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Title: Are group psychotherapeutic treatments effective for patients with schizophrenia? A Systematic Review and Meta-analysis

Short title: Group Psychotherapy for Schizophrenia

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Key Words: Schizophrenia, group psychotherapy, systematic review, meta-analysis

Background: Different psychotherapeutic treatments for schizophrenia are delivered in groups. However, little is known about the effectiveness of these groups for people with schizophrenia across different treatments with varying therapeutic orientations. This review aimed to i) estimate the effect of different group psychotherapeutic treatments for schizophrenia and ii) to explore whether any overall 'group effect' is moderated by treatment intensity, diagnostic homogeneity and therapeutic orientation. **Methods:** A systematic search of randomised controlled trials exploring the effectiveness of group psychotherapeutic treatments for people with schizophrenia was conducted. Random-effect meta-analyses on end-point symptom scores compared group psychotherapeutic treatments against treatment-as-usual and active sham groups. Findings on social functioning were described narratively and meta-regression analyses on group characteristics were carried out. **Results:** Thirty-four eligible trials were included. A small-to-moderate significant between-group difference in favour of group psychotherapeutic treatments was found for negative symptom scores (SMD = -0.37, 95%CI:-0.60,-0.14, $p < 0.01$, $I^2 = 59.8\%$) only when compared to treatment-as-usual, not active sham groups. Improved social functioning was reported as a treatment outcome in the majority of studies compared to treatment-as-usual. The 'group effect' on negative symptoms was positively related to 'treatment intensity' (Beta=0.32, SE=0.121, $P < 0.05$). **Conclusion:** Group psychotherapeutic treatments can improve negative symptoms and social functioning deficits in the treatment of schizophrenia. The effect occurs across different treatments and appears to be non-specific. Future research should identify the underlying mechanisms for the positive effect of participating in groups and explore how they can be maximised to increase the therapeutic benefit.

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Introduction

In accordance with guidelines from the National Institute for Health and Care Excellence in the United Kingdom (UK) [1] and the Schizophrenia Patient Outcomes Research Team in the United States (US) [2], psychotherapeutic treatments are widely regarded as a necessary intervention for schizophrenia. In particular, there has been a growing interest in the development and delivery of psychotherapeutic treatments in a group format for this population [3].

From an economic perspective, a group setting is seen as a useful approach, as it allows for one therapist to treat several people at the same time [4]. From a clinical perspective, group psychotherapeutic treatments are also believed to offer social advantages relevant to this population [4-8], who often have smaller social networks and less satisfactory interpersonal relationships compared to a healthy population [9]. Seminal work on group therapeutic processes [10] (including group cohesion, instillation of hope, interpersonal learning and sharing of information) supports the notion that the group setting can be utilized as an agent of change in group psychotherapeutic treatments.

Evidence from randomised controlled trials on group cognitive behavioural therapy (CBT) [6], group social skills training [11], group music therapy [12] and group psycho-education [13], suggest that group psychotherapeutic treatments, with different therapeutic orientations, can be effective in improving a number of clinical outcomes for people with schizophrenia. In their review of controlled studies for schizophrenia conducted between 1986 and 2006, Segredou and colleagues [8] found that, descriptively, all of the 23 they identified showed a positive effect on either symptom or skills outcomes.

In the treatment of positive symptoms, including hallucinations and delusions, a group format has been suggested to provide an opportunity for participants to share experiences and reflect on similarities, which in turn aid restructuring of false beliefs [7, 14, 15]. In the treatment of negative symptoms, such as lack of speech, social withdrawal, blunted affect and social functioning deficits, it has been argued that group members serve as models and reinforcers for each other, which, in turn, can help the development of relationships [11, 16]. Improved understanding on how to treat negative symptoms is of particular importance, given these symptoms are more resistant to medication than positive symptoms [17], and highly related to poor social functioning [18] and poor quality of life [19].

