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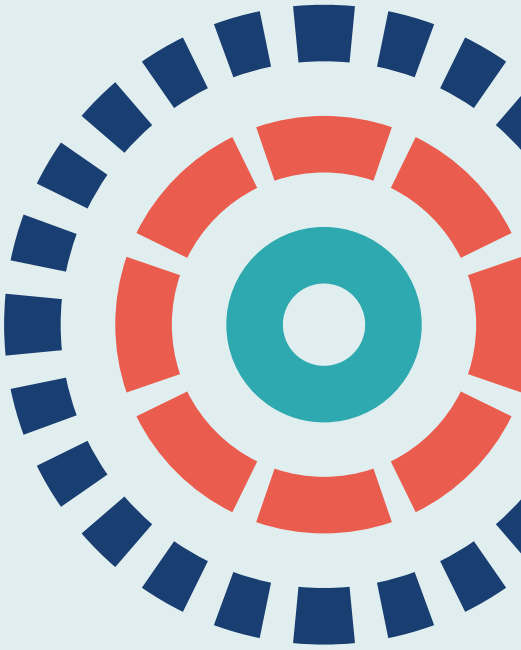

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Abstract

School-based interventions to prevent anxiety, depression and conduct disorder in children and young people: a systematic review and network meta-analysis

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Background: Schools in the UK increasingly have to respond to anxiety, depression and conduct disorder as key causes of morbidity in children and young people.

Objective: The objective was to assess the comparative effectiveness of educational setting-based interventions for the prevention of anxiety, depression and conduct disorder in children and young people.

Design: This study comprised a systematic review, a network meta-analysis and an economic evaluation.

Data sources: The databases MEDLINE, EMBASE™ (Elsevier, Amsterdam, the Netherlands), PsycInfo® (American Psychological Association, Washington, DC, USA) and Cochrane Central Register of Controlled Trials (CENTRAL) were searched to 4 April 2018, and the NHS Economic Evaluation Database (NHS EED) was searched on 22 May 2019 for economic evaluations. No language or date filters were applied.

Main outcomes: The main outcomes were post-intervention self-reported anxiety, depression or conduct disorder symptoms.

Review methods: Randomised/quasi-randomised trials of universal or targeted interventions for the prevention of anxiety, depression or conduct disorder in children and young people aged 4–18 years were included. Screening was conducted independently by two reviewers. Data extraction was conducted by one reviewer and checked by a second. Intervention- and component-level network meta-analyses were conducted in OpenBUGS. A review of the economic literature and a cost–consequence analysis were conducted.

Results: A total of 142 studies were included in the review, and 109 contributed to the network meta-analysis. Of the 109 studies, 57 were rated as having an unclear risk of bias for random sequence generation and allocation concealment. Heterogeneity was moderate. In universal secondary school settings, mindfulness/relaxation interventions [standardised mean difference (SMD) –0.65, 95% credible interval (CrI) –1.14 to –0.19] and cognitive–behavioural interventions (SMD –0.15, 95% CrI –0.34 to 0.04) may be effective for anxiety. Cognitive–behavioural interventions incorporating a psychoeducation component may be effective (SMD –0.30, 95% CrI –0.59 to –0.01) at preventing anxiety immediately post intervention. There was evidence that exercise was effective in preventing anxiety in targeted secondary school settings (SMD –0.47, 95% CrI –0.86 to –0.09). There was weak evidence that cognitive–behavioural interventions may prevent anxiety in universal (SMD –0.07, 95% CrI –0.23 to 0.05) and targeted (SMD –0.38, 95% CrI –0.84 to 0.07) primary school settings. There was weak evidence that cognitive–behavioural (SMD –0.04, 95% CrI –0.16 to 0.07) and cognitive–behavioural + interpersonal therapy (SMD –0.18, 95% CrI –0.46 to 0.08) may be effective in preventing depression in universal secondary school settings. Third-wave (SMD –0.35, 95% CrI –0.70 to 0.00) and cognitive–behavioural interventions (SMD –0.11, 95% CrI –0.28 to 0.05) incorporating a psychoeducation component may be effective at preventing depression immediately post intervention. There was no evidence of intervention effectiveness in targeted secondary, targeted primary or universal primary school settings post intervention. The results for university settings were unreliable because of inconsistency in the network meta-analysis. A narrative summary was reported for five conduct disorder prevention studies, all in primary school settings. None reported the primary outcome at the primary post-intervention time point. The economic evidence review reported heterogeneous findings from six studies. Taking the perspective of a single school budget and based on cognitive–behavioural therapy intervention costs in universal secondary school settings, the cost–consequence analysis estimated an intervention cost of £43 per student.

Limitations: The emphasis on disorder-specific prevention excluded broader mental health interventions and restricted the number of eligible conduct disorder prevention studies. Restricting the study to interventions delivered in the educational setting may have limited the number of eligible university-level interventions.

Conclusions: There was weak evidence of the effectiveness of school-based, disorder-specific prevention interventions, although effects were modest and the evidence not robust. Cognitive–behavioural therapy-based interventions may be more effective if they include a psychoeducation component.

Future work: Future trials for prevention of anxiety and depression should evaluate cognitive–behavioural interventions with and without a psychoeducation component, and include mindfulness/relaxation or exercise comparators, with sufficient follow-up. Cost implications must be adequately measured.

Study registration: This study is registered as PROSPERO CRD42016048184.

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List of abbreviations

ADHD	attention deficit hyperactivity disorder
ALPHA	Advice Leading to Public Health Advancement
BASC	Behavior Assessment System for Children
BASC-TRS	Behavior Assessment System for Children – Teacher Rating Scale
BEI	British Education Index
CAMHS	Child and Adolescent Mental Health Services
CBCL	Child Behaviour Checklist
CBM	cognitive bias modification
CBT	cognitive–behavioural therapy
CENTRAL	Cochrane Central Register of Controlled Trials
CHU-9D	Child Health Utility-9 Dimensions
CI	confidence interval
CMD	common mental disorder
CrI	credible interval
CYP	children and young people
DALY	disability-adjusted life-year
DECIPHer	Development and Evaluation of Complex Interventions for Public Health Improvement
df	degrees of freedom
DIC	deviance information criterion
DSM	*Diagnostic and Statistical Manual of Mental Disorders*
ERIC	Education Resources Information Center
GP	general practitioner
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HIC	high-income country
ICA	intervention component analysis
ICC	intracluster correlation coefficient
ICD-10	*International Statistical Classification of Diseases and Related Health Problems*, Tenth Revision
ICER	incremental cost-effectiveness ratio
IPT	interpersonal therapy
IQR	interquartile range
LIC	low-income country
MECIR	Methodological Expectations of Cochrane Intervention Reviews
MesH	medical subject heading
MHP	mental health professional
MIC	middle-income country
NAM	National Academy of Medicine
NHS EED	NHS Economic Evaluation Database
NICE	National Institute for Health and Care Excellence
NMA	network meta-analysis
ODD	oppositional defiant disorder
OR	odds ratio
PATHS	Promoting Alternative THinking Strategies
PhD	Doctor of Philosophy
PPI	patient and public involvement
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PSHE	personal, social and health education
QALY	quality-adjusted life-year
RAP	Resourceful Adolescent Program
RCADS	Revised Children's Anxiety and Depression Scale
RCT	randomised controlled trial

SD	standard deviation	SMD	standardised mean difference
SDQ	Strengths and Difficulties Questionnaire	SPARX	smart, positive, active, realistic, X-factor thoughts
SE	standard error	TIDieR	Template for Intervention Description and Replication
SES	socioeconomic status		

Plain English summary

Anxiety, depression and conduct disorder are the most commonly diagnosed mental disorders among children and young people in the UK. Research suggests that preventing mental disorders from developing before adulthood can provide the largest benefit to the individual, society and the economy. Prevention programmes in schools are at the forefront of recent prevention attempts; studies evaluating whether or not they work have shown a small, but positive, effect.

In this report, we combined these studies to determine which type of school-based prevention programme was the most effective and best value for money for preventing anxiety, depression or conduct disorder. The types of programmes we included were psychological, educational and physical. For example, a physical intervention may be exercise, meditation or relaxation based. An educational intervention may provide information to the young person about mental health disorders and where to seek help. Psychological interventions typically address behavioural (actions and activities), cognitive (thoughts, reasoning, understanding), emotional and social factors. The programmes could be universal or targeted. Universal means that children are included regardless of whether or not they are showing signs of problems. Targeted means that only those children at higher risk of developing a problem, or already showing very early signs of mental health problems, are included.

When combining the results of studies, it is important that the studies include similar participants and comparable programmes, and record the effects of the programmes in similar ways. Programme effects are measured as 'outcomes' from the study. The main outcomes of interest in our report were symptoms of anxiety, depression and conduct disorder as reported by the young people themselves (self-reported). We were primarily interested in the outcomes immediately after the programme had been completed.

We separated studies into primary school settings (ages 4–11 years), secondary school settings (ages 12–18 years) and tertiary settings, for example university (up to 19 years of age), and planned separate statistical analyses for each. The findings were mixed. We found some evidence that in primary school settings cognitive–behavioural programmes may be effective in preventing symptoms 'of anxiety' but not symptoms of depression. In secondary school settings, universally delivered interventions based on cognitive–behavioural therapy and mindfulness or relaxation may be effective at preventing anxiety and depression. There was also evidence that exercise programmes may be effective when delivered to young people at higher risk (targeted) in secondary schools. We were not able to run similar analyses for the university settings. The studies evaluating prevention of conduct disorder were not similar enough to be combined and they did not use self-reported symptoms as their outcome measure. Instead, teachers and parents were asked to report on the students' behaviours. We did not run statistical analyses, but the authors of the original studies concluded that there was some evidence that programmes were effective in primary school settings.

Very few studies assessed the cost of the anxiety, depression or conduct disorder programmes, or whether or not they were value for money. Studies that did evaluate 'economic evidence' concluded that school-based, preventative interventions are unlikely to be value for money.

Many of the studies we included were small or not rigorously designed. Previous research has suggested that such studies are likely to overestimate the effectiveness of the interventions they evaluate. Therefore, we need to be cautious in interpreting the results of our study. Nevertheless, there was some evidence that school-based interventions are effective in preventing symptoms of anxiety, depression and conduct disorder. This evidence was weak, and we recommend that further large well-designed studies be conducted to investigate this further. Critically, these studies must also evaluate value for money.

Scientific summary

Background

Common mental disorders are a key cause of morbidity in children and young people. In the UK, the most common among children and young people are anxiety, depressive and conduct disorders. There is robust evidence to suggest that lifetime trajectories of common mental disorders are established by mid-adolescence, with half of all disorders recognisable by the age of 14 years and three-quarters recognisable by the age of 25 years. Intervening to prevent the onset of a common mental disorder has the potential to reduce short- and longer-term negative health and social outcomes for young people. Schools are increasingly at the forefront of the prevention agenda for children and young people in the UK. The comparative effectiveness of the multiple competing intervention options is not known.

Objectives

The overall aim of this project was to identify the comparative effectiveness and cost-effectiveness of interventions, component(s) or combination(s) of components for universal and targeted prevention of anxiety, depression and conduct disorder among children and young people.

The specific objectives were to:

- conduct a systematic review of educational setting-based universal and targeted (selective and indicated) interventions for the prevention of common mental disorders
- develop a classification scheme of preventative mental health intervention components
- conduct intervention-level and component-level network meta-analyses to identify effective interventions and components of interventions
- conduct an economic evaluation to determine the most cost-effective component, or combinations of components, of interventions.

Methods

We carried out a systematic review and network meta-analysis, at the whole-intervention level and by intervention components, of educational setting-based interventions to prevent anxiety, depression and conduct disorder in children and young people aged 4–18 years. A comprehensive search strategy was developed with an information specialist, and the following databases were searched from inception to 4 April 2018: MEDLINE, EMBASE™ (Elsevier, Amsterdam, the Netherlands), PsycInfo® (American Psychological Association, Washington, DC, USA) and the Cochrane Central Register of Controlled Trials (CENTRAL). No language or date filters were applied. Studies were eligible if they were randomised controlled trials or quasi-randomised trials; they included participants aged between 4 and 18 years; the intervention specifically addressed the prevention of anxiety, depression or conduct disorder; and they were delivered in an educational setting. Study screening was conducted independently by two reviewers. Before data extraction commenced, we consulted a young people's patient and public involvement group to ask the young people which mental health outcomes were of relevance to them.

Data extraction was conducted by one reviewer and checked by a second. Primary outcomes of interest were self-reported symptoms of anxiety, depression or conduct disorder; self-reported well-being; and suicidal ideation, behaviour and self-harm. We also extracted information relevant for assessing

inequalities in health, such as socioeconomic status, ethnicity and sex. The primary time point for analysis was immediately post intervention. Secondary outcomes included mental health-related stigma (identified as important from the patient and public involvement consultation); acceptability of the intervention; parent-reported child or young person's disorder-specific symptoms; self-reported problem behaviour, such as substance use; and academic attainment. Secondary follow-up time points of 6–12, 13–24 and ≥ 25 months post intervention were also recorded.

Intervention-level network meta-analyses were performed in a Bayesian framework using OpenBUGS for the primary outcomes at all time points. Three different random-effects network meta-analysis models were considered: intervention level, component-level additive effects (nested within the intervention) and a component-level full interaction model (nested within the intervention). Model fit and selection were examined by the posterior mean of the residual deviance and the deviance information criterion. Component-level network meta-analysis models were implemented for the primary time point only. Component network meta-analysis results are reported only when model fit statistics were suggestive of effect modification by components. If meta-analysis was not feasible, results are reported narratively.

We also searched the NHS Economic Evaluation Database (NHS EED) on 22 May 2019 to identify economic evaluations, with no date restrictions. A narrative review of existing trial- and model-based economic evaluations was conducted. Informed by the results of the intervention- and component-level network meta-analysis, we also conducted a microcosting study for effective interventions, assigning appropriate costs to the constituent components of the interventions when feasible, for use in a cost–consequence analysis.

Results

A total of 11,990 citations were screened, and 1512 full-text articles were retrieved. A total of 253 reports, corresponding to 142 studies, were included in the review. Seventy-nine studies were eligible for the anxiety prevention review, 105 for the depression prevention review and five for the conduct disorder prevention review. There was overlap between the anxiety and depression reviews, with 54 studies being eligible for both.

A total of 109 studies contributed to the network meta-analysis at any time point. Seventy-one studies were included in the network meta-analysis for anxiety and 86 were included in the network meta-analysis for depression. There was an overlap, with 48 studies contributing data to both network meta-analyses. The evidence is not robust. Of the 109 studies included in the network meta-analysis, 57 were judged to be at unclear risk of bias for both random sequence generation and allocation concealment. In addition, possible small-study effects were observed in the analyses for the anxiety outcome, but not for depression. Moderate levels of heterogeneity were observed in 9 out of 10 main analyses, and mild to moderate levels of heterogeneity were observed in one analysis. This should be considered in the interpretation of the statistical results.

Psychological interventions were based on the principles of cognitive–behavioural therapy, interpersonal therapy, cognitive–behavioural therapy plus interpersonal therapy, third-wave or behavioural therapies. Other interventions were based on exercise, biofeedback, mindfulness/relaxation, bias modification or occupational therapy. Analyses were conducted by outcome, population (universal or targeted) and school setting. School setting broadly maps on to age grouping: primary schooling maps on to age 4–11 years, secondary schooling to age 12–18 years and tertiary education to age ≤ 19 years. Results are reported by time point, population and setting, and are summarised using standardised mean differences (SMDs) and 95% credible intervals (CrIs).

At the post-intervention time point, for the prevention of anxiety in universal secondary settings, there was evidence that mindfulness/relaxation interventions (SMD –0.65, 95% CrI –1.14 to –0.19) may be effective

in preventing symptoms of anxiety. There was weak evidence of a small beneficial effect of cognitive–behavioural therapy-based interventions (SMD –0.15, 95% CrI –0.34 to 0.04) compared with a usual curriculum comparator. However, the mindfulness/relaxation studies were small and judged to be at unclear risk of bias. Model fit statistics suggested that component network meta-analysis models were appropriate and estimable for cognitive–behavioural interventions only. We observed that the effect of a cognitive–behavioural intervention including a psychoeducation component was to reduce the SMD (β –0.39, 95% CrI –0.78 to 0.01); in other words, in universal secondary settings, cognitive–behavioural interventions including a psychoeducation component were more effective than those not containing a psychoeducation component.

There was weak evidence of a very small effect of cognitive–behavioural therapy-based interventions in preventing symptoms of anxiety in universal primary settings (SMD –0.07, 95% CrI –0.23 to 0.05). In targeted secondary settings, there was evidence that exercise reduced symptoms compared with no intervention (SMD –0.47, 95% CrI –0.86 to –0.09). However, this evidence came from a single study, only connected to the network via a spur, that was judged to be at unclear risk of bias. There was weak evidence that in targeted primary settings cognitive–behavioural interventions were effective in preventing anxious symptoms (SMD –0.38, 95% CrI –0.84 to 0.07).

When outcome data were reported by study authors, we extracted these data at all follow-up time points, which, for the purpose of analysis only, were divided into medium term (between 6 and 12 months from the end of an intervention), longer term (between 13 and 24 months) and long term ($\geq$ 25 months). If a study reported two time points in our ad hoc grouping, we used the later time point in our analyses.

There was no evidence that any type of intervention, in any setting, was effective in preventing symptoms of anxiety between 6 and 12 months. A single study reported a follow-up time point of between 13 and 24 months post intervention. There was evidence that cognitive–behavioural therapy-based interventions were effective in targeted secondary settings (SMD –0.26, 95% CrI –0.52 to –0.01). There was no evidence that any intervention was effective in other settings at this time point. At $\geq$ 25 months' follow-up, there was weak evidence that cognitive–behavioural interventions prevented symptoms of anxiety in universal secondary settings (one study; SMD –0.23, 95% CrI –0.55 to 0.08) and universal primary settings (one study; SMD –0.12, 95% CrI –0.26 to 0.02). Evidence from one study suggests that cognitive–behavioural interventions were effective in targeted secondary settings in preventing symptoms of anxiety (SMD –0.39, 95% CrI –0.65 to –0.14).

At the post-intervention time point, there was weak evidence of a very small effect of cognitive–behavioural therapy-based interventions compared with usual curriculum, in preventing depressive symptoms in universal secondary settings (SMD –0.04, 95% CrI –0.16 to 0.07). There was also weak evidence for a small effect of cognitive–behavioural + interpersonal therapy-based interventions compared with usual curriculum comparator (SMD –0.18, 95% CrI –0.46 to 0.08). Model fit statistics suggested that component models were appropriate and estimable for cognitive–behavioural and third-wave interventions. The results indicate that the impact of including a psychoeducation component in third-wave interventions was to reduce the SMD by –0.45 (β –0.45, 95% CrI –0.87 to –0.04). There was no evidence of effect modification by components for cognitive–behavioural interventions in universal secondary settings. In all other populations and settings, there was no evidence from the intervention-level network meta-analysis to suggest that any type of intervention was effective at the post-intervention time point, and no evidence of effect modification by intervention components.

There was weak evidence, with a small effect size, that in universal secondary settings, between 6 and 12 months, cognitive–behavioural (SMD –0.02, 95% CrI –0.10 to 0.06), cognitive–behavioural + interpersonal (SMD –0.10, 95% CrI –0.26 to 0.05) and third-wave therapy-based interventions (SMD –0.13, 95% CrI –0.27 to 0.01) may prevent symptoms of depression, compared with the usual usual curriculum control. In universal primary settings, there was weak evidence, with a small effect size, that cognitive–behavioural interventions prevented depressive symptoms between 6 and 12 months,

compared with usual curriculum control (SMD −0.15, 95% CrI −0.43 to 0.09). In targeted primary settings, there was weak evidence that cognitive–behavioural therapy-based interventions may be effective, compared with a waiting list control (SMD −0.34, 95% CrI −0.72 to 0.05) at 6–12 months' and at 13–24 months' follow-up (one study; SMD −0.50, 95% CrI −0.96 to 0.05). At ≥ 25 months' follow-up, there was evidence that cognitive–behavioural therapy-based reduced depressive symptoms in a universal primary setting (one study; SMD −0.27, 95% CrI −0.42 to −0.13).

Owing to a lack of model fit, suggesting possible inconsistency, we did not report network meta-analysis results for tertiary settings.

A narrative review was conducted for conduct disorder. None of the included studies reported the primary outcome of self-reported conduct symptoms, post intervention. Four studies were judged to be at unclear risk of bias, and one was judged to have a low risk of bias. There was evidence from two studies of school-only interventions and from one study of a multisystemic intervention that, on the basis of teacher- or parent-reported outcomes, externalising behaviour was reduced post intervention. Two studies evaluating multicomponent, multisystemic and multiphase interventions reported no evidence that the intervention reduced externalising behaviour compared with a no intervention control (between 1 and 3 years' follow-up). However, both these studies reported evidence that, over the longer term (5–20 years), intervention prevented self-reported conduct disorder symptoms.

The body of evidence identified in the review of economic evidence was both small (six studies) and heterogeneous. Identified studies were from the UK, the USA and Australia. Trial-based evaluations suggested that the school-based interventions were unlikely to be cost-effective. There was little empirical evidence on costs that could inform decisions on the implementation of preventative interventions.

We conducted a cost–consequence analysis based on hypothetical and highly stylised cognitive–behavioural and cognitive–behavioural + interpersonal therapy-based universal interventions to provide an idea of the costs that might accrue to a school budget in the first year of implementation. Taking the perspective of a single school budget, and based on intervention costs for cognitive–behavioural interventions in universal secondary settings, the cost–consequence analysis estimated an intervention cost of £43 per student. We were not able to estimate longer-term costs and benefits because of a lack of follow-up data reported in the studies.

Conclusions

The conclusions are based on the narrow set of disorder-specific preventative interventions included. Considering the strength, robustness and possible biases in the findings, it is concluded that there is weak evidence that school-based anxiety, depression and conduct disorder prevention interventions may be effective. There was weak evidence from the network meta-analysis that cognitive–behavioural therapy-based interventions were effective for preventing symptoms of anxiety and depression and that mindfulness/relaxation and exercise interventions were effective for symptoms of anxiety post intervention. However, evidence for mindfulness/relaxation and exercise interventions was judged to be at unclear risk of bias and was based on only three studies. There was also weak evidence from the component network meta-analysis that cognitive–behavioural interventions including a psychoeducation component were effective for preventing symptoms of anxiety and depression in universal secondary settings. The available economic literature was scarce and heterogeneous. There was a lack of robust empirical evidence on costs and resource use to inform the economic evaluation.

Future trials should be multiarm and allow for sufficient follow-up. Studies might compare the effect of cognitive–behavioural therapy-based interventions with and without a psychoeducation component. Such a trial should be active or attention controlled, and comparators might include mindfulness/relaxation or exercise interventions. Work to optimise the content of such an intervention should be conducted in consultation with children and young people.

To ensure high-quality information for decision-makers and commissioners, it is imperative that future trials should be rigorously designed, with long-term follow-up, and that the cost implications of interventions are adequately measured.

Study registration

This study is registered as PROSPERO CRD42016048184.

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Chapter 1 Background

Description of the problem

Common mental disorders are a key cause of morbidity in children and young people (CYP). Globally, depressive disorders are the third largest cause of adolescent disability-adjusted life-years (DALYs) lost, and anxiety disorders are the fifth cause of DALYs lost for adolescent girls.[2] In the UK, the most common mental disorders among CYP are anxiety, depressive and conduct disorders. NHS Digital figures from 2017 suggest that 7.2% of 5- to 19-year-olds have an anxiety disorder, 2.1% a depressive disorder and 4.6% a conduct disorder.[3] In this report, we will refer to anxiety, depressive and conduct disorders as 'common mental disorders' (CMDs), as these are the disorders with the highest prevalence among CYP in the UK. Although the prevalence of CMDs tends to increase with age, it is noted that rates of anxiety and depressive disorders have increased among CYP in the UK over the last 20 years, in contrast to the stability of diagnoses for conduct and hyperactivity disorders.[3–5] However, as many CYP or their guardians do not seek help,[6,7] these figures may represent an underestimate.[8,9]

Children and young people with a mental health disorder are more likely to engage in risky behaviours, such as smoking and substance use; are more likely to self-harm; and are more likely to be excluded from school.[10–16] Although the causes are multifactorial, with genetic and environmental factors contributing to susceptibility, the distribution of CMDs is socially and economically patterned.[17] For example, young people with a common mental disorder are nearly twice as likely as those without a disorder to be living with a lone parent, more than twice as likely to have unemployed parents and more likely to have parents with low incomes and fewer qualifications and living in social housing.[11] Evidence from the UK Millennium Cohort[18] suggests that children from low-income families are four times more likely to have a mental health problem than those from higher-income families. Longitudinal evidence suggests a linear relationship between the frequency of disorder episodes and the likelihood of adverse social outcomes. In a cohort of CYP aged 16–21 years from New Zealand,[19] the odds of later welfare dependence were 1.34 [95% confidence interval (CI) 1.09 to 1.64] times higher among those reporting 1–4 episodes of depression than among those reporting no episodes of major depression. The odds among those reporting $\geq$ 10 episodes were 2.42 (95% CI 1.31 to 4.45) times higher than among those reporting none.

Although there is ongoing debate about the drivers of increased prevalence,[20] there is robust evidence to suggest that lifetime trajectories of CMDs are established by mid-adolescence,[21] with half of all disorders recognisable by age 14 years and three-quarters by age 25 years.[22] The Royal College of Psychiatrists has stated that greater personal, social and economic benefits can be generated by intervening early in the life course than by intervening at any other time.[22] However, Child and Adolescent Mental Health Services (CAMHS) worldwide are under-resourced.[23] In the UK, the Local Government Association estimates that > 338,000 children were referred to CAMHS in 2017, but fewer than one-third had received treatment within the year.[24] Even in the advent of optimal access and treatment, one economic modelling study has suggested that < 30% of the burden of CMDs could be alleviated by treatment alone.[25]

Description of the intervention

Against this background, there has been a growing focus on the primary prevention of CMDs among CYP. Primary prevention aims to prevent the onset of disease before clinically relevant symptoms are detectable and, therefore, targets a seemingly 'healthy' population. According to the National Academy of Medicine (NAM) (formerly known as the Institute of Medicine), primary prevention encompasses the prevention of disorder-specific symptoms, reduction of preclinical symptoms and prevention (or delay) of disorder onset.[26] The NAM definition of primary prevention also refers to universal, selective and indicated prevention[26,27] and is distinguished from mental health promotion (*Figure 1*). Universal prevention addresses whole populations regardless of their risk status or susceptibility to a CMD. Selective prevention targets subgroups with higher than average risk of developing a mental disorder; risk can be defined as biological, psychological or social factors. Indicated prevention focuses on individuals with detectable, but subclinical, symptoms of a CMD. Increasingly, the boundary between indicated prevention and 'early intervention' is being blurred by clinicians.[28] The NAM framework views mental health promotion as a focus on encouraging mental health and the enhancement of well-being, rather than the prevention of illness.

