Practitioner Review: effectiveness of indicated school-based interventions for adolescent depression and anxiety - a meta-analytic review

Article

Accepted Version

Effectiveness of indicated school-based interventions for adolescent depression and anxiety: a meta-analytic review

Brioney Gee[1,2], Shirley Reynolds[3], Ben Carroll[1], Faith Orchard[3], Tim Clarke[1,2], David Martin[1], Jon Wilson[1,2], Laura Pass[2,3]

[1]Norfolk and Suffolk NHS Foundation Trust, UK

[2]Norwich Medical School, University of East Anglia, UK

[3]School of Psychology and Clinical Language Sciences, University of Reading, UK

Corresponding Author:

Dr Brioney Gee, Norfolk and Suffolk NHS Foundation Trust

80 St Stephens Road, Norwich, UK. NR1 3RE

Email: brioney.gee@nsft.nhs.uk Tel: +44 (0)1603 974701

Word counts – Abstract: 290, Text body: 5993

Abstract

Background: Interest in delivering psychological interventions within schools to facilitate early intervention is increasing. However, most reviews have focused on universal or preventative programmes rather than interventions designed to decrease existing symptoms of depression or anxiety. This paper aims to provide a meta-analytic review of randomised controlled trials of indicated psychological interventions for young people aged 10-19 with elevated symptoms of depression and/or anxiety.

Methods: Eight electronic databases were systematically searched from inception to April 2019 for eligible trials. Study quality was assessed using two scales designed to evaluate psychotherapy intervention trials. Random effects meta-analyses were conducted separately for trials that recruited participants based on symptoms of depression and based on symptoms of anxiety.

Results: Data from 45 trials were analysed. Most interventions studied used cognitive and behavioural strategies. Few studies met methodological quality criteria, but effect size was not associated with study quality. Indicated school-based interventions had a small effect on reducing depression symptoms (SMD = 0.34, 95% CI -0.48, -0.21) and a medium effect on reducing anxiety symptoms (SMD=-0.49, 95% CI -0.79, -0.19) immediately post-intervention. Subgroup analyses indicated that interventions delivered by internal school staff did not have significant effects on symptoms. Reductions in depression were maintained at short-term (≤6 months) but not medium (>6 months ≤12) or long-term (>12 month) follow up. Reductions in anxiety symptoms were not maintained at any follow up.

Conclusions: Indicated school-based interventions are effective at reducing symptoms of depression and anxiety in adolescents immediately post-intervention but there is little evidence that these reductions are maintained. Interventions delivered by school staff are not supported by the current evidence-base. Further high quality randomised controlled trials incorporating assessment of longer-

term outcomes are needed to justify increased investment in school-based interventions for adolescent depression and anxiety.

Keywords: adolescent, school, anxiety, depression, indicated interventions

Introduction

Concern about the mental health and wellbeing of adolescents appears to have increased worldwide in recent years (Collishaw, 2015). There is evidence of increased prevalence of emotional disorders (Collishaw, Maughan, Natarajan, & Pickles, 2010; Pitchforth et al., 2018) and growing demand for services to meet the needs of young people with poor mental health (Frith, 2016). Recent UK prevalence data suggests that approximately 9% of 11 to 16 year olds and 15% of young people aged 17 to 19 years have a diagnosable emotional disorder such as anxiety or depression (Vizard et al., 2018).

Adolescent depression and anxiety disorders often persist into adulthood if left untreated (Jones, 2013). They are associated with increased risk of a wide range of long-term negative outcomes including educational underachievement, unemployment, substance abuse, teenage pregnancy and poor physical health (Clayborne, Varin, & Colman, 2018; Essau, Lewinsohn, Olaya, & Seeley, 2014; Keenan-Miller, Hammen, & Brennan, 2007; Woodward & Fergusson, 2001). Subthreshold symptoms of depression and anxiety are even more common in adolescents than symptoms that meet diagnostic thresholds (Balázs et al., 2013; Bertha & Balázs, 2013). These are a strong predictor of future onset of a mental health diagnosis (Haller, Cramer, Lauche, Gass, & Dobosand, 2014; Judd, Akiskal, & Paulus, 1997). Prompt intervention can prevent recurrence of mental health difficulties (Bockting, Hollon, Jarrett, Kuyken, & Dobson, 2015; Neufeld, Dunn, Jones, Croudace, & Goodyer, 2017). Therefore, early identification of young people experiencing symptoms of common mental health problems and providing prompt evidence-based treatment is important to reduce disability and distress.

There are a growing range of evidence-based treatments for depression and anxiety disorders in young people (Pennant et al., 2015; Reynolds, Wilson, Austin, & Hooper, 2012; Tindall et al., 2017; Weersing, Jeffreys, Do, Schwartz, & Bolano, 2017). Unfortunately, most young people do not access these evidence-based treatments, even in high income countries (Children and Young People's Mental Health and Wellbeing Taskforce, 2015; Merikangas et al., 2011). There are a

number of reasons for this. First, only a small proportion of young people in psychological distress seek help (Gulliver, Griffiths, & Christensen, 2010). Significant barriers to help-seeking have been identified, including perceived stigma, infrequent contact with health services and lack of knowledge about mental health (Langer et al., 2015; Plaistow et al., 2013; Reardon et al., 2017). Second, primary care professionals often do not make referrals to specialist services (O'Brien, Harvey, Howse, Reardon, & Creswell, 2016). Third, there are significant capacity problems in specialist child and adolescent mental health services in most countries, including the UK (Department of Health, 2017; Frith, 2016). As a consequence, even when children and young people are referred to specialist services, waiting times for assessment and treatment are typically lengthy and many young people do not meet the high clinical thresholds to qualify for treatment (Crenna-Jennings & Hutchinson, 2018).

Schools play an important role in the lives of young people. Most young people spend much of their time at school and attend the same setting over a number of years. The extended contact time that school staff have with young people gives opportunities for trusting and supportive relationships to develop, and for school staff to notice changes in the young people they educate. For young people facing adversities at home, schools can play an especially important role as places of safety and consistency. In countries where universal education is available, schools are, in principle, well placed to identify young people with emotional problems (Patel et al., 2018; Public Health England, 2015). A recent systematic review of school-based psychological interventions designed to prevent the onset of depression and anxiety disorders (Werner-Seidler, Perry, Calear, Newby, & Christensen, 2017) found small but significant effects on both depression and anxiety symptoms, which remained significant at 12 month follow-up.

The school setting also presents valuable opportunities for offering prompt and early intervention for mental health concerns. In the USA, where school mental health services are a relatively well-established resource for assessment and treatment, the majority of young people who successfully access mental health services receive these services via their school (Kern et al.,

2017). In the UK, mental health provision has traditionally been delivered within the health service and formal school mental health services are less comprehensive. However, recent policy proposals (Department of Health, 2017; Department of Health and Social Care, 2019) have advocated increasing the role of schools in the provision of mental health services. This has resulted in funding for the development of new school-based mental health support teams to deliver brief evidence-based treatments to children and young people with mild to moderate mental health difficulties.

Although the intention is for these new services to use interventions that are based on evidence, reviews of school-based interventions (e.g. Weare & Nind, 2011) suggest that most interventions studied aim to prevent rather than treat mental health symptoms. Targeted interventions (i.e. interventions delivered only to young people at risk of developing a disorder) appear to be more effective than universal interventions for depression but no more effective for anxiety (Calear & Christensen, 2010; Kavanagh et al., 2009; Mychailyszyn, 2012; Werner-Seidler et al., 2017). There is also a concern over the methodological quality of school-based intervention trials (e.g. Werner-Seidler et al., 2017), particularly because in psychotherapy research with adults, low quality studies appear to over-estimate effect sizes (Cuijpers, Van Straten, Bohlmeijer, Hollon, & Andersson, 2010).

The aim of this review is to help inform the decisions of professionals and policy-makers who plan, commission, deliver and evaluate school-based support for young people with depression or anxiety symptoms. Our objectives are to identify, evaluate and synthesise the data from randomised controlled trials of indicated, school-based psychological interventions for adolescents with symptoms of depression or anxiety. In line with the intended remit of the new UK school-based mental health support teams, we included trials of school-based interventions for adolescents presenting with mild or subthreshold symptoms, as well as interventions provided to young people with threshold depression or anxiety disorders. Following concerns raised in other reviews regarding the quality of evidence (e.g. Cuijpers et al., 2010; Werner-Seidler et al., 2017), we also evaluate the

methodological quality of included trials, and explore the relationship between quality rating and effect size.

Methods

Search strategy

The review was conducted in accordance with guidance in the 'preferred reporting items for systematic reviews and meta-analyses' (PRISMA) statement (Moher et al., 2009). The protocol was registered with the PROSPERO registry prior to implementation of the search strategy (ID: CRD42018099695).

We searched eight electronic databases (EMBASE, MEDLINE, PsycINFO, CINAHL, British Nursing Index, ASSIA, ERIC and British Education Index) from inception to 4th April 2019. The search string was developed based on a preliminary search of EMBASE followed by analysis of the keywords and index terms used in the records retrieved, and tailored to each of the included databases. No restrictions on date of publication or reporting language were imposed. The EMBASE search string is available via the review's PROSPERO record. We also hand searched the reference lists of eligible articles and relevant reviews to identify eligible articles missed by the electronic search.

Eligibility Criteria

Studies were included if they met the following criteria:

a) Randomised controlled trial (RCT) design, including cluster RCTs.
b) Participants aged 10-19 years were the direct recipients of the trial intervention (trials where some participants were aged under 10 were included provided the mean age of the sample was 10 years or over).

c) All included participants were symptomatic: i.e. they were seeking help for symptoms of depression or anxiety and/or were presenting with depression or anxiety symptoms deemed to exceed a threshold for intervention pre-specified by the trial team.
d) The trial intervention was a manualised psychological intervention. If a multi-component intervention, the psychological component constituted at least 75% of the content.
e) The trial intervention was delivered wholly or partly within an institution whose primary function was education.
f) The trial intervention was designed primarily to decrease symptoms of depression and/or anxiety.

Since the focus of this review was indicated interventions, trials of universal (whole-school) approaches or integrated universal-indicated programmes were not eligible for inclusion unless they also included an indicated intervention only arm. Trials of interventions delivered in universities or other higher education institutions were also ineligible. Trials were only included if we were able to obtain sufficient outcome data for meta-analysis (either from the published report or by contacting the corresponding author).

Study selection

The titles and abstracts of 100 articles retrieved via the electronic search (selected using a random number generator) were screened independently by all review team members (BG, BC, TC, AJ, DM, FO, LP and SR). The average rate of agreement between the first author and other reviewers was 95% (range 92-97%). Following this concordance check, discrepancies were discussed, and the eligibility criteria clarified before all articles were screened by one of the above reviewers. The full texts of all articles deemed potentially relevant were obtained and assessed for eligibility against the inclusion/exclusion criteria by two reviewers independently. All disagreements regarding eligibility were discussed by the two reviewers and, if consensus not reached, resolved by a third reviewer.

Where multiple publications describing the same trial were identified, the publication reporting the primary trial outcomes was identified to avoid including data from the same participants more than once.

Data extraction

Data were extracted by two reviewers and cross-checked to ensure accuracy. The following information was recorded using a custom data extraction spreadsheet: study characteristics (authors, title, year of publication); sample characteristics (age, gender); intervention characteristics i.e. theoretical approach, mode of delivery (group or individual), parental involvement, contact hours, whether externally or internally delivered); control condition (active, minimal or passive); setting (mainstream or non-mainstream school, high or middle income country), depression measure(s), anxiety measure(s), and baseline and outcome data for depression and anxiety symptoms (means and standard deviations where available). Where insufficient outcome data were reported for the standardised mean difference to be calculated, we contacted corresponding authors to request this information. We had planned to analyse secondary outcomes of functioning, educational performance and/or behaviour post-intervention but the included studies did not report these outcomes sufficiently consistently to allow for meaningful meta-analysis.

We also recorded whether the trial was individually or cluster randomised, and in the case of cluster randomised trials, attempted to extract information about whether the data presented were adjusted for clustering, the intra-cluster correlations for each outcome and average cluster size.

