



Corrigendum



Corrigendum to “The effects of radiofrequency electromagnetic fields exposure on human self-reported symptoms: A systematic review of human experimental studies” [Environ. Int. 187 (2024) 108612]

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The authors of the article with the title “The effects of radiofrequency electromagnetic fields exposure on human self-reported symptoms: A systematic review of human experimental studies” regret to report a few inconsistencies detected in the article after its publication, due to some dysfunctions in the proofreading process, partially beyond own control. We stress that none of these issues has produced any significant change in the quantitative outputs of the effects estimates or in the interpretation and conclusions of the systematic review.

- (1) One article included in our review, Stovner 2008¹, actually reported on the same study as Oftedal 2007², and should therefore be excluded to avoid double counting. We have, therefore, excluded Stovner 2008, which has resulted in the following changes:
 - (a) the new Figure 1 (see below Figure 1-corrected) changing the number of included studies from 41 to 40 and the number of excluded studies from 65 to 66;
 - (b) the total number of subjects is 2,857 instead of 2,874;
 - (c) the new Summary of Findings table (Table 2-corrected) with changes in outcome 1 (changing the number of subjects and the upper limit of the confidence interval from 0.22 to 0.24);
 - (d) a new Figure 3 (Figure 3-corrected) and Figure SA3 (Figure SA3-corrected);

- (e) the citations of included (Supplementary data 3 with Table 6.3) and excluded studies (Supplementary data 4 with Table S.4) have been update accordingly (into Supplementary data 3 corrected with Table 6.3 corrected and Supplementary data 4 corrected, with Table S.4 corrected).
- (2) Furthermore, we have detected some inconsistencies between the text of the article and the analytical outputs in various figures, the latter being the correct data. 3.4.c – sleeping disturbances in the general population for head exposure should be 1.0 to 6.0 W/kg (instead of 1.0 to 2.0 W/kg) and SMD should be $-0.01 [-0.22, 0.20]$ (instead of $0.03 [-0.23, 0.29]$); 3.4.f – composite score in the general population and whole body exposure should be 1.9 to 19.4 V/m (instead of 1.0 to 19.4 V/m) and SMD $0.05 [-0.17, 0.07]$ (instead of $0.13 [-0.51, 0.76]$); and 3.4.g: SMD for headache in IEI-EMF individuals for head exposure should be $-0.16 [-0.38, 0.06]$ (instead of $+0.16 [-0.38, 0.06]$).

The authors would like to apologise for any inconvenience caused.
Figure 1-corrected. Flow diagram of studies considered in this review.

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¹ Stovner, L. J. and Oftedal, G. and Straume, A. and Johnsson, A. Nocebo as headache trigger: evidence from a sham-controlled provocation study with RF fields. *Acta neurologica Scandinavica. Supplementum.* 2008;188:67–71.

² Oftedal, G. and Straume, A. and Johnsson, A. and Stovner, L. J. Mobile phone headache: a double blind, sham-controlled provocation study. *Cephalalgia.* 2007;27(5):447–455.