In the UK, schools are at the forefront of the prevention agenda. For example, the green paper *Transforming Children and Young People's Mental Health Provision*[29] calls for mental health leads to be embedded in schools and a greater role for schools in cross-sectoral support teams. The 2019 green paper *Advancing our Health: Prevention in the 2020s*[30] takes this further, with subsequent policy announcements giving schools statutory responsibility for children's mental health and well-being. Across the UK, school-based education is compulsory between the ages of 5 and 16 years,[31] with further statutory provision for 16- to 18-year-olds in England. In 2019, 8.82 million pupils were enrolled in England,[32] 698,000 in Scotland,[33] 234,550 in Wales[34] and 330,000 in Northern Ireland.[35]

Multiple systematic reviews examining school-based preventative interventions for CMDs have been published in recent years, and taken together the results suggest a small but positive effect of psychological and educational interventions. For example, for the prevention of anxiety and depression, Werner-Seidler *et al.*[36] evaluated both universal and targeted (selective and indicated) interventions in school settings

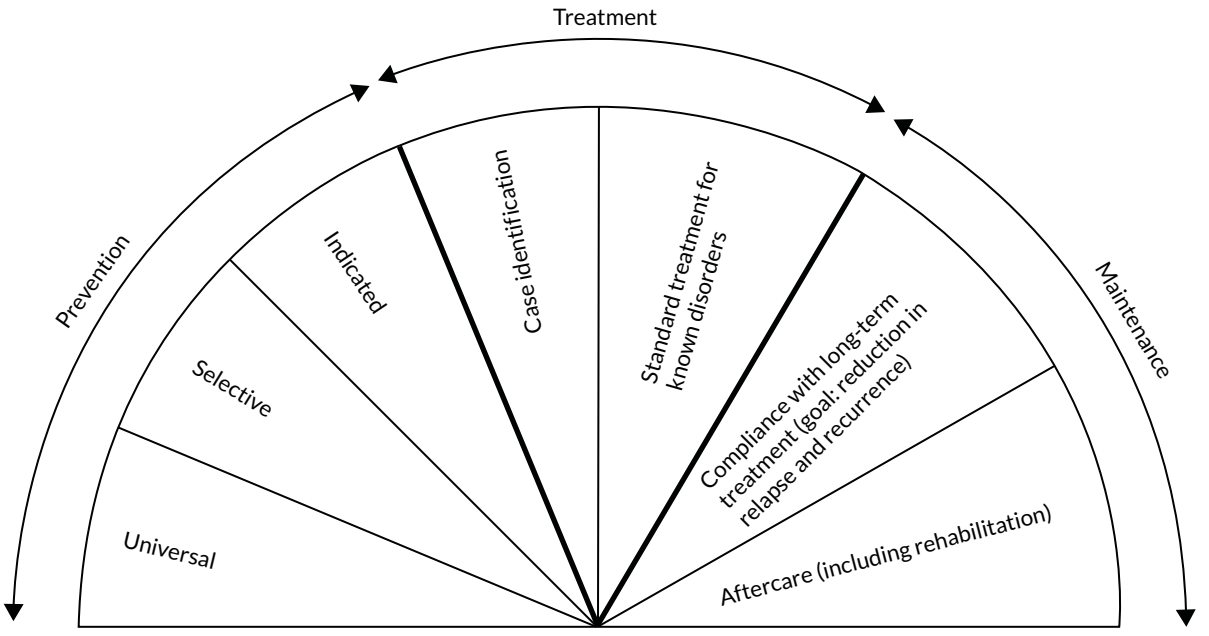

FIGURE 1 The mental health intervention spectrum for mental disorders. Reproduced with permission from *Reducing Risks for Mental Disorders: Frontiers for Preventive Intervention Research*.[26] Copyright © National Academy of Sciences. All rights reserved.

and found a small beneficial effect on both depression (Hedges' *g* 0.23, 95% CI 0.19 to 0.28) and anxiety (Hedges' *g* 0.20, 95% CI 0.14 to 0.25). Johnstone *et al.*[37] focused on universal interventions in school settings and observed a positive effect on symptoms of depression (Hedges' *g* 0.17, 95% CI 0.06 to 0.28), but not on anxiety (Hedges' *g* 0.09, 95% CI −0.07 to 0.26). Stockings *et al.*[38] included multiple settings in their review, and included both universal and targeted populations. They concluded that universal (Cohen's *d* −0.11, 95% CI −0.16 to −0.05) and targeted interventions (Cohen's *d* −0.33, 95% CI −0.46 to −0.20) to prevent depression are effective in the short term. They observed that universal prevention had a positive effect on anxiety (Cohen's *d* −0.16, 95% CI −0.27 to −0.06), but that indicated prevention did not (Cohen's *d* −0.01, 95% CI −0.27 to 0.26). Rasing *et al.*[39] focused on targeted interventions only, in any setting, and concluded that depression symptoms were reduced [standardised mean difference (SMD) −0.25, 95% CI −0.38 to −0.12], but not anxiety (SMD −0.19, 95% CI −0.36 to 0.03).

Much research into the prevention of conduct disorder has focused on indicated parenting programmes to prevent antisocial/disruptive behaviour in young children. Meta-analyses of indicated parenting programmes suggest that they have a positive effect. For example, Piquero *et al.*[40] report a medium effect size for preventing antisocial behaviour (Hedges' *g* 0.37; $p < 0.001$). Meta-analyses of school-based universal interventions have focused on reducing broader 'externalising' or general behaviour problems, rather than on the prevention of conduct disorder. For example, Lipsey and Wilson[41] found that both universal school-based interventions (Hedges' *g* 0.21; $p < 0.05$; Q_{76} 212; $p < 0.05$) and indicated interventions (Hedges' *g* 0.29; $p < 0.05$; Q_{108} 300; $p < 0.05$) had a small beneficial effect in terms of preventing outcomes of disruptive behaviour.

Rationale for the current study

It can be argued that no two preventative interventions are exactly alike, as they are made up of combinations of components, each delivered with differing degrees of fidelity and intensity, to slightly different populations and settings. However, in a standard meta-analysis, intervention complexity and variation are overlooked when studies are combined to form a single comparator for analysis (e.g. 'CMD intervention' compared with control). This 'lumping', or conflating, of potentially disparate interventions can induce statistical heterogeneity. Estimates of statistical heterogeneity (variability across intervention effects) in meta-analyses of preventative CMD interventions can be substantial. Although heterogeneity may be inevitable in public health meta-analyses,[42] it should nevertheless be minimised because of the consequences for policy recommendations and decision-making.[43] For example, in a random-effects meta-analysis, the precision (certainty) with which the average intervention effect is estimated decreases as heterogeneity increases, that is CIs are wider.

The need to 'lump' interventions, and control conditions, can be avoided by using a network meta-analysis (NMA).[44] A NMA combines direct and indirect estimates of intervention effect to allow the simultaneous comparison of multiple interventions in a single evidence synthesis. Crucially, a NMA retains the distinct identity of each intervention analysed.[45] It also enables the ranking of interventions according to the probability that each is the best, or worst, for a given outcome. The effect of intervention components (individually or in combination) can be modelled in a meta-analysis using metaregression methods.[46] Work since 2014[47–49] has highlighted the importance and feasibility of NMAs in public health, and how they can be used to explore and minimise heterogeneity in evidence syntheses. A component-level NMA is ideally suited to synthesising preventative CMD interventions, as the complexity of interventions can be incorporated, while providing the coherent and quantitative assessment of effectiveness necessary for decision-making.

Aims and objectives

The overall aim of this project was to identify the most effective and cost-effective intervention component(s), or combination of components, for the universal and targeted prevention of common mental health problems among CYP. For the purposes of this project, CMDs were defined as anxiety, depressive and conduct disorders. This focus was clarified in a protocol update (see the following section and *Table 1* for details).

This aim was addressed by the following objectives:

- consult with CYP and their parents/guardians to inform the outcomes of interest for the systematic review
- conduct a systematic review of educational setting-based (1) universal and (2) targeted interventions for the primary prevention of anxiety, depression and conduct disorder that have been evaluated in randomised controlled trials (RCTs)
- develop a classification scheme, or taxonomy, of components used in preventative mental health interventions
- conduct intervention-level and component-level NMAs to identify effective interventions and components of interventions
- conduct an economic evaluation to determine the most cost-effective component, or combinations of components, of targeted and universal interventions by condition and setting.

Changes to protocol, clarifications and additional analyses

The protocol was updated in October 2018, to reflect decisions made at the searching and screening stages of the review. These are listed in *Searching and screening*, with full details and accompanying rationale reported in *Table 1* Further changes and clarifications were made at the analysis stage and are listed in *Analysis* for transparency.

TABLE 1 Protocol deviations and clarifications

Deviation or clarification	Proposal or original protocol	Date	Review stage and change	Rationale
Project began: October 2016				
Deviation	Proposal and protocol	November 2016	Searching: reduced number of databases searched	The proposal stated that 12 databases would be searched. In consultation with an information specialist, we derived a more efficient approach involving three stages: 1. Databases – we followed the Cochrane MECIR guidance[50,51] for searching, which states that CENTRAL, MEDLINE and EMBASE™ (Elsevier, Amsterdam, the Netherlands) should always be searched as a mandatory first step. In addition, the MECIR guidance states that it is highly desirable that specialist databases are searched. In the updated protocol, we ordered the databases in terms of how likely they were to yield relevant papers, based on databases used in existing reviews.[52] As the condition being reviewed was CMDs we chose to search PsycInfo® (American Psychological Association, Washington, DC, USA) in the first instance

TABLE 1 Protocol deviations and clarifications (*continued*)

Deviation or clarification	Proposal or original protocol	Date	Review stage and change	Rationale
				2. Systematic reviews – the second stage of our search strategy involved searching for existing systematic reviews. In addition to the reviews identified via the database searches, we also searched Epistemonikos, which is a database of systematic reviews. The reference lists from reviews were downloaded and screened for potentially relevant studies. These were added to our list of titles and abstracts to screen for inclusion in the review 3. Scoping – finally, we conducted an informal scoping search of ERIC to check if any additional records (over and above those identified by the above strategy) could be identified. The scoping search did not identify additional studies. We therefore determined that this was an appropriate place to stop the search. In response to peer-review comments on the draft NIHR report, the ERIC scoping search was formalised in June 2020. It was combined with a search of the BEI, and is reported in *Appendix 1*
Deviation	Proposal and protocol	December 2016	Screening: change to inclusion criteria	In the original proposal, we stated that the relevant age range would be 5–25 years. To increase relevance to school settings in the UK, the lower age limit was changed to age 4 years. Studies were included if the majority of children were aged ≥ 5 years, or if the mean age was approximately 5 years with a 'small' standard deviation. Studies in which the majority of children were < 4 years of age were excluded
Deviation	Proposal and protocol	December 2016	Screening: change to inclusion criteria	In the original proposal, we stated that the relevant age range would be 5–25 years. The original upper age limit was selected to allow sufficient time for multiple follow-ups in tertiary settings, and was not intended to reflect age at baseline (entry to trial). This approach was difficult to operationalise during pilot data extraction, as studies had a wide age range at baseline, spanning the upper age limit (e.g. ages 18–28 years at baseline). Therefore, this was modified to include studies in which the majority of participants were aged ≤ 19 years at baseline
Clarification	Proposal and protocol	December 2016	Screening: clarification of inclusion criteria	'Community' was defined in the protocol inclusion criteria as 'school affiliated' and the examples 'after-school and holiday clubs, church groups, youth clubs and student unions' given as an illustration. During screening, 'school affiliated' was operationalised as 'attached or linked to a specific school setting'. Studies that used schools as the source of recruitment but that were conducted 'off-site' at home or in other community settings were not eligible for inclusion. Multisetting studies that were primarily based in schools were included. This was to ensure that the school was not simply be the point of recruitment for an intervention that was then (entirely) carried out elsewhere

continued

TABLE 1 Protocol deviations and clarifications (*continued*)

Deviation or clarification	Proposal or original protocol	Date	Review stage and change	Rationale
Project paused: April 2017 to February 2018				
Clarification	Protocol	April 2018	Data extraction: clarification to conditions included	The original proposal listed CMDs as obsessive–compulsive disorder, phobia, post-traumatic stress, panic disorder, anxiety, depression and conduct disorder. We stated in the proposal that we anticipated focusing on the most common: anxiety, depression and conduct disorder. However, the original protocol did not reflect this anticipated focus clearly enough, and a clarification was needed. After staff absence, to ensure efficiency and expedite the review, a modification was made to the protocol to ensure that the explicit focus was on anxiety, depression and conduct disorder. At the stage this decision was made, data extraction for depression and conduct disorder studies had not started, but was under way for anxiety
Clarification	Protocol	January 2019	Analysis: clarification of analysis plans	Educational settings were divided into UK-specific primary, secondary and tertiary groupings for the purposes of analysis, and studies were grouped on the basis of the mean age (or range) and mapped to a primary, secondary or tertiary setting for analysis. This was not made explicit in the original protocol, which implied that the intervention should be delivered in one of these settings. This would not have been practical from an international perspective, owing to differences in educational systems (e.g. middle and junior-high schools). Studies were grouped on the basis of the mean age (or range) and mapped to a UK-equivalent primary, secondary or tertiary setting for analysis
Deviation	Protocol	January 2019	Analysis: change to analysis plan	We planned to analyse 'inequality' as a main outcome. However, few studies reported inequality as a primary outcome; instead, we carried out post hoc subgroup analyses by SES, sex and ethnicity. These characteristics were selected post hoc, on the basis of the most commonly reported study characteristics
Deviation	Protocol	January 2019	Analysis: change to analysis plan	In the protocol, we stated that we would conduct metaregression by intervention intensity, defined as total session time (number of sessions × duration in minutes). However, we determined that this would not be meaningful in a NMA with differing classes of intervention. It would have been possible to conduct the metaregression in a subgroup analysis of psychological therapies only
Deviation	Protocol	May 2019	Analysis: change to outcome measure	In response to reviewer comments on Caldwell *et al.*,[1] we added a post hoc composite 'internalising' outcome for inclusion in the NMA. We defined internalising outcomes as combined, or total, scores from depression and anxiety symptom scales. For example, the 'internalising' subscale of the SDQ or the total score from the DASS

TABLE 1 Protocol deviations and clarifications (*continued*)

Deviation or clarification	Proposal or original protocol	Date	Review stage and change	Rationale
Deviation	Protocol	June 2019	Analysis: change to analysis plan	Parental reporting of child symptoms was a secondary outcome and, as such, it was not anticipated that we would conduct a NMA. However, based on external evidence of a discrepancy between CYP and parent reports, and that some included studies reported only a parent outcome, we conducted a post hoc analysis of parent-reported outcomes
Clarification	Protocol	October 2019	Analysis: change to analysis plan	In the protocol, we stated that a cost-effectiveness analysis would be conducted if there was sufficient evidence to build and populate a model. If this were not the case, then a cost–consequence analysis would be conducted. We did not identify sufficient evidence to build and populate a model; therefore, we did not conduct a cost-effectiveness analysis. We did, however, conduct a cost–consequence analysis. This, therefore, does not constitute a change from protocol, but we report it here for transparency

BEI, British Education Index; CENTRAL, Cochrane Central Register of Controlled Trials; DASS, Depression, Anxiety and Stress Scale; ERIC, Education Resources Information Center; MECIR, Methodological Expectations of Cochrane Intervention Reviews; SDQ, Strengths and Difficulties questionnaire; SES, socioeconomic status.

Searching and screening

- The number of databases searched was reduced from the original proposal. Instead, we followed Cochrane Methodological Expectations of Cochrane Intervention Reviews (MECIR) conduct guidelines[50,51] on the selection of primary databases and applied approaches for optimising search strategies.[52–54]
- The protocol stated that the relevant age range for inclusion was 5–25 years. This was difficult to operationalise in practice, and changes were made to the age limits so that the report covers the age range 4–18 years.
- We clarified the intended intervention setting as 'educational-setting based'. In the original proposal, we stated that the review would be conducted for 'school and community based . . . prevention interventions', and defined 'community' as 'school affiliated' settings. The clarification here pertains to the definition of 'school affiliated', which was operationalised as 'formally attached or linked to a specific school setting'.
- A further clarification relates to the definition of CMDs. In this review, CMDs were defined in reference to their prevalence. The updated protocol clarified that the clinical conditions of interest were anxiety, depressive and conduct disorders, as these are the most common across the included age groups.

Analysis

- The educational setting for each study was categorised as UK-specific primary, secondary and tertiary groupings for the purposes of analysis only. This was not made explicit in the original protocol, which implied that the intervention should be delivered in one of these settings.
- We planned to analyse 'inequality' as a main outcome. However, owing to a lack of data, this was not possible; instead, we considered subgroup analyses by socioeconomic status (SES), sex and ethnicity. These characteristics were selected post hoc, based on participant characteristic data that had been extracted.

- We planned to conduct a metaregression of intervention intensity, in which intensity was defined as total session time (number of sessions × duration in minutes). However, we determined that this would not be meaningful in a NMA with differing classes of intervention, and so the analysis was not conducted.
- In response to reviewer comments on Caldwell *et al.*,[1] we added a post hoc analysis for a composite internalising symptoms outcome (which combined depression and anxiety symptom scores).
- A post hoc NMA of parent-reported child symptoms was conducted.
- In the protocol, we stated that a cost-effectiveness analysis would be done if there was sufficient evidence to build and populate a model. As an alternative, we planned a cost–consequence analysis. We found that there was insufficient evidence for a cost-effectiveness analysis, and so a cost–consequence analysis is reported.

Chapter 2 Methods for assessing effectiveness

In this chapter, we describe the methods and process applied for the systematic review and NMA. The protocol for the study was registered with PROSPERO (CRD42016048184). Changes from the protocol and clarifications relating to inclusion criteria are listed in *Chapter 1* and are described in detail in *Table 1*. They are also briefly noted throughout this chapter.

Patient and public involvement

As part of the systematic review process, we consulted with the Advice Leading to Public Health Advancement (ALPHA) research advisory group of young people aged 14–21 years, facilitated by the Development and Evaluation of Complex Interventions for Public Health Improvement (DECIPHer) Centre at Cardiff University.[55] The aim was to identify health and social outcomes of importance to young people that could be considered in the systematic review. On the basis of this focus group, we included a post hoc outcome looking at the impact of prevention interventions on the stigma associated with mental disorders. We also met with members of The Caerphilly County Borough Parent Network to explore their views on young people's mental health and the role of schools in preventing and identifying problems.[56] There were no outcomes from that focus group that fed directly into this report.

Methods for the systematic review of effectiveness studies

Criteria for considering studies for this review

In the absence of direct head-to-head evidence comparing interventions, indirect comparisons can be made across a connected network of interventions. For example, the effect of intervention C against intervention B (BC) can be obtained indirectly from the effect of C against intervention A (AC), minus the effect of B against A (AB). The combination of indirect and direct evidence across a network of intervention comparisons is known as a NMA.

The following eligibility criteria were specified to address the key consistency assumption required for a valid NMA. In a three-intervention network, the consistency assumption requires the true BC intervention effect estimated in the B versus C trials to be the same as the BC intervention effect estimated by the A versus C and A versus B trials (had they also included the B and C arms).[57] For this to hold, one should check that the populations included across all trials in the analysis are comparable to each other, with respect to any potential effect-modifying characteristics.[58] This requirement has been conceptualised as 'joint randomisability' of the interventions for the target population.[59] 'Joint randomisability' implies that a hypothetical, multiarm trial of every included intervention would be reasonable, in principle, and that all participants would be randomisable to any of the interventions included.[60] This requires clearly and specifically defined inclusion criteria, to ensure the included studies, populations and interventions are sufficiently comparable. Further details on NMA are provided in *Methods for the evidence synthesis of effectiveness studies*.

Study design

Parallel-group RCTs and quasi-randomised controlled trials were eligible for inclusion. We defined quasi-randomised trials as those for which allocation was based on a pseudo-random sequence, such as the order in which participants were recruited or their date of birth. Both individually randomised and cluster randomised trials were eligible for inclusion. We did not plan to exclude crossover trials, but only the first period was considered eligible for inclusion.

Population

We followed the NAM's definition of primary prevention, which refers to universal, selective and indicated populations (see *Figure 1*).[27] Briefly, universal prevention addresses whole populations not defined on the basis of risk; selective prevention is targeted at subgroups with a higher than average risk of developing a mental disorder; and indicated prevention is targeted at high-risk subgroups and/or individuals with detectable, but subclinical, symptoms of a mental disorder. In the first instance, we used author-reported classifications of the intended prevention level. However, when interventions were delivered to a whole class or school with the same at-risk characteristic (such as schools in low-income areas), they were combined with universal prevention. Studies were excluded if the intervention was described by the author as indicated prevention, but baseline symptoms scores were suggestive of clinically meaningful symptom levels (see *Definition of disorder*).

Age

As noted in *Chapter 1*, the eligible age range was modified during the screening stage of the review. Further details of this change to protocol are provided in *Table 1*.

Studies including participants between the ages of 4 and 18 years (age at study recruitment), in full- or part-time education, were eligible for inclusion. The lower age limit was set in accordance with the de facto school starting age in England and Wales. However, owing to global differences in school starting age, we determined that studies implemented in preschool settings would be eligible for inclusion if (1) the mean age of participants was 5 years or (2) the majority of enrolled children were aged 5 years at the time of the baseline assessment. The upper age limit reflects the minimum age of entry to higher (tertiary) education in England and Wales. However, studies were eligible for inclusion if the mean age of participants at baseline was $\leq$ 19 years. Studies targeted at young people not in education or training were excluded.

Definition of disorder

The original proposal listed CMDs among CYP as obsessive–compulsive disorder, phobia, post-traumatic stress, panic disorder, anxiety, depression and conduct disorder. However, we anticipated focusing on anxiety, depression and conduct disorder, as they are the most common, and we expected the greatest number of studies for these conditions. The structure and connectivity of a network are important considerations in a NMA, as estimates can be obtained only for connected networks, and sparsely populated networks with few participants can lead to imprecise estimates.[57] Further details of this clarification to the original protocol are provided in *Table 1*.

Studies were included if they were explicitly aimed at the primary prevention of anxiety, depression and/or conduct disorder as operationalised according to categorical or clinically referenced definitions of disorder [e.g. *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (DSM-5)].[61] This was to differentiate studies addressing related mental health constructs, such as emotional health or well-being, which were excluded (see *Interventions and comparators*). Studies were eligible if they focused on either prevention of disorder onset or prevention of symptoms.

However, studies that addressed individual symptoms, or combinations of symptoms, associated with anxiety, depression and conduct disorder, but without explicitly linking these to a clinically identifiable disorder, were excluded. For example, interventions to prevent insomnia, rumination or low self-esteem were excluded, even though these symptoms are associated with depressive and/or anxiety disorders, and interventions to prevent truancy, bullying or aggressive behaviour were excluded, even though these behaviours are associated symptoms of conduct disorder. Studies were included only if they addressed the whole condition, not individual symptoms or combinations of associated symptoms. We consulted trial registrations and protocols, when available, for further information.

Studies in indicated populations were eligible if participants had subclinical mental disorder symptoms as identified by a screening instrument, an interview or a teacher referral. Subclinical symptoms could be defined in reference to diagnostic criteria such as the *International Statistical Classification of Diseases and Related Health Problems*, Tenth Revision (ICD-10)- or DSM-5-categorised disorders, or 'in research' via use of a disorder-specific screening instrument, for example the Children's Depression Inventory or Revised Children's Manifest Anxiety Scale. The boundary between indicated prevention and early intervention (treatment) is debated,[26,27] with no definitive diagnostic threshold. Studies were excluded if baseline measures were suggestive of clinically meaningful symptoms in > 40% of participants, even if the study had been defined as indicated prevention by the author. Young people at risk of comorbid mental health disorders were eligible for inclusion. However, we excluded studies for which > 40% of participants had an identifiable or pre-existing mental disorder. To ensure a clinically homogeneous population for analysis, studies in which the whole population had a diagnosis of attention deficit hyperactivity disorder (ADHD) or an autism spectrum disorder were excluded, as these form distinct diagnostic categories.

Setting

As noted in *Chapter 1*, the operationalisation of setting was clarified from the original proposal. Full details are provided in *Table 1*.

Interventions implemented in an educational setting were eligible for inclusion. For the purposes of analysis, this was operationalised as being primary, secondary or tertiary educational settings. However, to accommodate global differences in educational systems, we did not restrict to interventions implemented in these settings if the age eligibility criteria were met. For example, an intervention delivered in a kindergarten setting would be eligible for inclusion if the mean age of participants was 5 years, or the majority of enrolled children were aged 5 years at the time of the baseline assessment. Interventions implemented in school-affiliated settings (e.g. after-school and holiday clubs) were eligible for inclusion if they were implemented on school grounds. This clarification from the original protocol is explained in *Table 1*. Studies that used schools as the source of recruitment but for which the intervention was not school based were excluded.

Health service settings, such as primary care and outpatient and inpatient settings, were excluded. Interventions implemented in young offender institutions and for looked-after children in residential care were also excluded. Interventions implemented in low-income countries (LICs), middle-income countries (MICs) or high-income countries (HICs) were eligible, as defined by 2017 World Bank classifications.[62]

Interventions and comparators

Inclusion criteria

Interventions were eligible for inclusion if they addressed a universal, selective or indicated population, and the primary study aim was to prevent anxiety, depression or conduct disorder.

Eligible intervention types included psychological and psychosocial, educational or physical interventions that were implemented in educational settings, either individually or in groups. Inclusion was not restricted by mode of delivery. Interventions were included if delivered by peer educators, teachers, youth workers, clinicians, health visitors, school nurses or counsellors. However, digital and online interventions were eligible for inclusion only if they were primarily delivered in the education setting or were a clear adjunct to a wider programme delivered in the school/educational setting (e.g. as homework).

All relevant non-pharmacological control interventions were considered eligible for inclusion, for example standard provision/usual curriculum, waiting list, no intervention, attention control or 'placebo' interventions, and other active psychological and psychosocial, educational or physical interventions. Further details on active and control interventions are provided in *Chapter 3*.

Exclusion criteria

The following intervention exclusion criteria were informed by the need to ensure the validity of the NMA. The key assumption underpinning a NMA is described in the Cochrane handbook[59] as 'transitivity', but is also known as the consistency assumption. Regarding the interventions included in the network, transitivity requires 'all competing interventions of a systematic review to be jointly randomizable'[59] and that intervention A is 'similar' when it appears in the A versus B and A versus C studies.

Assessment of transitivity for public health interventions is not straightforward. To ensure the validity of the NMA, we included only interventions for which the primary aim in a given study was to prevent anxiety, depression or conduct disorder. Unless the study was explicitly focused on disorder-specific prevention, then mental health promotion, awareness, literacy or information interventions were not eligible for inclusion. Social and emotional well-being and positive psychology interventions to improve mental well-being were also excluded, as research suggests that well-being is a separate construct to mental ill health.[63,64] When possible, we consulted trial protocols or registrations if this was ambiguous in the publication. Interventions designed to target prevention of behaviours or social problems that might be on the causal pathway to a mental disorder (e.g. prevention of stress, anti-bullying interventions, substance abuse prevention) were also excluded. Similarly, classroom management and school readiness interventions were not eligible. 'Parenting' interventions such as parent management training or parenting skills interventions were not eligible for inclusion. However, interventions that took place in schools, with a parenting component, were eligible if the parenting component was not > 50% of the whole intervention.

Outcomes

According to the NAM classification of primary prevention, the overall, longer-term aim of preventative interventions 'is the reduction of the occurrence of new cases'[26] of mental disorders. However, it also recognises the importance of shorter-term prevention in terms of reducing symptoms, which, in turn, may delay or reduce the risk of the onset of the disorder. All are considered beneficial at a population level and are 'worthwhile goals of prevention'.[26] In this report, we focus on the effect of prevention interventions on symptoms of anxiety, depression and conduct disorder. The main outcome was prevention or reduction of disorder-specific symptoms for self-reported anxiety, depression and conduct disorder.

All validated disease-specific measurement scales for CYP were eligible for inclusion. When studies reported multiple outcome measures, we applied a prespecified hierarchy to select the most appropriate outcome for analysis from each study (see *Appendix 1*). We did not exclude studies reporting a composite mental health scale from the systematic review [e.g. the Strengths and Difficulties Questionnaire (SDQ)]; however, they were not combined with disorder-specific scales in the main NMA. In a change from protocol (see *Table 1*), a post hoc analysis for composite 'internalising' symptom scales was conducted. For example, measurement scales reporting a total or combined score across depression and anxiety symptoms, such as a total Revised Children's Anxiety and Depression Scale (RCADS) score, or a composite outcome such as the SDQ 'emotional symptoms' subscale, were included in this post hoc outcome.

