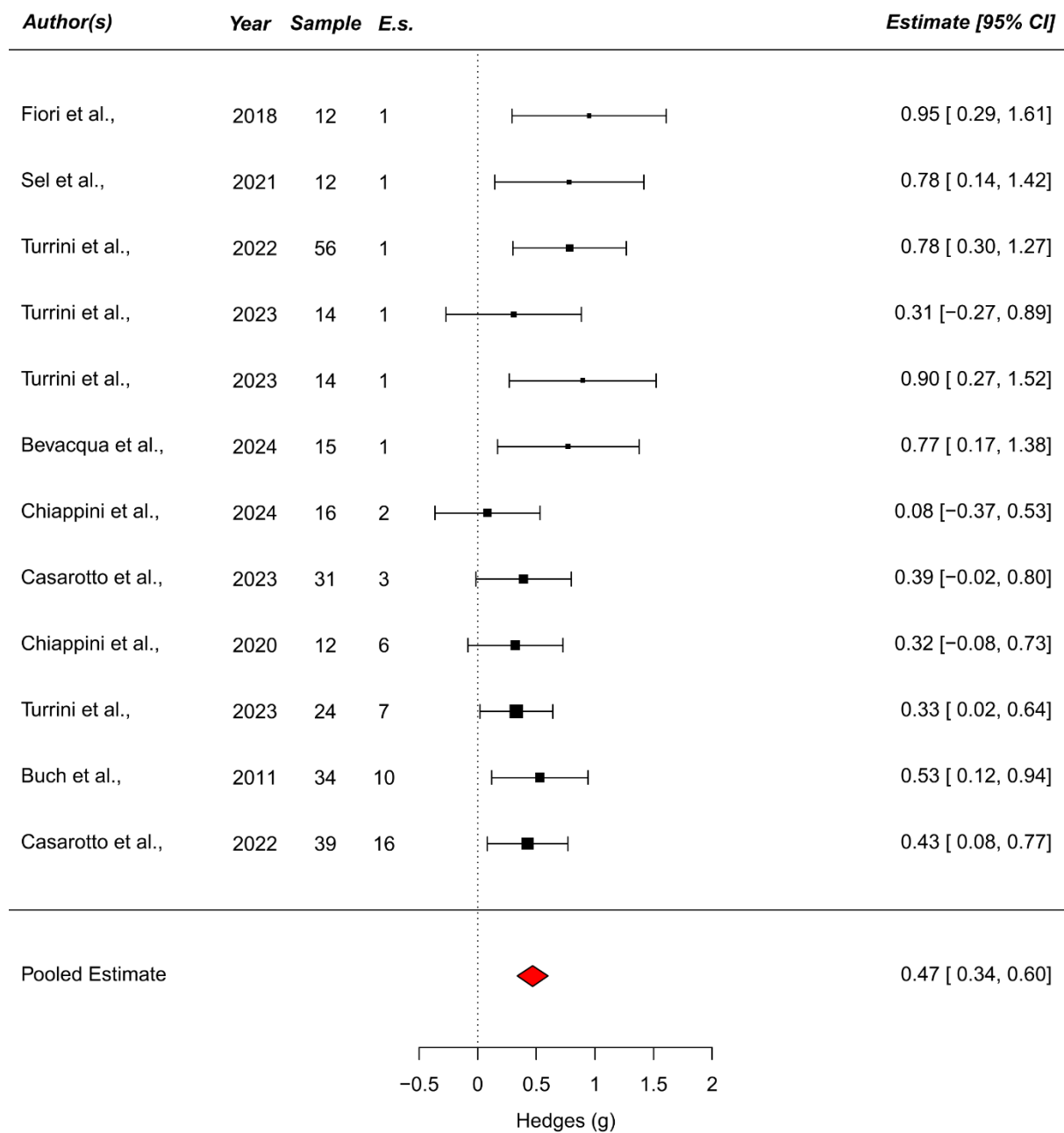


Figure S 7

