Online Supplementary Material

METHODS

Search strategy and study selection

In this meta-analysis, an electronic database search was conducted in Pubmed, PsycINFO and Embase using a combination of terms regarding Major Depressive Disorder (MDD), Personality Disorder (PD) and antidepressant treatments (Table 1 for specific search terms). Additional records were identified by examining the reference lists of the selected articles, and earlier reviews and meta-analyses on this topic. Studies about the effectiveness of acute phase treatment for MDD that included a subset of individuals with a co-morbid personality disorder were included. Criteria for eligibility were: 1) adults with a primary diagnosis of MDD, 2) acute phase treatment for MDD, including all forms of talking therapy, antidepressant medication (ADM), and other biological treatments (electroconvulsive therapy and transcranial magnetic stimulation), 3) controlled treatment(s) and random treatment assignment for studies with more than one treatment condition, 4) MDD and PD diagnoses based on a structured interview derived from DSM-III, DSM-IV, DSM-5, ICD-9 or ICD-10 conducted prior to the start of treatment, 5) change of depression severity scores from baseline to post-treatment assessed with the Beck Depression inventory (BDI, 1), the Hamilton Depression Rating Scale (HDRS, 2), the Montgomery Asberg Depression Rating Scale (MADRS, 3) or the (Quick) Inventory of Depressive Symptomatology (IDS, 4). Studies were excluded if the primary diagnosis was not MDD, e.g. bipolar disorder, dysthymia or PD. In addition, studies with MDD and PD diagnoses based on self-report questionnaires or non-structured clinical interviews were excluded. The search was restricted to articles written in English, Dutch or German, and to a human and adult sample. Publications up to the 3rd of April 2017 were included in the search. The study protocol was registered with PROSPERO (CRD42019120200). Two reviewers (EK, FP) independently screened abstracts of studies retrieved from the initial search. Records that were selected by at least one of the reviewers were then screened full-text by three reviewers independently (EK; all records, FP first part and SB second part of all records). Conflicts over inclusion were resolved through discussion with a third independent reviewer (FP or SB depending on the record). If information on eligibility criteria remained unclear, corresponding authors were contacted with specific questions concerning these criteria.