The following additional primary and secondary outcomes were also specified a priori. However, in the absence of a core outcome set[65] or guidelines for the selection of measurement scales for school-based mental health interventions,[66] we determined that an inclusive approach to additional primary and secondary outcomes was appropriate. Therefore, we did not specify how these outcomes should be measured in advance, or which scales should be used. Instead, we extracted outcomes as reported by the study authors.

Additional primary outcomes were as follows:

- self-reported well-being, as defined by study author(s)
- self-reported suicidal ideation, behaviour and self-harm, as reported by study author(s)
- intervention impact on inequalities in health, as defined by study author(s).

The primary time point of interest was immediately post intervention. However, as sustainability of intervention effect is an important question for public mental health,[67] we also report results for mid-term (6–12 months) and longer-term (13–24 months) follow-ups. If studies had a follow-up of ≥ 25 months, these results were also extracted.

Secondary outcomes of interest were as follows:

- Mental health-related stigma, as defined by study author(s). During our initial patient and public involvement (PPI) focus groups, reducing the stigma associated with mental health problems was identified as an important outcome for young people.
- Acceptability of an intervention to young people, as reported by the study author(s).
- Parent-reported prevention or reduction of disorder-specific symptoms, as reported by the study author(s).
- Self-reported problem behaviour, such as substance use or involvement in violence.
- Academic attainment, as defined by the study author(s).

Study identification, inclusion and data extraction

Identification of studies

As noted in *Chapter 1*, the approach to searching was modified from that of the original proposal. Full details and explanation are reported in *Table 1*.

The revised search strategy involved three stages, which might be considered to combine the 'known items' and 'law of diminishing returns' approaches described by Booth,[52] to optimise searching. First, working with an information specialist (SDa) and following the Cochrane MECIR guidance on conducting searches,[50,51] we searched MEDLINE, EMBASE, the Cochrane Central Register of Controlled Trials (CENTRAL) and PsycInfo electronic databases. The search strategies for each electronic database are described in *Appendix 1*. The final searches were carried out on 4 April 2018. Searches were not restricted by language, country or date of publication.

Second, in addition to the database searches, we conducted searches of Epistemonikos (www.epistemonikos.org; Epistemonikos Foundation, Santiago, Chile) to identify published systematic reviews of interventions for the prevention of CMDs among CYP. Epistemonikos was searched on 16 November 2016. The reference lists from these reviews were added to the results of the database searches, ready for screening.

Finally, after screening, we conducted an informal scoping search of the Education Resources Information Center (ERIC) database. This was to check whether further relevant studies could be located, cross-referencing with those already identified from the previously mentioned approaches. If scoping revealed further relevant studies, a formal search was planned. In response to reviewer comments on the draft version of this report, the ERIC scoping searches were formalised and extended to the British Education Index (BEI). Further details are reported in *Appendix 1*.

Screening for study inclusion/exclusion was independently assessed by two reviewers (SRD, JCP, DMC, PC); disagreement was resolved by a third reviewer if necessary (SRD, JCP, DMC, PC, SEH). Owing to the volume of potentially relevant studies retrieved, reasons for study exclusion were recorded at full-text screening only.

We used a standardised data extraction form in Microsoft Excel® (Microsoft Corporation, Redmond, WA, USA) to extract information from included studies. Data were extracted by one reviewer and checked by a second (SRD, CF, PC, JCP, DMC). Discrepancies were discussed and a consensus reached.

Disagreements were resolved by a third reviewer if necessary. The following information was extracted from the papers:

- Study design and the target CMD of intervention (i.e. anxiety, depression or conduct disorder); whether the intervention was universal or targeted (indicated or selected); and number of participants recruited, randomised and assessed (or clusters, if a cluster RCT).
- Details of participants (country, intervention setting, age, sex, ethnicity).
- Details of intervention as reported by trial author. Narrative description of components and delivery process for experimental and control interventions. This included number of sessions; intervention dose (calculated as intensity of intervention: total session time × duration in minutes); whether the intervention was group or individual, face to face or digital; who facilitated the intervention; and intervention fidelity measures.
- Outcome(s) assessed and all follow-up time points.
- Risk-of-bias assessment, including additional assessment for cluster trials.
- Mean total symptom score and standard deviation (SD) at baseline and follow-up time points for primary measurement scale, change from baseline or mean difference between arms; details on whether results were for completers only or use of methods for handling missing data such as last observation carried forward; and intracluster correlation coefficient (ICC), the statistical model used to account for clustering (if any).

Study authors were contacted for additional data, if necessary.

Classification of interventions and components

Eligible interventions were psychological and psychosocial, educational, or physical interventions. Following previous studies,[68–72] and based on author-reported descriptions, the content of psychological and psychosocial interventions was classified into four broad intervention types: cognitive–behavioural, behavioural, third wave and interpersonal. Physical interventions were further classified as exercise or biofeedback. Further categories identified were a combined mindfulness/relaxation intervention, psychoeducational and psychosupportive interventions, and occupational therapy. Control interventions were classified into four categories: no intervention, waiting list, usual curriculum and attention controls.[72–74] A full description of all interventions is given in *Chapter 3*.

We also conducted an intervention component analysis (ICA)[75] to identify features of intervention content and process, influenced by the why, what, who, how, when and how much domains of the Template for Intervention Description and Replication (TIDieR).[76] We applied the constant comparative method,[77] whereby the intervention descriptions reported by authors were used to develop a coding scheme to classify the components of each intervention and control. If necessary, descriptions were supplemented by intervention manuals and/or correspondence with the study author. ICA is an iterative and inductive process. One reviewer (SRD) developed and piloted a list of provisional component codes based on published studies.[46,68,72,78] The components were discussed with a second reviewer and a preliminary coding exercise was then undertaken on a sample of interventions by a wider group (SRD, DMC, JK and SEH), and the coding scheme was further refined based on discussion. The refined coding scheme was then applied inductively by one researcher (SDa) and audited by another (DMC). Iterative coding refinements were made until application failed to reveal any new information and the component categories could be described as ‘saturated’.

The working definitions of each intervention and control classification and the classifications of intervention components are provided in *Chapter 3*.

Assessment of risk of bias in included studies

Two reviewers independently used the Cochrane Risk of Bias tool[79] to assess whether there was a high, low or unclear risk of bias in the following domains: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessor, incomplete outcome data, selective outcome reporting and other sources of bias (including cluster-specific issues such as contamination, recruitment bias and unit-of-analysis errors). All eligible studies were included in the NMA regardless of their risk-of-bias classification, and sensitivity analyses examined the impact of excluding studies deemed to be at high and unclear risks of bias for random sequence generation and allocation concealment.

Methods for the evidence synthesis of effectiveness studies

Data preparation

For continuous outcomes, data were extracted for number randomised to each intervention arm at baseline, and baseline mean and SD, and number assessed at follow-up, and follow-up mean and SD (for each time point listed previously). If the mean change from baseline was reported, then this was extracted, together with the standard error (SE) for the mean change from baseline (if reported). Data were extracted for complete cases. However, if authors reported means and SEs from an appropriate model accounting for participant dropout or non-response, this was preferred.

For analysis, we used the standardised mean change from baseline, as a variety of outcome measurement scales were used across the studies. An adjustment for small sample size was applied, following the formula for Hedges' *g*.[80] For studies that did not report mean change from baseline, we derived this from reported baseline and follow-up means and SDs.[81] Here we assumed a correlation coefficient of 0.7, based on previous analyses.[82] This value was explored in sensitivity analyses. Results are summarised using SMDs and 95% credible intervals (CrIs).

For dichotomous outcomes, data were extracted for available cases unless authors clearly reported events and number of participants following the intention-to-treat principle. Dichotomous outcomes were summarised using odds ratios (ORs) and 95% CrIs.

If key statistics (e.g. SDs) were not available in the published report, we contacted trial authors for further information. In cases of non-response, or if missing data were not available, we did not impute the data and these studies were excluded from the NMA (but not the systematic review).

For cluster randomised trials that did not account for the effect of clustering, we followed the advice in the Cochrane handbook (section 16.3.4)[81] for calculating an approximate sample size. We reviewed reported ICCs from all included papers and used an ICC estimate of 0.03, which is the mean of the values reported and is similar to ICCs used in previous public health systematic reviews.[68,83–85] This value was also explored in sensitivity analyses.

Pairwise and network meta-analyses

Both standard pairwise meta-analyses and NMAs were conducted. A NMA was planned for each primary outcome and for the primary time point only.

A NMA allows data on multiple interventions to be pooled in a single analysis.[86] It is considered a 'core method' by Cochrane[59] and is routinely used in National Institute for Health and Care Excellence (NICE) technology appraisals and guidelines.[87,88] For the novice, the Cochrane handbook[81] provides an accessible introduction; for further depth, we recommend consulting tutorials and introductory papers on NMA.[44,45,60,89–92] However, we describe the fundamentals in the following paragraphs.

A NMA requires that the intervention comparisons made in RCTs can be displayed pictorially as a network of comparisons that are 'connected' (i.e. there is a path from any one intervention to another formed by RCT evidence).[59,93] In the absence of direct head-to-head evidence comparing interventions, indirect comparisons can be made via common comparator(s) across the network. For example, the effect of intervention C against intervention B can be obtained from the effect of C against A, minus the effect of B against A. The combination of indirect and direct evidence across a network of intervention comparisons is known as a NMA.

The validity of a NMA assumes that there are no differences between studies in factors that might interact with the intervention effect (effect modification). This is the same assumption made in a pairwise meta-analysis,[57] but in a NMA applies across intervention comparisons. It is therefore important to consider separate analyses according to factors that may be potential effect modifiers. In the first instance, separate analyses were conducted by population (universal or targeted) and setting (primary, secondary or tertiary education). Separate analyses were run for the main outcomes of self-reported anxiety, self-reported depression and self-reported conduct disorder symptoms. Following research suggesting common mechanisms and pathways within internalising and externalising disorders (transdiagnostic factors),[94–97] we ran analyses across (1) all studies aiming to prevent depression and/or anxiety and (2) studies aiming to prevent conduct disorder. That is, studies contributing to either the depression or anxiety outcome analyses could be studies that aimed to prevent (1) anxiety (2) depression or (3) anxiety and depression. Studies contributing to the analysis of the conduct disorder outcome were only those aiming to prevent conduct disorder. We explore this decision further in a subgroup analysis (see *Subgroup, metaregression and sensitivity analyses*). A visual check of the inclusion/exclusion characteristics of trials in each network was conducted, to ensure that potential effect modifiers were evenly distributed across studies.

Network plots were drawn in Stata® version 15 (StataCorp LP, College Station, TX, USA) to allow visual inspection of network connectedness.[98]

For the primary time point of post intervention only, we considered three NMA models, each allowing for increasing specificity of intervention detail:[46,82]

1. Intervention-level model – interventions were analysed as 'clinically meaningful units'.[48] For example, cognitive–behavioural therapy (CBT) was analysed as a distinct intervention to psychoeducation or third wave-based interventions.
2. Additive model – components nested within intervention. A main intervention effect was estimated (as per the intervention-level model), plus additional effects for specific components within each intervention. For example, we estimated an overall CBT effect, which represents the effect for CBT interventions with components that were common across all the included CBT interventions, and also estimated the additional effect of CBT interventions containing a psychoeducation component, a mindfulness component and so on.
3. Full interaction model – components nested within intervention: under this model, each unique combination of intervention and components was considered as a separate intervention. For example, CBT with cognitive + behavioural + psychoeducation components was considered a distinct intervention to CBT with cognitive + behavioural + psychoeducation + relaxation components.

For follow-up time points, where we anticipated finding fewer studies, we ran the intervention-level model only as prespecified in the protocol. Intervention-level analyses were implemented in a Bayesian framework using OpenBUGS software (version 3.2.3). Component analyses were implemented in WinBUGS[99] (version 1.4.3; MRC Biostatistics Unit, Cambridge, UK). Statistical details are reported in *Appendix 1*. Data and WinBUGS code can be obtained by contacting the corresponding author. Vague prior distributions were specified for intervention effect and heterogeneity parameters (see *Appendices 1* and *3*). We assessed convergence for the intervention-level NMA based on three chains using the Brooks–Gelman–Rubin diagnostic tool and history plots in OpenBUGS. Specific convergence details for each model and population/setting analysis are reported in the model fit tables in *Appendix 3*, *Table 29–46*.

Random-effects models were run for the main outcomes, assuming a common between-study SD (known as 'homogeneous variance').[100] However, we assessed both fixed- and random-effects models on the basis of model fit. Heterogeneity was evaluated by examining the posterior median between-study SD (τ) and 95% CrIs from the random-effects model, and by comparing model fit of the fixed- and random-effects models. Model fit was measured by the posterior mean of residual deviance. In addition, we examined the deviance information criterion (DIC), which penalises model fit with model complexity. Differences of ≥ 5 points in posterior mean residual deviance and the DIC were considered meaningful, with lower values preferred.[101] Model fit statistics are reported in *Appendix 3*.

As described previously, a key assumption for a valid NMA is that of consistency between the direct and indirect evidence. If the effect estimates from the direct and indirect evidence in a network do not agree, this is known as inconsistency. The strict inclusion/exclusion criteria described previously were specified to avoid inconsistency, but they do not guarantee consistency. For this reason, the statistical agreement of the evidence was formally checked. Consistency was assessed by comparing the goodness of fit of a model assuming consistency with that of one allowing for inconsistency (i.e. a model that provides effect estimates based on direct evidence only). A common between-study SD was also assumed for these inconsistency models.[57]

Pairwise meta-analyses were also conducted when head-to-head evidence was available. The method of estimation is similar to the NMA, except that the consistency assumption is removed such that intervention effects for separate comparisons are unrelated and separate intervention effects can be estimated.[57] Estimates are reported for the post-intervention time point only and are from a random-effects model that assumes that the heterogeneity parameter is common across intervention comparisons. This better reflects the assumption made in the NMA and, therefore, allows a fair comparison of the intervention effect estimates obtained from both approaches.

Subgroup, metaregression and sensitivity analyses

Metaregression and subgroup analyses were performed in OpenBUGS following the Evidence Synthesis Technical Support Unit code available from the NICE Decision Support Unit's website and described in Dias *et al.*[102,103] Subgroup analyses were conducted to assess whether or not intervention effects differed by intended focus of the intervention, for example if interventions addressing anxiety had a larger effect on anxiety outcomes than interventions intended to focus on depression but which also recorded anxiety outcomes.

Metaregression was planned for the intervention-level NMA and main outcomes only, to examine if intervention effects differed by mode of intervention delivery and who facilitated intervention delivery:

- Mode of intervention delivery – interventions were categorised as being delivered face to face or via a computer/internet. To explore whether or not intervention effects were modified by mode of delivery, we fitted a metaregression model for face-to-face (covariate value = 0) and computer/internet (covariate = 1) interventions. A random-effects NMA model was fitted. However, the regression coefficient for the covariate was assumed to be a fixed effect across studies. The between-study SD was assumed to be common for face-to-face and computer/internet interventions. Vague priors were specified.
- Who facilitated intervention delivery – interventions were categorised as being facilitated by a teacher or a mental health professional (MHP). There was considerable variation within the category of 'MHP' and it should be regarded as a simplification. Here, MHP included school counsellors, qualified psychotherapists and graduate and post-doctoral psychology students. Graduate and post-doctoral students included those studying general psychology, educational psychology or counselling psychology, when specified. We fitted a metaregression model that enabled us to estimate the intervention effect at each value of the covariate (0 or 1), for each intervention, comparing the effect of each facilitator (e.g. CBT-teacher vs. CBT-MHP vs. usual care). To allow for networks containing multiarm studies with more than two interventions facilitated by a teacher or MHP,

a hierarchical model was fitted. In this hierarchical model, a regression coefficient for each intervention was assumed to come from a normal distribution with a common mean and between-intervention SD. The between-intervention SD was assumed to be common for each value of the covariate. Vague priors were specified.

We explored the potential for small-study effects using comparison-adjusted funnel plots.[98]

Sensitivity analyses were conducted for the intervention-level NMA, main outcomes and primary time point only. Analyses explored the robustness of results to the following:

- Excluding studies deemed to have a high/unclear risk of bias on the domains of random sequence generation and allocation concealment.
- The ICC value of 0.03 for cluster randomised trials. Sensitivity analyses were conducted assuming an ICC of 0.01 and 0.06.
- The correlation value of 0.7 assumed for calculating change from baseline SD. Sensitivity analyses were conducted assuming a correlation of 0.6 and 0.8.

Interpreting the results and evaluating evidence of effect

As described previously, summary effect estimates and their 95% CrIs from the NMA are reported. In interpreting these statistical findings, we followed the guidance from the Cochrane handbook (section 15.3) that interpretation of results from a meta-analysis should not rely on statements of 'statistical significance' or thresholds implying 'significance'.[104] Instead, we interpret the strength of statistical evidence on a graduated scale from weaker to stronger evidence of an intervention effect.[105,106]

In *Chapter 9*, we also provide a summary of these statistical findings for the primary outcomes of anxiety, depression and conduct disorder symptoms at the primary time point of post intervention. This interpretation forms the basis of the conclusions for the report. The criteria used are based on the considerations outlined in Chapters 14[107] and 15[104] of the Cochrane handbook. These considerations are informed by the Grading of Recommendations Assessment, Development and Evaluation (GRADE) domains of imprecision, inconsistency (heterogeneity), risk of bias and publication bias. It is not a formal application of the GRADE rating system, which necessitates up- or downgrading of the evidence on the basis of the assessments to form an overall assessment of 'quality'.[107]

Specifically, our interpretation of the evidence is not solely based on the magnitude and direction of the summary point estimate, but also incorporates an evaluation of all of the following:

- the precision of the effect estimate, as described by the 95% CrI
- the extent of the between-study heterogeneity observed in each analysis, as described by τ and its 95% CrI
- the risk-of-bias assessment
- the possibility of non-reporting biases or evidence of small-study effects.

Chapter 3 Intervention and component categorisation

In this chapter, we describe the intervention classifications and the components used in the NMAs reported in *Chapters 4* and *5*.

Main 'intervention-level' classification

The main 'intervention-level' classifications were assigned based on the trial authors' descriptions and classifications used in previous systematic reviews.[36–39,68,108–113] Many interventions to prevent anxiety and depression have been adapted from existing clinical interventions for treatment which, in turn, are grounded in identifiable therapeutic traditions. In adapting therapeutic interventions for a prevention context, some developers have retained the reference to the underlying therapy on which they are based, for example cognitive–behavioural therapy. Although these preventative interventions focus on the same techniques, exercises and skills that underpin the clinical 'therapeutic' intervention, the term 'therapy' may be considered a misnomer in a preventative context. As such, it may be preferable and more accurate to consider these preventative interventions as 'interventions based on the principles of CBT'. However, for conciseness and consistency with the trial literature we retain the use of 'therapy' when using intervention abbreviations throughout the report (e.g. CBT).

Behavioural therapy

Behavioural therapy is a group of allied techniques that focus on behavioural models of psychology and seek to modify overt maladaptive behaviours. In the current review, we categorised interventions based on behavioural activation, self-monitoring, role-playing, exposure to feared stimuli or scheduling pleasant activities as being behavioural in nature.

Cognitive–behavioural therapy

Cognitive–behavioural therapy can be considered a family of allied techniques, based in both behavioural and cognitive models of psychology, that utilise a set of overlapping cognitive and behavioural techniques. CBT is based on the proposition that a person's behaviour is influenced by their cognitive activity (and vice versa), and that cognitions can be monitored and altered (cognitive restructuring). In turn, emotions and behaviour can be modified via this cognitive change. CBT interventions for treatment of CMDs typically include a psychoeducation component; however, in preventative interventions, this may not always be present.

Third-wave interventions

This was a composite category. Third-wave psychotherapies emphasise mindfulness, acceptance and flexibility. They tend to focus on a person's relationship to their cognitions and emotions, encouraging an acceptance of thoughts, rather than modifying their content. Interventions that described themselves as mindfulness-based CBT, acceptance and commitment therapy or dialectical behavioural therapy were included in this classification. Third-wave preventative interventions were distinguished from mindfulness meditation or relaxation interventions that did not explicitly address cognitions or behaviours.

Interpersonal therapy

From a treatment perspective, interpersonal therapy (IPT) is based on the relationship between mood symptoms and interpersonal relationships. It seeks to relieve symptoms via resolving interpersonal conflict and difficulties. In the preventative context, IPT addresses the relationship between young people significant adults (e.g. teachers, parents), with regard to avoiding/resolving conflict via improved coping communication skills. The techniques used attempt to improve interpersonal skills may include role play, problem-solving exercises and practising effective communication.

Mindfulness meditation and relaxation-based interventions

In the present review, mindfulness/relaxation is a composite category and is distinct from third-wave interventions. Relaxation includes breathing exercises, muscle relaxation and yoga from the Iyengar or Hatha traditions (as opposed to more vigorous traditions). Mindfulness meditation interventions were included in this category if they focused solely on meditation or relaxation without incorporating aspects of traditional 'talking' psychotherapeutic approaches.

Biofeedback

Biofeedback is a mind–body intervention that uses physiological monitoring devices or equipment to learn to control physiological responses, such as heart rate. Users may monitor their heart rate variability using pulse oximetry, for example while completing a standard deep-breathing exercise. The feedback received helps the participant learn how to influence the negative, or undesired, response (e.g. a stress response). Smartphone applications and 'consumer wearables' have been developed for monitoring stress, anxiety and sleep problems.

Exercise

In this review, we classified an exercise intervention as a cardiovascular intervention designed to raise heart rate and breathing to (at least) a moderate intensity level, for example dancing, running and team sports.

Cognitive bias modification

Cognitive bias modification (CBM) relates to a group of approaches, including attention and interpretation bias training, that aim to retrain cognitive distortions. CBM evolved from a visual attention task (a dot-probe task), in which a participant is exposed to a series of threatening and neutral stimuli via computer, such as angry and neutral faces, and the speed of their response to a 'probe' is measured (e.g. where on the screen the angry or neutral face was displayed). In individuals with a CMD, attention tends to be selectively directed towards the negative image and response times to the probe are slower. CBM for the treatment of anxiety disorders seeks to 'retrain' this selective attention bias towards the positive stimulus. In preventative interventions for CYP, CBM tasks may be embedded in engaging and user-friendly formats such as interactive video games ('CBM gamification').

Occupational therapy

Occupational therapy interventions are based on engaging CYP in meaningful daily activities or 'occupations'. Interventions are skill based and aim to enable CYP to successfully engage with, and participate in, developmentally appropriate everyday events. For example, an intervention might focus on a favourite activity to increase self-esteem, or schoolwork may be modified to create a positive learning environment and reduce stress.

Control groups

On the basis of previous research,[68,72–74] we distinguished the following separate control groups. We note that, in the included trials, psychoeducation and psychosupport were sometimes considered as active interventions in their own right. Their inclusion under a 'control group' heading does not affect the findings.

Psychoeducation

Often a component of CBT-based interventions, psychoeducation can also be used as a distinct intervention. It typically involves a systematic approach to providing background information, for example what the cause or symptoms of a mental disorder are and advice regarding the mental disorder and/or explaining the approaches that can help to mitigate symptoms. Written materials or presentations may be provided.

Psychosupport and counselling

Often a component of other interventions, psychosupportive interventions are also used in a stand-alone format. In the current report, we combined psychosupportive and counselling-based interventions into one category. Here it refers to a non-specific, possibly therapeutic, intervention that could include listening, signposting to further services, or forming an attachment or therapeutic alliance.

Usual curriculum

If an active intervention took place during a regular timetabled class and participants in the control group continued to receive the regular class curriculum, the control intervention was classified as standard provision or 'usual curriculum'. This included a variety of different classes and could have included a 'well-being' or health lesson or a standard timetabled academic lesson (such as history or mathematics).

Waiting list

If participants in the control group were explicitly told (e.g. via informed consent processes) that they would receive the active intervention at a later date, the control condition was categorised as a waiting list. Although participants were also likely to be receiving usual curriculum or a no-intervention control, the use of an explicit waiting list design takes precedence in our categorisation.

No intervention

A no-intervention control categorisation was used to differentiate between a control condition in which participants received something and a control condition in which participants were not involved in any structured activity. This classification was applied when the active intervention was held outside regular timetabled classes (e.g. after school) and the participants were not described as being in a waiting list control.

Attention control

A control was classified as attention control if it was a de novo intervention provided to the participants for the purpose of the research study.

Component classifications

As described in *Chapter 2*, ICA is a subjective process. We defined an intervention component as a potentially active ingredient or constituent part of a main 'therapy-level' intervention. In a NMA, components can be included as indicator variables in a network metaregression; as such, they are pragmatic classifications related to the techniques used, and may not pertain to psychotherapeutic schools or traditions. We did not assume the presence of a component based on the therapy-based intervention-level classification assigned by study authors, but on the details provided about what was done. For example, if an author stated that the intervention was CBT based, we did not assume that it contained a psychoeducation, cognitive or behavioural component unless it was clearly stated in the paper (or intervention manual if applicable). We coded only what was clearly reported, and discuss this further in the limitations section of the discussion (see *Chapter 10*).

Component classifications should also be read independently from the similar-sounding main intervention-level classifications mentioned previously. For example, an intervention-level CBT classification may be defined by the following illustrative combinations of components, depending on what was reported:

- CBT intervention 1 – psychoeducation + cognitive + behavioural + relaxation + exercise
- CBT intervention 2 – cognitive + behavioural
- CBT intervention 3 – psychoeducation + cognitive.

Behavioural

A behavioural component was one in which techniques included helping participants to practise and acquire new skills to cope or manage difficult emotions, moods or behaviours. This component includes strategies used in behavioural activation, social skills exercises (including how to make friends, be a good friend and support your friends), role play, assertiveness training, interpersonal work and activity scheduling and contingency management including goal-setting, planning and decision-making activities, problem-solving and exposure. Following Hetrick *et al.*,[68] this component was initially subdivided into four further subcomponents: (1) social skills training, (2) problem-solving, (3) exposure and (4) 'other' behavioural categories. However, this resulted in unconnected networks, so results are reported for a 'lumped' behavioural component only.

Cognitive

This component label was applied when an intervention included strategies or techniques designed to identify and replace cognitive distortions with more accurate and adaptive ones, for example recognising and understanding thoughts and feelings, using positive self-talk and challenging negative self-talk and thoughts.

Third wave

During the ICA, we observed that standard CBT, third wave interventions and mindfulness/relaxation interventions were often based on combinations of the same components. We included a third wave component category to ensure differentiation between these 'therapy-level' interventions. The component definition is the same as described previously for the intervention level analysis.

Mindfulness

Mindfulness techniques included guided meditation, colouring and drawing, and exercises to practise being in the moment and being free from judgemental thoughts and distractions. On completion of the component coding, we observed that a mindfulness component was always present in conjunction with a relaxation component.

Relaxation

Separate mindfulness and relaxation components were specified to allow for relaxation techniques that were not defined as meditation or mindfulness. This included strategies such as progressive muscle relaxation, abdominal breathing exercises, cue-controlled relaxation, and identification of physiological arousal ('body clues') approaches.

Physiological

A component was coded as physiological if it involved the process of displaying involuntary or subthreshold physiological processes, usually by electronic instrumentation, and learning to voluntarily influence those processes by making changes in cognition.

Bias modification

This component was present only in the main therapy-level intervention, CBM, as described previously. However, on completion of coding, it was retained as a separate component, as the four studies that could be described as evaluating a CBM intervention were assessed as containing different combinations of components:

- study 1[114] – bias modification
- study 2[115] – behavioural + relaxation + physiological + bias modification
- study 3[116] – behavioural + physiological + bias modification
- study 4[117] – cognitive + bias modification.

Psychoeducation

Psychoeducation was also included as a component of broader interventions. The definition applied at the component level is the same as described previously for the intervention-level analysis.