Despite the potential cost benefits and clinical advantages of a group setting, little methodologically robust research has explored whether group psychotherapeutic treatments have a benefit for people with schizophrenia [20-22], and whether they are effective across specific therapeutic orientations [23]. At present too few studies are available to test the effectiveness of group treatments as compared to individual treatments for each psychotherapeutic treatment for schizophrenia [22]. Furthermore, whilst attempts have been made to summarise findings from controlled trials exploring the effectiveness of group psychotherapeutic treatments for schizophrenia [8, 22, 24, 25], the conclusions from these studies are limited in scope. For example, Segredou and colleagues' most recent attempt [8] does not include evidence from nonverbal creative group arts therapies (including music therapy, body psychotherapy and art therapy) which have been shown to be effective in reducing negative symptoms [1]. Furthermore, their findings are limited to a descriptive analysis of the literature.

To date, no attempt has been made to pool statistically the existing evidence using meta-analytical techniques. Consequently it is unclear whether group psychotherapeutic treatments have an effect across different treatment models for schizophrenia with varying therapeutic orientations. This review therefore aimed to establish whether there is an overall 'group effect' across a range of group psychotherapeutic treatments as compared to treatment-as-usual (TAU) [26]. If people with schizophrenia benefit from a non-specific

'group experience', one would expect to see clinical improvements in participants across a range of group psychotherapeutic treatments. If this effect was in fact due to processes in the 'group', it might not be apparent when compared to an active sham group [1]. In the literature, active sham groups are defined as a group condition aimed at controlling for *nonspecific* effects of the 'group' (for example therapist attention, therapeutic rationale and therapeutic alliance), and strictly does not involve any of the unique psychotherapeutic techniques under investigation [27, 28]. We therefore also assessed whether there is an effect of group psychotherapeutic approaches with active sham groups. Finally, we aimed to explore what group characteristics contribute to any potential group effect. In particular, we considered the *therapeutic orientation, number of sessions/length of intervention* [22] and/or *diagnostic homogeneity* [7], as potentially important factors for the impact of group psychotherapeutic treatments [8, 24].

Methods

Search Strategy:

A protocol was developed using the Preferred Reporting Items for Systematic reviews and Meta-Analyses statement (PRISMA) [29]. The electronic databases searched included PsychINFO (1806 to March 2014), Medline (1946 to March 2014), Embase (1974 to March 2014), and AMED (1985 to March 2014). MESH and text word search terms relating to 'group psychotherapeutic therapies' AND 'randomised controlled trials' AND 'schizophrenia' (see online suppl. Table 1 for Medline search terms) were used for each database. Search terms were modified for each database. Where outcome data were not fully reported, first and second authors were contacted via email requesting any missing information. Hand-searching of the following key journals was conducted: Group Therapy, Behavioural Group Therapy, Clinical Psychologist, Group Analysis, International Library of Group Analysis and the Journal of Contemporary Psychotherapy. A grey literature search of the Cochrane database, and websites including Health Technology Assessment, National Institute of Mental Health, Wellcome Trust and Medical Research Council, was also conducted. Additionally, studies cited in relevant reviews on psychotherapeutic treatments for schizophrenia were hand-searched.

Eligibility Criteria:

Studies at the title and abstract phase were screened against the following inclusion criteria: (1) randomised controlled trial; (2) psychotherapeutic treatments provided in treatment condition; (3) included participants with a diagnosis of schizophrenia and related disorders. Studies were excluded if they (1) involved individualised treatment; (2) involved family therapy and/or family intervention; (3) included participants aged 16 years or below. Studies that were only abstract publications and/or protocols were not included.

At the full paper review stage, studies were further excluded against the following exclusion criteria: (1) a sample with fewer than 85% of participants diagnosed with schizophrenia, schizotypal, schizoaffective and/or other non-affective psychotic disorders outlined in the Diagnostic Statistical Manual and International Classification of Diseases; (2) did not measure either symptoms of schizophrenia (either positive, negative, general or total symptoms) or social functioning; (3) did not make a clear reference to a group format in the treatment condition; (4) was not published in a language using Latin-based characters; (5) control condition was delivered as a group psychotherapeutic treatment, rather than an *active sham group* (i.e. active discussion group, support group, counselling group, occupational therapy group, or problem solving discussion group) or TAU; where 'waitlist control group' (no treatment offered until the intervention condition has received their treatment) and 'standard psychiatric care' are considered as treatment-as-usual.