Table 1: Database search terms

Search terms in PUBMED	
	("depressive disorder"[MeSH Terms] OR depress*[Text Word] OR unipolar depress*[Text Word] OR major depress*[Text Word])
AND	("Psychotherapy"[Mesh Terms] OR "Counseling"[MeSH Terms] OR "Psychoanalysis"[MeSH Terms] OR "Electroconvulsive Therapy"[MeSH Terms] OR "Transcranial Magnetic Stimulation"[MeSH Terms] OR "Antidepressive Agents"[MeSH Terms] OR "Serotonin Uptake Inhibitors"[MeSH Terms] OR "Monoamine Oxidase Inhibitors"[MeSH Terms] OR "antipsychotic agents"[MeSH Terms] OR "Serotonin and Noradrenaline Reuptake Inhibitors"[MeSH Terms] OR "Combined Modality Therapy"[MeSH Terms] OR "Lithium"[MeSH Terms] OR "Bupropion"[MeSH Terms] OR "Antidepressive Agents, Tricyclic"[MeSH Terms] OR "Citalopram"[MeSH Terms] OR "Fluvoxamine"[MeSH Terms] OR "Sertraline"[MeSH Terms] OR "Paroxetine"[MeSH Terms] OR "Trazodone"[MeSH Terms] OR "Clomipramine"[MeSH Terms] OR "Imipramine"[MeSH Terms] OR "Desipramine"[MeSH Terms] OR "Lofepramine"[MeSH Terms] OR "Nortriptyline"[MeSH Terms] OR "Protriptyline"[MeSH Terms] OR Amitriptyline [MeSH Terms] OR "Amoxapine"[MeSH Terms] OR "Doxepin"[MeSH Terms] OR "Maprotiline"[MeSH Terms] OR "Iprindole"[MeSH Terms] OR "Opipramol"[MeSH Terms] OR "Trimipramine"[MeSH Terms] OR "Isocarboxazid"[MeSH Terms] OR "Nialamide"[MeSH Terms] OR "Phenelzine"[MeSH Terms] OR "Tranylcypromine"[MeSH Terms] OR "Moclobemide"[MeSH Terms] OR "Selegiline"[MeSH Terms] OR "Aripiprazole"[MeSH Terms] OR "Risperidone"[MeSH Terms] OR "Clozapine"[MeSH Terms] OR animal assisted therapy[Text Word] OR equine-assisted therapy[Text Word] OR aromatherapy[Text Word] OR art therapy[Text Word] OR behavior therapy[Text Word] OR anger management therapy[Text Word] OR applied behavior analysis[Text Word] OR aversive therapy[Text Word] OR biofeedback, psychology[Text Word] OR feedback, sensory[Text Word] OR neurofeedback[Text Word] OR cognitive remediation[Text Word] OR cognitive therapy[Text Word] OR acceptance commitment therapy[Text Word] OR mindfulness[Text Word] OR desensitization, psychologic[Text Word] OR eye movement desensitization reprocessing[Text Word] OR implosive therapy[Text Word] OR virtual reality exposure therapy[Text Word] OR relaxation therapy[Text Word] OR meditation[Text Word] OR sleep phase chronotherapy[Text Word] OR bibliotherapy[Text Word] OR color therapy[Text Word] OR crisis intervention[Text Word] OR dance therapy[Text Word] OR emotion-focused therapy[Text Word] OR feedback, psychological[Text Word] OR gestalt therapy[Text Word] OR horticultural therapy[Text Word] OR hypnosis[Text Word] OR autogenic training[Text Word] OR suggestion[Text Word] OR autosuggestion[Text Word] OR imagery (psychotherapy)[Text Word] OR music therapy[Text Word] OR narrative therapy[Text Word] OR person-centered therapy[Text Word] OR psychoanalytic therapy[Text Word] OR free association[Text Word] OR transactional analysis[Text Word] OR abreaction[Text Word] OR catharsis[Text Word] OR association[Text Word] OR transference (psychology)[Text Word] OR countertransference (psychology)[Text Word] OR psychotherapy, brief[Text Word] OR psychotherapy, multiple[Text Word] OR psychotherapy, psychodynamic[Text Word] OR psychotherapy, rational-emotive[Text Word] OR reality therapy[Text Word] OR socioenvironmental therapy[Text Word] OR milieu therapy[Text Word] OR psychotherapy, group[Text Word] OR couples therapy[Text Word] OR family therapy[Text Word] OR marital therapy[Text Word] OR psychodrama[Text Word] OR role playing[Text Word] OR sensitivity training groups[Text Word] OR residential treatment[Text Word] OR psychotherapy[Text Word] OR counseling[Text Word] OR interpersonal therapy[Text Word] OR interpersonal psychotherapy[Text Word] OR electroconvulsive therapy[Text Word] OR cognitive analytic therapy[Text Word] OR cognitive behavior therapy[Text Word] OR psychoanalysis[Text Word] OR repetitive transcranial magnetic stimulation[Text Word] OR antidepressive agent* [Text Word] OR antidepressant*[Text Word] OR serotonin reuptake inhibitor*[Text Word] OR serotonin uptake inhibitor*[Text Word] OR monoamine oxidase inhibitor*[Text Word] OR lithium[Text Word] OR antipsychotic agent*[Text Word] OR serotonin and noradrenaline reuptake inhibitor*[Text Word] OR serotonin and noradrenaline uptake inhibitor*[Text Word]OR combined modality therapy[Text Word] OR combined therapy[Text Word]OR bupropion[Text Word] OR antidepressive agent*, tricyclic[Text Word]OR citalopram[Text Word] OR fluvoxamine[Text Word] OR sertraline[Text Word] OR paroxetine[Text Word] OR escitalopram[Text Word] OR fluoxetine[Text Word] OR trazodone[Text Word] OR mirtazapine[Text Word] OR vortioxetine[Text Word] OR venlaflaxine[Text Word]OR duloxetine[Text Word] agomelatine[Text Word] OR clomipramine[Text Word] OR imipramine[Text Word] OR desipramine[Text Word] OR dibenzepin[Text Word] OR lofepramine[Text Word] OR nortriptyline[Text Word] OR protriptyline[Text Word] OR amitriptyline [Text Word] OR amitriptylinoxide[Text Word] OR amoxapine[Text Word] OR butriptyline[Text Word] OR demexiptiline[Text Word] OR dimetacrine[Text Word] OR Dosulepin[Text Word] OR doxepin[Text Word] OR melitracen[Text Word] OR metapramine[Text Word] OR Nitroxazepine[Text Word] OR propizepine[Text Word] OR quinupramine[Text Word] OR maprotiline[Text Word] OR amineptine[Text Word] OR iprindole[Text Word] OR opipramol[Text Word] OR tianeptine[Text Word] OR trimipramine[Text Word] OR noxiptiline[Text Word] OR pipofezine[Text Word] OR isocarboxazid[Text Word] OR nialamide[Text Word] OR phenelzine[Text Word] OR tranylcypromine[Text Word] OR moclobemide[Text Word] OR selegiline[Text Word] OR bifemelane[Text Word] OR pirlindole[Text Word] OR toloxatone[Text Word] OR rasagiline[Text Word] OR hydracarbazine[Text Word] OR aripiprazole[Text Word] OR risperidone[Text Word] OR quetiapine[Text Word] OR lurasidone[Text Word] OR olanzapine[Text Word] OR ziprasidone[Text Word] OR clozapine[Text Word])
AND	("personality disorders"[MeSH Terms] OR personality disorder*[Text Word] antisocial personality disorder*[Text Word] OR borderline personality disorder*[Text Word] OR compulsive personality disorder*[Text Word] OR dependent personality disorder*[Text Word] OR histrionic personality disorder*[Text Word] OR hysteria[Text Word] OR paranoid personality disorder*[Text Word] OR passive-aggressive personality disorder*[Text Word] OR schizoid personality disorder*[Text Word] OR schizotypal personality disorder*[Text Word] OR Narcissistic personality disorder*[Text Word] OR depressive personality disorder[Text Word] OR personality disorder* not otherwise specified[Text Word])
Limits	English, Dutch, German, All Adults: 19+ years, Humans
Search terms in PsycINFO	
	((DE "Major Depression") OR (DE "Atypical Depression") OR (TX "analytic depress*) OR (TX "dysthymic depress*) OR (TX "endogenous depress*") OR (TX "postpartum depress*") OR (TX "reactive depress*") OR (TX "recurrent depress*") OR (TX "treatment resistant depress*") OR (TX "major depress*") OR (TX "atypical depress*") OR (TX "unipolar depress*"))
AND	((DE "Psychotherapy") OR (DE "Cognitive Therapy") OR (DE "Cotherapy") OR (DE "Counseling") OR (DE "Transcranial Magnetic Stimulation") OR (DE "Animal Assisted Therapy") OR (DE

