

Data supplement to Lutgens et al. Psychological and psychosocial interventions for negative symptoms in psychosis: systematic review and meta-analysis. Br J Psychiatry doi: 10.1192/bjp.bp.116.197103

Online supplement DS1

Key search terms:

(Psychotic Disorders OR psychotic OR psychosis OR psychoses OR schizoaffective OR schizophreniform OR Schizophrenia OR schizophrenia OR schizophrenias OR schizophrenic OR "delusional disorder" OR "delusional disorders" OR "deficit syndrome") AND ("negative symptom" OR "negative symptoms" OR "negative symptomatology" OR "negative symptomatologies" OR "negative syndrome" OR "negative syndromes" OR "Alogia" OR "affective blunting" OR "blunted affect" OR "affective flattening" OR "flat affect" OR "inappropriate affect" OR "restricted affect" OR affectiveness OR affectivity OR "Anhedonia" OR Anhedonia OR anhedonic OR Avolition OR avolitional OR Amotivation OR amotivational OR "Apathy" OR Apathy OR apathetic OR Asocial OR asociality) AND (randomized controlled trial OR controlled clinical trial OR randomized OR randomised OR placebo OR clinical trials as topic OR randomly OR trial)

Example of search strategy for Pubmed:

(((((Psychotic Disorders[MeSH] OR psychotic[tw] OR psychosis[tw] OR psychoses[tw] OR schizoaffective[tw] OR schizophreniform[tw] OR Schizophrenia[MeSH] OR schizophrenia[tw] OR schizophrenias[tw] OR schizophrenic[tw] OR "delusional disorder"[tw] OR "delusional disorders"[tw] OR "deficit syndrome"[tw]))) AND (("negative symptom"[tw] OR "negative symptoms"[tw] OR "negative symptomatology"[tw] OR "negative symptomatologies"[tw] OR "negative syndrome"[tw] OR "negative syndromes"[tw] OR "Alogia"[tw] OR "affective blunting"[tw] OR "blunted affect"[tw] OR "affective flattening"[tw] OR "flat affect"[tw] OR "inappropriate affect"[tw] OR "restricted affect"[tw] OR affectiveness[tw] OR affectivity[tw] OR "Anhedonia"[Mesh] OR Anhedonia[tw] OR anhedonic[tw] OR Avolition[tw] OR avolitional[tw] OR Amotivation[tw] OR amotivational[tw] OR "Apathy"[Mesh] OR Apathy[tw] OR apathetic[tw] OR Asocial[tw] OR asociality[tw]))) AND ((randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR randomised[tiab] OR placebo[tiab] OR clinical trials as topic[mesh:noexp] OR randomly[tiab] OR trial[ti]) NOT (animals[mh] NOT humans[mh])))

Table DS1 Pooled SMD by study characteristics

Active control only						
Study characteristic	# of studies	Pooled SMD	Lower 95% CI	Upper 95% CI	I²	p-value of I²
Mechanism						
Nonspecific	3	-0.068	-0.402	0.266	0.0%	0.706
Behaviour activation	9	-0.066	-0.257	0.124	23.5%	0.234
Social Engagement	10	-0.276	-0.608	0.056	83.4%	0.000
Skill enhancement	3	0.206	-0.039	0.451	0.0%	0.712
Neurocognitive	2	-0.431	-1.48	0.618	75.3%	0.044
All studies						
Study characteristic	# of studies	Pooled SMD	Lower 95% CI	Upper 95% CI	I²	p-value of I²
Mean age of sample						
≤ 35 years old	27	-0.347	-0.553	-0.141	81.4%	0.001
> 35 years old	31	-0.284	-0.520	-0.048	86.5%	0.019
Type of sample						
FEP	6	-0.331	-0.542	-0.120	21.3%	0.274
General population	57	-0.304	-0.467	-0.141	85.0%	0.000
Elderly	1	-0.414	-0.707	-0.121	-	-
Format						
Group	23	-0.31	-0.601	-0.019	88.5%	0.000
Combined	6	-0.243	-0.483	-0.004	80.4%	0.000
Individual	34	-0.313	-0.505	-0.120	64.9%	0.014
Intensity of intervention						
≥45 min/week	39	-0.341	-0.558	-0.125	87.3%	0.000
< 45 min/week	6	-0.024	-0.373	0.324	60.2%	0.028
Type of intervention						
CBT	16	-0.336	-0.548	-0.124	73.60%	0.000
ST, OT, and CAT	13	-0.438	-0.775	-0.102	85.80%	0.000
NCT	14	-0.15	-0.408	0.108	74.20%	0.000
Exercise Therapy	7	-0.358	-0.705	-0.010	54.80%	0.039
Art and Music Therapy	7	-0.139	-0.779	0.502	94.90%	0.000
Family Based Intervention	3	-0.177	-0.698	0.344	65.40%	0.056
Misc.	7	-0.400	-0.636	-0.164	33.30%	0.174

