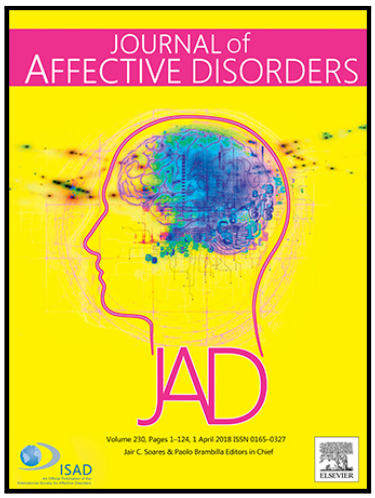

Dropout from randomised controlled trials of psychological treatments for depression in children and youth: a systematic review and meta-analyses

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Highlights

- 14.6% dropout from depression psychotherapy interventions in children and youth.
- Overall dropout was equally likely from intervention and control conditions.
- Interventions offering more sessions and longer duration had less dropout.
- Lack of detail reported regarding dropout limited the factors to be analysed.

Abstract

Background: Depression is a prevalent and disabling condition in youth. Treatment efficacy has been demonstrated for several therapeutic modalities. Acceptability of treatments is also important to explore and was addressed by investigating treatment dropout using meta-analyses.

Methods: A systematic search was conducted using MEDLINE, CINAHL and PsycARTICLES databases. Peer-reviewed randomised controlled trials investigating psychotherapy treatment of depression in children and youth (aged up to and including 18 years) were included. Proportion meta-analyses were used to calculate estimated dropout rates; odds ratios assessed whether there was greater dropout from intervention or control arms and meta-regressions investigated for associations between dropout, study and treatment characteristics.

Results: Thirty-seven studies were included (N=4343). Overall estimate of dropout from active interventions was 14.6% (95% CI 12.0-17.4%). Dropout was equally likely from intervention and control conditions, aside from family/dyadic interventions (where dropout was more likely from control arms). There was some suggestion that interventions offering more sessions and longer duration had less dropout and of less dropout from IPT than other interventions. There were no significant associations between dropout and study quality, CBT, family or individual versus other approaches.

Limitations: Lack of consistent reporting decreased the factors which could be analysed.

Conclusions: Dropout from depression treatment in children and youth was similar across different types of intervention and control conditions. Future treatment trials should specify minimum treatment dose, define dropout and provide information about participants who dropout. This may inform treatment choice and modification of treatments.

Key words

depression, psychotherapy, youth, dropout, meta-analysis

Introduction

Depression is a disabling condition for all ages, including children and youth. The prevalence of depression in children has been found to be under 1% (Thapar, Collishaw, Pine, & Thapar, 2012), although in 13-18 year olds this rises to an estimated 5.6% (Costello, Erkanli, & Angold, 2006). The lifetime prevalence of depression with severe impairment by late adolescence has been estimated at 8.7% (Merikangas et al., 2010). Adolescent depression has been associated with poorer physical health, higher healthcare utilisation and increased work impairment due to physical health by age 20 (Miller, Constance, & Brennan, 2007) and significantly reduced years of schooling (Fletcher, 2010). Early-onset depression often continues into adulthood, has high comorbidity with other psychiatric disorders, is associated

with poor psychosocial and academic outcomes and increased risk for bipolar disorder, substance abuse and suicide (Birmaher et al., 1996). In adults, depression has been identified as one of the ten leading diseases for global disease burden (Lopez, Mathers, Ezzati, Jamison, & Murray, 2006). Suicide is one of the leading causes of death in youth globally (Blum & Nelson-Mmari, 2004).

Effectiveness for depression treatment in youth has been demonstrated for several therapy modalities. Interpersonal psychotherapy (IPT) and Cognitive Behavioural Therapy (CBT) have been found to be more effective than control conditions in meta-analyses (Arnberg & Ost, 2014; Pu et al., 2017; Zhou et al., 2015). A systematic review found preliminary evidence that computerised CBT is acceptable and effective for the treatment of depression in children and adolescents (Richardson, Stallard, & Velleman, 2010). Limited evidence supports the effectiveness of behavioural activation for depression in young people (Tindall et al., 2017). There is also some evidence that family approaches can be effective in treating depression in young people (Diamond, Russon, & Levy, 2016). Medication is not a focus of the present review, but meta-analyses have found that combined treatment with CBT and antidepressants can be more effective than antidepressants alone in adolescents (Calati et al., 2011). However, in a large meta-analysis evaluating youth psychological therapy for internalizing and externalizing disorders, depression treatment was found to have the weakest mean effect size (Weisz et al., 2017). Alongside further treatment development it is necessary to determine which interventions are more acceptable.

Treatment effectiveness is not the only factor to consider; it is important to work out which interventions young people find acceptable and are able to engage in. This can be explored by investigating treatment dropout. Poor clinical outcomes,

demoralisation of clinicians and overutilization of services have been associated with adults who have terminated therapeutic interventions early (Reis & Brown, 1999). Attrition decreases the cost-effectiveness of services (the financial burden from staff salaries and overhead costs from missed appointments) and contributes to waiting lists (Barrett, Chua, Crits-Christoph, Gibbons, & Thompson, 2008).

In order to inform choices about which treatments may balance both efficacy and retention it is necessary to know what the typical dropout rate for psychotherapeutic depression treatment is and which factors are associated with dropout. Meta-analyses investigating psychotherapy interventions for depression in adults have found average dropout rates from 17.5% to 19.2% (Cooper & Conklin, 2015; Swift & Greenberg, 2014). Longer treatment duration (intended number of weeks of intervention) has been associated at trend level with higher rates of dropout in adults (Cooper & Conklin, 2015). The same study found no association between dropout and intended number of intervention sessions, however (Cooper & Conklin, 2015). Therapeutic modality also impacts retention. In one meta-analysis addressing adults, integrative approaches had significantly lower dropout rates than cognitive behavioural-analysis system of psychotherapy (CBASP), cognitive therapy, CBT, IPT, solution-focussed and supportive psychotherapy. The same study found CBASP had significantly higher dropout than cognitive therapy and integrative approaches (Swift & Greenberg, 2014). One meta-analysis investigated dropout from antidepressant drug treatments in adolescents and found that medication only had highest dropout; CBT combined with drugs had lower nonadherence prevalence (Rohden et al., 2017). Zhou and colleagues investigated both efficacy and acceptability of psychotherapies for depression in children and adolescents (Zhou et al., 2015). IPT and problem solving had significantly less all-cause discontinuation

than CBT but only IPT and CBT were significantly more effective than control conditions, they were also more effective than problem-solving therapy. To the authors' knowledge there have been no dropout meta-analyses incorporating investigation of moderators of dropout from depression treatment in youth.

The present review had three aims. The first was to conduct a systematic review and meta-analysis of randomised controlled trials on psychotherapeutic treatments for depression in youth and calculate a pooled estimate of dropout rate, in both absolute (i.e. absolute prevalence rate) and comparative terms (i.e. odds of dropout when compared to a control condition). The second aim was to determine whether any participant or intervention factors are related to dropout. The third aim was to explore reasons for dropout, if data on this were available. The present review focussed on randomised controlled trials as these studies are clear about which types of therapy are being offered and this is carefully controlled and standardised, allowing clear comparisons of different interventions.

Method

Details of the protocol for this systematic review were registered on PROSPERO (CRD42018092696).

