Psychological therapy for inpatients receiving acute mental healthcare: A systematic review and meta-analysis of controlled trials

Running Head: Psychological therapy for inpatients: A meta-analysis

Charlotte Paterson[a]
Thanos Karatzias[a, c]
Adele Dickson[b]
Sean Harper[c]
Nadine Dougall[a]
Paul Hutton[a]

[a]School of Health and Social Care
Edinburgh Napier University

[b]Department of Psychology and Allied Health Sciences
Glasgow Caledonian University

[c]Rivers Centre for Traumatic Stress, Royal Edinburgh Hospital, NHS Lothian

Corresponding author: Charlotte Paterson;
Email: charlotte.paterson@napier.ac.uk
Address: 1.B.29, School of Health and Social Care, Edinburgh Napier University, Sighthill Campus, Edinburgh, EH11 4BN.

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Declaration of interest

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Abstract

Objectives
The effectiveness of psychological therapies for those receiving acute adult mental health inpatient care remains unclear, partly because of the difficulty in conducting randomised controlled trials (RCTs) in this setting. The aim of this meta-analysis was to synthesise evidence from all controlled trials of psychological therapy carried out with this group, to estimate its effects on a number of important outcomes, and examine whether the presence of randomisation and rater-blinding moderated these estimates.

Method
A systematic review and meta-analysis of all controlled trials of psychological therapy delivered in acute inpatient settings was conducted, with a focus on psychotic symptoms, readmissions or emotional distress (anxiety and depression). Studies were identified through ASSIA, Embase, Cinahl, Cochrane, Medline and PsycINFO using a combination of the key terms 'inpatient', 'psychological therapy' and 'acute'. No restriction was placed on diagnosis. The moderating effect of the use of single-blind RCT methodology was examined via subgroup and sensitivity analyses.

Results
Overall, psychological therapy was associated with small to moderate improvements in psychotic symptoms at end of therapy but the effect was smaller and not significant at follow-up. Psychological therapy was also associated with reduced readmissions, depression and anxiety. The use of single-blind randomised controlled trial methodology was associated with significantly reduced benefits on psychotic symptoms, and was also associated with reduced benefits on readmission and depression, however these reductions were not statistically significant.

Conclusions
The provision of psychological therapy to acute psychiatric inpatients is associated with improvements, however the use of single-blind RCT methodology was associated with reduced therapy-attributable improvements. Whether this is a consequence of increased internal validity or reduced external validity is unclear. Trials with both high internal and external validity are now required to establish what type, format and intensity of brief psychological therapy is required to achieve sustained benefits.

Practitioner points

Clinical implications:
- This review provides the first meta-analytical synthesis of brief psychological therapy delivered in acute psychiatric inpatient settings.
- This review suggests that brief psychological therapy is associated with reduced emotional distress and readmissions.

Limitations:
- The evidence in this review is of limited quality.
- The type, format and intensity of brief psychological therapy required to achieve sustained benefits is yet to be established

Introduction

Although some reviews and meta-analyses have questioned the benefit of psychological therapies for people with severe mental illness (Jauhar et al., 2014; McKenna & Kingdon, 2014), several others have found persuasive evidence of effectiveness and acceptability (Khoury et al., 2013; Lam, Burbeck, Wright, & Pilling, 2009; Turner, Van Der Gaag, Karyotaki, & Cuijpers, 2014). As such, there have been growing calls for psychological therapies to be routinely offered to psychiatric inpatients during acute admissions (Schizophrenia Commission, 2012). However it is unclear whether existing evidence can be generalised to those receiving acute mental health inpatient care, partly because of the short time periods involved in acute admissions and partly because of the increased illness severity many acute inpatients experience.

For instance, trials evaluating psychological interventions for severe mental illness have often involved a period of outpatient therapy lasting six months (Garety et al., 1997; Haddock et al., 2009) or longer (Garety et al., 2008; Sensky et al., 2000; Turkington, Sensky, Scott, & Barnes, 2008), whereas acute inpatient admissions are typically much shorter in duration (Mental Health Network, 2012), thus placing a natural limit on the number of sessions patients can realistically be offered. Although NICE guidelines recommend a minimum of 10 to 16 sessions of psychological intervention are provided, depending on the therapy and condition (National Institute for Health and Care Excellence, 2009, 2014), the evidence this recommendation is based on is not strong, and recent findings suggest that low-intensity therapies (i.e. designed to be delivered in less than 16 sessions (between 6 and 15)) may also benefit those diagnosed with psychosis (Hazell, Hayward, Cavanagh, & Strauss, 2016). As alternatives to hospital admission are increasingly advocated, and the number of hospital beds reduce (Department of Health, 2015; Lehman et al., 2010; McGorry et al., 2005), the threshold for admission is rising, meaning those admitted to an acute inpatient service are likely to be the most severely ill (Brooker, Ricketts, Bennett, & Lemme, 2007). However there are concerns that this increased illness severity may prevent these individuals from engaging effectively in a talking-based intervention (Canadian Psychiatric Association, 2005) and much of the evidence relating to psychological therapy for severe mental illness does not include those within the 'acute' phase of illness, or those said to be in crisis.

The effectiveness of psychological therapy may also be moderated by the acute ward environment itself, since this is not always perceived by patients or staff to be therapeutic, safe or conducive to emotional disclosure (Schizophrenia Commission, 2012). Indeed some guidelines even recommend that individuals are discharged before commencing therapy (National Institute for Health and Care Excellence, 2014). Determining the effectiveness of therapy for people in this acute setting has become particularly important in the context of growing demands from patients, carers and providers for this treatment to be accessible to them (Bright, 2008; Haddock et al., 2014; Rethink, 2004; Schizophrenia Commission, 2012), and recognition that services must do more to improve the experience of patients receiving inpatient psychiatric care (Schizophrenia Commission, 2012). If psychological therapy delivered in this context does prove to be of benefit, then this would have significant implications for the design of inpatient services for people with severe mental health problems, and would challenge existing views that therapy may be inappropriate for this patient group.

Nonetheless, determining the effectiveness of therapy for acute psychiatric inpatients is a challenging task. Whereas single-blind (i.e. assessor blind), randomised controlled trials have

strong internal validity, their experimental design may limit the degree to which their findings have external validity. That is, patients who are very unwell, suicidal or in crisis may be less likely to take part in these studies, or may indeed be explicitly excluded. In this context, non-randomised controlled trials may be more acceptable to this group, and their clinicians (Black, 1996). However it is unclear whether such studies produce different effects to single-blind randomised controlled trials and, if they do, whether this is attributable to reduced internal validity, or increased external validity.

For these reasons we set out to conduct the first comprehensive meta-analytical synthesis of the available evidence from randomised and non-randomised controlled trials of psychological therapy for acute adult mental health inpatients. Our aim was to determine the effect of therapy on outcomes of importance to clinicians and patients, including psychotic symptoms, risk of readmission and emotional distress, also examining the association between estimates of effect and study design variables.

Method

Protocol registration

A review protocol was developed and registered online (PROSPERO CRD42015026732). Subsequent changes include specification of additional subgroup analyses, i.e. contact with a therapist in the control group, therapy type and diagnosis.

Inclusion and exclusion criteria

We included all randomised and non-randomised trials of psychological therapies for adults receiving acute mental health inpatient care, where the comparator was usual care, usual care plus waiting list, or usual care plus 'inactive' psychological interventions (e.g. 'non-directive' interventions such as befriending, supportive counselling). Given the broad focus of the review, i.e. to identify the benefit of any talking psychological therapy, studies where the only comparison was between two active talking therapies were excluded. Inclusion of non-randomised controlled trials was planned because such studies may be able to recruit a more representative group of participants, and to allow the effect of study design on efficacy to be examined empirically, rather than assumed. The extent to which including non-blind and/or non-randomised studies led to a reduction in effect sizes was determined by subgroup analysis (see below). Uncontrolled studies, including case studies and case series, were excluded.

For the purpose of this meta-analysis, psychological therapy was defined as *"meeting with a therapist to talk about (..) feelings and thoughts and how these affect (..) behaviour and wellbeing"* (National Institute for Health and Care Excellence, 2014). Examples of interventions which satisfy this definition and were therefore included are cognitive behavioural therapy, (CBT), psychodynamic therapy (PT), acceptance and commitment therapy (ACT) and meta-cognitive training (MCT). Interventions were included regardless of whether they were delivered in a group or individual format. Examples of interventions not meeting our criteria for inclusion are those which aimed primarily to reduce substance misuse, aid reintegration into the community, increase compliance with medication, or increase knowledge of mental illness. Trials of interventions delivered via art, music or computers also did not satisfy our working definition. Additionally, therapies considered 'non-directive', e.g. supportive counselling or befriending, were not categorised as psychological therapy for the purpose of this review.

We were primarily interested in the benefit of therapy for patients in a particular *setting* (i.e. acute inpatient mental healthcare) and therefore no restriction was placed on the diagnosis of

participants. However, trials where less than 50% of participants were inpatients (and the inpatient data was not reported separately) were excluded. Only studies providing usable data on either severity of psychotic symptoms, depression, anxiety or number of readmissions were included. Application of criteria developed by the Mental Health Network (Mental Health Network, 2012) to define adult acute inpatient mental healthcare led to exclusion of trials conducted in adolescent or older adult wards, specialist wards (e.g., eating disorder units or specialised personality disorder services), forensic wards, rehabilitation wards, crisis houses, therapeutic communities and respite care. According to the Mental Health Network (Mental Health Network, 2012), patients typically spend less than 90 days on an acute inpatient ward, therefore studies where the average length of stay of participants was longer than this were excluded.

Outcomes

Psychotic symptoms are frequently encountered in acute inpatient care, occur across a range of diagnostic categories, and are commonly measured in intervention trials. Therefore overall psychotic symptoms were chosen as the primary outcome. This was defined by group differences in mean post-treatment Positive and Negative Syndrome Scale (PANSS) (Kay, 1990) total scores but where this was not available, group difference in mean change was used. If neither were available, the nearest post intervention mean was used, as per previous meta-analyses (Jauhar et al., 2014). If no PANSS total scores were reported but subscale scores were reported, then these were combined using the method specified by Jauhar et al (Jauhar et al., 2014). If PANSS data were not reported, the Brief Psychiatric Rating Scale (Overall & Gorham, 1962) (BPRS) or the Global Assessment of Functioning (Hall, 1995) (GAF) mean scores were converted to PANSS scores using conversion tables provided by Leucht and colleagues (Leucht, Rothe, Davis, & Engel, 2013) and Samara and colleagues (Samara et al., 2014). Further details on the process of data conversion can be found in the supplement.

Secondary outcomes included follow-up PANSS scores, number of readmissions, symptoms of depression and symptoms of anxiety. Depression and anxiety were thought to be useful indicators of emotional distress (Derogatis, 2001; Pilkonis et al., 2011), which is often the target of psychological interventions and is considered by some researchers to contribute to the onset and maintenance of a variety of SMIs (Birchwood, Shiers, & Smith, 2014; Isabel Clarke, 1999). If available, Beck Depression Inventory (Beck, Steer, & Brown, 1996) (BDI) data was extracted for the depression outcome. If unavailable, Hamilton rating Scale of Depression (Hamilton, 1960) (HMRD) data was used. If neither were available, other measures reported by the authors were used if adequate reliability and validity was reported (see supplement). For example, the anxiety outcome included a combination of data from the anxiety subscale of the Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983) (HADS), Hamilton Anxiety Rating Scale (Beck, Epstein, Brown, & Steer, 1988) (HAMA) and the Symptom Checklist – 90 – Revised (van der Laan, Van Spaendonck, Horstink, & Goris, 1999) (SCL-90-R).

Search strategy and study selection

As recommended by Lipsey and Wilson (Lipsey & Wilson, 2001) three methods were used to search the literature: (i) the use of two or more computerized databases, (ii) manually searching the reference lists of related meta-analyses and reviews, (iii) making contact with researchers for relevant or unpublished material. The electronic databases ASSIA, Embase, Cinahl, Cochrane, Medline and PsycINFO were searched in October 2014 and again in February 2016. The full search strategy is provided in the supplementary file. Clinical trial registries (clinicaltrials.gov; ISRCTN) were searched for potentially unpublished trials. Titles and

abstracts were first screened and obviously ineligible studies removed. The full-text of the remaining papers were then accessed and reviewed.

Data extraction

One reviewer (CP) extracted data from each study using a data extraction sheet created specifically for this review. Any uncertainties were discussed during review meetings with other authors. Trial authors were contacted in the event of missing or unclear data. For each study, information on a number of design, treatment, and outcome related variables were extracted. This included method of randomisation, use of assessor blinding, length of follow-up, diagnosis of participants, equivalence of groups, overall sample size, type of intervention and control, likely contact with therapist in control group, whether interventions were delivered according to a manual (and manual specificity) and duration of therapy (including number of sessions) (see supplements for further detail).

Data conversion and analysis

Procedures outlined in the Cochrane Handbook (Higgins et al., 2011) were used to combine groups where studies had more than two relevant treatment or control arms. Where multiple follow-up data were reported, the longest were included. Meta-analysis was carried out using Comprehensive Meta-Analysis for Windows (CMA, version 2.0) (Borenstein & Rothstein, 2004). For continuous outcomes, pooled standardised mean differences (SMD) and 95% confidence intervals were calculated, with Hedges's g adjustment for small samples. Using the SMD allows multiple continuous measures of the same construct to be combined. All SMDs were interpreted using Cohen's (Cohen, 1988) guidelines: 0.2 signifies a small effect, 0.5 a medium effect and 0.8 a large effect. Odds ratios and 95% confidence intervals were used to quantify group differences in dichotomous outcomes. A random-effects model was applied in all analyses due to the variation between studies (Borenstein, 2009) (i.e. therapy type, length, diagnosis, control group).

Assessment of study and outcome quality

One author assessed study-level risk of bias with the Cochrane Collaboration risk of bias tool (Higgins et al., 2011) and outcome quality using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach (Guyatt et al., 2008). Any uncertainties were discussed with other authors. Further details of ratings and rationale are provided in the supplement.

Subgroup analysis

Subgroup analyses to investigate the effect of single-blind RCT methodology were carried out on all outcomes where there were at least 4 studies. Studies were categorised as either single-blind RCTs or non-blind and/or non-randomised. Additional subgroup analyses were carried out on the primary outcome to examine the effect of therapy type and the nature of control groups (i.e. extra contact with a therapist in the control group). Studies were categorised into three groups to look at differences in therapy types: cognitive behavioural therapies, 'third wave' cognitive behavioural therapies and other therapies. Additionally, some studies included control groups that had more contact with a therapist than usual treatment. This is thought to moderate the summary effect (Button & Munafò, 2015; Wykes, Steel, Everitt, & Tarrier, 2008), therefore all studies were categorised into two groups: probable contact with a therapist in the control group and no probable contact with a therapist in the control group. Details of therapies and control group categories can be found in the supplements. Additional subgroup analysis to explore the moderating role of diagnosis was also carried out in the depression symptom outcome. Three diagnostic groups were identified: depression, psychosis and 'other' which

included one study which evaluated the effectiveness of therapy for behaviours of self-harm. As only one study was included in the 'other' group it was excluded from this subgroup analysis.

Analysis of heterogeneity and publication bias

The I-squared statistic was calculated to determine the proportion of heterogeneity in outcome estimates (Lipsey & Wilson, 2001). Heterogeneity was investigated further if the proportion was judged to be at least moderate, defined as an I-squared value of 40% or more (Higgins & Green, 2011). Duval and Tweedie's Trim and Fill method (Duval & Tweedie, 2000) was used to look for missing studies due to publication bias where ten or more studies were included in the analysis.

Results

A total of 512 studies were retrieved from searching online databases, 13 were retrieved from searching reference lists of included studies and meta-analyses, reviews and other relevant studies (Jauhar et al., 2014; Lynch, Laws, & McKenna, 2010; Mehl, Werner, & Lincoln, 2015; Turner et al., 2014) and one unpublished study was found from emailing relevant authors. Of the 526 full text reports that were examined, 20 individual studies (described in 27 separate reports) were identified for inclusion in one or more of the meta-analyses. Bach et al. (2013) carries out an intention to treat analysis using data from Bach and Hayes (2002) and Gaudiano and Herbert (2006), therefore data from Bach et al. (2013) was used for outcomes where Bach and Hayes (2002) and Gaudiano and Herbert (2006) were both included. The process of study selection is summarised in the PRISMA flow diagram (Figure 1) and a list of studies excluded after inspection of the full-text is provided in the supplement.

Treatment characteristics

Eleven trials examined CBT and the remaining examined MCT (k=3), ACT (k=2), dialectical behaviour therapy (DBT; k=1), eye-movement desensitisation and reprocessing (EMDR; k=1), interpersonal psychotherapy (IPT; k=1) or social skills training (SST; k=1). One trial investigated the efficacy of a 'psychological approach', which in content appeared to be similar to CBT and was therefore included in the CBT category for subgroup analysis (Hayashi, Yamashina, Igarashi, & Kazamatsuri, 2001). Seven studies used a group format to deliver treatment, eleven used an individual format and two used a mixture of both. The period between baseline and post treatment assessment ranged between 2 and 12 weeks. The total number of sessions available ranged between 3 and 54, and the number of sessions available per week was between 1 and 7. The actual number of hours of therapy available ranged widely, between three and 133.

Comparator characteristics

Thirteen trials compared psychological therapy to TAU alone (k=13). Four trials compared psychological therapy to psychoeducation (k=2), cognitive remediation (k=1) and supportive counselling (k=1). The remaining 3 trials had 3 arms, and compared psychological therapy to both TAU and TAU plus a comparator intervention (relaxation therapy and/or supportive counselling).

Risk of bias and GRADE assessment

As shown in Table DS8 the randomised studies generally performed well in relation to random sequence generation, with only a minority (k=4) being judged to have a high risk of bias in this

domain. On the other hand the studies performed very poorly in relation to selective reporting bias, with all but two being judged to have a high risk of such bias. Attrition bias was also high, with over half (k=13-16) of the studies being judged as having a high risk of this type of bias. The risk of bias attributable to the lack of blinding of participants and personnel was unavoidably high given the nature of the interventions being studied. Almost half the studies had a high risk of detection bias because assessors were aware of the group that participants had been allocated to.

A summary of outcome quality can be found in the Table 1. Of the 20 outcomes and subgroup outcomes, 12 were rated as very low quality, eight were rated as low, one was rated as moderate and none were rated as high. Further detail is provided below and justification for these ratings can be found in table DS9 in the supplement.

Outcomes

The results of all meta-analyses and related subgroup analyses are reported in Table 1 and below. Forest plots of subgroup analyses are available in the supplement.

Psychotic symptoms (primary outcome)

Fifteen studies reported post-intervention symptom data, and the pooled estimate suggested psychological therapy was associated with a small to medium benefit over comparators (SMD -0.39; CI -0.64, -0.14; p=0.00) (see Figure 2). Heterogeneity was high (I^2=68%) but there was no clear evidence of publication bias. The quality of the evidence was downgraded due to the majority of included studies being judged to have a high risk of bias on more than one domain, including selective reporting, incomplete data and non-blinding of assessors. Six studies were included in the analysis for follow-up PANSS total scores. The overall effect was small (SMD -0.21) and not significant (CI -0.52 to 0.09) (see Figure 3). Moderate heterogeneity (I^2=59%), wide confidence intervals (including both a moderate effect favouring intervention and a small effect favouring control) and high risk of bias meant the evidence was judged to be very low in quality. Startup et al did not report end of treatment data (Startup, Jackson, & Bendix, 2004), but inclusion of their 6-month follow-up data in the end of treatment meta-analysis and their 12-month follow-up data in the follow-up meta-analysis had no effect on these estimates. There were too few studies to assess publication bias.

Depression and anxiety (secondary outcomes)

Data from six studies suggested psychological therapy was associated with a moderate improvement in depression when compared to comparators (k=6, SMD -0.49, CI -0.83 to -0.15, p = 0.01) (see Figure 4). Inclusion of follow-up data from Startup et al had no effect on estimates. Four studies provided data on anxiety. The pooled estimate suggested psychological therapy was associated with a moderate to large benefit at end of treatment (k=4, SMD -0.68, CI -1.29 to -0.07, p = 0.03) (see Figure 5). Imprecision and risk of detection bias, selective reporting bias and attrition bias meant we judged the evidence to be very low in quality. Some heterogeneity was observed (depression I^2=50%; anxiety I^2=60%), however there was a clear direction of effect for both estimates. There were too few studies to assess publication bias.

Readmission (secondary outcome)

Six studies provided readmission data, and together these suggested active psychological therapy was associated with a reduction in odds of readmission by just over a third (OR 0.62, CI 0.46, 0.84, z=-3.05, p=0.00) (see Figure 6). Very little heterogeneity was observed (I^2=12%), however the relative weight was not evenly distributed between studies with one study (Veltro et al., 2006) contributing approximately 50%. Excluding this study did not change the

magnitude or the significance of the effect (OR=0.68, CI 0.47 to 0.99). The quality of evidence was judged to be low because of a high risk of detection bias, attrition bias and selective reporting bias. There were too few studies to assess publication bias.