Additional process and implementation classifications

We also extracted information on the following implementation and process components of interventions: number of sessions, duration of intervention (minutes), mode of delivery (face to face or digital), group or individual delivery, who the facilitator was and whether or not training was provided, and whether or not intervention fidelity was monitored. The characteristics of interventions, the components and process details are provided in *Chapters 4* and *5* and in *Appendix 2*. We did not include the process components in the NMA owing to concerns regarding a lack of power and network connectedness.[82]

Chapter 4 Effectiveness of educational setting-based interventions for preventing anxiety

In this chapter, we report the systematic review and NMA results for studies reporting an anxiety outcome only. Studies reporting a depression outcome are reported in *Chapter 5* and additional and secondary outcomes are reported in *Chapter 6*.

Systematic review results

Studies included in the review

The overall Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram for the whole review is reported in *Figure 2*. A total of 11,990 citations were screened, and 1512 full-text articles were retrieved for further screening. Of these, 142 studies were identified as eligible for inclusion in either the anxiety, depression or conduct disorder reviews. Fifty-four studies reported both an anxiety and a depression outcome. The full list of included studies can be found in *Appendix 2*.

Of the 142 studies eligible for the review, 79 included a self-reported anxiety outcome; the details are reported in this chapter. Studies reporting a depression or conduct disorder outcome are reported separately in *Chapters 5* and *7*. Among the studies reporting an anxiety outcome, the primary focus of 38 studies was the prevention of anxiety whereas 13 were focused on the prevention of depression and 28 addressed both anxiety and depression. Subgroup analyses examining whether or not intervention effects differed by intended focus of the intervention are reported in *Exploring heterogeneity and small-study effects*.

Study characteristics are reported in *Appendix 2*. Included studies were published between 1982 and 2018, and randomised between 22 and 5030 participants (median 184 participants). There were 43 cluster randomised studies, of which four reported cluster-adjusted means and SDs and 35 reported model-based estimates. Thirty-six were individually randomised trials. Seventy-three studies reported a post-intervention end point, 38 reported a follow-up of between 6 and 12 months and seven reported a follow-up of between 13 and 24 months. Studies could report more than one follow-up time point; details of studies reporting multiple time points are in *Appendix 2*.

Forty-four studies were classified as universal and 35 were classified as targeted (27 indicated, eight selective). Twenty-seven studies were implemented in primary schools, 45 in secondary schools, five in tertiary education and two across multiple settings (i.e. two or more settings). Seventy studies were conducted in HICs, with eight conducted in MICs and one in a LIC. Of the studies conducted in HICs, five were conducted in lower-income settings, as specified by the trial authors. Categorisation of LICs and MICs was based on 2017 World Bank classifications.[62]

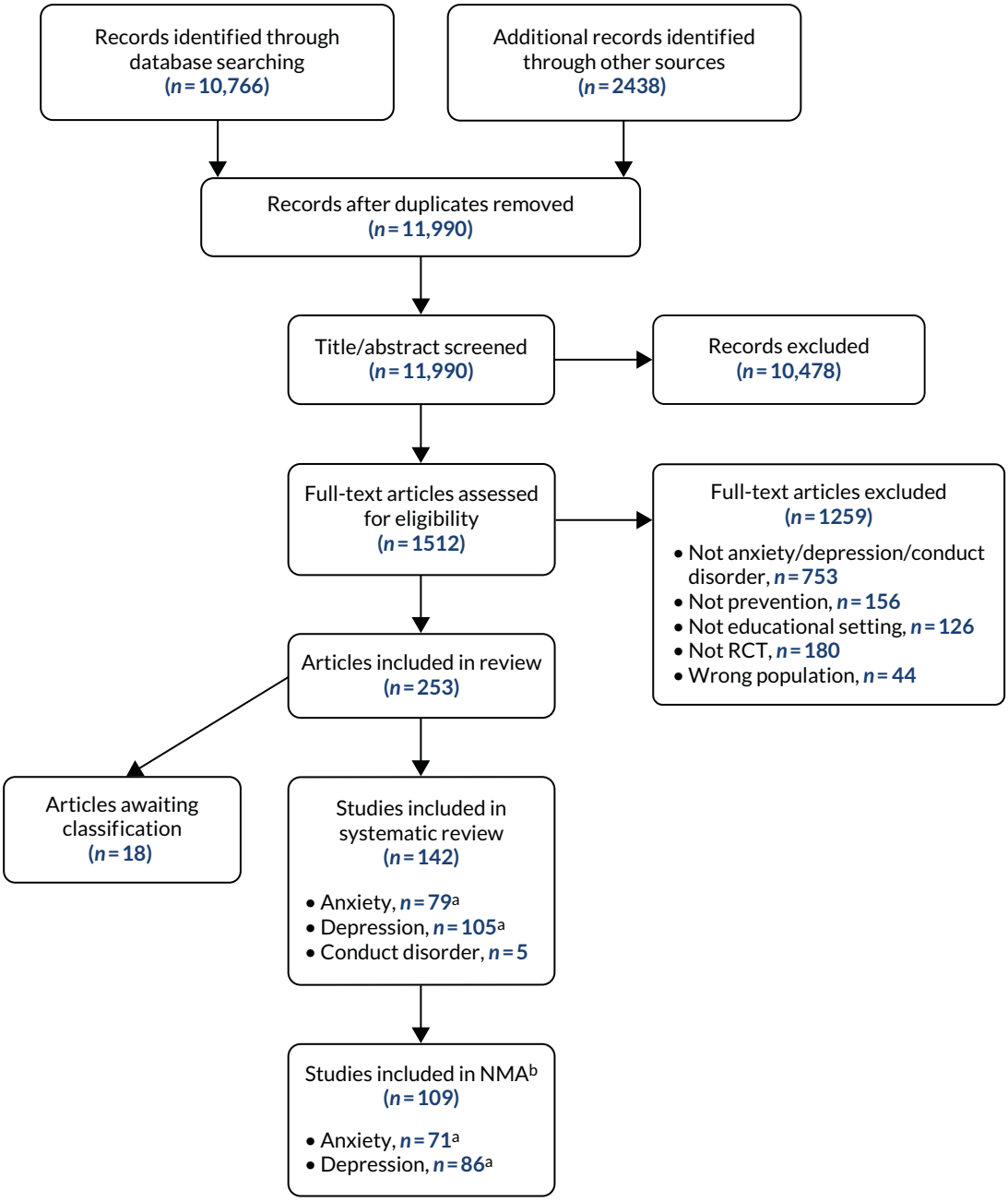

FIGURE 2 Study selection process: PRISMA flow diagram for whole systematic review. a, Not mutually exclusive. Some studies reported both anxiety and depression outcomes. Of 142 studies, 54 reported both anxiety and depression outcomes. Seven did not report either. Forty-eight of 109 studies contributing to the NMA reported both an anxiety and a depression outcome. b, Study was included in the NMA at any of the follow-up time points. Note that references to the main study publication and articles awaiting classification are listed in *Appendix 2*.

Risk-of-bias assessment

Study-level risk-of-bias assessments are reported in *Appendix 2*. Thirteen of the 79 studies reporting an anxiety outcome were assessed as being at low risk of bias for both random sequence generation and allocation concealment. A further 13 studies reported a suitable randomisation approach, but did not report sufficient details of allocation concealment to allow assessment (i.e. unclear). Fifty studies were judged as having unclear risk of bias for both random sequence generation and allocation concealment. Two studies were judged to have an unclear risk of bias for randomisation and a low risk of bias for allocation concealment. One study was judged to have a low risk of bias for randomisation and a high risk of bias for allocation concealment.

Seventy-three studies were judged to be at high or unclear risk of bias for participant blinding. The six studies judged to have a low risk of bias for participant blinding used active controls or alternative interventions. Study protocols and/or trial registrations were available for 23 studies, of which 20 were considered to have a low risk of bias, and three an unclear risk of bias, for selective outcome reporting. For cluster randomised trials, we also considered how recruitment, randomisation and analysis were conducted under the Cochrane Risk of Bias tool heading of 'other bias'. Of 43 cluster RCTs, 19 were judged to be at high risk for 'other bias'.

Interventions and components identified in the review

Table 2 reports the interventions and components identified for studies reporting a self-reported anxiety outcome. Seventeen studies compared three or more interventions. Sixty-two studies included an intervention based on CBT, eight included a relaxation/mindfulness-based intervention, one included an intervention based on CBT + IPT, three included a 'third-wave' intervention, four used methods of biofeedback, two included an exercise intervention and two used CBM approaches. One study used an occupational therapy-based intervention. With regard to non-active comparators, 27 studies were waiting list controlled, 17 were 'usual curriculum' controlled, 16 had a no-intervention control and 14 used an attention control.

Table 2 also reports the combinations of components identified across all studies reporting an anxiety outcome (at any time point) by population and setting. Components are reported by intervention arm level, and not at the trial level. When there are multiarm trials (i.e. three or more arms) with multiple 'active' interventions, intervention components are reported on separate lines. There were 99 active intervention arms, of which 67 had a psychoeducation component. Seventy-eight interventions had a cognitive component, 75 had a behavioural component, eight had a mindful component, four had third-wave components, 60 had a relaxation component, six had a physiological component, four arms had an exercise component and four had a bias modification component.

Further intervention process and delivery characteristics are reported in *Appendix 2*. The number of sessions implemented ranged from 2 to 120 [mean 11.13 (SD 13.44) sessions]. As a proxy for intervention dose, we calculated the intervention intensity as total session time (number of sessions × duration in minutes). This ranged from 135 to 10,800 minutes [mean 740.15 (SD 1295.60) minutes]. A total of 90% of interventions were delivered to whole classrooms or small groups. Forty-three per cent of interventions were delivered by a MHP, school counsellor or student psychologist, and 10% were delivered by miscellaneous external professionals. Twenty-two per cent of studies used interventions delivered by teachers. Fifteen per cent of studies involved a combination of both teaching and a MHP/psychology professional. Four studies implemented interventions via computer. Two studies could not be classified.

Network meta-analysis results

Of the 79 studies reporting an anxiety outcome, 71 ($n = 33{,}377$ participants) contributed data to the NMA for anxiety (across all settings and time points). Forty-eight of these studies also reported a depression outcome and contributed to the depression NMA reported in *Chapter 5*. The network plot for all studies reporting an anxiety outcome across all populations and settings is reported in *Figure 3*.

Analyses were conducted separately by population, setting and follow-up time point. Three models were compared for each analysis: a main effects (intervention-level) model, an additive component model and a full interaction component model for the primary time point of immediately post intervention. The longer-term follow-ups of 6–12, 13–24 and ≥ 25 months are reported for the standard intervention-level NMAs only. When data were available from head-to-head trials, we conducted pairwise meta-analyses. The results are reported alongside NMA results in *Table 3*. Full NMA and pairwise results are reported in *Appendix 4*.

TABLE 2 Intervention-level classifications and component classifications by population and setting for anxiety outcome

		Classification												
		Intervention level				Component level, for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	BM
Universal secondary setting														
Araya *et al.*[118] 2013	Depression	(Usual curriculum)	CBT			–	+	+	–	–	–	–	–	–
Aune and Stiles[119] 2009	Anxiety	(No intervention)	CBT			+	+	+	–	–	–	–	–	–
Baker and Butler[120] 1984	Anxiety	CBT	CBT			–	+	+	–	–	+	–	–	–
						–	+	+	–	–	+	–	–	–
Barrett *et al.*[121] 2005	Anxiety	(No intervention)	CBT			+	+	+	–	–	+	–	–	–
Bonhauser *et al.*[122] 2005	Anxiety + depression	Exercise	Exercise			–	–	–	–	–	–	–	+	–
Bonhauser *et al.*[122] 2005						–	–	–	–	–	–	–	+	–
Britton *et al.*[123] 2014	Anxiety + depression	(Attention control)	Mindfulness/ relaxation			–	–	–	+	–	+	–	–	–
Burckhardt *et al.*[124] 2015	Anxiety + depression	(Attention control)	Mindfulness/ relaxation			–	–	–	–	–	+	–	–	–
Calear *et al.*[125] 2009	Anxiety + depression	(Waiting list)	CBT			–	+	+	–	–	+	–	–	–
Calear *et al.*[126] 2016	Anxiety	(Waiting list)	CBT	CBT		+	+	+	+	–	+	–	–	–
						+	+	+	+	–	+	–	–	–
Calear *et al.*[127] 2016	Anxiety	(Waiting list)	CBT			+	+	+	+	–	+	–	–	–
Gillham *et al.*[128] 2006	Anxiety + depression	(No intervention)	CBT			+	+	+	–	–	–	–	–	–
Gucht *et al.*[129] 2017	Anxiety + depression	(Usual curriculum)	Third wave			+	–	–	–	+	–	–	–	–

		Classification												
		Intervention level				Component level, for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	BM
Hiebert *et al.*[130] 1989	Anxiety	(Attention control)	Mindfulness/ relaxation			+	–	–	–	–	+	+	–	–
Hodas[131] 2016	Anxiety + depression	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Johnson *et al.*[132] 2016	Anxiety + depression	(Usual curriculum)	Third wave			–	–	–	+	+	+	–	–	–
Johnson *et al.*[133] 2017	Anxiety + depression	(Usual curriculum)	Third wave	Third wave		–	–	–	+	+	+	–	–	–
Johnson *et al.*[133] 2017						–	–	–	+	+	+	–	–	–
Lock and Barrett[134] 2003	Anxiety	(No intervention)	CBT			+	+	+	–	–	+	–	–	–
Lowry-Webster *et al.*[135] 2001	Anxiety + depression	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
Perry *et al.*[136] 2017	Depression	(Attention control)	CBT			+	+	+	–	–	+	–	–	–
Potek[137] 2012	Anxiety	(Waiting list)	Mindfulness/ relaxation			+	–	–	+	–	+	–	–	–
Roberts *et al.*[138] 2003	Depression	(Usual curriculum)	CBT			–	+	+	–	–	–	–	–	–
Roberts *et al.*[139] 2010	Anxiety + depression	(Usual curriculum)	CBT			–	+	+	–	–	–	–	–	–
Rodgers and Dunsmuir[140] 2015	Anxiety	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–

continued

TABLE 2 Intervention-level classifications and component classifications by population and setting for anxiety outcome (*continued*)

		Classification												
		Intervention level				Component level, for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	BM
Sheffield *et al.*[141] 2006	Depression	(No intervention)	CBT			+	+	+	–	–	–	–	–	–
Stallard *et al.*[142] 2013	Depression	(Usual curriculum)	(Attention control)	CBT + IPT		+	+	+	–	–	+	–	–	–
Tomba *et al.*[143] 2010	Anxiety + depression	CBT	CBT			+	+	+	–	–	+	–	–	–
Tomba *et al.*[143] 2010						+	+	+	–	–	+	–	–	–
Wong *et al.*[144] 2014	Anxiety + depression	(Usual curriculum)	CBT	CBT		+	+	+	–	–	–	–	–	–
Wong *et al.*[144] 2014						+	+	+	–	–	–	–	–	–
Universal primary setting														
Ahlen *et al.*[145] 2018	Anxiety + depression	(Usual curriculum)	CBT			+	+	+	–	–	+	–	–	–
Attwood *et al.*[146] 2012	Anxiety	(Attention control)	CBT			+	+	+	–	–	–	–	–	–
Barrett and Turner[147] 2001	Anxiety	(Usual curriculum)	CBT	CBT		+	+	+	–	–	+	–	–	–
Barrett and Turner[147] 2001						+	+	+	–	–	+	–	–	–
Bouchard *et al.*[148] 2013	Anxiety	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Collins *et al.*[149] 2014	Anxiety	(Usual curriculum)	CBT	CBT		+	+	+	–	–	+	–	–	–
Collins *et al.*[149] 2014						+	+	+	–	–	+	–	–	–

		Classification												
		Intervention level				Component level, for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	BM
Essau *et al.*[150] 2012	Anxiety	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
Gallegos[151] 2008	Anxiety + depression	(Usual curriculum)	CBT			+	+	+	–	–	+	–	–	–
Johnstone *et al.*[152] 2014	Anxiety + depression	(Usual curriculum)	CBT			–	+	+	–	–	+	–	–	–
Miller *et al.*[153] 2010	Anxiety	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Miller *et al.*[154] 2011	Anxiety	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
Miller *et al.*[154] 2011	Anxiety	(Attention control)	CBT			+	+	+	–	–	+	–	–	–
Pattison and Lynd-Stevenson[155] 2001	Depression	(No intervention)	(Attention control)	CBT	CBT	–	+	+	–	–	–	–	–	–
Pattison and Lynd-Stevenson[155] 2001						–	+	+	–	–	–	–	–	–
Pophillat *et al.*[156] 2016	Anxiety + depression	(Usual curriculum)	CBT			+	+	–	–	–	–	–	–	–
Rooney *et al.*[157] 2006	Depression	(No intervention)	CBT			–	+	+	–	–	+	–	–	–
Ruttledge *et al.*[158] 2016	Anxiety	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
Stallard *et al.*[159] 2014	Anxiety	(Usual curriculum)	CBT	CBT		+	+	+	–	–	+	–	–	–
Stallard *et al.*[159] 2014						+	+	+	–	–	+	–	–	–

continued

TABLE 2 Intervention-level classifications and component classifications by population and setting for anxiety outcome (*continued*)

		Classification												
		Intervention level				Component level, for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	BM
Targeted secondary setting														
Balle and Tortella-Feliu[160] 2010	Anxiety	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
Berry and Hunt[161] 2009	Anxiety	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Cova *et al.*[162] 2011	Depression	(No intervention)	CBT			+	+	+	–	–	–	–	–	–
Dobson *et al.*[163] 2010	Anxiety + depression	(Attention control)	CBT			–	+	+	–	–	–	–	–	–
Fitzgerald *et al.*[114] 2016	Anxiety	(Attention control)	CBM			–	–	–	–	–	–	–	–	+
Gaete *et al.*[164] 2016	Depression	(Usual curriculum)	CBT			–	+	+	–	–	–	–	–	–
Gillham *et al.*[165] 2012	Depression	(No intervention)	CBT	CBT		+	+	+	–	–	+	–	–	–
Gillham *et al.*[165] 2012						+	+	+	–	–	+	–	–	–
Hiebert *et al.*[130] 1989	Anxiety	(Waiting list)	Mindfulness/ relaxation	Biofeedback		+	–	–	–	–	+	+	–	–
Hiebert *et al.*[130] 1989						–	–	–	–	–	–	+	–	–
Hunt *et al.*[166] 2009	Anxiety	(No intervention)	CBT			+	+	+	–	–	+	–	–	–
Jordans *et al.*[167] 2010	Anxiety + depression	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Kiselica *et al.*[168] 1994	Anxiety	Psychosupport	CBT			+	+	+	–	–	+	–	–	–
Owen and Lanning[169] 1982	Anxiety	(Waiting list)	Mindfulness/ relaxation	CBT	CBT	–	–	–	–	–	+	–	–	–

		Classification												
		Intervention level				Component level, for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	BM
Owen and Lanning[169] 1982						+	+	–	–	–	–	–	–	–
Owen and Lanning[169] 1982						+	+	–	–	–	+	–	–	–
Peng *et al.*[170] 2015	Anxiety + depression	(No intervention)	Exercise			–	–	–	–	–	+	–	+	–
Rice[171] 2009	Anxiety	(Attention control)	CBT	Mindfulness/ relaxation		+	+	+	–	–	+	–	–	–
Rice[171] 2009						–	–	–	–	–	+	–	+	–
Scholten *et al.*[172] 2016	Anxiety	(Attention control)	Biofeedback			–	–	–	–	–	+	+	–	–
Sheffield *et al.*[141] 2006	Depression	(No intervention)	CBT	CBT	CBT	+	+	+	–	–	–	–	–	–
Sheffield *et al.*[141] 2006						+	+	+	–	–	–	–	–	–
Sheffield *et al.*[141] 2006						+	+	+	–	–	–	–	–	–
Sportel *et al.*[117] 2013	Anxiety	(No intervention)	CBM	CBT		–	+	–	–	–	–	–	–	+
Sportel *et al.*[117] 2013						–	+	+	–	–	–	–	–	–
Topper *et al.*[173] 2017	Anxiety + depression	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–

continued

TABLE 2 Intervention-level classifications and component classifications by population and setting for anxiety outcome (*continued*)

		Classification												
		Intervention level				Component level, for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	BM
Targeted primary setting														
Cooley-Strickland *et al.*[174] 2011	Anxiety	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
Manassis *et al.*[175] 2010	Anxiety + depression	(Attention control)	CBT			+	+	–	–	–	–	–	–	–
McLoone *et al.*[176] 2012	Anxiety	(Waiting list)	CBT	CBT		+	+	+	–	–	–	–	–	–
McLoone *et al.*[176] 2012						+	+	+	–	–	–	–	–	–
Mifsud and Rapee[177] 2005	Anxiety	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Miller *et al.*[178] 2011	Anxiety	(Attention control)	CBT			+	+	+	–	–	+	–	–	–
Schoneveld *et al.*[115] 2016	Anxiety	(Attention control)	Biofeedback			–	–	+	–	–	+	+	–	+
Schoneveld *et al.*[116] 2018	Anxiety	CBT	Biofeedback			–	+	+	–	–	+	–	–	–
Schoneveld *et al.*[116] 2018						–	–	+	–	–	–	+	–	+
Simpson[179] 2008	Anxiety + depression	(Attention control)	CBT			+	+	+	–	–	–	–	–	–
Siu[180] 2007	Anxiety + depression	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
Tokolahi *et al.*[181] 2018	Anxiety + depression	(Waiting list)	Occupational therapy			–	–	–	–	–	–	–	–	–
van Starrenburg *et al.*[182] 2017	Anxiety	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–

Study	Focus[a]	Classification: Intervention level: Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Component level, for active intervention only: Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	BM
Targeted tertiary/university setting														
Cui *et al.*[183] 2016	Depression	(Waiting list)	Psychosupport	CBT		+	+	+	–	–	+	–	–	–
Ellis *et al.*[184] 2011	Depression	(No intervention)	Psychosupport	CBT		+	+	+	–	–	+	–	–	–
Higgins[185] 2007	Anxiety	(No intervention)	CBT			+	+	+	–	–	+	–	–	–
Seligman *et al.*[186] 1999	Anxiety + depression	(No intervention)	CBT			+	+	+	–	–	+	–	–	–
Seligman *et al.*[187] 2007	Anxiety + depression	(No intervention)	CBT			+	+	+	–	–	+	–	–	–
Multiple/mixed settings														
Liddle and Macmillan[188] 2010	Anxiety	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
Velásquez *et al.*[189] 2015	Anxiety + depression	(Waiting list)	Mindfulness/ relaxation			–	–	–	–	–	+	–	–	–

a Focus of intervention describes the CMD that the intervention aimed to prevent.
b Arm = number of arms included in the study. Studies listed multiple times denote multiple active arms. Components are listed for active interventions only.

Note
Parentheses indicate control interventions (usual curriculum, attention control, waiting list and no intervention).

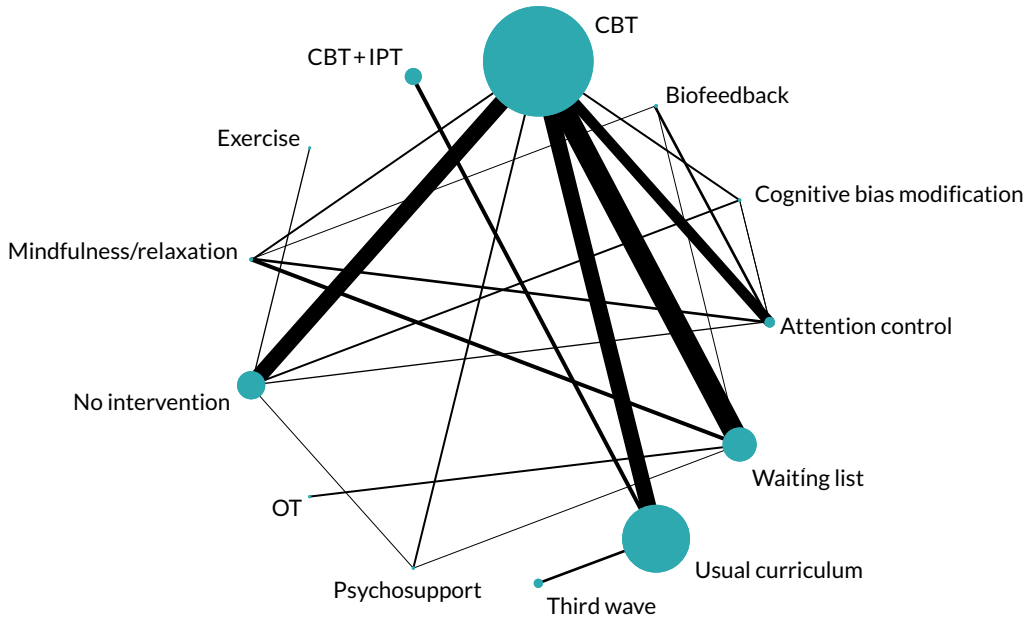

FIGURE 3 Network plot of all eligible studies reporting an anxiety outcome. OT, occupational therapy; third wave, third-wave CBT-based therapies. The plot edges (lines) connecting each pair of interventions represent a direct comparison and are proportional to the number of trials making that direct comparison. Intervention 'nodes' are proportional to the number of participants randomised to each intervention.

TABLE 3 Results from the NMA and pairwise meta-analyses for the primary end point of post intervention for self-reported anxiety

Setting	Intervention	Reference intervention	NMA		Direct meta-analysis		Number of direct trials
			SMD	95% CrI	SMD	95% CrI	
Universal secondary	CBT	Usual curriculum	−0.15	−0.34 to 0.04	−0.15	−0.33 to 0.02	3
	Third wave	Usual curriculum	0.03	−0.14 to 0.20	0.04	−0.10 to 0.19	3
	Mindfulness/ relaxation	Usual curriculum	−0.65	−1.14 to −0.19	NA	NA	0
Universal primary	CBT	Usual curriculum	−0.07	−0.23 to 0.05	−0.08	−0.24 to 0.04	6
Targeted secondary	CBT	No intervention	0.03	−0.11 to 0.16	0.03	−0.10 to 0.16	4
	CBM	No intervention	−0.17	−0.45 to 0.11	−0.21	−0.54 to 0.15	1
	Exercise	No intervention	−0.47	−0.86 to −0.09	−0.47	−0.86 to −0.08	1
	Biofeedback	No intervention	−0.18	−0.55 to 0.21	NA	NA	0
	Mindfulness/ relaxation	No intervention	0.03	−0.42 to 0.48	NA	NA	0
Targeted primary	CBT	Waiting list	−0.38	−0.84 to 0.07	−0.35	−0.79 to 0.09	5
	Occupational therapy	Waiting list	0.11	−0.91 to 1.14	0.11	−0.93 to 1.16	1
	Biofeedback	Waiting list	−0.38	−1.50 to 0.72	NA	NA	0

NA, not available.

Notes

Network meta-analysis results from a random-effects model assuming consistency and pairwise results from a random-effects unrelated treatment effect model. Intervention effects are reported relative to a reference intervention per network. In universal networks, the reference intervention was usual curriculum. In the targeted secondary network, the reference intervention was no intervention, and for targeted primary, it was waiting list. Full NMA results for all available comparisons are reported in *Appendix 4*.

Universal population, secondary setting

Post intervention

The analysis-specific network diagram is reported in *Figure 4*. Twenty-one studies ($n = 10,208$ participants) contributed to the analysis for the main time point of immediately post intervention.[119,120,125–141,143,144] Most studies in this network were judged to be at unclear risk of bias. The risk of bias was judged to be unclear for 13 studies and low for three studies in both the randomised sequence generation and allocation concealment domains. In four studies, the risk of bias was judged to be low for randomisation but unclear for allocation concealment. In one study, the risk of bias was judged to be unclear for randomisation but low for allocation concealment. Sixteen studies included an intervention based on CBT, three were based on third-wave interventions, and two were mindfulness/relaxation-based interventions; the reference intervention was usual curriculum (see *Appendix 2* for details). All reported results are from a random-effects NMA model unless otherwise stated. Model fit and selection statistics suggested that a consistency model was appropriate. Of the three models fitted (intervention, additive and full interaction), the additive model was preferred, suggesting evidence for effect modification by components. All model fit statistics are reported in *Appendix 3*. Results reported in the following sections are SMDs and 95% CrIs.