Table DS2 Cognitive-behavioural therapy

Study characteristics									Study results at treatment end		
Reference	Intervention	Control	Treatment duration in months (max sessions offered)	Duration of follow-up (months)	Assessment instrument	Diagnosis/status	% Male	<i>n</i>	Exp. v. TAU, SMD (95% CI)	Exp. v. Control, SMD (95% CI)	Quality
Barrowclough <i>et al</i> (2006) ³⁵	CBT (group)	TAU	6 (18)	12	PANSS Neg	SZ, SA/NA	NR	113 (CBT=57, TAU=56)	-0.06 (-0.43 to 0.31)	NA	Medium
Cather <i>et al</i> (2005) ³⁶	CBTf	Psychoed programme	4 (16)	NA	PANSS PSYRATS	SZ, SA/out-patients	57%	30 (CBT=16, AC=12)	NA	-0.01 (-0.75, 0.73)	High
Drury <i>et al</i> (1996), ³⁷ (2000) ³⁸	CT (group and individual)	Social recreation and support	6 (128)	9, 60	PAS – flat affect, poverty of speech	PD non-specific/in-patients	62%	40 (CT=20, AC=20)	NA	NR, missing data	Medium
Farhall <i>et al</i> (2009) ²⁴	CBTp	TAU	9–12 (24)	18	PANSS Neg	SZ, SA, DD, MD/out-patients	59%	94 (CBT=45, TAU=49)	0.30 (-0.11 to 0.71)	NA	Medium
Granhölm <i>et al</i> (2014) ²⁵	CBT SST (group)	Active goal focused supportive contact	9 (36 + 12 booster)	21	SANS – diminished expression and motivation factors	SZ, SA/out-patients	66%	149 (CBT SST=73, AC=76)	NA	-0.23 (-0.56 to 0.09)	High
Grant <i>et al</i> (2012) ³⁹	CT	TAU	18 (72)	NA	SANS	SZ, SA/ chronic low functioning	67%	60 (CT=31, TAU=29)	Avolition Apathy Subscale, $t_{145} = 2.20$, $P = 0.01$ *	NA	High
Gumley <i>et al</i> (2003) ²⁶	CBT	TAU	12 (range 2–16)	NA	PANSS Neg	SZ, SA/out-patients	72%	144 (CBT=72, TAU=72)	-0.35 (-0.68 to -0.02)*	NA	Medium
Hall & Tarrier (2003) ⁴⁰	CBT	TAU	1.75 (7)	3	PANSS Neg	PD/in-patients	67%	25 (CBT=13, TAU=12)	-1.77 (-2.71 to -0.83)*	NA	Medium
Jackson <i>et al</i> (2008) ²⁷	CT	Befriending	3.5 (20)	12	SANS	FEP – acute phase	73%	62 (CT= 31, AC=31)	NA	-0.45 (-0.95 to 0.06)	High
Klingberg <i>et al</i> (2011) ²⁹	CBT	Cognitive remediation	9 (20)	NA	PANSS Neg	SZ/out-patients	56%	198 (CBT=99, AC=99)	NA	0.00 (-0.28 to 0.28)	High
Klingberg <i>et al</i> (2010) ²⁸	CBT (group)	TAU	8 (40 + 4 with family in hospital; 8 in community + as needed)	NA	PANSS Neg –	SZ, SA/in-patient in transition to out-patient	48%	169 (CBT=84, TAU=85)	NR, $P = 0.014$ *	NA	Medium
Krakovik <i>et al</i> (2013) ⁴¹	CBTp	TAU (+ waitlist)	6 (20)	12	SANS	SZ, SA, DD/ in- and out-patients	52%	45 (CBT=23, TAU=22)	-0.54 (-1.13 to 0.06)	NA	Medium
Leclerc <i>et al</i> (2000) ⁴²	CBT (group)	TAU	3 (24)	6	PANSS Neg	SZ, SA, PP/ out- and in-patients	73%	99 (CBT=55, TAU=44)	NR, missing data	NA	Medium
Lecomte <i>et al</i> (2012), ⁴³ (2008) ⁴⁴	CBT (group)	Skills training (Group), (TAU + Waitlist)	3 (24)	15	BPRS neg	FEP – Sz spectrum, MDP, Phos/out-patients	74%	129 (CBT=48, AC=54, TAU=27)	$t_{12} = -2.00$, $P = 0.006$	NR, missing data	High
Li <i>et al</i> (2015) ⁴⁵	CBT (culturally adapted)	Supportive Therapy	6 (15)	15	PANSS Neg	Out-patients	37%	192 (CBT=96, AC=96)	NA	-0.17 (-0.45 to 0.12)	High
Lincoln <i>et al</i> (2012) ⁴⁶	CBTp	TAU (+ waitlist)	4–5 (45)	12	PANSS Neg	SZ, SA, DD, BPD/ out-patients	57%	80 (CBTp=40, TAU=40)	0.11 (-0.34 to 0.55)	NA	Medium