Study selection and data extraction

The first author (SO) conducted the initial screening of all the titles and abstracts and all studies at the full paper review phase. The second author (CB) re-extracted 50% of the studies at full paper review and 20% of abstracts, randomly selected using a random number generator. Any ambiguity was resolved with the third author (SP). All included studies were independently extracted by two reviewers (SO and CB) using a structured format (see online suppl. Table 2). The Cochrane risk of bias tool was used to assess the studies [30]. It was agreed by all authors to exclude 'blinding of personnel' category, given that in trials examining the effectiveness of group psychotherapeutic treatments it is not possible to keep participants blind to their treatment allocation. 'High' risk studies were identified as those that scored 'high risk' for at least 4 of the 6 categories prior to data extraction.

Outcomes:

The primary outcome was end of treatment mean symptom scores (including positive, negative, general and/or total symptom scores), measured as a continuous variable. As measured by the Positive and Negative Symptom Scale (PANSS [31]), positive symptoms include delusions, grandiosity, suspiciousness, hostility and hallucinations; negative symptoms include emotional withdrawal, poor rapport, difficulty in abstract thinking, blunt affect and social withdrawal; general symptoms include anxiety, depression, insight and guilt; while total symptom scores are the sum of positive, negative and general symptoms. Original authors' definitions of symptoms were followed, rather than a predefined operationalised definition. Social functioning scores were measured as a secondary outcome and examined descriptively.

Data Analysis:

For each study, means and standard deviations were extracted. Standard mean differences (SMDs) with 95% confidence intervals (CIs) were calculated from the data extracted. Data were pooled using a random-effects meta-analysis in STATA Version 12. End-point scores from both the treatment and control conditions were used to assess the impact of group psychotherapeutic treatments on symptoms of schizophrenia. Data were pooled in such a way that a SMD less than 0 favoured the treatment condition. Heterogeneity was assessed visually and by the I^2 statistic [32].

The first set of meta-analyses explored group psychotherapeutic treatments compared with TAU for positive, negative, general and total symptom scores. The second set of meta-analyses explored group psychotherapeutic treatments compared to active sham groups for positive, negative, general and total symptom scores. Planned sensitivity analyses were conducted to explore the robustness of the results. In these analyses, studies with a high risk of bias and studies where baseline mean symptom scores varied across the treatment and control condition were excluded.

A post-hoc meta-regression analysis was used to explore what factors were driving significant group effects found across the main meta-analyses and planned sensitivity analyses. A meta-regression analysis was therefore only conducted on studies that compared a group psychotherapeutic treatment to TAU and not active sham groups. The first meta-regression analysis explored the effect of therapeutic orientation, by dichotomising psychotherapeutic treatments as a) nonverbal arts therapies (including music therapy, body-oriented psychotherapy and art therapy) vs non-arts therapies and b) as cognitive-behavioural approaches (including cognitive-behavioural social skills training, and compensatory cognitive training) vs other therapeutic approaches. The second meta-regression analysis explored the effect of treatment 'intensity'; calculated as a continuous variable from duration of session (in hours) multiplied by the number of sessions offered in

the treatment. A log transformation was conducted on this variable to ensure this variable was normally distributed. The third meta-regression analysis explored the effect of 'diagnosis' as a dichotomised variable, comparing studies that included 'schizophrenia' and 'schizophrenia and related disorders'.

Due to the varied range of assessments used to measure social functioning, it was decided a-prior to not conduct a meta-analysis on this outcome. As outlined by Higgins and colleagues [30], a meta-analysis should only be conducted if outcomes share similar clinical characteristics. Instead, outcomes on social functioning deficits were discussed descriptively in a narrative synthesis, which included a description of statistical outcomes and author conclusions.

Results

Search Results

5078 studies were identified in the electronic database search. Following the exclusion of duplications (n=1962) and removal of studies at the title screening phase (n=1564), 1552 abstract articles were reviewed (see online suppl. Fig. 1). Of the 324 studies identified for full paper review, 34 studies were included. Seven studies [33-39] used the data from three data sets, one study [40] included data from two separate trials, and one study [41] had two control arms. Hence in total, 32 data sets were included in the final meta-analysis.

