Supplementary Material

The efficacy of transcranial magnetic stimulation (TMS) for negative symptoms in schizophrenia: A systematic review and meta-analysis

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Search strategy

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751 hits

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Supplementary Table 1. Risk of bias in individual studies

	Cochrane Risk of Bias 2.0 domains	Overall score

Author	Year	A	B	C	D	E	
Bais	2014	L	L	L	L	L	**L**
Barr	2012	SC	H	H	L	L	**H**
Bation	2021	L	L	L	L	L	**L**
Chauhan	2020	L	SC	L	L	L	**SC**
Chibbaro	2005	SC	SC	H	L	L	**H**
Cordes	2010	SC	H	L	L	L	**H**
de Jesus	2011	L	L	L	L	L	**L**
Dlabac-de Lange	2014	L	L	L	L	L	**L**
Dollfus	2018	SC	H	H	L	L	**H**
Fitzgerald	2008	L	SC	H	L	L	**H**
Garg	2016	SC	H	H	L	L	**H**
Goyal	2007	H	L	L	L	L	**H**
Guan	2020	L	SC	H	L	L	**H**
Güleken	2020	H	SC	H	L	L	**H**
Hajak	2004	SC	L	L	L	L	**SC**
Holi	2004	L	L	L	L	L	**L**
Huang	2016	SC	SC	L	L	L	**SC**
Klein	1999	SC	H	H	L	L	**H**
Kumar	2020	L	L	L	L	L	**L**
Li	2016	SC	SC	L	L	L	**SC**
Mogg	2007	L	L	L	L	L	**L**
Novak	2006	SC	H	H	L	L	**H**
Paillère-Martinot	2016	L	L	L	L	L	**L**
Pan	2021	SC	L	L	L	L	**SC**
Prikryl	2007	SC	L	L	L	L	**SC**
Prikryl	2012	SC	H	H	L	L	**H**
Prikryl	2013	SC	H	H	L	L	**H**
Prikryl	2014	SC	H	H	L	L	**H**
Quan	2015	SC	SC	L	L	L	**SC**
Rabany	2014	SC	L	H	L	L	**H**
Rosa	2007	SC	L	L	L	L	**SC**
Rosenberg	2012	L	H	H	L	L	**H**
Saba	2006	SC	SC	H	L	L	**H**
Schneider	2008	SC	SC	L	L	L	**SC**
Singh	2020	L	L	H	L	L	**H**
Tikka	2017	L	H	H	L	L	**H**
Wang	2020	SC	SC	H	L	L	**H**
Wobrock	2015	L	SC	H	L	L	**H**
Xiu	2020	L	SC	H	L	L	**H**
Zhao	2014	SC	SC	L	L	L	**SC**
Zhuo	2019	SC	H	H	L	L	**H**

A: Randomization process, B: Deviations from intended interventions, C: Missing outcome data, D: Measurement of the outcome, E: Selection of the reported result, L: Low risk, SC: Some concerns, H: High risk.

Supplementary Table 2. Studies with follow up data from at least four weeks after end of treatment

Author	Year	Follow up time	Follow up score $(SD)_{active}$		Follow up score $(SD)_{control}$	
Bation	2021	6 months	22.83	(6.043)	27.3	(10.38)
Chibbaro	2005	8 weeks	-8.28	(2.72)	0.45	(0.19)
de Jesus	2011	4 weeks	9.5	(3.81)	12.56	(4.79)
Dlabac-de Lange	2014	3 months	18.1	(4.6)	18.2	(6)
Dollfus	2018	4 weeks	22.77	(7.81)	22.97	(8.39)
Li	2016	4 months	15.7	(4.93)	19.3	(5.92)
Liu	2008	4 weeks	72.5	(16.8)	83.5	(20.5)
Novak	2006	6 weeks	18	(5.73)	15.38	(5.1)
Rabany	2014	4 weeks	18.6	(4.93)	15	(5.83)
Rosa	2007	4 weeks	18	(4.8)	18.75	(0.5)
Schneider	2008	4 weeks	46.59	(22.55)	50.93	(22.37)
Wang	2020	2 months	12.08	(3.66)	14.52	(4.78)
Wobrock	2015	84 days	19.99	(50.82)	20.32	(63)
Xiu	2020	6 months	20.76	(8.48)	22.2	(7.9)