Moderator analyses

The use of single-blind randomised controlled methodology
Eight studies employed single-blind randomised controlled methodology (Aghotor, Pfueller, Moritz, Weisbrod, & Roesch-Ely, 2010; Bechdolf et al., 2004; Habib, Dawood, Kingdon, & Naeem, 2015; Haddock et al., 1999; Kim, Choi, & Kim, 2010; Lewis et al., 2002; Moritz, Veckenstedt, Randjbar, Vitzthum, & Woodward, 2011; Schramm et al., 2007) and seven were either not randomised and/or did not employ blinding (Bach & Hayes, 2002; Gaudiano & Herbert, 2006; Hall & Tarrier, 2003; Hayashi et al., 2001; Kumar et al., 2010; Shelley et al., 2001; Startup et al., 2004). Excluding blind RCTs led to an increase in the effect size for overall psychotic symptoms at end of treatment (SMD -0.68, CI=-1.02, -0.35; p=0.00), and excluding non-blind or non-randomised studies reduced it (SMD -0.16, CI=-0.45, 0.13; p=0.28). This difference was significant (Q=5.47, df=1, p=0.02), suggesting that blinding and/or randomisation was significantly and inversely associated with estimates of effectiveness in this domain. However both overall estimates were judged to be very low in quality, in part because dividing the data this way introduced imprecision to both estimates. At follow-up, single-blind RCTs studies (k=4) reported no association between therapy and symptom improvement (SMD -0.01, CI-0.22, 0.19; p=0.91; very low quality evidence), whereas non-blind and/or non-randomised studies (k=2) reported a large association (SMD -0.83, CI -1.28, -0.19; p=0.00; very low-quality evidence). This difference was again significant (Q=10.71, df=1, p=0.00).

The use of single-blind randomised methodology did not emerge as a significant moderator of readmission (Q=2.78, df=1, p=0.10). However the overall effect in four single-blind RCTs compared to all controls was small and non-significant 0.83 (CI 0.54, 1.28; p=0.40; low quality evidence). The evidence was rated as low quality because the included studies were judged to have a high risk of other forms of bias and because the confidence intervals for the estimate were very wide. The overall effect size for three non-blind studies compared to all controls was larger and significant -0.52 (CI 0.37, 0.73; p=0.00; low quality evidence). Psychological therapy had a small and non-significant effect on depression in blind RCTs (SMD -0.33 CI-0.84, 0.18; p=0.21) and a moderate to large effect in non-blind and/or non-randomised trials (SMD -0.67 (CI -1.18, -0.16; p=0.01), however this difference was not significant (Q=0.84, df=1, p=0.36). These outcomes were judged to be low and very low in quality, respectively, in part because of the risk of bias in the individual studies and in part because the estimate was imprecise. There were too few studies to examine the relationship between study quality and the effect of therapy on anxiety.

The following analyses were conducted on the primary outcome of overall symptoms at end of treatment.

Type of psychological therapy
The overall association between therapy and symptom improvement was not moderated by therapy type (Q=0.43, df=2, p=0.81). CBT (k=8) had an overall moderate effect (SMD -0.45, CI -0.85, -0.07; p=0.02; very low quality evidence), 'Third Wave' approaches (k=5) had an effect of similar magnitude (SMD, -0.44, CI -0.95, 0.06; p=0.09; very low quality evidence) and 'other' approaches (k=2; EMDR and IPT) combined had a small and non-significant effect (SMD -0.19 (CI -0.90, 0.53; p=0.61; low quality evidence).

Contact with therapist in control group
Probable contact with a therapist in the control group emerged as a significant moderator. The association between active therapy and symptom improvement in trials where there was no probable therapist contact in the control group (k=7) was large (SMD -0.77, CI=-1.09, -0.45; p=0.00; very low quality evidence), and significantly higher (Q=9.46, DF=1, p=0.00) than the for studies where there was probable therapist contact in the control group (k=8; SMD = -0.12, CI=-0.38, 0.13; p=0.35; low quality evidence).

Diagnosis
A post hoc analysis found no evidence that diagnosis of participants moderated the effect of therapy on depression (Q=4.05, df=2, p=0.13). The association between psychological therapy and improved depression was moderate in trials where participants also had psychosis (k=3; SMD -0.48, CI -1.03, 0.08; p=0.09; low quality evidence) but small where participants had depression only (k=3; SMD -0.30, CI -0.70, 0.10; p=0.14; low quality evidence), however these estimates were not significantly different.

Discussion

This meta-analysis synthesised, for the first time, findings from studies that explored the effectiveness of brief psychological therapy for inpatients receiving acute mental healthcare. We focused on the effect of therapy on outcomes that matter to both clinicians and patients - psychotic symptoms, emotional distress and risk of readmission. Although psychological therapy was significantly associated with reduced observer-rated psychotic symptoms, risk of readmission and emotional distress (depression and anxiety), our findings replicate those of previous meta-analyses (Turner et al., 2014; Wykes et al., 2008), in that effect sizes were smaller in studies employing both randomisation and rater blinding. Inverse associations between study quality and effect sizes were observed for all outcomes, although this was only significant in relation to psychotic symptoms.

It is important to note, however, that analyses of moderator variables in meta-analyses, such as those related to study quality, only produce estimates of the association between variables. As with subgroup analyses of clinical trials, the absence of experimental manipulation requires plausible alternative explanations to be ruled out before we are able to draw causal inferences. It is possible that the relationship between single-blind RCT methodology and effect sizes we observed reflects the operation of some third variable or variables. As we have discussed single-blind RCTs are challenging to implement in an acute psychiatric care setting. Patients who are in crisis, subject to compulsory care or actively suicidal may be unwilling to be randomised or may not be eligible for inclusion. Non-randomised studies may be more acceptable to these individuals and their clinicians, and may operate with more lenient exclusion criteria. Thus, although they suffer from lower internal validity, they may have an advantage in terms of external validity which in turn may account for their larger effects. Similar arguments have been made in relation to long-acting injectable antipsychotic medication and community treatment orders (Hastings & Gray, 2016), where blind randomised trials have failed to replicate the effects of naturalistic studies (Haddad, Kishimoto, Correll, & Kane, 2015). Whether these arguments are justified is moot, but it is essential that pharmacological and psychological interventions are evaluated against the same standards.

Although previous meta-analyses have found different therapies are effective in reducing specific psychotic symptoms (Turner et al., 2014; Zimmermann, Favrod, Trieu, & Pomini,

2005) their results were based largely on trials conducted in an outpatient setting. In contrast, our analysis of inpatient trials found no evidence to favour one specific type of psychological therapy over another in terms of symptom relief. In addition, we found that the advantage of active psychological therapy over control treatments was significantly smaller when the control treatment involves contact with a therapist. Together, these findings suggest that what may be particularly important to inpatients receiving acute mental healthcare is having the opportunity to spend time with a trained therapist. If active ingredients identified in both 'directive' and 'non-directive' therapies (e.g. establishing trust, alliance and engagement), are beneficial for inpatient, this would have implications for the design of a psychologically informed acute inpatient service. A stepped approach to psychological intervention, for example, recognises the impact of basic psychological ingredients which may be provided by frontline staff, i.e. healthcare assistants and nursing staff, for whom more senior psychologically trained professionals provide supervision and reflective support to maintain a therapeutic milieu and psychological presence. Some inpatient initiatives already recognise the potential impact of creating a psychological stance within the multidisciplinary inpatient workforce (Clarke & Wilson, 2009), however rigorous evaluation is still required to establish effectiveness. It is also possible that the process of psychological intervention in this context informs longer term psychological therapy, however further research is needed to examine this question.

Limitations

The definition of psychological therapy adopted in this review focused on 'directive' talking psychotherapies, therefore excluding 'non-directive' psychosocial talking therapies such as befriending and supportive counselling. Whether non-directive therapies improve outcomes for acute inpatients compared to usual treatment, and whether directive therapies improve outcomes more than non-directive therapies remains unclear, therefore further investigation is warranted. Studies where over 50% of participants were outpatients were also excluded. This may defer focus from the inpatient context that this meta-analysis aimed to investigate. However, only one study included outpatients, of which there were only 17% (Lewis, et al. 2002). Although inpatient stays vary in length, studies where average stay exceeded 90 days were excluded from this review to maintain focus on the acute setting. Future studies may wish to include greater variance in length of stay to explore the mediating effect on treatment outcome. Additionally, our meta-analysis was unable to shed light on which types of therapy are most effective in an acute setting, and recommendations regarding an acceptable and effective duration or intensity of therapy cannot yet be made, as the evidence base does not currently allow meta-analysis to explore these issues. Again, this is largely due to the small size and limited quality of the overall evidence. Future research may address these issues. Definitive trials examining 'what works for whom' would be useful and identifying patient and therapy characteristics that predict therapy response and non-response would be particularly informative. Future research may be able to identify what dose, format, intensity and type of therapy is most effective and acceptable. Finally, only one author screened papers, extracted data and assessed risk of bias of studies and quality of outcomes. Although two reviewers are recommended to complete such tasks to minimise potential bias (Lipsey & Wilson, 2001), all decisions were carefully reviewed and discussed with the review team.

Implications

Provision of psychological therapy in an acute psychiatric inpatient care setting is associated with improvements in overall psychotic symptoms, reduced readmissions, and improved depression and anxiety. However the use of randomisation and rater blinding was inversely associated with these outcomes. Adequately powered trials that seek to maximise both internal and external validity are now required to overcome the limitations of the existing evidence, and

future work is needed to further understand specific components of therapy which are conducive to recovery (e.g. the therapeutic relationship, distress management or problem formulation). Whether such therapy has benefits on patient centred outcomes, such as quality of life, self-esteem or recovery, remains unclear and future studies should consider measuring these important outcomes.

References

Aghotor, J., Pfueller, U., Moritz, S., Weisbrod, M., & Roesch-Ely, D. (2010). Metacognitive training for patients with schizophrenia (MCT): Feasibility and preliminary evidence for its efficacy. *Journal of Behavior Therapy and Experimental Psychiatry*, *41*(3), 207–211. http://doi.org/10.1016/j.jbtep.2010.01.004

Bach, P., Gaudiano, B. A., Hayes, S. C., Herbert, J. D., Bach, P., Gaudiano, B. A., … James, D. (2013). Acceptance and commitment therapy for psychosis : intent to treat , hospitalization outcome and mediation by believability. *Psychosis*, *5*(2), 166–174. http://doi.org/10.1080/17522439.2012.671349

Bach, P., & Hayes, S. C. (2002). The Use of Acceptance and Commitment Therapy to Prevent the Rehospitalization of Psychotic Patients : A Randomized Controlled Trial. *Journal of Consulting and Clinical Psychology*, *70*(5), 1129–1139. http://doi.org/10.1037//0022-006X.70.5.1129

Bechdolf, A., Knost, B., Kuntermann, C., Schiller, S., Klosterkotter, J., Hambrecht, M., & Pukrop, R. A. (2004). A randomized comparison of group cognitive-behavioural therapy and group psychoeducation in patients with schizophrenia. *Acta Psychiatrica Scandinavica*, *110*, 21–28. http://doi.org/10.1111/j.1600-0447.2005.00649.x

Beck, A., Epstein, N., Brown, G., & Steer, R. (1988). An inventory for measuring clinical anxiety: psychometric properties. *Journal of Consulting and Clinical Psychology*, *56*(6), 893–7. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/3204199

Beck, A., Steer, R., & Brown, G. (1996). *Manual for the Beck Depression Inventory-II*. San Antonion: Psychological Corporation.

Birchwood, M., Shiers, D., & Smith, J. (2014). CBT for psychosis: not a “quasi neuroleptic.” *British Journal of Psychiatry*. http://doi.org/10.1192/bjp.204.6.488

Black, N. (1996). Why we need observational studies to evaluate the effectiveness of health care. *BMJ*, *312*(7040), 1215–1218. http://doi.org/10.1136/bmj.312.7040.1215

Borenstein, M. (2009). *Introduction to meta-analysis* (1st ed.). Chichester, UK: John Wiley & Sons.

Borenstein, M., & Rothstein, H. (2004). *Comprehensive Meta-Analysis*. Engelwood, NJ: Biostat.

Bright. (2008). Star wards: Practical ideas for improving the daily experiences and treatment outcomes of acute metal health inpatients. Retrieved from http://www.horticulturaltherapy.info/documents/starwardsprogranandcsourbyquotepage28.pdf

Brooker, C., Ricketts, T., Bennett, S., & Lemme, F. (2007). Admission decisions following contact with an emergency mental health assessment and intervention service. *Journal of Clinical Nursing*, *16*(7), 1313–1322. http://doi.org/10.1111/j.1365-2702.2007.01302.x

Button, K. S., & Munafò, M. R. (2015). Addressing risk of bias in trials of cognitive behavioral therapy. *Shanghai Archives of Psychiatry*, *27*(3), 144–8. http://doi.org/10.11919/j.issn.1002-0829.215042

Canadian Psychiatric Association. (2005). Clinical practice guidelines: treatment of schizophrenia. *Canadian Journal of Psychiatry*, *50*(suppl1), 1s–57s.

Clarke, I. (1999). Cognitive Therapy and Serious Mental Illness. *Clinical Psychology & Psychotherapy*, *6*(5), 375–383. http://doi.org/10.1002/(SICI)1099-0879(199911)6:5<375::AID-CPP216>3.0.CO;2-C

Clarke, I., & Wilson, H. (Eds.). (2009). *Cognitive behaviour therapy for acute inpatient mental health units: Working with clients, staff and the milieu.* London, UK: Routledge Forthcoming. Retrieved from

http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=psyc6&NEWS=N&AN=2008-07840-000

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (1st ed.). Hillsdale, NJ: Erlbaum Associates.

Department of Health. (2015). Mental health service reform. Retrieved from https://www.gov.uk/government/publications/2010-to-2015-government-policy-mental-health-service-reform

Derogatis, L. (2001). *Brief Symptom Inventory (BSI)-18. Administration, scoring and procedures manual*. Minneapolis: NCS Pearson.

Duval, S., & Tweedie, R. (2000). Trim and Fill: A Simple Funnel-Plot-Based Method. *Biometrics*, *56*(2), 455–463. http://doi.org/10.1111/j.0006-341x.2000.00455.x

Garety, P., Fowler, D., Kuipers, E., Freeman, D., Dunn, G., Bebbington, P., … Jones, S. (1997). London East Anglia randomised controlled trial of cognitive-behavioural therapy for psychosis .2. Predictors of outcome. *British Journal of Psychiatry*, *171*, 420–426. http://doi.org/10.1192/bjp.171.5.420

Garety, P. P. A., Fowler, D. D. G., Freeman, D., Bebbington, P., Dunn, G., & Kuipers, E. (2008). Cognitive–behavioural therapy and family intervention for relapse prevention and symptom reduction in psychosis: randomised controlled trial, *192*(6), 412–423. http://doi.org/10.1192/bjp.bp.107.043570

Gaudiano, B. A., & Herbert, J. D. (2006). Acute treatment of inpatients with psychotic symptoms using Acceptance and Commitment Therapy: Pilot results. *Behaviour Research and Therapy*, *44*(3), 415–437. http://doi.org/10.1016/j.brat.2005.02.007

Guyatt, G. H., Oxman, A. D., Vist, G. E., Kunz, R., Falck-, Y., Alonso-coello, P., & Schünemann, H. J. (2008). GRADE : An Emerging Consensus on Rating Quality of Evidence and Strength of Recommendations. *British Medical Journal*, *336*(April), 924–926. http://doi.org/10.1136/bmj.39489.470347.AD

Habib, N., Dawood, S., Kingdon, D., & Naeem, F. (2015). Preliminary Evaluation of Culturally Adapted CBT for Psychosis (CA-CBTp): Findings from Developing Culturally-Sensitive CBT Project (DCCP). *Behavioural and Cognitive Psychotherapy*, *43*(2), 200–208. http://doi.org/10.1017/S1352465813000829

Haddad, P. M., Kishimoto, T., Correll, C. U., & Kane, J. M. (2015). Ambiguous findings concerning potential advantages of depot antipsychotics. *Current Opinion in Psychiatry*, *28*(3), 216–221. http://doi.org/10.1097/YCO.0000000000000160

Haddock, G., Barrowclough. C, Shaw, J., Dunn, G., Novaco, R., & Tarrier, N. (2009). Cognitive-behavioural therapy v. social activity therapy for people with psychosis. *British Journal of Psychiatry*, *194*(2), 152–157. http://doi.org/10.1192/bjp.bp.107.039859

Haddock, G., Eisner, E., Boone, C., Davies, G., Coogan, C., & Barrowclough, C. (2014). An investigation of the implementation of NICE-recommended CBT interventions for people with schizophrenia. *Journal of Mental Health*, *8237*(4), 1–4. http://doi.org/10.3109/09638237.2013.869571

Haddock, G., Tarrier, N., Morrison, A., Hopkins, R., Drake, R., & Lewis, S. . (1999). A pilot study evaluating the effectiveness of individual inpatient cognitive-behavioural therapy in early psychosis. *Social Psychiatry and Psychiatric Epidemiology*, *34*(5), 254–258. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/10396167

Hall, P. L., & Tarrier, N. (2003). The cognitive-behavioural treatment of low self-esteem in psychotic patients: A pilot study. *Behaviour Research and Therapy*, *41*(3), 317–332. http://doi.org/10.1016/S0005-7967(02)00013-X

Hall, R. C. W. (1995). Global assessment of functioning. A modified scale. *Psychosomatics*, *36*(3), 267–75. http://doi.org/10.1016/S0033-3182(95)71666-8

Hamilton, M. (1960). A Rating Scale for Depression. *J. Neurol. Neurosurg. Psychiat*, *23*, 56–62. http://doi.org/10.1136/jnnp.23.1.56

Hastings, T. J., & Gray, J. E. (2016). Community Treatment Orders Disconnect. *The Canadian Journal of Psychiatry*, *61*(7), 435–436. http://doi.org/10.1177/0706743716645306

Hayashi, N., Yamashina, M., Igarashi, Y., & Kazamatsuri, H. (2001). Improvement of patient attitude toward treatment among inpatients with schizophrenia and its related factors: Controlled study of a psychological approach. *Comprehensive Psychiatry*, *42*(3), 240–246. http://doi.org/10.1053/comp.2001.23136

Hazell, C. M., Hayward, M., Cavanagh, K., & Strauss, C. (2016). A systematic review and meta-analysis of low intensity CBT for psychosis. *Clinical Psychology Review*. http://doi.org/10.1016/j.cpr.2016.03.004

Higgins, J., & Green, S. (2011). *Cochrane Handbook for Systematic Reviews of Interventions | Cochrane Training*. *The Cochrane Collaboration*. Retrieved from http://training.cochrane.org/handbook

Higgins, J. P. T., Altman, D. G., Gøtzsche, P. C., Jüni, P., Moher, D., & Oxman, A. D. (2011). The Cochrane Collaboration ' s tool for assessing risk of bias in randomised trials. *British Medical Journal*, *343:d5928*, 1–9. http://doi.org/10.1136/bmj.d5928

Jauhar, S., McKenna, P. J., Radua, J., Fung, E., Salvador, R., & Laws, K. R. (2014). Cognitive-behavioural therapy for the symptoms of schizophrenia: Systematic review and meta-analysis with examination of potential bias. *British Journal of Psychiatry*, *204*(1), 20–29. http://doi.org/10.1192/bjp.bp.112.116285

Kay, S. R. (1990). Positive-negative symptom assessment in schizophrenia: Psychometric issues and scale comparison. *Psychiatric Quarterly*, *61*(3), 163–178. http://doi.org/10.1007/BF01064966

Khoury, B., Lecomte, T., Fortin, G., Masse, M., Therien, P., Bouchard, V., … Hofmann, S. G. (2013). Mindfulness-based therapy: A comprehensive meta-analysis. *Clinical Psychology Review*, *33*(6), 763–771. http://doi.org/10.1016/j.cpr.2013.05.005

Kim, D., Choi, J., & Kim, S. (2010). A Pilot Study of Brief Eye Movement Desensitization and Reprocessing (EMDR) for Treatment of Acute Phase Schizophrenia. *Korean Journal of Biological Psychiatry*, *17*(2), 94–102. Retrieved from http://journal.biolpsychiatry.or.kr/asp/pdfdown.asp?pn=0092010010

Kumar, D., Ul Haq, M. Z., Dubey, I., Dotivala, K. N., Siddiqui, S. V., Prakash, R., … Nizamie, S. H. (2010). Effect of meta-cognitive training in the reduction of positive symptoms in schizophrenia. *European Journal of Psychotherapy and Counselling*, *12*(2), 149–158. http://doi.org/10.1080/13642537.2010.488875

Lam, D. H., Burbeck, R., Wright, K., & Pilling, S. (2009, August). Psychological therapies in bipolar disorder: The effect of illness history on relapse prevention - A systematic review. *Bipolar Disorders*. http://doi.org/10.1111/j.1399-5618.2009.00724.x

Lehman, A. F., Lieberman, J. A., Dixon, L. B., McGlashan, T. H., Miller, A. L., Perkins, D. O., & Kreyenbuhl, J. (2010). *Practice Guideline for the Treatment of Patients With Schizophrenia*. *American Psychiatric Association*. Retrieved from https://psychiatryonline.org/pb/assets/raw/sitewide/practice_guidelines/guidelines/schizophrenia.pdf

Leucht, S., Rothe, P., Davis, J. M., & Engel, R. R. (2013). Equipercentile linking of the BPRS and the PANSS. *European Neuropsychopharmacology*, *23*(8), 956–959. http://doi.org/10.1016/j.euroneuro.2012.11.004

Lewis, S., Tarrier, N., Haddock, G., Bentall, R., Kinderman, P., Kingdon, D., … Dunn, G. (2002). Randomised controlled trial of cognitive −− behavioural therapy in early schizophrenia : acute-phase outcomes Randomised controlled trial of cognitive

behavioural therapy in early schizophrenia : *British Journal of Psychiatry*, *181*(43), 91–97. http://doi.org/10.1192/bjp.181.43.s91

Lipsey, M., & Wilson, D. (2001). *Practical Meta-analysis*. Thousand Oaks, California: Sage Publications.