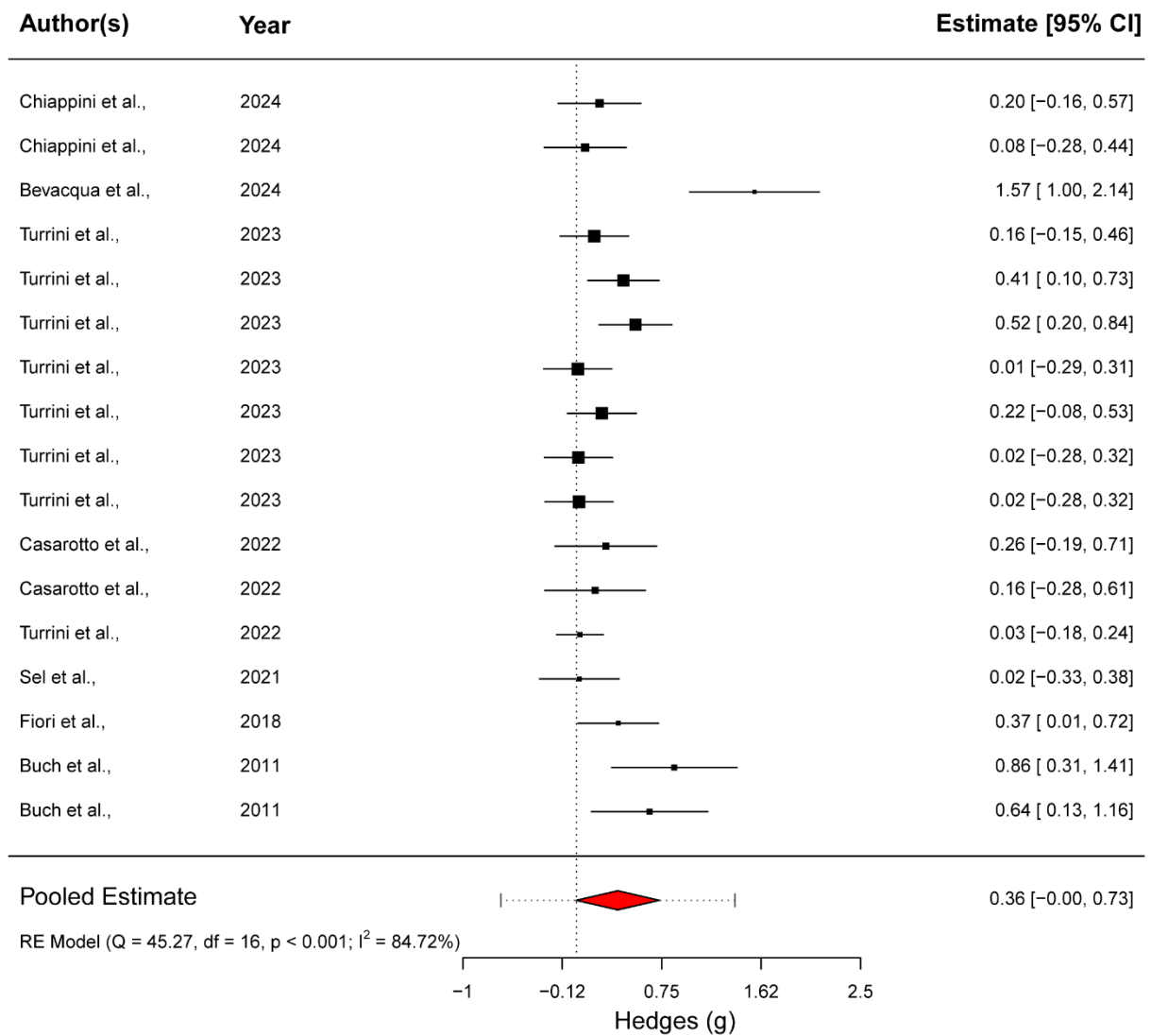


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