Study selection

MEDLINE, CINAHL and PsycARTICLES databases were searched. No filters were applied. The following search terms were entered: depress* or Depression [MeSH] or Depressive Disorder [MeSH] AND child* OR young OR adolescen* OR youth OR pupil OR student or Child [MeSH] or Adolescent [MeSH] AND psychotherapy OR therapy OR cognitive therap* OR CBT OR psychodynamic OR bibliotherap* OR client-cent* OR intervention OR interpersonal OR family

therap* OR counsel* OR Psychotherapy [MeSH] AND RCT OR random* OR control* OR clinical trial OR randomised OR randomized or Randomized Controlled Trial [MeSH].

The inclusion criteria were:

- Peer-reviewed journal articles published in English;
- Randomised controlled trials investigating psychotherapy interventions (psychological treatment including individual and group talking therapies; for example cognitive behavioural therapy, family approaches and interpersonal psychotherapy) with participants aged up to (and including) 18 years;
- Participants met criteria for diagnosis of depression or scored above cut-off on a validated measure.

. There was no restriction placed on the type of comparison intervention or control within studies. Studies investigating interventions which were universally delivered (e.g. to a whole school year group) were excluded, as it was not possible to determine dropout rates for participants who met criteria for depression prior to the intervention. Preventative intervention studies were excluded, as the focus of this review is treatment for existing depression. Inpatient interventions were not included. Interventions which were systemic changes (e.g. quality improvement/collaborative care) were not included, as these are not psychotherapy interventions. Transdiagnostic or interventions where depression was not the primary treatment target were also excluded. Studies which selected participants based on suicidality or self-harm only (without also meeting criteria/scoring above cut-off for depression) were not included. No restrictions were imposed on type of depression diagnosis or the method used to derive a diagnosis. Validated measures included self-report questionnaires with published psychometric properties and cut-off scores

(to indicate likely diagnosis or clinical level of severity, e.g. Mood and Feelings Questionnaire, Beck Depression Inventory and Hamilton Depression Scale).

Screening

Titles and abstracts were screened by the first author and irrelevant studies excluded. Full texts of relevant studies were sought, and inclusion criteria applied. In ambiguous cases the second author was consulted.

Data extraction

Data were extracted by the first author. The extracted data included information about methodology, participant characteristics, whether/how treatment completion and dropout were defined, intervention/s, number of participants who dropped out at different stages and their characteristics, reasons given for dropout. It was noted whether studies defined dropout *a priori*.

In the current review two definitions of 'dropout' are used: study rated treatment non-completion, or if this was unavailable, participants who had missing post-treatment assessment data. The former was preferred in order to capture dropout from treatment rather than research assessment. Withdrawal post randomisation was considered dropout. These two definitions were investigated separately in sub-group analyses.

Study quality was rated on a six-point scale. One point was given for each of the following: intent to treat analysis; presentation of a CONSORT diagram; definition of treatment completion; utilisation of a treatment manual; therapists trained in conducting the therapy; and treatment integrity checked (e.g. recording

and rating of sessions, use of measures, covered in supervision). The latter three criteria were defined in a review of empirically supported therapies (Chambless & Hollon, 1998) and used in subsequent psychological treatment reviews (Cuijpers et al., 2014; Gersh et al., 2017). Self-directed interventions where clients were provided with standardised content (i.e. bibliotherapy or computerised treatment) were rated as meeting the latter three criteria; as the material received was inherently identical across participants. Where information about a criterion was not presented (e.g. no mention of treatment integrity/adherence checks) a score of 0 was given.

In order to test inter-rater reliability of quality rating, 8 studies (22% of those included) were randomly selected and co-rated by a collaborator using a coding guide that was specifically created for this review, with the six-point scale described above. Cohen's Kappa with all datapoints was 0.75, indicating substantial agreement (Landis & Koch, 1977). Discrepancies were addressed by discussion between raters.

Analysis

Proportion meta-analyses were carried out to calculate the estimated dropout rates using OpenMeta[Analyst] software (Wallace et al., 2012), which uses the metafor package in R (Viechtbauer, 2010). A random effects model was used in order to take account of the degree of heterogeneity between studies (Borenstein, Hedges, Higgins, & Rothstein, 2009). Studies were weighted based on sample size using the inverse variance. Heterogeneity was examined using Cochran's *Q* and I^2, which indicates how much variation across studies is due to heterogeneity rather than chance (Higgins & Thompson, 2002). Proportion meta-analyses were conducted for all arms and for sub-groups of active and non-active interventions.

Odds ratios were used to assess whether there was a higher proportion of dropout from intervention or control arms. Sub-group analyses of therapeutic modalities (CBT, family approaches, IPT) versus different control conditions (any, active control, wait list or treatment as usual [TAU]) were carried out.

Meta-regressions were conducted to investigate whether there was a relationship between dropout and study quality, number of sessions and treatment duration. Dropout was compared between types of intervention; CBT, family and IPT modalities were separately grouped together and compared to all other active treatment arms. Interventions delivered individually (across modalities) were compared to all other methods of delivery. Studies were only included in the meta-regressions if they reported the relevant variable.

For all analyses results for studies that defined dropout were also reported separately; overall results included studies where dropout was not defined specifically and instead inferred from missing post-treatment assessment data. Additionally, analyses were re-run excluding studies that scored below 3/6 on the study quality scale to assess whether this affected the pattern of results.

Deviations from the PROSPERO protocol

The inclusion of a second definition of dropout was identified during full text screening and data extraction, as several studies did not directly report treatment completion/dropout. It was considered that the review would be more complete if these studies were included, with the closest proxy for dropout possible to calculate from the available data (the second definition as stated above). Other meta-analyses of dropout have utilised this second definition (e.g. Lewis, Roberts, Gibson, &

Bisson, 2020). Analyses are reported separately for each of the definitions of dropout throughout, as well as when pooling these approaches.

We did not make *a priori* plans to run sub-group analyses based on the age of participants, however we found few studies with preschool and primary aged children so we completed *post hoc* analyses excluding these studies to see if this changed the pattern of results.

In our original protocol we did not specify that absolute prevalence and comparative prevalence (odds ratios) would be examined. We opted for this comprehensive approach as the absolute prevalence estimates would provide clinicians and researchers with an idea of how frequent drop out is for a given class of psychological interventions in clinical trials, while the odds ratio statistics would provide the *controlled* estimate of dropout (thereby taking full advantage of the RCT design).

If study age range extended above 18 years the decision was taken to nevertheless include the study in the review as long as the mean age was less than 18 years.

Results

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart. *To be positioned here*

Thirty-seven eligible studies were identified (see Figure 1). A summary of these is presented in Table 1. There were a total of 4343 participants, with an approximate mean age of 14.2 years, approximately 37% male (1 study gave median ages for treatment arms; 1 did not collect ages, just school year; 6 studies were included in the calculations but only reported demographics for completers; 2 studies did not

report sex). Studies were mostly conducted in the USA (48.6%) and UK (21.6%). Sample sizes ranged from 20 to 470. Duration of interventions ranged from 4 to 39 weeks.

Table 1. Description of included studies. *To be positioned here*

Study quality

Of the 37 included studies, 36 specified that a treatment manual was used and that therapists had been trained in treatment delivery. Treatment integrity was checked (e.g. by use of recordings or checklists) in 32 studies. Intent to treat analysis was implemented in 26 studies, CONSORT diagrams were presented by 24 studies. Treatment completion was specifically defined in 9 studies. An overall study quality score was calculated (summing these 6 indicators), the average across included studies was 4.4. See Supplementary Table 1 for details of scores for each study.

Proportion meta-analyses

A proportion meta-analysis yielded a pooled estimate of 15.2% dropout across all arms (i.e. psychological therapy arms and control arms) of included studies (k=88, 95% CI 13.0, 17.5), with significant heterogeneity (Q = 299.400, df = 87, p <.001, I^2 = 70.9). The forest plot (Figure 2) shows dropout rates with 95% confidence intervals. I^2 statistics indicated that approximately 71% of the total variance is attributable to variability in true effects (Borenstein et al., 2009). A separate proportion meta-analysis was conducted including only studies that defined dropout, with similar results; pooled estimate of 15.9% dropout across all arms (k=47, 95% CI 12.9, 19.4), with significant heterogeneity (Q = 171.784, df = 46, p <.001, I^2= 73.2).