SD: Standard deviation

Supplementary Table 3. Studies with data on depressive symptoms

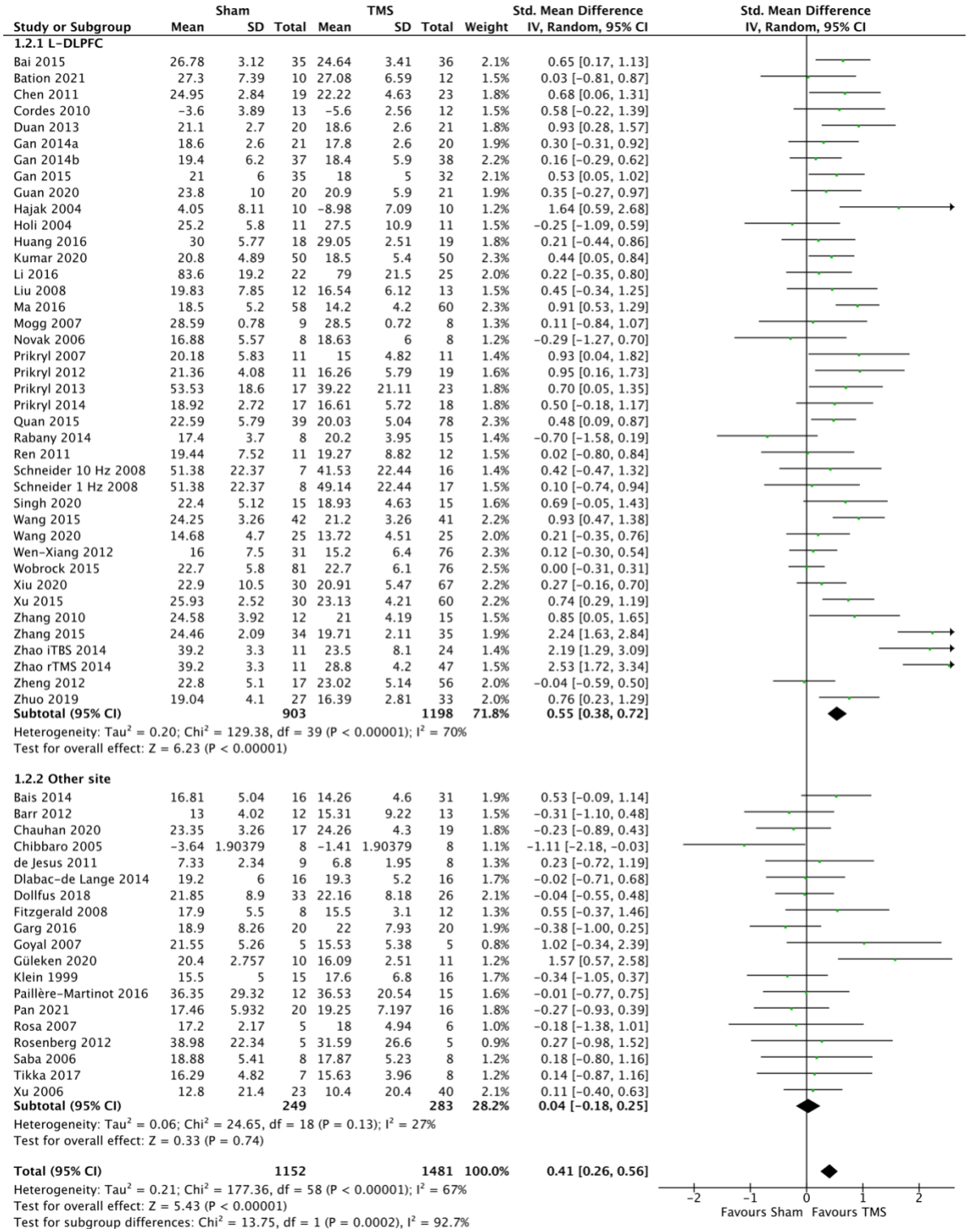
Author	Year	Depression scale used	Post treatment depression score (SD)$_{active}$		Post treatment depression score (SD)$_{control}$	
Barr	2012	CDSS	2.23	(1.87)	1.58	(2.5)
de Jesus	2011	BPRS-DF	3.37	(2.26)	3.55	(3.24)
Dlabac-de Lange	2014	MADRS	16.3	(7.8)	11.8	(6.8)
Fitzgerald	2008	CDSS	7.2	(5.9)	3.5	(3.8)
Garg	2016	CDSS	6.3	(3.45)	6.5	(3.68)
Goyal	2007	CDSS	0	(0)	0.8	(0.836)
Guan	2020	PANSS-DF	3.9	(2)	4.2	(1.6)
Huang	2016	MADRS	14.89	(5.52)	12.39	(2.57)
Klein	1999	HDRS	8.6	(3.5)	6.9	(4)
Kumar	2020	CDSS	0.12	(0.44)	0.12	(0.72)
Mogg	2007	HADS-D	2.5	(3.1)	5.2	(3.3)
Prikryl	2007	CDSS	0	(0)	0.73	(1.19)
Prikryl	2013	CDSS	0.04	(0.21)	0.76	(1.48)
Prikryl	2014	CDSS	0.92	(0.78)	1.09	(1.51)
Rabany	2014	CDSS	5.8	(3.23)	5.5	(4.78)
Singh	2020	CDSS	1.33	(0.97)	1.33	(1.23)
Wang	2020	HDRS	3.76	(1.45)	5.4	(3:33)
Wobrock	2015	CDSS	4.4	(3.5)	4.6	(4.4)