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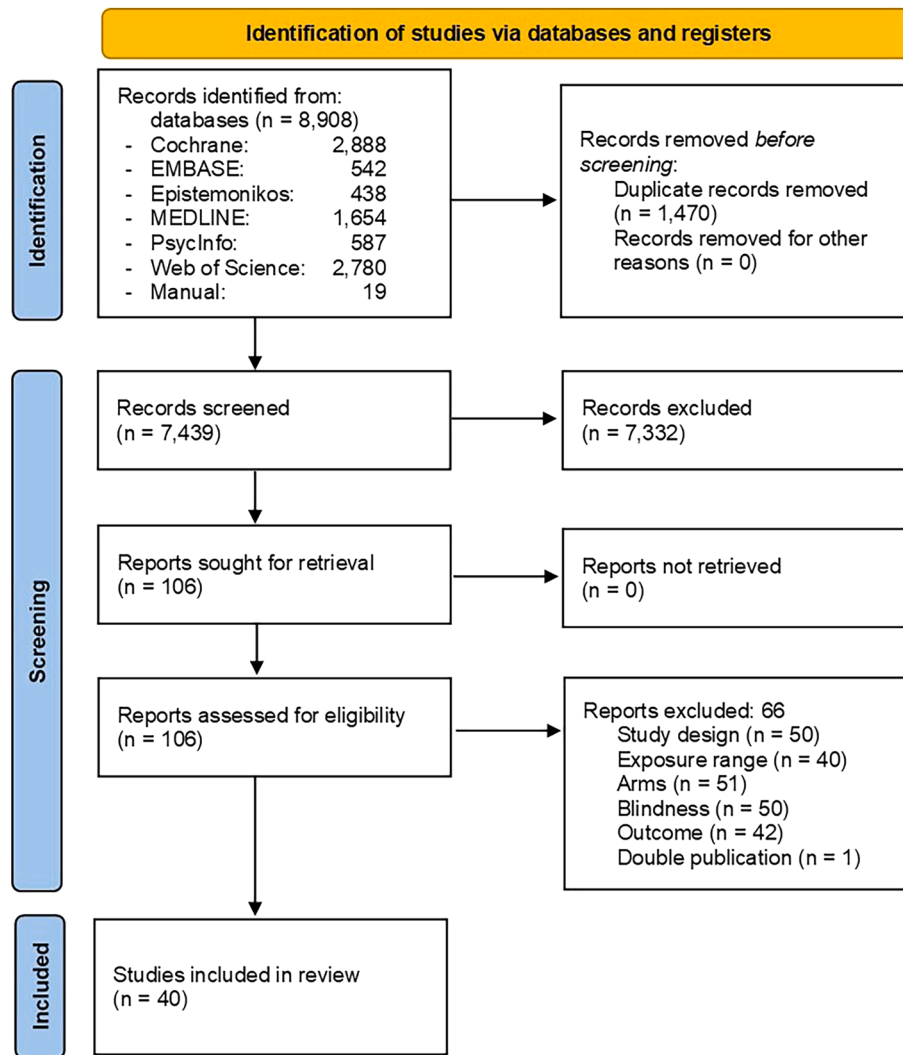


Table 2-corrected. Summary of findings table across all primary outcomes.

N of studies	Study design	Certainty assessment					Publication bias	Summary of findings		
		Risk of bias	Inconsistency	Indirectness	Imprecision	Number of events		SMD	Certainty	
							Exposure	Comparison	(95% CI)	
General population										
1	Outcome	Headache - head exposure Exposure = 0.5 to 1.6 W/kg								
6	Trial	Some concerns	No concerns	No concerns	No concerns	No concerns	319	317	0.08 (-0.07 to 0.24)	Moderate
2	Outcome	Headache - whole body exposure Exposure = 1.0 and 19.4 V/m								
2	Trial	No concerns	No concerns	No concerns	No concerns	No concerns	132	132	0.09 (-0.35 to 0.54)	High
3	Outcome	Sleeping disturbances - head exposure Exposure = 1.0 to 6.0 W/kg								
8	Trial	Some concerns	No concerns	No concerns	No concerns	No concerns	196	196	-0.01 (-0.22 to 0.20)	Moderate
4	Outcome	Sleeping disturbances - whole body exposure Exposure = NA								
1	Trial	Some concerns	Some concerns	No concerns	No concerns	No concerns	363	363	0.00 (-0.15 to 0.15)	Low
5	Outcome	Composite symptoms - head exposure Exposure = 0.4 to 1.6 W/kg								
3	Trial	Some concerns	Some concerns	Some concerns	No concerns	No concerns	54	56	0.13 (-0.51 to 0.76)	Very low
6	Outcome	Composite symptoms - whole body exposure Exposure = 1.9 to 19.4 V/m								
4	Trial	No concerns	No concerns	No concerns	No concerns	No concerns	572	572	-0.05 (-0.17 to 0.07)	High
IEI-EMF individuals										
7	Outcome	Headache - head exposure Exposure = 0.8 to 1.4 W/kg								
3	Trial	Some concerns	No concerns	No concerns	No concerns	No concerns	161	163	-0.16 (-0.38 to 0.06)	Moderate
8	Outcome	Headache - whole body exposure Exposure = 19.4 V/m (all)								
1	Trial	No concerns	Some concerns	No concerns	No concerns	No concerns	58	58	0.11 (-0.29 to 0.52)	Moderate
9	Outcome	Composite symptoms - head exposure Exposure = 0.8 W/kg (all)								
2	Trial	Some concerns	Serious concerns	No concerns	No concerns	No concerns	84	85	0.05 (-0.58 to 0.68)	Very low
10	Outcome	Composite symptoms - whole body exposure Exposure = 1.9 to 19.4 V/m								
3	Trial	No concerns	No concerns	No concerns	No concerns	No concerns	139	139	-0.19 (-0.46 to 0.07)	High

Figure 3-corrected. Forest plot of the effects of EMF exposure to head exposures on headache in the general population.