	"Aromatherapy") OR (DE "Art Therapy") OR (DE "Biofeedback") OR (DE "Neurotherapy") OR (DE "Mindfulness") OR (DE "Relaxation Therapy") OR (DE "Meditation") OR (DE "Bibliotherapy") OR (DE Crisis Intervention) OR (DE "Dance Therapy") OR (DE "Emotion Focused Therapy") OR (DE "Music Therapy") OR (DE "Free Association") OR (DE "Catharsis") OR (DE "Psychotherapeutic Transference") OR (DE "Countertransference") OR (DE "Milieu Therapy") OR (DE "Couples Therapy) OR (DE "Role Playing") OR (DE "Electroconvulsive Shock Therapy") OR (DE "Antidepressant Drugs") OR (DE Tricyclic Antidepressant Drugs") OR (DE "Serotonin Norepinephrine Reuptake Inhibitors") OR (DE "Serotonin Reuptake Inhibitors") OR (DE "Monoamine Oxidase Inhibitors") OR (DE "Lithium") OR (DE "Neuroleptic Drugs") OR (DE "Bupropion") OR (DE "Clozapine") OR (TX "Citalopram") OR (TX "Fluoxetine") OR (TX "Fluvoxamine") OR (TX "Iproniazid") OR (TX "Isocarboxazid") OR (TX "Lithium Carbonate") OR (TX "Methylphenidate") OR (TX "Mianserin") OR (TX "Moclobemide") OR (TX "Nefazodone") OR (TX "Nialamide") OR (TX "Nomifensine") OR (TX "Paroxetine") OR (TX "Phenelzine") OR (TX "Pheniprazine") OR (TX "Pipradrol") OR (TX "Serotonin Nodepinephrine Reuptake Inhibitors") OR (TX "Venlaflaxine") OR (TX "Sertraline") OR (TX "Sulpiride") OR (TX "Tranylcypromine") OR (TX "Trazodone") OR (TX "Tricyclic Antidepressant Drugs") OR (TX "Amitriptyline") OR (TX "Chlorimipramine") OR (TX "Desipramine") OR (TX "Doxepin") OR (TX "Imipramine") OR (TX "Maprotiline Nortriptyline") OR (TX "Zimeldine") OR (TX "Pargyline") OR (TX "Aripiprazole") OR (TX "Clozapine") OR (TX "Olanzapine") OR (TX "Quetiapine") OR (TX "Reserpine") OR (TX "Risperidone") OR (TX "Spiroperidol") OR (TX "Sulpiride") OR (TX "Tetrabenazine") OR (TX "Escitalopram") OR (TX "Duloxetine") OR (TX "Mirtazapine") OR (TX "Vortioxetine") OR (TX "Agomeltatine") OR (TX "Clopipramine") OR (TX "Dibenzepin") OR (TX "Lofepramine") OR (TX "protriptyline") OR (TX "amitriptylinoxide") OR (TX "amoxapine") OR (TX "butriptyline") OR (TX "demexiptiline") OR (TX "dimetacrine") OR (TX "dosulepin") OR (TX "imipraminoxide") OR (TX "melitracen") OR (TX "metapramine") OR (TX "nitroxazepine") OR (TX "noxiptiline") OR (TX "pipofexine") OR (TX "propizepine") OR (TX "quinupramine") OR (TX "amineptine") OR (TX "iprindole") OR (TX "opipramol") OR (TX "tianeptine") OR (TX "trimipramine") OR (TX "hydracarbazine") OR (TX "bifemelane") OR (TX "pirlindole") OR (TX "toloxatone") OR (TX "rasagiline") OR (TX "selegiline") OR (TX "ziprasidone") OR (TX "Lurasidone") OR (TX "Antidepressant Drug*") OR (TX "Tricyclic Antidepressant Drug*") OR (TX "Serotonin Norepinephrine Reuptake Inhibitor*") OR (TX "Serotonin Reuptake Inhibitor*") OR (TX "Monoamine Oxidase Inhibitor*") OR (TX "Lithium") OR (TX "Neuroleptic Drug*") OR (TX "Bupropion") OR (TX "Serotonin Uptake Inhibitor*") OR (TX "Serotonin Norepinephrine Uptake Inhibitor*") OR (TX "Adlerian Psychotherapy") OR (TX "Adolescent Psychotherapy") OR (TX "Multisystemic Therapy") OR (TX "Affirmative Therapy") OR (TX "Analytical Psychotherapy") OR (TX "Autogenic Training") OR (TX "Behavior Therapy") OR (TX "Aversion Therapy") OR (TX "Covert Sensitization") OR (TX "Conversion Therapy") OR (TX "Dialectical Behavior Therapy") OR (TX "Exposure Therapy") OR (TX "Implosive Therapy") OR (TX "Systemic Desensitization Therapy") OR (TX "Brief Psychotherapy") OR (TX "Brief Relational Therapy") OR (TX "Client Centered Therapy") OR (TX "Cognitive Behavior Therapy") OR (TX "Acceptance and Commitment Therapy") OR (TX "Eclectic Psychotherapy") OR (TX "Emotion Focused Therapy") OR (TX "Existential Therapy") OR (TX "Experiential Psychotherapy") OR (TX "Expressive Psychotherapy") OR (TX "Eye Movement Desensitization Therapy") OR (TX "Gestalt Therapy") OR (TX "Empty Chair Technique") OR (TX "Group Psychotherapy") OR (TX "Encounter Group Therapy") OR (TX "Marathon Group Therapy") OR (TX "Guided Imagery") OR (TX "Humanistic Psychotherapy") OR (TX "Client Centered Psychotherapy") OR (TX "Hypnotherapy") OR (TX "Age Regression (Hypnotic)") OR (TX "Ericksonian Psychotherapy") OR (TX "Individual Psychotherapy") OR (TX "Insight Therapy") OR (TX "Integrative Psychotherapy") OR (TX "Schema Therapy") OR (TX "Interpersonal Psychotherapy") OR (TX "Logotherapy") OR (TX "Narrative Therapy") OR (TX "Network Therapy") OR (TX "Persuasion Therapy") OR (TX "Primal Therapy") OR (TX "Psychoanalysis") OR (TX "Dream Analysis") OR (TX "Self-Analysis") OR (TX "Brief Relational Therapy") OR (TX "Psychodrama") OR (TX "Psychodynamic Psychotherapy") OR (TX "Psychotherapeutic Counseling") OR (TX "Family Therapy") OR (TX "Rational Emotive Behavior Therapy") OR (TX "Reality Therapy") OR (TX "Relationship Therapy") OR (TX "Solution Focused Therapy") OR (TX "Supportive Psychotherapy") OR (TX "Transactional Analysis") OR (TX "animal assisted therapy") OR (TX "equine-assisted therapy") OR (TX "aromatherapy") OR (TX "art therapy") OR (TX "anger management therapy") OR (TX "applied behavior analysis") OR (TX "biofeedback, psychology") OR (TX "feedback, sensory") OR (TX "neurofeedback") OR (TX "cognitive remediation") OR (TX "cognitive therapy") OR (TX "mindfulness") OR (TX "virtual reality exposure therapy") OR (TX "relaxation therapy") OR (TX "meditation") OR (TX "sleep phase chronotherapy") OR (TX "bibliotherapy") OR (TX "color therapy") OR (TX "crisis intervention") OR (TX "dance therapy") OR (TX "emotion-focused therapy") OR (TX "feedback, psychological") OR (TX "feedback, sensory") OR (TX "horticultural therapy") OR (TX "suggestion") OR (TX "autosuggestion") OR (TX "music therapy") OR (TX "psychoanalytic therapy") OR (TX "free association") OR (TX "abreaction") OR (TX "catharsis") OR (TX "association") OR (TX "transference (psychology)") OR (TX "countertransference (psychology)") OR (TX "psychotherapy, multiple") OR (TX "socioenvironmental therapy") OR (TX "milieu therapy") OR (TX "couples therapy") OR (TX "marital therapy") OR (TX "role playing") OR (TX "sensitivity training groups") OR (TX "residential treatment") OR (TX "electroconvulsive therapy") OR (TX "cognitive analytic therapy") OR (TX "combined modality therapy") OR (TX "combined therapy") OR (TX "Interpersonal Therapy") OR (TX "repetitive transcranial magnetic stimulation"))
AND	((DE "Personality Disorders") OR (TX "Antisocial Personality Disorder*") OR (TX "Avoidant Personality Disorder*") OR (TX "Borderline Personality Disorder*") OR (TX "Dark Triad") OR (TX "Machiavellianism") OR (TX "Narcissism") OR (TX "Psychopathy") OR (TX "Dependent Personality Disorder*") OR (TX "Histrionic Personality Disorder*") OR (TX "Narcissistic Personality Disorder*") OR (TX "Obsessive Compulsive Personality Disorder*") OR (TX "Paranoid Personality Disorder*") OR (TX "Passive-Aggressive Personality Disorder*") OR (TX "Sadomasochistic Personality") OR (TX "Masochistic Personality") OR (TX "Schizoid Personality Disorder*") OR (TX "Schizotypal Personality Disorder*") OR (TX "Personality Disorder Not Otherwise Specified") OR (TX "Depressive Personality Disorder*"))
Limits	English, German, Dutch, adulthood (18 years and older), Inpatients, Outpatients, Human
Search terms in Embase	
	((Major depression OR depressive disorder).sh. OR (depress* OR major depress* OR unipolar depress*).tw.)
AND	((Psychotherapy OR transcranial magnetic stimulation OR antidepressant agent OR serotonin uptake inhibitor OR serotonin noradrenalin reuptake inhibitor OR monoamine oxidase inhibitor OR lithium OR tricyclic antidepressant agent OR atypical antipsychotic agent OR trazodone OR mirtazapine OR vortioxetine OR agomelatine OR maprotiline OR pipofezine OR hydracarbazine).sh. OR (OR psychotherapy OR repetitive transcranial magnetic stimulation OR interpersonal psychotherapy OR interpersonal therapy OR Art therapy OR assertive therapy OR