Assessment of methodological quality and publication bias

The methodological quality of all included trials was rated using two methods. First, studies were coded for presence or absence of six of the eight standards for acceptable quality for psychotherapy trials used by Cuijpers et al. (2010). Two standards were omitted as they were not appropriate for this context: i) the use of a diagnostic interview (as we were interested in mild and subthreshold symptoms as well as those that met criteria for a diagnosis), and ii) a minimal level of statistical power to detect significant effects and at least 50 participants in the comparison between treatment and control groups (as relative sample size was accounted for within the meta-analyses). The six standards that were rated as present or absent were: 1) use of a treatment manual; 2) the therapists were trained for the specific therapy; 3) treatment integrity was checked; 4) data analysed with intention-to-treat analyses; 5) randomization conducted by an independent (third) party; and 6) assessors of outcome were blinded (when only self-reports were used, it was assumed that this criterion was met). Further details of these standards can be found in Cuijpers et al. (2010). Total scores could range from 0-6, except for studies where Cognitive Bias Modification (CBM) or computerised Cognitive Behavioural Therapy (cCBT) were used where the first three items were coded as not applicable. Studies were rated as having acceptable quality if all applicable standards were present. All studies were double rated by two from SR, BC and LP (98% concordance) and discrepancies resolved via consensus discussion.

We also evaluated study quality using a system adapted from Moncrieff et al. (2001) which was designed specifically to assess trials of interventions for mental health problems. The scale reflects specific methodological issues associated with mental health treatment studies including recording of adverse events. Each of the 24 items are given a rating between 0 and 2, therefore possible scores range from 0 to 48. Higher scores indicate better quality studies. All studies were rated by one author (SR) who has previously demonstrated good inter-rater reliability using this tool. In this study, 17% were also rated by a second rater (BC), evidencing good inter-rater reliability (87.5% concordance) and discrepancies resolved by consensus discussion. Publication bias was assessed via construction and visual inspection of funnel plots.

Data synthesis

Review Manager Version 5.3 (The Cochrane Collaboration, 2014) was used to pool the outcome data from eligible trials in random effects meta-analyses. The standardised mean difference (SMD) between the symptom severity scores of trial arms and their 95% confidence intervals were calculated, and weighted according to sample size using a random effects model. SMDs greater than 0.8 were considered large, 0.5 moderate and 0.2 small (Cohen, 1988). Pooled SMDs are reported accompanied by the 95% confidence intervals. The primary meta-analyses assessed the pooled effect on depression symptoms in studies where participants were recruited on the basis of elevated depression symptoms, and the pooled effect on anxiety symptoms in studies where recruitment was on the basis of elevated anxiety symptoms. One study required elevated symptoms of both anxiety and depression, and therefore was included in both meta-analyses (Moharreri et al., 2017). Secondary analyses were conducted assessing whether interventions primarily targeting depression had an impact on anxiety symptoms, and vice versa. Further, secondary meta-analyses were conducted of available follow-up data collected at short-term (≤6 months post-intervention), medium-term (>6 months ≤12 months post-intervention) and long-term (>12 months post-intervention) time points.

Where studies compared multiple relevant interventions delivered within schools, data from each arm were included and the participant numbers for the control group divided by the number of arms to which the control was compared. In the case of more than one control arm, the most active control condition was selected as the comparison condition. In cases where multiple outcome measures were used to assess anxiety or depression, adolescent reported outcomes were included in the meta-analysis in preference to parent reported outcomes; where there was more than one adolescent reported outcome, the primary outcome measure was used. Adolescent reported outcomes were prioritised for two reasons. First these data were more often available than

symptom reports from parents; second, there is evidence of significant discrepancy between adolescent and parent reports of the young person's symptoms, meaning that these cannot be considered inter-changeable (Orchard, Pass, Cocks, Chessell, & Reynolds, 2019).

A random effects model was selected as we expected there would be heterogeneity in study effect sizes because of diversity in their target populations and the specific interventions trialled. Statistical heterogeneity was assessed using the Chi^2 and I^2 statistics. Significant heterogeneity is indicated by a Chi^2 statistic greater than the degrees of freedom and a p value <0.05; I^2 values range from 0% to 100%, with higher values indicating greater heterogeneity (Ryan, 2016). Studies were identified as outliers where their SMD was not included in the 95% confidence interval of any other included study.

We conducted four a priori planned subgroup analyses to investigate hypothesised sources of heterogeneity at post-intervention. These involved grouping the studies according to: (a) whether the intervention was delivered individually or in a group; (b) type of intervention evaluated, (c) whether the intervention was delivered by staff members internal to the school or external facilitators, and (d) the income level of the country in which the trial was conducted. Additionally, we conducted two post-hoc subgroup analyses to explore whether differing effect sizes were detected in trials of interventions that did and did not incorporate parental involvement, and to investigate the impact of control condition employed. Tests for heterogeneity across subgroups were conducted and the I^2 statistic computed to quantify the percentage of the variability in effect estimates attributable to genuine subgroup differences rather than sampling error.

Since both individually randomised and cluster randomised trials were eligible for inclusion, we intended to correct for the impact of clustering using the method recommended in the Cochrane handbook, i.e. by calculating the 'effective sample size' based on extracted intra-cluster correlations and average cluster size for use in the meta-analysis. However, since this data was only reported by one included trial, it was not possible to adjust the data in this way. Therefore, we performed a

sensitivity analysis by excluding cluster randomised trials to investigate the potential effect of artificial narrowing of confidence intervals due to clustering.

Results

Study selection

The study selection process is illustrated in Figure 1. We identified 64 unique papers that met the inclusion criteria, four of which reported longer term outcomes of already included trials, and nine of which reported secondary analyses. There were seven papers with incomplete data, of which we obtained contact details for six corresponding authors; two authors provided additional data. We therefore excluded five studies due to insufficient outcome data. Therefore, data from 45 trials are included in the analyses: 29 in the depression meta-analyses only, 15 in the anxiety meta-analyses only, and one study was included in both. Three studies (two included in the depression analyses and one in the anxiety analyses) reported on two different active school-based interventions within one study. For these studies, data from both intervention arms were included. One of the included studies did not measure outcomes immediately post-intervention so is included in the anxiety meta-analyses for longer-term follow ups only (Hunt et al., 2009). Therefore, 32 active intervention arms are included in the primary depression meta-analysis and 16 in the primary anxiety meta-analysis.

[Insert Figure 1]

Characteristics of included studies

Characteristics of the 45 included trials are summarised in Table 1. The majority of studies recruited participants who scored above a specified cut-off on a continuous measure of symptom severity, sometimes in combination with another risk factor (for instance, recent exposure to violence or bullying). Only eight studies required participants to meet diagnostic criteria for a depression (n = 3) or anxiety disorder (n = 5) to be eligible for inclusion.

Since three studies included two active school-based treatment arms, the 45 included studies evaluated a total of 48 eligible intervention arms (number of intervention arms is denoted by 'k' in this review). Most (k=33) of the included interventions were described as cognitive behavioural therapy (CBT) or CBT-based, of these three were of the FRIENDS programme (Stallard, Simpson, Anderson, Hibbert, & Osborn, 2007) and three of the Penn Resiliency Programme (Brunwasser, Gillham, & Kim, 2009). The next most commonly evaluated interventions were Interpersonal Therapy (IPT) or IPT-based interventions (k=4), and behavioural therapy interventions (k=2). All other interventions were each evaluated by one trial each; these included cognitive bias modification, mindfulness-based cognitive therapy, the mind-body skills programme, integrated CBT-IPT, acceptance and commitment therapy, exposure treatment, a supportive-expressive intervention and narrative therapy. All of the interventions were 100% psychological in content, i.e. there were no multi-modal interventions that incorporated other (e.g. dietary, exercise) intervention strategies.

The interventions trialled were intended to be delivered over a minimum of 3 and a maximum of 20 sessions (the planned length of sessions ranged between 20 and 120 minutes where this was specified); however, most articles did not report the number of sessions participants actually attended. Three studies evaluated interventions delivered via a computer within a school setting, the remaining interventions were delivered face-to-face. All of the included studies were conducted within the context of mainstream schools. The majority were carried out in high income North American and European countries; other trials were conducted in Bosnia, Chile, India, Iran

(n=3), Kosovo, Nigeria, South Africa, Taiwan (China), and Thailand. No studies evaluated interventions delivered in colleges of further education or non-mainstream education settings.

[Insert Table 1]

Funnel plots were constructed for both depression and anxiety focused studies (available as online supplementary material). Inspection of the plots suggested no evidence of publication bias for studies focussed on reducing depression symptoms. However, for studies primarily targeting anxiety symptoms, the possibility of publication bias could not be ruled out.

The post-intervention effect of indicated school-based interventions for elevated symptoms of depression

The results of the random effects meta-analysis for depression symptoms post-intervention are illustrated in Figure 2. Data from 2895 young people, 1535 of whom were randomised to receive one of the school-based interventions evaluated, were synthesised. There was a small to medium effect of school-based psychological interventions in reducing depression symptoms in comparison to control conditions at post treatment (SMD=-0.45, 95% CI -0.63, -0.269, p<0.001, k=32). Statistical heterogeneity in effect sizes across studies was high (I^2=81%, X^2=162.41, df=31, p<0.0001). One outlier was identified (Singhal et al., 2018) and removal of this study reduced the effect size (SMD=-0.34, 95% CI -0.48, -0.21, p<0.0001, k=31) and heterogeneity (I^2=61%, χ2=77.91, df=30, p<0.0001). All subsequent analyses excluded data from this trial which evaluated an 8-week 'Coping Skills' programme devised by the authors, compared with a control intervention of one interactive psychoeducation session.

[Insert Figure 2]

The post-intervention effect of indicated school-based interventions for elevated symptoms of anxiety

The results of the random effects meta-analysis for anxiety symptoms post-intervention are illustrated in Figure 3. Data from 1075 young people, of whom 528 were randomised to receive an eligible school-based intervention, were synthesised. School-based psychological interventions were effective in reducing anxiety symptoms in comparison to control conditions at post treatment (SMD=-0.61, 95% CI -0.95, -0.27, p<0.001, k=16). Statistical heterogeneity across studies was high (I^2=84%, X^2=96.09, df=15, p=<0.0001) with the wide confidence intervals indicating that the true effect size could vary from small to large. One outlier was identified (Yoosefi et al., 2014) and removal of this study reduced the effect size (SMD=-0.49, 95% CI -0.79, -0.19, p<0.002, k=15) and heterogeneity (I^2=80%, X2=71.07, df=14, p<0.0001). All subsequent analyses excluded data from this trial which evaluated a twice weekly 14 sessions intervention for social phobia comprising play and narrative story-telling activities, compared to a wait-list control.

[Insert Figure 3]

Quality ratings and association with effect size

Methodological quality was generally rated as low across both depression and anxiety focused studies. Using the adapted acceptability standards by Cuijpers et al. (2010), 73% of depression intervention studies and 59% of anxiety intervention studies were rated as low quality,

so the meta-analyses were re-run comparing acceptable quality vs low quality studies. For trials that recruited based on elevated depression symptoms, the effect size for acceptable quality studies (k= 7) was not significantly different from low quality trials (k=24). There was also no significant difference between the effect sizes in acceptable quality studies (k=7) and low quality studies (k=9) that focused on anxiety symptoms.

Scores on the adapted Moncrieff et al. (2001) quality rating ranged from 14 to 37. Ratings indicated common methodological problems with study design. This included inadequate recording of adverse events in all trials. These continuous scores were not significantly correlated with study effect size for either depression symptoms or anxiety symptoms; inspection of the corresponding scatter plots did not suggest any linear relationship between study quality and effect sizes.

Subgroup analyses

The results of all subgroup analyses for studies of interventions aimed at reducing elevated depression symptoms are presented in Table 2. All study subgroups showed a significant effect of depression symptom reduction apart from trials of interventions delivered by internal school staff, interventions that included parents, trials conducted in middle income countries, and trials which employed active controls. The only significant subgroup difference found was between group and individual interventions: both types of interventions had a significant effect on depression symptoms but the pooled effect for individual interventions was higher than for group interventions.