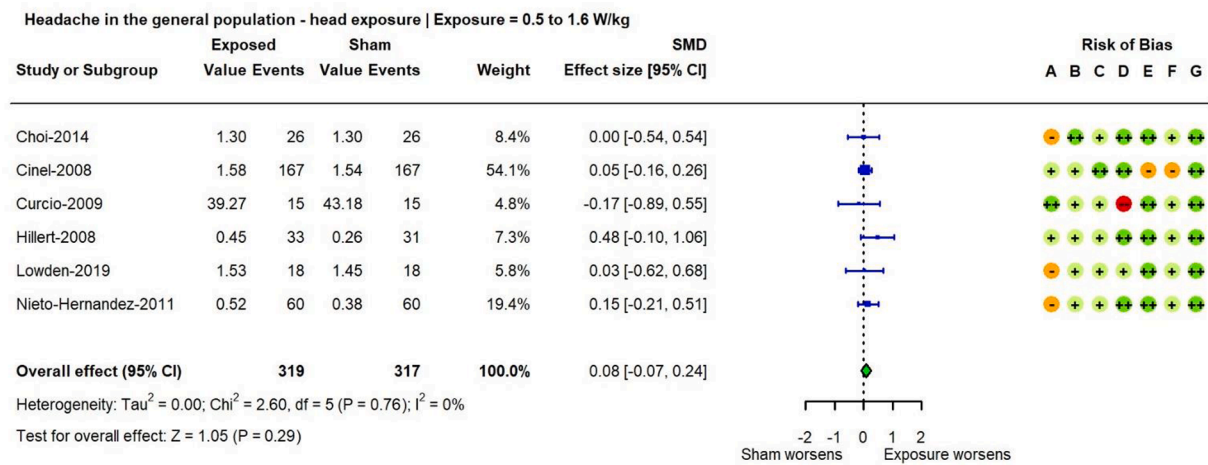
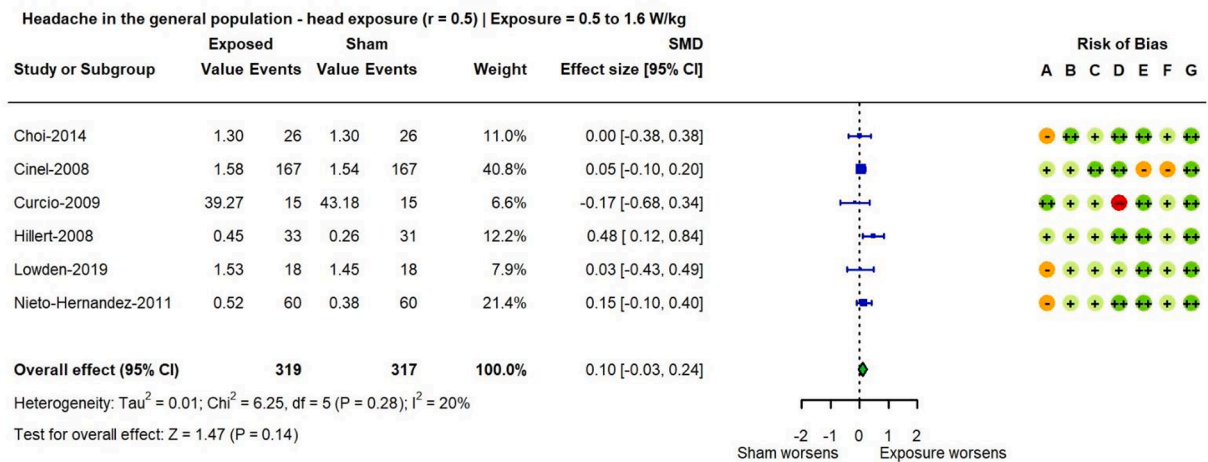


Figure SA3-corrected. Forest plot of the effects of EMF exposure to head exposures on headache in the general population – sensitivity analysis.



Supplementary data 3-corrected

Table 6.3-corrected. Description of studies included in the review (sorted by author and year).