Lynch, D., Laws, K. R., & McKenna, P. J. (2010). Cognitive behavioural therapy for major psychiatric disorder: does it really work? A meta-analytical review of well-controlled trials. *Psychological Medicine*, *40*(1), 9–24. http://doi.org/10.1017/S003329170900590X

McGorry, P., Killackey, E., Lambert, T., Lambert, M., Jackson, H., & Codyre, D. (2005). Royal Australian and New Zealand College of Psychiatrists clinical practice guidelines for the treatment of schizophrenia and related disorders. *Australian and New Zealand Journal of Psychiatry*, *39*(1–2), 1–30. Retrieved from http://onlinelibrary.wiley.com/store/10.1111/j.1440-1614.2005.01516.x/asset/j.1440-1614.2005.01516.x.pdf?v=1&t=j5asfe5w&s=c554c714da4269aa4862a63802598e9375060ac9

McKenna, P., & Kingdon, D. (2014). Has cognitive behavioural therapy for psychosis been oversold? *BMJ (Clinical Research Ed.)*. http://doi.org/http://dx.doi.org/10.1136/bmj.g2295

Mehl, S., Werner, D., & Lincoln, T. M. (2015). Does Cognitive Behavior Therapy for psychosis (CBTp) show a sustainable effect on delusions? A meta-analysis. *Frontiers in Psychology*, *6*(OCT), 1450. http://doi.org/10.3389/fpsyg.2015.01450

Mental Health Network. (2012). *Defining mental health services*. Retrieved from http://www.nhsconfed.org/~/media/Confederation/Files/Publications/Documents/Defining_mental_health_services.pdf

Moritz, S., Veckenstedt, R., Randjbar, S., Vitzthum, F., & Woodward, T. S. (2011). Antipsychotic treatment beyond antipsychotics: metacognitive intervention for schizophrenia patients improves delusional symptoms. *Psychological Medicine*, *41*(9), 1823–1832. http://doi.org/10.1017/S0033291710002618

National Institute for Health and Care Excellence. (2009). Borderline personality disorder: recognition and management. *NICE CG78*. Retrieved from https://www.nice.org.uk/guidance/cg78

National Institute for Health and Care Excellence. (2014). Psychosis and schizophrenia in adults: prevention and management. *NICE CG178*. Retrieved from http://www.nice.org.uk/guidance/cg178/ evidence/cg178-psychosis-and-schizophrenia-in-adults-full-guideline3

Overall, J., & Gorham, D. (1962). The Brief Psychiatric Rating Scale. *Psychological Reports*, *10*, 267–75.

Pilkonis, P. A., Choi, S. W., Reise, S. P., Stover, A. M., Riley, W. T., Cella, D., & PROMIS Cooperative Group. (2011). Item Banks for Measuring Emotional Distress From the Patient-Reported Outcomes Measurement Information System (PROMIS(R)): Depression, Anxiety, and Anger. *Assessment*, *18*(3), 263–283. http://doi.org/10.1177/1073191111411667

Rethink. (2004). Behind Closed Doors: The current state and future vision of acute mental health care in the UK. Retrieved from https://www.scie-socialcareonline.org.uk/behind-closed-doors-acute-mental-health-care-in-the-uk-the-current-state-and-future-vision-of-acute-mental-health-care-in-the-uk/r/a11G0000001830OIAQ

Samara, M. T., Engel, R. R., Millier, A., Kandenwein, J., Toumi, M., & Leucht, S. (2014). Equipercentile linking of scales measuring functioning and symptoms: Examining the GAF, SOFAS, CGI-S, and PANSS. *European Neuropsychopharmacology*, *24*(11), 1767–1772. http://doi.org/10.1016/j.euroneuro.2014.08.009

Schizophrenia Commission. (2012). *The Abandoned Illness: a Report from the Schizophrenia*

Commission. Retrieved from https://www.rethink.org/media/514093/TSC_main_report_14_nov.pdf

Schramm, E., Van Calker, D., Dykierek, P., Lieb, K., Kech, S., Zobel, I., … Berger, M. (2007). An intensive treatment program of interpersonal psychotherapy plus pharmacotherapy for depressed inpatients: Acute and long-term results. *American Journal of Psychiatry*, *164*(5), 768–777. http://doi.org/10.1176/appi.ajp.164.5.768

Sensky, T., Turkinggon, D., Kingdom, D., Scott, J., Scott, J., & Siddle, R. (2000). A randomized controlled trial of cognitive-behavioral therapy for persistent symptons on schizophrenia resistant to medication. *Arch Gen Psychiatry*, *57*(2), 165–72. Retrieved from http://archpsyc.jamanetwork.com/article.aspx?articleid=481567

Shelley, A., Battaglia, J., Lucey, J., & Opler, L. A. (2001). Symptom-Specific Group Therapy for Inpatients with Schizophrenia. *Einstein Quarterly Journal of Biology and Medicine*, *18*, 21–28. Retrieved from https://www.researchgate.net/publication/247690942_Symptom-Specific_Group_Therapy_for_Inpatients_with_Schizophre_n_i_a

Startup, M., Jackson, M., & Bendix, S. (2004). North Wales randomized controlled trial of cognitive behaviour therapy for acute schizophrenia spectrum disorders: outcomes at 6 and 12 months. *Psychological Medicine*, *34*(3), 413–422. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/15259826

Turkington, D., Sensky, T., Scott, J., & Barnes, T. (2008). A randomized controlled trial of cognitive-behavior therapy for persistent symptoms in schizophrenia: a five-year follow-up. *Schizophrenia*, *98*(1–3), 1–7. http://doi.org/10.1016/j.schres.2007.09.026

Turner, D. T., Van Der Gaag, M., Karyotaki, E., & Cuijpers, P. (2014). Psychological interventions for psychosis: A meta-analysis of comparative outcome studies. *American Journal of Psychiatry*, *171*(5), 523–538. http://doi.org/10.1176/appi.ajp.2013.13081159

van der Laan, L., Van Spaendonck, K., Horstink, M. W. I. M., & Goris, R. J. A. (1999). The symptom checklist-90 revised questionnaire: No psychological profiles in complex regional pain syndrome-dystonia. *Journal of Pain and Symptom Management*, *17*(5), 357–362. http://doi.org/10.1016/S0885-3924(99)00009-3

Veltro, F., Falloon, I., Vendittelli, N., Oricchio, I., Scinto, A., Gigantesco, A., & Morosini, P. (2006). Effectiveness of cognitive-behavioural group therapy for inpatients. *Clinical Practice and Epidemiology in Mental Health*, *2*(16). http://doi.org/10.1186/1745-0179-2-16

Wykes, T., Steel, C., Everitt, B., & Tarrier, N. (2008). Cognitive behavior therapy for schizophrenia: Effect sizes, clinical models, and methodological rigor. *Schizophrenia Bulletin*, *34*(3), 523–537. http://doi.org/10.1093/schbul/sbm114

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *British Medical Journal (Clinical Research Ed.)*, *67*(6), 344. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/3080166

Zimmermann, G., Favrod, J., Trieu, V. H., & Pomini, V. (2005). The effect of cognitive behavioral treatment on the positive symptoms of schizophrenia spectrum disorders: A meta-analysis. *Schizophrenia Research*, *77*(1), 1–9. http://doi.org/10.1016/j.schres.2005.02.018

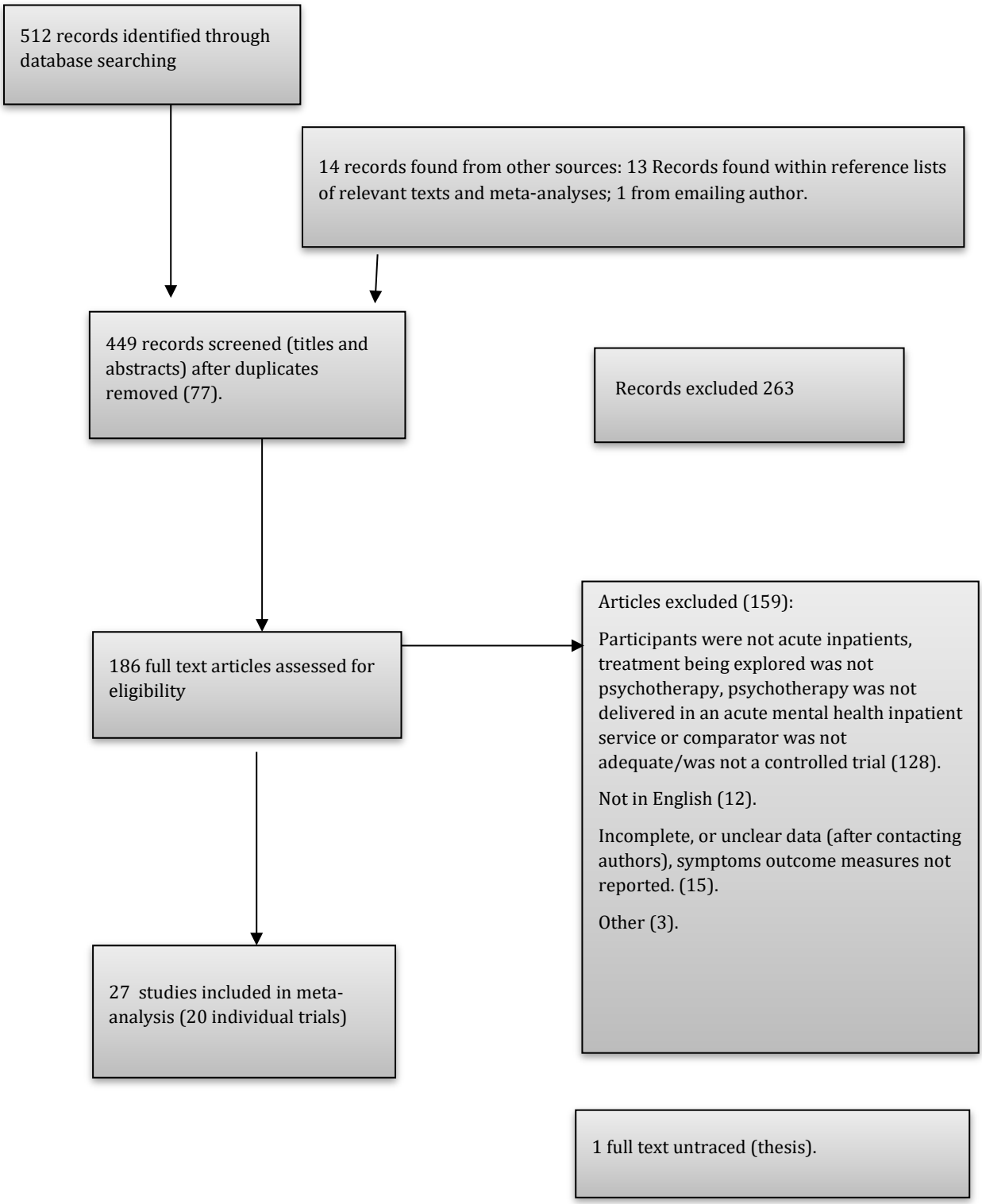


Figure 1: PRISMA flowchart of exclusions

Table 1

Summary of results of meta-analyses and subgroup analyses

Outcomes (k studies)	N	SMD or OR	95% CI	P	Z-Score	I^2 (%)	Tau	T^2	Quality rating
Post PANSS total (15)	993	-0.39	-0.64, -0.14	0.00	-3.44	67.86	0.41	0.17	VL
Post PANSS total (randomised and single-blind studies) (8)	686	-0.16	-0.45, 0.13	0.28	-1.08	56.10	0.30	0.09	VL
Post PANSS total (non-randomised and non-blind studies) (7)	307	-0.68	-1.02, -0.35	0.00	-3.44	49.79	0.33	0.11	VL
Post PANSS total (probable contact with therapist in control group) (8)	520	-0.12	-0.38, 0.13	0.35	-0.94	30.68	0.17	0.03	L
Post PANSS total (no probable contact with therapist in control group) (7)	295	-0.75	-1.06, -0.44	0.00	-4.67	55.04	0.38	0.14	VL
Post PANSS total CBT (8)	670	-0.44	-0.80, -0.07	0.02	-2.33	82.06	0.59	0.34	VL
Post PANSS total third-wave (5)	170	-0.43	-0.92, 0.06	0.09	-1.72	0.00	0.00	0.00	VL
Post PANSS total other (2)	153	-0.18	-0.89, 0.52	0.61	-0.51	0.00	0.00	0.00	L
Follow-up PANSS total (6)	501	-0.21	-0.52, 0.09	0.18	-1.35	58.50	0.29	0.08	VL
Follow-up PANSS total (randomised and single-blind studies) (4)	420	-0.01	-0.22, 0.19	0.91	-0.12	0.00	0.00	0.00	VL

Follow-up PANSS total (non-randomised and non-blind studies) (2)	81	-0.83	-1.28, -0.38	0.00	-3.64	0.00	0.00	0.00	VL
Readmissions (7)	1376	0.62 (OR)	0.46, 0.84	0.00	-3.05	11.34	0.14	0.02	L
Readmissions (randomised and single-blind studies) (4)	523	0.83 (OR)	0.54, 1.28	0.40	-0.85	0.00	0.00	0.00	L
Readmissions (non-randomised and non-blind studies) (3)	853	0.52 (OR)	0.37, 0.73	0.00	-3.77	0.00	0.00	0.00	L
Depression (7)	338	-0.49	-0.83, -0.15	0.01	-2.80	49.65	0.32	0.10	VL
Depression (randomised and single-blind studies) (3)	183	-0.32	-0.83, 0.18	0.21	-1.26	0.00	0.00	0.00	L
Depression (non-randomised and non-blind studies) (4)	155	-0.65	-1.14, -0.15	0.01	-2.56	68.33	0.56	0.32	VL
Depression (psychosis) (3)	74	-0.46	-0.99, 0.08	0.09	-1.84	53.63	0.49	0.00	L
Depression (depression) (3)	199	-0.30	-0.69, 0.09	0.14	-2.23	0.00	0.00	0.00	L
Anxiety (4)	149	-0.68	-1.29, -0.07	0.03	-2.22	59.98	0.48	0.23	VL

H (high); L, low; M, moderate; OR, odd ratio; PANSS, Positive and Negative Symptom Scale;SMD, Standardised mean difference; VL, very low.

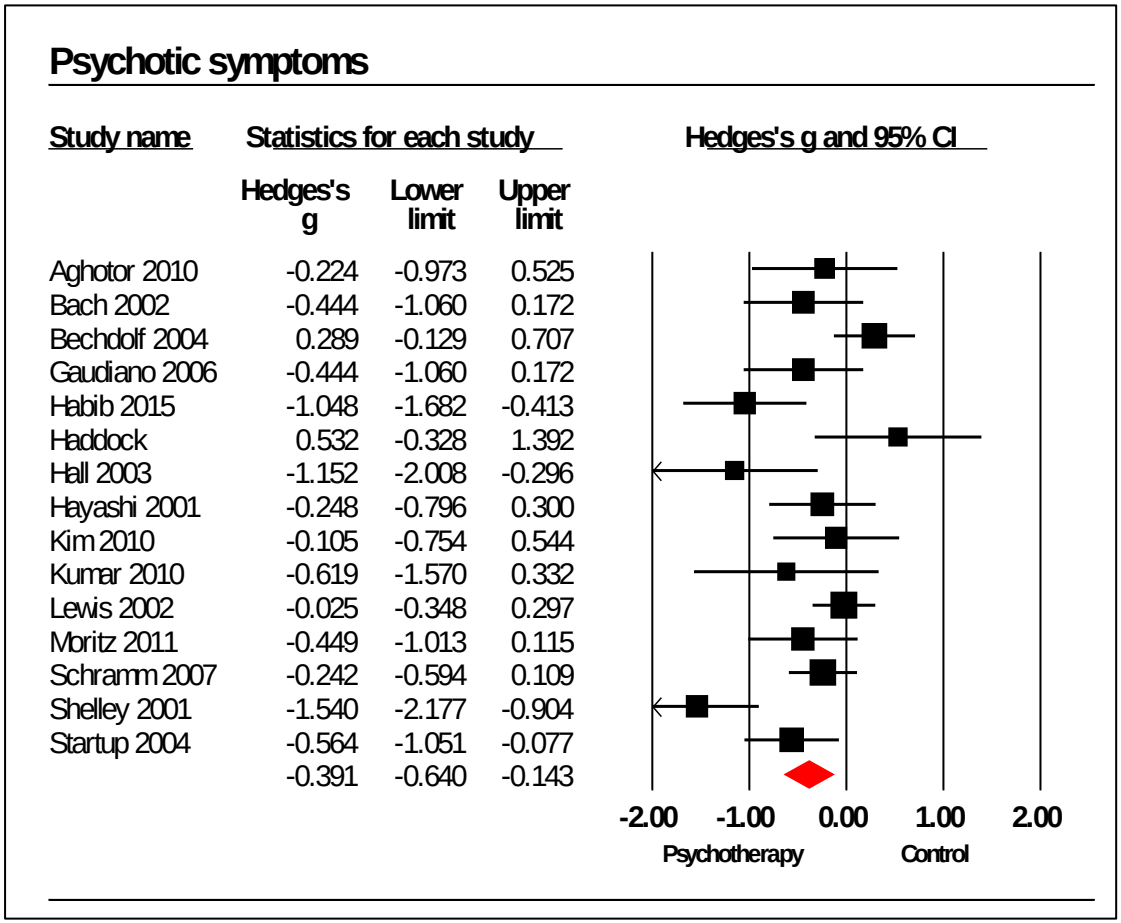


Figure 2: The effect of psychological interventions on psychotic symptoms at end of treatment

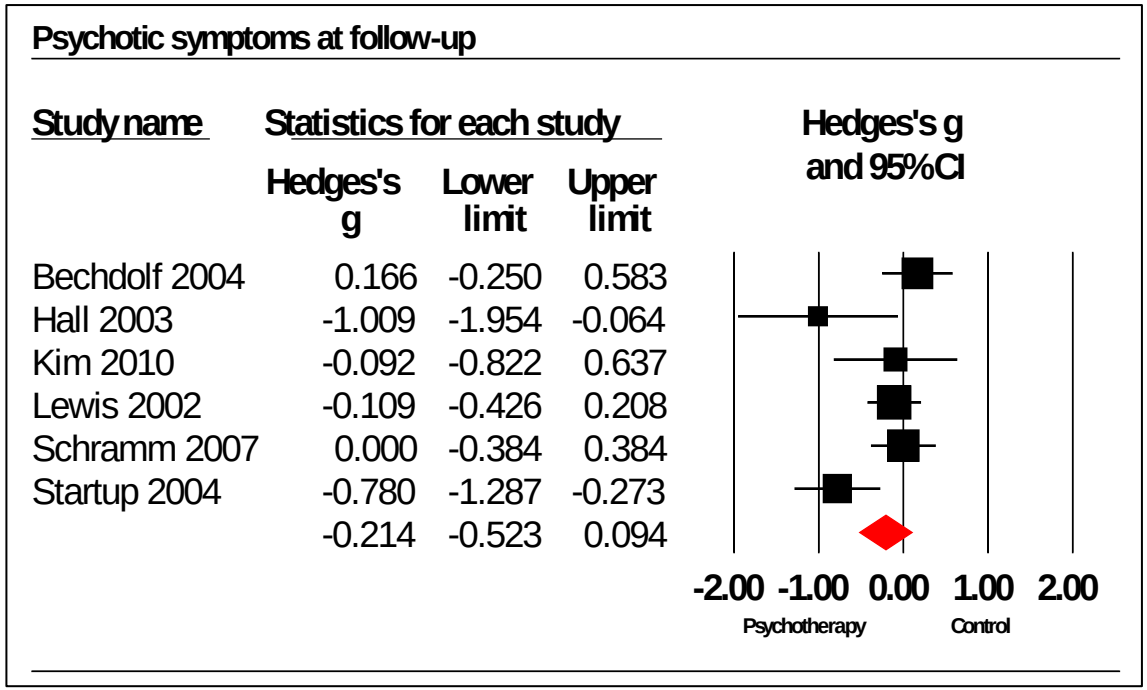


Figure 3: The effect of psychological interventions on psychotic symptoms at follow-up

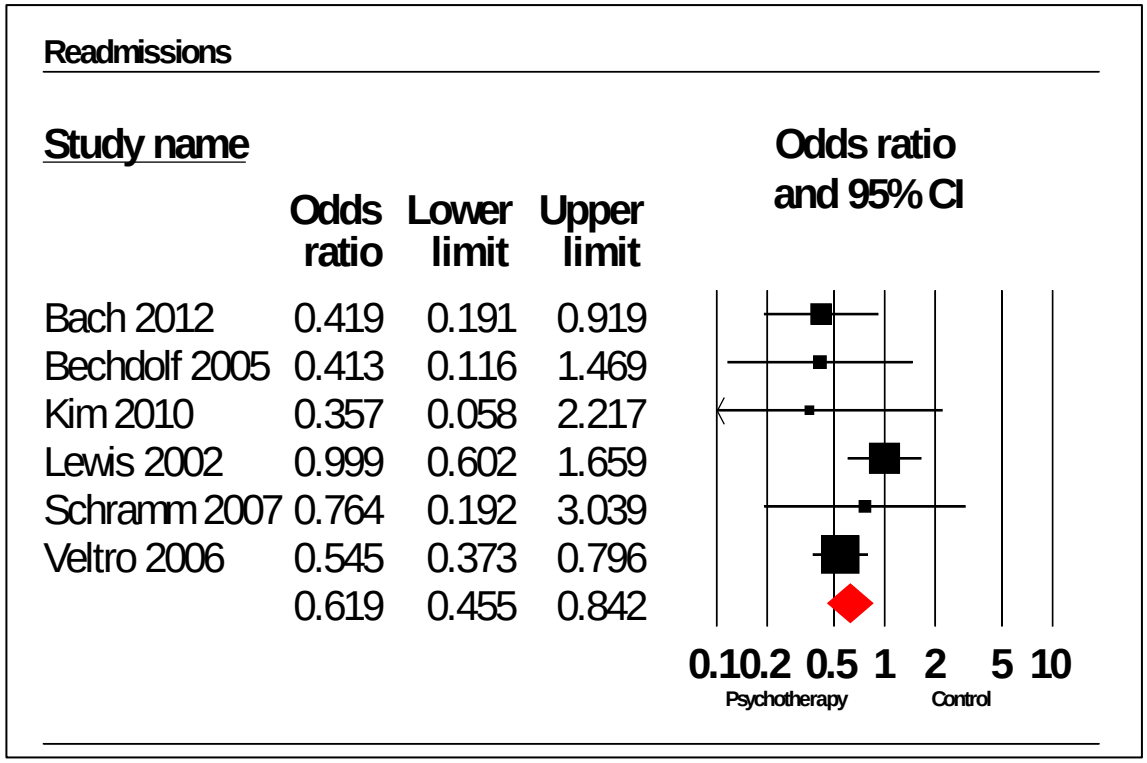


Figure 6: The effect of psychological interventions on risk of readmission.