Study Characteristics

The study characteristics of the studies from which the 32 data sets were included are summarised in online suppl. Table 3. In total, 13 data sets compared a group psychotherapeutic treatment to an active sham group [37, 39, 41-51], and 19 data sets compared a group psychotherapeutic treatment to treatment-as-usual [7, 12, 13, 34, 40, 41, 52-63]. 31% of the interventions were cognitive-behavioural approaches (including cognitive-behavioural social skills training, and compensatory cognitive training), 19% came under the umbrella term non-verbal arts therapies (including music therapy, body-oriented psychotherapy and art therapy); the remaining 50% included a range of therapeutic orientations such as cognitive remediation therapy, psycho-education, and integrated approaches. These approaches were varied in terms of their therapeutic focus and therapeutic outcome (see online suppl. Table 4); including positive symptoms (13%), social functioning (22%), cognitive functioning (22%) and negative symptoms (9%), a range of outcomes (22%) or outcomes that did not fit in any of these categories (22%). The most common measures of symptoms was the PANSS; 81%, 63%, 92.9% and 68.4% for positive, negative, general and total symptom scores respective (see online suppl. Table 5). 22 studies (71%) were conducted in an outpatient setting, 12 studies (38%) stated use of an intention-to-treat design and nine studies (28%) included a sample size calculation. The average follow-up rate was 8% for studies that compared a group psychotherapeutic treatment with an active sham group, and 7% for studies that compared group psychotherapeutic treatment with treatment-as-usual. On average, 38% and 34% of the treatment and control condition were female, respectively. The lower and upper ages of the participants ranged from 17 years to 78 years of age and the mean age reported was 39 years; four studies did not have any information on age range and four studies did not state an upper limit. In total 2634 patients were represented in the 32 data sets included in this review; of which 1334 participants were represented in the treatment condition and 1300 were represented in the control condition.

Risk of Bias

In total, three studies scored 'high risk of bias' for at least four of the six categories, and were therefore rated as low quality (see online suppl. Fig. 2). With the exception of the funnel plot on positive symptoms, all plots are slightly asymmetric, with an absence of data in the lower right hand side of the plot (see online Fig. 3). Egger tests of publication bias found no statistical evidence for publication bias for negative, positive or general symptom scores. There was however statistical evidence for publication bias for the studies included in the meta-analyses comparing group therapeutic treatments with TAU and active sham groups for total symptoms (Beta = 0.975, P=0.01) and for studies included in the total symptoms planned sensitivity analyses (Beta = 0.999, P = 0.02).

Impact of Group Psychotherapeutic Treatments on Symptoms

Table 1 summarises findings from the meta-analyses comparing group psychotherapeutic treatments with TAU and active sham groups, and sensitivity analyses (which excluded studies with a high risk of bias and studies where baseline mean symptom scores varied across the treatment and control condition, see online suppl. Table 6) on end-point outcomes for positive, negative and general symptoms. Separate analyses were conducted for studies that compared a group psychotherapeutic treatment to TAU, and those that compared a group psychotherapeutic treatment to an active sham group.

In the meta-analyses comparing group psychotherapeutic treatments to TAU, there was a significant between-group difference for end-point negative symptom scores, end-point general symptom scores and end-point total symptom scores in favour of the treatment condition. No main effect was found for positive symptom scores. Findings were robust across planned sensitivity analyses for both negative and positive symptoms. However, the effect on general symptoms and total symptoms were no longer significant in the planned sensitivity analyses, following removal of studies rated as high risk of bias. Forest plots for group psychotherapeutic treatments compared to TAU and active group shams are shown in online suppl. Fig 4.a and 4.b respectively.

There was no evidence for a significant between-group difference for end-point negative symptoms, positive symptoms, general symptoms or total symptoms for studies that compared a group psychotherapeutic treatment and an active sham group.