Morrison <i>et al</i> (2014) ³⁰	CT	TAU	18 (26 + 4 booster)	NA	PANSS Neg	SZ, SA, DD/ FEP out- patients	53%	74 (CT=37, TAU=37)	NA	-0.79 (-1.27 to -0.32)*	High
Nacem <i>et al</i> (2015) ⁴⁷	CBTp (culturally adapted)	TAU	4 (4 with caregiver + 1 with family)	NA	PANSS Neg	SZ – or related disorder/out- patients	60%	116 (CBTp=59, TAU=57)	NR, $P<0.001^*$	NA	Medium
Peters <i>et al</i> (2010) ⁴⁸	CBTp	TAU (+ waitlist)	6 (mean of 16)	3	PANSS Neg	PD – diagnoses not defined/ out-patients	60%	74 (CBTp=36, TAU=38)	-0.31 (-0.76 to 0.15)	NA	Medium
Rector <i>et al</i> (2003) ⁴⁹	CBT	TAU	6 (20)	6	PANSS Neg	SZ, SA/ out- patients	45%	42 (CBT=24, TAU=18)	-0.50 (-1.12 to 0.12)	NA	Medium
Sensky <i>et al</i> (2000) ³¹ Turkington <i>et al</i> (2008) ⁵⁴	CBT	Befriendin g	9 (19)	9, 60	SANS	SZ/out- patients	58%	90 (CBT=46, AC=44)	NA	NR, missing data	High
Startup <i>et al</i> (2005) ⁵⁰	CBT	TAU	6 (24)	12, 24	SANS	SZ, SP, SA/ out-patients	75%	90 (CBT=47, TAU=43)	-0.64 (-1.06 to -0.21)*	NA	Medium
Tarrier <i>et al</i> (2004) ⁵¹	CBT	Supportive counselling , TAU	3 (20)	18	PANSS Neg	SZ, SA, SP, DD, Pnos/ in-patients	68%	316 (CBT= 101, AC=106, TAU =102)	-0.94 (-1.22 to -0.65)* (Liverpool)	0.24 (-0.03 to 0.51) (Liverpool)	High
Tarrier <i>et al</i> (2000) ⁵²	CBT	Supportive counselling / TAU	3 (20 + 4 booster sessions)	24	SANS	SZ, SA, DD/ out- and in- patients	79%	87 (NR)	$F(2,56)=5.55, P=0.03^*$	NR, missing data	Medium
Turkington <i>et al</i> (2006), ³² Turkington & Kingdon (2000) ³³ Malik <i>et al</i> (2009) ³⁴	CBT – brief	TAU	2–3 (6 + 3 for main caregiver)	12, 24	NSRS	SZ/in- and out-patients	NR	422 (NR)	NR, $P=0.002^*$ (apathy, reduced volition and asociality items only)	NA	Medium
Valmaggia <i>et al</i> (2005) ⁵³	CBT	Supportive counselling plus psycho- education	5.5 (16)	6	PANSS Neg	SZ/in- patients	71%	58 (CBT=35, AC=23)	NA	0.37 (-0.16 to 0.90)	High

See end of Table DS8 for footnotes for all tables.

Table DS3 Skills-based therapies

Study characteristics									Study results at treatment end		
Reference	Intervention	Control	Treatment duration in months (max sessions offered)	Duration of follow-up (months)	Assessment instrument	Diagnosis/status	% Male	<i>n</i>	Exp. v. TAU, SMD (95% CI)	Exp. v. Control, SMD (95% CI)	Quality
Bartels <i>et al</i> (2014) ⁵⁵	Skills training (group and individual)	TAU	24 (1st year=52, 24 field trips, 12 individual/ 2nd year=12 sessions)	12	SANS	SZ, SA, BP, MD/ out-patients	42%	183 (ST=90, TAU=93)	-0.41 (-0.71 to -0.12) *	NA	High
Bio & Gattaz <i>al</i> (2011) ⁷¹	Vocational rehabilitation	TAU (+ waitlist)	6 (NR)	NA	PANSS Neg	SZ/out-patients	79%	102 (VR=57, TAU=55)	-0.18 (-0.55 to 0.19)	NA	Medium
Cook <i>et al</i> (2009) ⁶⁶	Occupational therapy (individual + family)	TAU	12 (Individually tailored)	NA	SANS	SZ, psychosis/ NA	66%	44 (OT=30, TAU=14)	NR, missing data	NA	Medium
Dobson <i>et al</i> (1995) ⁶¹	Social skills training (group)	Social Milieu	2.25 (36)	3, 6	PANSS Neg	SZ/out-patients (day hospital)	71%	45 (NR: SS=15, SM=13 – treatment completers only)	NA	<i>F</i> =5.73, d.f.=1,26, <i>P</i> <0.006 * (emotional withdrawal, rapport and speech items)	Medium
Foruzandeh <i>et al</i> (2013) ⁶⁸	Occupational therapy	TAU	6 (3 hours a day, 6 days a week)	NA	SANS	SZ/in-patients	72%	60 (OT=30, TAU=30)	-2.90 (-3.63 to -2.17) *	NA	Medium
Hansen <i>et al</i> (2012) ⁶⁹	Cognitive adaptation training	TAU	6 (12)	9	PANSS Neg	SSD/out-patients	65.0 0%	62 (CAT=31, TAU=31)	-0.08 (-0.58 to 0.42)	NA	High
Hayes <i>et al</i> (1995) ⁵⁹	Social skills training (group)	Discussion group	10 (36 + 9 booster)	NA	SANS	SZ/out-patients	NR	63 (NR)	NA	<i>F</i> =1.5, d.f.=2,31, <i>P</i> <0.1*	Medium
Horan <i>et al</i> (2010) ⁵⁸	Social cognitive skills training (group)	Illness self-management and relapse prevention skills training	1.5 (12)	NA	BPRS Anergia	SZ, SA/ out-patients	72%	34 (NR: SC=15, ISM=16 – treatment completers only)	NA	0.28 (-0.03 to 0.58)	Low
Li & Wang (1994) ⁶⁰	Skills training	TAU	3 (18)	NA	SANS – Chinese version	SZ/in-patients	54%	52 (ST=28, TAU=24)	-0.92 (-1.49 to -0.35) *	NA	Low
Lin <i>et al</i> (2013) ⁶³	IMR programme (group)	TAU	.75 (6)	1	BPRS Neg subscale: thought disturbance, anergia, affect, and disorganisation	SZ, SA/in-patients	64%	94 (IMR=48, TAU=49)	-0.15 (-0.54 to 0.25) (anergia subscale)	NA	Medium
Quee <i>et al</i> (2014) ⁷⁰	Cognitive adaptation training	TAU (+ waitlist)	8 (32)	NA	NSA–M	SZ, SA, Pdnos/in- and out-patients	80%	36 (CAT=16, TAU=14: randomisation data only available for <i>n</i> =30)	NR, missing data	NA	Low