Intervention-level model

Between-study posterior median SDs (τ) were indicative of moderate heterogeneity (τ 0.11, 95% CrI 0.02 to 0.22). *Table 3* reports SMDs (and 95% CrIs) for each active intervention relative to usual curriculum. There was weak evidence of a modest effect of CBT in preventing symptoms of anxiety post intervention (SMD −0.15, 95% CrI −0.34 to 0.04). Mindfulness/relaxation interventions (SMD −0.65, 95% CrI −1.14 to −0.19) reduced symptoms relative to usual curriculum. However, this finding must be interpreted in the context of the possible small-study effects observed in the funnel plot reported in *Appendix 6*, *Figure 17*, and the ratings of unclear risk of bias. Only two small mindfulness/relaxation studies ($n = 30$,[130] and $n = 79$[137] participants) contributed to the network, and both were rated as having an unclear risk of bias for random sequence generation and allocation concealment. There was a lack of evidence for the effect of third-wave interventions (SMD 0.03, 95% CrI −0.14 to 0.20).

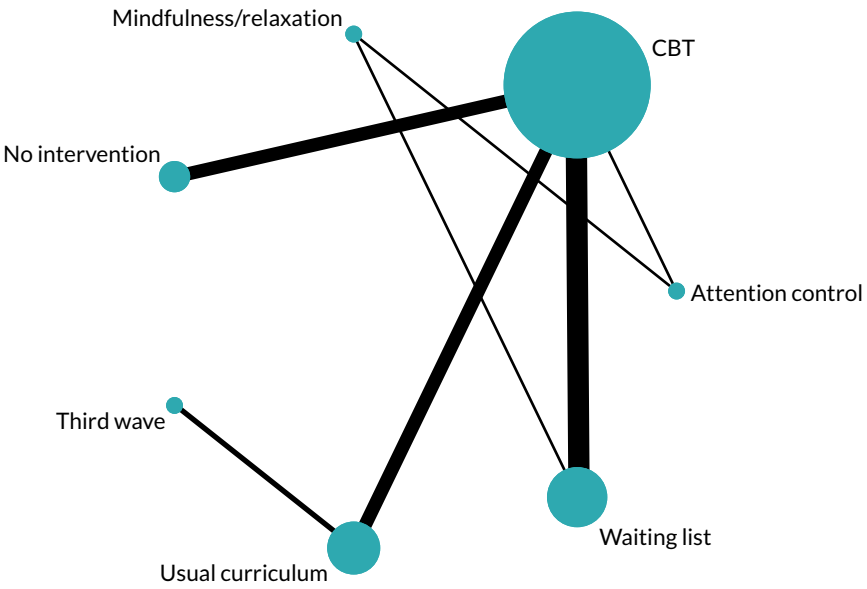

FIGURE 4 Network plot for universal population, secondary setting: post-intervention anxiety outcome.

Additive model: components nested within intervention

Component-level models were fitted to evaluate whether or not the observed between-study heterogeneity in the intervention model could be explained by differences in intervention components.

We fitted an additive model with components nested within interventions, such that a main intervention effect was estimated, plus an additional effect for the inclusion of a specific component. Results are reported as regression coefficients (β-values and 95% CrIs) describing the increase or decrease in SMD via the addition of each component to each intervention. The coefficients can be interpreted as the additional effect of each specific component over and above the 'common' intervention-level effect.

All CBT interventions in the universal secondary network included a cognitive and a behavioural component. We estimated the additional effect of including a psychoeducational, mindfulness or relaxation component to cognitive and behavioural components. The between-study heterogeneity was reduced compared with that of the intervention-level analysis (τ 0.06, 95% CrI 0.00 to 0.21) (see *Appendix 3*). The effect of any CBT intervention including a psychoeducation component was to reduce the SMD (β −0.39, 95% CrI −0.78 to 0.01). The effect of including a mindfulness component in a CBT intervention was to increase the SMD (β 0.57, 95% CrI 0.08 to 1.03) (i.e. less effective at reducing anxiety). There was no evidence to suggest an effect of adding a relaxation component to CBT (β 0.07, 95% CrI −0.21 to 0.38).

Table 4 reports the SMDs for all specific additive combinations of intervention components. Under the additive component model, it is possible to estimate an effect for all combinations, even in the absence of directly observable trials. Relative to a usual curriculum control, there is some evidence that the combination of cognitive + behavioural + psychoeducation components is effective at reducing anxiety post intervention in universal secondary settings (SMD −0.30, 95% CrI −0.59 to −0.01). There is a lack of evidence for all other combinations.

TABLE 4 Results from additive and full interaction component models: universal secondary settings, self-reported anxiety

Population/ setting	Main intervention	Components (within main intervention)	Study arms (*n*)	Model, SMD (95% CrI)	
				Additive	Full interaction
Universal secondary, anxiety	CBT	(Cognitive + behavioural)	2	0.09 (−0.17 to 0.36)	0.09 (−0.22 to 0.40)
		(Cognitive + behavioural) + psychoeducation	6	−0.30 (−0.59 to −0.01)	−0.30 (−0.62 to 0.02)
		(Cognitive + behavioural) + relaxation	2	0.16 (−0.22 to 0.57)	−31.49 (−144.2 to 90.84)
		(Cognitive + behavioural) + psychoeducation + relaxation	6	−0.23 (−0.62 to 0.19)	−0.21 (−0.66 to 0.26)
		(Cognitive + behavioural) + psychoeducation + mindfulness + relaxation	3	0.34 (−0.12 to 0.82)	−31.32 (−144 to 91.01)
		(Cognitive + behavioural) + mindfulness	0	0.66 (−0.02 to 1.31)	–
		(Cognitive + behavioural) + mindfulness + relaxation	0	0.73 (0.03 to 1.45)	–
		(Cognitive + behavioural) + psychoeducation + mindfulness	0	0.27 (−0.10 to 0.64)	–

Notes
Intervention components are nested within the main intervention (CBT). All CBT interventions in the universal secondary analysis contained a cognitive and a behavioural component. The 'Study arms' column reports the number of trial arms that include the specific combination of components listed. As there are several multiarm trials, this is not equivalent to the number of studies. For example, there are two study arms that include a CBT intervention, which is defined only by cognitive and behavioural components. The reference intervention is usual curriculum. SMD and 95% CrIs are reported for the additive and full interaction models. For full details of the models, see *Chapter 2* and *Appendix 1*.

Full interaction model: components nested within intervention

Under a full interaction model, each different combination of intervention and components is considered as a separate intervention. For example, a CBT intervention with cognitive + behavioural + psychoeducation components is considered to be distinct from CBT with cognitive + behavioural + psychoeducation + relaxation components. However, the power to estimate and detect evidence of interactions is limited by the data available for each distinct combination. For the universal secondary anxiety analysis, there were sufficient data to estimate the effects for CBT-based interventions only, although we note that power was low and convergence was problematic. Model fit statistics suggested that the full interaction model was slightly preferred over the intervention-level model, but that the additive effect model is preferred overall (see *Appendix 3*). However, for completeness, we also report the full interaction results in *Table 4*. There was weak evidence that CBT with cognitive + behavioural + psychoeducation components is effective relative to usual curriculum (SMD −0.30, 95% CrI −0.62 to 0.02). The between-study posterior median SD was suggestive of low to moderate heterogeneity (τ 0.09, 95% CrI 0.01 to 0.24). Regression coefficients are reported in *Appendix 3*, but yielded very imprecise estimates of change in SMD.

Universal, secondary, further time points: intervention-level effects

Full results for the following time points are reported in *Appendix 6*. Details for studies contributing to each time point are reported in *Appendix 2*.

Six to 12 months post intervention Fifteen studies ($n = 13{,}150$ participants), comparing seven interventions, were included in the analysis for 6–12 months post intervention.[118,125,126,128,129,131,133–136,138,139,141–143] Twelve studies included an intervention based on CBT, one study included a CBT + IPT intervention and two studies included a third-wave intervention. There was no evidence to suggest that any intervention reduced symptoms of anxiety between 6 and 12 months, relative to usual curriculum (CBT: SMD −0.11, 95% CrI −0.34 to 0.11; third wave: SMD −0.05, 95% CrI −0.32 to 0.22; and CBT + IPT: SMD −0.02, 95% CrI −0.42 to 0.36). Between-study heterogeneity was moderate (τ 0.15, 95% CrI 0.06 to 0.37).

Thirteen to 24 months post intervention Three studies ($n = 1077$ participants) contributed to the analysis for 13–24 months post intervention, all of which included an intervention based on CBT.[136,138,139] There was no evidence to suggest that CBT-based interventions prevented symptoms of anxiety between 13 and 24 months, relative to usual curriculum (SMD −0.01, 95% CrI −2.84 to 2.81).

Twenty-five or more months post intervention One study ($n = 92$ participants) reported a follow-up time point of 30 months.[139] The SMD for the effect of CBT relative to usual curriculum was −0.23 (95% CrI −0.55 to 0.08). The study was rated as having an unclear risk of bias for random sequence generation and allocation concealment.

Universal population, primary setting

Post intervention

The analysis-specific network diagram for universal primary settings is reported in *Figure 5*. Fifteen studies from 14 publications ($n = 5605$ participants) contributed to the analysis for the main time point of immediately post intervention.[145–158] Thirteen studies were deemed to have an unclear risk of bias and one study was deemed to have a low risk of bias for both randomised sequence generation and allocation concealment domains. One study was judged to be at unclear risk of bias for randomisation but at low risk of bias for allocation concealment. All studies included an intervention based on CBT. Model fit and selection statistics suggested that a random-effects consistency model was appropriate. Fit was similar across all three models (intervention, additive and full interaction) but indicated that the intervention-level model was preferred (see *Appendix 3*). Therefore, we report effect estimates from the intervention-level analysis only. Regression coefficients from the additive and full interaction models are reported in *Appendix 3*.

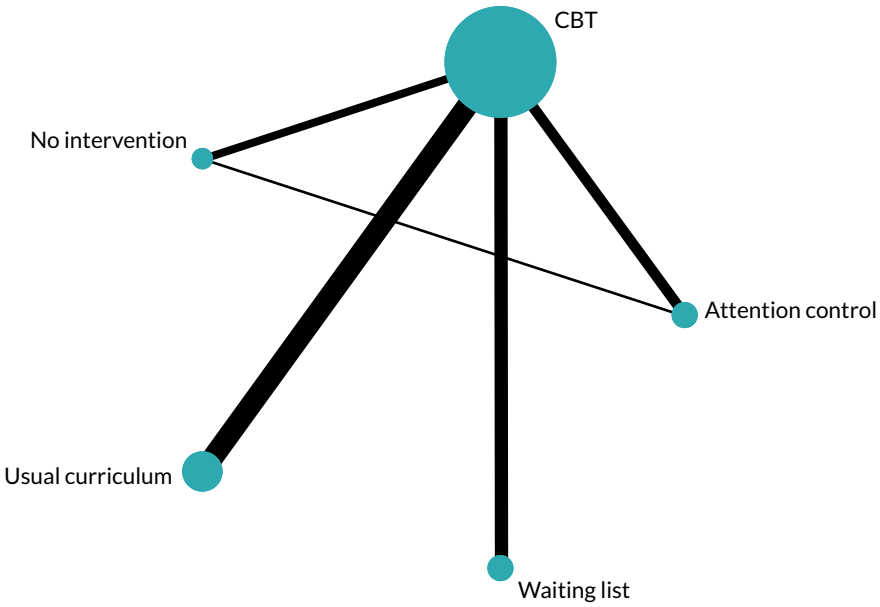

FIGURE 5 Network plot for universal population, primary setting: post-intervention anxiety outcome.

Intervention-level model

Between-study posterior median SDs were indicative of moderate heterogeneity (τ 0.10, 95% CrI 0.01 to 0.26). There was weak evidence of a very small effect of CBT relative to usual curriculum (SMD −0.07, 95% CrI −0.23 to 0.05) (see *Table 3*).

Universal, primary, further time points: intervention-level effects

Six to 12 months post intervention Ten studies ($n = 4794$ participants) contributed to the analysis for 6–12 months post intervention, all of which evaluated a CBT-based intervention.[145,149–152,154,155,157,159] Between-study posterior median SDs were indicative of substantial heterogeneity (τ 0.22, 95% CrI 0.08 to 0.45). There was no evidence that CBT reduced symptoms of anxiety at between 6 and 12 months, relative to usual curriculum (SMD −0.11, 95% CrI −0.35 to 0.11) (see *Appendix 5*).

Thirteen to 24 months post intervention Three studies ($n = 1603$ participants) contributed to the analysis for 13–24 months post intervention, all of which included an intervention based on CBT.[152,157,159] There was no evidence to suggest that CBT-based interventions prevented symptoms of anxiety at between 13 and 24 months, relative to usual curriculum (SMD 0.00, 95% CrI −0.68 to 0.71; τ 0.13).

Twenty-five or more months post intervention One study ($n = 910$ participants) reported a follow-up time point of 30 months.[152] This study provided weak evidence of a small effect of CBT relative to usual curriculum (SMD −0.12, 95% CrI −0.26 to 0.02). The study was deemed to be at unclear risk of bias for random sequence generation and allocation concealment.

Targeted population, secondary setting

Post intervention

The analysis-specific network diagram for targeted secondary settings is reported in *Figure 6*. Fifteen studies ($n = 2383$ participants) contributed to the analysis for the main time point of immediately post intervention.[114,117,130,141,160–163,165,167,168,170–173] Three studies were deemed to be at low risk of bias and seven were deemed to be at unclear risk of bias for randomised sequence generation and allocation concealment. Four studies were deemed to be at low risk of bias for randomised sequence generation and at unclear risk for allocation concealment. Five studies were multiarm and compared multiple active interventions. Twelve studies included an intervention based on CBT, two studies examined

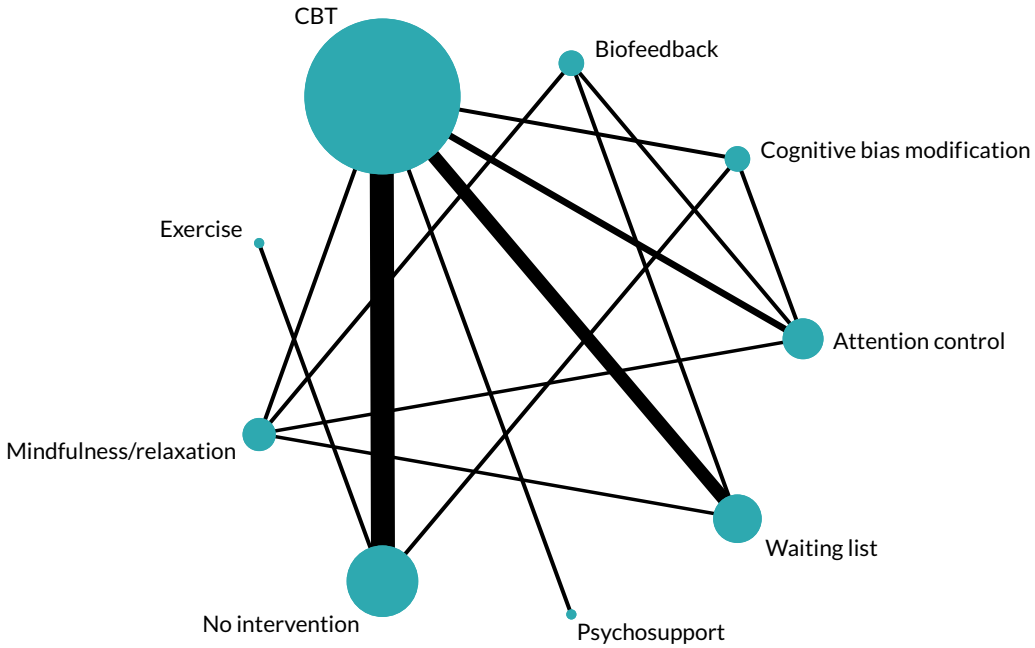

FIGURE 6 Network plot for targeted population, secondary setting: post-intervention anxiety outcome.

biofeedback interventions, two studies included a CBM intervention, two studies included a mindfulness/relaxation intervention and one study evaluated study an exercise intervention. Model fit and selection statistics suggested that a random-effects consistency model was appropriate. Model fit was similar across all three intervention models (main intervention, additive and full interaction) (see *Appendix 3*). There was no evidence of effect modification by intervention components in targeted secondary settings. The intervention-level model is preferred, and regression coefficients from the additive and full interaction models are reported in *Appendix 3*.

Intervention-level effects

There was mild to moderate between-study heterogeneity (τ 0.06, 95% CrI 0.00 to 0.21). *Table 3* reports SMDs (and 95% CrIs) for each active intervention, relative to no intervention. There was no evidence of an effect for CBT (SMD 0.03, 95% CrI −0.11 to 0.16), biofeedback (SMD −0.18, 95% CrI −0.55 to 0.21), CBM (SMD −0.17, 95% CrI −0.45 to 0.11) or mindfulness/relaxation (SMD 0.03, 95% CrI −0.42 to 0.48). There was evidence that exercise reduced post-intervention anxiety symptoms, relative to no intervention (SMD −0.47, 95% CrI −0.86 to −0.09). However, exercise was evaluated in only one study, which was judged to be at unclear risk of bias for random sequence generation and allocation concealment.

Targeted, secondary, further time points: intervention-level effects only

Six to 12 months post intervention Six studies ($n = 1284$ participants) contributed to the analysis for 6–12 months post intervention, of which all included a CBT-based intervention and one included a CBM intervention (three-arm study).[117,141,160,163,165,173] There was evidence of mild to moderate between-study heterogeneity (τ 0.06, 95% CrI 0.00 to 0.25). There was no evidence that either CBT (SMD 0.05, 95% CrI −0.12 to 0.20) or CBM (SMD −0.14, 95% CrI −0.53 to 0.24) reduced anxiety at between 6 and 12 months, relative to no intervention.

Thirteen to 24 months, and ≥ 25 months, post intervention One study ($n = 260$ participants),[166] deemed to be at unclear risk of bias, provided evidence for a small effect of CBT, relative to no intervention, for the prevention of anxiety between 13 and 24 months' follow-up (SMD −0.26, 95% CrI −0.52 to −0.01) and at 48 months' follow-up (SMD −0.39, 95% CrI −0.65 to −0.14).

Targeted population, primary setting

Post intervention

The analysis-specific network diagram for targeted primary settings is reported in *Figure 7*. Eleven studies ($n = 1314$) contributed to the analysis for the post-intervention time point.[115,116,174–182] Three studies were deemed to be at low risk of bias and six studies were deemed to be at unclear risk of bias for both the randomisation and allocation concealment domains. A further two studies were rated as having an unclear risk of bias for allocation concealment, but a low risk of bias for random sequence generation. One study compared two active interventions. Ten studies included an intervention based on CBT, one examined a biofeedback intervention and one included an occupational therapy intervention. Model fit and selection statistics indicated that a random-effects consistency model was appropriate. Model fit was similar across all three intervention models (main intervention, additive and full interaction), but suggested that the intervention-level model was preferred (see *Appendix 3*). Regression coefficients from the additive and full interaction models are reported in *Appendix 3*.

Intervention-level effects

There was evidence of substantial between-study heterogeneity (τ 0.42, 95% CrI 0.21 to 0.89). *Table 3* reports SMDs (95% CrIs) for each intervention relative to a waiting list. There was weak evidence of an effect for CBT (SMD −0.38, 95% CrI −0.84 to 0.07), but a lack of evidence for biofeedback (SMD −0.38, 95% CrI −1.50 to 0.72) or occupational therapy (SMD 0.11, 95% CrI −0.91 to 1.14).

Targeted, primary, further time points: intervention-level effects only

Six to 12 months post intervention Five studies ($n = 713$ participants) contributed to the analysis for 6–12 months post intervention, of which five included a CBT-based intervention and one included a biofeedback intervention (one study compared two active interventions).[116,175–178] The between-study posterior median SD was indicative of substantial heterogeneity (τ 0.52, 95% CrI 0.15 to 2.51). There was no evidence that either CBT (SMD −0.17, 95% CrI −1.37 to 1.06) or biofeedback (SMD −0.28, 95% CrI −2.49 to 1.93) reduced anxiety symptoms at between 6 and 12 months, relative to a waiting list. No studies reported a follow-up of > 12 months post intervention.

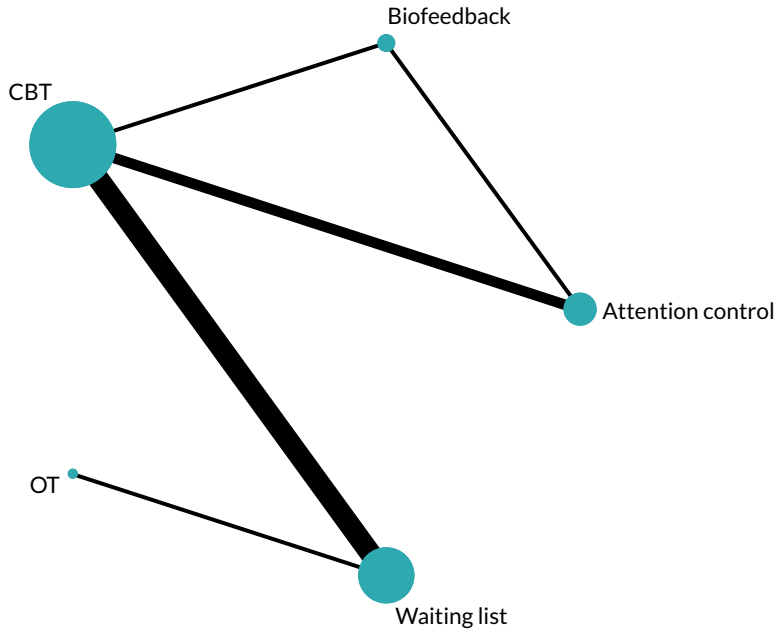

FIGURE 7 Network plot for targeted population, primary setting: post-intervention anxiety outcome. OT, occupational therapy.

Targeted population, tertiary/university setting

The analysis-specific network diagram is reported in *Figure 8*. Four studies ($n = 743$ participants) contributed to the analysis for the main post-intervention time point, of which all included an intervention based on CBT.[183,184,186,187] Owing to insufficient data in this network, the component models were not fitted.

Intervention-level model

Post intervention, and 6–12 and 13–24 months post intervention

Model fit and selection statistics suggested that a random-effects consistency model was reasonable (see *Appendix 3*). However, the between-study posterior median SDs were indicative of substantial heterogeneity (τ 0.43, 95% CrI 0.05 to 2.24). This was considerably reduced in the unrelated intervention effects model (τ 0.21, 95% CrI 0.01 to 2.68), and may indicate the presence of inconsistency. For this reason, results are not reported. However, this potential inconsistency should be interpreted in the light of the inclusion criteria that interventions needed to be delivered in the educational institution, and the unanticipated limitations this caused for the tertiary/university setting analyses. We consider the limitations in *Chapter 10*, *Limitations relating to inclusion criteria*.

Exploring heterogeneity and small-study effects

Subgroup analyses, metaregression and sensitivity analyses were conducted for the intervention-level NMA, for the main outcome and for the primary end point of post intervention only. The comparison-adjusted funnel plots suggest that small study effects are possible in the universal primary and secondary settings analyses. That is, smaller studies may be reporting more beneficial results than larger studies among non-active controlled trials reporting an anxiety outcome (see *Appendix 6*). This is a potentially important finding. Of all the populations and settings considered in this chapter, the universal analyses provided the strongest evidence for a reduction in anxiety post intervention. There was no evidence to suggest the presence of small-study effects for the analyses of targeted populations in either setting.

A metaregression was conducted for intervention mode of delivery (face to face or via computer), and for intervention facilitator (teacher or a MHP). There was no evidence of effect modification by facilitator or mode of delivery for any population or setting combination (see *Appendix 6*). However, for the universal primary analysis, there was weak evidence that teacher-delivered CBT interventions (SMD −0.05, 95% CrI −0.21 to 0.08) may be slightly less effective than MHP-delivered CBT interventions (SMD −0.18, 95% CrI −0.42 to 0.00).

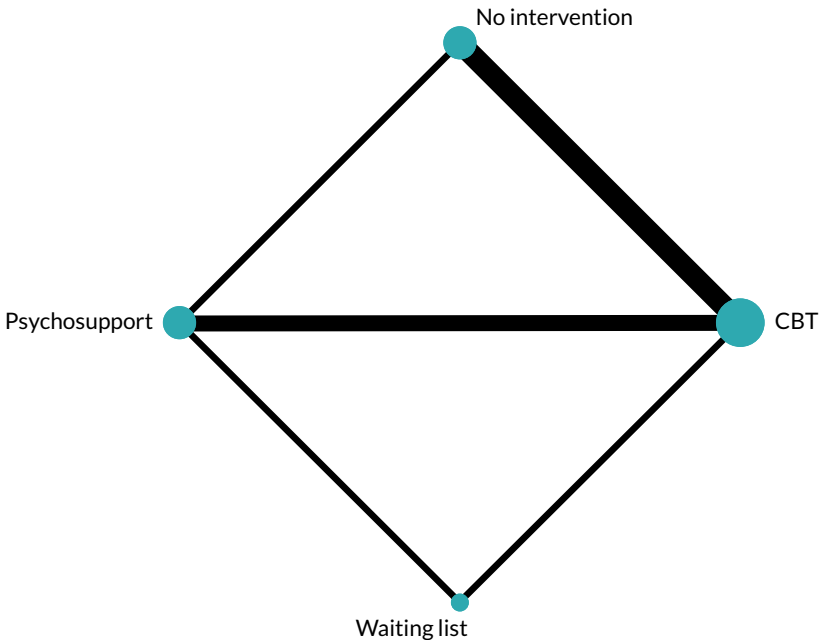

FIGURE 8 Network plot for targeted population, tertiary/university setting: post-intervention anxiety outcome.

Subgroup analyses were conducted to evaluate if intervention effects differed by intended focus of the intervention. For each population and setting combination, intervention estimates were compared across three subgroups: (1) interventions that aimed to prevent anxiety (2) interventions that aimed to prevent only depressive symptoms and (3) interventions that aimed to prevent both anxiety and depression.

For the universal secondary and universal primary anxiety networks, there was very weak evidence that intervention focus was important. Interventions focused on preventing anxiety appeared to have a larger effect on anxiety symptoms than those focusing on depression or combined depression and anxiety. However, CrIs overlapped, and we did not conduct a statistical test to examine subgroup differences. For targeted populations, there was some evidence to suggest that interventions focusing on both anxiety and depression were slightly more effective than interventions focused on anxiety alone. However, we emphasise that these results are to be considered descriptive only. Full results are reported in *Appendix 6*.

Sensitivity analyses: risk of bias

Sensitivity analyses were conducted for the intervention-level NMA, for the main outcome and primary end point of post intervention only. We explored the robustness of the findings to excluding studies judged to be at high/unclear risk of bias for the domains of random sequence generation and allocation concealment.

Having removed studies judged to be at high/unclear risk of bias, few studies were eligible for inclusion. In the universal secondary network, only three studies[125,126,141] of three interventions (waiting list, no intervention and CBT) remained after excluding studies judged to be at high risk of bias, and there was no evidence of an effect for CBT (SMD −0.07, 95% CrI −0.77 to 0.58), relative to a waiting list control (*Table 5*). For targeted secondary interventions, there were three studies judged to be at low risk of bias comparing four interventions (waiting list, no intervention, CBT and CBM).[117,141,167] There was no evidence of a beneficial effect for either CBT (SMD 0.07, 95% CrI −0.25 to 0.41) or CBM (SMD −0.20, 95% CrI −0.69 to 0.30), relative to no intervention. One study was judged to be at low risk of bias in the universal primary network.[145] A sensitivity analysis was not possible for the targeted primary network.