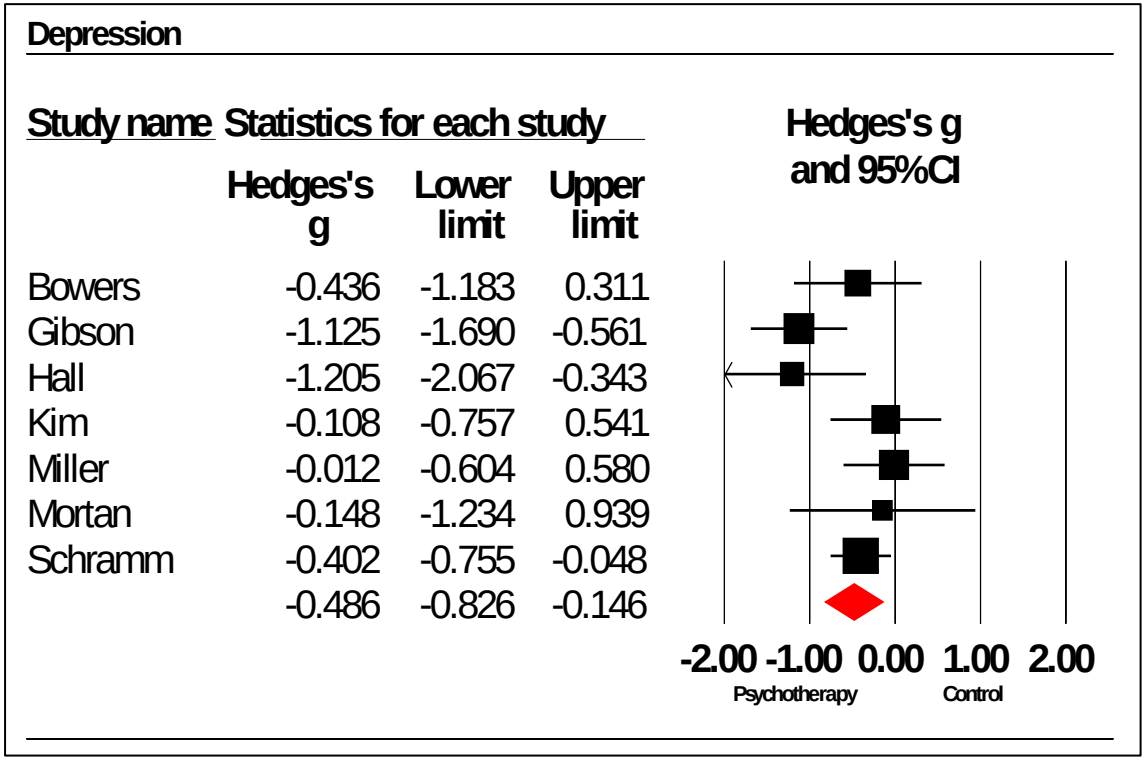


Figure 4: The effect of psychological interventions on depression at end of treatment

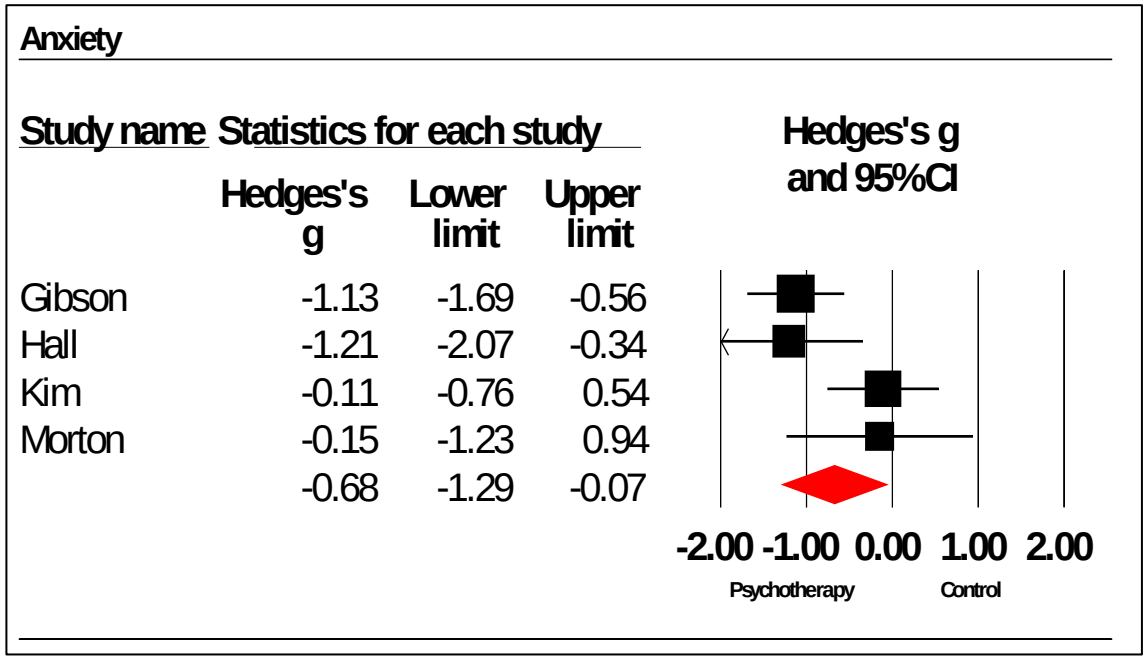


Figure 5: The effect of psychological interventions on anxiety at end of treatment

Supplementary appendix to:

Psychological therapy for inpatients receiving acute mental healthcare: A systematic review and meta-analysis of controlled trials

Content of supplementary material

A. Justification of outcomes

The primary outcome was post intervention means measured by Positive and Negative Symptom Scale (PANSS) total scores (Hall & Tarrier, 2003; Kim et al., 2010; Moritz et al., 2011; Shelley et al., 2001). Where PANSS total scores were not reported the PANSS subscale scores were combined to create the total score which was calculated using Jauhur's (Jauhar et al., 2014) method (Bechdolf et al., 2004; Habib, Dawood, Kingdon, & Naeem, 2015; Hayashi, Yamashina, Igarashi, & Kazamatsuri, 2001; Kumar et al., 2010). Where PANSS was not available the Brief Psychiatric Rating Scale (BPRS) or the Global Assessment of Functioning (GAF) mean scores were converted into PANSS using Leucht, and colleague's (Leucht, Rothe, Davis, & Engel, 2013) and Samara and colleague's (Samara et al., 2014) conversion (Bach & Hayes, 2002; Gaudiano & Herbert, 2006; Haddock et al., 1999; Schramm et al., 2007; Startup et al., 2004). Leucht et al.'s (2013) total score conversion table was used to convert BPRS standard deviations into PANSS standard deviations (10 point difference on BPRS converted to 19 point difference on PANSS).

Other outcomes included symptoms of depressions and anxiety at post intervention. 7 studies measured symptoms of depression (Bowers, 1990; Gibson et al., 2014; Hall & Tarrier, 2003; Kim et al., 2010; Miller et al., 1989; Mortan et al., 2011; Schramm et al., 2007). Within these 7 studies 6 measures of depression were used (BDI, DAS, HAD-D, HMRD, M-HMRD, SCL-90-R-D). HMRD and BDI are the most commonly used measures of depression in these studies, therefore where a study used either of these measures and another measure of depression, the BDI or HMRD was chosen. In a previous meta-analysis (Belvederi Murri et al., 2015) the BDI was found to be used more in research in the area of depression in schizophrenia, therefore if both the BDI and HMRD were reported the BDI was chosen. Other included measures used by studies that did not use the BDI or HMRD were the HAD-D (Hall & Tarrier, 2003) and the SCL-90-R-D (Gibson et al., 2014). Therefore, a total of 4 measures of depression were included (BDI, HAD-D, HMRD, and SCL-90-R-D). Psychometric properties of all measures were explored and found to be sufficient. Of the 22 identified studies 4 measured symptoms of anxiety (Gibson et al., 2014; Hall & Tarrier, 2003; Kim et al., 2010; Mortan et al., 2011). Within these studies 3 measures were used (HAD-A, HAMA, SCL-90-R-A). All these measures were included in order to increase the number of studies included in the meta-analysis.

B. Excluded studies

The following table details studies or reports excluded after inspection of the full-text report, or via correspondence with authors. Studies or reports excluded on basis of title or abstract alone are not detailed as these are too numerous and the vast majority were of different conditions or were otherwise unrelated to the review question.

Table DS1. Excluded studies

Study (first author and date)	Reason for exclusion	Reason Code [a]
Andres (1998)	Full text not in English	1
Andres (2000)	No access to required data	2
Andres (2003)	No access to required data	2
Arnevik (2010)	Therapy specialised for PD	3
Ascher-Svanum (1999)	Comparing 2 psycho-education styles.	3
Bartak (2011a)	Study is a comparison of locations of psychotherapy, therefore same psychotherapy in both groups.	3
Bartak (2011b)	Study is a comparison of locations of psychotherapy, therefore same psychotherapy in both groups.	3
Bateman (1999)	Service specialised for PD	3
Bateman (2001)	Service specialised for PD	3
Bateman (2008)	Service specialised for PD	3
Beecham (2006)	Service specialised for PD	3
Bellack (2006)	Treatment targets drug abuse	3
Berglund (2003)	Psycho-education	3
Bertelsen (2008)	Community treatment	3
Bertolin-Colilla (2011)	Review/meta-analysis (including mixed patient group)	3
Bertolin-Guillen (2011)	Conference paper. Emailed authors for more information but no response.	4
Bohus (2000)	Treatment specialised for PD/no comparator	3
Bohus (2004)	Treatment specialised for PD/waiting list control group in community	3
Bout (2008)	Centre specifically designed for couples therapy therefore not acute service	3
Brady (1984)	Outdated review	4
Candini (2013)	Outpatients	3
Carter (2010)	Outpatient/treatment specialised for PD	3

Study (first author and date)	Reason for exclusion	Reason Code [a]
Chien (2004)	Outpatient service	3
Chien (2013)	Outpatient treatment	3
Clarke (2013)	Outpatients	3
Clarkin (1990)	Does not include chosen outcomes	2
Colom (2003)	Outpatients/psychoeducation	3
Colom (2004)	Outpatients	3
Comtois (2010)	Treatment focus on reintegration	3
Crameri (2009)	Not in English	1
Davidson (2006)	Not inpatient	3
Davidson (2010_	Not inpatient	3
Durham (2003)	Long term treatment(9 months)	3
Drury (1996i)	Not correct outcome measures	2
Drury (1996ii)	Not correct outcome measures	2
Drury (2000)	Not correct outcome measures	2
Dyck (2002)	Outpatients	3
Falloon (1985)	Community treatment	3
Feldmann (2002)	Outpatients	3
Fisher (1996)	Therapy tailored for substance abused/outpatients and inpatients included but not separated.	3
Fox (2015)	Within subjects design	3
Frank (1990)	No control group	3
Frank (2005)	Participants recruited from inpatient and outpatient services. Emailed author and author responded that 17.5% patients began as inpatients.	3
Gaudiano (2005)	Outpatients/all participants received same treatment	3
Giron (2010)	Not inpatient; long term treatment	3
Glick (1985)	Does not include chosen outcomes	2
Glick (1990)	Does not include chosen outcomes	2
Glick (1991)	Does not include chosen outcomes	2
Glick (1993)	Does not include chosen outcomes	2
Glynn (2010)	Therapy targets substance abuse/not inpatients	3
Gratz (2014)	Community treatment	3
Grawe (2006)	Not inpatients	3
Grawe (2013)	Not inpatients	3
Haller (2009)	Article in German	1
Haas (1988)	Does not include chosen outcomes	2

Study (first author and date)	Reason for exclusion	Reason Code [a]
Haas (1990)	Does not include chosen outcomes	2
Healey (1998)	Compliance therapy	3
Herz (2000)	Outpatients	3
Herz (1979)	Comparison of hospital length not effectiveness of psychotherapy/before 1980	3
Huang (2005)	Not typical acute inpatients (all soldiers)	3
Isasi (2010)	Refractory bipolar disorder therefore not acute	3
Jackson (2008)	57% participants were outpatients.	3
Jacob (2010)	Outpatients	3
James (2004)	Therapy aims to reduce drug use.	3
Javadpour (2013)	Outpatients	3
Kanas (1980)	US airforce teaching hospital-not typical acute inpatients	3
Kessing (2011)	Outpatient	3
Kessing (2014)	Outpatients	3
Kim (2005)	Rehabilitation service- longer term and not acute.	3
Kleindienst (2011)	Inpatient service specifically for PD	3
Kliem (2010)	Specifically for PD	3
Kohler (2014)	Not a controlled trial (within design)	3
Kopelowicz (1998)	Community re-entry	3
Kopelowicz (2012)	Treatment aimed at adherence	3
Kopinke (2007)	Within group	3
Kroger (2006)	No control group.	3
Kuipers (1998)	Community treatment	3
Lam (2003)	Not inpatient treatment	3
Lana (2015)	Outpatients	3
Lee (2013)	Community	3
Leerer (1997)	Thesis. No access	4
Li (1994)	Long term hospitalisations	3
Liang (2004)	Published in Chinese	1
Liberman (1981)	Psychoeducation rather than psychotherapy	3
Linehan (1991)	Control= TAU in community; 1 year of treatment; service specifically for PD	3
Linehan (1993)	Control in community; service for PD	3
Linehan (2006)	Outpatient and community clinic	3
Linehan (2015)	Community setting	3

Study (first author and date)	Reason for exclusion	Reason Code [a]
Links (2013)	Within group; long treatment; treatment for PD	3
Linszen (1996)	Outpatient intervention evaluation	3
Lipton (1988)	Not acute inpatient setting	3
Liu (1999)	Not psychological therapy	3
Lukoff (1986)	Not an acute inpatient environment. Holistic programme	3
Lykke (2010)	Therapy for substance abuse	3
Malik (2009)	Community treatment	3
Manning (1997)	Not controlled trial	3
Marois (2011)	Not acute inpatients	3
Marziali (1995)	Service specific for PD	3
McFarlane (1995)	2 year treatment; outpatient treatment	3
Miklowitz (2003)	Therapy began after acute hospitalisation	3
Millson (1993)	Treatment aimed at increasing water intake	3
Min (2001)	Published in Chinese	1
Monroe-Blum (1995)	Treatment specific to BPD	3
Mueser (2008)	Community treatment; treatment specific for PTSD	3
Naoki (2003)	Community re-entry therapy	3
Newton (2007)	Cognitive remediation therapy	3
Ng (2006)	Rehabilitation ward (long term)	3
Norman (2002)	Not inpatient	3
Norrie (2013)	Treatment in community	3
Novakovic (2011)	Not controlled trial	3
O'Donnell (2003)	Compliance therapy; not psychological	3
Ohlenschlaeger (2007)	Community as comparison	3
Ojeda (2012)	Rehabilitation ward	3
Owen (2015)	Does not include chosen outcomes	2
Pabst (2014)	Therapy for PTSD	3
Penn (2009)	Community and outpatient clinical	3
Penn (2011)	Community and outpatient clinical	3
Pereira (1994)	Published in Spanish	1
Petersen (2008)	Day hospital treatment; service for PD	3
Phillips (2007)	Not relevant patient group/context	3
Puschner (2011)	Not psychological therapy	3
Qu (2007)	Cognitive remediation	3

Study (first author and date)	Reason for exclusion	Reason Code [a]
Quee (2014)	Outpatients	3
Rabovsky (2012)	Psychoeducation	3
Rea (2003)	Treatment began after hospitalisation	3
Reker (1997)	Work therapy	3
Roder (2006/2011)	Meta-analysis about psychiatric rehabilitation therefore not acute. Mixed inpatients and outpatients (not separated in analysis)	3
Roder (2006)	Vocational rehabilitation is aim of therapy and in German	1
Rodriguez (2007)	Case study	3
Ruggeri (2015)	Community service	3
Salkever (2014)	Community and rehabilitation treatment	3
Schilling (2015)	BDI data not presented- emailed author but no response.	2
Schmidt-Kraeplin (2009)	Participants recruited on discharge from hospital	3
Scott (2001)	Not inpatient	3
Scott (2009)	No psychological therapy	3
Sellwood (2007)	Not inpatient	3
Sieftert (2012)	Not controlled trial	3
Sigrunarson (2013)	Not directly accessing addition of psychological therapy to TAU (also included home based crisis management, etc).	3
Silverstein (2006)	Long term inpatients (1-7 years)	3
Soloman (2008)	Outpatient and long term treatment	3
Spencer (1988)	Does not include chosen outcomes	2
Srihari (2015)	Community treatment	3
Stevenson (1999)	Outpatients	3
Styla (2012)	Residential ward therefore not acute setting. 66 participants in day-treatment setting and 39 participants in residential ward.	3
Svensson (1999)	Long term stay (average 230 days)	3
Tao (2015)	Cognitive rehabilitation	3
Tarrier (1998)	Outpatient treatment	3
Tarrier (1999)	Outpatient treatment	3
Thekiso (2015)	Treatment for substance abuse	3
Thunnissen (2008)	Assessing continued community treatment following hospitalisation	3
Turner (2000)	Not acute inpatient (recruited from emergency room and treated in community)	3
Valencia (2010)	Outpatients	3
Valmaggia (2005)	22 weeks of therapy (over 90 days).	3

Study (first author and date)	Reason for exclusion	Reason Code [a]
Van den Bosch (2014)	Service for PD	3
Van der Gaag (2011)	Community treatment	3
Van Wel (2009)	Published in Dutch	1
Vancampfort (2011)	Not psychotherapy (PMR)	3
Van Meerten (2013)	Therapy in community (counting how many inpatient admissions following this)	3
Vaslamatzis (2014)	Comparing presence or absence of medication (psychological therapy in both groups)	3
Vauth (2005)	Rehab ward (not acute)	3
Vauth (2001)	Published in German	1
Veltro (2006)	Community; not in English?	3
Wang (2000)	Published in Chinese	1
Wang (2000)	Psychoeducation; Published in Chinese	1
Wykes (1999)	Cognitive Remediation	3
Wykes (2003)	Cognitive Remediation	3
Wykes (2007)	Cognitive Remediation	3
Xiang (2007)	Community re-entry (not psychological therapy). For clinically stable inpatients and outpatients.	3
Xiong (1994)	Therapy adapted specifically for complex family situation in China. Not relevant for typical acute setting.	3
Zaretsky (2008)	Patients in remission. Therefore assumed not acute.	3
Zhou (2005)	Published in Chinese; long term hospitalisation	1
Zieba (1996)	All participants received psychotherapy	3

BDI, Beck Depression Inventory; PD, Personality Disorder; PMR, Progressive Muscle Relaxation; PTSD, Post Traumatic Stress Disorder; TAU, Treatment as Usual.

a. The following codes were given for exclusion reasons: 1) Not in English, 2) Adequate data not presented/does not present data for chosen outcomes, 3) Not acute inpatient setting/appropriate psychotherapy/controlled trial, and 4) Other.

C. Characteristics of included studies

Table DS2. Included studies

Study characteristics of included studies.													
Study	**Target Group**	**Average length of stay (days)**	**Conditions**	**N**	**Intervention**	**Control**	**Contact with therapist in control**	**Assessment points**	**Follow-up length (months)**	**Sample for analysis**	**Randomisation**	**Assessor blinding**	**Quality (randomisation and blinding)**
Aghotor (Aghotor, Pfueller, Moritz, Weisbrod, & Roesch-Ely, 2010)	Schizophrenia spectrum disorder (ICD-10 criteria, diagnoses F2.x)	UC	1. MCT 2. NRG	26	MCT	NRG	N	1. pre 2. post	N/A	C	Y	Y	H
Bach et al 2002	Psychotic disorder (DSM-IV)	10.7	1. ACT 2. ETAU	40	ACT	ETAU	Y	1. pre 2. FU	4	ITT	Y	N	L

Study characteristics of included studies.

Study	Target Group	Average length of stay (days)	Conditions	N	Intervention	Control	Contact with therapist in control	Assessment points	Follow-up length (months)	Sample for analysis	Randomisation	Assessor blinding	Quality (randomisation and blinding)
Bach 2012	Psychotic disorder (DSM-IV)	10.7	1. ACT 2. ETAU	120	ACT	ETAU	Y	1. pre 2. post 3. FU	4	ITT	Y	N	L
Bechdolf et al 2004	Schizophrenia and related disorders (ICD-10 criteria, diagnoses F20, F23, F25)	UC	1. Brief GCBT 2. PE	88	GCBT	PE	Y	1. pre 2. post 3. FU	6	ITT	Y	Y	H
Bowers 1990	DSM-III unipolar depression	29.43	1. CT&M 2. RT&M 3. M	30	CT&M	1. RT&M 2. M	Y	1. pre 2. post	N/A	ITT	Y	Y	H
Gaudiano & Herbert 2006	DSM-IV diagnosis of psychotic disorder or affective disorder	10.7	1. Brief GCBT 2. PE	40	ACT	ETAU	Y	1. pre 2. post 3. FU	4	ITT	Y	N	L

Study characteristics of included studies.