CDSS: Calgary Depression Scale for Schizophrenia, BPRS-DF: Brief Psychiatric Rating Scale – depressive factor, MADRS: Montgomery-Asberg Depression Rating Scale, PANSS-DF: Positive and Negative Syndrome Scale – Depressive Factor, HDRS: Hamilton Depression Rating Scale, HADS-D: Hospital Anxiety and Depression Score – Depression score.

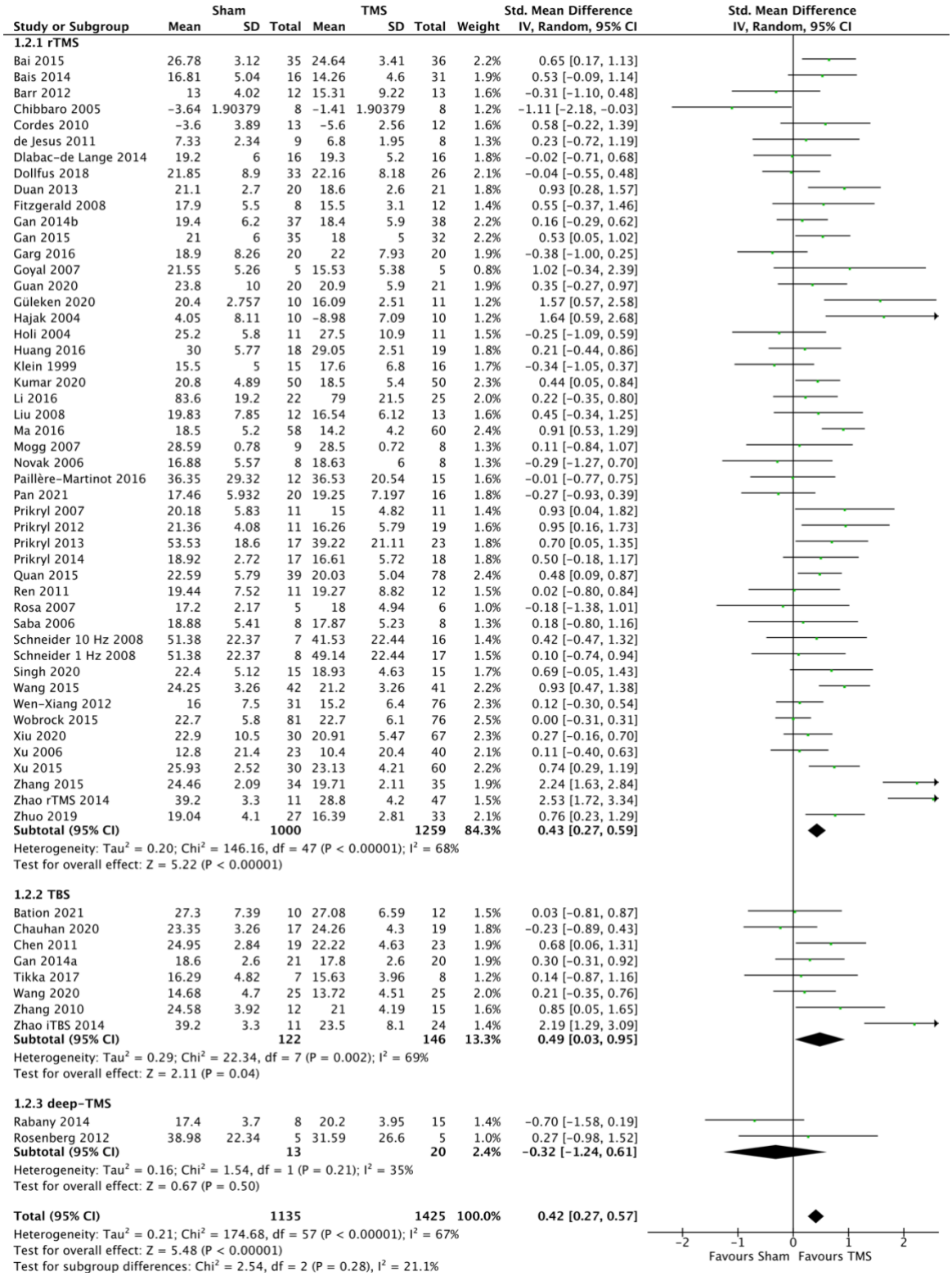
Supplementary Table 4. Stepwise exclusion of the ten most outlying studies compared to the overall efficacy estimate (beginning with the most outlying)

Original estimate	0.41 (0.26; 0.56)	p < 0.00001
Excluding Zhao rTMS 2014	0.38 (0.24; 0.52)	p < 0.00001
+ excluding Zhang 2015	0.34 (0.22; 0.47)	p < 0.00001
+ excluding Zhao iTBS 2014	0.32 (0.21; 0.44)	p < 0.00001
+ excluding Chibarro 2005	0.34 (0.22; 0.45)	p < 0.00001
+ excluding Hajak 2004	0.33 (0.21; 0.44)	p < 0.00001
+ excluding Güleken 2020	0.31 (0.21; 0.42)	p < 0.00001
+ excluding Rabany 2014	0.33 (0.22; 0.43)	p < 0.00001
+ excluding Garg 2016	0.34 (0.24; 0.45)	p < 0.00001
+ excluding Klein 1999	0.36 (0.25; 0.46)	p < 0.00001
+ excluding Barr 2012	0.36 (0.26; 0.47)	p < 0.00001

Supplementary Figure 1. Subgroup analysis stratified by targeted brain structure (Left dorsolateral prefrontal cortex (L-DLPFC) or "other site"