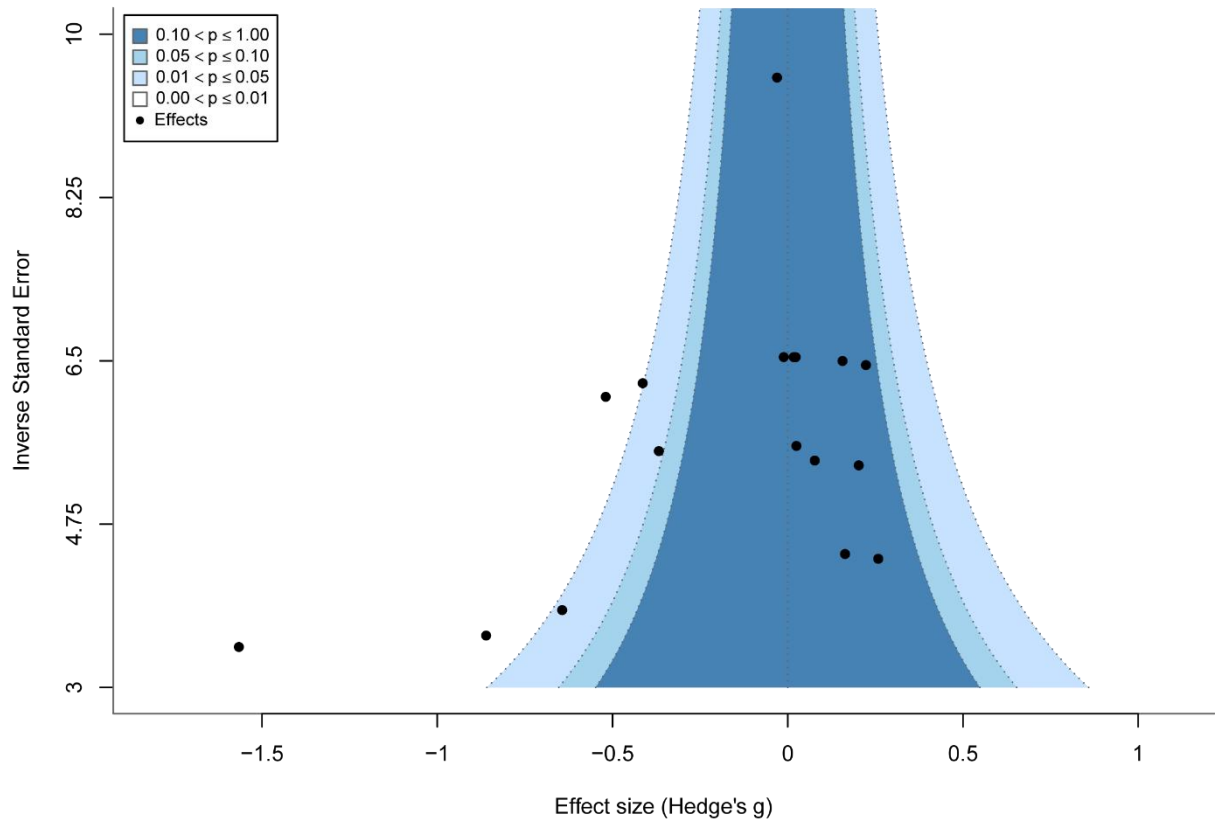