Roberts <i>et al</i> (2014) ⁵⁷	Social cognition and interaction training (group)	TAU	6 (20–24)	9	PANSS Neg	SZ, SA/out-patients	67%	66 (SCIT=33, TAU=33)	-0.13 (-0.61 to 0.35)	NA	Medium
Rus-Calafell <i>et al</i> (2013) ⁶⁵	Social skills training (group)	TAU	2 (16)	6	PANSS Neg	SZ, SA/out-patients	78.0 0%	36 (SST=18, TAU=18)	-0.39 (-1.05 to 0.27)	NA	Medium
Gil-Sanz <i>et al</i> (2009) ⁶⁴	Social cognition training (group)	TAU	2.5 (20)	NA	PANSS Neg	SZ/out-patients	50%	14 (SC=7, TAU=7)	-0.18 (-1.23 to 0.87)	NA	Low
Tatsumi <i>et al</i> (2011) ⁶⁷	Occupational therapy	TAU	3.75 (15)	NA	SANS	SZ/in-patients	53%	38 (OT=19, TAU=19)	NR, missing data *	NA	Medium
Valencia <i>et al</i> (2007) ⁵⁶	Psychosocial skills training (group + family)	TAU	12 (48)	NA	PANSS Neg	SZ/out-patients	64%	98 (PST=49, TAU=49)	-0.82 (-1.24 to -0.41) *	NA	High
Xiang <i>et al</i> (2006) ⁶²	Social skills training (group)	Supportive counselling	2 (16)	6	PANSS Neg	SZ/out-patients	47%	96 (SST=48, SC=48)	NA	-0.66 (-1.07 to -0.25)*	Medium

See end of Table DS8 for footnotes for all tables.