[Insert Table 2]

The results of subgroup analyses for studies of interventions aimed at reducing elevated anxiety symptoms are presented in Table 3. All study subgroups showed a significant effect of

anxiety symptom reduction apart from trials of individual interventions, interventions delivered by internal school staff, and trials which employed active controls. There were no significant subgroup differences.

[Insert Table 3]

Secondary effects of interventions

Where studies included measurement of both depression and anxiety symptoms, we also assessed whether interventions with primarily targeted depression symptoms had a secondary effect on anxiety symptoms, and vice versa. For both depression focused studies where anxiety was measured as a secondary outcome (k=8), and anxiety focused studies where depression was measured as a secondary outcome (k=6), no significant impact on the secondary outcome was found.

Sensitivity analysis excluding cluster randomised trials

To assess the potentially confounding effect of including cluster randomised trials without being able to adjust the data as planned, we excluded data from five cluster randomised trials. Excluding data from three depression focused cluster randomised trials, the effect size for depression symptoms at post-intervention remained in the small-medium range (SMD=-0.39, 95% CI -0.54, -0.25, $p<0.001$, k=28). Statistical heterogeneity in effect sizes across studies remained high (I^2=62%, χ^2=70.29, df=27, $p<0.001$).

Excluding data from two cluster randomised trials, the effect of school-based psychological interventions on anxiety symptoms at post-intervention remained in the small-large range (SMD=-

0.52, 95% CI -0.85, -0.18, p=0.003, k=13). Statistical heterogeneity in effect sizes across studies remained similarly high (I^2=80%, χ^2=60.06, df=12, p<0.001).

Durability of effects

To investigate longer-term outcomes, meta-analyses were conducted for short-term (≤6 months post-intervention), medium-term (>6 months ≤12 months post-intervention), and long-term (>12 months post-intervention) follow up. In studies of interventions aimed at depression symptom reduction, a small but significant effect on depression symptoms was found in studies with a short-term follow-up (SMD=-0.19, 95% CI -0.33, -0.04, p=-0.01, k=21), with high heterogeneity (I^2=54%, χ^2=43.48, df=20, p=0.002). There was no significant effect in depression symptoms at medium-term (k=8) or long-term (k=3) follow up. In studies of interventions aimed at anxiety symptom reduction, no significant reduction of anxiety symptoms compared to control was found at short-term (k=8), medium-term (k=3) or long-term (k=3) follow up. Forrest plots for these outcomes are available as online supplementary material.

Discussion

We identified and synthesised the results of 45 randomised controlled trials of indicated school-based psychological interventions for adolescents with symptoms of anxiety or depression. Pooled effect sizes at post-intervention were small for studies that targeted elevated depression symptoms, and medium for studies that targeted elevated anxiety symptoms. School-based psychological interventions reduced symptoms of anxiety and depression significantly more than passive and minimal, but not active, controls. There was a high degree of statistical heterogeneity and study quality was variable; 70% of trials did not meet quality standards set for psychotherapy research trials (Cuijpers et al., 2010).

The effect of indicated school-based interventions on depression symptoms at post-intervention is of a comparable size to the effect of psychological interventions for adolescent depression delivered across settings (Weisz et al., 2017; Weisz, McCarty, & Valeri, 2006). However, the effect of indicated school-based interventions on anxiety symptoms at post-intervention is smaller than that of adolescent anxiety interventions delivered in other settings, where large effect sizes have been reported (Reynolds et al., 2012). There are some challenges implementing high quality anxiety focused interventions within schools (Bernstein, 2010; Drmic, Aljunied, & Reaven, 2017; Masia-Warner et al., 2016), including the need to incorporate exposure-based strategies, and these may account for the smaller effects of school-based anxiety interventions compared to clinic-based approaches.

In the subgroup of studies that evaluated interventions delivered by staff employed by the schools, there were no significant effects on symptoms of either depression or anxiety. These trials were also almost all rated as being of low methodological quality. Subgroup differences between studies of internally and externally delivered interventions were not significant but this may be due to high heterogeneity within the subgroups. However, the finding that internally delivered interventions do not have a significant effect on symptoms presents a significant challenge to the sustainability of school-based interventions in the context of significant capacity problems in the workforce of child and adolescent mental health specialists. It is therefore important to develop interventions that can be effectively delivered by existing school staff and other cost-effective and readily available practitioners (Herzig-Anderson, Colognori, Fox, Stewart, & Masia-Warner, 2012).

For interventions targeting depression, subgroup analyses suggested that individual interventions may have a larger effect on depressions symptoms than do group interventions. Conversely, for anxiety focused interventions, individual interventions did not have a significant effect on anxiety symptoms while group interventions had a medium effect. The number of trials of individual interventions included in this review is small, therefore these subgroup findings should be

interpreted with caution. However, it could be hypothesised that group delivery is suited to young people with anxiety symptoms because of the opportunities afforded for normalisation, peer modelling, reinforcement and exposure to social situations (Wergeland et al., 2014), whereas depressed young people may benefit more from the one-to-one attention and tailored approach facilitated by individual delivery.

Subgroup analyses revealed that depression focused intervention studies that involved parents in treatment did not find a significant effect on depression symptoms. This finding was unexpected as previous research, and treatment guidelines, have emphasised the importance of involving parents and carers in the treatment of adolescent depression (e.g. Dardas, van de Water, & Simmons, 2018; NICE, 2005). Further, there are plausible theoretical reasons to hypothesise that involving parents in treatment would reinforcing skills and techniques learnt in the adolescent's home environment and thus enhance generalisability and maintenance of treatment effects (Cooley, Boyd, & Grados, 2004). Whilst practical difficulties involving parents in school-based treatment have been noted (Drmic et al., 2017; Melnyk, Kelly, & Lusk, 2014) many of these barriers are not unique to school settings (Wells & Albano, 2005). Whist it is conceivable that resources needed to involve parents in school-based interventions might be better focused on delivering interventions directly to adolescents, further research directly comparing interventions with and without parental involvement is needed before confident recommendations can be made.

Meta-analyses of symptom severity at short, medium and long term follow ups indicated that the effects of school-based interventions on depression and anxiety symptoms had limited durability. There were small effects on depression symptoms at follow-ups of less than 6 months but not beyond that point. There were no significant effects on anxiety symptoms at 6 months or any subsequent follow up assessments. Therefore, whilst high quality trials which include longer-term follow-ups are essential, the available evidence suggests that it may be necessary to develop

additional strategies to ensure reductions in depression and anxiety symptoms are maintained after the interventions ends.

Implications and recommendations for practice

Offering school-based psychological interventions to adolescents presenting with elevated symptoms of common mental health problems is a promising way to improve access to treatment. New school-based mental health services for young people with mild to moderate mental health difficulties, including anxiety and depression, (Department of Health, 2017; Department of Health and Social Care, 2019) have the potential to significantly expand provision and improve access to treatment. However, to maximise the return on the investment required to resource these teams, it is essential that their development is informed by available evidence. The findings from this review provide the basis for some key recommendations for practitioners and researchers involved in the development and delivery of indicated school based mental health initiatives.

Our results provide some evidence that indicated school-based mental health interventions are effective. However, the results also clearly indicate the need to critically examine potential barriers to effectiveness and to the durability of symptom reductions. The evidence collated in this review indicates that interventions that target symptoms of depression have a significant small to medium effect on reducing depression symptoms in comparison to control conditions and that benefits are maintained for up to 6 months. Anxiety focused interventions also have a significant effect on the targeted symptoms in comparison to control conditions, but the current evidence does not permit a precise estimate of the size of this effect and reductions in anxiety symptoms are not maintained.

For both depression and anxiety focused interventions, indicated school-based interventions delivered by staff external to the school were effective whereas those delivered by internal school

staff were not effective compared with control interventions. Further, indicated school-based interventions focused on depression that did not include parents were effective whereas those that included parents were not effective compared with controls. We would therefore urge caution when considering using internal school staff to deliver interventions or when inviting parents to take part in depression interventions.

For researchers, this review identified several gaps in the current literature. We did not identify any trials that evaluated interventions delivered in further education settings (i.e. for young people aged 16 years and over studying for a qualification below degree level) or in alternative provision (e.g. for students excluded from mainstream schools). This is therefore a research priority, especially given high mental health needs among young people educated in these settings (Association of Colleges, 2017; House of Commons Education Select Committee, 2018).

Many trials appropriately assessed the adherence of treatment delivery; however, very few recorded the acceptability of interventions or participants' engagement with treatment, including attendance at treatment sessions. We also noted that adverse events were inadequately recorded in every study we included. Similarly, the costs and therefore the cost effectiveness of school-based psychological interventions were not reported; this should be rectified in future studies.

Finally, whilst psychological interventions delivered in educational settings may reduce anxiety and depression in young people, other types of intervention may also be effective. For example, there is emerging evidence that diet (Khalid, Williams & Reynolds, 2016) and physical activity (Carter, Morres, Meade & Callaghan, 2016) are associated with mental health in young people and that interventions that target these may be effective.

Limitations

There are a number of limitations of the current review. Although we tried to obtain missing data from authors of trials we identified as fitting our criteria, this was not possible for all eligible studies. This is a potential source of bias in the data analysed. Further, as previously noted, we were unable to adjust data from cluster randomised trials as planned due to papers not reporting intra-cluster correlations and average cluster sizes. Although our sensitivity analyses suggested that the inclusion of unadjusted data from cluster randomised trials had minimal impact on the results, it remains possible that we would had found different results had the planned corrections been possible. We would encourage authors to include intra-cluster correlations and average cluster sizes in the reports of cluster randomised trials to assist future systematic reviews and meta-analyses. In addition, assessing adverse events, adherence and engagement with treatment, and costs of interventions, would all help inform evidence-based decision making.

We carried out multiple subgroup analyses, most of which were planned but some of which were post-hoc. While we felt this to be a useful means of exploring the considerable heterogeneity in trial effect size estimates and of answering specific questions about the effect sizes found in studies of interventions with particular characteristics, conducting multiple subgroup analyses can lead to low power and may produce misleading results (Higgins & Green, 2008). For example, the effect size estimate for internally delivered anxiety focused interventions is based on just four studies.

Further, the observational nature of such subgroup analyses must be kept in mind when interpreting the results; that is, subgroup analyses are not based on randomised comparisons and thus it is possible that subgroups differ from one another in important ways other than the characteristics which define the subgroups. For example, in the current review, trials of depression focused interventions delivered by internal school staff were also of relatively low quality. However, as these standards of acceptability quality relate to more rigorous procedures, any bias introduced

by not meeting these standards would be expected to produce inflated effect size estimates. Therefore, this is unlikely to account for the lack of significant effect for this subgroup that we found.

Conclusion

Indicated school-based interventions for depression were similarly effective to interventions for depression delivered in other settings and indicated school-based interventions were also successful in reducing anxiety symptoms. However, there is considerable variation in the quality of trials and in the effectiveness of the programmes that have been evaluated.

Key Practitioner Message

- Indicated school-based interventions for depression are similarly effective to psychological interventions delivered in other settings.
- Indicated school-based interventions also reduce anxiety symptoms but may have smaller effects than anxiety-focused psychological interventions delivered in other settings.
- Current evidence does not support the effectiveness of indicated school-based interventions delivered by internal school staff, therefore careful consideration is needed before implementing such approaches.
- Given the relatively low quality of the current evidence-base and high heterogeneity, expansion of school-based mental health treatment should be accompanied by robust evaluation and monitoring.

Areas for Future Research

- Further high quality trials of school-based interventions for anxiety and/or depression incorporating longer-term follow-ups are needed.
- Evaluation of indicated psychological interventions for anxiety and depression delivered within further education colleges (16-18 years) and non-mainstream education institutions (e.g. for students excluded from mainstream schools) is urgently needed.
- Researchers should consider potential costs and adverse effects of school-based psychological interventions in future studies.

Acknowledgments

We gratefully acknowledge the contribution of Ansu Joy who assisted with study selection and data extraction. We would like to thank authors who provided additional data for inclusion in the meta-analyses and the staff of Norfolk and Suffolk NHS Foundation Trust Frank Curtis Library for their assistance in article retrieval. This review was not supported by any specific funding. We have no conflicts of interest to declare.