Figure S.9



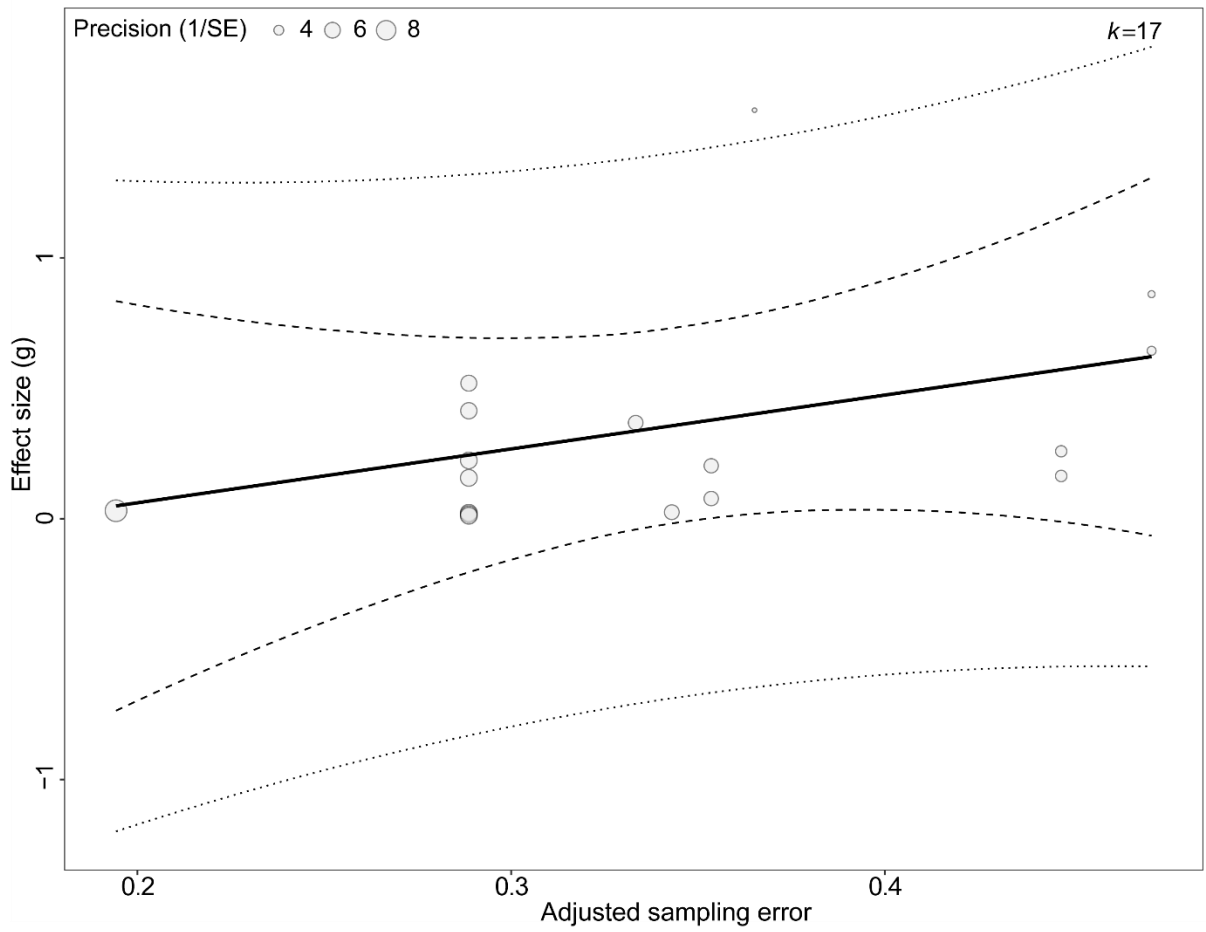


Figure S 10