Study	Target Group	Average length of stay (days)	Conditions	N	Intervention	Control	Contact with therapist in control	Assessment points	Follow-up length (months)	Sample for analysis	Randomisation	Assessor blinding	Quality (randomisation and blinding)
Gibson et al 2014	Engaged in DSH or meet diagnostic criteria for BPD	UC	1. LTD 2. TAU	103	LTD	TAU	N	1. pre 2. post	N/A	ITT	N	N	L
Habib et al 2015	DSM-IV-TR diagnosis of schizophrenia	UC	1. CaCBTp 2. TAU	42	CaCBTp	TAU	N	1. pre 2. post	N/A	ITT	Y	Y	H
Haddock et al 1999	DSM-IV diagnosis of schizophrenia or schizo-affective disorder	46.49	1. CBT 2. SC+PE	21	CBT	SC	Y	1. pre 2. post 3. F/U	24	C	Y	Y	H
Hall et al 2003	Diagnosis of psychotic disorder and low self esteem (as scored by RSCQ)	UC	1. CBT for self esteem. 2. TAU	25	CBT for self esteem	TAU	N	1. pre 2. post 3. F/U	3	C	Y	N	L

Study characteristics of included studies.

Study	Target Group	Average length of stay (days)	Conditions	N	Intervention	Control	Contact with therapist in control	Assessment points	Follow-up length (months)	Sample for analysis	Randomisation	Assessor blinding	Quality (randomisation and blinding)
Hayashi et al 2001	DSM-IV diagnosis of schizophrenia	78.3	1. CBT[a] 2. TAU	58	CBT	TAU	N	1. pre 2. post	N/A	C	Y	N	L
Kim et al 2010	DMS-(V axis 1 disorders	UC	1. EMDR 2. PMR 3. TAU	45	EMDR	1. PMR 2. TAU	Y	1. pre 2. post 3. F/U	3/24	C	Y	Y	H
Kumar et al 2010	ICD-10 diagnosis of paranoid schizophrenia	UC	1. MCT 2. TAU		MCT	TAU	N	1. pre 2. post	N/A	UC	Y	UC	L
Lewis et al 2002	1st or 2nd admission and meets criteria for DSM-IV diagnosis of schizophrenia, schizophreniform disorder, schizoaffective	UC	1. CBT for early acute schizophrenia 2. SC 3. TAU	309	CBT	1. SC 2. TAU	Y	1. pre 2. post 3. F/U	24	ITT	Y	Y	H

Study characteristics of included studies.

Study	Target Group	Average length of stay (days)	Conditions	N	Intervention	Control	Contact with therapist in control	Assessment points	Follow-up length (months)	Sample for analysis	Randomisation	Assessor blinding	Quality (randomisation and blinding)
	disorder or Delusional disorder												
Miller et al 1989	Diagnosis of Major Depressive Disorder	25.35	1. CBT 2. SST 3. TAU	45	1. CBT 2. SST	TAU	N	1. pre 2. post 3. F/U	6/12	ITT	Y	N	L
Moritz et al 2011	Fulfilled criteria for schizophrenia diagnosis.	UC	1. MCT 2. CR	48	MCT	CR	Y	1. pre 2. post	N/A	ITT	Y	Y	H
Mortan et al 2011	Diagnosis of schizophrenia or schizoaffective disorder (DSM-IV)	UC	1. GCBT 2. TAU	12	GCBT	TAU	N	1. pre 2. post	N/A	C	N	UC	L

Study characteristics of included studies.

Study	Target Group	Average length of stay (days)	Conditions	N	Intervention	Control	Contact with therapist in control	Assessment points	Follow-up length (months)	Sample for analysis	Randomisation	Assessor blinding	Quality (randomisation and blinding)
Schramm et al 2007	Diagnosis of MDD (DSM-IV)	UC	1. IPP 2. TAU	124	IPP	TAU	N	1. pre 2. post 3. F/U	6/12	ITT/C[b]	Y	Y	H
Shelley et al 2001	Diagnosis of schizophrenia or schizo-affective disorder	UC	1. CBT 2. TAU	48	CBT	TAU	N	1. pre 2. post	N/A	ITT	N	N	L
Startup et al 2004	Diagnosis of schizophrenia or schizo-affective disorder and experiencing an acute psychotic episode (DSM-IV)	UC	1. CBT 2. TAU	90	CBT	TAU	N	1. pre 2. F/U	6/12	ITT	Y	N	L
Veltro et al 2006	All inpatients	12.2	1. GCBT 2. TAU	733	GCBT	TAU	N	1. F/U	48	ITT	N	N/A	L

Study characteristics of included studies.

Study	Target Group	Average length of stay (days)	Conditions	N	Intervention	Control	Contact with therapist in control	Assessment points	Follow-up length (months)	Sample for analysis	Randomisation	Assessor blinding	Quality (randomisation and blinding)

BPD, Borderline Personality Disorder; CBT, CR, Cognitive Remediation; Cognitive behavioural therapy; CBTp, CBT for psychosis; C, Completer analysis; CT, Cognitive Therapy; CaCBTp , Culturally adapted CBT for psychosis; DSH, Deliberate self harm; EMDR, Eye Movement Desensitisation & Reprocessing; ETAU, Enhanced treatment as usual; F/U, Follow-up; GCBT, Group CBT; H, High quality; ICD-10, International Classification of Diseases; IPP, Interpersonal Psychotherapy; ITT, Intention to treat; LTD, Living through distress; L, Low quality; LOS, length of stay; MDD, Major Depressive Disorder; M, Medication; MCT, Metacognitive training; N/A, Not Applicable; N, No; NRG, Newspaper reading group; PE, Psychoeducation; Post, Post-intervention assessment; Pre, Pre-intervention assessment; PMR, Progressive Muscle Relaxation; RM, Relaxation therapy; RSCQ, Robson Self Concept Questionnaire; SC, Supportive Counselling; UC, Unclear; Y, Yes.

a. Intervention described as psychological approach, however considered CBT for the purpose of this meta-analysis.
b. ITT analysis for pre-post analysis but Completer analysis for follow-up.

D. Details of treatment groups

Table DS3. Details of treatment groups

Summary of study interventions								
Name	**Intervention type**	**Extra therapy info**	**Format**	**Duration (weeks)**	**Number of sessions (total)**	**No. sessions (per week)**	**Length of session (mins)**	**Total offered (mins)**
Aghotor (Aghotor et al., 2010)	MCT	Focus on schizophrenia	Group	4	8	2	60	480
Bach (Bach & Hayes, 2002)	ACT	Focus on psychosis	Individual	2	4	1-4	50	200
Bechdolf (Bechdolf et al., 2004)	CBT	Focus on schizophrenia	Group	8	16	2	90	1440
Bowers (Bowers, 1990)	CT	Focus on depression	Individual	Unclear	12	7	50	600
Gaudiano (Gaudiano & Herbert, 2006)	ACT	Focus on psychosis	Individual	Unclear	3	Unclear	60	180
Gibson (Gibson et al., 2014)	DBT	Focus on DSH	Group	6	24	4	60	1440
Habib (Habib et al., 2015)	CBT	Focus on psychosis	Individual	8	16	2	60	960
Haddock (Haddock et al., 1999)	CBT	Focus on early psychosis	Individual	5	17.5 (+4 booster outpatient)	4	50	875
Hall (Hall & Tarrier, 2003)	CBT	Focus on low self-esteem in psychosis	Individual	7	7	1	Unclear	Unclear
Hayashi (Hayashi et al., 2001)	Psychological approach	Focus on schizophrenia	Individual	8	8	1	50	400
Kim (Kim et al., 2010)	EMDR	Focus on schizophrenia	Individual	3	3	1	90	270
Kumar (Kumar et al., 2010)	MCT	Focus on schizophrenia	Group	4	8	2	60	480
Lewis (Lewis et al., 2002)	CBT	Focus on early schizophrenia	Individual	5	17.5 (+4 booster outpatient)	4	50	875

Summary of study interventions

Name	Intervention type	Extra therapy info	Format	Duration (weeks)	Number of sessions (total)	No. sessions (per week)	Length of session (mins)	Total offered (mins)
Miller (Miller et al., 1989)	CT + SST	Focus on depression	Individual	Unclear	Unclear	7	50	Unclear
Moritz (Moritz et al., 2011)	MCT	Focus on delusional symptoms in schizophrenia	Group + individual	Unclear	8	Unclear	60	480
Mortan (Mortan et al., 2011)	CBT	Focus on coping with auditory hallucinations	Group	5	10	2	80	8000
Schramm (Schramm et al., 2007)	IPP	Focus on depression	Group + individual	5	15	3	50	750
Shelley (Shelley et al., 2001)	CBT	Symptom specific	Group	12	54	5	Unclear	Unclear
Startup (Startup et al., 2004)	CBT	Focus on acute schizophrenia	Individual	Unclear	25	Unclear	90	2250
Veltro (Veltro et al., 2006)	CBT	Focus on group for inpatients	Group	Unclear	Unclear	Unclear	90	Unclear

ACT, Acceptance and Commitment Therapy; CBT, Cognitive Behavioural Therapy; CT, Cognitive Therapy; DBT, Dialectical Behaviour Therapy; DSH, Deliberate Self Harm; EMDR, Eye Movement Desensitisation Reprocessing; IPP, Interpersonal Psychotherapy; MCT, Metacognitive Therapy/Training; SST, Social Skills Training.

E. Characteristics of included therapies

Table DS4. Details of included therapies

Characteristics of included therapies

Treatment	Definition	N of studies	N of participants receiving intervention	Studies
Metacognitive Training/Therapy	Encourages thinking about thinking. Aims to identify typically negative cognitive bias such as dysfunctional attribution styles, jumping to conclusions, over confidence in errors, negative schemata. Therapy aims to address these and challenge them.	3	46	Aghotor (Aghotor et al., 2010); Kumar (Kumar et al., 2010); Moritz (Moritz et al., 2011)
Cognitive Behavioural Therapy	Uses techniques such as formulation, problem solving, guided discovery, reality testing, distraction techniques, exposure, rational responding and more. It aims to increase awareness of connections between thoughts, behaviours and mood in order begin change.	10	868	Bechdolf (Bechdolf et al., 2004); Bowers (Bowers, 1990); Habib (Habib et al., 2015); Haddock (Haddock et al., 1999); Hall (Hall & Tarrier, 2003); Lewis (Lewis et al., 2002); Miller (Miller et al., 1989); Mortan (Moritz et al., 2011); Startup (Startup et al., 2004); Veltro (Veltro et al., 2006)
Acceptance and Commitment Therapy	Mindfulness and acceptance exercises are used to address and decrease avoidance and difficult internal experiences (e.g. disturbing thoughts and emotions).	2	52	Bach (Bach & Hayes, 2002); Gaudiano (Gaudiano & Herbert, 2006)
Dialectical Behaviour Therapy	Derives from CBT. It aims to change harmful behaviours with a particular focus on regulating and reducing intense emotional distress. Often	1	58	Gibson (Gibson et al., 2014)

Characteristics of included therapies

Treatment	Definition	N of studies	N of participants receiving intervention	Studies
	targets behaviours such as deliberate self-harm, eating problems and substance abuse. Acceptance is a key focus of therapy.			
Psychological Approach	Described as creating a collaborative approach with a focus on self-esteem. Patients' attitudes and understanding of their illness are discussed and new perspectives are encouraged. Psycho-educational techniques are also used. Content described similarly to CBT therefore grouped as CBT for analysis.	1	25	Hayashi (Hayashi et al., 2001)
Eye Movement Desensitization & Reprocessing	A psychological therapy used to release blocked traumatic memories with continuous sounds, taps or eye movements. Stressful life event, trauma experienced during childhood or adulthood, distressing psychotic symptoms or adversities related to treatment were key focuses.	1	11	Kim (Kim et al., 2010)
Interpersonal Psychotherapy	IPP primarily focuses on the way our relationships affect us and also how other mental health difficulties can affect our relationships.	1	63	Schramm (Schramm et al., 2007)
Rational Emotive Behaviour Therapy	Described as a specific type of CBT. It focuses on resolving emotional and behavioural disturbances. Grouped as CBT.	1	25	Shelley (Shelley et al., 2001)
Social Skills Training	A psychotherapy used to improve social skills. Primarily behavioural, however can involve some cognitive elements.	1	10	Miller (Miller et al., 1989)

CBT, Cognitive Behavioural Therapy; IPP, Interpersonal Psychotherapy.

F. Characteristics of control conditions

Table DS5. Details of control conditions

Characteristics of control conditions

Control	Definition	N of studies	N of participants receiving intervention	Studies
Usual Treatment				
Newspaper discussion group (grouped as TAU)	Described in the study as a group discussion of issues in a current newspaper. Participants were also asked to discuss and summarise these topics and received usual treatment such as medication.	1	14	Aghotor (Aghotor et al., 2010)
TAU [a]	TAU refers to usual treatment received by inpatients. This varies between studies, however all participants in these studies received just usual treatment.	12	410	Bowers (Bowers, 1990); Gibson (Gibson et al., 2014); Habib (Habib et al., 2015); Hall (Hall & Tarrier, 2003); Hayashi (Hayashi et al., 2001); Kumar (Kumar et al., 2010); Lewis (Lewis et al., 2002); Miller (Miller et al., 1989); Mortan (Mortan et al., 2011); Shelley (Shelley et al., 2001); Startup (Startup et al., 2004); Veltro (Veltro et al., 2006)
TAU including psychotherapy (TAUP)[b]	This varied between studies but includes some form of individual therapy (described as individual psychotherapy sessions with a psychologist or psychoeducation) with a focus on psychoeducation, stress management, mood management, anxiety management, exercise groups, craft groups, and symptom identification. All participants in these studies (control and intervention) received TAUP.	3	60	Bach (Bach & Hayes, 2002); Gaudiano (Gaudiano & Herbert, 2006); Kim (Kim et al., 2010)
Total		16	514	

Characteristics of control conditions

Control	Definition	N of studies	N of participants receiving intervention	Studies
Less sophisticated control interventions				
Supportive Counselling	A talking therapy described as delivering basic assessment, psycho-education and counselling in a supportive and empathetic unstructured style. Often used as an active comparator to psychological therapy to control for therapy time.	2	117	Haddock (Haddock et al., 1999); Lewis (Lewis et al., 2002)
Psycho-education[c]	Provision of information relating to patients' mental health diagnosis to aid understanding and coping. This intervention is commonly delivered in a group setting. Substantial variations exist within this intervention as it can act as a means to provide information or teaching coping skills.	2	109	Bechdolf (Bechdolf et al., 2004); Schramm (Schramm et al., 2007)
PMR/Relaxation Therapy	PMR is led by a therapist. It is used to monitor and control the tension of muscles with the aim to relax.	2	19	Bowers (Bowers, 1990); Kim (Kim et al., 2010)
Cognitive Remediation [d]	Neuropsychological therapy consisting of exercises that aim to improve cognitive processing and functioning such as memory, attention and problem solving.	1	24	Moritz (Moritz et al., 2011)
Total		7	239	

TAU, Treatment as Usual; TAUP, Treatment as Usual with Psychotherapy; PMR, Progressive Muscle Relaxation.
a. medication alone (MA) (Miller et al., 1989) and waiting list (Gibson et al., 2014) also used to describe TAU.
b. Enhanced treatment as usual (ETAU) also used to describe TAUP
c. Clinical management also used to describe psycho-education.
d. Cognitive Remediation is a psychologically active therapy, however differs from psychotherapies included in this analysis as it targets cognitive processes rather than cognition and behaviour and can therefore be used as a control.

G. Grouping of therapies and comparators

Table DS6: Grouping of therapies and comparators

Therapy/Comparator Groups Name	**Therapies/Comparators Included**
Psychological therapies	CBT; ACT; CT; MCT; DBT; SST; EMDR; IPP; Psychological 'approach'
Control group with extra therapist contact	Relaxation therapies; PMR; Psycho-education; Supportive counselling; Befriending; TAUP
Usual Treatment	TAU; Waiting list; Newspaper reading group; TAUP; ETAU
All controls	TAU; TAUP; Waiting list; Newspaper reading group; Medication; Relaxation therapies; PMR; Psycho-education; Supportive counselling; Befriending
Acceptance and Commitment Therapy, ACT; Cognitive Behavioural Therapy, CBT; Cognitive Therapy, CT; Dialectical Behaviour Therapy, DBT; Eye-Movement Desensitisation Reprocessing, EMDR; Interpersonal psychotherapy, IPP; Meta-Cognitive Therapy, MCT; Progressive Muscle Relaxation, PMR; Social Skills Training, SST; Treatment as Usual with Psychotherapy, TAUP; Treatment as Usual, TAU.	

H. Risk of bias criteria

Selection Bias: randomisation

Low risk rating given if randomisation is reported (even is method not specified). Unclear risk rating given if randomisation is not reported. High risk rating given if non-randomisation is specified.

Selection Bias: allocation concealment

If unreported an unclear rating was given. If method for concealment was reported a low risk rating was given. If non-concealment was reported or it seemed unlikely that concealment was possible a high risk rating was given.

Performance Bias: blinding of participants and personnel

Blinding of participants and personnel is uncommon in trials of psychotherapy (Slade & Priebe, 2001) and unrealistic in an acute inpatient environment, however where unreported bias was rated as high.

Detection Bias: blinding of subjective outcomes; self and observer reported

Where non-blinding was reported a high risk of bias rating was given. If blinding was reported a low risk of bias was reported. If unreported an unclear risk of bias rating was given.

Detection Bias: blinding of objective outcomes (readmission)

Where applicable, a low risk of bias rating was given if the decision of readmission was separate from the researchers. An unclear risk rating was given if unreported. A high risk rating was given is researchers were involved in the decision of readmission.

Attrition Bias: incomplete outcome data

A high risk rating was given if ≥ 25% of those who entered the trial did not complete it (Xia et al., 2009) or if attrition was not reported (or not clearly reported) and a completer analysis was carried out. If attrition was low (≥ 25%) and completer analysis was used risk of bias was rated as low.

Reporting Bias: selective outcome reporting

If outcomes are pre-specified and reported a low risk of bias rating was given. However, if no protocol is reported a high risk of bias rating was given. If subgroup analysis are reported but not pre-specified a high risk rating was given.

I. Results of risk of bias assessment – detailed

Table DS7: Results of risk of bias assessment in detail

Study	Selection Bias: random sequence generation	Selection Bias: allocation concealment	Performance Bias: blinding of participants and personnel	Detection Bias: blinding of subjective outcomes: self and observer reported	Detection Bias: blinding of objective outcomes (readmission)	Attrition Bias: incomplete outcome data	Reporting Bias: selective outcome reporting
Aghotor (Aghotor et al., 2010)	'non-stratified randomisation method established by statistician.' Randomisation used.	'Predetermined random plan'. Group assignment was previously planned.	Not reported.	Observer rater blinding.	N/A	Attrition not reported clearly. Completer analysis.	All outcomes pre-specified and reported but no protocol
	Low risk	High risk	High risk	Low risk	N/A	High risk	High risk
Bach (Bach & Hayes, 2002)	States randomisation but method not reported	Unreported	Staff were blind to treatment allocation.	Subjective measures presented orally. Assessor not blind.	Readmission data taken from hospital records.	Completer analysis	No protocol. Scores from one outcome not reported.
	Low risk	Unclear risk	Low risk	High risk	Low risk	High risk	High risk
Bach (Bach et al., 2013)[a]	Randomisation reported	Unreported (Bach) No concealment (Gaudiano).	Staff blind to treatment allocation (Bach)/staff not blind to treatment allocation (Gaudiano)	Subjective measures presented orally. Assessor not blind (Bach). Observer raters unblind to group allocation. Self	Readmission data taken from hospital records (Bach). Readmission determined independently	About 6% missing data. ITT analysis.	All pre-specified outcomes reported. No protocol

Study	Selection Bias: random sequence generation	Selection Bias: allocation concealment	Performance Bias: blinding of participants and personnel	Detection Bias: blinding of subjective outcomes: self and observer reported	Detection Bias: blinding of objective outcomes (readmission)	Attrition Bias: incomplete outcome data	Reporting Bias: selective outcome reporting
				report measures also used (Gaudiano).	of study (Gaudiano).		
	Low risk	High risk	High risk	High risk	Low risk	Low risk	High risk
Bechdolf (Bechdolf et al., 2004)	'Randomization conducted by computer-generated random numbers' Blocks of 8.	'results were placed in sealed envelopes'	Not reported	Psychopathology and compliance measures mostly done by independent rater. Secondary outcomes were self-report.	Readmission decided independent of study.	24% lost to 6 month follow-up and around 50% lost to 24 month follow-up. ITT used.	ITT reported. All pre-specified outcomes were reported. But no protocol.
	Low risk	Low risk	High risk	Low risk	Low Risk	High risk	High risk
Bowers (Bowers, 1990)	'Assignment to one of three groups was done on a rotating basis.'	Unreported	Unreported	Self-report measures used. But observer rated measures were blind.	N/A	Attrition not reported.	All pre-specified outcomes reported but no protocol
	Low risk	Unclear risk	High risk	Low risk	N/A	High risk	High risk
Gaudiano (Gaudiano & Herbert, 2006)	'Simple randomisation without blocking or stratification based on a computer generated list was used'	'…without concealment.'	'Staff were not blinded to treatment allocation'.	Observer ratersnot blind to group allocation. Self-report measures also used.	Readmission determined independently of study.	Around 24% missing data. Completer and ITT data analysed.	All outcomes said to be reported were. But no protocol
	Low risk	High risk	High risk	High risk	Low Risk	Low risk	High risk

Study	Selection Bias: random sequence generation	Selection Bias: allocation concealment	Performance Bias: blinding of participants and personnel	Detection Bias: blinding of subjective outcomes: self and observer reported	Detection Bias: blinding of objective outcomes (readmission)	Attrition Bias: incomplete outcome data	Reporting Bias: selective outcome reporting
Gibson (Gibson et al., 2014)	Non-randomised. Assigned by timing of referrals.	Not reported	Not reported.	Assessor blinding not reported.	N/A	27% missing data. Completer analysis used where entire measures missing.	No protocol. Although pre-specified outcomes were reported.
	High risk	Unclear risk	High risk	Unclear risk	N/A	High risk	High risk
Habib (Habib et al., 2015)	Randomised using online programme	Unreported	Not reported	Blind assessors	N/A	Percentage of missing data not reported.	Previously specified outcomes were reported. Means and SDs not reported but available through contact with author. No protocol reported.
	Low risk	Unclear risk	High risk	Low risk	N/A	High risk	High risk
Haddock (Haddock et al., 1999)	Reported randomisation but no detail.	Not reported	Staff blind to treatment allocation.	Blinding of assessors reported.	Blind independent assessor using case notes.	10% attrition. Analysis unclear (likely to be completer analysis).	Subscales of measures reported-not previously specified. Follow-up data not presented due to missing data.