Further proportion meta-analyses were carried out to explore dropout rates in sub-groups of intervention types (see Table 2). Across all studies dropout generally ranged from 12.5% to 20.8%, though IPT was an outlier with an estimate of 4.3%. Estimated dropout rates for study-defined dropout were generally within 3% of the estimates for all studies. The exceptions to this were CBT plus medication (20.8% for all studies; 24.2% for defined dropout studies) and computerised CBT (13.1% for all studies; 26.0% for defined dropout studies). The overall pattern of results was unchanged when studies scoring less than 3/6 on the quality scale were excluded.

Further post-hoc sensitivity tests were conducted to see whether the inclusion of younger children had a disproportionate impact on these findings. The first sensitivity analysis involved removing the two studies with young child participants (studies 14 and 15, Table 1; mean age 5.2 years and 4.4 years, respectively). The overall pattern of results was unchanged, with an overall dropout rate estimate of 14.6% (95% CI 12.4-16.8%; Q=264.62, df=83, p <.001, I^2=68.6%); for all estimates that exclude these two studies, see Supplementary Table 2. The results for studies that defined dropout did not change as these two studies did not contribute to these estimates. The second sensitivity analysis involved removing (in addition to the removed young child studies) a further four studies that comprised primary/elementary school aged children (studies 8, 22, 32 and 34). The overall pattern of results was unchanged, with an overall dropout rate estimate of 14.4% 0 (95% CI 12.2-16.8%; Q=238.512, df=73, p<.001, I^2=69.4%). For those studies which defined dropout, the estimate was also largely unchanged at 15.0% (95% CI 12.1-18.0%; Q=200.022, df=44, p<.001, I^2=78.0). For all estimates ignoring the effect of these six studies, see Supplementary Table 3.

Figure 2. Forest plot of dropout rate for all arms of included trials. *To be positioned here*

Table 2. Proportion meta-analyses comparing intervention types. *To be positioned here*

Between groups comparisons (Odds ratios)

The relative likelihoods of dropout between different types of intervention and control conditions were assessed using odds ratios, shown in Table 3. The only significant finding was greater dropout for wait list or TAU as compared to family/dyadic interventions (all studies) (OR=0.485, 95% CI 0.250, 0.940 p = .032) with no significant heterogeneity between studies (Q = 0.422, df = 2, p = .810). The overall pattern of results was unchanged when studies scoring less than 3/6 on the quality scale were excluded.

Sensitivity analyses were also run looking at the effect of removing young children and then also primary/elementary schooled-aged children. For both these sets of sensitivity analyses, the same overall pattern of non-significant differences for dropout rates was observed (see Supplementary Tables 4 and 5). However, the result for family/dyadic interventions vs wait list or TAU was no longer significant for both sets of analyses.

Table 3. Odds ratios comparing intervention and control conditions. *To be positioned here*

Meta-regressions

A series of meta-regression analyses investigated associations between predictor variables and dropout rate. Results are reported in Table 4, italicised rows show results for analyses excluding studies that scored less than 3/6 on the study quality scale. There was a significant association between the maximum number of sessions and dropout (greater number of sessions was associated with less dropout), but not when excluding lower quality, young child studies (see Supplementary Table 6), or young or primary/elementary school-aged children studies (see Supplementary Table 7) were excluded or when only studies which defined dropout were included. As such this result does not seem robust.

A significant association between treatment duration and dropout (longer duration, less dropout) was found only when the lower quality studies were excluded from the analysis. This effect was not present for the defined dropout studies, and was not present when both young child and primary/elementary school-aged children studies were excluded, again suggesting the finding was not robust.

There was a significant finding of less dropout from IPT than other interventions when considering all studies and only those that defined dropout. This effect remained when young children studies or young child and primary/elementary school-aged children studies were excluded, but was not present when lower quality studies were excluded. There were no significant associations between dropout and study quality, CBT, family or individual versus other approaches.

Table 4. Meta-regressions investigating predictor variables and dropout rate. *To be positioned here*

Reasons for dropout

It was not possible to analyse reasons for dropout as few studies reported these. Examples of reasons given are shown in Table 5.

Table 5. Reasons given for dropout. *To be positioned here*

Discussion

The overall dropout rate for active psychotherapy interventions for depression in children and youth was found to be 14.6% (95% CI 12.0, 17.4) for the randomised controlled trials included here, with significant heterogeneity. For studies that provided definition of dropout, the figure was 15.6% (95% CI 11.7-19.9). This is similar to average dropout rates from adult depression treatment studies, which have been estimated at 17.5% to 19.2% (Cooper & Conklin, 2015; Swift & Greenberg, 2014). It is slightly less than the 23% dropout prevalence found from randomised clinical trials of antidepressant drug treatment in adolescents (Rohden et al., 2017). Interestingly, it has been suggested that antidepressant drugs do not seem to offer a clear advantage for the treatment of depression in children and adolescents (Cipriani et al., 2016). In the current review dropout generally ranged from 12% to 20% when therapeutic modalities were analysed separately, but IPT was an outlier to this with a lower dropout rate of 4.3% (95% CI 1.1, 7.4) and little heterogeneity, albeit with a smaller sample. Zhou and colleagues also found that IPT had significantly fewer all-cause discontinuations than other psychotherapeutic interventions for depression in children and adolescents (Zhou et al., 2015). Studies which identified how many participants had dropped out (rather than this being inferred from missing post-treatment data) were also analysed separately, with generally similar results. An exception to this was computerised CBT, where

dropout was 13.1% (95% CI 3.1, 27.6) for all studies and 26.0% (95% CI 6.3, 51.8) for defined dropout. Dropout from wait list and TAU control conditions did not differ substantially from treatment or active control conditions.

Odds ratios were used to look for differences in relative likelihood of dropout between different interventions and control conditions, none were found aside from there was greater dropout for wait list or TAU as compared to family/dyadic interventions (all studies) (OR = 0.485, 95% CI 0.250, 0.940 p = .032) with no significant heterogeneity. This finding did not hold when young child and primary/elementary school-aged studies were removed from the analysis. Results from meta-regressions varied between the aggregation approaches used. There was some suggestion that interventions offering more sessions or of longer duration had less dropout and of less dropout from IPT than other interventions, but these findings were not always robust to study quality or sampling sensitivity tests. There were no significant associations between dropout and study quality, CBT, family or individual versus other approaches.

It was not possible to analyse the effect of depression severity or therapist experience on dropout, as several different measures of depression were used between studies and therapist experience was not consistently reported. It was also not possible to analyse reasons for dropout as few studies reported these.

Increased reporting of factors related to dropout would enhance understanding of treatment acceptability. It would help for the timeframe of dropout to be reported (e.g. before starting, before halfway through or after halfway through sessions) to elucidate whether there may be an aspect of the treatment that participants find difficult. Although quality checks indicated that the included studies met most of the chosen criteria, a minority reported the minimum number of sessions for treatment completion. Specification of the minimum

number of sessions required would help with determination of dropout. Future studies may consider administration of outcome measures at each session, to track change and provide end of treatment scores for those who dropout prematurely (as suggested by Swift & Greenberg, 2012). More detailed reporting of the characteristics of participants who dropout (e.g. gender, age, baseline scores) would assist future reviews to assess whether certain interventions are more/less acceptable for different presentations. Wider reporting of reasons given for dropout would be useful and potentially inform decisions about which interventions to offer to whom.