	autogenic training OR aversion therapy OR behavior contracting OR behavior modification OR behavior therapy OR anger management therapy OR exposure therapy OR desensitization OR implosive therapy OR systematic desensitization OR virtual reality exposure therapy OR bibliotherapy OR client centered therapy OR cognitive behavioral therapy OR cognitive behavioral stress management OR cognitive rehabilitation OR cognitive therapy OR acceptance commitment therapy OR cognitive remediation therapy OR dance therapy OR eye movement desensitization processing OR family therapy OR gestalt therapy OR group therapy OR guided imagery OR hypnosis OR marital therapy OR milieu therapy OR mindfulness OR music therapy OR narrative therapy OR psychodrama OR psychodynamic psychotherapy OR reality therapy OR relaxation training OR role playing OR sociotherapy OR validation therapy OR abreaction OR catharsis OR holistic psychotherapy OR imagery OR psychotherapy, brief OR psychotherapy, multiple OR psychotherapy, rational-emotive OR short term psychotherapy OR socioenvironmental psychotherapy OR transference OR animal assisted therapy OR hippotherapy OR pet therapy OR applied behavior analysis OR emotion-focused therapy OR suggestion OR autosuggestion OR aromatherapy OR biofeedback OR feedback, sensory OR neurofeedback OR meditation OR sleep phase therapy OR color therapy OR crisis intervention OR horticultural therapy OR psychoanalysis OR free association OR transactional analysis OR counter transference OR couples therapy OR sensitivity training OR residential care OR counseling OR electroconvulsive therapy OR cognitive analytic therapy OR antidepressant* OR antidepressant agent* OR serotonin reuptake inhibitor* OR serotonin uptake inhibitor* OR noradrenaline reuptake inhibitor* OR noradrenaline uptake inhibitor* OR serotonin noradrenaline reuptake inhibitor* OR serotonin noradrenaline uptake inhibitor OR monoamine oxidase inhibitor* OR antipsychotic agent* OR atypical antipsychotic agent* OR tricyclic antidepressant agent* OR bupropion OR combined modality therapy OR combined therapy OR lithium OR citalopram OR fluvoxamine OR sertraline OR paroxetine OR escitalopram OR fluoxetine OR trazodone OR mirtazapine OR vortioxetine OR venlaflaxine OR duloxetine OR agomelatine OR clomipramine OR imipramine OR desipramine OR dibenzepin OR lofepramine OR nortriptyline OR protriptyline OR amitriptylinoxide OR amoxapine OR butriptyline OR demexiptiline OR dimetacrine OR Dosulepin OR doxepin OR melitracen OR metapramine OR Nitroxazepine OR propizepine OR quinupramine OR maprotiline OR amineptine OR iprindole OR opipramol OR tianeptine OR trimipramine OR imipraminoxide OR noxiptiline OR pipofezine OR isocarboxazid OR nialamide OR phenelzine OR tranylcypromine OR moclobemide OR selegiline OR bifemelane OR pirlindole OR toloxatone OR rasagiline OR hydracarbazine OR aripiprazole OR risperidone OR quetiapine OR lurasidone OR olanzapine OR ziprasidone OR clozapine).tw.)
AND	((Personality disorder OR narcissism).sh.) OR (personality disorder* OR antisocial personality disorder* OR avoidant personality disorder* OR borderline state OR borderline personality disorder* OR character disorder* OR compulsive personality disorder* OR dependent personality disorder* OR histrionic personality disorder* OR narcissism OR paranoid personality disorder* OR passive-aggressive personality disorder* OR psychopathy OR schizoid personality disorder OR schizotypal personality disorder* OR narcissistic personality disorder* OR depressive personality disorder* OR personality disorder* not otherwise specified)tw.)
Limits	Human, Dutch or English or German, Adult (18 – 64 years)

Data extraction and quality assessment

Data extraction was done independently by three reviewers (EK; all selected records, FP first part and SB second part of all selected records). Data extraction was checked by - and discrepancies were discussed with - an independent reviewer (FP or SB depending on the record). Primary outcome measures were average depression severity change scores from pre- to posttreatment and secondary outcome measures involved response and remission rates at the end of treatment. In each trial, primary and secondary outcome measures (summary estimates) were extracted for individuals with and without PD. Other extracted information included: study setting, demographics (male/female ratio, mean age of the sample), number of dropouts, time of post-treatment measurement, treatment description (type of treatment, treatment duration, dose of antidepressant medication, number psychotherapy sessions, number of electroconvulsive therapy sessions, number of transcranial magnetic stimulation sessions, integrity checks for specific psychotherapies), depression variables (type of measurement instrument, mean baseline depression severity, age of onset of the first depressive episode, number of previous depressive episodes, total illness duration and duration of the current depressive episode), and personality variables (type of measurement instrument, specific diagnoses). All corresponding authors were contacted and asked to provide missing data and to check the extracted data. Studies were included in the meta-analysis if calculation of an effect size was possible based on the extracted and received data. The validity of the included studies was evaluated by two independent reviewers (FP and SB) using the following four criteria of the 'Risk of Bias' assessment tool, developed by the Cochrane Collaboration (5): 1) adequate random sequence generation, 2) allocation to treatments by an independent party, 3) blinding of the outcome assessment and 4) the quantity, nature and management of incomplete outcome data. For each study, these criteria were rated as "unclear", "low risk", or "high risk", and disagreements between reviewers were resolved through discussion.