Study	Selection Bias: random sequence generation	Selection Bias: allocation concealment	Performance Bias: blinding of participants and personnel	Detection Bias: blinding of subjective outcomes: self and observer reported	Detection Bias: blinding of objective outcomes (readmission)	Attrition Bias: incomplete outcome data	Reporting Bias: selective outcome reporting
							No protocol
	Low risk	Unclear risk	Low risk	Low risk	Low risk	Low risk	High risk
Hall (Hall & Tarrier, 2003)	Reported clearly. 'Sealed envelope technique'	Sealed envelopes were used	'Neither participants nor investigator knew which condition had been assigned until baseline assessments were complete'.	Assessor not blind. Inter-rater reliability checked by blind assessor.	N/A	8% attrition at post-treatment. 28% attrition at follow-up. Unclear what analysis was used.	All data pre-specified was reported with means and variance. No protocol.
	Low risk	Low risk	High risk	High risk	N/A	High risk	High risk
Hayashi (Hayashi et al., 2001)	States randomisation.	Not reported	Not reported	Assessors not blind.	N/A	Attrition not reported.	Subscale analyses carried out which were not pre-specified. No protocol reported.
	Low risk	Unclear	High risk	High risk	N/A	High risk	High
	Reports randomisation.	Not reported	Unreported	All observer rated. Blind assessor.	Unreported	12% attrition at post-treatment. 25%	'Study protocol was approved by the

Study	Selection Bias: random sequence generation	Selection Bias: allocation concealment	Performance Bias: blinding of participants and personnel	Detection Bias: blinding of subjective outcomes: self and observer reported	Detection Bias: blinding of objective outcomes (readmission)	Attrition Bias: incomplete outcome data	Reporting Bias: selective outcome reporting
Kim (Kim et al., 2010)						attrition at follow-up. Analysis type unknown.	institutional research board of this institution'
	Low risk	Unclear	High risk	Low risk	Unclear risk	Low/High risk	Low risk
Kumar (Kumar et al., 2010)	'names of patients were shuffled and given numbers sequentially. Once numbers were assigned, each even numbered patient was included in the experimental group….'	Unclear	Participants were aware of allocation after randomisation. Blinding of staff not reported.	Observer reported measures used. Blinding unreported	N/A	Attrition not reported and analysis type not specified.	All pre-specified outcomes reported adequately. No protocol
	Low risk	Unclear risk	High risk	Unclear risk	N/A	High risk	High risk
Lewis (Lewis et al., 2002)	Randomised	Allocation concealed	Some personnel blind, others non-blind. Participants not blind.	Raters were blind	N/A	18% missing data post-treatment.28% missing data at follow-up .ITT analysis.	All outcomes reported, however subscales also reported but not previously specified. No prospective protocol reported.

Study	Selection Bias: random sequence generation	Selection Bias: allocation concealment	Performance Bias: blinding of participants and personnel	Detection Bias: blinding of subjective outcomes: self and observer reported	Detection Bias: blinding of objective outcomes (readmission)	Attrition Bias: incomplete outcome data	Reporting Bias: selective outcome reporting
	Low risk	Low risk	High risk	Low risk	N/A	Low/high risk	High risk
Miller (Miller et al., 1989)	Reports randomisation.	Not reported	Not reported	Assessor not blind but some interviews taped and check by blind independent raters.	N/A	ITT and completer data analysed. 33% dropout.	All means and variance reported for pre-specified outcomes. No protocol
	Low risk	Unclear risk	High risk	High risk	N/A	High risk	High risk
Moritz (Moritz et al., 2011)	Randomization plan created by statistician.	Unreported	Patients were asked not to reveal group allocation therefore unlikely staff would know.	Observer reported measures blind to groups.	N/A	8% missing data at post-intervention. ITT used.	All pre-specified outcomes reported. Protocol registered.
	Low risk.	Unclear risk	Low risk	Low risk	N/A	Low risk	Low risk
Mortan (Mortan et al., 2011)	Not randomised- based on number of psychotic patients admitted at one time	Unreported	Unreported	Unreported	N/A	14% dropout at post intervention and 50% missing data at follow-up. Only completers analysed.	Mean and variance reported for only completers. No protocol
	High risk	Unclear risk	High risk	Unclear risk	N/A	High risk	High risk

Study	Selection Bias: random sequence generation	Selection Bias: allocation concealment	Performance Bias: blinding of participants and personnel	Detection Bias: blinding of subjective outcomes: self and observer reported	Detection Bias: blinding of objective outcomes (readmission)	Attrition Bias: incomplete outcome data	Reporting Bias: selective outcome reporting
Schramm (Schramm et al., 2007)	'dynamic allocation using minimisation method'	'…the allocation sequence was unpredictable for any of the investigators.'	'not blind to patients' treatment status.'	'assessments were performed by blind and independent raters'.	Unreported who decides readmission.	15% missing data at post intervention. 22% missing data at follow-up. Only ITT for post analysis. Completer analysis at both post and follow-up.	All pre-specified outcomes reported.No protocol reported.
	Low risk	Low risk	High risk	Low risk	Unclear risk	Low/high risk (depending on outcome)	High risk
Shelley (Shelley et al., 2001)	Not randomised. Allocated depending on ward.	Not reported	Unreported	Rated by group leader. Not blinded	Not reported	Not reported but ITT used.	No protocol
	High risk	Unclear risk	High risk	High risk	Unclear risk	High risk	High risk
Startup (Startup et al., 2004)	Coin toss	Coin tossed at allocation	Unreported	Assessor not blind, however 12 blind re-ratings showed inter-rater reliability.	N/A	45% dropout from intervention group during treatment. No control group drop out. Methods for missing data not reported.	All pre-specified outcomes are reported with adequate data. However sample divided by disorganisation score and reanalysed-not pre-specified.

Study	**Selection Bias: random sequence generation**	**Selection Bias: allocation concealment**	**Performance Bias: blinding of participants and personnel**	**Detection Bias: blinding of subjective outcomes: self and observer reported**	**Detection Bias: blinding of objective outcomes (readmission)**	**Attrition Bias: incomplete outcome data**	**Reporting Bias: selective outcome reporting**
							No protocol
	Low risk	Low risk	High risk	High risk	N/A	High risk	High risk
Veltro (Veltro et al., 2006)	Not randomised. Retrospective control	No concealment as retrospective design	Blinding to group allocation not possible due to retrospective design	N/A	Unclear who assessors of readmission were	N/A	Pre-specified outcomes were reported adequately. No protocol
	High risk	High risk	High risk	N/A	Unclear risk	N/A	High risk

N/A, Not applicable.

a. Bach et al. (2013) carries out an intention to treat analysis using data from Bach and Hayes (2002) and Gaudiano and Herbert (2006), therefore data from Bach et al. (2013) was used for outcomes where Bach and Hayes (2002) and Gaudiano and Herbert (2006) were both included.

J. Results of risk of bias assessment – summary

Table DS8: Results of risk of bias assessment - summary

Summary of risk of bias ratings

Study	Random sequence	Allocation concealment	Blinding of participants and personnel	Blinding of assessor (symptom outcomes)	Blinding of assessor (readmissions outcome) (N/A: study does not report readmission data)	Incomplete data (attrition bias)	Selective outcome reporting
Aghotor et al. (2010)	Low	High	High	Low	N/A	High	High
Bach & Hayes (2002)	Low	Unclear	Low	High	Low	High	High
Bach et al. (2013)[a]	Low	High	High	High	Low	Low	High
Bechdolf et al. (2004)	Low	Low	High	Low	Low	High	High
Bowers (Bowers, 1990)	Low	Unclear	High	Low	N/A	High	High
Gaudiano (Gaudiano & Herbert, 2006)	Low	High	High	High	Low	Low	High
Gibson (Gibson et al., 2014)	High	Unclear	High	Unclear	N/A	High	High
Habib (Habib et al., 2015)	Low	Unclear	High	Low	N/A	High	High
Haddock (Haddock et al., 1999)	Low	Unclear	Low	Low	Low	Low	High
Hall (Hall & Tarrier, 2003)	Low	Low	High	High	N/A	High	High
Hayashi (Hayashi et al., 2001)	Low	Unclear	High	High	N/A	High	High
Kim (Kim et al., 2010)	Low	Unclear	High	Low	Unclear	Low[b] / High[b]	Low
Kumar (Kumar et al., 2010)	Low	Low	High	Unclear	N/A	High	High

Summary of risk of bias ratings

Study	Random sequence	Allocation concealment	Blinding of participants and personnel	Blinding of assessor (symptom outcomes)	Blinding of assessor (readmissions outcome) (N/A: study does not report readmission data)	Incomplete data (attrition bias)		Selective outcome reporting
Lewis (Lewis et al., 2002)	Low	Low	High	Low	N/A	Low[a]	High[a]	High
Miller (Miller et al., 1989)	Low	Unclear	High	High	N/A	High		High
Moritz (Moritz et al., 2011)	Low	Low	Low	Low	N/A	Low		Low
Mortan (Mortan et al., 2011)	High	Unclear	High	Unclear	N/A	High		High
Schramm (Schramm et al., 2007)	Low	Unclear	High	Low	Unclear	High[b]	Low[b]	High
Shelley (Shelley et al., 2001)	High	Unclear	High	High	Unclear	High		High
Startup (Startup et al., 2004)	Low	Low	High	High	N/A	High		High
Veltro (Veltro et al., 2006)	High	High	High	N/A	Unclear	N/A		High

H, high risk of bias; L, low risk of bias; N/A, not applicable; Unclear, unclear risk of bias.

a. Bach (Bach et al., 2013) carries out an intention to treat analysis using data from Bach (Bach & Hayes, 2002) and Gaudiano (Gaudiano & Herbert, 2006), therefore data from Bach (Bach et al., 2013) was used in outcomes where Bach (Bach & Hayes, 2002) and Gaudiano (Gaudiano & Herbert, 2006) were both included.
b. Complete data at post intervention but incomplete data at follow-up.

K. GRADE assessment criteria

While observational studies increase the risk of bias included in an outcome, the current available literature specifically involved in evaluating psychotherapy in acute inpatient settings is limited and some of that literature is not randomised. Therefore, despite the known limitations of such inclusions, the current meta-analysis included both randomised and non-randomised trials. However, if an outcome included less than 50% RCTs the quality rating of the evidence started as moderate instead of the recommended high for RCTs or low for observational studies.

4=high; 3=moderate; 2=low; 1=very low

Risk of bias

If >50% of studies included 2 high risk of bias ratings, according to the Cochrane Risk of Bias assessment that was conducted, the quality of the outcome was downgraded (-2). If >50% of studies included 1 or more high risk of bias rating the quality of the outcome was downgraded (-1). A 'high' risk rating for non-randomisation or performance bias was excluded as one of the two ratings because non-randomisation has already been addressed (see above) and blinding of personnel and participants is uncommon and near impossible in psychotherapy trials (Slade & Priebe, 2001). If the risk of bias was not related to the outcome being assessed, the quality was not downgraded. For example, if the study was rated 'high risk' for missing data that did not relate to the outcome of interest it was not noted for that outcome.

Inconsistency

Quality was downgraded by 1 point if the I-squared statistic was >40% in the context of an unclear direction of effect or >75% in the context of a clear direction of effect. 2 points were deducted if the I-squared statistic was >75% in the context of an unclear direction of effect. An unclear direction of effect was identified by an outcome including studies which favoured both intervention and control.

Indirectness

Study population, intervention and outcome measures were considered in the rating outcomes for indirectness.

Imprecision

Precision was downgraded by 1 if "a recommendation or clinical course of action would differ if the upper versus the lower boundary of the CI represented the truth", for example if the confidence intervals include no effect and a large effect (Guyatt et al., 2011). Therefore clinical, over statistical, significance was considered. In addition to or instead of clinical significance, precision was also downgraded if the OIS (i.e. sample size or number of events) was not reached. Optimum information size (OIS) was generated using G-Power to judge imprecision. If the OIS (i.e. sample size or number of events) was not reached the outcome was downgraded (-1). Guyatt's (Guyatt et al., 2011) recommendations were used to calculate OIS of continuous outcomes: alpha was 0.05, beta was 0.20 and the effect size used was 0.2 therefore recommending OIS of 400 (n=200 in each arm). The OIS for readmission outcomes was calculated using http://www.stat.ubc.ca/~rollin/stats/ssize/ b2.html. Proportions entered into the programme were taken for all included studies reporting number of readmissions (intervention (p1)=0.24; control (p2)=0.37). The calculated OIS was n=392 (n=196 in each arm).

Publication Bias

Quality was downgraded by one level if, for outcomes including over five studies, funnel-plots showed asymmetry. Quality was not downgraded if less than five studies were included in the analysis as no evidence was available although publication bias may exist.

L. Results of GRADE assessment

Table DS9: Results of GRADE assessment

Appendix 8.2 Summary of GRADE assessment results									
Outcomes and questions	**Starter number (what % of studies are randomised)**	**Quality (risk of bias)**	**Inconsistency**	**Indirectness**	**Imprecision**	**Publication bias**	**Overall**	**Comments**	**Included studies**
Is end of treatment PANSS total score in psychological therapy statistically superior to control?	4 All but 1 of the included studies were randomised	-2 9 of 13 studies had 2 high risk of bias ratings	-1 High heterogeneity (67.86%) and unclear effect.	0	0	0	1	Very low	Aghotor (Aghotor et al., 2010); Bechdolf (Bechdolf et al., 2004); Gaudiano (Gaudiano & Herbert, 2006); Habib (Habib et al., 2015); Haddock (Haddock et al., 1999); Hall (Hall & Tarrier, 2003); Hayashi (Hayashi et al., 2001); Kim (Kim et al., 2010); Kumar (Kumar et al., 2010); Lewis (Lewis et al., 2002); Moritz (Moritz et al., 2011); Schramm (Schramm et al., 2007); Shelley (Shelley et al., 2001); Startup

Appendix 8.2 Summary of GRADE assessment results

Outcomes and questions	Starter number (what % of studies are randomised)	Quality (risk of bias)	Inconsistency	Indirectness	Imprecision	Publication bias	Overall	Comments	Included studies
									(Startup et al., 2004).
Is end of treatment PANSS total score in psychological therapy statistically superior to control in randomised and single-blind studies?	4 All studies randomised	-1 >50% studies had 1 or more high risk of bias ratings.	-1 >40% heterogeneity and unclear direction of effect.	0	-1 N exceeded OIS but wide confidence intervals (-0.46, 0.14).	N/A	1	Very low	Aghotor (Aghotor et al., 2010); Bechdolf (Bechdolf et al., 2004); Habib (Habib et al., 2015); Haddock (Haddock et al., 1999); Kim (Kim et al., 2010); Lewis (Lewis et al., 2002); Moritz (Moritz et al., 2011); Schramm (Schramm et al., 2007).
Is end of treatment PANSS total score in psychological therapy statistically superior to control in non-randomised and non-blind studies?	4 All but 1 study was randomised	-2 >50% of studies had 2 or more high risk of bias ratings	0 >40% but has clear direction of effect.	0	-1 N not exceeded OIS	N/A	1	Very low	Gaudiano (Gaudiano & Herbert, 2006); Hall (Hall & Tarrier, 2003); Hayashi (Hayashi et al., 2001); Kumar (Kumar et al., 2010); Shelley (Shelley et al., 2001); Startup (Startup et al., 2004).

Appendix 8.2 Summary of GRADE assessment results

Outcomes and questions	Starter number (what % of studies are randomised)	Quality (risk of bias)	Inconsistency	Indirectness	Imprecision	Publication bias	Overall	Comments	Included studies
Is end of treatment PANSS total score in CBT and cognitive therapy group statistically superior to control?	4 All but 1 study was randomised	-2 >50% of studies had 2 or more high risk of bias ratings	-2 >75% heterogeneity and unclear direction of effect.	0	-1 N exceeded OIS but wide CI (-0.82, -0.07)	N/A	-1	Very low	Bechdolf (Bechdolf et al., 2004); Habib (Habib et al., 2015); Haddock (Haddock et al., 1999); Hayashi (Hayashi et al., 2001); Lewis (Lewis et al., 2002); Shelley (Shelley et al., 2001); Startup (Startup et al., 2004).
Is end of treatment PANSS total score in third wave therapy group statistically superior to control?	4 All studies were randomised	-2 >50% of studies had 2 or more high risk of bias ratings	0 0% heterogeneity and clear direction of effect	0	-1 N not exceeded OIS and wide CI (-0.95, 0.06)	N/A	1	Very low	Aghotor (Aghotor et al., 2010); Gaudiano (Gaudiano & Herbert, 2006); Kumar (Kumar et al., 2010); Moritz (Moritz et al., 2011).
Is end of treatment PANSS total score in other therapies group statistically superior to control?	4 All studies were randomised	-1 50% of studies had 1 or more high risk of bias rating	0 0% heterogeneity and clear direction of effect.	0	-1 N not exceeded OIS and very wide CI (-0.90, 0.53).	N/A	2	Low	Kim (Kim et al., 2010); Schramm (Schramm et al., 2007)

Appendix 8.2 Summary of GRADE assessment results

Outcomes and questions	Starter number (what % of studies are randomised)	Quality (risk of bias)	Inconsistency	Indirectness	Imprecision	Publication bias	Overall	Comments	Included studies
Is end of treatment PANSS total score in psychological therapy statistically superior to control group that had increased contact with a therapist?	4 All studies were randomised	-1 50% of studies had 1 or more high risk of bias ratings	0 Heterogeneity did not exceed 40%	0	-1 N exceeded -1 OIS but wide CI (-0.38, 0.13).	N/A	2	Low	Bechdolf (Bechdolf et al., 2004); Gaudiano (Gaudiano & Herbert, 2006); Haddock (Haddock et al., 1999); Kim (Kim et al., 2010); Lewis (Lewis et al., 2002); Moritz (Moritz et al., 2011); Schramm (Schramm et al., 2007)
Is end of treatment PANSS total score in psychological therapy statistically superior to control groups that did not have increased contact with a therapist?	4 All but one study was randomised	-2 >50% studies had 2 or more high risk ratings.	0 >40% heterogeneity but clear direction of effect.	0	-1 N not exceeded OIS	N/A	1	Very low	Aghotor (Aghotor et al., 2010) Habib (Habib et al., 2015) Hall (Hall & Tarrier, 2003) Hayashi (Hayashi et al., 2001) Kumar (Kumar et al., 2010) Shelley (Shelley et al., 2001) Startup (Startup et al., 2004)
Is follow-up PANSS total score in	4	-2 >50% studies	-1 >40% heterogeneity but	0	-1 N exceeded OIS but wide	N/A	0	Very low	Bechdolf (Bechdolf et al., 2004)

Appendix 8.2 Summary of GRADE assessment results

Outcomes and questions	Starter number (what % of studies are randomised)	Quality (risk of bias)	Inconsistency	Indirectness	Imprecision	Publication bias	Overall	Comments	Included studies
psychological therapy statistically superior compared to control?	All included studies randomised	had 2 or more high risk ratings	unclear direction of effect		CI (-0.53, 0.10)				Hall (Hall & Tarrier, 2003) Kim (Kim et al., 2010) Lewis (Lewis et al., 2002) Startup (Startup et al., 2004)
Is follow-up PANSS total score in psychological therapy statistically superior compared to control in randomised and single-blind studies?	4 All studies randomised	-2 >50% have 2 or more high risk of bias ratings.	0 No heterogeneity (I^2=0.00)	0	-1 N exceeded OIS but wide CI (-0.22, 0.19).	N/A	1	Very low	Bechdolf (Bechdolf et al., 2004) Kim (Kim et al., 2010) Lewis (Lewis et al., 2002) Schramm (Schramm et al., 2007)
Is follow-up PANSS total score in psychological therapy statistically superior compared to control in non-	4 All studies randomised	-2 >50% have 2 or more high risk of bias ratings.	0 No heterogeneity (I^2=0.00)	0	-1 N did not exceed OIS.	N/A	1	Very low	Hall (Hall & Tarrier, 2003) Startup (Startup et al., 2004)

Appendix 8.2 Summary of GRADE assessment results

Outcomes and questions	Starter number (what % of studies are randomised)	Quality (risk of bias)	Inconsistency	Indirectness	Imprecision	Publication bias	Overall	Comments	Included studies
randomised and non-blind studies?									
Is there a significant difference in number of readmissions during follow-up period between psychological therapy and control group?	4 ¾ studies randomised	-2 >50% have 2 or more high risk of bias ratings.	0 Heterogeneity <40%	0	0	0	2	Low	Bach (Bach et al., 2013) (including Bach (Bach & Hayes, 2002) and Gaudiano (Gaudiano & Herbert, 2006); Bechdolf (Bechdolf et al., 2004); Kim (Kim et al., 2010); Lewis (Lewis et al., 2002); Schramm (Schramm et al., 2007); Veltro (Veltro et al., 2006);
Is there a significant difference in number of readmissions during follow-up period between psychological	4 All studies randomised	-1 > 50% studies have 1 or more high risk of bias ratings.	0 Heterogeneity <40%	0	-1 N exceeded OIS but wide CI (OR: 0.54, 1.28)	N/A	2	Low	Bechdolf (Bechdolf et al., 2004) Kim (Kim et al., 2010) Lewis (Lewis et al., 2002) Schramm (Schramm et al., 2007)