The main clinical implication of results presented here is that psychological therapies for depression in children and youth seem to be broadly acceptable, with minimal dropout. Findings from meta-regressions were mixed, there was some suggestion that dropout was less likely when more intervention sessions or longer duration of treatments were offered. It could be that participants may have felt more hopeful or validated by the offer of more sessions and engaged more, or there was more time for consolidation of new ideas, or that a stronger therapeutic alliance was built up with more contact time. Individual choice and preferences should be considered when deciding on treatment options, particularly as dropout rates were similar across different types of intervention. It has been suggested that depression treatment for adolescents involving psychotherapy is more acceptable (less dropout) than medication alone (Rohden et al., 2017). There was also some suggestion of less dropout from IPT than other treatment modalities, however there were relatively few IPT studies (five) and when one of these was removed from analyses due to scoring less than 3/6 on the study quality scale the effect was no longer present.

The current review has several limitations. Due to resource issues, only one author was able to undertake the initial screen of titles and abstracts and the data extraction. We were concerned about including grey literature studies as unpublished work may not have

been subjected to peer review, and so the basic quality of such studies would not have been verified. However, it is possible that some unpublished studies were missed. We did not have the resources to search additional sources, e.g. checking reference lists, or asking experts in the area. While our prevalence estimate of dropout for any active psychotherapy was reasonably precise, with the 95% confidence interval margin only 3% either way, this estimate was associated with significant heterogeneity. For some particular approaches, particularly those that have been studied in fewer trials (e.g. family approaches, computerised CBT), dropout estimates became more imprecise. In summary, our results have to be treated with caution in that precise estimates only extend to certain classes of treatment, and the significant heterogeneity associated with our results mean they cannot be generalised to all settings. It would be beneficial for future research to build on this analysis as future treatment trials are published, including analysis of additional factors, for example therapist experience, reasons for dropout, stage of treatment at which dropout occurred and characteristics of participants who dropout if these variables are available. Many studies did not report the number of cases who did not complete a defined number of sessions. Related to this issue, we did not find any instances where study authors noted how many cases were actually "early responders", i.e. cases where recovery was so great in the first few sessions that treatment was discontinued. These would have been counted as "dropouts" in the present analysis, which would not be an accurate description of their status. It is also important to note that the estimates for dropout rates drawn from randomised controlled trials summarised in the present review may not generalise to "real world" clinical settings, where there may be fewer resources to support clinical care. As such, our findings may therefore represent a "best-possible" case scenario.

In conclusion, an overall estimate of dropout from active interventions was 14.6%, largely comparable results were found when considering different therapeutic modalities and

forms of intervention. Although not consistent across different aggregations of studies there were significant associations between the maximum number of sessions, treatment duration and dropout (greater number of sessions/longer duration was associated with less dropout) and for less dropout from IPT than other interventions. There were no significant associations between dropout and study quality, CBT, family or individual versus other approaches. Future studies should provide detailed information about minimum treatment dose, how dropout is defined and information about participants who dropout to further understanding, inform which treatments are offered and allow modification of treatments to help reduce attrition and optimise effectiveness of psychotherapy treatments for depression in children and young people.

Author statement

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Contributors

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References

Arnberg, A., & Ost, L.-G. (2014). CBT for children with depressive symptoms: a meta-analysis. *Cognitive Behaviour Therapy*, *43*(4), 275–288. https://doi.org/10.1080/16506073.2014.947316

Barrett, M. S., Chua, W., Crits-Christoph, P., Gibbons, M. B., & Thompson, D. (2008). Early

withdrawal from mental health treatment: implications for psychotherapy practice. *Psychotherapy Theory, Research, Practice, Training*, *45*(2), 247–267. https://doi.org/10.1037/0033-3204.45.2.247

Birmaher, B., Ryan, N. D., Williamson, D. E., Brent, D. A., Kaufman, J., Dahl, R. E., … Nelson, B. (1996). Childhood and adolescent depression: a review of the past 10 years. Part I. *Journal Of The American Academy Of Child And Adolescent Psychiatry*, *35*(11), 1427–1439.

Blum, R. W., & Nelson-Mmari, K. (2004). The Health of Young People in a Global Context, 402–418. https://doi.org/10.1016/j.jadohealth.2003.10.007

Borenstein, M., Hedges, L. V., Higgins, J. P. ., & Rothstein, H. R. (2009). *Introduction to meta-analysis.* West Sussex, UK: John Wiley And Sons.

Calati, R., Pedrini, L., Alighieri, S., Alvarez, M. I., Desideri, L., Durante, D., … De Girolamo, G. (2011). Is cognitive behavioural therapy an effective complement to antidepressants in adolescents? A meta-analysis. *Acta Neuropsychiatrica*, *23*(6), 263–271. https://doi.org/10.1111/j.1601-5215.2011.00595.x

Chambless, D. L., & Hollon, S. D. (1998). Defining Empirically Supported Therapies. *Journal Of Consulting And Clinical Psychology*, *66*(1), 7–18.

Cipriani, A., Zhou, X., Giovane, C. Del, Hetrick, S. E., Qin, B., Whittington, C., … Hazell, P. (2016). Comparative efficacy and tolerability of antidepressants for major depressive disorder in children and adolescents: a network meta-analysis. *The Lancet*, *388*(10047), 881–890. https://doi.org/10.1016/S0140-6736(16)30385-3

Cooper, A. A., & Conklin, L. R. (2015). Dropout from individual psychotherapy for major depression : A meta-analysis of randomized clinical trials. *Clinical Psychology Review*,

40, 57–65. https://doi.org/10.1016/j.cpr.2015.05.001

Costello, E. J., Erkanli, A., & Angold, A. (2006). Is there an epidemic of child or adolescent depression ? *Journal Of Child Psychology And Psychiatry*, *12*(47), 1263–1271. https://doi.org/10.1111/j.1469-7610.2006.01682.x

Cuijpers, P., Sijbrandij, M., Koole, S., Huibers, M., Berking, M., & Andersson, G. (2014). Clinical Psychology Review Psychological treatment of generalized anxiety disorder : A meta-analysis. *Clinical Psychology Review*, *34*(2), 130–140. https://doi.org/10.1016/j.cpr.2014.01.002

Diamond, G., Russon, J., & Levy, S. (2016). Attachment-Based Family Therapy: A Review of the Empirical Support. *Family Process*, *55*(3), 595–610. https://doi.org/10.1111/famp.12241

Fletcher, J. M. (2010). Adolescent depression and educational attainment: results using sibling fixed effects. *Health Economics*, *19*, 855–871. https://doi.org/10.1002/hec

Gersh, E., Hallford, D. J., Rice, S. M., Kazantzis, N., Gersh, H., Gersh, B., & Mccarty, C. A. (2017). Systematic review and meta-analysis of dropout rates in individual psychotherapy for generalized anxiety disorder. *Journal of Anxiety Disorders*, *52*(August), 25–33. https://doi.org/10.1016/j.janxdis.2017.10.001

Higgins, J. P. T., & Thompson, S. G. (2002). Quantifying heterogeneity in a meta-analysis, *1558*, 1539–1558. https://doi.org/10.1002/sim.1186

Landis, J. R., & Koch, G. G. (1977). The Measurement of Observer Agreement for Categorical Data. *Biometrics*, *33*(1), 159–174.

Lewis, C., Roberts, N. P., Gibson, S., & Bisson, J. I. (2020). Dropout from psychological therapies for post-traumatic stress disorder (PTSD) in adults : systematic review and

meta-analysis. *European Journal of Psychotraumatology*, *11*(1). https://doi.org/10.1080/20008198.2019.1709709

Lopez, A. D., Mathers, C. D., Ezzati, M., Jamison, D. T., & Murray, C. J. L. (2006). Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet (London, England)*, *367*(9524), 1747–1757.