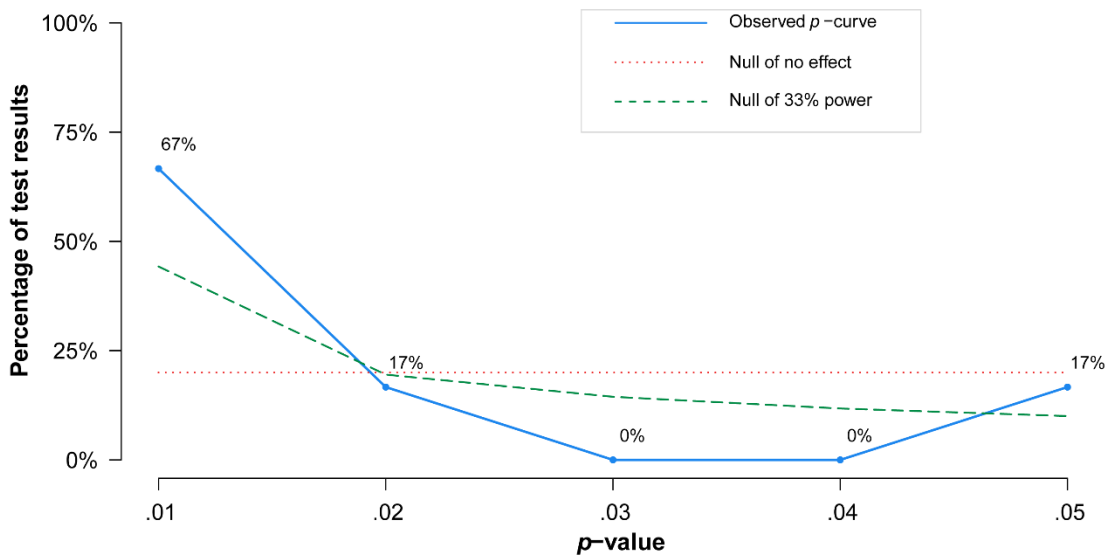


Figure S 11

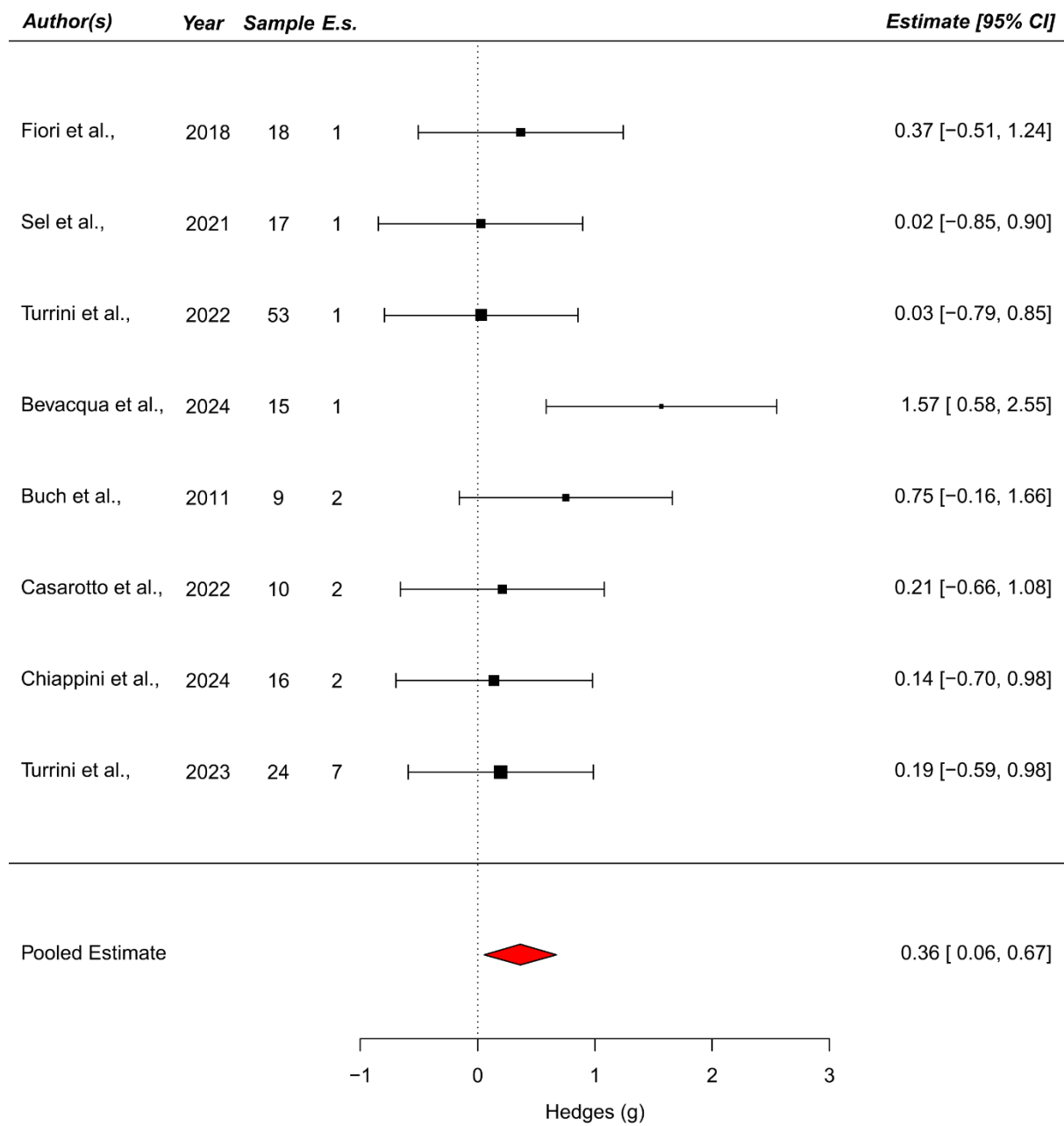