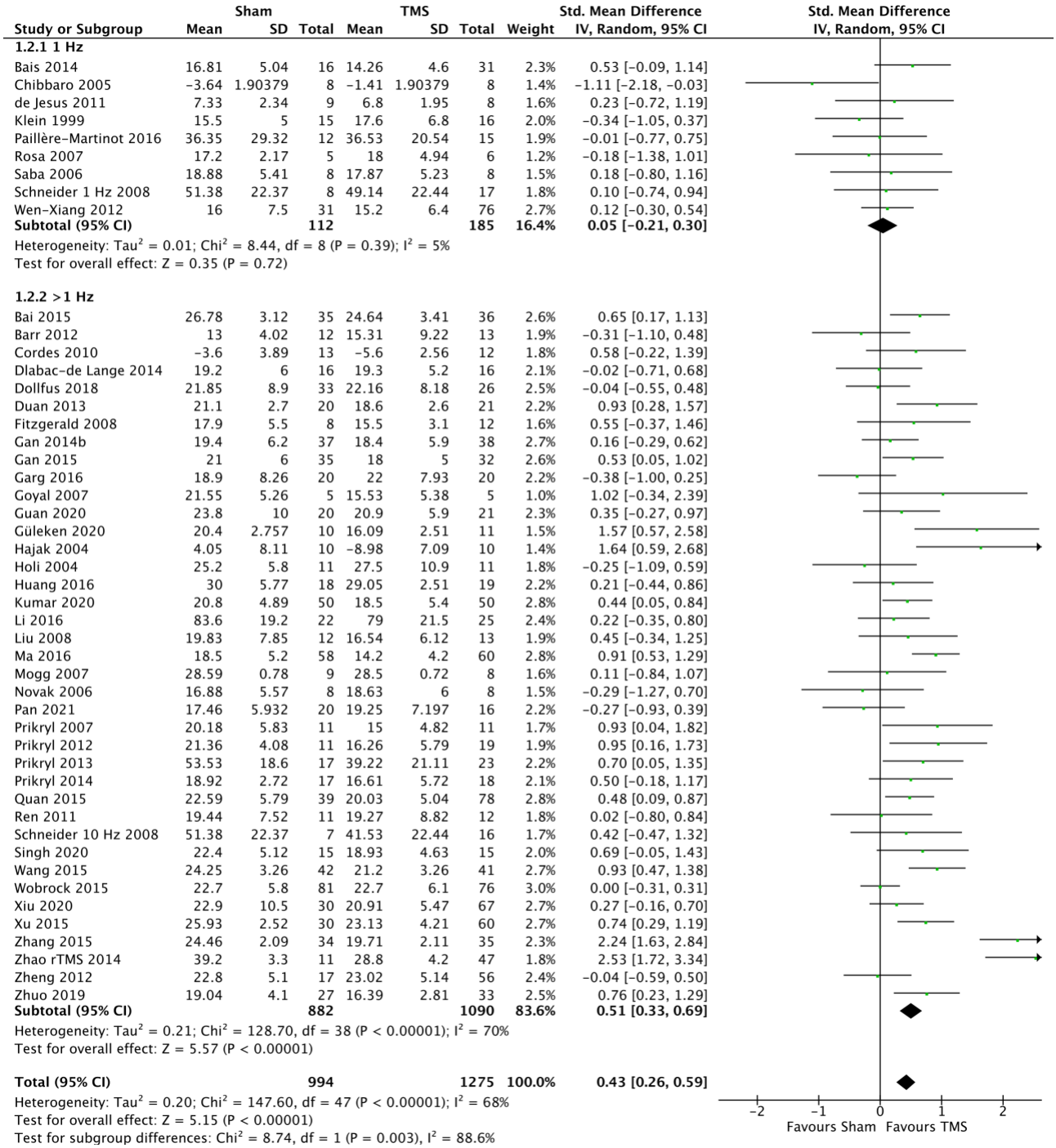


Supplementary Figure 2. Subgroup analysis stratified by type of treatment (repetitive transcranial stimulation (rTMS), theta burst stimulation (TBS), and deep transcranial stimulation (deep-TMS)