Merikangas, K. R., He, J., Burstein, M., Swanson, S. A., Avenevoli, S., Cui, L., … Swendsen, J. (2010). Lifetime prevalence of mental disorders in US adolescents: results from the national comorbidity study- adolescent supplement (NCS-A). *Journal of the American Academy of Child and Adolescent Psychiatry*, *49*(10), 980–989. https://doi.org/10.1016/j.jaac.2010.05.017.Lifetime

Miller, D. K., Constance, H. L., & Brennan, P. A. (2007). Health outcomes related to early adolescent depression. *Journal of Adolescent Health*, *41*(3), 256–262.

Pu, J., Zhou, X., Liu, L., Zhang, Y., Yang, L., Yuan, S., … Xie, P. (2017). Efficacy and acceptability of interpersonal psychotherapy for depression in adolescents: A meta-analysis of randomized controlled trials. *Psychiatry Research*, *253*, 226–232. https://doi.org/10.1016/j.psychres.2017.03.023

Reis, B. F., & Brown, L. G. (1999). Reducing psychotherapy dropouts: maximising perspective convergence in the psychotherapy dyad. *Psychotherapy*, *36*(2), 123–136.

Richardson, T., Stallard, P., & Velleman, S. (2010). Computerised cognitive behavioural therapy for the prevention and treatment of depression and anxiety in children and adolescents: a systematic review. *Clinical Child And Family Psychology Review*, *13*(3), 275–290. https://doi.org/10.1007/s10567-010-0069-9

Rohden, A. I., Benchaya, M. C., Camargo, R. S., Moreira, T. de C., Barros, H. M. T., &

Ferigolo, M. (2017). Dropout Prevalence and Associated Factors in Randomized Clinical Trials of Adolescents Treated for Depression: Systematic Review and Meta-analysis. *Clinical Therapeutics*, *39*(5), 971–992.e4. https://doi.org/10.1016/j.clinthera.2017.03.017

Swift, J. K., & Greenberg, R. P. (2012). Premature Discontinuation in Adult Psychotherapy : A Meta-Analysis. *Journal Of Consulting And Clinical Psychology*, *80*(4), 547–559. https://doi.org/10.1037/a0028226

Swift, J. K., & Greenberg, R. P. (2014). A Treatment by Disorder Meta-Analysis of Dropout From Psychotherapy. *Journal of Psychotherapy Integration*, *24*(3), 193–207.

Thapar, A., Collishaw, S., Pine, D. S., & Thapar, A. K. (2012). Depression in adolescence. *The Lancet*, *379*(9820), 1056–1067.

Tindall, L., Mikocka-Walus, A., McMillan, D., Wright, B., Hewitt, C., & Gascoyne, S. (2017). Is behavioural activation effective in the treatment of depression in young people? A systematic review and meta-analysis. *Psychology And Psychotherapy*, *90*(4), 770–796. https://doi.org/10.1111/papt.12121

Viechtbauer, W. (2010). Conducting Meta-Analyses in R with the metafor Package. *Journal of Statistical Software*, *36*(3).

Wallace, B. C., Dahabreh, I. J., Trikalinos, T. A., Lau, J., Trow, P., & Schmid, C. H. (2012). End-Users : R as a Computational Back-End, *49*(5), 1–15.

Weisz, J. R., Kuppens, S., Ng, M. Y., Eckshtain, D., Ugueto, A. M., Vaughn-Coaxum, R., … Fordwood, S. R. (2017). What five decades of research tells us about the effects of youth psychological therapy: A multilevel meta-analysis and implications for science and practice. *The American Psychologist*, *72*(2), 79–117. https://doi.org/10.1037/a0040360

Zhou, X., Hetrick, S. E., Cuijpers, P., Qin, B., Barth, J., Whittington, C. J., … Xie, P. (2015). Comparative efficacy and acceptability of psychotherapies for depression in children and adolescents: A systematic review and network meta-analysis. *World Psychiatry: Official Journal Of The World Psychiatric Association (WPA)*, *14*(2), 207–222. https://doi.org/10.1002/wps.20217

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart.

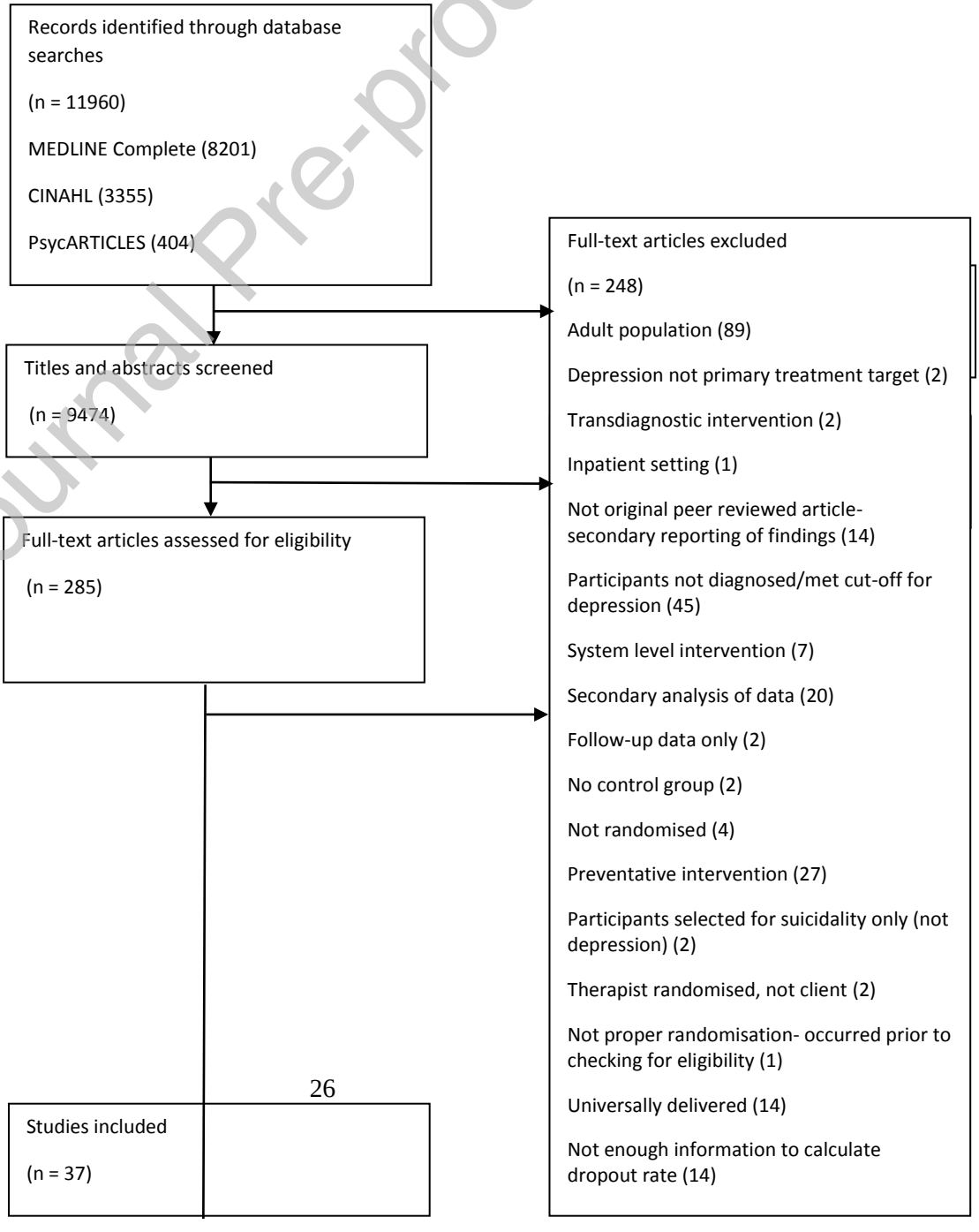

Figure 2. Forest plot of dropout rate for all arms of included trials.