References

***Included in meta-analyses**

Association of Colleges. (2017). *Association of Colleges (AoC) survey about students with mental health conditions in Further Education in England*. Retrieved from https://www.aoc.co.uk/sites/default/files/AoC survey on students with mental health conditions in Further Education - summary report 2015 - FINAL_0.pdf

Balázs, J., Miklõsi, M., Keresztény, Á., Hoven, C. W., Carli, V., Wasserman, C., … Wasserman, D. (2013). Adolescent subthreshold-depression and anxiety: Psychopathology, functional impairment and increased suicide risk. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *54*(6), 670–677. https://doi.org/10.1111/jcpp.12016

*Bella-Awusah, T., Ani, C., Ajuwon, A., & Omigbodun, O. (2016). Effectiveness of brief school-based, group cognitive behavioural therapy for depressed adolescents in south west Nigeria. *Child and Adolescent Mental Health*, *21*(1), 44–50.

Bernstein, E. R. (2010). *Transportability of Evidence-Based Anxiety Interventions to a School Setting: Evaluation of a Modularized Approach to Intervention*. University of Wisconsin-Madison.

*Berry, K., & Hunt, C. J. (2009). Evaluation of an Intervention Program for Anxious Adolescent Boys Who Are Bullied at School. *Journal of Adolescent Health*, *45*(4), 376–382. https://doi.org/10.1016/j.jadohealth.2009.04.023

Bertha, E. A., & Balázs, J. (2013). Subthreshold depression in adolescence: A systematic review. *European Child and Adolescent Psychiatry*, *22*(10), 589–603. https://doi.org/10.1007/s00787-013-0411-0

Bockting, C. L., Hollon, S. D., Jarrett, R. B., Kuyken, W., & Dobson, K. (2015). Clinical Psychology Review A lifetime approach to major depressive disorder : The contributions of psychological

interventions in preventing relapse and recurrence. *Clinical Psychology Review*, *41*, 16–26. https://doi.org/10.1016/j.cpr.2015.02.003

*Brière, F. N., Reigner, A., Yale-Soulière, G., & Turgeon, L. (2019). Effectiveness Trial of Brief Indicated Cognitive-Behavioral Group Depression Prevention in French-Canadian Secondary Schools. *School Mental Health*, (0123456789). https://doi.org/10.1007/s12310-019-09316-2

Brunwasser, S. M., Gillham, J. E., & Kim, E. S. (2009). A meta-analytic review of the Penn Resiliency Program's effect on depressive symptoms. *Journal of Consulting and Clinical Psychology*, *77*(6), 1042–1054.

Calear, A. L., & Christensen, H. (2010). Systematic Review of School-Based Prevention and Early Intervention Programs for Depression. *Journal of Adolescence*, *33*(3), 429–438.

Carter, T., Morres, I. D., Meade, O., & Callaghan, P. (2016). The effect of exercise on depressive symptoms in adolescents: a systematic review and meta-analysis. *Journal of the American Academy of Child & Adolescent Psychiatry*, *55*(7), 580-590.

Children and Young People's Mental Health and Wellbeing Taskforce. (2015). *Future in mind: Promoting, protecting and improving our children and young people's mental health and wellbeing*. London.

*Chu, B. C., Crocco, S. T., Esseling, P., Areizaga, M. J., Linder, A. M., & Skriner, L. C. (2016). Transdiagnostic group behavioural activation and exposure therapy for youth anxiety and depression: intial randomised controlled trial. *Behavior Research and Therapy*, *76*, 65–75.

*Clarke, G., Hawkins, W., Murphy, M., Sheeber, L., Lewinsohn, P., & Seeley, J. (1995). Targeted prevention of unipolar depressive disorder in an at-risk sample of high school adolescents: A randomized trial of a group cognitive intervention. *Journal of the American Academy of Child & Adolescent Psychiatry*, *34*(3), 312–321.

Clayborne, Z. M., Varin, M., & Colman, I. (2018). Adolescent Depression and Long-Term Psychosocial Outcomes: A Systematic Review and Meta-Analysis. *Journal of the American Academy of Child & Adolescent Psychiatry*, *58*(1), 72–79. https://doi.org/10.1016/j.jaac.2018.07.896

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. New York: Routledge.

Collishaw, S. (2015). Annual research review: Secular trends in child and adolescent mental health. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *56*(3), 370–393. https://doi.org/10.1111/jcpp.12372

Collishaw, S., Maughan, B., Natarajan, L., & Pickles, A. (2010). Trends in adolescent emotional problems in England: A comparison of two national cohorts twenty years apart. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *51*(8), 885–894. https://doi.org/10.1111/j.1469-7610.2010.02252.x

Cooley, M. R., Boyd, R. C., & Grados, J. J. (2004). Feasibility of an Anxiety Preventive Intervention for Community Violence Exposed African-American Children. *The Journal OfPrimary Prevention*, *25*(1), 105–123.

Crenna-Jennings, W., & Hutchinson, J. (2018). *Access to children and young people's mental health services*.

Cuijpers, P., Van Straten, A., Bohlmeijer, E., Hollon, S. D., & Andersson, G. (2010). The effects of psychotherapy for adult depression are overestimated: A meta-analysis of study quality and effect size. *Psychological Medicine*, *40*(2), 211–223. https://doi.org/10.1017/S0033291709006114

Dardas, L. A., van de Water, B., & Simmons, L. A. (2018). Parental involvement in adolescent depression interventions: A systematic review of randomized clinical trials. *International Journal of Mental Health Nursing*, *27*, 555–570.

*De Cuyper, S., Timbremont, B., Braet, C., De Backer, V., & Wullaert, T. (2004). Treating depressive symptoms in schoolchildren: A pilot study. *European Child and Adolescent Psychiatry*, *13*(2), 105–114. https://doi.org/10.1007/s00787-004-0366-2

Department of Health. (2017). *Transforming Children and Young People's Mental Health Provision: a Green Paper*.

Department of Health and Social Care. (2019). *NHS Long Term Plan*.

Drmic, I. E., Aljunied, M., & Reaven, J. (2017). Feasibility, Acceptability and Preliminary Treatment Outcomes in a School-Based CBT Intervention Program for Adolescents with ASD and Anxiety in Singapore. *Journal of Autism and Developmental Disorders*, *47*(12), 3909–3929. https://doi.org/10.1007/s10803-016-3007-y

*Ebrahiminejad, S., Poursharifi, H., Roodsari, A. B., Zeinodini, Z., & Noorbakhsh, S. (2016). The effectiveness of mindfulness-based cognitive therapy on Iranian female adolescents suffering from social anxiety. *Iranian Red Crescent Medical Journal*, *18*(11). https://doi.org/10.5812/ircmj.25116

Essau, C. A., Lewinsohn, P. M., Olaya, B., & Seeley, J. R. (2014). Anxiety disorders in adolescents and psychosocial outcomes at age 30. *Journal of Affective Disorders*, *163*, 125–132. https://doi.org/10.1016/j.jad.2013.12.033

*Ettelson, R. G. (2002). *The treatment of adolescent depression* (Illinois State University). https://doi.org/10.1016/0924-977x(96)87344-5

*Fitzgerald, A., Rawdon, C., & Dooley, B. (2016). A randomized controlled trial of attention bias modification training for socially anxious adolescents. *Behaviour Research and Therapy*, *84*, 1–8. https://doi.org/10.1016/j.brat.2016.06.003

Frith, E. (2016). *Children and Young People's Mental Health: State of the Nation*.

*Gaete, J., Martinez, V., Fritsch, R., Rojas, G., Montgomery, A. A., & Araya, R. (2016). Indicated school-based intervention to improve depressive symptoms among at risk Chilean adolescents: A randomized controlled trial. *BMC Psychiatry*, *16*, 276.

*Ginsburg, G. S., Becker, K. D., Drazdowski, T. K., & Tein, J.-Y. (2012). Treating Anxiety Disorders in Inner City Schools: Results from a Pilot Randomized Controlled Trial Comparing CBT and Usual Care. *Child Youth Care Forum*, *41*(1), 1–19. https://doi.org/10.1037/a0032811.Child

*Ginsburg, G. S., & Drake, K. L. (2002). School-Based Treatment for Anxious African-American Adolescents: A Controlled Pilot Study. *Journal of the American Academy of Child and Adolescent Psychiatry*, *41*(7), 768–775. https://doi.org/10.1097/00004583-200207000-00007

*Gordon, J. S., Staples, J. K., Blyta, A., Bytyqi, M., & Wilson, A. T. (2008). Treatment of posttraumatic stress disorder in postwar Kosovar adolescents using mind-body skills groups: A randomized controlled trial. *Journal of Clinical Psychiatry*, *69*(9), 1469–1476. https://doi.org/10.4088/JCP.v69n0915

Gulliver, A., Griffiths, K. M., & Christensen, H. (2010). Perceived barriers and facilitators to mental health help-seeking in young people: a systematic review. *BMC Psychiatry*, *113*(10). https://doi.org/10.1186/1471-244X-10-113

Haller, H., Cramer, H., Lauche, R., Gass, F., & Dobosand, G. J. (2014). The prevalence and burden of subthreshold generalized anxiety disorder: a systematic review. *BMC Medical Research Methodology*, *14*(128). https://doi.org/10.1186/1471-244X-14-128

Herzig-Anderson, K., Colognori, D., Fox, J., Stewart, C. E., & Masia-Warner, C. (2012). School-Based Anxiety Treatments for Children and Adolescents. *Child and Adolescent Psychiatric Clinics of North America*, *21*(3), 655–668. https://doi.org/10.1016/j.chc.2012.05.006.School-Based

Higgins, J., & Green, S. (2008). *Cochrane handbook for systematic reviews of interventions*.

Chichester: JohnWiley & Sons, Ltd.

House of Commons Education Select Committee. (2018). *Forgotten children: alternative provision and the scandal of ever increasing exclusions*.

*Hunt, C., Crino, R., & Erskine, A. (2009). Randomized controlled trial of an early intervention programme for adolescent anxiety disorders. *Australian and New Zealand Journal of Psychiatry*, (43), 300–304.

Jones, P. B. (2013). Adult mental health disorders and their age at onset. *The British Journal of Psychiatry: The Journal of Mental Science*, *202*, s5-10. https://doi.org/10.1192/bjp.bp.112.119164

Judd, L., Akiskal, H., & Paulus, M. (1997). The role and clinical significance of subsyndromal depressive symptoms (SSD) in unipolar major deressive disorder. *Journal of Affective Disorder*, *45*, 27.

*Kaesornsamut, P., Sitthimongkol, Y., Williams, R. A., Sangon, S., Rohitsuk, W., & Vorapongsathron, T. (2012). Effectiveness of the BAND Intervention Program on Thai Adolescents' Sense of Belonging, Negative Thinking and Depressive Symptoms. *Pacific Rim International Journal of Nursing Research*, *16*(1), 29–47. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=2011532526&site=ehost-live

Khalid, S., Williams, C. M., & Reynolds, S. A. (2016). Is there an association between diet and depression in children and adolescents? A systematic review. *British journal of nutrition*, *116*(12), 2097-2108.

Kavanagh, J., Oliver, S., Lorenc, T., Caird, J., Tucker, H., Harden, A., … Oakley, A. (2009). School-based cognitive-behavioural interventions: A systematic review of effects and inequalities. *Health*

Sociology Review, *18*(1), 61–78.

Keenan-Miller, D., Hammen, C. L., & Brennan, P. A. (2007). Health Outcomes Related to Early Adolescent Depression. *Journal of Adolescent Health*, *41*(3), 256–262. https://doi.org/10.1016/j.jadohealth.2007.03.015

Kern, L., Mathur, S. R., Albrecht, S. F., Poland, S., Rozalski, M., & Skiba, R. J. (2017). The Need for School-Based Mental Health Services and Recommendations for Implementation. *School Mental Health*, *9*(3), 205–217. https://doi.org/10.1007/s12310-017-9216-5

Langer, D. A., Wood, J. J., Wood, P. A., Garland, A. F., Landsverk, J., & Hough, R. L. (2015). Mental Health Service Use in Schools and Non-school-Based Outpatient Settings: Comparing Predictors of Service Use. *School Mental Health*, *7*(3), 161–173. https://doi.org/10.1007/s12310-015-9146-z

*Layne, C. M., Saltzman, W. R., Poppleton, L., Burlingame, G. M., Pašalić, A., Duraković, E., … Pynoos, R. S. (2008). Effectiveness of a school-based group psychotherapy program for war-exposed adolescents: A randomized controlled trial. *Journal of the American Academy of Child and Adolescent Psychiatry*, *47*(9), 1048–1062. https://doi.org/10.1097/CHI.0b013e31817eecae

*Listug-Lunde, L., Vogeltanz-Holm, N., & Collins, J. (2013). A Cognitive-Behavioral Treatment for Depression in Rural American Indian Middle School Students. *American Indian and Alaska Native Mental Health Research: The Journal of the National Center*, *20*(1), 16–35.