Item	Reference	Study design	Country	Participants	Type of participants	Sample size	Exposure type	Exposure value [1]	Body part	Outcomes
1	Bamiou 2008	Cross-over trial	United Kingdom	Adults	General population	30	Near – Mobile phone	1.3 W/kg	Head	Perception
2	Burgess 2016	Cross-over trial	United Kingdom	Adults	General population	221	Near – Mobile phone	1.3 W/kg	Head	Perception
3	Choi 2014	Cross-over trial	Korea	Young adults and adolescents	General population	52	Near – Mobile phone	1.57 W/kg	Head (3 mm)	Headache and other

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Item	Reference	Study design	Country	Participants	Type of participants	Sample size	Exposure type	Exposure value [1]	Body part	Outcomes
4	Cinel 2008	Cross-over trial	United Kingdom	Adults	General population	496	Near – Mobile phone	1.4 W/kg	Head	Headache and other
5	Curcio 2009	Cross-over trial	Italy	Young adults (only female)	General population	15	Near – Mobile phone	0.5 W/kg	Head (1.5 cm)	Headache and other
6	Danker-Hopfe 2010	Cross-over trial	Germany	Adults	General population	397	Far – Base station	NA	Whole body	Sleeping disturbances
7	Danker-Hopfe 2011	Cross-over trial	Germany	Young adults (only male)	General population	30	Near – Mobile phone	2 W/Kg	Head	Sleeping disturbances
8	Danker-Hopfe 2020	Cross-over trial	Germany	Elderly	General population	60	Near – Other	6 W/kg	Head	Sleeping disturbances
9	Dorn 2014	Cross-over trial	Germany	Adults (only male)	General population	15	Near – Other	6 W/kg	Head (35 mm)	Temperature
10	Eltiti 2007	Cross-over trial	United Kingdom	Adults	IEI-EMF only and General population	NA	Far – Base station	1.94 V/m	Whole body (5 m)	Variety
11	Fritzer 2007	Parallel group	Germany	Adults (only male)	General population	20	Near – Other	1 W/kg	Head (30 cm)	Sleeping disturbances
12	Furubayashi 2009	Cross-over trial	Japan	Adults (only female)	IEI-EMF only and General population	54	Far – Base station	0.01 W/kg	Whole body (3 m)	Perception
13	Hietanen 2002	Cross-over trial	Finland	Adults	IEI-EMF only	20	Near – Mobile phone	NA	Head (1-5 cm)	Perception
14	Hillert 2008	Cross-over trial	Sweden	Adults	IEI-EMF only and General population	71'	Near – Other	1.4 W/kg	Head	Headache and other
15	Huang 2022	Cross-over trial	Taiwan	Adults	IEI-EMF only and General population	150	Far – Base station	19.41 V/m	Whole body (50 cm)	Perception and Headache and Composite
16	Johansson 2008	Cross-over trial	Sweden	Young adults	Patients with atopic dermatitis	30	Near – Total near field	1 W/kg	Head (8.5 cm)	Composite
17	Kwon 2012	Cross-over trial	Korea	Adults	IEI-EMF only and General population	37	Near – Mobile phone	1.57 W/Kg	Head (3 mm)	Perception
18	Lowden 2011	Cross-over trial	Sweden	Adults	General population	48	Near – Other	1.4 W/kg	Head	Sleeping disturbances
19	Lowden 2019	Cross-over trial	Sweden	Young adults	General population	18	Near – Other	1.6 W/kg	Head	Headache and other
20	Misek 2018	Parallel group	Slovakia	Young adults	General population	46	Near – Total near field	NA	Head (30 cm)	Perception and Composite
21	Nakatani-Enomoto 2013	Cross-over trial	Japan	Adults	General population	19	Near – Mobile phone	1.52 W/kg	Head (15 mm)	Sleeping disturbances and Perception
22	Nam 2009	Cross-over trial	Korea	Young adults	IEI-EMF only and General population	37	Near – Mobile phone	1.22 W/Kg	Head	Perception
23	Nieto-Hernandez 2011	Cross-over trial	United Kingdom	Adults	IEI-EMF only and General population	120	Near – Mobile phone	1.3 W/kg	Head (few mm)	Headache and other
24	Oftedal 2007	Cross-over trial	Norway	Adults	IEI-EMF only	17	Near – Other	0.8 W/kg	Head (8.5 cm)	Perception and Pain and Headache and Composite
25	Parazzini 2007	Cross-over trial	Italy	Young adults	General population	26	Near – Mobile phone	Target organ in 10.5 to 13.5 cm of deepness: 0.02 W/Kg	Head	Temperature and Perception
26	Radon 1998	Individualised cross-over trial	Germany	Other or unclear	General population	11	Other	9.51 V/m	Whole body	Perception
27	Regel 2006	Cross-over trial	Switzerland	Adults	IEI-EMF only and General population	128	Near – Base station	10 V/m (whole body SAR: 0.62 mW/Kg)	Whole body (2 m)	Perception and Composite
28	Riddervold 2008	Cross-over trial	Denmark	Adolescents	General population	80	Far – Base station	1 V/m	Whole body (2.8 m)	Headache and Concentration
29	Riddervold 2010	Cross-over trial	Denmark	Adults (only male)	General population	54	Near – Other	2 W/kg	Head	Perception