Figure S 12

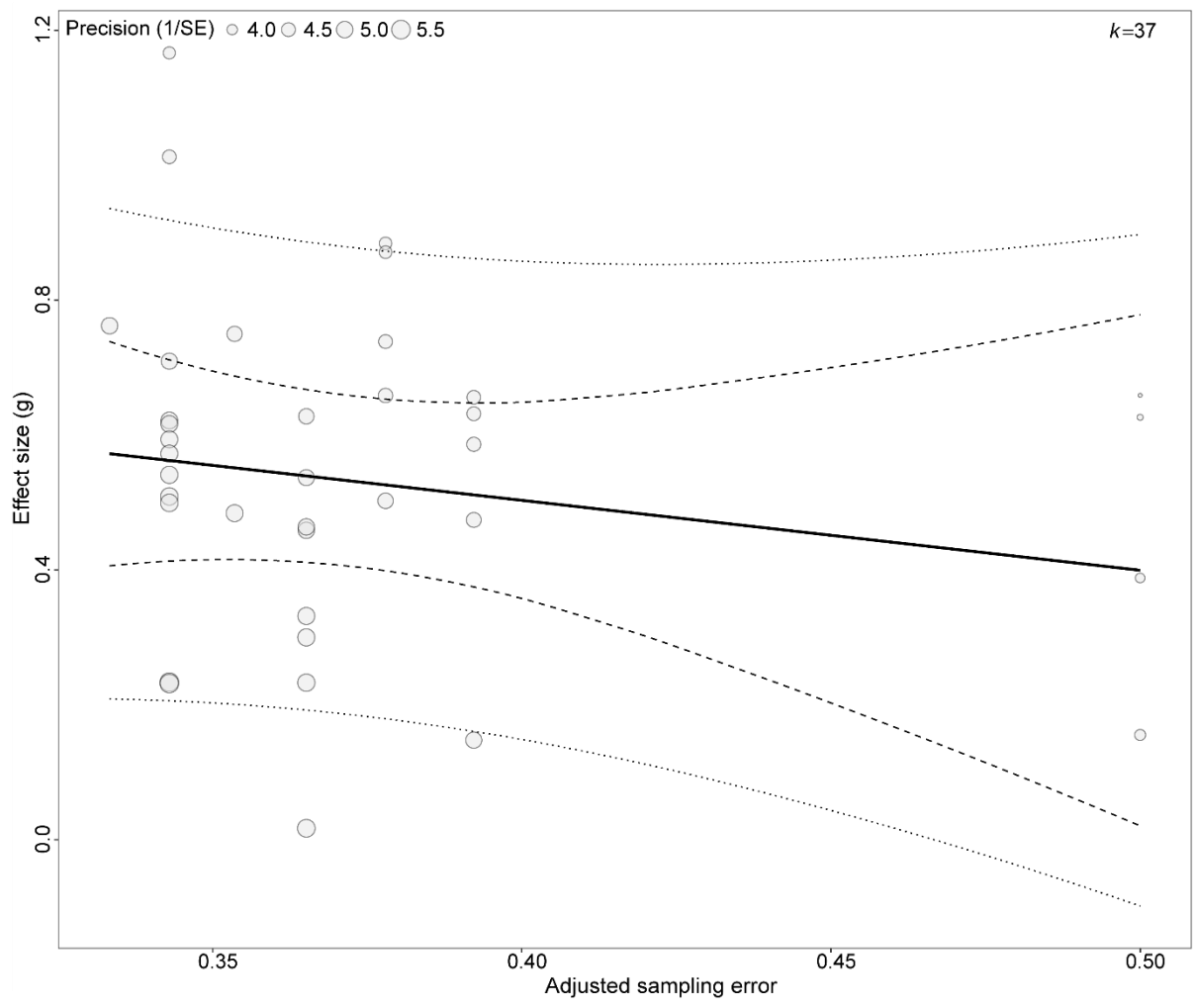


Figure S 13

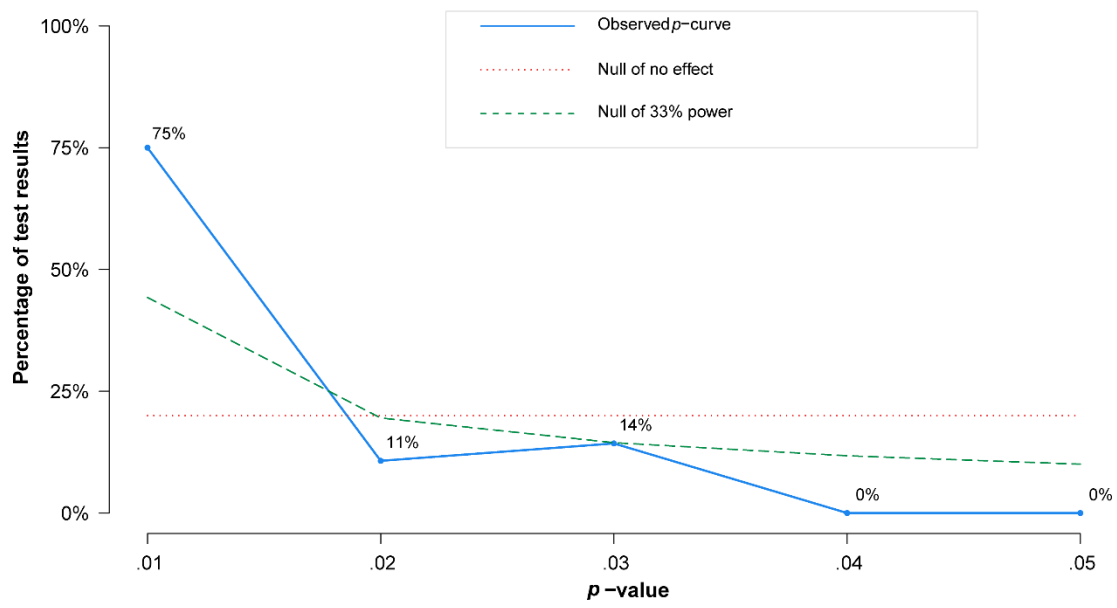