Data analysis

All analyses were done using STATA software (version 13.1). First, meta-analyses comparing individuals with and without PD were conducted for both primary (depression severity change scores) and secondary (response and remission rates) outcomes, using random-effects models with the DerSimonian and Laird method (6). Hedges' g effect sizes (Formula 1), risk ratios (RRs) and odds ratios (ORs) comparing individuals with and without PD were calculated for each treatment condition; if a study contained multiple treatment conditions, multiple effect sizes were calculated. Depending on data availability, we intended to calculate effect sizes with intention to treat study-level data. Effect sizes

were pooled with 95% confidence intervals (CI). A rule of thumb for interpreting Hedges' g effect sizes is that 0.2 represents a small effect, 0.5 a moderate effect, and 0.8 a large effect of co-morbid PD on mean depression severity change during treatment (7). RRs and ORs can be interpreted as the multiplication of the risk or odds respectively of response or remission when individuals have a co-morbid PD diagnosis. To test the homogeneity of these outcomes, I2 statistics were estimated with 95% CI (8). Estimates were interpreted as 0-40% representing low heterogeneity, 30-60% representing moderate heterogeneity, 50 90% representing substantial heterogeneity, and 75-100% representing considerable heterogeneity (5). If multiple measurement instruments were available to measure the primary outcome, the mean Hedges' g effect size was calculated (9). If average change scores and their S.D.'s were unavailable, they were computed using average pre- and posttreatment depression severity scores, their S.D.'s, and the correlation coefficients between these scores (S.D. calculations were based on formula 2). If these correlation coefficients were unavailable, a correlation of $r = 0.5$ was assumed based on data of a recent controlled trial comparing acute phase depression treatments (10). Second, multiple sensitivity analyses were conducted to test if the following changes affected the findings: 1) reducing (0.2) and increasing (0.8) the assumed correlation coefficient between mean pre- and posttreatment depression severity scores to calculate mean change score S.D.'s, if these correlation coefficients and S.D.'s were unavailable (this was the case for one study that included four comparisons (11)), 2) including only studies with just one (and not multiple) measurement instrument for depression severity, 3) including only studies with a low-risk score for all four risk-of-bias criteria. Third, a meta-regression was conducted to examine the association between specific study-level variables and between-study heterogeneity of the results (35). To this end, univariate meta-regressions were done with the following variables: male/female ratio, mean age of the sample, time of post treatment measurement, type of treatment (talking therapy, ADM, other biological treatment), treatment duration, percentage of dropout, mean baseline depression severity, age of onset of the first depressive episode, number of previous depressive episodes, total illness duration, duration of the current depressive episode, self report or clinician-rated depression severity scores and an intention to treat approach for the extracted outcome measures (absence or imputation of missing data). Variables with a p value < 0.10 were then included in a multivariate meta-regression. For the multivariate meta-regression, p-values were based on a Bonferroni correction. Correlations between the variables included in the multivariate meta-regression were calculated to check for multicollinearity. Finally, potential publication bias was examined by inspecting funnel plots and applying the Egger's test (12).

Formula 1: calculating Hedges' g

Formula to calculate Hedges' g effect sizes. The calculation includes a includes an adjustment for small sample bias:

$$\text{Hedges}'\text{g} = \frac{Depression\ change_{PD} - Depression\ change_{no\ PD}}{SD_{change}} \times \left(1 - \frac{3}{4(n_{PD} + n_{no\ PD)} - 9}\right)$$

Depression change $_{PD}$ = average depression severity change for individuals with co-morbid PD

Depression change $_{noPD}$ = average depression severity change for individuals without co-morbid PD

SD change = standard deviation of depression severity change scores

Formula 2: calculating the standard deviation of depression severity change

Formula to estimate the standard deviation of the average depression severity change using the standard deviations of the pre and post intervention depression severity scores and the correlation between pre and post intervention depression severity:

$$SD_{change} = \sqrt{SD_{pre}^2 + SD_{post}^2 - (2R\ SD_{pre}SD_{post})}$$

SD change = estimated standard deviation of the average depression severity change

SD_{pre} = standard deviation of average depression severity pre intervention

SD_{post} = standard deviation of average depression severity post intervention

R = correlation between average depression severity pre and post intervention

RESULTS

A total of 2046 citations were identified through database searching, 10 additional citations were extracted from other sources (Figure 1). After removing duplicates and ineligible studies based on abstract screening, a total of 206 records were screened full-text. From these records, 11 studies met the inclusion criteria; however, only six studies (12 comparisons) had sufficient data to be included in the meta-analysis. Study characteristics for all six studies are summarized in Table 2. The included trials comprised of 942 depressed individuals of which a subset of 447 individuals (47.5%) had a co-morbid PD. All trials were conducted in an outpatient setting in the Netherlands (n=1), Iran (n=1), the United States (n=3) and the United Kingdom (n=1). Treatment consisted of different types of psychotherapy (cognitive (behavioral) therapy, interpersonal psychotherapy, behavioral activation, psychodynamic interpersonal

psychotherapy, 8 conditions, n = 350,) and ADM (sertraline, paroxetine, nortriptyline, fluoxetine, 4 conditions, n = 592). Change in depression severity scores was measured with self-report questionnaires (BDI), clinician-rated measures (HDRS) or with both. For one study, intention to treat data were available (13). Response rates were available for four studies (10, 13-15). These were defined as i) at least 50% reduction ,or ii) a predefined minimum decrease of the score on the severity scale, or a combination of both criteria. Remission rates were available for four studies (10, 11, 13, 14) and were based on cut-off scores on depression severity scales (HDRS ≤ 7, BDI ≤ 9, 10 or 15). One study did not report response and remission rates (3, 16).