*Livheim, F., Hayes, L., Ghaderi, A., Magnusdottir, T., Högfeldt, A., Rowse, J., … Tengström, A. (2015). The Effectiveness of Acceptance and Commitment Therapy for Adolescent Mental Health: Swedish and Australian Pilot Outcomes. *Journal of Child and Family Studies*, *24*(4), 1016–1030. https://doi.org/10.1007/s10826-014-9912-9

*Masia-Warner, C., Colognori, D., Brice, C., Herzig, K., Mufson, L., Lynch, C., … Klein, R. G. (2016). Can

school counselors deliver cognitive-behavioral treatment for social anxiety effectively? A randomized controlled trial. *The Journal of Child Psychology and Psychiatry*, *11*, 1229–1238. https://doi.org/10.1111/jcpp.12550

*Masia-Warner, C., Klein, R. G., Dent, H. C., Fisher, P. H., Alvir, J., Albano, A. M., & Guardino, M. (2005). School-based intervention for adolescents with social anxiety disorder: Results of a controlled study. *Journal of Abnormal Child Psychology*, *33*(6), 707–722. https://doi.org/10.1007/s10802-005-7649-z

*McCarty, C. A., Violette, H. D., Duong, M. T., Cruz, R. A., & McCauley, E. (2013). A Randomized Trial of the Positive Thoughts and Action Program for Depression Among Early Adolescents. *Journal of Clinical Child and Adolescent Psychology*, *42*(4), 554–563. https://doi.org/10.1080/15374416.2013.782817

*McCarty, C. A., Violette, H. D., & Mccauley, E. (2011). Feasibility of the Positive Thoughts and Actions Prevention Program for Middle Schoolers at Risk for Depression. *Depression Research and Treatment*. https://doi.org/10.1155/2011/241386

*McLaughlin, C. L. (2010). Evaluating the effect of an empirically-supported group intervention for students at-risk for depression in a rural school district. *ProQuest Dissertations and Theses*, (August), 175. Retrieved from http://flagship.luc.edu/login?url=http://search.proquest.com/docview/748834854?accountid=12163%5Cnhttp://hn9yf5lh6v.search.serialssolutions.com/?ctx_ver=Z39.88-2004&ctx_enc=info:ofi/enc:UTF-8&rfr_id=info:sid/ProQuest+Dissertations+&+Theses+Full+Text&rft_val_

Melnyk, B. M., Kelly, S., & Lusk, P. (2014). Outcomes and Feasibility of a Manualized Cognitive-Behavioral Skills Building Intervention: Group COPE for Depressed and Anxious Adolescents in School Settings. *Journal of Child and Adolescent Psychiatric Nursing*, *27*, 3–13.

https://doi.org/10.1111/jcap.12058

Merikangas, K. R., He, J. P., Burstein, M., Swendsen, J., Avenevoli, S., Case, B., … Olfson, M. (2011). Service utilization for lifetime mental disorders in U.S. adolescents: Results of the national comorbidity survey Adolescent supplement (NCS-A). *Journal of the American Academy of Child and Adolescent Psychiatry*, *50*(1), 32–45. https://doi.org/10.1016/j.jaac.2010.10.006

*Miller, L. D., Laye-Gindhu, A., Liu, Y., March, J. S., Thordarson, D. S., & Garland, E. J. (2011). Evaluation of a preventive intervention for child anxiety in two randomized attention-control school trials. *Behaviour Research and Therapy*, *49*(5), 315–323. https://doi.org/10.1016/j.brat.2011.02.006

*Moharreri, F., & Yazdi, A. (2017). Evaluation of the effectiveness of the friends for life program on children's anxiety and depression. *Iranian Journal of Psychiatry*, *12*(4), 272.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., Altman, D., Antes, G., … Tugwell, P. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine*, *6*(7), e1000097. https://doi.org/10.1371/journal.pmed.1000097

Moncrieff, J., Churchill, R., Colin Drummond, D., & McGuire, H. (2001). Development of a quality assessment instrument for trials of treatments for depression and neurosis. *International Journal of Methods in Psychiatric Research*, *10*(3), 126–133. https://doi.org/10.1002/mpr.108

*Mufson, L., Dorta, K. P., Wickramaratne, P., Nomura, Y., Olfson, M., & Weissman, M. M. (2004). A randomized effectiveness trial of interpersonal psychotherapy for depressed adolescents. *Arch Gen Psychiatry*, *61*(6), 577–584.

Mychailyszyn, M. P. (2012). School-based interventions for anxious and depressed youth: A meta-analysis of outcomes. *Clinical Psychology Science and Practice*, *19*, 129–153.

Neufeld, S. A. S., Dunn, V. J., Jones, P. B., Croudace, T. J., & Goodyer, I. M. (2017). Reduction in

adolescent depression after contact with mental health services : a longitudinal cohort study in the UK. *The Lancet Psychiatry*, *4*(2), 120–127. https://doi.org/10.1016/S2215-0366(17)30002-0

NICE. (2005). *Depression in Children and Young People: identification and management*. London: British Psychological Society, Royal College of Psychiatrists.

O'Brien, D., Harvey, K., Howse, J., Reardon, T., & Creswell, C. (2016). Barriers to managing child and adolescent mental health problems: A systematic review of primary care practitioners' perceptions. *British Journal of General Practice*, *66*(651), e693–e707. https://doi.org/10.3399/bjgp16X687061

Orchard, F., Pass, L., Cocks, L., Chessell, C., & Reynolds, S. (2019). Examining parent and child agreement in the diagnosis of adolescent depression. *Child and Adolescent Mental Health*. https://doi.org/10.1111/camh.12348

Patel, V., Saxena, S., Lund, C., Thornicroft, G., Baingana, F., Bolton, P., … UnÜtzer, Jü. (2018). The Lancet Commission on global mental health and sustainable development. *The Lancet*, *392*(10157), 1553–1598. https://doi.org/10.1016/S0140-6736(18)31612-X

Pennant, M., Loucas, C., Whittington, C., Creswell, C., Fonagy, P., Fuggle, P., … Kendall, T. (2015). Computerised therapies for anxiety and depression in children and young people: a systematic review and meta-analysis. *Behaviour Research and Therapy*, *67*(PG-1-18), 1–18. https://doi.org/10.1016/j.brat.2015.01.009

Pitchforth, J., Fahy, K., Ford, T., Wolpert, M., Viner, R. M., & Hargreaves, D. S. (2018). Mental health and well-being trends among children and young people in the UK, 1995-2014: Analysis of repeated cross-sectional national health surveys. *Psychological Medicine*. https://doi.org/10.1017/S0033291718001757

Plaistow, J., Masson, K., Koch, D., Wilson, J., Stark, R. M., Jones, P. B., & Lennox, B. R. (2013). Young

people' s views of UK mental health services. *Early Intervention in Psychiatry*, *8*(1), 12–23. https://doi.org/10.1111/eip.12060

*Poppelaars, M., Tak, Y. R., Lichtwarck-Aschoff, Anna Engels, R. C., Lobel, A., Merry, S. N., Lucassen, M. F., & Granic, I. (2016). A randomized controlled trial comparing two cognitive-behavioral programs for adolescent girls with subclinical depression: a school-based program (Op Volle Kracht) and a computerized program (SPARX). *Behavior Research and Therapy*, *80*, 33–42.

Public Health England. (2015). *Promoting children and young people's emotional health and wellbeing. A whole school and college approach*. 1–38. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/414908/Final_EHWB_draft_20_03_15.pdf

*Puskar, K., Sereika, S., & Tusaie-Mumford, K. (2003). Effect of the Teaching Kids to Cope (TKC) program on outcomes of depression and coping among rural adolescents. *Journal of Child and Adolescent Psychiatric Nursing*, *16*(2), 71–80.

Reardon, T., Harvey, K., Baranowska, M., O'Brien, D., Smith, L., & Creswell, C. (2017). What do parents perceive are the barriers and facilitators to accessing psychological treatment for mental health problems in children and adolescents? A systematic review of qualitative and quantitative studies. *European Child and Adolescent Psychiatry*, *26*(6), 623–647. https://doi.org/10.1007/s00787-016-0930-6

Reynolds, S., Wilson, C., Austin, J., & Hooper, L. (2012). Effects of psychotherapy for anxiety in children and adolescents: A meta-analytic review. *Clinical Psychology Review*, *32*(4), 251–262. https://doi.org/10.1016/j.cpr.2012.01.005

*Roberts, C., Kane, R., Thomson, H., Bishop, B., & Hart, B. (2003). The prevention of depressive symptoms in rural school children: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, *71*(3), 622–628. https://doi.org/10.1037/0022-006X.71.3.622

*Rohde, P., Stice, E., Shaw, H., & Briere, F. N. (2014). Indicated Cognitive-Behavioral Group Depression Prevention Compared to Bibliotherapy and Brochure Control: Acute Effects of an Effectiveness Trial with Adolescents. *Journal of Consulting and Clinical Psychology*, *82*(1), 65–74. https://doi.org/10.1016/j.cortex.2009.08.003.Predictive

*Rossouw, J., Yadin, E., Alexander, D., Mbanga, I., Jacobs, T., & Seedat, S. (2016). A pilot and feasibility randomised controlled study of Prolonged Exposure Treatment and supportive counselling for post-traumatic stress disorder in adolescents: A third world, task-shifting, community-based sample. *Trials*, *17*(1). https://doi.org/10.1186/s13063-016-1677-6

Ryan, R. (2016). Heterogeneity and subgroup analyses in Cochrane Consumers and Communication Review Group reviews: Planning the analysis at protocol stage. Retrieved December 8, 2017, from http://cccrg.cochrane.org

*Sheffield, J. K., Kowalenko, N., Davis, A., Spence, S. H., Rapee, R. M., Wignall, A., & McLoone, J. (2006). Evaluation of universal, indicated, and combined cognitive-behavioral approaches to the prevention of depression among adolescents. *Journal of Consulting and Clinical Psychology*, *74*(1), 66–79. https://doi.org/10.1037/0022-006X.74.1.66

*Singhal, M., Munivenkatappa, M., Kommu, J. V. S., & Philip, M. (2018). Efficacy of an indicated intervention program for Indian adolescents with subclinical depression. *Asian Journal of Psychiatry*, *33*(June 2017), 99–104. https://doi.org/10.1016/j.ajp.2018.03.007

*Smith, P., Scott, R., Eshkevari, E., Jatta, F., Leigh, E., Harris, V., … Yule, W. (2015). Computerised CBT for depressed adolescents: Randomised controlled trial. *Behaviour Research and Therapy*, *73*, 104–110. https://doi.org/10.1016/j.brat.2015.07.009

*Sportel, B. E., de Hullu, E., de Jong, P. J., & Nauta, M. H. (2013). Cognitive Bias Modification versus CBT in Reducing Adolescent Social Anxiety: A Randomized Controlled Trial. *PLoS One*, *8*(5), e64355.

Stallard, P., Simpson, N., Anderson, S., Hibbert, S., & Osborn, C. (2007). The FRIENDS emotional health programme: Initial findings from a school-based project. *Child and Adolescent Mental Health*, *12*(1), 32–37. https://doi.org/10.1111/j.1475-3588.2006.00421.x

*Stark, K. D., Reynolds, W. M., & Kaslow, N. J. (1987). A comparison of the relative efficacy of self-control therapy and a behavioral problem-solving therapy for depression in children. *Journal of Abnormal Child Psychology*, *15*(1), 91–113. https://doi.org/10.1007/BF00916468

*Stasiak, K., Hatcher, S., Frampton, C., & Merry, S. N. (2014). A Pilot Double Blind Randomized Placebo Controlled Trial of a Prototype Computer-Based Cognitive Behavioural Therapy Program for Adolescents with Symptoms of Depression. *Behavioural and Cognitive Psychotherapy*, *42*, 385–401. https://doi.org/10.1017/S1352465812001087

*Stein, B. D., Jaycox, L. H., Kataoka, S. H., Wong, M., Elliott, M. N., & Fink, A. (2003). A Mental Health Intervention for Schoolchildren Exposed to Violence. *JAMA - Journal of the American Medical Association*, *290*(5), 603–611.