Appendix 8.2 Summary of GRADE assessment results

Outcomes and questions	Starter number (what % of studies are randomised)	Quality (risk of bias)	Inconsistency	Indirectness	Imprecision	Publication bias	Overall	Comments	Included studies
therapy and control group in randomised and single-blind studies?									
Is there a significant difference in number of readmissions during follow-up period between psychological therapy and control group in non-randomised and non-blind studies?	4 All but 1 study randomised	-2 All studies have 2 or more high risk of bias ratings.	0 Heterogeneity <40%	0	0	N/A	2	Low	Bach (Bach et al., 2013) (including Bach (Bach & Hayes, 2002) and Gaudiano (Gaudiano & Herbert, 2006); Veltro (Veltro et al., 2006)
Is there a significant difference in depression between psychological therapy and control group?	4 5/7 included studies are randomised	-2 All studies have 2 or more high risk of bias ratings.	0 Heterogeneity >40% with clear direction of effect	0	-1 N does not reach OIS	0	1	Very low	Bowers (Bowers, 1990) Gibson (Gibson et al., 2014) Hall (Hall & Tarrier, 2003) Kim (Kim et al., 2010) Miller (Miller et al., 1989)

Appendix 8.2 Summary of GRADE assessment results

Outcomes and questions	Starter number (what % of studies are randomised)	Quality (risk of bias)	Inconsistency	Indirectness	Imprecision	Publication bias	Overall	Comments	Included studies
									Mortan (Mortan et al., 2011) Schramm (Schramm et al., 2007)
Is there a significant difference in depression between psychological therapy and control group in randomised and single-blind studies?	4 All studies are randomised	-1 Over 50% of studies included at least one high risk of bias rating	0 0% heterogeneity	0	-1 N does not reach OIS and wide CI (-0.84, 0.18).	N/A	2	Low	Bowers (Bowers, 1990) Kim (Kim et al., 2010) Schramm (Schramm et al., 2007)
Is there a significant difference in depression between psychological therapy and control group in non-randomised and non-blind studies?	3 50% of studies were not randomised	-2 Over 50 % of studies included as least 2 risk of bias ratings.	0 >40% heterogeneity but clear direction of effect.	0	-1 N does not reach OIS and wide CI (-1.18, 0.18).	N/A	1	Very low	Gibson (Gibson et al., 2014) Hall (Hall & Tarrier, 2003) Miller (Miller et al., 1989) Mortan (Mortan et al., 2011)

Appendix 8.2 Summary of GRADE assessment results

Outcomes and questions	Starter number (what % of studies are randomised)	Quality (risk of bias)	Inconsistency	Indirectness	Imprecision	Publication bias	Overall	Comments	Included studies
Is there a significant difference in depression between psychological therapy and control group in patients diagnosed with psychosis?	4 50% if included studies are randomised	-2 Over 50 % of studies included as least 2 risk of bias ratings.	0 heterogeneity >40% with clear direction of effect	0	-1 N does not reach OIS and wide CI (-1.18, 0.16).	N/A	1	Low	Hall (Hall & Tarrier, 2003) Kim (Kim et al., 2010) Mortan (Mortan et al., 2011)
Is there a significant difference in depression between psychological therapy and control group in patients diagnosed with depression?	4 50% if included studies are randomised	-2 Over 50 % of studies included as least 2 risk of bias ratings..	0 no heterogeneity.	0	-1 N does not reach OIS and wide CI (-1.03, 0.08).	N/A	1	Low	Bowers (Bowers, 1990) Miller (Miller et al., 1989) Schramm (Schramm et al., 2007)
Does psychological therapy have a significant effect on symptoms of anxiety at post intervention	4 50% of included studies are randomised	-2 Over 50 % of studies included as least 2 risk of bias ratings.	0 Heterogeneity >40% with clear direction of effect.	0	-1 N does not reach OIS and wide CI (-0.70, 0.10).	N/A	0	Very low	Gibson (Gibson et al., 2014) Hall (Hall & Tarrier, 2003) Kim (Kim et al., 2010) Mortan (Mortan et al., 2011)

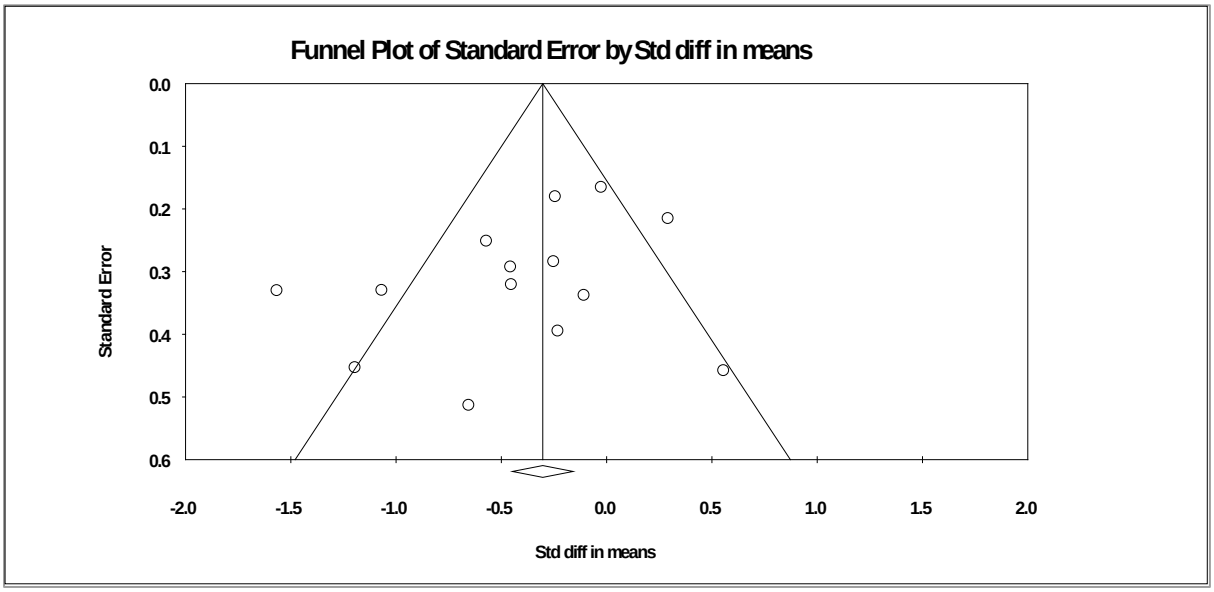
Appendix 8.2 Summary of GRADE assessment results

Outcomes and questions	Starter number (what % of studies are randomised)	Quality (risk of bias)	Inconsistency	Indirectness	Imprecision	Publication bias	Overall	Comments	Included studies
compared to control?									
Does psychological therapy have a significant effect on 'coping' at post intervention compared to control?	N/A	N/A	N/A	0	N/A	N/A	N/A	Important outcome for patients however too few report this outcome (k=3)	
Does psychological therapy have a significant effect on quality of life at post intervention compared to control?	N/A	N/A	N/A	0	N/A	N/A	N/A	Important outcome for patients however too few studies directly report this outcome (k=1)	

CBT, Cognitive Behavioural Therapy; N/A, not applicable; OIS, Optimal Information Size; PANSS, Positive and Negative Symptom Scale.

M. Publication bias plot for primary outcome

Figure DS1: Funnel plot for effect of therapy on overall psychotic symptoms at end of treatment



N. Forest plots for subgroup analyses

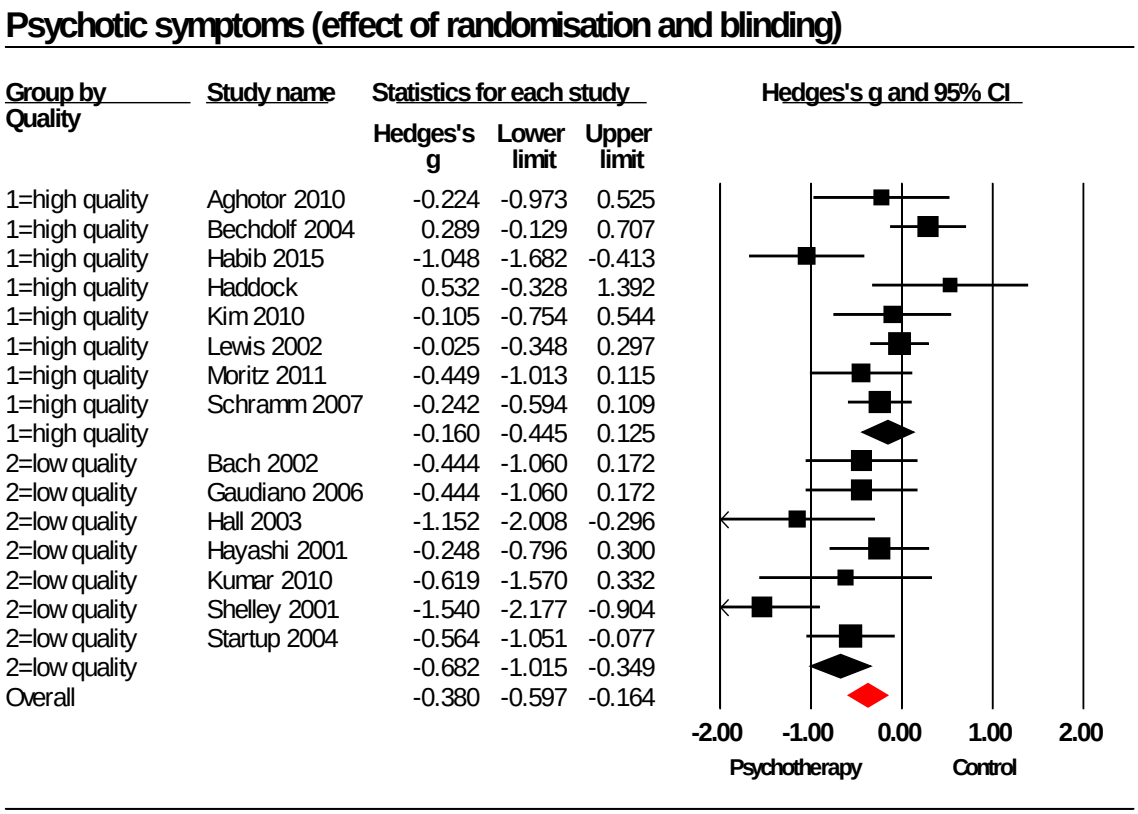


Figure DS2 (a): Forest plot for effect of single blind-RCT methodology on symptoms at end of treatment

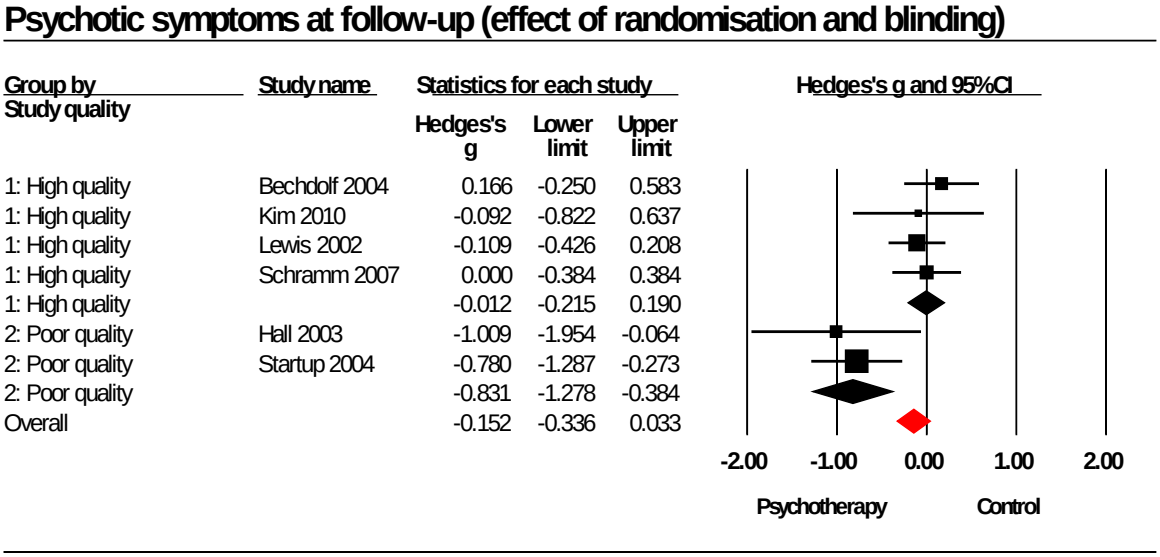


Figure DS2 (b): Forest plot for effect of single blind-RCT methodology on symptoms at follow-up

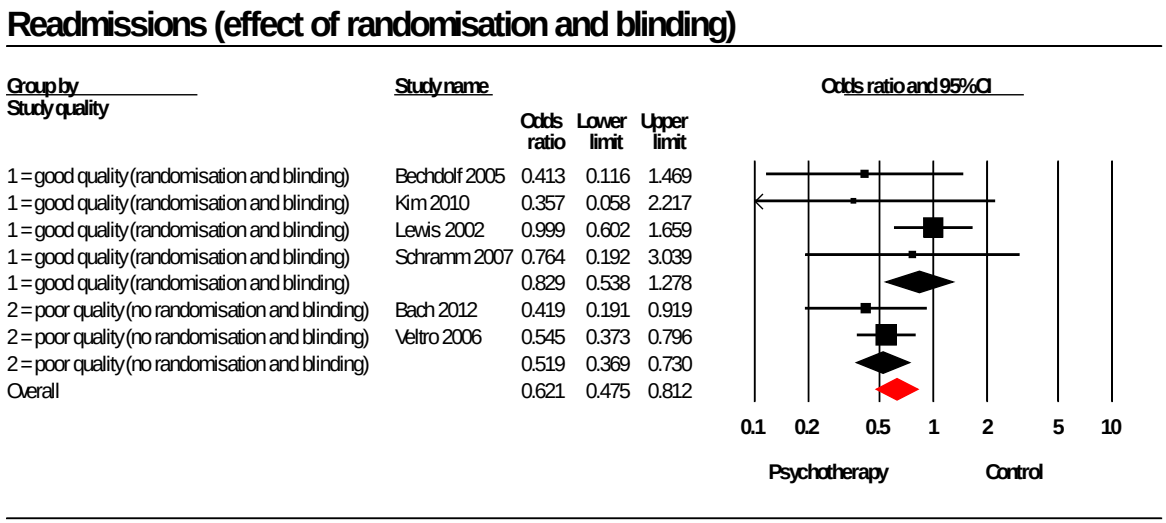


Figure DS2 (c): Forest plot for effect single blind-RCT methodology on readmission

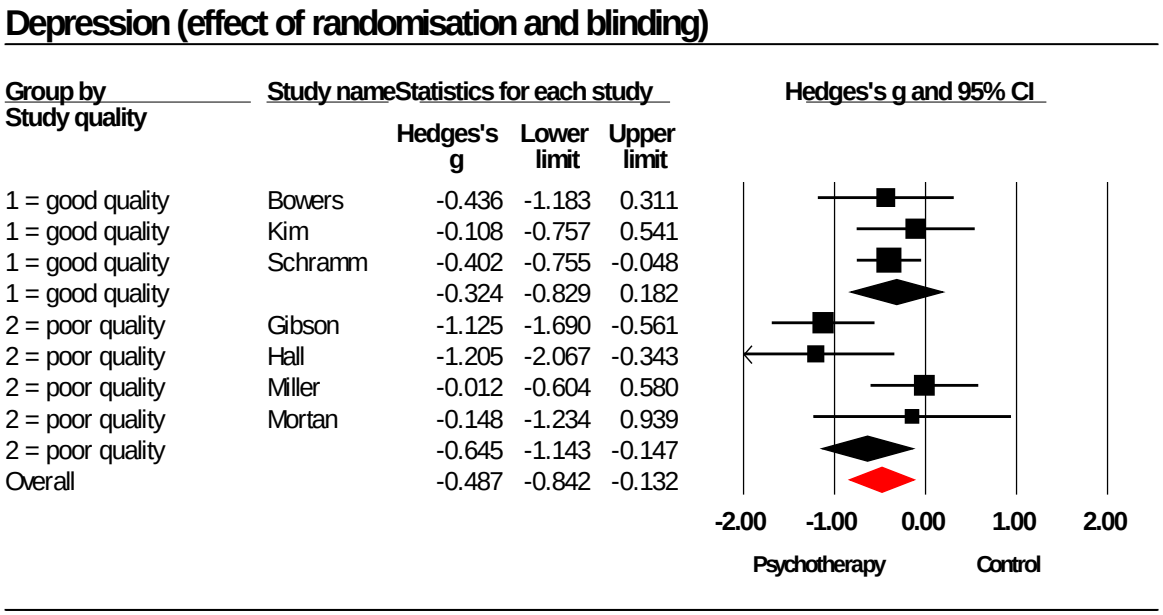


Figure DS2 (d): Forest plot for effect of single blind-RCT methodology on depression

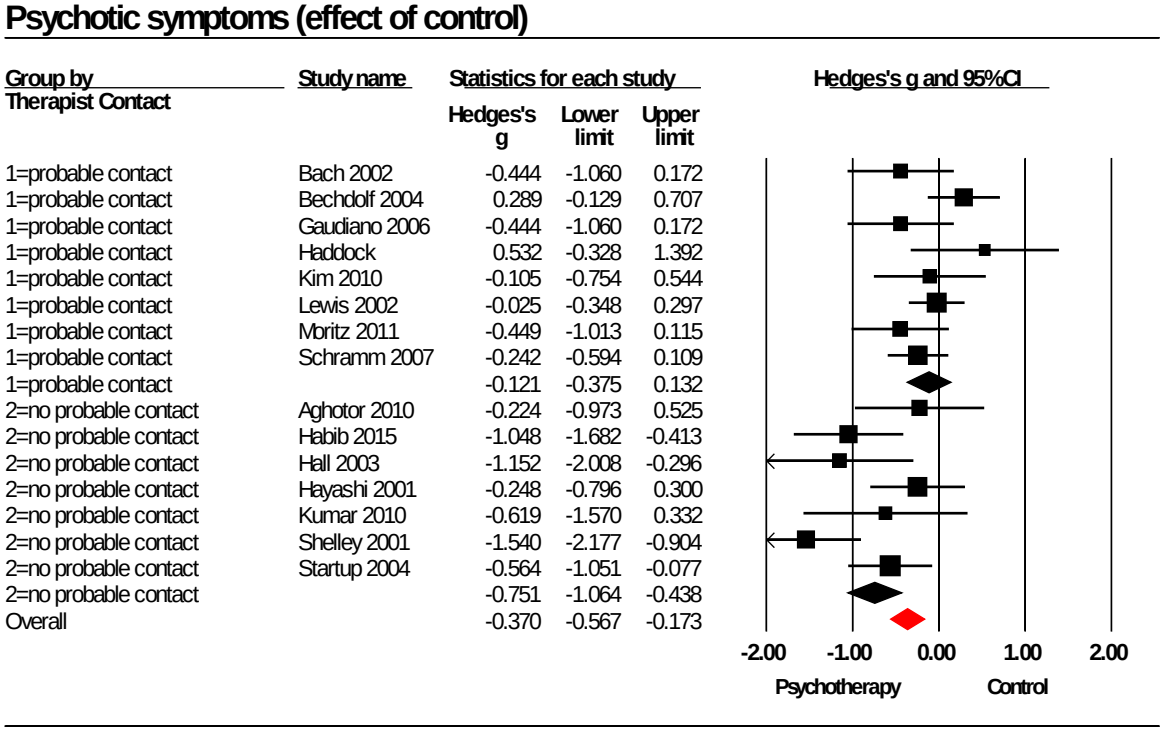


Figure DS3: Forest plot for effect of 'contact with therapist in control group' on overall psychotic symptoms at end of treatment

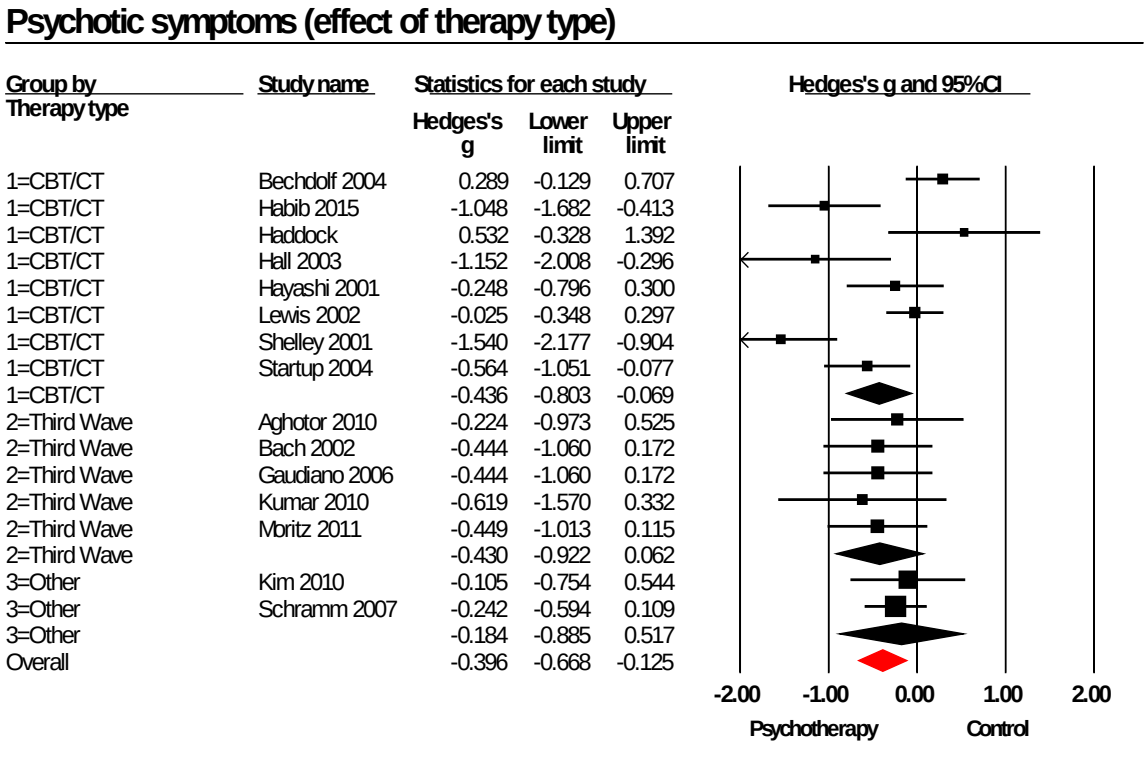


Figure DS4: Forest plot for effect of therapy type on overall psychotic symptoms at end of treatment