The primary outcome, depression severity change, was pooled using Hedges 'g effect sizes for six studies that included 12 comparisons. The mean pooled Hedges 'g effect size was g = 0.03 (95% CI -0.15 to 0.20, p = 0.27) indicating no significant difference in average depression severity change between individuals with and without a PD. The heterogeneity of the pooled effect size was low with a moderately high level of uncertainty (I2 = 17.6%, 95% CI 0.00% to 56.95 %). The sensitivity analyses described in the data analysis section did not change these results.

Secondary outcomes, response and remission rates, were pooled using risk ratios (RRs) and odds ratios (ORs). A total of 219 individuals with a PD achieved response (58.2%), compared to 209 individuals without a PD (54.5%). The pooled RR for response was 1.14 (95% CI 0.99 to 1.31, p = 0.07), and the pooled OR was 1.32 (95% CI 0.83 to 2.12, p = 0.24), indicating no significant difference between individuals with and without a PD. Heterogeneity of these pooled estimates was low to moderate with moderate to substantial uncertainty (RR: I2 = 25.0%, 95% CI 0.0% to 68.0 %; OR: I2 = 42.3%, 95% CI 0.0% to 77.0 %). A total of 98 individuals with a PD met criteria for remission (44.3%), and 125 individuals without PD achieved remission (47.2%). The pooled RR for remission was 0.895 (95% CI 0.736 to 1.089, p = 0.27), and the pooled OR was 0.751 (95% CI 0.473 to 1.194 , p = 0.23), indicating no significant difference between individuals with and without a PD. These summary estimates had low to moderate heterogeneity with substantial uncertainty (RR: I2 = 13.7 %, 95% CI 0.00% to 56.0 %; OR: I2 = 36.2%, 95% CI 0.0% to 71.0 %).