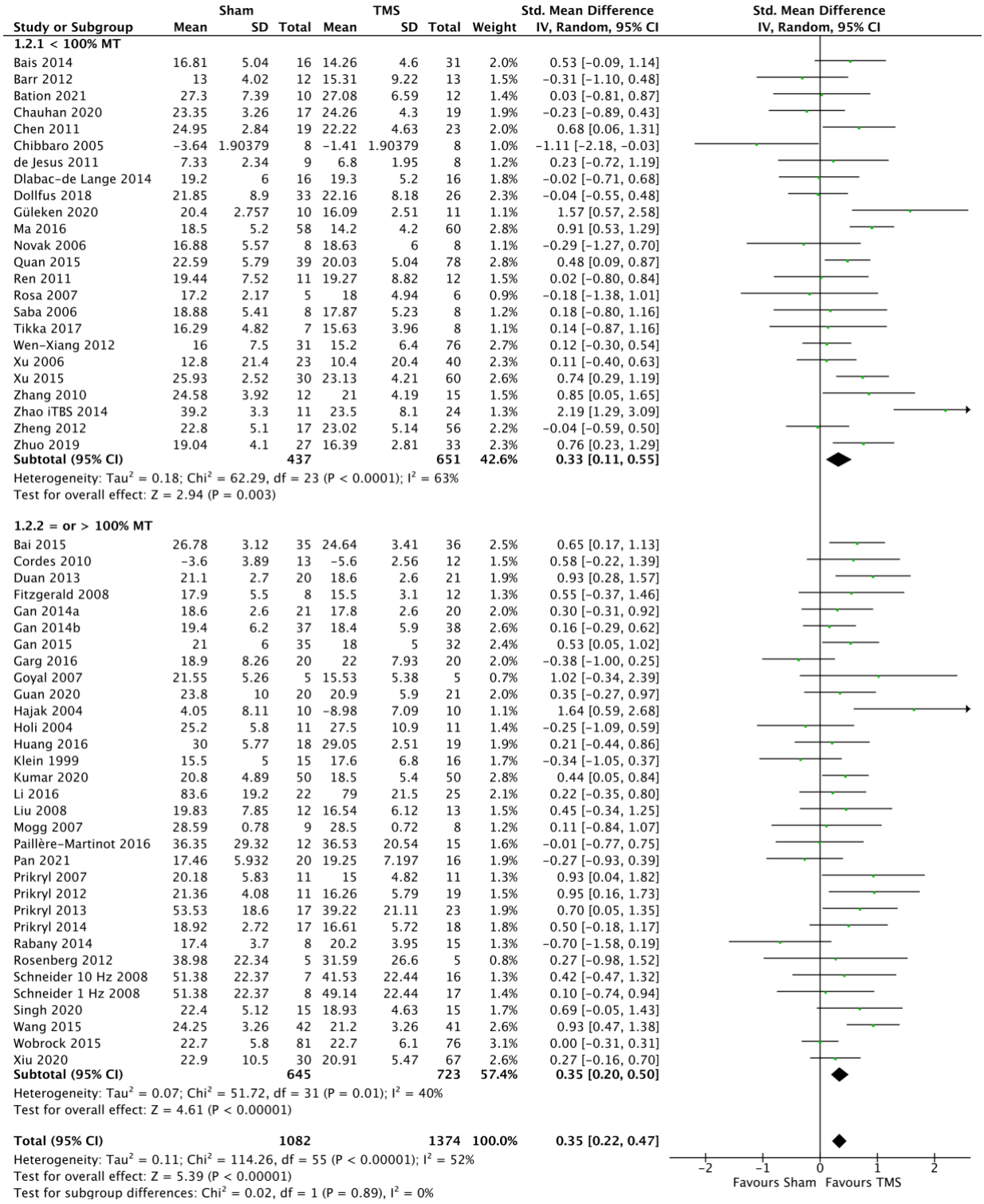


Zheng 2012 not included as the data were not reported separately for rTMS- and TBS-treated groups.

Supplementary Figure 3. Subgroup analysis stratified by treatment stimulation frequency (>1 Hz and 1 Hz). rTMS studies only.