Figure S 14

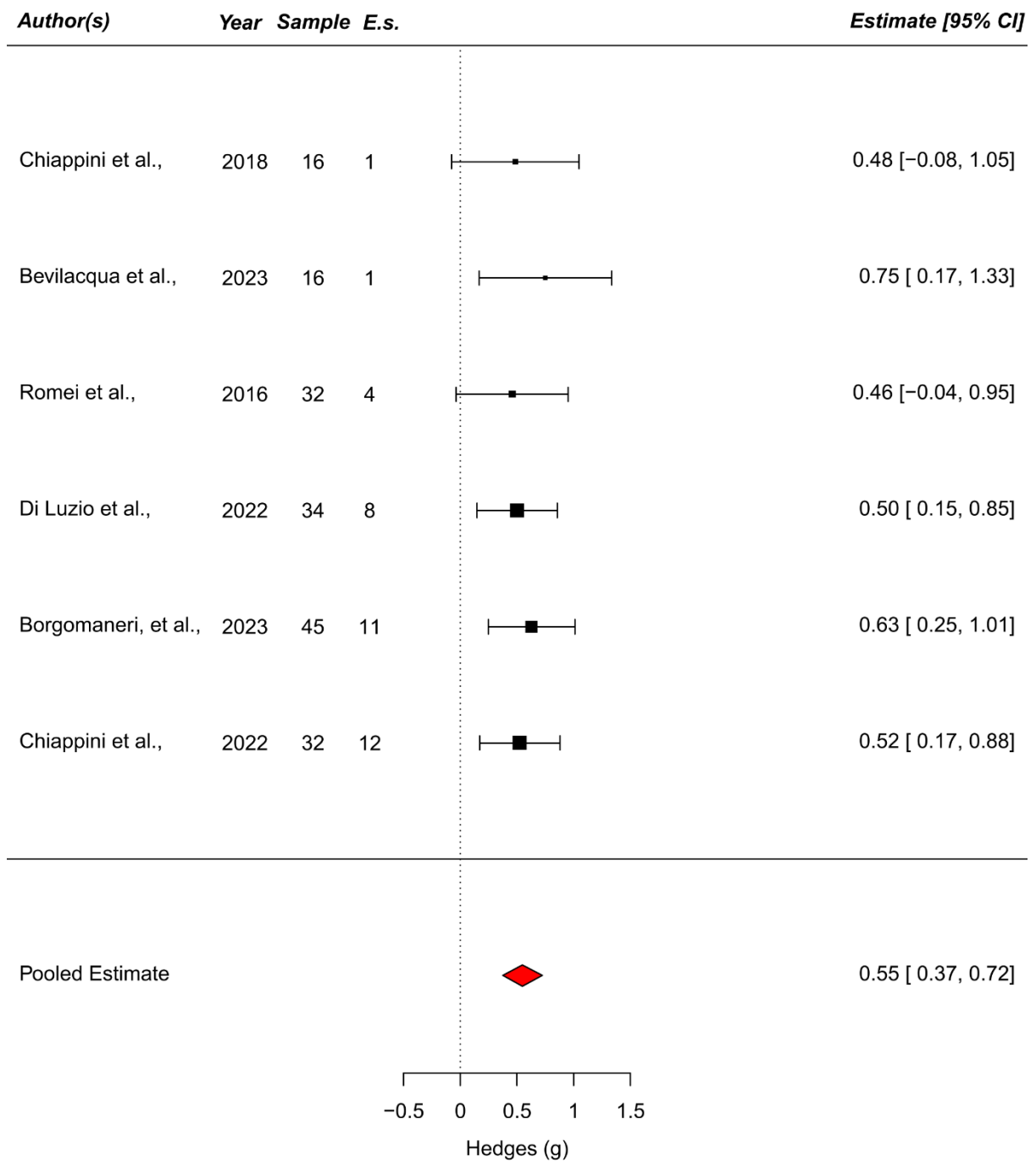


Figure S 15

## Supplementary References

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