Table DS4 Neurocognitive therapies

Study characteristics									Study results at treatment end		
Reference	Intervention	Control	Treatment duration in months (max sessions offered)	Duration of follow-up (months)	Assessment instrument	Diagnosis /status	% Male	<i>n</i>	Exp. v. TAU, SMD (95% CI)	Exp. v. Control, SMD (95% CI)	Quality
Ahmed <i>et al</i> (2015) ⁸¹	Cognitive remediation (computer assisted)	Computer games	5 (60)	NA	PANSS Neg	SZ/in-patient (forensic)	87%	78 (CR=42, AC=36)	NA	-0.19 (-0.63 to 0.26)	High
Bellucci <i>et al</i> (2003) ⁸²	Cognitive rehabilitation (computer assisted)	TAU	2 (18)	NA	SANS	SZ, SA/ out-patients	47%	34 (CRhab=17, TAU=17)	-0.57 (-1.26 to 0.12)	NA	Medium
Cella <i>et al</i> (2014) ⁷³	Cognitive remediation	TAU	3.5 (40)	NA	PANSS Neg (5 factor structure)	SZ/out-patients	73%	85 (CR=43, TAU=42)	0.02 (-0.40 to 0.45)	NA	Low
Eack <i>et al</i> (2013) ⁸⁶	Cognitive enhancement (group)	Supportive therapy	24 (45)	NA	The Wing Negative Symptom Scale and BPRS	SZ, SA (early course)/ out-patients	69%	58 (CE=31, AC=27)	NA	<i>t</i> (82)=2.63, <i>P</i> =0.01*	Medium
Farreny <i>et al</i> (2012) ⁷²	Cognitive remediation (group)	Leisure Activities	4 (32)	10	PANSS Neg	SZ, SA/ out-patients	68%	62 (CR= 34, AC= 28)	NA	-0.19 (-0.70 to 0.31)	Medium
Gharaeipour & Scott (2012) ⁷⁶	Cognitive remediation (group)	Supportive therapy	2 (48)	NA	PANSS Neg	SZ/in-patients	71%	42 (CR=21, AC=21)	NA	-1.83 (-2.55 to -1.10) *	High
Holzer <i>et al</i> (2013) ⁸⁰	Cognitive remediation (computer assisted)	Computer games	2 (16)	NA	PANSS Neg	PD/ adolescent out-patients	57%	32 (CR=18, AC=14)	NA	0.15 (-0.55 to 0.85)	Medium
Mueller <i>et al</i> (2015) ⁸⁵	Neurocognitive therapy	TAU	3.75 (30)	9	PANSS Neg	SZ, SA (FEP)/out-patients	69%	156 (NT=81, TAU=75)	0.65 (0.33 to 0.97)*	NA	High
Nemoto <i>et al</i> (2009) ⁸³	Cognitive training for divergent thinking	Program for convergent thinking	2 (independent homework for 15 minutes, 6 days a week)	NA	PANSS Neg	SZ/out-patients	53%	17 (CTDiv= 9, AC=8)	NA	-1.10 (-2.13 to -0.07)*	Medium
Ostergaard <i>et al</i> (2014) ⁷⁷	Cognitive remediation	TAU	4 (38)	12	PANSS Neg	FEP/out-patients	54%	117 (CR=60, TAU=57)	-0.05 (-0.41, 0.31)	NA	High
Penades <i>et al</i> (2006) ⁷⁴	Cognitive remediation (group)	CBT	4 (40)	6	PANSS Neg	SZ/out-patients	57%	40 (CR =20, AC=20)	NA	-0.11 (-0.73 to 0.51)	Medium
Sanchez <i>et al</i> (2014) ⁷⁵	Cognitive remediation (group)	Group activities	3 (36)	NA	PANSS Neg	SZ/in-patients	76%	92 (CR =38, TAU= 54)	NA	-0.09 (-0.51 to 0.32)	Medium
Tan <i>et al</i> (2015) ⁷⁹	Cognitive remediation	Musical and dancing therapy (MDT)	2.5 (40)	NA	PANSS Neg	SZ/in-patients	53%	104 (CR=52, TAU=52)	NA	0.19 (-0.20 to 0.57)	Medium
Twamley <i>et al</i> (2012) ⁸⁴	Compensatory cognitive training (group)	TAU	3 (24)	3	PANSS Neg	SZ, SA, PMD, PDnos/	65%	69 (CCT=38, TAU=31)	NR, <i>P</i> <0.025 *	NA	Medium

Vauth <i>et al</i> (2005) ⁸⁷	CBT groups: cognitive training v. self- management skills for negative symptoms	TAU	2 (8)	12	PANSS Neg	out- patients SZ/in- patient	64	138 (CogT=47, SMS=45, VRA=46)	-0.15 (-0.56 to 0.26)	-0.23 (-0.64 to 0.18)	Medium
Vita <i>et al</i> (2011) ⁷⁸	Computer assisted cognitive remediation/ integrated psychological therapy (group)	Non- cognitive oriented rehab	6 (48)	NA	PANSS Neg	SZ/NR	69%	84 (CR=26, AC=30, TAU=28)	0.10 (-0.43 to 0.62)	0.73 (0.18 to 1.27)*	Medium

See end of Table DS8 for footnotes for all tables.