Sensitivity analyses: intracluster correlation coefficient and change from baseline scores

When cluster randomised trials did not explicitly account for clustering in their analyses, we followed the advice in the Cochrane handbook (section 16.3.4)[81] for calculating an approximate sample size, using an ICC of 0.03. We explored the robustness of this decision in a best-case/worst-case sensitivity analysis using ICCs of 0.01 and 0.06, respectively. All results were robust to alternative ICC values.

TABLE 5 Risk-of-bias sensitivity analyses for self-reported anxiety

Population/setting	Intervention	Reference intervention	Trials (*n*)	SMD (95% CrI)	
				Low risk of bias	All
Universal secondary	CBT	Waiting list	3	−0.07 (−0.77 to 0.58)	−0.09 (−0.24 to 0.03)
Universal primary	CBT	Usual curriculum	1	−0.01 (−0.18 to 0.17)[a]	−0.07 (−0.23 to 0.05)
Targeted secondary	CBT	No intervention	3	0.07 (−0.25 to 0.41)	0.03 (−0.11 to 0.16)
	CBM	No intervention		−0.20 (−0.69 to 0.30)	−0.17 (−0.45 to 0.11)

a From fixed-effect analysis.

Notes

Results are listed by population, setting and outcome. Results are compared for the immediate post-intervention time point. Comparisons listed are those remaining once studies deemed to be at high/unclear risk of bias for random sequence generation and allocation concealment had been removed from the network. Results are SMDs and 95% CrIs, for the intervention relative to the reference intervention listed.

To calculate the standardised mean change from baseline, we assumed a correlation of 0.7, which was based on previous analyses (see *Chapter 2*, *Data preparation*). Sensitivity analyses were robust to using correlation values of 0.6 and 0.8 (see *Appendix 6*).

Summary of main results

Seventy-nine studies met the inclusion criteria for the anxiety prevention review, most of which ($n = 66$) were deemed to be at high or unclear risk of bias for random sequence generation and/or allocation concealment. In addition, there was evidence of possible small-study effects in the universal primary and universal secondary networks. Moderate levels of heterogeneity were observed in all analyses.

A more detailed interpretation of the results, applying the criteria outlined in *Chapter 3*, is considered in *Chapter 9*. Seventy-one studies contributed data to the NMA. In the universal secondary network, there was evidence that mindfulness/relaxation interventions (SMD −0.65, 95% CrI −1.14 to −0.19) reduced symptoms of anxiety, relative to usual curriculum. There was weak evidence for a small effect of CBT in reducing self-reported anxiety symptoms (SMD −0.15, 95% CrI −0.34 to 0.04). However, the two mindfulness/relaxation studies were connected to the network only via single small studies.[130,137] Both studies were rated as having an unclear risk of bias for random sequence generation and allocation concealment. The CBT estimate is based on 16 studies ($n = 8851$ participants),[119,120,125–128,131,134–136,138–141,143,144] of which three ($n = 4001$ participants) were judged to be at low risk of bias for random sequence generation and allocation concealment.[125,126,141] This could, therefore, be considered a more robust finding (because of the lower risk of bias).

There was evidence of effect modification by intervention components for the CBT interventions in the universal secondary network. The additive components analysis suggests that a CBT intervention with a psychoeducation component was more effective than other CBT combinations. There was a reduction in the SMD of −0.39 (95% CrI −0.78 to 0.01) for CBT interventions with a psychoeducation component.

Studies included in the universal primary network were mostly judged to be at unclear risk of bias. There was weak evidence of a very small effect that CBT prevented symptoms of anxiety, relative to usual curriculum, at post intervention.

For the targeted secondary analysis there was evidence that exercise was effective, relative to no intervention (SMD −0.47, 95% CrI −0.86 to −0.09). However, this was based on a single study, connected to the network via no intervention ($n = 121$ participants) and judged to be at unclear risk of selection bias.[170] There was no evidence of an effect for any other type of intervention in this network.

There was weak evidence to suggest that CBT was effective, relative to waiting list, in the targeted primary analysis at post intervention.

There was evidence of inconsistency in the targeted tertiary/university network. We consider this, and the limitations imposed by the inclusion criteria on the validity of the university network, in *Chapter 10*, *Limitations relating to inclusion criteria*.

Chapter 5 Effectiveness of educational setting-based interventions for preventing depression

In this chapter, we report the systematic review and NMA results for studies reporting a depression outcome only.

Systematic review

Studies included in the review

The overall PRISMA flow diagram for the project can be seen in *Figure 2*. There were 105 studies reporting a self-reported depression outcome. The full list of included studies can be found in *Appendix 2*. Of these 105 studies, the primary focus of 62 studies was the prevention of depression, 29 focused on the prevention of anxiety and depression, and 14 focused on the prevention of anxiety alone. A subgroup analysis to explore whether or not intervention effects varied depending on intended intervention focus is reported subsequently in *Exploring heterogeneity and small-study effects*.

Study characteristics are reported in *Appendix 2*. Included studies were published between 1993 and 2018, and randomised between 16 and 8873 participants (median 198). Fifty-three studies were cluster randomised, of which seven reported cluster-adjusted means (SEs) and 29 reported results from appropriate models. The median number of clusters was 13 [interquartile range (IQR) 8–22 clusters]. Fifty-two were individually randomised trials. Ninety-seven studies reported a post-intervention end point, 64 reported a follow-up of between 6 and 12 months, and 18 reported a follow-up of between 13 and 24 months. Six reported a follow-up of $\geq$ 25 months.

Fifty-seven studies were classified as universal and 48 as targeted (38 indicated, 10 selective). Twenty studies were implemented in a primary school setting, 72 in secondary school, eight in tertiary education and five across multiple settings. A total of 94 studies were conducted in HICs, with 10 conducted in MICs and one in a LIC. Of the studies conducted in HICs, seven were conducted in lower-income settings, as specified by the trial authors.

Risk-of-bias assessment

Study-level risk-of-bias assessments are reported in *Appendix 2*. Seventeen of the 105 studies reporting a depression outcome were assessed as being at low risk of bias for both random sequence generation and allocation concealment. A further 21 studies reported a suitable randomisation approach, but did not report sufficient details of allocation concealment to allow assessment. Seven studies were judged as being at low risk of bias for participant blinding; all were active, or attention controlled. Study protocols and/or trial registrations were available for 27 studies, of which 25 were judged to be at low risk of bias for selective outcome reporting. Two studies were judged as being at unclear risk of bias. One reported a trial registration number that we could not locate, and the primary outcome was not clear for the other. For cluster randomised trials, we also considered how recruitment, randomisation

and analysis were conducted under the Cochrane Risk of Bias tool heading of 'other bias'. Of 53 cluster RCTs, 18 were judged to be at high risk and 16 at unclear risk of 'other bias'.

Interventions and components identified in the review

Table 6 reports the interventions and components identified for studies reporting a self-reported depression outcome. Twenty-three studies were multiarm, comparing three or more interventions. Seventy-six studies included an intervention based on CBT, five studies included an intervention based on a combination of CBT + IPT and four were based on IPT alone. Four studies included a relaxation/mindfulness-based intervention, six included a third-wave intervention, four included a behavioural intervention, two included an exercise intervention and one used a CBM approach. One study used an occupational therapy-based intervention. With regard to non-active comparators, 26 studies were waiting list controlled, 33 were usual curriculum controlled, 27 had a no-intervention control and nine used an attention control. Two studies were classified as having a psychoeducation control group and six were classified as having a psychosupport control.

Table 6 also reports the combinations of components identified across all studies reporting a depression outcome (at any time point) by population and setting. Components identified were psychoeducation, cognitive, behavioural, mindful, third wave, relaxation, physiological, exercise and CBM. There were 123 active intervention arms from the 105 studies reporting a self-reported depression outcome. Of these active intervention arms, 72 had a psychoeducation component, 96 had a cognitive component, 100 had a behavioural component, 11 had mindful components, seven had third-wave components, 61 had a relaxation component, two had an exercise component and one had a CBM component. The most frequently identified combinations were psychoeducation + cognitive + behavioural (26 study arms), psychoeducation + cognitive + behavioural + relaxation (28 arms) and cognitive + behavioural + relaxation (17 arms).

Further intervention process and delivery characteristics are reported in *Appendix 2*. The number of intervention sessions implemented ranged from 2 to 120 [median 10 (IQR 8–12) sessions]. As a proxy for intervention dose, we calculated the intervention intensity as total session time (number of sessions × duration in minutes); this ranged from 135 to 10,800 minutes [median 600 (IQR 450–900) minutes]. Ninety per cent of interventions were delivered to whole classrooms or small groups. In 52 studies, interventions were delivered by a MHP, school counsellor or student psychologist. In 10 studies, interventions were delivered by miscellaneous external professionals. Twenty studies used interventions delivered solely by teachers. Fifteen studies involved a combination of teaching, psychology and other professionals. Three studies implemented interventions via computer. Five studies could not be classified.

Network meta-analysis results

Of the 105 studies in the depression review, 86 studies (50,159 participants) contributed to the NMA for depression. Studies not contributing to the NMA are listed in *Appendix 2*. The network plot for all studies reporting a depression outcome across all populations and settings is reported in *Figure 9*. The plot edges (lines) connecting each pair of interventions represent a direct comparison and are proportional to the number of trials making that direct comparison. Intervention 'nodes' are proportional to the number of participants randomised to each intervention.

Model details are described in *Chapter 2* and *Appendix 1*. Three models were compared for each analysis. We report the results from an intervention-level main effect, a nested additive component and a full interaction component model. Results are reported by population, setting and follow-up time point. The longer-term follow-ups of 6–12, 13–24 and $\geq$ 25 months are reported for the main intervention-level model only. When data were available from head-to-head trials, we conducted pairwise meta-analyses. The results are reported alongside NMA results in *Table 7*. Full NMA and pairwise results are reported in *Appendix 4*.

TABLE 6 Intervention-level classifications and component classifications by population and setting for depression outcome

		Classification												
		Intervention level				Component level for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	Bias modification
Universal secondary														
Araya *et al.*[118] 2013	Depression	(Usual curriculum)	CBT			–	+	+	–	–	–	–	–	–
Aune and Stiles[119] 2009	Anxiety	(No intervention)	CBT			+	+	+	–	–	–	–	–	–
Barrett *et al.*[121] 2005	Anxiety	(No intervention)	CBT			+	+	+	–	–	+	–	–	–
Barry *et al.*[190] 2017	Depression	(Usual curriculum)	CBT			+	+	–	–	–	–	–	–	–
Bonhauser *et al.*[122] 2005	Anxiety + depression	Exercise	Exercise			–	–	–	–	–	–	–	+	–
Bonhauser *et al.*[122] 2005						–	–	–	–	–	–	–	+	–
Burckhardt *et al.*[124] 2015	Anxiety + depression	(Attention control)	Mindfulness/ relaxation			–	–	–	+	–	+	–	–	–
Burckhardt *et al.*[191] 2016	Anxiety + depression	(Usual curriculum)	Third wave			+	–	+	+	+	+	–	–	–
Calear *et al.*[125] 2009	Anxiety + depression	(Waiting list)	CBT			–	+	+	–	–	+	–	–	–
Calear *et al.*[126] 2016	Anxiety	(Waiting list)	CBT	CBT		+	+	+	+	–	+	–	–	–
Calear *et al.*[126] 2016	Anxiety					+	+	+	+	–	+	–	–	–
Calear *et al.*[127] 2016	Anxiety	(Waiting list)	CBT			+	+	+	+	–	+	–	–	–
Chaplin *et al.*[192] 2006	Depression	(No intervention)	CBT	CBT		–	+	+	–	–	+	–	–	–
Chaplin *et al.*[192] 2006	Depression					–	+	+	–	–	+	–	–	–

continued

TABLE 6 Intervention-level classifications and component classifications by population and setting for depression outcome (*continued*)

		Classification												
		Intervention level				Component level for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	Bias modification
Clarke *et al.*[193] 1993	Depression	(Usual curriculum)	Psychoeducation			+	–	–	–	–	–	–	–	–
Clarke *et al.*[193] 1993	Depression	(Usual curriculum)	Behavioural therapy			+	–	+	–	–	–	–	–	–
Gillham *et al.*[128] 2006	Anxiety + depression	(No intervention)	CBT			+	+	+	–	–	–	–	–	–
Gillham *et al.*[194] 2007	Depression	(No intervention)	(Attention control)	CBT		–	+	+	–	–	+	–	–	–
Gucht *et al.*[129] 2017	Anxiety + depression	(Usual curriculum)	Third wave			+	–	–	–	+	–	–	–	–
Hodas[131] 2016	Anxiety + depression	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Horowitz *et al.*[195] 2007	Depression	(Usual curriculum)	CBT	IPT		+	+	+	–	–	–	–	–	–
Horowitz *et al.*[195] 2007	Depression					+	–	+	–	–	–	–	–	–
Johnson *et al.*[132] 2016	Anxiety + depression	(Usual curriculum)	Third wave			–	–	–	+	+	+	–	–	–
Johnson *et al.*[133] 2017	Anxiety + depression	(Usual curriculum)	Third wave	Third wave		–	–	–	+	+	+	–	–	–
Johnson *et al.*[133] 2017	Anxiety + depression					–	–	–	+	+	+	–	–	–
Kindt *et al.*[196] 2014	Depression	(Usual curriculum)	CBT			+	+	+	–	–	+	–	–	–
Lock and Barrett[134] 2003	Anxiety	(No intervention)	CBT			+	+	+	–	–	+	–	–	–
Lowry-Webster *et al.*[135] 2001	Anxiety + depression	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
Merry *et al.*[197] 2004	Depression	(Attention control)	CBT + IPT			–	+	+	–	–	+	–	–	–
Perry *et al.*[136] 2017	Depression	(Attention control)	CBT			+	+	+	–	–	+	–	–	–

		Classification												
		Intervention level				Component level for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	Bias modification
Pössel *et al.*[198] 2004	Depression	(Usual curriculum)	CBT			+	+	+	–	–	–	–	–	–
Pössel *et al.*[199] 2011	Depression	(Usual curriculum)	CBT			+	+	+	–	–	–	–	–	–
Pössel *et al.*[200] 2013	Depression	(Usual curriculum)	(Attention control)	CBT		+	+	+	–	–	–	–	–	–
Raes *et al.*[201] 2014	Depression	(Usual curriculum)	Third wave			+	–	–	+	+	+	–	–	–
Rivet-Duval *et al.*[202] 2011	Depression	(Waiting list)	CBT + IPT			–	+	+	–	–	+	–	–	–
Roberts *et al.*[138] 2003	Depression	(Usual curriculum)	CBT			–	+	+	–	–	–	–	–	–
Roberts *et al.*[139] 2010	Anxiety + depression	(Usual curriculum)	CBT			–	+	+	–	–	–	–	–	–
Rose *et al.*[203] 2014	Depression	(Attention control)	CBT + IPT	CBT + IPT		–	+	+	–	–	+	–	–	–
Rose *et al.*[203] 2014	Depression					–	+	+	–	–	+	–	–	–
Sawyer *et al.*[204] 2010	Depression	(Usual curriculum)	CBT			+	+	+	–	–	+	–	–	–
Shatté[205] 1997	Depression	(No intervention)	(Attention control)	CBT		–	+	+	–	–	–	–	–	–
Sheffield *et al.*[141] 2006	Depression	(No intervention)	CBT			+	+	+	–	–	–	–	–	–
Spence *et al.*[206] 2003	Depression	(Usual curriculum)	CBT			–	+	+	–	–	–	–	–	–
Stallard *et al.*[142] 2013	Depression	(Usual curriculum)	(Attention control)	CBT + IPT		+	+	+	–	–	+	–	–	–
Tak *et al.*[207] 2016	Depression	(Usual curriculum)	CBT			+	+	+	–	–	–	–	–	–
Tomba *et al.*[143] 2010	Anxiety + depression	CBT	CBT			+	+	+	–	–	+	–	–	–

continued

TABLE 6 Intervention-level classifications and component classifications by population and setting for depression outcome (*continued*)

		Classification												
		Intervention level				Component level for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	Bias modification
Tomba *et al.*[143] 2010						+	+	+	–	–	+	–	–	–
Wong *et al.*[144] 2014	Anxiety + depression	(Usual curriculum)	CBT	CBT		+	+	+	–	–	–	–	–	–
Wong *et al.*[144] 2014	Anxiety + depression					+	+	+	–	–	–	–	–	–
Universal primary														
Ahlen *et al.*[145] 2018	Anxiety + depression	(Usual curriculum)	CBT			+	+	+	–	–	+	–	–	–
Barrett and Turner[147] 2001	Anxiety	(Usual curriculum)	CBT	CBT		+	+	+	–	–	+	–	–	–
Barrett and Turner[147] 2001	Anxiety					+	+	+	–	–	+	–	–	–
Cardemil *et al.*[208] 2007	Depression	(Usual curriculum)	CBT			+	+	+	–	–	–	–	–	–
Essau *et al.*[150] 2012	Anxiety	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
Gallegos[151] 2008	Anxiety + depression	(Usual curriculum)	CBT			+	+	+	–	–	+	–	–	–
Gillham[209] 1994	Depression	(No intervention)	CBT	CBT		–	+	+	–	–	+	–	–	–
Gillham[209] 1994						–	+	+	–	–	+	–	–	–
Johnstone *et al.*[152] 2014	Anxiety + depression	(Usual curriculum)	CBT			–	+	+	–	–	+	–	–	–
Mendelson *et al.*[210] 2010	Depression	(Waiting list)	Mindfulness/ relaxation			–	–	–	+	–	+	–	–	–
Pattison and Lynd-Stevenson[155] 2001	Depression	(No intervention)	(Attention control)	CBT	CBT	–	+	+	–	–	–	–	–	–
Pattison and Lynd-Stevenson[155] 2001	Depression					–	+	+	–	–	–	–	–	–

		Classification												
		Intervention level				Component level for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	Bias modification
Pophillat *et al.*[156] 2016	Anxiety + depression	(Usual curriculum)	CBT			+	+	+	–	–	+	–	–	–
Quayle *et al.*[211] 2001	Depression	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Rooney *et al.*[157] 2006	Depression	(No intervention)	CBT			–	+	+	–	–	+	–	–	–
Soffer[212] 2003	Depression	(No intervention)	(Attention control)	Behavioural therapy		–	–	+	–	–	–	–	–	–
Stallard *et al.*[159] 2014	Anxiety	(Usual curriculum)	CBT	CBT		+	+	+	–	–	+	–	–	–
Stallard *et al.*[159] 2014	Anxiety					+	+	+	–	–	+	–	–	–
Targeted secondary														
Arnarson and Craighead[213] 2009	Depression	(Waiting list)	CBT + IPT			–	+	+	–	–	+	–	–	–
Balle and Tortella-Feliu[160] 2010	Anxiety	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
Berry and Hunt[161] 2009	Anxiety	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Clarke *et al.*[214] 1995	Depression	(No intervention)	CBT			–	+	–	–	–	–	–	–	–
Congleton[215] 1995	Depression	(Waiting list)	CBT			+	+	–	–	–	–	–	–	–
Cova *et al.*[162] 2011	Depression	(No intervention)	CBT			+	+	+	–	–	–	–	–	–
Dobson *et al.*[163] 2010	Anxiety + depression	(Attention control)	CBT			–	+	+	–	–	–	–	–	–

continued

TABLE 6 Intervention-level classifications and component classifications by population and setting for depression outcome (*continued*)

		Classification												
		Intervention level				Component level for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	Bias modification
Fitzgerald *et al.*[114] 2016	Anxiety	(Attention control)	CBM			–	–	–	–	–	–	–	–	+
Fung *et al.*[216] 2016	Anxiety + depression	(Waiting list)	Mindfulness/ relaxation			–	–	–	+	–	+	–	–	–
Gaete *et al.*[164] 2016	Depression	(Usual curriculum)	CBT			–	+	+	–	–	–	–	–	–
Gillham *et al.*[165] 2012	Depression	(No intervention)	CBT	CBT		+	+	+	–	–	+	–	–	–
Gillham *et al.*[165] 2012	Depression					+	+	+	–	–	+	–	–	–
Hunt *et al.*[166] 2009	Anxiety	(No intervention)	CBT			+	+	+	–	–	+	–	–	–
Jordans *et al.*[167] 2010	Anxiety + depression	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Livheim *et al.*[217] 2015	Depression	Psychosupport	Third wave			–	–	–	–	+	–	–	–	–
McCarty *et al.*[218] 2011	Depression	(Usual curriculum)	CBT			–	+	+	–	–	+	–	–	–
McCarty *et al.*[219] 2013	Depression	Psychosupport	CBT			–	+	+	–	–	+	–	–	–
Noël *et al.*[220] 2013	Depression	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Peng *et al.*[170] 2015	Anxiety + depression	(No intervention)	Exercise			–	–	–	–	–	+	–	+	–
Poppelaars *et al.*[221] 2016	Depression	(Waiting list)	CBT	CBT	CBT	+	+	–	–	–	–	–	–	–
Poppelaars *et al.*[221] 2016	Depression					–	+	+	–	–	–	–	–	–
Poppelaars *et al.*[221] 2016	Depression					+	+	+	–	–	–	–	–	–
Puskar *et al.*[222] 2003	Depression	(No intervention)	CBT			–	+	+	–	–	+	–	–	–

		Classification												
		Intervention level				Component level for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	Bias modification
Rohde *et al.*[223] 2014	Depression	Psychoeducation	CBT	CBT		–	+	+	–	–	–	–	–	–
Rohde *et al.*[223] 2014	Depression					–	+	+	–	–	–	–	–	–
Sheffield *et al.*[141] 2006	Depression	(No intervention)	CBT	CBT	CBT	+	+	+	–	–	–	–	–	–
Sheffield *et al.*[141] 2006	Depression					+	+	+	–	–	–	–	–	–
Sheffield *et al.*[141] 2006	Depression					+	+	+	–	–	–	–	–	–
Stallard *et al.*[142] 2013	Depression	(Usual curriculum)	(Attention control)	CBT + IPT		+	+	+	–	–	+	–	–	–
Stice *et al.*[224] 2008	Depression	Psychoeducation	Psychosupport	CBT	CBT	–	+	+	–	–	–	–	–	–
Stice *et al.*[224] 2008	Depression					+	–	+	–	–	–	–	–	–
Stoppelbein[225] 2003	Depression	(Attention control)	CBT			+	+	+	–	–	+	–	–	–
Topper *et al.*[173] 2017	Anxiety + depression	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Wijnhoven *et al.*[226] 2014	Depression	(Waiting list)	CBT			–	+	–	–	–	–	–	–	–
Woods and Jose[227] 2011	Depression	(Usual curriculum)	CBT			+	+	+	–	–	–	–	–	–
Young *et al.*[228] 2006	Depression	Psychosupport	IPT			+	–	+	–	–	–	–	–	–
Young *et al.*[229] 2010	Depression	Psychosupport	IPT			+	–	+	–	–	–	–	–	–
Young *et al.*[230] 2016	Depression	Psychosupport	IPT			+	–	+	–	–	–	–	–	–

continued

TABLE 6 Intervention-level classifications and component classifications by population and setting for depression outcome (*continued*)

		Classification												
		Intervention level				Component level for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	Bias modification
Targeted primary														
Cowell *et al.*[231] 2009	Depression	(No intervention)	Psychosupport			–	–	–	–	–	–	–	–	–
Jaycox *et al.*[232] 1994	Depression	(Waiting list)	CBT			–	+	+	–	–	+	–	–	–
Manassis *et al.*[175] 2010	Anxiety + depression	(Attention control)	CBT			+	+	–	–	–	–	–	–	–
Simpson[179] 2008	Anxiety + depression	(Attention control)	CBT			+	+	+	–	–	–	–	–	–
Siu[180] 2007	Anxiety + depression	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
Tokolahi *et al.*[181] 2018	Anxiety + depression	(Waiting list)	Occupational therapy			–	–	–	–	–	–	–	–	–
Universal tertiary/university setting														
Reynolds *et al.*[233] 2011	Depression	(Usual curriculum)	Behavioural therapy			–	–	+	–	–	–	–	–	–
Targeted tertiary/university setting														
Cui *et al.*[183] 2016	Depression	(Waiting list)	Psychosupport	CBT		+	+	+	–	–	+	–	–	–
Ellis *et al.*[184] 2011	Depression	(No intervention)	Psychosupport	CBT		+	+	+	–	–	+	–	–	–
Higgins[185] 2007	Anxiety	(No intervention)	CBT			+	+	+	–	–	+	–	–	–
Peden *et al.*[234] 2000	Depression	(No intervention)	CBT			–	+	–	–	–	–	–	–	–
Seligman *et al.*[186] 1999	Anxiety + depression	(No intervention)	CBT			+	+	+	–	–	+	–	–	–
Seligman *et al.*[187] 2007	Anxiety + depression	(No intervention)	CBT			+	+	+	–	–	+	–	–	–
Takagaki *et al.*[235] 2016	Depression	(No intervention)	Behavioural therapy			+	–	+	–	–	–	–	–	–

		Classification												
		Intervention level				Component level for active intervention only								
Study	Focus[a]	Arm[b] 1	Arm[b] 2	Arm[b] 3	Arm[b] 4	Psychoeducation	Cognitive	Behavioural	Mindfulness	Third wave	Relaxation	Physiological	Exercise	Bias modification
Multiple/mixed settings														
Liddle and Macmillan[188] 2010	Anxiety	(Waiting list)	CBT			+	+	+	–	–	+	–	–	–
McLaughlin[236] 2011	Depression	Psychosupport	CBT			–	+	+	–	–	+	–	–	–
Stice *et al.*[237] 2007	Depression	(Waiting list)	CBT			+	+	+	–	–	–	–	–	–
Velásquez *et al.*[189] 2015	Anxiety + depression	(Waiting list)	Mindfulness/ relaxation			–	–	–	–	–	+	–	–	–
Yu[238] 2002	Depression	(No intervention)	CBT			+	+	+	–	–	–	–	–	–

a Focus of intervention describes whether the intervention aimed to prevent anxiety, depression or anxiety + depression.
b Arm = number of arms included in the study. Studies listed multiple times denote multiple active arms. Components are described for active arms only.

Note
Parentheses indicate control interventions (usual curriculum, attention control, waiting list and no intervention).

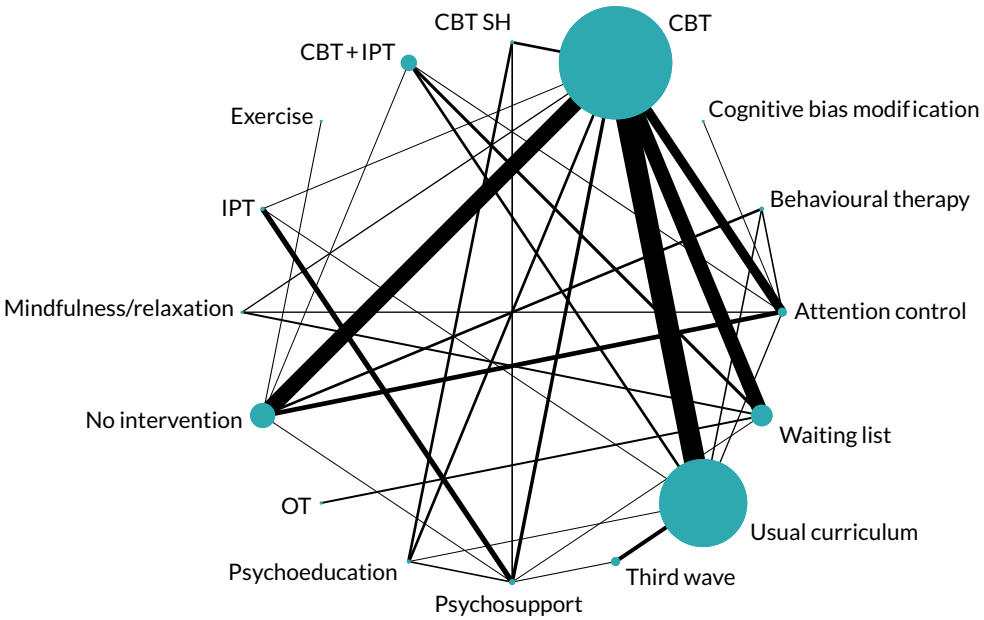

FIGURE 9 Network plot for all eligible studies reporting a depression outcome. OT, occupational therapy; SH, self-help; third wave, third-wave CBT-based therapies.