*Stice, E., Rohde, P., Seeley, J. R., & Gau, J. M. (2008). Brief Cognitive-Behavioral Depression Prevention Program for High-Risk Adolescents Outperforms Two Alternative Interventions: A Randomized Efficacy Trial. *Journal of Consulting and Clinical Psychology*, *76*(4), 595–606. https://doi.org/10.1037/a0012645

*Tang, T. C., Jou, S. H., Ko, C. H., Huang, S. Y., & Yen, C. F. (2009). Randomized study of school-based intensive interpersonal psychotherapy for depressed adolescents with suicidal risk and parasuicide behaviors: Regular article. *Psychiatry and Clinical Neurosciences*, *63*(4), 463–470. https://doi.org/10.1111/j.1440-1819.2009.01991.x

The Cochrane Collaboration. (2014). *Review Manager (RevMan)*. Copenhagen: The Nordic Cochrane Centre.

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: Theory, Research and Practice*, *90*(4), 770–796. https://doi.org/10.1111/papt.12121

Vizard, T., Pearce, N., Davis, J., Sadler, K., Ford, T., Goodman, A., … McManus, S. (2018). *Mental Health of Children and Young People in England, 2017: Emotional Disorders*. https://doi.org/10.7748/paed2009.06.21.5.28.c7079

Weare, K., & Nind, M. (2011). *Promoting Mental Health of Children and Adolescents Through Schools and School Based Interventions*.

Weersing, V. R., Jeffreys, M., Do, M.-C. T., Schwartz, K. T. G., & Bolano, C. (2017). Evidence Base Update of Psychosocial Treatments for Child and Adolescent Depression. *Journal of Clinical Child & Adolescent Psychology*, *46*(1), 11–43. https://doi.org/10.1080/15374416.2016.1220310

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. *American Psychologist*, *72*(2), 79–117. https://doi.org/10.1037/a0040360

Weisz, J. R., McCarty, C. A., & Valeri, S. M. (2006). Effects of psychotherapy for depression in children and adolescents: A meta-analysis. *Psychological Bulletin*, *132*(1), 132–149. https://doi.org/10.1037/0033-2909.132.1.132

Wells, K. C., & Albano, A. M. (2005). Parent involvement in CBT treatment of adolescent depression: Experiences in the Treatment for Adolescents with Depression Study (TADS). *Cognitive and Behavioral Practice*, *12*(2), 209–220. https://doi.org/10.1016/S1077-7229(05)80026-4

Wergeland, G. J. H., Fjermestad, K. W., Marin, C. E., Haugland, B. S. M., Bjaastad, J. F., Oeding, K., ...

& Heiervang, E. R. (2014). An effectiveness study of individual vs. group cognitive behavioral therapy for anxiety disorders in youth. *Behaviour research and therapy*, *57*, 1-12.

Werner-Seidler, A., Perry, Y., Calear, A. L., Newby, J. M., & Christensen, H. (2017). School-based depression and anxiety prevention programs for young people: A systematic review and meta-analysis. *Clinical Psychology Review*, *51*, 30–47. https://doi.org/10.1016/j.cpr.2016.10.005

*Wijnhoven, L. A., Creemers, D. H., Vermulst, A. A., Scholte, R. H., & Engels, R. C. (2014). Randomized controlled trial testing the effectiveness of a depression prevention program ('Op Volle Kracht') among adolescent girls with elevated depressive symptoms. *Journal of Abnormal Child Psychology*, *42*(2), 217–228.

*Woods, B., & Jose, P. E. (2011). Effectiveness of a school-based indicated early intervention program for Māori and Pacific adolescents. *Journal of Pacific Rim Psychology*, *5*(1), 40–50. https://doi.org/10.1375/prp.5.1.40

Woodward, L. J., & Fergusson, D. M. (2001). Life course outcomes of young people with anxiety disorders in adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry*, *40*(9), 1086–1093. https://doi.org/10.1097/00004583-200109000-00018

*Yoosefi Looyeh, M., Kamali, K., Ghasemi, A., & Tonawanik, P. (2014). Treating social phobia in children through group narrative therapy. *Arts in Psychotherapy*, *41*(1), 16–20. https://doi.org/10.1016/j.aip.2013.11.005

*Young, J. F., Benas, J. S., Schueler, C. M., Gallop, R., Gillham, J. E., & Mufson, L. (2016). A Randomized Depression Prevention Trial Comparing Interpersonal Psychotherapy—Adolescent Skills Training to Group Counseling in Schools. *Prevention Science*, *17*(3), 314–324. https://doi.org/10.1007/s11121-015-0620-5

*Young, J. F., Mufson, L., & Davies, M. (2006). Efficacy of Interpersonal Psychotherapy-Adolescent

Skills Training: An indicated preventive intervention for depression. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *47*(12), 1254–1262. https://doi.org/10.1111/j.1469-7610.2006.01667.x

Table 1. Characteristics of included studies

First author	Year published	Sample age range (years)	% female	Depression/ anxiety screening measure used	Country Income Level	Experimental intervention(s)	Group or Individual	Type of Int.	Delivery Method	Parents Involved	Control Type	Depression outcome measure	Anxiety outcome measure	Met Cuijpers quality standards	Moncrieff Rating (0-Mzx)
Studies of intervention primarily targeting depression symptoms															
Bella-Awusah	2016	14 - 17	70	BDI	Middle	CBT	Group	CBT	External	No	Passive [1]	BDI	-	No	28
Brière	2019	14-18	66	CES-D	High	CBT – The Blues	Group	CBT	External	No	Active	CES-D	-	Yes	31
Clarke	1995	14 - 16	47.3	CES-D	High	CBT - Coping with Stress Course	Group	CBT	External	No	Passive [2]	CES-D	-	No	26
De Cuyper	2004	9 - 11	75	CDI	High	CBT - Taking Action	Group	CBT	External	Yes	Passive [1]	CDI	STAI-C	No	22
Ettelson	2002	14 - 18	56	DICA-IV	High	CBT	Group	CBT	External	No	Minimal	CDI	-	No	19
Gaete	2016	14 - 19	50.3	BDI	High	CBT	Group	CBT	External	No	Passive [2]	BDI	-	Yes	28
~~**Gillham**~~	~~2007~~	~~11 - 14~~	~~38~~	~~CDI~~	~~High~~	~~a CBT- Penn Resiliency Program~~	~~Group~~	~~CBT~~	~~External and internal~~	~~No~~	~~P:assive~~	~~CDI~~	~~-~~	~~Yes~~	~~37~~

					~~b Other – Penn Enhancement program psychosocial~~									
Kaesornsamut	2012	-	48.3	CES-D	Middle	Integrated CBT & IPT	Group	Other	External	No	Passive [1]	CES-D	-	No	20
Layne	2008	14 - 19	64	UCLA Grief Inventory	Middle	Multimodal CBT & Trauma & Grief & Building resilience	Group	CBT	Internal	No	Minimal	DSRS	-	No	35
Listug-Lunde	2013	11-14	37.5	CDI	High	CBT	Group	CBT	External	No	Passive [2]	CDI	MASC	No	24
Livheim	2015	12 - 18	87.8	RADS-2	High	ACT Experiential Adolescent Group	Group	Other	External	No	Passive [2]	RADS-2	-	No	25
McCarty	2011	12 - 13	56	MFQ	High	CBT	Group	CBT	Unclear	Yes	Passive [2]	MFQ	-	No	22
McCarty	2013	11 - 15	60	MFQ	High	CBT	Group	CBT	External	Yes	Minimal	MFQ	-	Yes	34
McLaughlin	2010	10 - 15	41	BYI-II + CES-D	High	CBT - Adolescent Coping with Depression	Group	CBT	Internal	No	Active	BDI-Y		No	18

Mufson	2004	12 - 18	84	HDRS	High	IPT	Individual	IPT	Internal	No	Active	HAMD	-	No	31
Poppelaars	2016	11 - 16	100	RADS-2	High	iCBT - Penn Resiliency Programme	Group	CBT	External	No	Active	RADS-2	-	No	31
Puskar	2003	14 - 18	82	RADS	High	CBT - Teaching Kids to Cope	Group	CBT	External	No	Passive [2]	RADS	-	No	17
Roberts	2003	11 - 13	49.7	CDI	High	CBT – Penn Prevention Program	Group	CBT	Internal	No	Passive [2]	CDI	Revised CMAS	No	22
Rohde	2014	13 - 19	68	CES-D	High	CBT group	Group	CBT	Internal	No	Minimal	K-SADS (adapted)	-	No	33
Sheffield	2006	13 - 15	69	CDI, CES-D	High	CBT, interpersonal skills, self-reward	Group	CBT	Internal and external	No	Passive [3]	CDI	-	No	31
Singhal	2018	13 - 18	-	DCI	Middle	CBT -Coping Skills Program	Group	CBT	Unclear	No	Minimal	CDI	-	No	18
Smith	2015	12 - 16	-	MFQ-C	High	Computerised-CBT Stressbusters	Individual	CBT	External	No	Passive [1]	MFQ-C	SCARED	Yes	29

Stark*	1987	9 - 12	42.9	CDI	High	a) behavioural problem solving b) self control therapy	a) Group b) Group	a) Other b) Other	External External	No	Passive [1]	CDI	RCMAS	No	24
Stasiak	2014	13 - 18	41	CDRS-R and RADS-II	High	Computerised CBT	Individual	CBT	Internal	No	Active	CDRS-R	-	No	22
Stice*	2008	14 - 19	56	CES-D	High	a) CBT Prevention Intervention; b) Supportive-Expressive	a) Group b) Group	a) CBT b) other	External External	No	Active	KSADS	-	Yes	31
Tang	2009	12 - 18	65.7	BDI, BAI	High	IPT-I-AN	Group	IPT	External	No	Passive [2]	BDI	BAI	No	20
Wijnhoven	2014	11 - 15	100	CDI	High	CBT -Penn Resiliency Programme	Group	CBT	Unclear	No	Passive [3]	CESD	-	No	26
Woods	2011	-	-	CDI	High	CBT Adolescents Coping with Emotions (ACE)	Group	CBT	Internal	No	Passive [2]	CDI	-	No	25

Young	2006	11 - 16	85.4	CES-D; K-SADS PL	High	IPT-AST	Group	IPT	External	No	Active	CES-D	-	Yes	31
Young	2016	12 - 16	66.7	CES-D; K-SADS PL	High	IPT-AST	Group	IPT	External	Yes	Active	CES-D	-	Yes	34
Studies of intervention primarily targeting anxiety symptoms															
Berry	2009	12 - 15	0	SCARED	High	CBT - Confident Kids Programme	Group	CBT	External	Yes	Passive [1]	CES-DC	SCARED	Yes	25
Chu	2016	12 - 14	25	ADIS	High	Behavioural Activation	Group	BA	External	No	Passive [1]	CES-D	SCARED	Yes	32
Ebrahiminejad	2016	12 - 18	100	SCID	Middle	CBT - Mindfulness Based Cognitive Therapy	Group	Other	External	No	Passive [2]	-	SPI	No	19
Fitzgerald	2016	15 - 18	57.5	SPAI-C	High	Other - Computer Based Attention Bias Modification	Individual	Other	External	No	Active	RCADS-MDD	SPAI-C	No	24
Ginsburg	2002	14 - 17	83	ADIS-IV-C	High	CBT	Group	CBT	External	No	Active	-	ADIS-IV-C	No	22
Ginsburg	2012	7 - 17	62	SCARED	High	CBT	Individual	CBT	Internal	Yes	Passive [2]	-	SCARED	Yes	31
Gordon	2008	14 - 18	76	HTQ	Middle	Mind-body skills	Group	Other	Internal	No	Passive [1]	-	HTQ	No	23