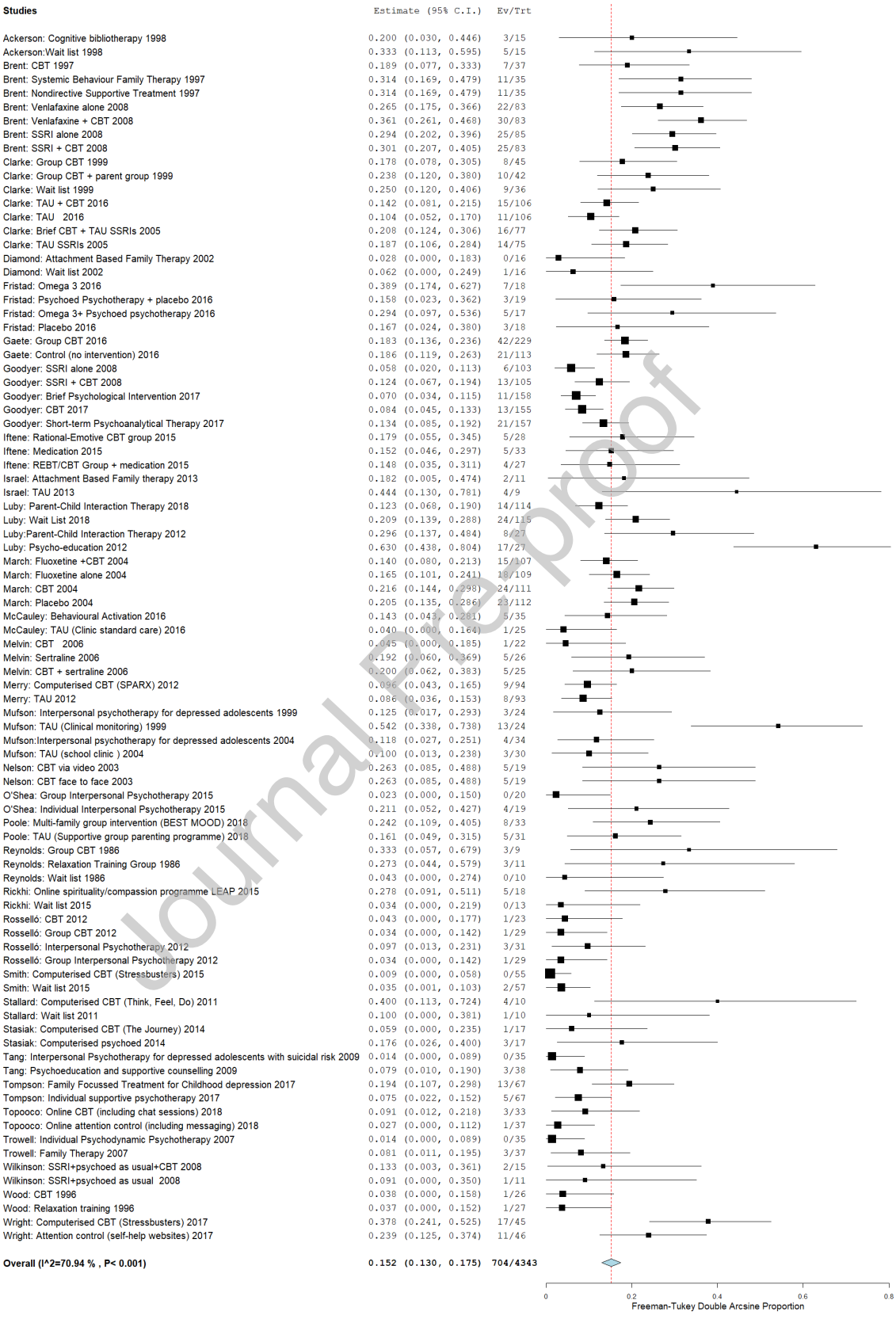

Table 1. Description of included studies.

Study No.	Study	Country	N	% Male	Mean age, years (SD)	Age range	Treatments	Number sessions	Treatment Duration (weeks)	Dropout, all arms (%) Study-defined	Post-treatment assessment missing
1	Ackerson et al., 1998	USA	30	36.4[a]	15.9[a] (1.7)	NR	Immediate/delayed cognitive bibliotherapy	-	4	26.7	
2	Brent et al., 1997	USA	107	24.3	15.6 (2.4)	13-18[b]	CBT/Systemic Behaviour Family Therapy/Nondirective supportive treatment	12-16	12-16	27.1	
3	Brent et al., 2008	USA	334	30.3	15.9 (2.2)	12-18	Venlafaxine/Venlafaxine + CBT/ SSRI/ SSRI + CBT	12	12	30.5	
4	Clarke et al., 1999	USA	123	29.2[a]	16.2[a] (1.3)	14-18[b]	Group CBT/ Group CBT + parent group / Wait list	16	8	13.8	
5	Clarke et al., 2016	USA	212	31.6	14.6 (1.7)	12-18	TAU + CBT / TAU	14	12		12.3
6	Clarke et al., 2005	USA	152	22.4	15.3 (2.3)	12-18	Brief CBT + TAU SSRIs / TAU SSRIs	9	12		19.7
7	Diamond et al., 2002	USA	32	22.0	14.9 (1.5)	13-17	Attachment Based Family Therapy / Wait List	12	12		3.1
8	Fristad et al., 2016	USA	72	57.0	11.6 (2.1)	7-14	Omega 3 / Psychoeducation + Placebo / Psychoeducation + Omega 3 / Placebo	12	12		25.0
9	Gaete et al., 2016	Chile	342	49.7	15.9 (0.9)	14-19	Group CBT / Control (no intervention)	8	8		18.4
10	Goodyer et al., 2008	UK	208	26.0	14.0 (1.5)	11-17	SSRI / SSRI + CBT	12	12	9.1	
11	Goodyer et al., 2017	UK	470	25.2	15.0 (NR)	11-17	Brief Psychological Intervention / CBT / Short Term Psychoanalytical Psychotherapy	12-28	20-30	9.6	
12	Iftene et al., 2015	Romania	88	44.3	15.3 (1.9)	11-17	Rational Emotive CBT Group / Medication / Rational Emotive CBT Group + Medication	16	16	15.9	