TABLE 7 Results from the NMA and pairwise meta-analyses for the primary end point of post intervention for self-reported depression

Setting	Intervention	Reference intervention	NMA		Direct meta-analysis		Number of trials
			SMD	95% CrI	SMD	95% CrI	
Universal secondary	CBT	Usual curriculum	−0.04	−0.16 to 0.07	−0.05	−0.17 to 0.06	11
	CBT + IPT	Usual curriculum	−0.18	−0.46 to 0.08	NA	NA	0
	Behavioural therapy	Usual curriculum	−0.02	−0.40 to 0.37	−0.02	−0.40 to 0.37	1
	IPT	Usual curriculum	−0.03	−0.36 to 0.29	−0.10	−0.47 to 0.26	1
	Third wave	Usual curriculum	−0.03	−0.21 to 0.14	−0.02	−0.19 to 0.14	4
Universal primary	CBT	Usual curriculum	−0.13	−0.44 to 0.17	−0.11	−0.37 to 0.16	6
	Behavioural therapy	Usual curriculum	−0.10	−1.04 to 0.80	NA	NA	0
Targeted secondary	CBT	No intervention	−0.22	−0.58 to 0.13	−0.16	−0.47 to 0.15	5
	IPT	No intervention	−0.65	−1.50 to 0.16	NA	NA	0
	Third wave	No intervention	−0.68	−1.83 to 0.47	NA	NA	0
	CBM	No intervention	−0.90	−2.20 to 0.40	NA	NA	0
	Exercise	No intervention	−0.28	−1.13 to 0.58	−0.28	−1.12 to 0.57	1
Targeted primary	CBT	Waiting list	−0.48	−2.49 to 1.50	−0.48	−2.48 to 1.47	2
	Occupational therapy	Waiting list	−0.10	−2.94 to 2.71	−0.10	−2.87 to 2.69	1

NA, not available.
Notes
NMA results from random-effects model assuming consistency and pairwise results from a random-effects, unrelated treatment effect model. Intervention effects are reported relative to a reference intervention per network. In universal networks, the reference intervention was usual curriculum. In the targeted secondary network, the reference intervention was no intervention, and for targeted primary it was a waiting list. Full NMA results for all available comparisons are reported in *Appendix 4*.

Universal population, secondary setting

Post intervention

The analysis-specific network diagram is reported in *Figure 10*. Thirty-four studies (18,094 participants) contributed to the analysis for the main time point of immediately post intervention, of which nine were multiarm trials.[119,125–129,131–136,138,139,141,143,144,190,192–203,205–207] Six studies were deemed to be at low risk of bias, and 18 studies were deemed to be at unclear risk of bias, for both random sequence generation and allocation concealment. Five studies were rated as having an unclear risk of bias for randomisation and a low risk of bias for allocation concealment. Three studies were rated as having a low risk of bias for randomisation and an unclear risk of bias for allocation concealment. Two studies were rated as having an unclear risk of bias for randomised sequence generation and a high risk of bias for allocation concealment. Twenty-five studies included an intervention based on CBT, one included an intervention based on IPT and three included an intervention based on a combination of CBT and IPT. Four interventions were based on third wave and one was based on behavioural therapy. All reported results are from a random-effects NMA model unless otherwise stated. Model fit and selection statistics suggested that a consistency model was appropriate. Of the three component models fitted (intervention, additive and full interaction), the additive model was preferred, suggesting evidence for effect modification by components. All model fit statistics are reported in *Appendix 3*. Results are reported as SMDs and 95% CrIs.

Intervention-level effects

The between-study posterior median SD (τ) was indicative of moderate heterogeneity (τ 0.15, 95% CrI 0.10 to 0.22). *Table 7* reports SMDs (95% CrIs) for each intervention relative to usual curriculum. There was weak evidence of a very small effect of CBT (SMD −0.04, 95% CrI −0.16 to 0.07) in preventing symptoms of depression post intervention. There was weak evidence of a small effect of CBT + IPT (SMD −0.18, 95% CrI −0.46 to 0.08) in preventing symptoms at the post-intervention time point. There was no evidence to suggest that IPT (SMD −0.03, 95% CrI −0.36 to 0.29), third-wave therapies (SMD −0.03, 95% CrI −0.21 to 0.14) or behavioural therapy (SMD −0.02, 95% CrI −0.40 to 0.37) are effective.

Additive model: components nested within intervention

Component-level models were fitted to evaluate whether or not the observed between-study heterogeneity in the intervention model could be explained by differences in intervention components. It was possible to estimate additive component effects in CBT and third-wave interventions.

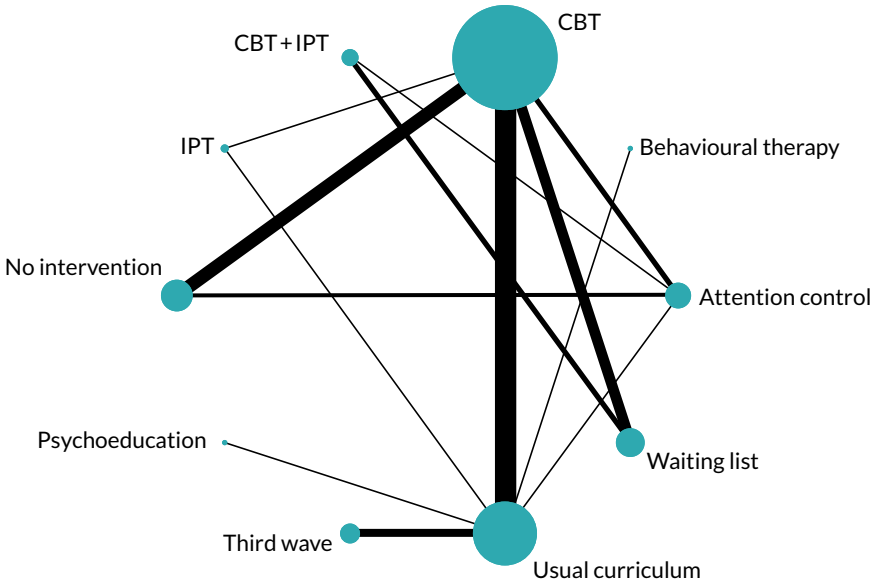

FIGURE 10 Network plot for universal population, secondary setting: post-intervention depression outcome.

The between-study posterior median SD was indicative of moderate heterogeneity (τ 0.14, 95% CrI 0.08 to 0.22). All CBT interventions included a cognitive component, and additive effects were estimated for psychoeducation, behavioural, mindful and relaxation components. The regression coefficients are reported in *Appendix 3* and suggest that there was no evidence of effect modification by components for CBT interventions. *Table 8* reports the SMDs for all specific additive combinations of intervention components. Relative to a usual curriculum control, there was weak evidence that a cognitive plus a behavioural component may be effective at reducing symptoms of depression post intervention in universal secondary settings (SMD −0.11, 95% CrI −0.28 to 0.05). There was a lack of evidence for all other combinations.

TABLE 8 Results from additive and full interaction component models: universal secondary settings, self-reported depression

Population/ setting/ outcome	Main intervention	Components (within main intervention)	Study arms (*n*)	SMD (95% CrI)	
				Additive model	Full interaction model
Universal/ secondary/ depression	CBT	Cognitive + psychoeducational + behavioural	11	0.01 (−0.12 to 0.13)	−0.03 (−0.15 to 0.09)
		Cognitive + psychoeducational	1	−0.55 (−1.33 to 0.20)	−0.57 (−1.33 to 0.21)
		Cognitive + behavioural + relaxation	4	−0.10 (−0.31 to 0.11)	−0.11 (−0.4 to 0.17)
		Cognitive + behavioural	4	−0.11 (−0.28 to 0.05)	−0.03 (−0.15 to 0.09)
		Cognitive + psychoeducational + behavioural + relaxation	6	0.02 (−0.18 to 0.22)	0.02 (−0.20 to 0.24)
		Cognitive + psychoeducational + behavioural + mindfulness + relaxation	3	−0.01 (−0.4 to 0.38)	−0.02 (−0.46 to 0.41)
		Cognitive + mindfulness	0	−0.70 (−1.6 to 0.18)	–
		Cognitive + relaxation	0	−0.66 (−1.47 to 0.13)	–
		Cognitive + psychoeducational + mindfulness	0	−0.59 (−1.44 to 0.26)	–
		Cognitive + behavioural + relaxation	0	−0.54 (−1.33 to 0.24)	–
		Cognitive + psychoeducational + mindfulness +relaxation	0	−0.57 (−1.44 to 0.29)	–
		Cognitive + psychoeducational + behavioural + mindfulness	0	−0.03 (−0.4 to 0.35)	–
		Cognitive + behavioural + mindfulness	0	−0.14 (−0.59 to 0.30)	–
		Cognitive + behavioural + mindfulness + relaxation	0	−0.13 (−0.58 to 0.32)	–
		Cognitive + mindfulness + relaxation	0	−0.69 (−1.6 to 0.21)	–
	Third wave	Third wave + psychoeducational	1	−0.05 (−0.38 to 0.27)	−0.05 (−0.40 to 0.30)
		Third wave + mindfulness + relaxation	3	0.10 (−0.12 to 0.33)	0.11 (−0.13 to 0.35)
		Third wave + psychoeducational + mindfulness + relaxation	1	−0.35 (−0.70 to 0.00)	−0.35 (−0.72 to 0.02)

Notes
Intervention components are nested within the main intervention (CBT and third wave). All CBT interventions in the universal secondary analysis contained a cognitive component. All third-wave interventions contained a third-wave component. Study arms reports the number of trial arms that included the specific combination of components listed. As there were several multiarm trials, this is not equivalent to the number of studies/trials. For example, one study arm includes a CBT intervention, which is defined by cognitive and psychoeducational components only. The reference intervention is usual curriculum. For full details of model, see *Chapter 2* and *Appendix 1*.

All third-wave interventions contained a third-wave component, and additive effects were estimated for psychoeducation and a combined mindfulness + relaxation component. Owing to the data structure, it was not possible to estimate the effects for mindfulness and relaxation components separately. The impact of including a psychoeducation component in third-wave interventions was to reduce the SMD by −0.45 (β −0.45, 95% CrI −0.87 to −0.04). Although this regression coefficient indicates the presence of effect modification, *Table 8* shows that there was still only weak evidence that a third-wave intervention (when made up of third wave + mindfulness + relaxation components) is effective at reducing symptoms of depression relative to a usual curriculum (SMD −0.35, 95% CrI −0.70 to 0.00). We note that this is based on evidence from a single study.

Full interaction model: components nested within intervention

Table 8 also reports the number of studies comparing each unique combination of components for CBT and third-wave interventions for the full interaction component model. Model fit and regression coefficients are reported in *Appendix 3*. The between-study posterior median SD for the full interaction model was suggestive of moderate heterogeneity (τ 0.15, 95% CrI 0.10 to 0.23). There was no evidence of a differential effect of CBT or third wave by intervention components in universal secondary settings.

Universal, secondary, further time points: intervention-level effects

Six to 12 months post intervention Twenty-eight studies (19,817 participants) contributed to the analysis for 6–12 months post intervention, eight of which were multiarm trials.[118,125,126,128,129,131,133–136,138,139,141–143,194–203,205–207] Twenty-one studies included an intervention based on CBT, four studies included a CBT + IPT intervention and one study evaluated an IPT-based intervention. Three studies included a third-wave-based intervention. The between-study posterior median SD was indicative of low heterogeneity (τ 0.08, 95% CrI 0.02 to 0.15). There was weak evidence, of small effects, to suggest that CBT (SMD −0.02, 95% CrI −0.10 to 0.06), CBT + IPT (SMD −0.10, 95% CrI −0.26 to 0.05) and third-wave interventions (SMD −0.13, 95% CrI −0.27 to 0.01) could prevent symptoms of depression, compared with a usual curriculum comparator. The third-wave studies were judged to be at low risk of bias. The CBT and CBT + IPT studies were judged to be at mostly unclear risk of selection bias (see *Appendix 2*). There was no evidence to support IPT (SMD 0.11, 95% CrI −0.13 to 0.35) reducing symptoms at 6–12 months, relative to usual curriculum.

Thirteen to 24 months post intervention Eight studies (7584 participants) contributed to the analysis for 13–24 months post intervention, seven of which included an intervention based on CBT and one that included an intervention based on CBT + IPT.[136,138,139,194,197,204,206,207] There was no evidence to suggest that CBT-based (SMD −0.04, 95% CrI −0.20 to 0.14) or CBT + IPT (SMD −0.10, 95% CrI −0.57 to 0.39) interventions prevented symptoms of depression at 13–24 months, relative to usual curriculum. The between-study posterior median SD was indicative of low heterogeneity (τ 0.07, 95% CrI 0.00 to 0.35).

Twenty-five or more months post intervention We combined studies reporting time points closest to 36 months post intervention. Three studies (1303 participants) reported time points between 30 and 36 months post intervention.[138,194,206] All evaluated a CBT intervention. There was no evidence of an effect for preventing symptoms (SMD −0.14, 95% CrI −2.89 to 2.63), compared with usual curriculum.

Universal population, primary setting

Post intervention

The analysis-specific network diagram is reported in *Figure 11*. Twelve studies (4116 participants) contributed to the analysis for the main time point of immediately post intervention.[145,147,150–152,155–157,208,209,211,212] Eleven included an intervention based on CBT and one study evaluated a behavioural intervention. Model fit and selection statistics were suggestive of slight lack of fit, but a consistency model was preferred. Model fit was similar across all three component models fitted (intervention, additive and full interaction), but

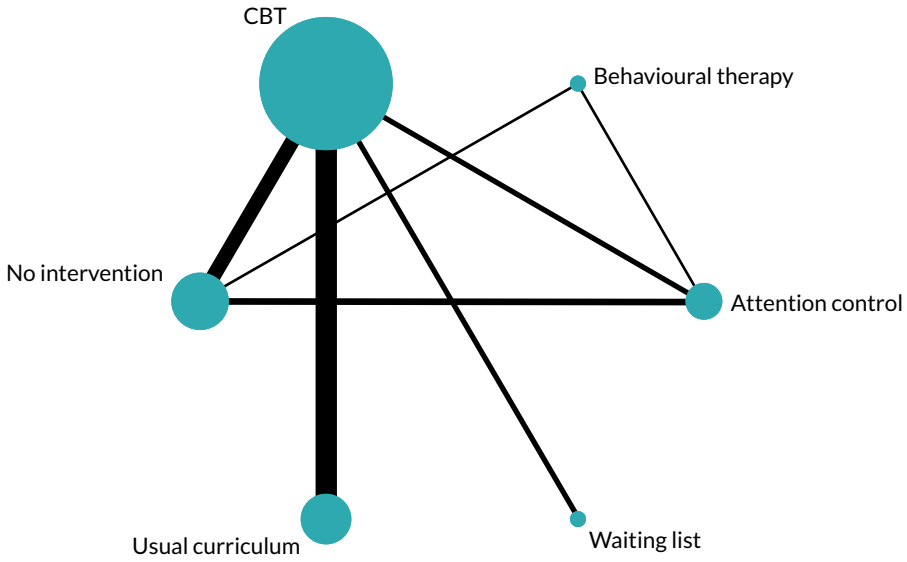

FIGURE 11 Network plot for universal population, primary setting: post-intervention depression outcome.

suggests that the intervention-level model was appropriate (see *Appendix 3*). Therefore, we report effect estimates from the random-effects intervention-level NMA only. Regression coefficients from the additive and full interaction models are reported in *Appendix 3*.

Intervention-level effects

The between-study posterior median SD was indicative of moderate to substantial heterogeneity (τ 0.32, 95% CrI 0.18 to 0.59). *Table 7* reports SMDs (95% CrIs) for each intervention, relative to usual curriculum. There was a lack of evidence that CBT (SMD −0.13, 95% CrI −0.44 to 0.17) or behavioural therapy (SMD −0.10, 95% CrI −1.04 to 0.80) reduced self-reported symptoms of depression post intervention.

Additive model: components nested within intervention

The between-study posterior median SD was indicative of high heterogeneity (τ 0.37, 95% CrI 0.20 to 0.70). All CBT interventions included a cognitive and a behavioural component, and additive effects could be estimated for psychoeducation and relaxation components only. However, there was no evidence for effect modification; regression coefficients are reported in *Appendix 3*, *Table 40*.

Full interaction model: components nested within intervention

The between-study posterior median SD was suggestive of high heterogeneity (τ 0.39, 95% CrI 0.21 to 0.78). There was no evidence of effect modification by intervention components for CBT in universal primary settings; regression coefficients are reported in *Appendix 3*, *Table 40*.

Universal, primary, further time points: intervention-level effects

Six to 12 months post intervention Nine studies (4134 participants) contributed to the analysis for 6–12 months post intervention, all of which evaluated a CBT-based intervention.[145,150–152,155,157,159,208,211] The between-study posterior median SDs were indicative of moderate to substantial heterogeneity (τ 0.21, 95% CrI 0.06 to 0.56). There was weak evidence, of a small effect, that CBT prevents symptoms of depression at 6–12 months, relative to usual curriculum (SMD −0.15, 95% CrI −0.43 to 0.09).

Thirteen to 24 months post intervention Three studies (1602 participants) contributed to the analysis for 13–24 months post intervention, all of which included an intervention based on CBT.[152,157,159] There was no evidence to suggest that CBT-based interventions prevented symptoms of depression at 13–24 months, relative to usual curriculum (SMD −0.03, 95% CrI −0.62 to 0.55).

Twenty-five or more months post intervention One study (910 participants) reported a follow-up time point of 30 months post intervention.[152] There was evidence that CBT prevented symptoms of depression at 30 months' follow-up (SMD −0.27, 95% CrI −0.42 to −0.13).

Targeted population, secondary setting

Post intervention

The analysis-specific network diagram for targeted secondary settings is reported in *Figure 12*. Twenty-four studies (3669 participants) contributed to the analysis for the main time point of immediately post intervention.[114,141,160–163,165,167,170,173,214,215,217–219,221–224,226–230] Four studies were deemed to be at low risk of bias and seven studies were deemed to be at unclear risk of bias for both random sequence generation and allocation concealment. Eleven studies were judged to be at low risk of bias for random sequence generation but at unclear risk of bias for allocation concealment, and two studies were judged to be at unclear risk of bias for random sequence generation but at low risk of bias for allocation concealment. Eighteen studies included an intervention based on CBT, three studies included IPT-based interventions, one study evaluated a third-wave intervention, one included a CBM intervention and one evaluated an exercise intervention. Model fit and selection statistics were suggestive of slight lack of fit, but a consistency model was considered reasonable. Model fit was similar across all three component models (intervention, additive and full interaction). Reported results are from a random-effects, consistency intervention-level NMA. Full model fit details are provided in *Appendix 3*.

Intervention-level effects

There was evidence of moderate to substantial between-study heterogeneity (τ 0.38, 95% CrI 0.25 to 0.58). *Table 7* reports SMDs (95% CrIs) for each intervention relative to no intervention. There was no evidence of an effect for any intervention: CBT (SMD −0.22, 95% CrI −0.58 to 0.13); CBM (SMD −0.90, 95% CrI −2.20 to 0.40); IPT (SMD −0.65, 95% CrI −1.50 to 0.16); exercise (SMD −0.28, 95% CrI −1.13. to 0.58); and third wave (SMD −0.68, 95% CrI −1.83 to 0.47).

Component models: additive and full interaction

Regression coefficients are reported for both the additive and full interaction models in *Appendix 3*, *Table 42*. There was no evidence of effect modification according to components for CBT interventions in a targeted secondary setting.

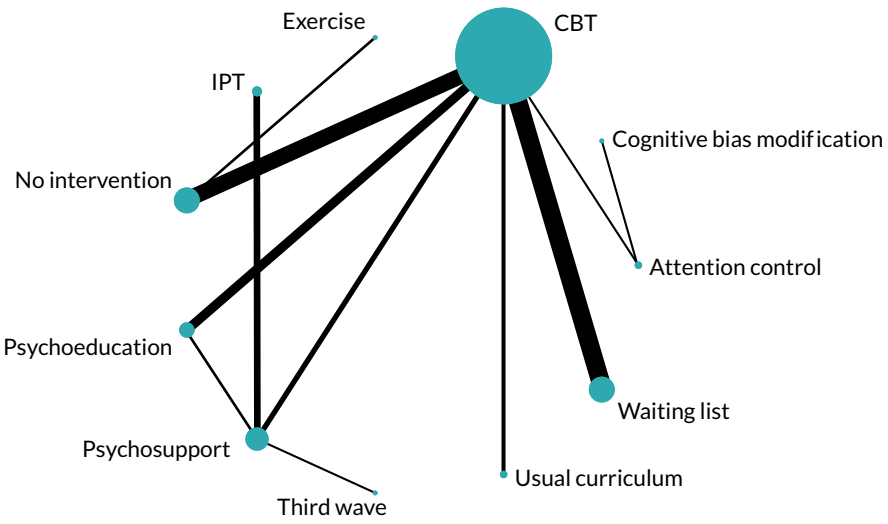

FIGURE 12 Network plot for targeted population, secondary setting: post-intervention depression outcome.

Targeted, secondary, further time points: intervention-level effects only

Six to 12 months post intervention Seventeen studies (2728 participants) contributed to the analysis for 6–12 months post intervention, of which 14 included a CBT-based intervention and three included an IPT intervention.[141,160,163,165,173,214,218,219,221–224,226–230] There was evidence of high levels of between-study heterogeneity (τ 0.44, 95% CrI 0.27 to 0.71). There was no evidence that either CBT (SMD −0.04, 95% CrI −0.51 to 0.41) or IPT (SMD −0.49, 95% CrI −1.49 to 0.48) prevented symptoms of depression at 6–12 months, relative to no intervention.

Thirteen to 24 months post intervention Five studies (1089 participants) provided data for the NMA of 13–24 months' follow-up.[166,218,223,224,229] Four evaluated a CBT intervention and one evaluated an IPT-based intervention. Between-study heterogeneity was high (τ 0.58, 95% CrI 0.12 to 3.08). There was no evidence that CBT (SMD −0.18, 95% CrI −2.56 to 2.16) or IPT (SMD 0.09, 95% CrI 3.81 to 3.93) reduced symptoms of depression at 13–24 months post intervention.

Twenty-five or more months post intervention One study (260 participants), judged to be at unclear risk of bias, provided no evidence to suggest that CBT prevented symptoms at 48 months' follow-up (SMD −0.27, 95% CrI −1.05 to 0.50).[166]

Targeted population, primary setting

Post intervention

The analysis-specific network diagram for targeted primary settings is reported in *Figure 13*. Five studies (497 participants) contributed to the analysis for the post-intervention time point, of which four included an intervention based on CBT, and one examined an occupational therapy-based intervention.[175,179–181,232] One study was deemed to be at low risk of bias for both random sequence generation and allocation concealment, and three studies were deemed to be at unclear risk of bias. One study was deemed to be at low risk of bias for random sequence generation but at unclear risk of bias for allocation concealment.

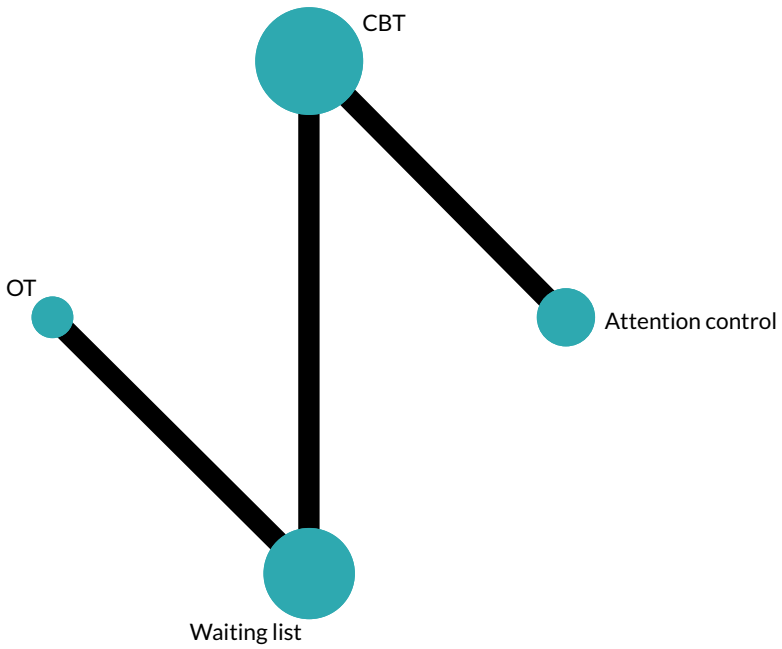

FIGURE 13 Network plot for targeted population, primary setting: post-intervention depression outcome.
OT, occupational therapy.

Model fit statistics are reported in *Appendix 3*. There were limited data available for the component-level models; however, model fit was similar across the three models. The between-study posterior median SD was lowest for the intervention-level model; it is on this basis that the intervention-level model is preferred here (see *Appendix 3*). All reported results are from a consistency random-effects NMA model unless otherwise stated.

Intervention-level effects

There was evidence of substantial between-study heterogeneity (τ 0.60, 95% CrI 0.08 to 3.80). *Table 7* reports SMDs (95% CrIs) for each intervention relative to a waiting list. There was no evidence of an effect for CBT (SMD −0.48, 95% CrI −2.49 to 1.50) or occupational therapy (SMD −0.10, 95% CrI −2.94 to 2.71) at the immediate post-intervention time point.

Component models: additive and full interaction

For the additive component model, the between-study posterior median SD tended to the prior (τ 2.48, 95% CrI 0.12 to 4.87), as did the regression coefficient for occupational therapy (β −8.97, 95% CrI −144.7 to 144.5). As a result, we conclude that data were insufficient to estimate additive or full interaction effects for targeted primary settings.

Targeted, primary, further time points: intervention-level effects only

Two studies (230 participants) reported follow-up at 6–12 months, both of which included a CBT-based intervention.[175,232] A fixed-effects NMA was conducted. There was weak evidence that CBT (SMD −0.34, 95% CrI −0.72 to 0.05) prevented symptoms of depression at 6–12 months, relative to a waiting list. There was weak evidence from one study (83 participants), judged to be at unclear risk of bias, that CBT prevented symptoms of depression at 24 months' follow-up, compared with a waiting list (SMD −0.50, 95% CrI −0.96 to 0.05).[232]

Targeted population, tertiary/university setting

The analysis-specific network diagram is reported in *Figure 14*. Five studies (789 participants) contributed to the analysis for the main time point of post intervention, four of which included an intervention based on CBT and one of which included an intervention based on behavioural therapy.[183,184,186,187,235]

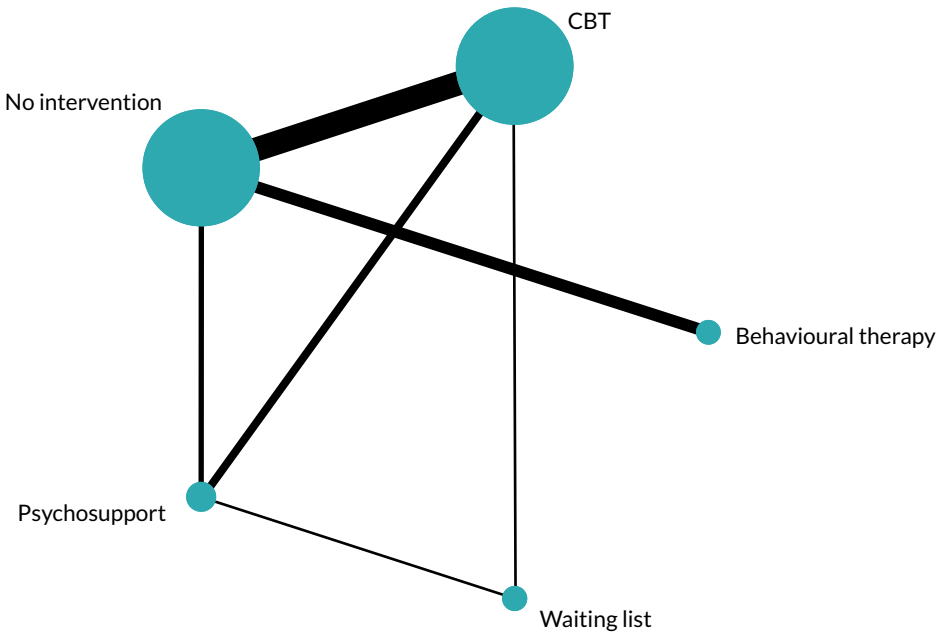

FIGURE 14 Network plot for targeted population, tertiary/university setting: post-intervention depression outcome.