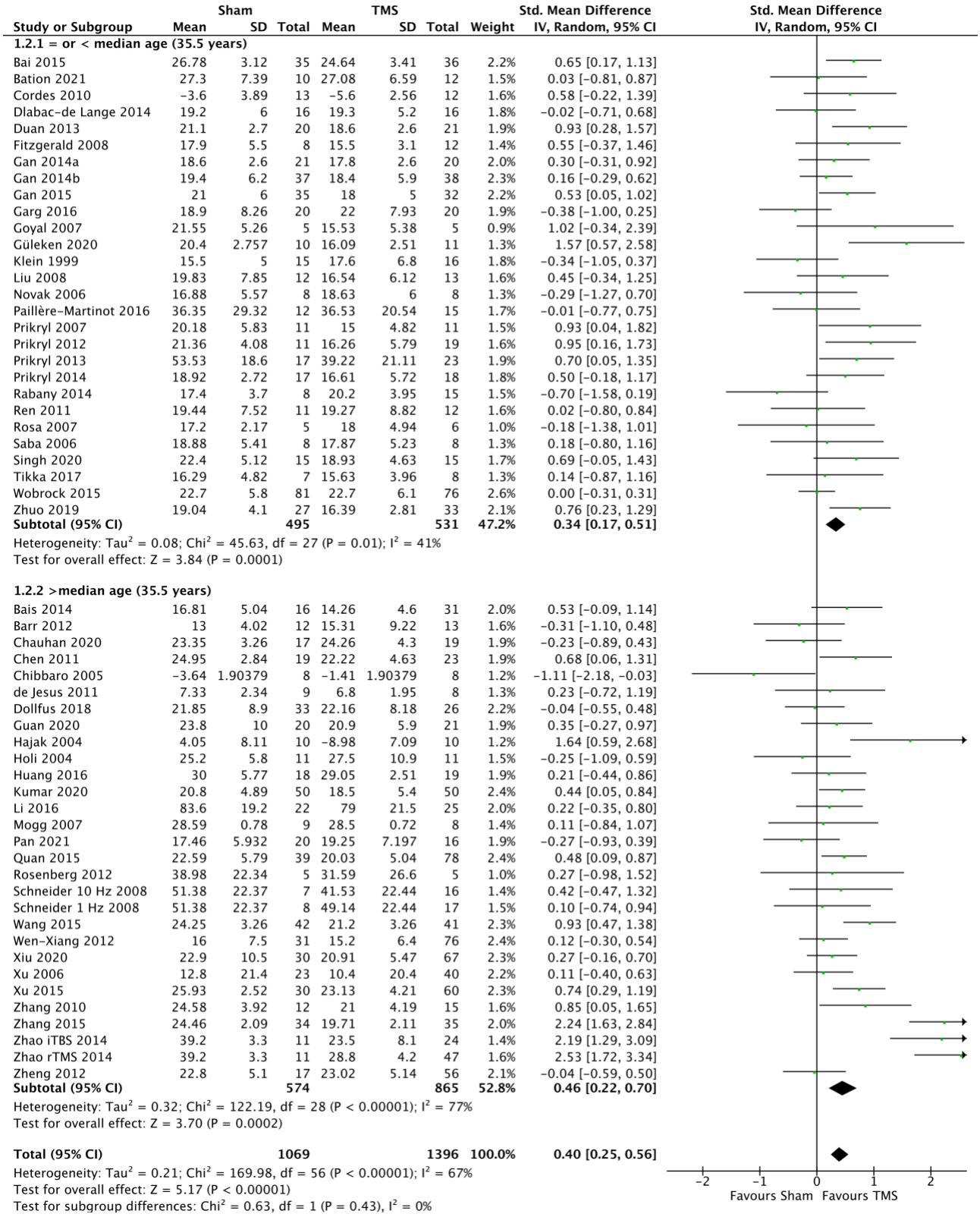


Supplementary Figure 4. Subgroup analysis stratified by treatment intensity (at or above 100% of motor threshold (MT) and under 100% of MT)



Data not available for Wang 2015 and Zhang 2015. Zhao rTMS 2014 used a variable intensity (80-110%) and was not included.

Supplementary Figure 5. Subgroup analysis stratified by age (at or below median age (35.5 years) and above median age)



Data not available for Ma 2016 and Wang 2020.