Hunt	2009	11 - 13	43	RCMAS	High	CBT - FRIENDS	Group	CBT	Internal	Yes	Passive [3]	SCAS	RCMAS	No	29
Masia-Warner	2005	13 - 17	74.3	ADIS-PC	High	CBT - Skills for Academic and Social Success	Group	CBT	External	Yes	Passive [1]	CDI	SPAI-C	Yes	27
Masia-Warner*	2016	13-17	68	ADIS-PC	High	CBT - Skills for Academic and Social Success a) counsellor b) psychologist	i) Group ii)Group	a) CBT b) CBT	a) Internal b) External	Yes	Active	-	ADIS-PC (Social Anxiety Disorder severity)	Yes	32
Miller	2011	9 - 12	48	MASC & BASC-P	High	CBT - FRIENDS	Group	CBT	Internal or both	No	Minimal	-	MASC	No	25
Rossouw	2016	14 - 18	91	MINI-KID, CPSS-I	Middle	~~CBT -~~ Prolonged Exposure	Individual	Other	External	No	Active	BDI	CPSS-I	Yes	27
Sportel	2013	12 - 15	72.5	RCADS and STAI	High	CBT	Group	CBT	External	No	Active	-	RCADS social phobia	No	26
Stein	2003	10-11	56.3	Child PTSD Symptom Scale	High	CBT for trauma	Group	CBT	External	No	Passive [1]	CDI	Child PTSD Symptoms Scale	No	29.5

Yoosefi	2014	10 - 11	0	CSI	Middle	Narrative therapy	Group	Other	Unclear	No	Passive [1]	-	CSI (social phobia subscale)	No	14
Eligible participants had both elevated depression and anxiety symptoms															
Moharreri	2017	9 - 12	0	RCMAS, CDI	Middle	CBT - Friends for Life	Group	CBT	External	Yes	Passive [1]	CDI	RCMAS	No	18

*Indicates study had two active interventions

Passive control type superscript 1 = wait list, 2 = treatment as usual / usual care, 3 = monitoring symptoms 4 = psychoeducation session

Minimal control = e.g. unguided self-help, individual support (1 session)

Abbreviation Key:

Treatments
CBT – Cognitive Behaviour Therapy
IPT-AST – Interpersonal Psychotherapy Adolescent Skills Training
IPT-A-IN – Interpersonal Psychotherapy for Depressed Adolescents with Suicidal Risk
CBM – Cognitive Bias Modification

Measures
BDI – Beck Depression Inventory
CES-D – Center for Epidemiological Studies Depression Scale
CDI – Children's Depression Inventory
DSRS - Depression Self-Rating Scale
STAI-C – State-Trait Anxiety Inventory for Children
MASC – The Multidimensional Anxiety Scale for Children
RADS-2 – Reynolds Adolescent Depression Scale
MFQ – Mood and Feelings Questionnaire
HAMD – Hamilton Depression Rating Scale
CMAS – Children's Manifest Anxiety Scale
K-SADS – Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS)
MFQ-C – The Mood and Feelings Questionnaire – Child version
BDI-Y Beck Depression inventory – Youth Vesion
CDRS-R – Children's Depression Rating Scale-Revised
CES-DC – Depression Scale for Children
MDD – Major Depressive Disorder
ADIS-IV-C – Anxiety Disorders Interview Schedule – Child version
RCMAS – Revised Children's Manifest Anxiety Scale
HTQ – Harvard Trauma Questionnaire
CPSS-I – Child PTSD Symptoms Scale
SCARED – Screen for Child Anxiety related Disorders
SCAS – Spence Children's Anxiety Scale
CSI – Core Symptom Index
SPAI-C – Social Phobia and Anxiety Inventory for Children

Table 2. Subgroup analyses for studies recruiting on the basis of elevated depression symptoms

Depression subgroup meta-analyses		**SMD**	**Lower CI**	**Upper CI**	**P value**	**K**
Group or Individual*	*Group*	-0.31	-0.45	-0.17	<0.0001	28
	Individual	-0.67	-0.96	-0.39	<0.0001	3
	Test for subgroup differences				*0.03*	
Type of Intervention	CBT-Based	-0.26	-0.40	-0.13	<0.0001	22
	IPT-Based	-0.69	-1.20	-0.17	0.009	4
	Other'	-0.60	-1.18	-0.01	0.05	5
	Test for subgroup differences				*0.18*	
Internal or External **	Internal	-0.22	-0.50	0.06	0.12	7
	External	-0.42	-0.60	-0.24	<0.0001	21
	Test for subgroup differences				*0.24*	
Country Income Level	High income	-0.32	-0.46	-0.18	<0.0001	27
	Middle income	-0.52	-1.11	0.06	0.08	4
	Test for subgroup differences				*0.51*	
Parental Involvement	Yes	-0.16	-0.35	0.03	0.09	5
	No	-0.39	-0.55	-0.24	<0.0001	26
	Test for subgroup differences				*0.06*	
Control Type	Active	-0.24	-0.53	0.05	0.10	9
	Passive	-0.43	-0.62	-0.23	<0.0001	18

	Minimal	-0.26	-0.43	-0.08	0.004	4
	Test for subgroup differences				*0.38*	
Sensitivity Analysis* **	Low Quality	-0.48	-0.73	-0.23	<0.0001	24
	Acceptable Quality	-0.36	-0.62	-0.10	0.007	8
	Test for subgroup differences				*0.50*	

NB *studies were classified as group or individual if over 75% of content was delivered in that format; **four studies could not be coded and are excluded from this analysis; ***sensitivity analysis includes outlier (Singhal et al., 2018)

Table 3. Subgroup analyses for studies recruiting on the basis of elevated anxiety symptoms

Anxiety Subgroup meta-analyses		**SMD**	**Lower CI**	**Upper CI**	**P value**	**K**
Group or Individual*	*Group*	-0.58	-0.91	-0.25	<0.0001	12
	Individual	0.003	-0.48	0.54	0.91	3
	Test for subgroup differences				*0.05*	
Type of Intervention	CBT-Based	-0.35	-0.64	-0.06	0.02	10
	Other'	-0.79	-1.58	-0.01	0.05	5
	Test for subgroup differences				*0.30*	
Internal or External	Internal	-0.34	-0.95	0.27	0.28	4
	External	-0.55	-0.93	-0.18	0.004	11
	Test for subgroup differences				*0.55*	
Country Income Level	High income	-0.44	-0.79	-0.09	0.01	11
	Middle income	-0.66	-1.23	-0.09	0.02	4
	Test for subgroup differences				*0.52*	
Parental Involvement	Yes	-0.43	-0.73	-0.14	0.004	6
	No	-0.55	-1.00	-0.11	0.02	9
	Test for subgroup differences				*0.66*	
Control Type**	*Active*	-0.31	-0.72	0.09	0.13	6
	Passive	-0.69	-1.07	-0.31	0.004	8

	Test for subgroup differences				*0.19*	
Sensitivity Analysis	Low Quality	-0.55	-1.01	-0.09	0.02	9
	Acceptable Quality	-0.71	-1.13	-0.28	0.001	7
	Test for subgroup differences				*0.48*	

NB *studies were classified as group or individual if over 75% of content was delivered in that format; **Only one study (Miller et al., 2011) was coded as having a minimal control so no pooled estimate was possible; ***sensitivity analysis includes outlier (Yoosefi et al., 2014)

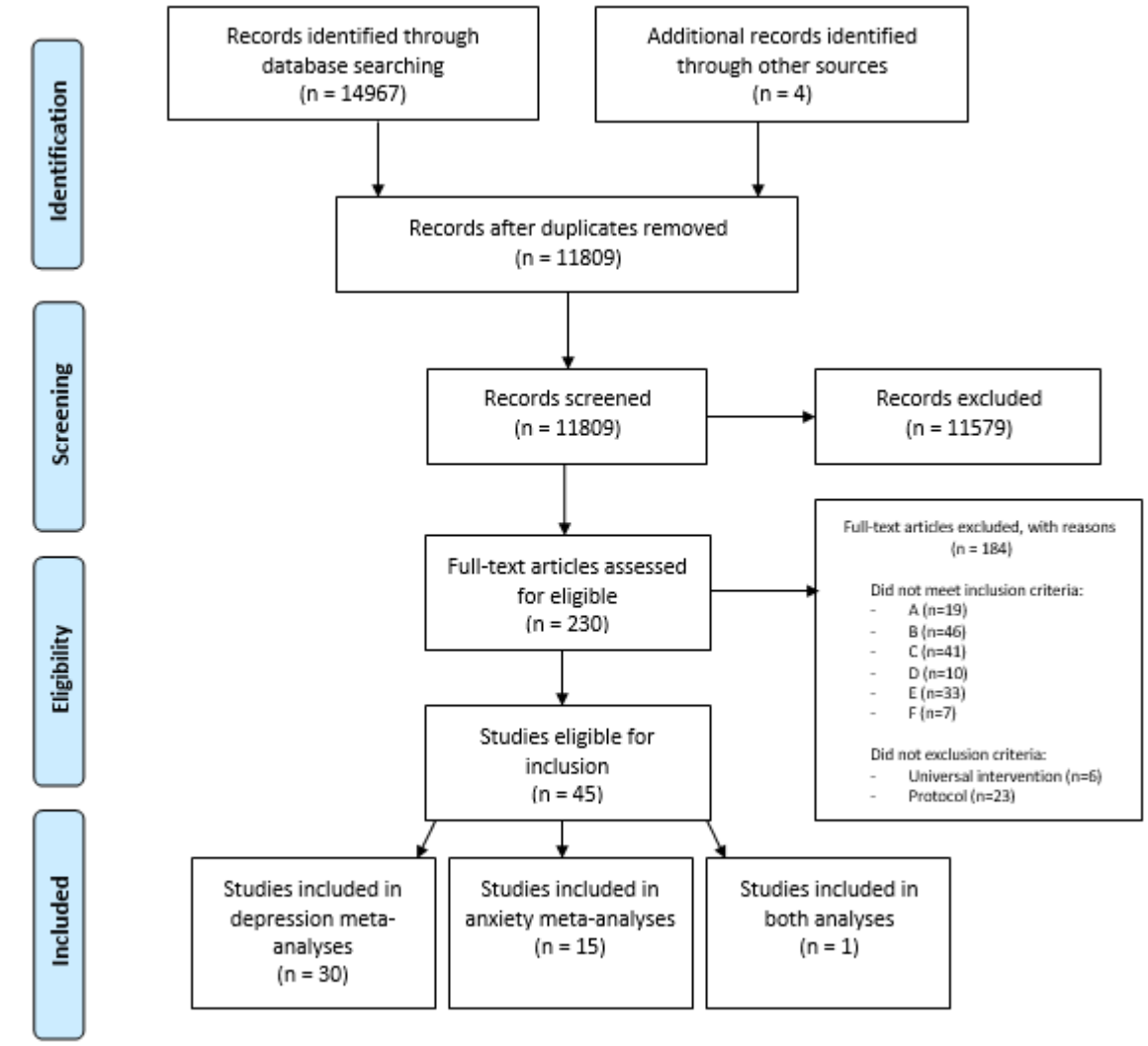
Figures Legends

Figure 1. Review flow diagram

Figure 2. Forest plot of effect of indicated school-based interventions on depression symptoms at post-intervention. Where a study had two active school-based intervention arms, the study appears twice with ‘a’ or ‘b’ after the year of publication to denote trial arms

Figure 3. Forest plot of effect of indicated school-based interventions on anxiety symptoms at post-intervention. Where a study had two active school-based intervention arms, the study appears twice with ‘a’ or ‘b’ after the year of publication to denote trial arms.