(Table 1 – Meta-analyses)

Meta-Regression Analysis

Meta-regression analyses were limited to outcomes on negative symptoms, given that no effect of group psychotherapeutic treatments was found on positive symptoms and that findings on the impact of general and total symptoms were inconsistent across the planned sensitivity analyses. The effect of group psychotherapeutic treatments on negative symptoms was not moderated by the therapeutic orientation or diagnostic homogeneity (see Table 2). However, the effect size on negative symptoms was positively moderated by the treatment intensity of the group psychotherapeutic treatments (Beta = 0.32 SE = 0.121, P<0.05). The adjusted R-squared value indicated that 31% of the variance in this model was accounted for by the intensity sessions, measured as number of sessions available in the group psychotherapeutic treatments.

(Table 2 – Meta-regression Table)

Impact of Group Psychotherapeutic Treatments on Social Functioning

In total, 11 of the 19 included which compared a group psychotherapeutic treatment with TAU, reported outcomes on social functioning; see online suppl. Table 7. Six of the 11 studies [7, 12, 34, 52, 58, 63] found a statistically significant improvement favoring the group psychotherapeutic treatments over the control condition and five studies did not [41, 53, 57, 59, 61]. Nine different measures of social functioning were reported in the 11 studies.

Discussion

This review found that group psychotherapeutic treatments were more effective in reducing negative symptoms than treatment-as-usual (TAU) across a diverse range of psychotherapeutic orientations. This effect was apparent only when these group psychotherapeutic treatments were compared against TAU, not active sham groups. There was no evidence that group psychotherapeutic treatments improved positive symptoms across a range of group psychotherapeutic treatments compared to TAU or active sham groups. Furthermore, any evidence that general symptoms and total symptoms improved in favour of the group psychotherapeutic treatment condition compared to TAU was no longer significant when eliminating studies rated as 'high-risk' of bias. The narrative summary of studies indicated that overall, participants in group psychotherapeutic treatments benefited more in terms of reduced social functioning deficits in the treatment condition compared to TAU. No evidence was found for an effect of therapeutic orientation or diagnostic homogeneity. However, there was a significant positive relationship between treatment intensity and reduced negative symptoms.

This study has a number of strengths. It is the first systematic review to explore the effectiveness of psychotherapeutic treatments delivered in groups using meta-analytic techniques. We used rigorous methods and a wide array of search terms encompassing a broad range of verbal and nonverbal psychotherapeutic group treatments. Stringent measures controlled for study quality. For example, all studies were independently extracted and assessed for risk of bias. Low-quality studies were excluded in planned sensitivity analyses rather than being rated on a quality scale and controlled for statistically [64].

There are also a number of potential limitations. The majority of the sample represented were outpatients (71%) and male (64%), which may limit generalisability. However, as noted by Jane-Wit and colleagues [65], an important factor contributing to different results between randomised controlled trials, is the difference in patient characteristics. Hence, the clinical validity of the findings is strengthened by the homogeneous population across the studies.

There is also the possibility of publication bias. Visual examination of funnel plots (see online suppl Fig.3) for negative, general and total symptoms indicate that there are slightly fewer trials with small samples favouring the control condition represented in this review. This may have biased the results of the review against the control condition. To account for this, statistical tests of publication bias were conducted. No statistical evidence of publication bias was found for positive, negative or general scores. There was however statistical evidence for bias for total symptom scores.

Furthermore, I^2 scores from meta-analyses on negative symptoms indicate a moderate to high level of heterogeneity; i.e. I^2 scores between 50-75% [32]. However, visual examination of the forest plots (see online suppl. Fig4.a and 4.b) indicated consistent overlap between the confidence intervals of the effect sizes in the majority of the studies, hence minimal heterogeneity between studies. It is therefore likely that the high heterogeneity is being driven by a minority of outliers - Vreeland et al [62] and Levine et al [46] in the TAU and active sham group analyses respectively – rather than significant variation between studies.

This review is also limited to symptom and social functioning outcomes. Given that group psychotherapeutic treatments have been implicated with a variety of improved outcomes [8, 22, 66], conclusions on their effectiveness are arguably therefore incomplete. To address this limitation, separate analyses were conducted on major symptom domains.