Table DS5 Exercise-based therapies

Study characteristics									Study results at treatment end		
Reference	Intervention	Control	Treatment duration in months (max sessions offered)	Duration of follow-up (months)	Assessment instrument	Diagnosis/status	% Male	<i>n</i>	Exp. v. TAU, SMD (95% CI)	Exp. v. Control, SMD (95% CI)	Quality
Acil <i>et al</i> (2008) ⁹¹	Exercise (group)	TAU	2.5 (30)	NA	SANS	SZ/in-patients transferring to out-patients	60%	30 (EX=15, TAU=15)	-1.25 (-2.03 to -0.46)* (except alogia subscale)	NA	Low
Cassilhas <i>et al</i> (2015) ⁹⁷	Resistance training (group)	Concurrent exercise, training w/o weights	5 (40)	NA	PANSS Neg	SZ/NR	100%	47 (RESEX=14, CONCEX=17, AC=16)	-1.02 (-1.94 to -0.10)*	-0.38 (-1.25 to 0.50)	High
Ho <i>et al</i> (2012) ⁸⁸	Tai Chi (group)	TAU (+waitlist)	1.5 (12 full + 12 half)	1.5	SANS	SZ/in-patients	40%	30 (Tai Chi=15, TAU=15)	-0.63 (-1.36 to 0.11)	NA	Medium
Ikai <i>et al</i> (2014) ⁸⁹	Yoga (group)	TAU	2 (8)	2 (NO)	PANSS Neg	SZ and related disorders /out-patients	66%	50 (Yoga=25, TAU=25)	-0.13 (-0.69 to 0.42)	NA	High
Kaltsatou <i>et al</i> (2015) ⁹⁶	Traditional dance (group)	TAU	8 (24)	NA	PANSS Neg	SZ/in-patients	81%	31 (TD=16, TAU=15)	-0.05 (-0.76 to 0.65)	NR, missing data	High
Loh <i>et al</i> (2015) ⁹⁵	Structured walking (group)	TAU	3 (36)	NA	PANSS Neg	SZ/in-patients	71%	104 (SW=52, TAU=52)	NR, missing data*	NA	Low
Manjunath <i>et al</i> (2013) ⁹²	Yoga (group and individual)	Exercise	0.5 (14 + at home practice)	1	PANSS Neg	Non AP/in-patients	55%	88 (yoga=44, AC=44)	NA	-0.12 (-0.54 to 0.29)	Low
Scheewe <i>et al</i> (2013) ⁹³	Exercise (group)	Occupational therapy	6 (48)	NA	PANSS Neg	SZ, SA/NR	73%	63 (EX=31, AC=32)	NA	0.11 (-0.38 to 0.61) (per protocol)	Medium
Varambally <i>et al</i> (2012) ⁹⁶	Yoga (group and individual)	Exercise, TAU waitlist	1 (25) + 3 ('regular' home practice)	NA	PANSS Neg	SZ/out-patients	71%	120 (Yoga=47, AC=37, TAU=36)	NR, NA missing data*	NR, NA missing data*	Medium
Visceglia <i>et al</i> (2011) ⁹⁰	Yoga (group)	TAU	2 (16)	NA	PANSS Neg	SZ/in-patients	67%	18 (yoga=10, TAU=8)	t= 3.04, P<0.01*	NA	Low

See end of Table DS8 for footnotes for all tables.

Table DS6 Arts therapies

Study characteristics									Study results at treatment end		
Reference	Intervention	Control	Treatment duration in months (max sessions offered)	Duration of follow-up (months)	Assessment instrument	Diagnosis / status	% Male	<i>n</i>	Exp. v. TAU, SMD (95% CI)	Exp. v. Control, SMD (95% CI)	Quality
Crawford <i>et al</i> (2012) ⁹⁸	Art therapy (group)	Activity groups, TAU	9–12 (39–52)	24	PANSS Neg	SZ/out-patients	67%	417 (Art=140, AC=140, TAU=137)	0.14 (–0.09 to 0.38)	1.30 (1.04 to 1.56)	High
Gold <i>et al</i> (2013) ¹⁰¹	Music therapy	TAU	3 (18–26)	NA	SANS	PD, AD, Other mental disorders/ in-patients and out-patients	52%	144 (Music=72, TAU=72)	NR, <i>P</i> <0.001 (per protocol)*, NR, <i>P</i> =0.018 (ITT) *	NA	Medium
Lu <i>et al</i> (2013) ¹⁰⁴	Music therapy (group)	TAU	1.25 (10)	3	PANSS Neg	SZ/in-patients	74%	80 (Music=40, TAU=40)	–0.51 (–0.96 to –0.07)*	NA	High
Montag <i>et al</i> (2014) ⁹⁹	Art therapy (group)	TAU	1.5 (12)	3	SANS	SZ/in-patients	63%	58 (AT=29, TAU=29)	–0.24 (–0.76 to 0.28)	NA	High
Talwar <i>et al</i> (2006) ¹⁰⁰	Music therapy	TAU	3 (12)	NA	PANSS Neg	SZ,SS/ in-patients	73%	81 (33=Music, 48=TAU)	–0.30 (–0.74 to 0.15)	NA	High
Tang <i>et al</i> (1994) ¹⁰³	Music therapy (group)	TAU	1 (19)	NA	SANS, DAS	SZ, SA, PD, other mental disorders/ in-patients	NR	76 (Music=38, TAU=38)	–1.08 (–1.56 to –0.60)*	NA	Medium
Ulrich <i>et al</i> (2007) ¹⁰²	Music therapy (group)	TAU	8 (mean=7.5)	NA	SANS	SZ, SA, DD, (ICD-10 code F20–F29)/In-patients	54%	37 (Music =21, TAU=16)	–0.40 (–1.06 to 0.25)	NA	Medium

See end of Table DS8 for footnotes for all tables.