Figure 1: Study selection process

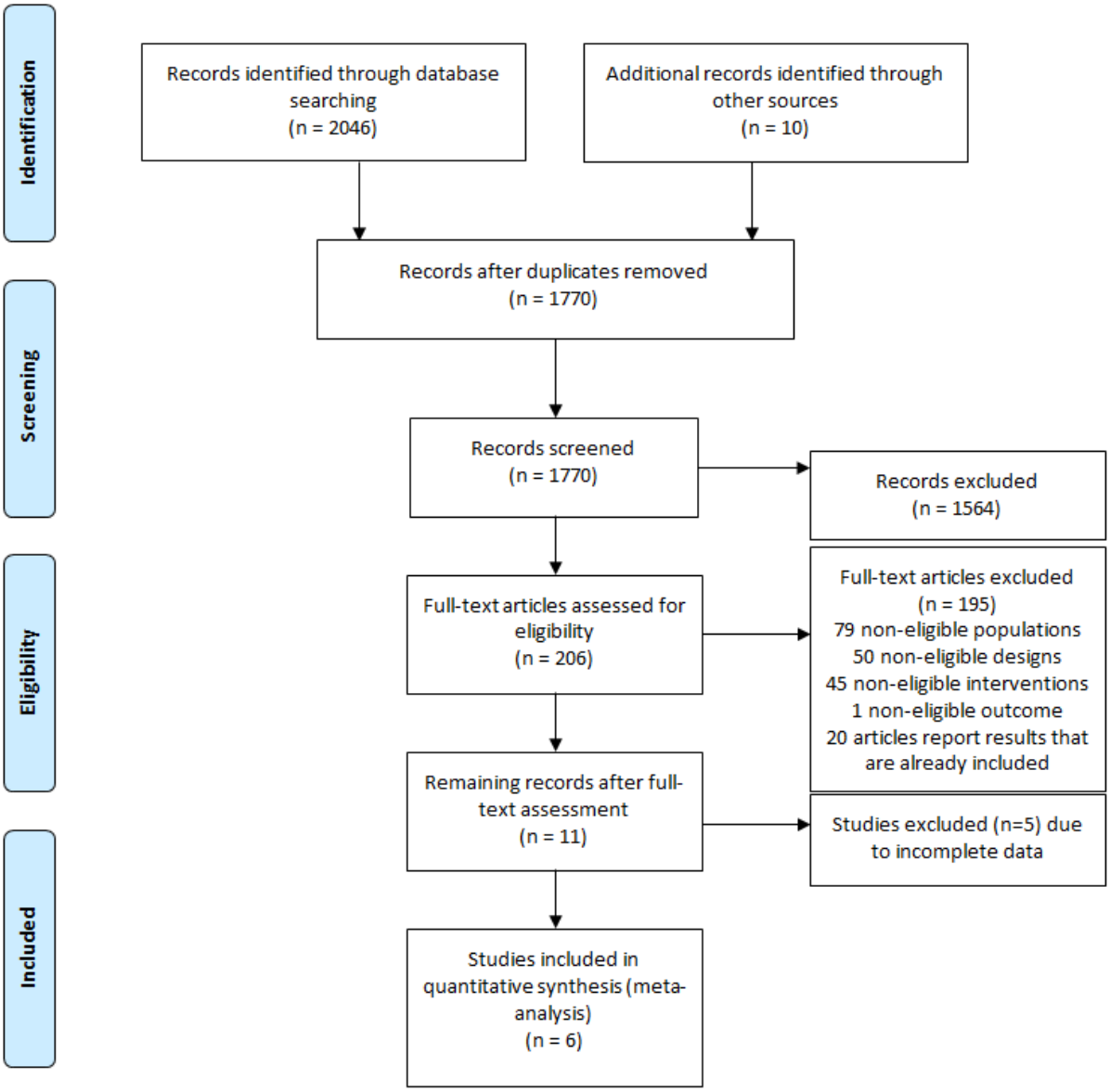


Table 2: Study characteristics

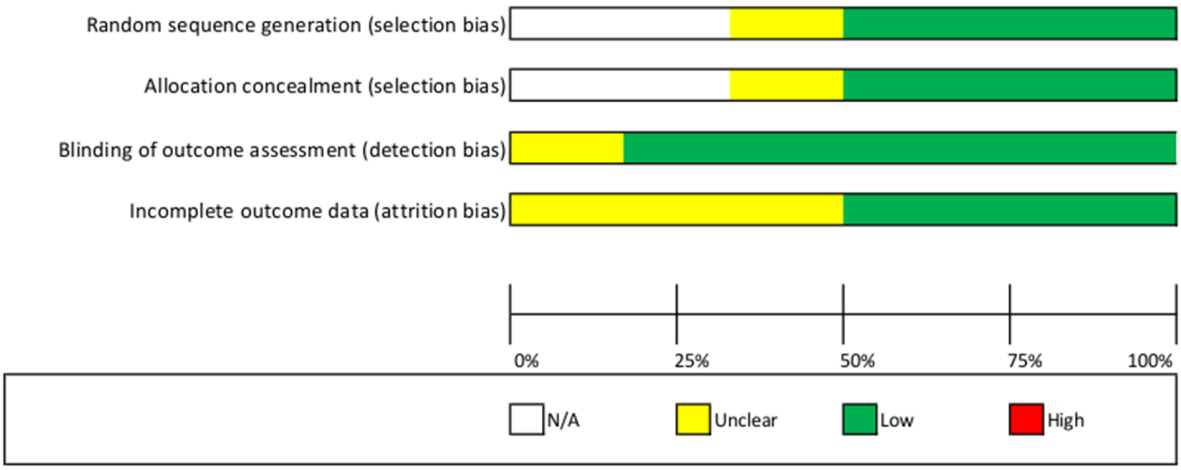
First author (year)	Sample size (PD, no PD)*	Number of PD diagnoses	Treatment	Time post-treatment measurement in weeks	Outcome			Age: mean	Sex (% female)	Current episode		Illness history: number of previous episodes: mean	Risk of bias**
					Severity scale	Response criteria	Remission criteria			Duration in months: mean	Baseline severity: mean		
Lemmens (2015)	131 (45, 86)	A: 7 B: 4 C: 51 NOS: 1	CT IPT	30	BDI	BDI decrease during TX ≥ 9	Post-TX BDI ≤ 9	41.4	67.1%	-	29.9	-	1: + 2: + 3: + 4: +
Moradveisi (2013)	80 (11, 69)	A: 2 B: 2 C: 16	BA SERT	13	HRSD; BDI	BDI & HRSD decrease during TX ≥ 50%	Post-TX HRSD ≤ 7 & BDI ≤ 10	31.4	85.0%	5.9	HDRS: 21.4	1.0	1: + 2: + 3: + 4: +
Fournier (2008)	180 (86, 94)	A: 8 B: 8 C: 74 NOS: 35	CT PAR	CT: 13.8 PAR: 14.2 PLAC: 7.1	HRSD; BDI	CT & PAR: 1. HRSD ≤ 12 at 16 w AND HRSD ≤ 14 at 14 w OR HRSD ≤ 12 at 10 and 12 w OR 2. HRSD ≤ 12 at 12, 14 and 18 w PLAC: HRSD ≤ 12 at 8 w	Response criteria + post-TX HRSD ≤ 7	40	59.0%	46	HRSD: 23.8 BDI: 33.1	2.4	1: + 2: + 3: + 4: +
Papakostas (2003)	59 (35, 24)	A: 11 B: 17 C: 40	NOR	6	HRSD	HRSD decrease from baseline to last record ≥ 50%	Last-recorded HRSD ≤ 7	41.1	50.0%	96.2	21.1	0.9	1: NA 2: NA 3: - 4: -
Fava (2002)	378 (243, 135)	A: 99 B: 98 C: 219	FLU	8	HRSD	HRSD decrease during TX ≥ 50%	Post-TX HRSD ≤ 7	39.9	55.0%	43.2	19.7	2.2	1: NA 2: NA 3: + 4: -
Hardy (1995)	114 (27, 87)	A: 36 B: 0 C: 0	CBT 8/16 s PI 8/16 s	8 s: 16 16 s: 37	BDI	-	Post-TX BDI ≤ 15	40.3	53.0%	-	21.3	-	1: - 2: - 3: + 4: -

*number of individuals that were assessed for personality disorders ** Risk of bias assessment tool, developed by the Cochrane Collaboration. A positive (low risk) or negative sign (high risk or unclear) is given to each of the criteria respectively: 1) adequate random sequence generation, 2) allocation to treatments by an independent (third) party, 3) blinding of the outcome assessment and 4) the quantity, nature and management of incomplete outcome data.

PD = Personality Disorder; A = cluster A personality disorder; B = cluster B personality disorder; cluster C = cluster C personality disorder; NOS = personality disorder not otherwise specified; CT = Cognitive Therapy; IPT = Interpersonal Psychotherapy; BA = Behavioral Activation; SERT = sertraline; PAR = paroxetine; NOR = nortriptyline; FLU = fluoxetine; CBT = Cognitive Behavioral Therapy; PI = Psychodynamic Interpersonal Psychotherapy; s = sessions; BDI = Beck Depression Inventory; HRSD = Hamilton Rating Scale for Depression; TX = treatment; w = weeks; NA = not applicable.

The risk of bias assessment is described in Table 2 and summarized in Figure 2. A total of three studies had a "low-risk" score on all four criteria. In three studies, the randomization process was adequately executed by an independent party and there was a low risk of attrition bias based on the quantity, nature and management of missing data. In five studies, the outcome assessors were blinded to treatment allocation and/or results of earlier assessments.