Most studies were not reported as intention-to-treat analyses. Since drop out is unlikely to be due to random factors, and that only few studies reported reasons for drop-out, this may introduce completer-only bias. Given that too few studies carried out an

intention-to-treat analysis, a further sensitivity analysis on this sub-group of studies was not deemed suitable. However, encouragingly, the follow-up assessment rate at end of treatment was high across both treatment vs active sham groups and treatment vs TAU comparisons.

Finally, group psychotherapeutic treatments have not been assessed against individual psychotherapeutic treatments. Without controlling for the specific factors potentially relevant to the psychotherapeutic treatment itself, it is difficult to make firm conclusions about the benefits of non-specific group effects. Whilst Wykes and colleagues [67] found no difference in the two treatment modalities, the validity of this comparison is limited by the fact that only seven group CBT studies were compared to 26 studies on individual CBT.

Overall, evidence from this review supports the view that group mechanisms underpinning different group psychotherapeutic treatments can be clinically advantageous for people with schizophrenia [8, 26, 66] in the treatment of negative symptoms [16] and social functioning deficits [11]. As argued by Kanas [66], 'the group experience itself' (page 10) appears to be clinically useful for this population who are often isolated and relate poorly with others. Both the effectiveness of group psychotherapeutic treatments across different therapeutic orientations as compared to TAU, and the absence of a significant effect as compared to active sham groups, is consistent with the hypothesis that beneficial group mechanisms are non-specific [20, 26]. In support of Wampold's [23] 'contextual' model of psychotherapy, these findings support the view that the benefit of group therapeutic mechanisms is due to common factors.

The group effect is shared across different approaches and potentially also with sham groups, which inevitably have some group processes in common with psychotherapeutic groups. The fact that a group condition is meant to be a sham condition in a trial can be obvious to researchers, but is often not evident to participants taking part in the trial. With respect to sham conditions however we cannot establish whether they are also effective in improving negative symptoms. Whilst we did not find a difference with psychotherapeutic groups, the data do not allow us to test for non-inferiority, and a direct comparison of sham groups with TAU was not possible.

Whilst the effect size on negative symptoms was only small-to-moderate, this effect is bigger than the standardised mean difference scores for negative symptoms reported in meta-analyses of CBT for schizophrenia [64]. Furthermore, the effect size is comparable with the effect sizes in studies of social skills training for schizophrenia [68], cognitive remediation therapy on overall symptoms of schizophrenia [69] and scores from meta-analyses of first and second generation anti-psychotics [70].

In contrast to Segredou and colleagues' [8] review on group psychotherapeutic treatments for schizophrenia, there was no evidence for improved positive symptoms. The inclusion of nonverbal therapies and more precise statistical techniques may account for this difference. Furthermore, results from this review are not consistent with the notion that group processes can be effective in aiding the restructuring of false beliefs around delusions or hallucinations [15, 71] in the treatment of positive symptoms [20, 23, 26]. As suggested by Wykes and colleagues [7], it might be difficult for therapists to flexibly respond to a wide variety of individual therapeutic needs when addressing positive symptoms in groups. Hence a 'group effect' for positive symptoms might be specific only for highly homogenous groups, such as Hearing Voices groups [14], rather than a non-specific shared effect [23].

In the meta-regression analyses there was no evidence that the 'therapeutic orientation', in terms of arts vs non-arts and CBT vs non-CBT studies, moderated the group effect on negative symptoms. This supports the idea that the benefit of group psychotherapeutic treatments, in terms of negative symptoms at least, is independent of a particular therapeutic approach [20]. Furthermore, there was no evidence to suggest that

the degree of 'diagnostic homogeneity' moderated the effect of group psychotherapeutic treatments on negative symptoms. Therefore the non-specific effect of negative symptoms held true for groups consisting of patients with a diagnosis of schizophrenia and related disorders [10]. However, the more 'intense' treatments were related to a greater difference in negative symptom scores. This supports the hypothesis that longer group psychotherapeutic treatments for schizophrenia are more effective than shorter treatments [22]. This result further refines the importance of 'length' of treatment to 'number of sessions in a given space of time' [72] as a more precise factor that may influence the effectiveness of this treatment modality [22]. Effective group mechanisms may therefore have a dose-response association, where short-term groups with few sessions do not exhaust the full potential of these mechanisms.