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Item	Reference	Study design	Country	Participants	Type of participants	Sample size	Exposure type	Exposure value [1]	Body part	Outcomes
30	Rubin 2006	Cross-over trial	United Kingdom	Adults	IEI-EMF only and General population	131	Near – Mobile phone	1.4 W/kg	Head (few mm)	Perception
31	Schmid 2012	Cross-over trial	Switzerland	Young adults (only male)	General population	30	Near – Other	2 W/kg	Head (115 mm)	Sleeping disturbances
32	Stovner 2008	Cross-over trial	Norway	Adults	General population	17	Near – Other	1 W/kg	Head (8.5 cm)	Headache
33	Tahvanainen 2004	Cross-over trial	Finland	Adults	General population	32	Near – Mobile phone	1.58 W/kg	Head	Temperature
34	vanMoorseelaar 2017	Individualised cross-over trial	Netherlands	Adults	General population	42	Far – Other	Individualized according to open provocation test (0.2 to 6 V/m)	Whole body	Perception
35	Vecsei 2013	Cross-over trial	Hungary	Young adults	General population	22	Near – Other	0.73 W/kg	Head	Pain
36	Vecsei 2018a	Cross-over trial	Hungary	Young adults	General population	60	Near – Mobile phone	1.8 W/kg	Head (7 mm)	Perception
37	Vecsei 2018b	Cross-over trial	Hungary	Adults	General population	18	Near – Other	1.8 W/kg	Head (7 mm)	Pain
38	Verreuder 2018	Individualised cross-over trial	Australia	Young adults	General population	44	Far – Other	10.63 V/m	Whole body (30 cm)	Perception and Composite
39	Wallace 2010	Cross-over trial	United Kingdom	Adults	IEI-EMF only and General population	183	Far – Base station	1.94 V/m	Whole body (4.95 m)	Variety
40	Wilén 2006	Cross-over trial	Sweden	Adults	IEI-EMF only	40	Near – Other	0.8 W/kg	Head (8.5 cm)	Composite

[1] If more than value, only the largest one is shown in this table.

[2] Reported in the study as power flux density.

Citations of included studies.

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subjects with mobile phone related symptoms. Bioelectromagnetics. 2006;27(3):204-214.

Supplementary data 4-corrected.

Table S.4-corrected. Excluded studies and reasons for exclusion (sorted by author and year).