Figure 2: Risk of bias assessment

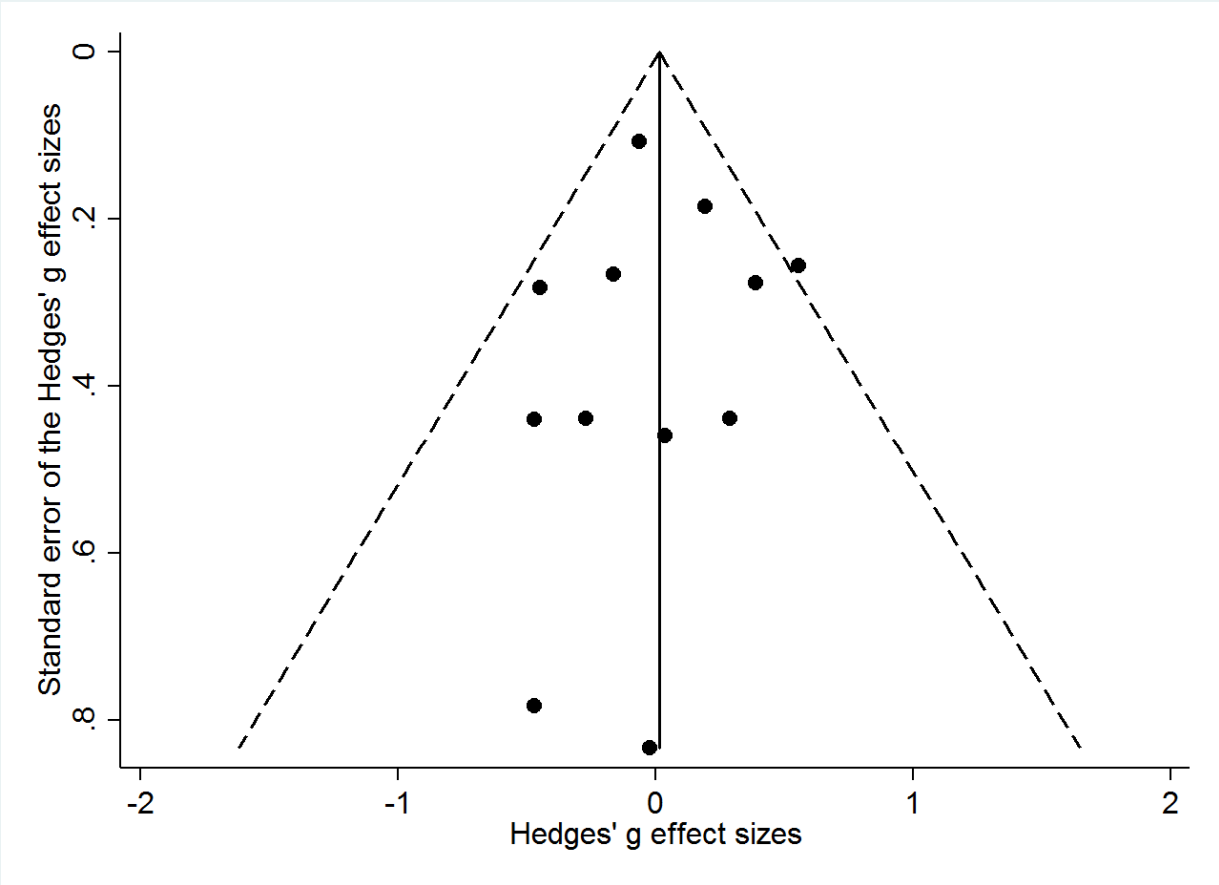


Reviewers' judgement about each risk of bias item as a proportion of all included controlled trials.
N/A = Not applicable

Because of missing data we were only able to compute the meta-regression for the following variables: male/female ratio, mean age of the sample, time of post-treatment measurement, type of treatment (talking therapy/ADM), treatment duration, percentage of dropout, mean baseline depression severity, number of previous depressive episodes, duration of the current depressive episode, self-report or clinician-rated depression severity scores and an intention to treat approach for the extracted outcome measures. Male/female ratio ($\beta = 0.02$; S.E. = 0.01; $p = 0.09$) and time of posttreatment measurement ($\beta = 0.02$; S.E. = 0.01; $p = 0.07$) met our criterion of $p < 0.10$ and were included in the multivariate meta-regression. In our multivariate meta-regression none of variables remained significant ($p = 0.05 / 2 = 0.025$), and there was no indication for multicollinearity (between variables cor. = 0.1).

There was no indication for publication bias based on visual inspection of the funnel plot (Figure 3) and the Egger's tests (intercept: -0.10; 95% CI −1.51 to 1.31; $p = 0.875$).

Figure 3: Funnel plot to examine publication bias



References

1. Beck AT, Steer RA, Brown GK. Beck depression inventory-II. San Antonio. 1996;78(2):490-8.
2. Hamilton M. A rating scale for depression. Journal of neurology, neurosurgery, and psychiatry. 1960;23(1):56.
3. Moradveisi L, Huibers MJ, Renner F, Arasteh M, Arntz A. The influence of comorbid personality disorder on the effects of behavioural activation vs. antidepressant medication for major depressive disorder: Results from a randomized trial in Iran. Behaviour research and therapy. 2013;51(8):499-506.
4. Rush AJ, Carmody T, Reimitz PE. The Inventory of Depressive Symptomatology (IDS): clinician (IDS-C) and self-report (IDS-SR) ratings of depressive symptoms. International Journal of Methods in Psychiatric Research. 2000;9(2):45-59.
5. Higgins JPT, Green S, editors. Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 The Cochrane Collaboration; 2011.
6. DerSimonian R, Laird N. Meta-analysis in clinical trials. Controlled clinical trials. 1986;7(3):177-88.
7. Cohen J. Statistical power analysis for the behavioral sciences: Routledge; 2013.
8. Ioannidis JP, Patsopoulos NA, Evangelou E. Uncertainty in heterogeneity estimates in meta-analyses. Bmj. 2007;335(7626):914-6.
9. Borenstein M, Hedges LV, Higgins JPT, Rothstein HR. Introduction to Meta-Analysis. NYC: Wiley; 2009.

10. Lemmens L, Arntz A, Peeters F, Hollon S, Roefs A, Huibers M. Clinical effectiveness of cognitive therapy v. interpersonal psychotherapy for depression: results of a randomized controlled trial. Psychological Medicine. 2015;45(10):2095-110.
11. Hardy GE, Barkham M, Shapiro DA, Stiles WB, Rees A, Reynolds S. Impact of Cluster C personality disorders on outcomes of contrasting brief psychotherapies for depression. Journal of Consulting and Clinical Psychology. 1995;63(6):997.
12. Egger M, Davey Smith G, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. Bmj. 1997;315(7109):629-34.
13. Fournier JC, DeRubeis RJ, Shelton RC, Gallop R, Amsterdam JD, Hollon SD. Antidepressant medications v. cognitive therapy in people with depression with or without personality disorder. The British Journal of Psychiatry. 2008;192(2):124-9.
14. Fava M, Farabaugh A, Sickinger A, Wright E, Alpert JE, Sonawalla S, et al. Personality disorders and depression. Psychological Medicine. 2002;32(6):1049-57.
15. Papakostas GI, Petersen TJ, Farabaugh AH, Murakami JL, Pava JA, Alpert JE, et al. Psychiatric comorbidity as a predictor of clinical response to nortriptyline in treatment-resistant major depressive disorder. The Journal of clinical psychiatry. 2003;64(11):1357-61.
16. Moradveisi L, Huibers MJ, Renner F, Arasteh M, Arntz A. Behavioural activation v. antidepressant medication for treating depression in Iran: randomised trial. The British Journal of Psychiatry. 2013;202(3):204-11.