In conclusion, findings from this review suggest that group psychotherapeutic therapies, irrespective of their therapeutic approach, can improve negative symptoms and social functioning deficits in the treatment of schizophrenia. In support of the contextual model of psychotherapy, the impact of group mechanisms on negative symptoms appear to be non-specific and shared across a wide range of psychotherapeutic treatments delivered in a group setting. Future research should identify the non-specific mechanisms that explain the effect of group participation on negative symptoms and explore ways to strengthen them so that the therapeutic benefit is maximised.

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Conflict of Interest

The authors declare no conflict of interest.

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Table 1. Summary of meta-analyses for positive, negative, general and total symptom scores, comparing group psychotherapeutic treatments against treatment-as-usual and active sham groups

Outcome	Analysis	Number of studies	Number of participants	SMD (95% CI)	P value	I ² (%)
Negative Symptoms	Treatment vs TAU	15	893	-0.37 (-0.60, -0.14)	0.002	59.8
	Treatment vs Sham	12	783	-0.09 (-0.36, 0.19)	0.542	68.5
	Sensitivity (Treatment vs TAU)	12	762	-0.40(-0.67, -0.13)	0.004	66.6
	Sensitivity (Treatment vs Sham)	10	687	-0.09 (-0.33, 0.16)	0.504	56.3
Positive Symptoms	Treatment vs TAU	11	730	-0.06 (-0.25, 0.13)	0.553	29.8
	Treatment vs Sham	9	654	0.07 (-0.32, 0.18)	0.590	49.7
	Sensitivity (Treatment vs TAU)	8	654	-0.02 (-0.21, 0.18)	0.877	27.5
	Sensitivity (Treatment vs Sham)	9	654	0.07 (-0.32, 0.18)	0.590	49.7
General Symptoms	Treatment vs TAU	9	625	-0.22 (-0.43, -0.02)	0.035	27.8
	Treatment vs Sham	6	521	0.17 (-0.76, 0.42)	0.575	87.9
	Sensitivity (Treatment vs TAU)	7	593	-0.13 (-0.29, -0.03)	0.120	0
	Sensitivity (Treatment vs Sham)	4	425	-0.16 (-0.46, 0.14)	0.303	49.8
Total Symptoms	Treatment vs TAU	9	651	-0.41 (-0.69, -0.13)	0.004	60.3
	Treatment vs Sham	10	812	0.12 (-0.74, 0.35)	0.479	91.8
	Sensitivity (Treatment vs TAU)	5	514	-0.33 (-0.66, 0.01)	0.052	66.3
	Sensitivity (Treatment vs Sham)	8	538	-0.48 (-1.10, 0.11)	0.108	88.5

NB: Treatment vs TAU = meta-analysis comparing group psychotherapeutic treatments with treatment-as-usual, waitlist control or standard psychiatric care; Treatment vs Sham = meta-analysis comparing group psychiatric treatments with active sham groups; Sensitivity = sensitivity analysis; SMD = Standardized Mean Differences; CI = Confidence Intervals; I² = heterogeneity

Table 2. Summary of meta-regression analysis on end-point negative symptom standardised mean difference scores comparing group psychotherapeutic treatments and TAU

Characteristic	Coef.	SE	I ² (%)	Adjusted R ² (%)	P value
Therapeutic Orientation: Arts & Others	0.220	0.201	61.39	-1.41	0.282
Therapeutic Orientation: Cognitive-Behavioural & Others	-0.004	0.185	63.46	-6.20	0.985
Intensity (log transformed)	0.320	0.121	55.10	31.02	0.014
Diagnostic Homogeneity	-0.001	0.176	61.65	-6.94	0.994

Note: TAU = treatment as usual, Coef. = coefficient, SE = Standard Error, Adjusted R² = variance, I² = heterogeneity