Study No.	Study	Country	N	% Male	Mean age, years (SD)	Age range	Treatments	Number sessions	Treatment Duration (weeks)	Dropout, all arms (%) Study-defined	Dropout, all arms (%) Post-treatment assessment missing
13	Israel et al., 2013	Norway	20	45.0	15.6 (0.99)	13-17	Attachment Based Family Therapy / TAU	-	12		30.0
14	Luby et al., 2018	USA	229	65.1	5.2 (1.5)	3-6	Parent-Child Interaction Therapy / Wait List	20	18		16.6
15	Luby et al., 2012	USA	54	62.8[a]	4.4[a] (NR)	3-7	Parent-Child Interaction Therapy / Psychoeducation	12-14	12		46.3
16	March et al., 2004	USA	439	45.6	14.6 (1.5)	12-17	Fluoxetine + CBT / Fluoxetine / CBT / Placebo	15	12		18.2
17	McCauley et al., 2016	USA	60	36.0	14.9 (1.5)	12-18	Behavioural Activation / Clinic Standard Care	14	-	11.7	
18	Melvin et al., 2006	Australia	73	34.3	15.3 (1.5)	12-18	CBT / Sertraline / CBT + Sertraline	12	12	15.1	
19	Merry et al., 2012	New Zealand	187	34.2	15.6 (2.3)	12-19[b]	Computerised CBT (SPARX) / TAU	7	9		9.1
20	Mufson et al., 1999	USA	48	27.1	15.8 (2.2)	12-18[b]	Interpersonal psychotherapy for depressed adolescents / Clinical monitoring	12	12	33.3	
21	Mufson et al., 2004	USA	64	16.0	15.1 (1.9)	12-18	Interpersonal psychotherapy for depressed adolescents / TAU school clinic	12	12-16	10.9	
22	Nelson et al., 2003	USA	38	71.4[a]	10.3[a] (2.0)	8-14	CBT via videoconferencing / CBT face to face	8	8	26.3	
23	O'Shea et al., 2015	Australia	39	15.4	15.3 (1.4)	13-19	Group Interpersonal Psychotherapy / Individual Interpersonal Psychotherapy	12	12		10.3
24	Poole et al., 2018	Australia	64	26.6	15.2 (1.4)	12-18[b]	Multi-family Group intervention (BEST MOOD) / Supportive parenting programme	8	8		20.3
25	Reynolds et al., 1986	USA	30	36.7	15.7 (NR)	NR	CBT Group / Relaxation Training Group	10	5		20.0
26	Rickhi et al., 2015	Canada	31	29.0	15.3 (NR)	12-18	Online spirituality/compassion programme (LEAP) / Wait List	8	8	16.1	

Study No.	Study	Country	N	% Male	Mean age, years (SD)	Age range	Treatments	Number sessions	Treatment Duration (weeks)	Dropout, all arms (%) Study-defined	Dropout, all arms (%) Post-treatment assessment missing
27	Rosselló et al., 2012	USA	112	44.6	14.5 (1.9)	12-18	Individual CBT / Group CBT / Individual Interpersonal Psychotherapy / Group Interpersonal Psychotherapy	12	12	5.4	
28	Smith et al., 2015	UK	112	-	NR	12-16	Computerised CBT (Stressbusters) / Wait List	-	8		1.8
29	Stallard et al., 2011	UK	20	66.6[a]	NR	11-17	Computerised CBT (Think Feel Do) / Wait List	6	6	25.0	
30	Stasiak et al., 2014	New Zealand	34	58.8	15.2 (1.5)	13-18	Computerised CBT (The Journey) / Computerised Psychoeducation	7	10	11.8	
31	Tang et al., 2009	Taiwan	73	-	15.3 (2.4)	12-18	Interpersonal psychotherapy for depressed youth with suicidal risk / Psychoeducation and supportive counselling	12	6	4.1	
32	Tompson et al., 2017	USA	134	44.0	10.8 (2.1)	7-14	Family focussed treatment for childhood depression / Individual supportive psychotherapy	15	22		13.4
33	Topooco et al., 2018	Sweden	70	5.7	17.0 (1.5)	15-19	Online CBT including chat sessions / Online attention control including messaging	16	8		5.7
34	Trowell et al., 2007	UK, Greece, Helsinki	72	62.0	11.7 (1.4)	9-15	Individual Psychodynamic Psychotherapy / Family Therapy	8-30	39		4.2
35	Wilkinson et al., 2008	UK	26	30.4[a]	15.3[a] (1.6)	11-17[b]	SSRI + Psychoed as usual + CBT / SSRI + Psychoed as usual	10-15	28		11.5
36	Wood et al., 1996	UK	53	31.2[a]	14.2[a] (2.3)	9-17[b]	CBT / Relaxation Training	5-8	9	9.4	
37	Wright et al., 2017	UK	91	34.1	15.4 (1.8)	12-18[b]	Computerised CBT (Stressbusters) / Attention control (self-help websites)	8	8	30.8	

[a]Demographic information reported for completers only

[b]Age range for inclusion criteria (not reported for sample)

NR=Not reported

CBT=Cognitive Behavioural Therapy; SSRI= selective serotonin reuptake inhibitor; TAU= treatment as usual

Table 2. Proportion meta-analyses comparing intervention types.

	All studies (defined dropout and missing post-treatment data)						Defined dropout only					
	N	k (arms)	Proportion dropout	95% CI	Heterogeneity stats (Q[df], sign)	I^2	N	k (arms)	Proportion dropout	95% CI	Heterogeneity stats (Q[df], sign)	I^2
All arms	4343	88	0.152	0.130, 0.175	*Q[87]*=299.400, *p*<.001	70.9	2057	47	0.159	0.126, 0.194	*Q*[46]=171.784, *p*<.001	73.2
Any active psychotherapy	2504	51	0.146	0.120, 0.174	*Q*[50]=149.552, *p*<.001	66.6	1253	29	0.156	0.117, 0.199	*Q*[28]=93.922, *p*<.001	70.2
AP (no MED)	1965	42	0.125	0.098, 0.153	*Q*[41]=183.033, *p*<.001	77.6	930	24	0.139	0.100, 0.183	*Q*[23]=62.189, *p*<.001	63.0
AP (with MED)	539	9	0.208	0.146, 0.276	*Q*[8]=23.691, *p*<.003	66.2	323	5	0.226	0.130, 0.338	*Q*[4]=18.082, *p*<.001	77.9
Individual psychother.	1419	26	0.145	0.110, 0.182	*Q*[25]=76.272, *p*<.001	67.2	913	17	0.139	0.094, 0.191	*Q*[16]=59.624, *p*<.001	73.2
Group psychotherapy	458	9	0.133	0.081, 0.195	*Q*[8]=17.088, *p*<.029	53.2	200	6	0.129	0.066, 0.208	*Q*[5]=10.361, *p*=.066	51.7
Family/dyadic approaches	307	7	0.163	0.096, 0.241	*Q*[6]=14.069, *p*<.029	57.4	-	1	-	-	-	-
Supportive intervention (AC)[*]	463	10	0.159	0.073, 0.267	*Q*[9]=61.403, *p*<.001	85.3	321	6	0.135	0.058, 0.235	*Q*[5]=20.634, *p*<.001	75.8
IPT (Individual or group)	227	8	0.043	0.011, 0.074	*Q*[7]=11.213, *p*=.130	37.6	153	5	0.068	0.026, 0.123	*Q*[4]=4.930, *p*=.295	18.9
Any CBT	1691	30	0.157	0.122, 0.196	*Q*[29]=100.759, *p*<.001	71.2	855	20	0.172	0.121, 0.229	*Q*[19]=69.406, *p*<.001	72.6
CBT alone	518	9	0.130	0.080, 0.188	*Q*[8]=20.067, *p*<.010	60.1	301	7	0.111	0.054, 0.182	*Q*[6]=12.823, *p*<0.046	53.2
CBT + MED	495	7	0.208	0.138, 0.288	*Q*[6]=22.405, p<.001	73.2	296	4	0.242	0.130, 0.374	*Q*[3]=17.018, *p*<.001	82.4
Group CBT	382	6	0.168	0.111, 0.232	*Q*[5]=8.025, *p*=.155	37.7	144	4	0.153	0.073, 0.252	*Q*[3]=6.408, *p*=.093	53.2
Computerised CBT	254	6	0.131	0.031, 0.276	*Q*[5]=34.708, *p*<.001	85.6	72	3	0.260	0.063, 0.518	*Q*[2]=7.777, *p*<.020	74.3
WL	272	8	0.123	0.052, 0.214	*Q*[7]=19.526, *p*<.007	64.2	74	4	0.179	0.067, 0.324	*Q*[3]=5.178, *p*=.159	42.1
TAU	287	6	0.167	0.062, 0.304	*Q*[5]=29.351, *p*<.001	83.0	79	3	0.192	0.002, 0.527	*Q*[2]=19.760, *p*<.001	89.9

Note. *includes psychoeducation & relaxation training. AC=active control; AP=active psychotherapy; CBT=Cognitive Behavioural Therapy; IPT=Interpersonal psychotherapy; MED = antidepressant medication; TAU= treatment as usual; WL=wait list.