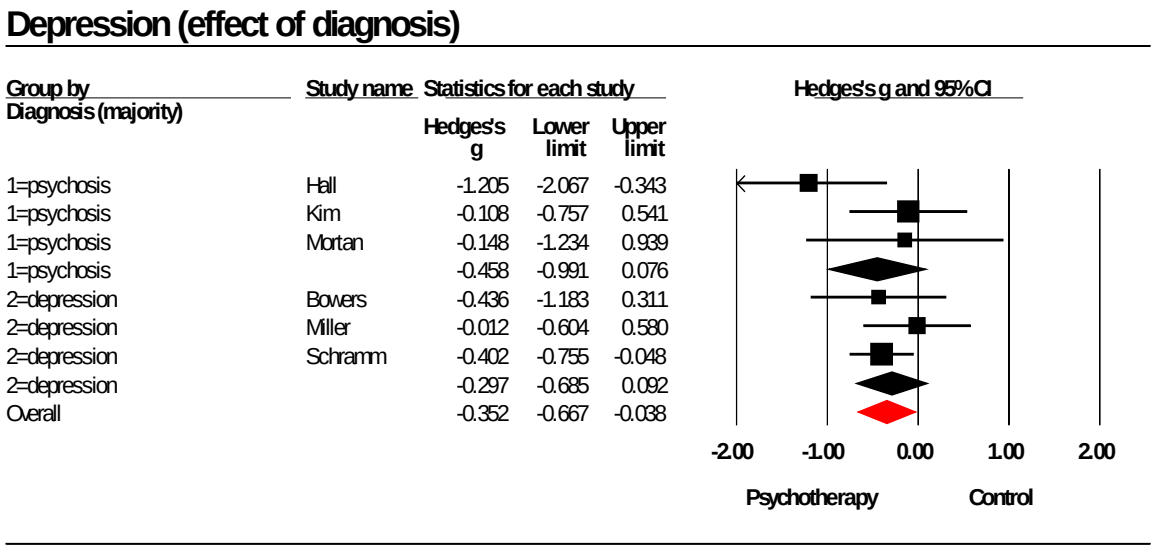


Figure DS5: Forest plot for effect of diagnosis on depression

O. Grouping of outcome measures for meta-analysis

Table DS10: Grouping of outcome measures for meta-analysis

Outcomes in included studies grouped by concept				
	Construct	**Measure**	**Studies using measure**	**Total No. studies reporting measure**
0	**Global Functioning**	GAF	Schramm, Startup	2
		GAS	Haas [a]	1
		RPTS	Haas [a]	1
		CGI	Gaudiano	1
		SDS	Bach, Gaudiano	2
1	**Psychiatric symptom severity**	PANSS (total)	Aghotor, Bechdolf, Habib, Hall, Hayashi, Kim, Kumar, Lewis, Moritz, Shelley	10
		BPRS	Bach, Gaudiano, Haddock, Startup	4
		PAS	Drury [a]	1
		PEF	Haas [a]	1
		PSE	Drury [a]	1
		SCL-90-G	Miller	1
		PSYRATS	Habib, Haddock, Lewis, Owen [a], Moritz	5
		Symptom Checklist	Mortan,	1
2	**Distress related to symptoms**	**Distress Total: 5**		
		H-distress	Bach, Gaudiano	2
		Symptomology-D	Haas [a]	1
		Problem Distress	Mortan	1
		CORE-10	Owen	1
3	**Negative symptoms severity**	**Negative General Total: 10**		
		PANSS (negative subscale	Bechdolf, Habib, Hall, Hayashi, Kim, Kumar, Lewis , Shelley	8
		SANS	Mortan, Startup	2

4	**Positive symptoms severity**	**Positive General Total: 12**		
		SAPS	Mortan, Startup	2
		PANSS (positive subscale);	Aghotor, Bechdolf, Habib, Hall, Hayashi, Kim, Kumar, Lewis, Moritz, Shelley,	10
		Specific:		
		SCL-90-Pos	Miller	1
		BCS	Drury [a]	1
		BABS	Kumar	1
		H-frequency	Bach, Gaudiano	2
5	**Depressive symptoms severity**	**Depression General Total: 7**		
		BDI	Bowers, Miller, Mortan, Schramm	4
		HRSD	Bowers, Kim, Miller, Schramm	4
		HAD (D-scale)	Hall	1
		HDI	Mortan	1
		SCL-90-R-D	Gibson	1
		Specific:		
		DAS	Bowers	1
		ATQ	Bowers	1
		HS	Bowers	1
		BHS	Mortan	1
		BADE (JTC)	Aghotor, Moritz	2
6	**Anxiety Symptoms severity**	**Anxiety Total: 4**		
		HAMA	Kim	1
		HAI	Mortan	1
		SCL-90-R-A	Gibson	1
		HAD (A-scale)	Hall	1
7	**Coping/self efficacy**	SCQ	Hall	1
		Problem Coping	Mortan	1
		MHSC	Owen [a]	1
8	**Service use**	Readmission (%)	Bach, Bechdolf, Gaudiano, Haddock, Kim, Lewis, Schramm, Veltro	7
		Days in hospital	Bach, Veltro	2
		Mean no. of total readmissions	Drury [a]	1
		Median time in acute care	Drury [a]	1
9	**Social functioning**	SFS	Hall, Startup	2
		SAS	Miller	1

		IPDC	Miller	1
10	**Deliberate Self Harm/Suicide**	DSI	Gibson	1
		MSSI	Miller	1
11	**Emotion Regulation**	DERS,	Gibson	1
		CERQ-short	Gibson	1
12	**Self Esteem**	RSES	Mortan	1
13	**Insight**	PANSS G12 (judgement and insight subscale)	Hayashi	1
		ABPS	Hayashi	1
		H-believability	Bach	1
		SAI	Habib	1
14	**Personality**	MPI	Hayashi	1
15	**Quality of Life**	MSQoL	Bechdolf	1

ABPS, Awareness of Being a Patient Scale; A-Scale, Anxiety Scale; ATQ, Automatic Thoughts Questionnaire; BABS, Brown Assessment of Beliefs Scale; BCS, Belief and Conviction Scale; BDI, Beck Depression Inventory; BHS, Becks Hopelessness Scale; BPRS, Brief Psychiatric Rating Scale; CERQ-Short, Cognitive Emotion Regulation Questionnaire- Short Form; CGI, Clinical Global Impression Scale; CORE-10, Clinical Outcome Routine Evaluation-10; DAS, Dysfunctional Attitudes Scale; DERS, Difficulties in Emotion Regulation Scale; D-Scale, Depression Subscale; DSI, Deliberate Self Harm Inventory; GAF, Global Assessment of Psychological Functioning; GAS, Global Assessment Scale; HAD, Hospital Anxiety and Depression Scale; HAI, Hamilton Anxiety Inventory; HAMA, Hamilton Anxiety Rating Scale; H-believability, Hallucinations- believability; H-distress, Hallucination-distress; HDI, Hamilton Depression Inventory; H-frequency, Hallucinations frequency; HRSD, Hamilton Rating Scale of Depression; HS, Hopelessness Scale; IPDC, Interpersonal Dependency Scale; JTC, Jumping to Conclusions; MHCS, Mental Health Confidence Scale; MPI, Maudsley Personality Inventory; MSQoL, Modular System of Quality of Life; MSSI, Modified Scale of Suicide Ideation; PANSS, Positive and Negative Symptom Scale; PANSS G12, PANSS judgement and insight subscale; PAS, Psychiatric Assessment Scale; PEF, Psychiatric Evaluation Form; PSE, Present State Examination; PSYRATS, Psychotic Symptom Rating Scale; RPTS, Role Performance Treatment Scale; RSES, Rosenberg Self-Esteem Scale; SAI, Schedule for Assessment of Insight; SANS, Scale for the Assessment of Negative Symptoms; SAPS, Scale for the Assessment of Positive Symptoms; SAS, Social Adjustment Scale; SCL-90-A, Symptom Checklist 90 anxiety symptoms; SCL-90-D, Symptom Checklist 90 depression symptoms; SCL-90-G, Symptom Checklist 90 General Symptom Index; SCL-90-P, Symptom Checklist 90 Positive Symptoms; SCQ, Stress Coping Questionnaire; SDS, Sheenan Disability Scale; Symptomology-D, Symptomology-distress; SFS, Social Functioning Scale.

a. Studies excluded due to outcome measures used (Drury, Birchwood, & Cochrane, 2000; Drury, Birchwood, Cochrane, & Macmillan, 1996a, 1996b; Haas et al., 1988; Owen, Sellwood, Kan, Murray, & Sarsam, 2015).

P. PRISMA checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	Title page
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	P1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	P2
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	P2/3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	P3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	P3/4

Section/topic	#	Checklist item	Reported on page #
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	P4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Supplement
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	P4
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	P4
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	Pp5-6
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	P5
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	P5
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	P5

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	Main paper, P5
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	Pp5
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	P6, Fig 1,
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Main paper, p6. Supplements
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	P6, Table 1, Supplements
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Main paper, Figs 2-6, Table 1 and Supplements
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	P7, Table 1
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	P6 and Supplement,

Section/topic	#	Checklist item	Reported on page #
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	P8/9, Table 1 and supplements
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	Pp8-10
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	pp10
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	Pp8-9
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	

Q. Example search strategy

The following search strategy was used: ((SU.EXACT.EXPLODE("Cognitive behavioural psychotherapy") OR SU.EXACT("Cognitive psychotherapy") OR SU.EXACT("Individual psychotherapy") OR SU.EXACT("Group psychotherapy") OR SU.EXACT("Behavioural psychotherapy")) OR (cognitive therap* OR behavio?r* therap* OR cognitive behavio?r* therap* OR CBT OR psychological therap* OR group therap* OR individual therap* OR dialectical behavio?r* therap* OR DBT OR compassion focus?ed therap* OR compassionate mind training OR CMT OR psychological treatment OR psychological intervention OR mindfulness OR emotion regulation OR acceptance commitment therap* OR ACT OR mindfulness based OR third wave therap* OR third wave cognitive therap*)) AND (((psychiatric inpatient care) OR (acute inpatient mental health care)) OR (mental health AND inpatient care)) AND (acute psychosis OR psychosis OR psychotic OR schizo* OR personality disorder OR PD OR borderline personality disorder OR BPD OR severe mental illness) AND (inpatient OR acute)

R. Supplementary references

Aghotor, J., Pfueller, U., Moritz, S., Weisbrod, M., & Roesch-Ely, D. (2010). Metacognitive training for patients with schizophrenia (MCT): Feasibility and preliminary evidence for its efficacy. *Journal of Behavior Therapy and Experimental Psychiatry*, *41*(3), 207–211. http://doi.org/10.1016/j.jbtep.2010.01.004

Bach, P., Gaudiano, B. A., Hayes, S. C., Herbert, J. D., Bach, P., Gaudiano, B. A., … James, D. (2013). Acceptance and commitment therapy for psychosis : intent to treat , hospitalization outcome and mediation by believability. *Psychosis*, *5*(2), 166–174. http://doi.org/10.1080/17522439.2012.671349

Bach, P., & Hayes, S. C. (2002). The Use of Acceptance and Commitment Therapy to Prevent the Rehospitalization of Psychotic Patients : A Randomized Controlled Trial. *Journal of Consulting and Clinical Psychology*, *70*(5), 1129–1139. http://doi.org/10.1037//0022-006X.70.5.1129

Bechdolf, A., Knost, B., Kuntermann, C., Schiller, S., Klosterkotter, J., Hambrecht, M., & Pukrop, R. A. (2004). A randomized comparison of group cognitive-behavioural therapy and group psychoeducation in patients with schizophrenia. *Acta Psychiatrica Scandinavica*, *110*, 21–28. http://doi.org/10.1111/j.1600-0447.2005.00649.x

Belvederi Murri, M., Respino, M., Innamorati, M., Cervetti, A., Calcagno, P., Pompili, M., … Amore, M. (2015). Is good insight associated with depression among patients with schizophrenia? Systematic review and meta-analysis. *Schizophrenia Research*, *162*(1–3), 234–247. http://doi.org/10.1016/j.schres.2015.01.003

Bowers, W. A. (1990). Treatment of depressed in-patients. Cognitive therapy plus medication, relaxation plus medication and medication alone. *British Journal of Psychiatry*, *156*, 73–78. http://doi.org/10.1192/bjp.156.1.73

Drury, V., Birchwood, M., & Cochrane, R. (2000). Cognitive therapy and recovery from acute psychosis: a controlled trial. 3. Five-year follow-up. *The British Journal of Psychiatry : The Journal of Mental Science*, *177*(1), 8–14. http://doi.org/10.1192/bjp.177.1.8

Drury, V., Birchwood, M., Cochrane, R., & Macmillan, F. (1996a). Cognitive therapy and recovery from acute psychosis: a controlled trial. I. Impact on psychotic symptoms. *The British Journal of Psychiatry*, *169*(5), 593–601. http://doi.org/10.1192/bjp.169.5.593

Drury, V., Birchwood, M., Cochrane, R., & Macmillan, F. (1996b). Cognitive therapy and recovery from acute psychosis: a controlled trial. II. Impact on recovery time. *The British Journal of Psychiatry*, *169*(5), 602–607. http://doi.org/10.1192/bjp.169.5.602

Gaudiano, B. A., & Herbert, J. D. (2006). Acute treatment of inpatients with psychotic symptoms using Acceptance and Commitment Therapy: Pilot results. *Behaviour Research and Therapy*, *44*(3), 415–437. http://doi.org/10.1016/j.brat.2005.02.007

Gibson, J., Booth, R., Davenport, J., Keogh, K., & Owens, T. (2014). Dialectical behaviour therapy-informed skills training for deliberate self-harm: A controlled trial with 3-month follow-up data. *Behaviour Research and Therapy*, *60*, 8–14. http://doi.org/10.1016/j.brat.2014.06.007

Guyatt, G. H., Oxman, A. D., Kunz, R., Brozek, J., Alonso-Coello, P., Rind, D., … Schünemann, H. J. (2011). GRADE guidelines 6. Rating the quality of evidence - Imprecision. *Journal of Clinical Epidemiology*, *64*, 1283–1293. http://doi.org/10.1016/j.jclinepi.2011.01.012

Haas, G. L., Glick, I. D., Clarkin, J. F., Spencer, J. H., Lewis, A. B., Peyser, J., … Lestelle, V. (1988). Inpatient family intervention: a randomized clinical trial. II. Results at hospital discharge. *Archives of General Psychiatry*, *45*(3), 217–24. http://doi.org/10.1001/archpsyc.1988.01800270025003

Habib, N., Dawood, S., Kingdon, D., & Naeem, F. (2015). Preliminary Evaluation of Culturally Adapted CBT for Psychosis (CA-CBTp): Findings from Developing Culturally-Sensitive CBT Project (DCCP). *Behavioural and Cognitive Psychotherapy*, *43*(2), 200–208. http://doi.org/10.1017/S1352465813000829

Haddock, G., Tarrier, N., Morrison, A., Hopkins, R., Drake, R., & Lewis, S. . (1999). A pilot study evaluating the effectiveness of individual inpatient cognitive-behavioural therapy in early psychosis. *Social Psychiatry and Psychiatric Epidemiology*, *34*(5), 254–258. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/10396167

Hall, P. L., & Tarrier, N. (2003). The cognitive-behavioural treatment of low self-esteem in psychotic patients: A pilot study. *Behaviour Research and Therapy*, *41*(3), 317–332. http://doi.org/10.1016/S0005-

7967(02)00013-X

Hayashi, N., Yamashina, M., Igarashi, Y., & Kazamatsuri, H. (2001). Improvement of patient attitude toward treatment among inpatients with schizophrenia and its related factors: Controlled study of a psychological approach. *Comprehensive Psychiatry*, *42*(3), 240–246. http://doi.org/10.1053/comp.2001.23136

Jauhar, S., McKenna, P. J., Radua, J., Fung, E., Salvador, R., & Laws, K. R. (2014). Cognitive-behavioural therapy for the symptoms of schizophrenia: Systematic review and meta-analysis with examination of potential bias. *British Journal of Psychiatry*, *204*(1), 20–29. http://doi.org/10.1192/bjp.bp.112.116285

Kim, D., Choi, J., & Kim, S. (2010). A Pilot Study of Brief Eye Movement Desensitization and Reprocessing (EMDR) for Treatment of Acute Phase Schizophrenia. *Korean Journal of Biological Psychiatry*, *17*(2), 94–102. Retrieved from http://journal.biolpsychiatry.or.kr/asp/pdfdown.asp?pn=0092010010

Kumar, D., Ul Haq, M. Z., Dubey, I., Dotivala, K. N., Siddiqui, S. V., Prakash, R., … Nizamie, S. H. (2010). Effect of meta-cognitive training in the reduction of positive symptoms in schizophrenia. *European Journal of Psychotherapy and Counselling*, *12*(2), 149–158. http://doi.org/10.1080/13642537.2010.488875

Leucht, S., Rothe, P., Davis, J. M., & Engel, R. R. (2013). Equipercentile linking of the BPRS and the PANSS. *European Neuropsychopharmacology*, *23*(8), 956–959. http://doi.org/10.1016/j.euroneuro.2012.11.004

Lewis, S., Tarrier, N., Haddock, G., Bentall, R., Kinderman, P., Kingdon, D., … Dunn, G. (2002). Randomised controlled trial of cognitive −− behavioural therapy in early schizophrenia : acute-phase outcomes Randomised controlled trial of cognitive behavioural therapy in early schizophrenia : *British Journal of Psychiatry*, *181*(43), 91–97. http://doi.org/10.1192/bjp.181.43.s91

Miller, I. W., Norman, W. H., Keitner, G. I., Bishop, S. B., & Dow, M. G. (1989). Cognitive-behavioral treatment of depressed inpatients. *Behavior Therapy*, *20*(1), 25–47. http://doi.org/10.1016/S0005-7894(89)80116-9

Moritz, S., Veckenstedt, R., Randjbar, S., Vitzthum, F., & Woodward, T. S. (2011). Antipsychotic treatment beyond antipsychotics: metacognitive intervention for schizophrenia patients improves delusional symptoms. *Psychological Medicine*, *41*(9), 1823–1832. http://doi.org/10.1017/S0033291710002618

Mortan, O., Sutcu, S. T., & Kose, G. G. (2011). A Pilot Study on the Effectiveness of a Group-Based Cognitive-Behavioral Therapy Program for Coping with Auditory Hallucinations. *Turk Psikiyatri Dergisi*, *22*(1), 26–34. http://doi.org/10.1007/s11274-015-1903-5

Owen, M., Sellwood, W., Kan, S., Murray, J., & Sarsam, M. (2015). Group CBT for psychosis: A longitudinal, controlled trial with inpatients. *Behaviour Research and Therapy*, *65*, 76–85. http://doi.org/10.1016/j.brat.2014.12.008

Samara, M. T., Engel, R. R., Millier, A., Kandenwein, J., Toumi, M., & Leucht, S. (2014). Equipercentile linking of scales measuring functioning and symptoms: Examining the GAF, SOFAS, CGI-S, and PANSS. *European Neuropsychopharmacology*, *24*(11), 1767–1772. http://doi.org/10.1016/j.euroneuro.2014.08.009

Schramm, E., Van Calker, D., Dykierek, P., Lieb, K., Kech, S., Zobel, I., … Berger, M. (2007). An intensive treatment program of interpersonal psychotherapy plus pharmacotherapy for depressed inpatients: Acute and long-term results. *American Journal of Psychiatry*, *164*(5), 768–777. http://doi.org/10.1176/appi.ajp.164.5.768

Shelley, A., Battaglia, J., Lucey, J., & Opler, L. A. (2001). Symptom-Specific Group Therapy for Inpatients with Schizophrenia. *Einstein Quarterly Journal of Biology and Medicine*, *18*, 21–28. Retrieved from https://www.researchgate.net/publication/247690942_Symptom-Specific_Group_Therapy_for_Inpatients_with_Schizophre_n_i_a

Slade, M., & Priebe, S. (2001). Are randomised controlled trials the only gold that glitters? *British Journal of Psychiatry*, *179*(OCT.), 286–287. http://doi.org/10.1192/bjp.179.4.286

Startup, M., Jackson, M., & Bendix, S. (2004). North Wales randomized controlled trial of cognitive behaviour therapy for acute schizophrenia spectrum disorders: outcomes at 6 and 12 months. *Psychological Medicine*, *34*(3), 413–422. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/15259826

Veltro, F., Falloon, I., Vendittelli, N., Oricchio, I., Scinto, A., Gigantesco, A., & Morosini, P. (2006). Effectiveness of cognitive-behavioural group therapy for inpatients. *Clinical Practice and Epidemiology in Mental Health*, *2*(16). http://doi.org/10.1186/1745-0179-2-16

Xia, J., Adams, C., Bhagat, N., Bhagat, V., Bhoopathi, P., El-Sayeh, H., … Takriti, Y. (2009). Losing participants before the trial ends erodes credibility of findings. *Psychiatric Bulletin*, *33*(7), 254–257. http://doi.org/10.1192/pb.bp.108.021949