Table DS7 Family-based therapies

Study characteristics									Study results at treatment end		
Reference	Intervention	Control	Treatment duration in months (max sessions offered)	Duration of follow-up (months)	Assessment instrument	Diagnosis /status	% Male	<i>n</i>	Exp. v. TAU, SMD (95% CI)	Exp. v. Control, SMD (95% CI)	Quality
Bradley <i>et al</i> (2006) ¹⁰⁵	Multiple family intervention (individual family and group)	TAU	12 (3 individual families + 24 group)	NA	SANS	SZ, SA, SP/out-patients	30%	59 family pairs (FBT=25, TAU=25)	0.38 (-0.18 to 0.94)	NA	Medium
Buchkremer <i>et al</i> (1997) ¹⁰⁹	Multiple family psychoeducation and psychotherapy (patients only and family groups)	Leisure Time group	12 (psychoeducational medication training=10; cognitive psychotherapy=15; key person counselling; Leisure time=NR)	24	SANS	SZ/out-patients	58%	191 patients (Group 1 (PMT, LTG)=32, Group 2 (PMT LTG KC)=35, Group 3 (PMT, CP)=34, Group 4 (PMT, CP, KC)=33, Group 5 (LTG)=57.	NR, <i>U</i> -test, <i>p</i> =0.91	NR, <i>U</i> -test, <i>P</i> =0.91	Medium
Cai <i>et al</i> (2015) ¹¹⁰	Family therapy (individual)	TAU	2.5 (10 sessions)	18	PANSS Neg	SZ/out-patient	46%	256 (FBT=133, TAU, 123)	0.13 (-0.11 to 0.38)	NA	Medium
Calvo <i>et al</i> (2014.) ¹⁰⁸	Family psychoeducational intervention (individual and group)	Unstructured groups	9 (3 individual and 12 group sessions)	NA	PANSS Neg	SZ, SA, SP, BP with PF, BPD, Pnos/adolescents with early onset/out-patients	62%	55 (FBT=27, AC=28)	NA	- 0.42 (-0.95 to 0.12)	High
Dyck <i>et al</i> (2000) ¹⁰⁷	Multiple family psychoeducation (group)	TAU	12 (3 family only and approximately 20 group sessions)	NA	SANS, attention removed	SZ, SA/out-patients	46%	63 (FBT=32, TAU=31)	-0.46 (-0.96 to 0.04)	NA	Medium
Wang <i>et al</i> (2013) ¹⁰⁶	Psychosocial rehabilitation – (group)	TAU	18 (18)	NA	PANSS Neg	SZ/out-patients	39%	140 (FBT=30, TAU=50) (at treatment end)	NR, <i>P</i> =0.003*	NA	Low

Table DS8 *Miscellaneous therapies*

Study characteristics									Study results at treatment end		
Reference	Intervention	Control	Treatment duration in months (max sessions offered)	Duration of follow-up (months)	Assessment instrument	Diagnosis /status	% Male	<i>n</i>	Exp. v. TAU, SMD (95% CI)	Exp. v. Control, SMD (95% CI)	Quality
Anderson <i>et al</i> (2010) ¹¹⁸	Adherence Therapy (Individual)	TAU	2 (8)	NA	PANSS Neg	SZ/out-patients	78%	26 (AT=12, TAU=14)	NR	NA	Medium
Cai <i>et al</i> (2014) ¹¹¹	Humour therapy (group)	Handiwor k	1.5 (10)	NA	PANSS Neg	in-patient	53%	30 (Humour=15, AC=15)	NA	-0.14 (-0.86 to 0.57)	Low
Choi & Medalia (2010) ¹²⁰	Motivational learning (group)	Cognitive tasks	1 (10)	NA	BPRS Neg	SZ, SA/ out-patients	67%	57 (ML=29, AC=28)	NA	NR, <i>P</i> =0.08	Low
Garety <i>et al</i> (2006) ¹¹⁴	Specialised early intervention (group and individual)	TAU	1.5 (NA)	NA	PANSS Neg	FEP/out-patients	65%	144 (SEI=71, TAU=73)	-0.55 (-0.88 to -0.22)*	NA	Medium
Gelkopf <i>et al</i> (2006) ¹¹²	Humorous movies (group)	Movies (only 15% humorous)	3 (60 movies, each night, 5 nights a week)	NA	PANSS Neg	SZ/in-patients	60%	29 (Humour=15, AC=14)	NA	0.02 (-0.71 to 0.75)	Low
Gholipour <i>et al</i> (2012) ¹¹⁹	Token therapy	Exercise, TAU	3 (36)	NA	SANS	SZ/in-patients	NR	45 (Token=15, AC=15, TAU=15)	-0.91 (-1.66 to -0.15) *	-0.27 (-0.99 to 0.45)	Low
Rohricht & Priebe (2006) ¹¹⁶	Body psychotherapy (group)	Supportiv e counselling	1.5 (20)	4	PANSS Neg	SZ/out-patients	49%	45 (BPT =24, AC =21)	NA	-0.74 (-1.35 to -0.13)	Medium
Thorup <i>et al</i> (2005) ¹¹³	Specialised early intervention (group and individual)	TAU	24 (NA)	36	PANSS Neg	FEP/out-patients	59%	547 (SEI=275, TAU=272)	NR, missing data*	NA	Medium
Villalta-Gil <i>et al</i> (2009) ¹¹⁷	Dog-assisted therapy (+ integrated psychological treatment – group)	TAU	3 (25)	NA	PANSS Neg	SZ/in-patients	85%	21 (DAT=12, TAU=9)	NA	0.48 (-0.40 to 1.36)	Low
White <i>et al</i> (2011) ¹¹⁵	Acceptance and commitment therapy	TAU	3 (10)	NA	PANSS Neg	PD/in and out-patients	78%	23 (ACT=13, TAU=14)	-0.42 (-1.19 to 0.34)	NA	High