Item	Study	Reasons
1	Abelin 2005	Study type: not experimental; Exposure: not quantified or beyond range; Blind sessions: no;
2	Abouzari 2020	Exposure: not quantified or beyond range; Blind sessions: no; Exposure type: not eligible; Outcomes: neither symptoms nor perception or not analysable
3	Alsanosi 2013	Exposure: not quantified or beyond range; Exposure type: not eligible
4	Altpeter 2006	Study type: not experimental; Blind sessions: no; Outcomes: neither symptoms nor perception or not analysable
5	Andersson 1996	Exposure: not quantified or beyond range
6	Andrianome 2017	Outcomes: neither symptoms nor perception or not analysable
7	Andrianome 2018b	Study type: not experimental; Exposure: not quantified or beyond range; Blind sessions: no; Outcomes: neither symptoms nor perception or not analysable
8	Andrianome 2019	Outcomes: neither symptoms nor perception or not analysable
9	Andrzejak 2008	Study type: not experimental; Blind sessions: no; Outcomes: neither symptoms nor perception or not analysable
10	Arnetz 2007	Outcomes: neither symptoms nor perception or not analysable
11	Augner 2009	Outcomes: neither symptoms nor perception or not analysable
12	Auvinen 2019	Study type: not experimental; Blind sessions: no
13	Barth 2000	Study type: not experimental; Exposure: not quantified or beyond range
14	Behbahanian 2018	Exposure: not quantified or beyond range; Blind sessions: no; Outcomes: neither symptoms nor perception or not analysable
15	Bijlsma 2021	Outcomes: neither symptoms nor perception or not analysable
16	Boehmert 2018a	Exposure: not quantified or beyond range; Exposure type: not eligible; Outcomes: neither symptoms nor perception or not analysable
17	Brascher 2017	Exposure: not quantified or beyond range; Blind sessions: no; Exposure type: not eligible
18	Brascher 2020	Exposure: not quantified or beyond range; Blind sessions: no; Exposure type: not eligible
19	Bueno-Lopez NA	Outcomes: neither symptoms nor perception or not analysable
20	Chu 2010	Study type: not experimental; Exposure: not quantified or beyond range; Blind sessions: no; Outcomes: neither symptoms nor perception or not analysable
21	Cinel 2008	Outcomes: neither symptoms nor perception or not analysable
22	Dalecki 2018	Outcomes: neither symptoms nor perception or not analysable
23	Dorokhov 2021a	Exposure: not quantified or beyond range; Exposure type: not eligible
24	Dorokhov 2021b	Exposure: not quantified or beyond range; Exposure type: not eligible
25	Drks 2020	Exposure: not quantified or beyond range; Blind sessions: no; Outcomes: neither symptoms nor perception or not analysable
26	Eggert 2015	Outcomes: neither symptoms nor perception or not analysable
27	Eltiti 2009	Outcomes: neither symptoms nor perception or not analysable
28	Eltiti 2015	Findings already reported in two other studies
29	Eltiti 2015	Outcomes: neither symptoms nor perception or not analysable
30	Eltiti 2018	Study type: not experimental
31	Flodin 2000	Exposure: not quantified or beyond range

(continued on next column)

(continued)

Item	Study	Reasons
32	Ghosn 2015	Outcomes: neither symptoms nor perception or not analysable
33	Heinrich 2007	Study type: not experimental
34	Hinrikus 2017	Outcomes: neither symptoms nor perception or not analysable
35	Hosseinabadi 2019	Study type: not experimental; Exposure: not quantified or beyond range; Blind sessions: no
36	Hosseini 2019	Outcomes: neither symptoms nor perception or not analysable
37	Kleinlogel 2008	Outcomes: neither symptoms nor perception or not analysable
38	Koivisto 2000	Outcomes: neither symptoms nor perception or not analysable
39	Kwon 2012	Study type: not experimental
40	Leitgeb 2008	Exposure: not quantified or beyond range; Outcomes: neither symptoms nor perception or not analysable
41	Lindholm 2011	Outcomes: neither symptoms nor perception or not analysable
42	Lonne-Rahm 2000	Exposure: not quantified or beyond range
43	Loos 2013	Outcomes: neither symptoms nor perception or not analysable
44	Loughran 2019	Outcomes: neither symptoms nor perception or not analysable
45	Lustenberger 2015	Outcomes: neither symptoms nor perception or not analysable
46	Malek 2015	Outcomes: neither symptoms nor perception or not analysable
47	Mortazavi 2011	Exposure: not quantified or beyond range
48	Movvahedi 2014	Outcomes: neither symptoms nor perception or not analysable
49	Nct 2005	Outcomes: neither symptoms nor perception or not analysable
50	Nct 2016	Outcomes: neither symptoms nor perception or not analysable
51	Nieto-Hernandez 2008	Study type: not experimental; Exposure: not quantified or beyond range;
52	Rea 1991	Exposure: not quantified or beyond range; Exposure type: not eligible
53	Sauter 2011	Outcomes: neither symptoms nor perception or not analysable
54	Sauter 2015	Outcomes: neither symptoms nor perception or not analysable
55	Selmaoui 2018	Outcomes: neither symptoms nor perception or not analysable
56	Singh 2021	Study type: not experimental; Blind sessions: no
57	Stovner 2008	Results reported in Oftedal 2007.
58	Swanbeck 1989	Exposure: not quantified or beyond range
59	Vrender 2018	Study type: not experimental
60	Wallace 2020	Outcomes: neither symptoms nor perception or not analysable
61	Wei 2019	Outcomes: neither symptoms nor perception or not analysable
62	Withoft 2013	Exposure: not quantified or beyond range; Exposure type: not eligible
63	Wolters 2021	Exposure: not quantified or beyond range; Exposure type: not eligible
64	Yang 2017	Outcomes: neither symptoms nor perception or not analysable
65	Zentai 2015a	Outcomes: neither symptoms nor perception or not analysable
66	Zentai 2015b	Blind sessions: no

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