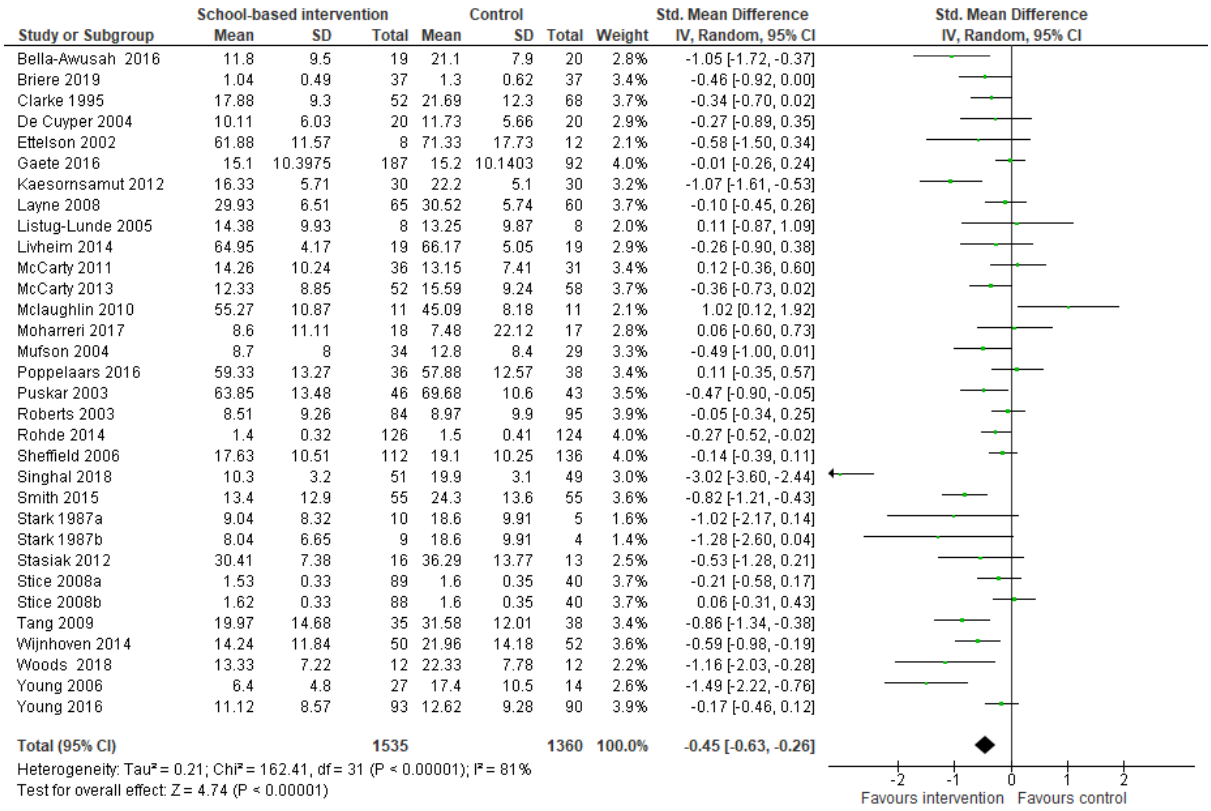
Figure 1



Inclusion criteria key:

a) Randomised controlled trial (RCT) design, including cluster RCTs
b) Participants aged 10-19 years were the direct recipients of the trial intervention (trials with participants aged 20 or over were excluded, trials with participants under 10 were included only if mean age of the sample was 10 years or over).
c) All included participants were symptomatic i.e. seeking help for anxiety/depression or presenting symptoms exceeding a threshold for
d) The trial intervention was a manualised psychological intervention. If a multi-component intervention, the psychological component constituted at least 75% of the content.
e) The trial intervention was delivered wholly or partly within an institution whose primary was education.
f) The trial intervention was designed primarily to decrease symptoms of depression and/or anxiety.

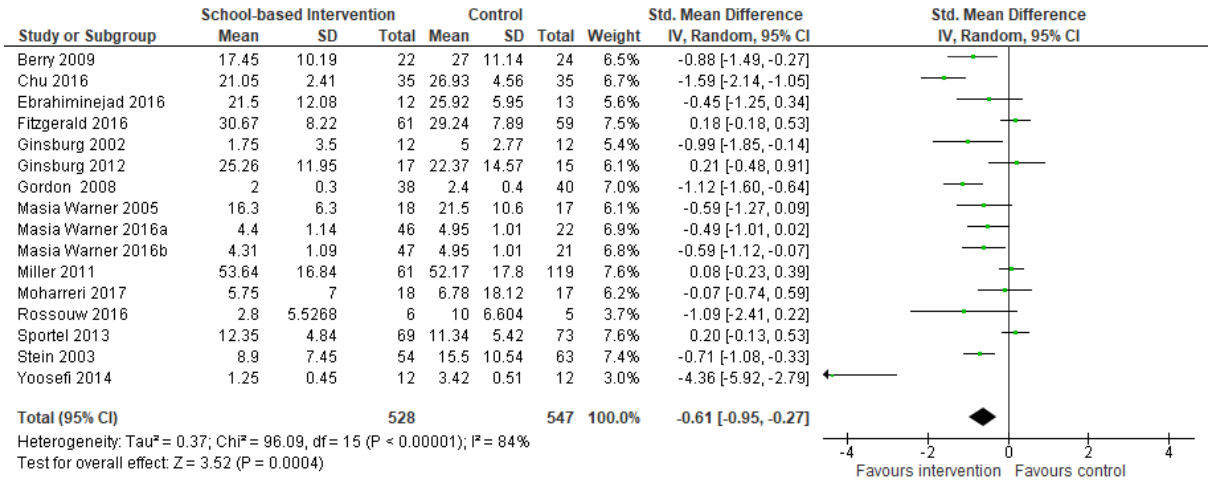
Figure 2



Study or Subgroup	School-based intervention Mean	SD	Total	Control Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Bella-Awusah 2016	11.8	9.5	19	21.1	7.9	20	2.8%	-1.05 [-1.72, -0.37]
Briere 2019	1.04	0.49	37	1.3	0.62	37	3.4%	-0.46 [-0.92, 0.00]
Clarke 1995	17.88	9.3	52	21.69	12.3	68	3.7%	-0.34 [-0.70, 0.02]
De Cuyper 2004	10.11	6.03	20	11.73	5.66	20	2.9%	-0.27 [-0.89, 0.35]
Ettelson 2002	61.88	11.57	8	71.33	17.73	12	2.1%	-0.58 [-1.50, 0.34]
Gaete 2016	15.1	10.3975	187	15.2	10.1403	92	4.0%	-0.01 [-0.26, 0.24]
Kaesornsamut 2012	16.33	5.71	30	22.2	5.1	30	3.2%	-1.07 [-1.61, -0.53]
Layne 2008	29.93	6.51	65	30.52	5.74	60	3.7%	-0.10 [-0.45, 0.26]
Listug-Lunde 2005	14.38	9.93	8	13.25	9.87	8	2.0%	0.11 [-0.87, 1.09]
Livheim 2014	64.95	4.17	19	66.17	5.05	19	2.9%	-0.26 [-0.90, 0.38]
McCarty 2011	14.26	10.24	36	13.15	7.41	31	3.4%	0.12 [-0.36, 0.60]
McCarty 2013	12.33	8.85	52	15.59	9.24	58	3.7%	-0.36 [-0.73, 0.02]
Mclaughlin 2010	55.27	10.87	11	45.09	8.18	11	2.1%	1.02 [0.12, 1.92]
Moharreri 2017	8.6	11.11	18	7.48	22.12	17	2.8%	0.06 [-0.60, 0.73]
Mufson 2004	8.7	8	34	12.8	8.4	29	3.3%	-0.49 [-1.00, 0.01]
Poppelaars 2016	59.33	13.27	36	57.88	12.57	38	3.4%	0.11 [-0.35, 0.57]
Puskar 2003	63.85	13.48	46	69.68	10.6	43	3.5%	-0.47 [-0.90, -0.05]
Roberts 2003	8.51	9.26	84	8.97	9.9	95	3.9%	-0.05 [-0.34, 0.25]
Rohde 2014	1.4	0.32	126	1.5	0.41	124	4.0%	-0.27 [-0.52, -0.02]
Sheffield 2006	17.63	10.51	112	19.1	10.25	136	4.0%	-0.14 [-0.39, 0.11]
Singhal 2018	10.3	3.2	51	19.9	3.1	49	3.0%	-3.02 [-3.60, -2.44]
Smith 2015	13.4	12.9	55	24.3	13.6	55	3.6%	-0.82 [-1.21, -0.43]
Stark 1987a	9.04	8.32	10	18.6	9.91	5	1.6%	-1.02 [-2.17, 0.14]
Stark 1987b	8.04	6.65	9	18.6	9.91	4	1.4%	-1.28 [-2.60, 0.04]
Stasiak 2012	30.41	7.38	16	36.29	13.77	13	2.5%	-0.53 [-1.28, 0.21]
Stice 2008a	1.53	0.33	89	1.6	0.35	40	3.7%	-0.21 [-0.58, 0.17]
Stice 2008b	1.62	0.33	88	1.6	0.35	40	3.7%	0.06 [-0.31, 0.43]
Tang 2009	19.97	14.68	35	31.58	12.01	38	3.4%	-0.86 [-1.34, -0.38]
Wijnhoven 2014	14.24	11.84	50	21.96	14.18	52	3.6%	-0.59 [-0.98, -0.19]
Woods 2018	13.33	7.22	12	22.33	7.78	12	2.2%	-1.16 [-2.03, -0.28]
Young 2006	6.4	4.8	27	17.4	10.5	14	2.6%	-1.49 [-2.22, -0.76]
Young 2016	11.12	8.57	93	12.62	9.28	90	3.9%	-0.17 [-0.46, 0.12]
Total (95% CI)			**1535**			**1360**	**100.0%**	**-0.45 [-0.63, -0.26]**

Heterogeneity: Tau² = 0.21; Chi² = 162.41, df = 31 (P < 0.00001); I² = 81%
Test for overall effect: Z = 4.74 (P < 0.00001)

Figure 3


School-based Intervention
Control
Std. Mean Difference
Std. Mean Difference
Study or Subgroup Mean SD Total Mean SD Total Weight IV, Random, 95% CI
IV, Random, 95% CI
Berry 2009 17.45 10.19 22 27 11.14 24 6.5% -0.88 [-1.49, -0.27]
Chu 2016 21.05 2.41 35 26.93 4.56 35 6.7% -1.59 [-2.14, -1.05]
Ebrahiminejad 2016 21.5 12.08 12 25.92 5.95 13 5.6% -0.45 [-1.25, 0.34]
Fitzgerald 2016 30.67 8.22 61 29.24 7.89 59 7.5% 0.18 [-0.18, 0.53]
Ginsburg 2002 1.75 3.5 12 5 2.77 12 5.4% -0.99 [-1.85, -0.14]
Ginsburg 2012 25.26 11.95 17 22.37 14.57 15 6.1% 0.21 [-0.48, 0.91]
Gordon 2008 2 0.3 38 2.4 0.4 40 7.0% -1.12 [-1.60, -0.64]
Masia Warner 2005 16.3 6.3 18 21.5 10.6 17 6.1% -0.59 [-1.27, 0.09]
Masia Warner 2016a 4.4 1.14 46 4.95 1.01 22 6.9% -0.49 [-1.01, 0.02]
Masia Warner 2016b 4.31 1.09 47 4.95 1.01 21 6.8% -0.59 [-1.12, -0.07]
Miller 2011 53.64 16.84 61 52.17 17.8 119 7.6% 0.08 [-0.23, 0.39]
Moharreri 2017 5.75 7 18 6.78 18.12 17 6.2% -0.07 [-0.74, 0.59]
Rossouw 2016 2.8 5.5268 6 10 6.604 5 3.7% -1.09 [-2.41, 0.22]
Sportel 2013 12.35 4.84 69 11.34 5.42 73 7.6% 0.20 [-0.13, 0.53]
Stein 2003 8.9 7.45 54 15.5 10.54 63 7.4% -0.71 [-1.08, -0.33]
Yoosefi 2014 1.25 0.45 12 3.42 0.51 12 3.0% -4.36 [-5.92, -2.79]
Total (95% CI) 528 547 100.0% -0.61 [-0.95, -0.27]
Heterogeneity: Tau² = 0.37; Chi² = 96.09, df = 15 (P < 0.00001); I² = 84%
Test for overall effect: Z = 3.52 (P = 0.0004)
-4
-2
0
2
4
Favours intervention
Favours control