AC, active control; ACT, acceptance and commitment therapy; BP, brief psychosis; BPD, brief psychotic disorder; BPRS, brief psychiatric rating scale; BPT, body psychotherapy; CAT, cognitive adaptation training; CBT, cognitive-behavioural therapy; CBTp, CBT for psychosis; CBT SST, CBT and social skills training; CBTf, CBT for functioning; CCT, compensatory cognitive training; CE, cognitive enhancement; CogT, cognitive training; CONCEX, concurrent exercise; CP, cognitive psychotherapy; CR, cognitive remediation; CRhab, cognitive rehabilitation; CT, cognitive therapy; CTDiv, cognitive training; DAT, dog-assisted therapy; DAS, disability assessment schedule; DD, delusional disorder; EX, exercise; Exp., experimental intervention; FEP, first-episode psychosis; FBT, family-based therapy; IMR, illness management and recovery programme; ITT, intention-to-treat analysis; KC, key person counselling; LTG, leisure time group; MD, mood disorder; MDP, mood disorder with psychotic features;

ML, motivational learning; NA, not applicable; NR, not reported; NSA-M, negative symptom assessment motivation subscale; NSRS, Negative Symptom Rating Scale; NT, neurocognitive therapy; OT, occupational therapy; PANSS, Positive and Negative Syndrome Scale (neg, negative subscale); PAS, Psychiatric Assessment Scale; PD, psychotic disorder; PF, psychotic features; PMD, psychotic mood disorder; PMT, psychoeducational medication training; Pnos, psychosis not otherwise specified; PP, paranoid psychosis; PST, psychosocial skills; Psychoed, psychoeducation; PsycRehab, psychological rehabilitation; PSYRATS, Psychotic Rating Scales; RESEX, resistance training; SA, schizoaffective disorder; SANS, Scale for Assessment of Negative Symptoms; SC, social cognition; SCIT, social cognition and interaction training; SEI, specialised early intervention; SMS, self-management skills for negative symptoms; SP, schizophreniform; SST, social skills training; ST, skills training; SW, structured walking; SZ, schizophrenia; TAU, treatment as usual; TD, traditional dance; VR, vocational rehabilitation; VRA, vocational remediation. *Denotes significance (*P*-value and statistic reported when data to calculate 95% CI unavailable).

Funnel plot with pseudo 95% confidence limits

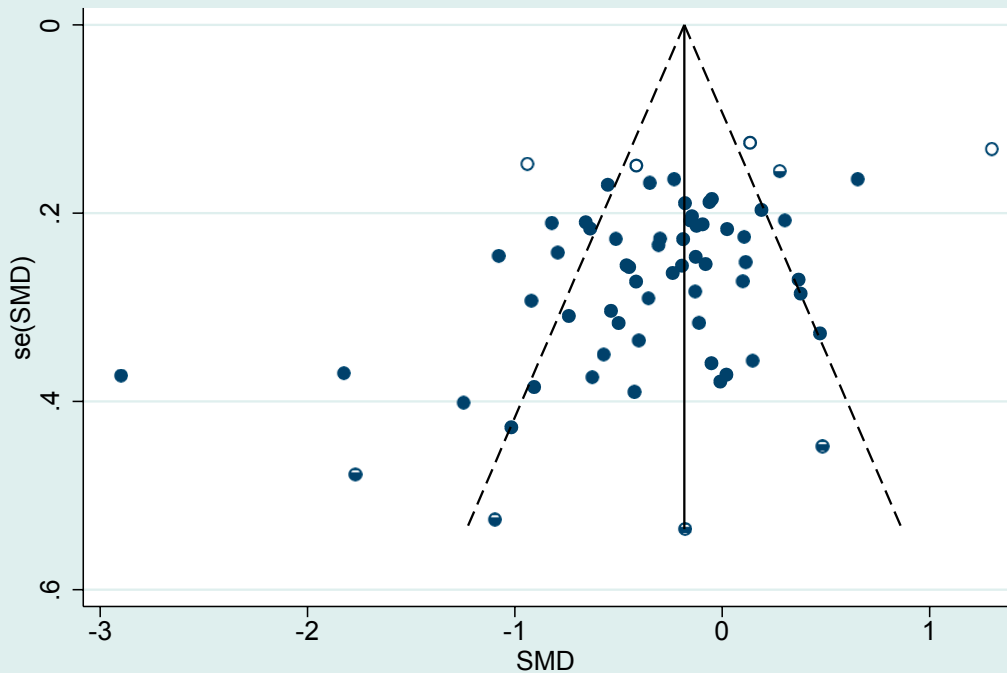


Fig. DS1