Table 3. Odds ratios comparing intervention and control conditions.

		All studies (defined dropout and missing post-treatment data)						Defined dropout only					
Experimental condition	Control condition	N	k (arms)	Odds ratio	95% CI	Heterogeneity stats (Q[df], sign)	I^2	N	k (arms)	Odds ratio	95% CI	Heterogeneity stats (Q[df], sign)	I^2
Any active psychotherapy	Any control	2117	41	1.025	0.836, 1.257	*Q*[40]=50.875, *p*=.116	21.4	1092	23	1.084	0.799, 1.470	*Q*[22]=30.698, *p*=.102	28.3
	Any AC	687	13	1.137	0.720, 1.795	*Q*[12]=20.003, *p*=.067	40.0	514	8	1.159	0.731, 1.838	*Q*[7]=8.791, *p*=.268	20.4
	WL/TAU	570	14	0.799	0.485, 1.317	*Q*[13]=21.383, *p*=.066	39.2	164	7	0.824	0.349, 1.949	*Q*[6]=12.803, *p*=.046	53.1
Any CBT	Any control	1493	26	1.101	0.903, 1.343	*Q*[25]=17.313, *p*=.870	0.0	769	16	1.130	0.860, 1.484	*Q*[15]=13.860, *p*=.536	0
	Any AC	331	7	1.158	0.713, 1.881	*Q[6]*=5.672,*p*=.461	0.0	283	5	1.053	0.589, 1.879	*Q*[4]=4.666, *p*=.323	14.3
	WL/TAU	327	7	1.096	0.607, 1.980	*Q*[6]=7.389, *p*=.286	18.8	61	3	0.894	0.282, 2.835	*Q*[2]=3.112, *p*=.211	35.7
	MED alone	584	10	1.164	0.859, 1.577	*Q*[9]=5.978, *p*=.742	0.0	389	7	1.264	0.873, 1.830	*Q*[6]=4.911, *p*=.555	0
	CBT + MED	159	3	1.104	0.414, 2.948	*Q*[2]=3.356,*p*=.187	40.4	52	2	0.597	0.099, 3.616	*Q*[1]=1.929, *p*=.165	48.2
CBT + MED	MED alone	525	8	1.202	0.877, 1.647	*Q*[7]=3.539, *p*=.831	0.0	330	5	1.342	0.908, 1.982	*Q*[4]=2.194, *p*=.700	0
Any Family/Dyadic intervention	Any control	269	6	0.671	0.306, 1.474	*Q*[5]=12.042, *p*=.034	58.5	-	1	-	-	-	-
	Any AC	129	3	0.912	0.233, 3.567	*Q*[2]=9.587, *p*=.008	79.1	-	1	-	-	-	-
	WL/TAU	140	3	0.485*	0.250, 0.940	*Q*[2]=0.422, *p*=.810	0.0	-	0	-	-	-	-
Any IPT	Any control	92	3	0.304	0.058, 1.598	*Q*[2]=4.675, *p*=.097	57.2	92	3	0.304	0.058, 1.598	*Q*[2]=4.675, *p*=.097	57.2
	Any AC	-	1	-	-	-	-	-	1	-	-	-	-
	WL/TAU	54	2	0.372	0.039, 3.528	*Q*[1]=4.381, *p*=.036	77.2	54	2	0.372	0.039, 3.528	*Q*[1]=4.381, *p*=.036	77.2

Note. *p<.05. AC=active control; CBT=Cognitive Behavioural Therapy; IPT=Interpersonal psychotherapy; MED = antidepressant medication; TAU= treatment as usual; WL=wait list.

Table 4. Meta-regressions investigating predictor variables and dropout rate.

	All studies (defined dropout and missing post-treatment data)				Defined dropout only			
	k	Coefficient	95% CI	*p*	k	Coefficient	95% CI	*p*
Study quality	51	-0.004	-0.038, 0.029	.796	29	-0.011	-0.054, 0.032	.625
	48	*-0.004*	*-0.047, 0.039*	*.854*	*26*	*-0.024*	*-0.090, 0.041*	*.464*
Max sessions	48	-0.007	-0.014, -0.000	**.048**	28	-0.005	-0.016, 0.006	.406
	45	*-0.007*	*-0.014, 0.000*	*.056*	*25*	*-0.004*	*-0.015, 0.007*	*.492*
Treatment duration	50	-0.005	-0.009, 0.000	.057	28	-0.005	-0.013, 0.004	.275
	47	*-0.005*	*-0.010, -0.000*	***.034***	*25*	*-0.006*	*-0.014, 0.002*	*.149*
CBT vs other[a]	51	0.036	-0.040, 0.111	.355	29	0.058	-0.050, 0.166	.293
	48	*0.017*	*-0.059, 0.093*	*.665*	*26*	*0.022*	*-0.089, 0.133*	*.700*
Family approach vs other[a]	51	0.027	-0.082, 0.135	.631	29	0.186	-0.088, 0.460	.183
	48	*0.026*	*-0.081, 0.133*	*.634*	*26*	*0.184*	*-0.080, 0.448*	*.171*
IPT vs other[a]	51	-0.119	-0.227, -0.010	**.032**	29	-0.157	-0.285, -0.028	**.017**
	48	*-0.086*	*-0.204, 0.031*	*.150*	*26*	*-0.114*	*-0.258, 0.030*	*.121*
Individual vs other[a]	51	-0.020	-0.094, 0.055	.599	29	-0.064	-0.170, 0.041	.234
	48	*-0.019*	*-0.094, 0.056*	*.620*	*26*	*-0.064*	*-0.169, 0.042*	*.236*

Note. [a]Treatment of interest = 1, control = 0. CBT=Cognitive Behavioural Therapy; IPT=Interpersonal psychotherapy.

Italicised = results excluding studies that scored below 3/6 on study quality scale. Statistically significant results are in bold.

Table 5. Reasons given for dropout.

Reason	Studies
Non-compliance with treatment	(Brent et al., 1997; Brent et al., 2008; Mufson et al., 1999)
Moving away	(Brent et al., 1997)
Not liking therapy/therapist	(Brent et al., 1997; Melvin et al., 2006)
Believing that the problem was physical health	(Brent et al., 1997)
Serious/adverse event from medication	(Brent et al., 2008; Fristad et al., 2016; Goodyer et al., 2008; Melvin et al., 2006)
Withdrawal of consent	(Brent et al., 2008; March et al., 2004; Wright et al., 2017)

Worsening depression	(Brent et al., 2008; Goodyer et al., 2008; Wright et al., 2017)
Other mental health condition requiring treatment	(Brent et al., 2008)
Insufficient attendance	(Clarke et al., 1999; Goodyer et al., 2017)
Starting external therapy	(Fristad et al., 2016; Goodyer et al., 2017; Stallard et al., 2011)
Time burden	(Fristad et al., 2016)
Protocol violation	(Goodyer et al., 2008)
Improvement in symptoms	(Goodyer et al., 2017; Melvin et al., 2006)
Clinical decision by therapist	(Goodyer et al., 2017; Merry et al., 2012;Mufson et al., 1999)
Withdrawn by parent	(Goodyer et al., 2017)
Transport problems	(Goodyer et al., 2017)