Model fit and selection statistics suggested that a random-effects consistency model was reasonable (see *Appendix 3*); however, the between-study posterior median SD was indicative of substantial heterogeneity (τ 0.51, 95% CrI 0.12 to 2.50). This was considerably reduced in the unrelated intervention effects model (τ 0.26, 95% CrI 0.02 to 2.48), and may indicate the presence of inconsistency. Therefore, results for the tertiary setting are not reported. This possible inconsistency should also be interpreted in the light of the inclusion criteria adopted in this review, that interventions needed to be delivered in the educational institution itself, and the unanticipated limitations it caused for the tertiary/university setting analyses. We consider the limitations in *Chapter 10*.

Exploring heterogeneity and small-study effects

Subgroup analyses, metaregression and sensitivity analyses were conducted for the intervention-level NMA, for the main outcome and primary end point of post intervention only. Comparison-adjusted funnel plots did not provide evidence of small-study effects (see *Appendix 6*). However, the small number of studies available for the primary settings makes interpretation difficult.

Metaregression was conducted for intervention mode of delivery (face to face or via computer) and for intervention facilitator (teacher or a MHP). There was no evidence of effect modification by facilitator or mode of delivery for any population or setting combination (see *Appendix 6*).

Subgroup analyses were conducted to assess whether or not intervention effects differed by intended focus of the intervention, for example whether or not interventions addressing depression had a larger effect on anxiety outcomes than interventions intended to focus on anxiety but which also recorded depression outcomes. For each population and setting combination, intervention estimates were compared across three subgroups: (1) interventions that aimed to prevent anxiety (2) interventions that aimed to prevent depression only and (3) interventions that aimed to prevent both anxiety and depression. The results are reported in *Appendix 6* but should be considered descriptive only. For the universal secondary network, there was some evidence that intervention focus was important. Interventions focused on preventing depression appear to have a larger effect on self-reported symptoms of depression than those focusing on anxiety or combined depression and anxiety. However, CrIs overlap, and we did not conduct a statistical test to examine subgroup differences.

Sensitivity analyses: risk of bias

Sensitivity analyses were conducted for the intervention-level NMA, for the main outcome and primary end point of post intervention only. We explored the robustness of the findings to excluding studies judged to be at high/unclear risk of bias for the randomised sequence generation and allocation concealment domains.

Having removed studies judged to be at high/unclear risk of bias for randomisation and allocation concealment, only six studies of six interventions remained in the universal secondary depression network.[125,126,141,196,197,201] However, only five studies formed a connected network.[125,126,141,196,201] Restricting to studies judged to have a low risk of bias, there was no evidence that CBT (SMD 0.02, 95% CrI −0.77 to 0.80) or third-wave (SMD −0.35, 95% CrI −1.15 to 0.45) interventions are effective to prevent symptoms of depression in universal secondary settings (*Table 9*). For targeted secondary interventions, only four studies of four interventions could be included in the analysis of studies judged to have a low risk of bias, and there was no evidence that CBT was effective.[141,167,219,226] One study was judged to be at low risk of bias in the universal primary network.[145] A sensitivity analysis was not possible for the targeted primary network.

Sensitivity analyses: intracluster correlation coefficient and change from baseline scores

When cluster-randomised trials did not explicitly account for clustering in their analyses, we followed the advice in the Cochrane handbook (section 16.3.4)[81] for calculating an approximate sample size, using an ICC of 0.03. We explored the robustness of this decision in a best-case/worst-case sensitivity analysis using ICCs of 0.01 and 0.06, respectively. Results were robust to alternative ICC values.

TABLE 9 Risk-of-bias sensitivity analyses for self-reported depression

Population/setting	Reference intervention	Intervention	Number of studies	SMD (95% CrI)	
				Low risk of bias studies	All studies
Universal secondary	Usual curriculum	CBT	5	0.02 (−0.77 to 0.80)	−0.04 (−0.16 to 0.07)
	Usual curriculum	Third wave		−0.35 (−1.15 to 0.45)	−0.03 (−0.21 to 0.14)
Universal primary	Usual curriculum	CBT	1	−0.10 (−0.29 to 0.09)[a]	−0.13 (−0.44 to 0.17)
Targeted secondary	No intervention	CBT	4	0.07 (−1.33 to 1.49)	−0.22 (−0.58 to 0.13)

a From fixed-effects analysis.

Notes

Results are compared for the immediate post-intervention time point. Comparisons listed are those remaining once studies deemed to be at high/unclear risk of bias for random sequence generation and allocation concealment had been removed from the network. Results are SMDs and 95% CrIs, for the intervention relative to the reference intervention listed.

When necessary, we derived mean change from baseline from reported baseline and follow-up means and SDs. To do so, we assumed a correlation coefficient of 0.7, which was based on previous analyses.[82] We conducted sensitivity analyses using correlation values of 0.6 and 0.8. Results were robust to alternative correlation values (see *Appendix 6*).

Summary of main results

A total of 105 studies met the inclusion criteria for the depression prevention review, of which 88 were judged to be at high or unclear risk of bias for random sequence generation and/or allocation concealment. Eighty-six studies contributed data to the NMA across all settings and time points. Moderate levels of heterogeneity were observed in all analyses, and high levels of heterogeneity were observed in some analyses. There was no suggestion of small-study effects in the depression networks.

At the primary time point of post intervention, there was weak evidence from 34 studies to suggest that CBT (SMD −0.04, 95% CrI −0.16 to 0.07) and CBT + IPT (SMD −0.18, 95% CrI −0.46 to 0.08) may be effective in universal secondary settings. In all other populations and settings, there was no evidence to suggest that any type of intervention was effective for preventing depression at the post-intervention time point. The interpretation of these results and the implications for conclusions are presented in *Chapter 9*.

At 6–12 months' follow-up, there was weak evidence to suggest that CBT (SMD −0.02, 95% CrI −0.10 to 0.06), CBT + IPT (SMD −0.10, 95% CrI −0.26 to 0.05) and third-wave interventions (SMD −0.13, 95% CrI −0.27 to 0.01) may reduce depression, compared with usual curriculum, in universal secondary settings. There was also weak evidence that CBT reduced self-reported depression at 6–12 months, relative to usual curriculum, in universal primary settings (SMD −0.15, 95% CrI −0.43 to 0.09), and relative to a waiting list in targeted primary settings (SMD −0.34, 95% CrI −0.72 to 0.05). In targeted primary settings, there was weak evidence, from a single study judged to be at unclear risk of bias, for the beneficial effect of CBT-based interventions (relative to a waiting list) at 13–24 months' follow-up (SMD −0.50, 95% CrI −0.96 to 0.05).

In all other populations and settings, at all remaining time points, there was an absence of evidence that any type of intervention was effective.

Owing to possible statistical inconsistency, we do not report the results for tertiary education settings. As noted in *Chapter 4*, we consider this, and the limitations imposed by the inclusion criteria on the validity of the tertiary/university network, in *Chapter 10*.

Chapter 6 Additional primary outcomes and secondary outcomes from studies focusing on prevention of depression and/or anxiety

In the preceding chapters, we reported the effectiveness results for the main outcomes of self-reported anxiety and depression. In this chapter, we report the additional outcomes from all studies focusing on anxiety, depression or anxiety and depression.

Additional primary outcomes

Self-reported psychological well-being

Of the 137 studies focused on preventing anxiety, depression, or both depression and anxiety, 15 reported an outcome of self-reported psychological well-being, life satisfaction or quality of life. Five studies reported measuring well-being using the Warwick–Edinburgh Mental Wellbeing Scale,[124,126,127,132,133] seven studies reported a measure of life satisfaction[124,131,159,181,187,203,239] and two studies reported a quality-of-life measure.[129,235] One study reported a measure of social functioning[206] and one used the Ryff Scales of Psychological Well-being.[143] Planned NMAs by population and setting were not possible; data are reported by outcome measure and study in *Table 10*. From their model-based analysis, Calear *et al.*[16] reported that there were no differences between interventions for school-led CBT and a waiting list (Cohen's *d* −0.08, 95% CI −0.29 to 0.13) or between health service-led CBT and a waiting list (Cohen's *d* −0.06, 95% CI −0.21 to 0.09). Using the data reported in the paper, we calculated the difference in mean change from baseline at post intervention, which suggested a small drop in well-being at post intervention. For each of the remaining 12 studies, summary intervention effects were compatible with both an increase and a decrease in well-being/life satisfaction.

TABLE 10 Well-being and life satisfaction: population, setting and intervention comparison reported by study for the post-intervention time point

Study	Population	Setting	Comparison[a]	Results, mean difference (95% CI)
Warwick–Edinburgh Mental Wellbeing Scale				
Calear *et al.*[126] 2016	Universal	Secondary	CBT vs. CBT vs. waiting list	Post intervention: −2.07 (−3.56 to −0.58) Post intervention: −1.09 (−2.32 to −0.14)
Calear *et al.*[127] 2016	Universal	Secondary	CBT vs. waiting list	Post intervention: 1.85 (−0.35 to 4.05)
Johnson *et al.*[132] 2016	Universal	Secondary	Third wave vs. usual curriculum	Post intervention: 0.01 (−0.12 to 0.14)
Johnson *et al.*[133] 2017	Universal	Secondary	Third wave vs. third wave vs. usual curriculum	Post intervention: 0.02 (−0.10 to 0.14) Post intervention: −0.06 (−0.18 to 0.06)
Burckhardt *et al.*[124] 2015	Universal	Secondary	Mindfulness/relaxation vs. attention control	Post intervention data not reported

continued

TABLE 10 Well-being and life satisfaction: population, setting and intervention comparison reported by study for the post-intervention time point (*continued*)

Study	Population	Setting	Comparison[a]	Results, mean difference (95% CI)
Life satisfaction scales				
Hodas[131] 2016	Universal	Secondary	CBT vs. waiting list	Post intervention: 1.74 (−1.28 to 4.76)
Khalsa *et al.*[239] 2012	Universal	Secondary	Mindfulness/relaxation vs. usual curriculum	Post intervention: 0.03 (−0.29 to 0.35)
Rose *et al.*[203] 2014	Universal	Secondary	CBT + IPT vs. CBT + IPT vs. waiting list	Post intervention: 0.13 (−0.12 to 0.38) Post intervention −0.13 (−0.37 to 0.11)
Burckhardt *et al.*[124] 2015	Universal	Secondary	Mindfulness/relaxation vs. attention control	Post intervention data not reported
Stallard *et al.*[159] 2014	Universal	Primary	CBT vs. CBT vs. usual curriculum	12-month follow-up: −0.58 (−1.26 to 0.10) 12-month follow-up: 0.03 (−0.66 to 0.72)
Tokolahi *et al.*[181] 2018	Targeted	Primary	Occupational therapy vs. waiting list	Post intervention: −0.45 (−3.39 to 2.49)
Seligman *et al.*[187] 2007	Targeted	Tertiary	CBT vs. no intervention	Post intervention: 0.10 (−1.06 to 1.26)
Quality of life, social functioning and Ryff Scales of Psychological Well-being				
Quality of life				
Gucht *et al.*[129] 2017	Universal	Secondary	Third wave vs. usual curriculum	Post intervention: 0.09 (−0.26 to 0.44)
Takagaki *et al.*[235] 2016	Targeted	University	Behavioural therapy vs. no intervention	Post intervention: 0.05 (0.02 to 0.08)
Social functioning				
Spence *et al.*[206] 2003	Universal	Secondary	CBT vs. usual curriculum	Post intervention: 0.22 (−0.70 to 1.14)
Ryff Scales of Psychological Well-being				
Tomba *et al.*[143] 2010	Universal	Secondary	CBT vs. CBT	Multiple subscales reported: autonomy, environmental mastery, personal growth, positive relations, purpose in life and self-acceptance

a Where there are three arms, effect estimates have been calculated for the active intervention versus the control intervention.

Self-reported suicidal ideation, behaviour and self-harm

Author-defined suicidal ideation, behaviour or self-harm was referenced in 34 studies narratively or quantitatively. However, of these, the majority ($n = 21$) excluded participants reporting suicidal thoughts or behaviours and/or removed questions asking about suicide and self-harm from the baseline questionnaires. Some studies reported that the removal of questions was requested by participating schools or education authorities. Eleven studies reported that suicidal thoughts and behaviours were measured at baseline and that participants were referred to further services when necessary. However, nine did not then provide details on whether or not these students continued in the study, nor did they provide follow-up measures. The full details of these studies are reported in *Appendix 7*.

Seven studies reported participants experiencing suicidal thoughts or self-harm at post intervention.[123,136,142,162,221,235,240] Details are reported in *Table 11*. Three studies were conducted in a universal secondary setting and formed a connected network via attention control. However, NMA model fit was suggestive of inconsistency, and combined results are not reported. Two studies were conducted in a targeted secondary setting, one in an indicated tertiary setting and one in a universal primary setting. There was no evidence to suggest that educational setting-based interventions to prevent anxiety and/or depression had an impact on suicidal ideation or thoughts of self-harm for CYP.

TABLE 11 Study-level summary for suicidal ideation and self-harm outcomes at post-intervention time point

Study	Analysis (population, setting)	Comparison	Outcome	Results
Perry *et al.*[136] 2017	Universal, secondary	Attention control vs. CBT	Suicidal ideation	OR 0.83 (95% CrI 0.28 to 2.40)
[a]Stallard *et al.*[142] 2013	Universal, secondary	Attention control vs. usual curriculum	Self-harm thoughts	OR 0.87 (95% CrI 0.72 to 1.04)
		Attention control vs. CBT + IPT		OR 0.83 (95% CrI 0.70 to 1.00)
Britton *et al.*[123] 2014	Universal, secondary	Attention control vs. mindfulness/ relaxation	Suicidal ideation or self-harm	Not estimable
Poppelaars *et al.*[221] 2016	Indicated, secondary	Waiting list vs. CBT	Suicidal ideation	OR 2.20 (95% CrI 0.29 to 65.56)
Cova *et al.*[162] 2011	Indicated, secondary	No intervention vs. CBT	Self-harm	Results not presented because of missing SDs
Roberts *et al.*[240] 2018	Universal, primary	Usual curriculum vs. CBT vs. CBT	Suicidal ideation	*For suicidal ideation, there was no significant group time interaction [F(2,198) = 2.84, p = 0.061]. There were, however, significant main effects for group [F(2,198) = 3.41, p = 0.035] and time [F(1,198) = 6.14, p = 0.014]*
Takagaki *et al.*[235] 2016	Indicated, tertiary/ university	No intervention vs. behavioural activation	Suicidal ideation	OR 0.39 (95% CrI 0.05 to 2.28)

a Six months' follow-up.
Notes
Population, setting and intervention comparison as reported by study. ORs were calculated when sufficient information was reported by author.

Inequalities in health

None of the included studies reported the impact of the intervention on inequalities in health;[241] therefore, we conducted post hoc subgroup analyses on the basis of available data. Data had been extracted on participant characteristics, including SES, sex and ethnicity (see *Chapter 2*). Descriptions of SES, sex and ethnicity, as defined by study authors, are reported in *Appendix 7*. Owing to insufficient data, subgroup analyses could not be conducted by sex or ethnicity for any population or setting. Subgroup analyses for studies conducted in lower socioeconomic settings (as described by the author) are reported.

Eleven studies reported being conducted in lower SES settings, of which three were conducted in MICs[118,122,189] and eight in HICs.[139,140,152,156,157,196,208,210] Interventions evaluated in lower SES settings were CBT relative to usual curriculum, no intervention or a waiting list. Unfortunately, for the primary time point of post intervention, data were available for only seven studies conducted in HICs.[139,140,152,156,157,196,208] The results suggest that, in the case of interventions in secondary school settings, those delivered in lower SES settings may be less effective than those delivered in higher/mixed SES settings in reducing self-reported symptoms of anxiety. However, owing to the number of studies available, it was necessary to conduct fixed-effects analyses for the lower SES subgroup. This was not observed for self-reported depression, although it is of interest that the SMD for CBT compared with usual curriculum in higher/mixed SES settings was −0.07 (95% CrI −0.20 to 0.06); in lower SES settings, the SMD was 0.04 (95% CrI −0.06 to 0.15).

Table 12 reports the subgroup analysis findings. There was no evidence of a difference by SES for either self-reported depression or anxiety in primary educational settings. However, for self-reported anxiety, the SMD of CBT compared with usual curriculum in higher/mixed SES settings was 0.15 (95% CrI −0.37 to 0.02); in lower SES settings, the SMD was 0.05 (95% CrI −0.08 to 0.18).

Combined depression and anxiety scores and other 'internalising' outcomes

As described in *Chapter 1*, *Changes to protocol, clarifications and additional analyses*, and *Table 1*, a post hoc decision was made to assess composite 'internalising' outcomes, for example outcome scales that reported combined anxiety and depression scores (such as total Depression, Anxiety and Stress Scale or RCADS scores) or 'internalising' subscales of broader psychological functioning measures such as the SDQ. Six studies reported an internalising outcome, with useable data at post intervention, and are reported in *Table 13* by population and setting.[119,123,163,171,216,219] Four studies in targeted secondary settings provided sufficient data for inclusion in a random-effects NMA.[163,171,216,219] Model fit statistics suggested that a consistency model was reasonable; however, the posterior median between-study SD was indicative of substantial heterogeneity (τ 0.97, 95% CrI 0.03 to 9.03) and tended to the prior distribution [uniform(0,10)]. Consequently, we report only study-specific SMDs in *Table 13*.

TABLE 12 Results from subgroup analysis by socioeconomic status

			SES, SMD (95% CrI)	
Population/setting	**Outcome**	**Comparison**	**Low**	**High/mixed**
Universal secondary	Depression	CBT vs. usual curriculum	0.04 (−0.06 to 0.15)[a]	−0.07 (−0.20 to 0.06)
	Anxiety	CBT vs. usual curriculum	0.09 (−0.11 to 0.29)[a]	−0.29 (−0.50 to −0.07)
Universal primary	Depression	CBT vs. usual curriculum	−0.23 (−0.60 to 1.13)	−0.05 (−0.55 to 0.45)
	Anxiety	CBT vs. usual curriculum	0.05 (−0.08 to 0.18)[a]	−0.15 (−0.37 to 0.02)

a Results from a fixed-effects analysis.
Notes
SMDs and 95% CrIs are reported by subgroup (lower vs. higher/mixed SES). Only CBT vs. usual curriculum could be compared in each subgroup.

TABLE 13 Composite internalising outcomes at post intervention time point

Study	Population	Setting	Time	Comparison	Results, SMD (95% CrI)
Britton *et al.*[123] 2014	Universal	Secondary	Post intervention	Attention control vs. mindfulness/relaxation	0.12 (−0.32 to 0.54)
Aune and Stiles[119] 2009	Universal	Secondary	Post intervention	No intervention vs. CBT	−0.02 (−0.10 to 0.06)
Fung *et al.*[216] 2016	Targeted	Secondary	Post intervention	Waiting list vs. mindfulness/relaxation	−0.19 (−0.83 to 0.44)
McCarty *et al.*[219] 2013	Targeted	Secondary	Post intervention	Psychosupport vs. CBT	−0.33 (−0.62 to −0.05)
Rice[171] 2009	Targeted	Secondary	Post intervention	Attention control vs. CBT	0.08 (−0.89 to 1.04)
Rice[171] 2009	Targeted	Secondary	Post intervention	Attention control vs. mindfulness/relaxation	0.41 (−0.31 to 1.13)
Dobson *et al.*[163] 2010	Targeted	Secondary	Post intervention	Attention control vs. CBT	0.19 (−0.26 to 0.64)

Note
All results reported as SMDs (95% CrIs) for comparability with NMA.

A fixed-effects NMA was possible for a further two studies[142,206] reporting a 12-month follow-up in a universal secondary setting, as they formed a connected network via usual curriculum.. However, there was no evidence that interventions based on CBT (SMD 0.03, 95% CrI −0.14 to 0.20) or CBT + IPT (SMD 0.01, 95% CrI −0.16 to 0.17) were more effective than usual curriculum for improving composite internalising outcomes at a 12-month follow-up.

Secondary outcomes

Acceptability and attendance

Intervention acceptability was defined by study authors. We anticipated considerable variability in the reporting of acceptability outcomes, but have combined them here under loose categories relating to (1) attitudes towards and satisfaction with intervention, (2) enjoyment and utility, and (3) attendance. Thirty-three studies reported a summary of acceptability of the intervention to study participants in terms of satisfaction or enjoyment and are summarised in *Tables 14* and *15* by population and setting. Attendance data, as reported by authors, are reported in *Appendix 7*, *Table 72*.

Attitudes and satisfaction with intervention

Eight studies reported satisfaction with the intervention (see *Table 14*). Two studies[120,137] reported an overall satisfaction outcome in a universal secondary setting. Both used Likert-type scales and suggested that students were highly satisfied with the interventions. In targeted secondary settings, five studies reported a satisfaction or attitude to 'treatment' measure.[168,216,218,219,224] However, results were reported for the experimental/active intervention arms only, and not for controls. All reported that participants were satisfied with their intervention assignment. One study[185] in a targeted tertiary setting reported satisfaction with intervention assignment, with a mean score of 4.0 (SD 0.47) on a five-point scale, suggesting that the majority of participants were satisfied with the intervention.

Intervention enjoyment and utility

Twenty-five studies reported enjoyment or utility of intervention. In universal secondary settings, 11 studies reported an acceptability outcome assessing enjoyment or usefulness of the intervention.[123,127,132,133,135,139,142,197,202,206,207] However, only two studies reported comparative data for all arms of the study. Stallard *et al.*[142] note that the control group intervention: 'Usual PSHE [personal, social and health education] was rated more positively than both classroom-based CBT and attention control PSHE for liking [F 7.11, df (degrees of freedom) 2970; $p < 0.01$], usefulness (F 6.46, df 2966; $p < 0.01$) and relevance for their age (F 8.84, df 2963; $p < 0.01$).' Merry *et al.*[197] compared intervention arms on a five-point Likert scale, where five was the most positive score and one the most negative. The programmes were rated by the students as reasonably enjoyable. The control group intervention received slightly higher ratings than the experimental intervention for both enjoyment and utility (see *Table 15*). The majority of studies reported that participants enjoyed the intervention and found it useful. Only one study reported negative enjoyment and utility feedback from students[207] (see *Table 15*).

In universal primary settings, eight studies reported some detail for enjoyment or usefulness of the intervention.[145,146,150,156,158,159,210,212] Two studies evaluating the FRIENDS anxiety programme reported an acceptability outcome assessing enjoyment or usefulness.[158,159] In Ruttledge *et al.*,[158] 68% of the children found the FRIENDS for Life programme 'very useful' or 'somewhat useful'. Stallard *et al.*[159] reported that 74% of participants enjoyed the intervention, 59% thought that it had been helpful and 62% would recommend it to a friend. Across all studies, results suggest that participants generally found the interventions enjoyable and useful (see *Table 15*).

Four studies reported enjoyment/utility in targeted secondary settings.[162,217,221,227] Poppelaars *et al.*[221] provided comparative data for two CBT-based interventions and concluded that acceptability was similar across the programmes. Woods and Jose[227] conducted semistructured focus groups at the end

TABLE 14 Author-reported satisfaction with the intervention

Study	Satisfaction
Baker and Butler[120] 1984	This was measured using the Attitudes Toward Treatment Scale, a 14-item Likert-type scale, with possible scores ranging from 14 to 98. Higher scores indicate a higher degree of satisfaction. Treatment group: mean score 75.47 (SD 12.93); control group: mean score 63.69 (SD 10.02)
Potek[137] 2012	On a 10-point Likert scale, the intervention group gave an average rating of 8.05 (SD 0.99, minimum 5.93, maximum 9.57). Higher scores indicate a higher degree of satisfaction
Fung *et al.*[216] 2016	On a scale of 1–10, the author reports 'moderate levels of satisfaction' among participants (mean score 7.21, SD 0.67)
Kiselica *et al.*[168] 1994	*. . . female participants had a more favourable attitude toward training experience than did male participants, regardless of the treatment condition they were assigned to*
McCarty *et al.*[218] 2011	Participants were asked how satisfied they were with group membership: 'very much', 48%; 'pretty much', 36%; and 'all right', 13%. One student disliked the group 'a little' and felt 'embarrassed' (3%)
McCarty *et al.*[219] 2013	Satisfaction: 83% liked their intervention group 'very much' or 'pretty much'. Comfort: 84% of students were comfortable in their intervention group
Stice *et al.*[224] 2008	In the two group-based interventions, 76% and 71% of respondents were 'pleased' or 'very pleased' with their assigned group. In the bibliotherapy group, 29% reported being 'pleased' or 'very pleased'
Higgins[185] 2007	On a scale of 1–5, the mean satisfaction score was 4.0 (SD 0.47). The author describes this as showing that most participants were 'somewhat satisfied' with the workshop

Note
Details reported by study and as reported in original publication.

TABLE 15 Author-reported enjoyment and usefulness of the intervention

Study	Enjoyment and usefulness of intervention
Stallard *et al.*[142] 2013	Usual PSHE was preferred over both classroom-based CBT and attention control PSHE: liking (F 7.11, df 2970; $p < 0.01$), usefulness (F 6.46, df 2966; $p < 0.01$), relevance (F 8.84, df 2963; $p < 0.01$)
Merry *et al.*[197] 2004	Enjoyment and usefulness were assessed using five-point Likert scales. Enjoyment: both the RAP-Kiwi intervention (mean score 3.0, SD 1.1) and attention control (mean score 3.7, SD 1.0) were rated 'reasonably enjoyable'. Usefulness: RAP-Kiwi mean score 2.9 (SD 1.1); attention control mean score 3.1 (SD 1.1). Higher values indicate greater enjoyment and usefulness
Johnson *et al.*[133] 2017	On a 10-point Likert scale, enjoyment and interest were rated as follows: mean score 6.92 (median 7.0, range 0–10). Higher values indicate greater enjoyment
Tak *et al.*[207] 2016	Rated on a four-point Likert-scale. Authors report that participants did not like the intervention (mean score 1.58, SD 0.69) and did not find it useful (mean score 1.96, SD 0.85). Higher values indicate greater enjoyment and usefulness
Roberts *et al.*[139] 2010	SLS: the 'Learning to negotiate' lessons were rated most enjoyable by students and 'Networks' the least enjoyable. Role plays were the most popular activities. A total of 68.7% to 79.0% rated the utility of SLS as average or higher
	OTS: the most enjoyable activities were games and quizzes. A total of 67.3% rated the utility of OTS as average or higher
Lowry-Webster *et al.*[135] 2001	Participants were asked 'How much did you enjoy the FRIENDS program?'; 31.1% enjoyed it 'a lot', 53.7% enjoyed it 'some', 14.2% 'a little' and 1% 'not at all'
Johnson *et al.*[132] 2016	On a 10-point Likert scale, student enjoyment and interest was rated as follows: mean score 6.67 (median 7.0, range 0–10). Higher values indicate greater enjoyment and interest

TABLE 15 Author-reported enjoyment and usefulness of the intervention (*continued*)

Study	Enjoyment and usefulness of intervention
Spence *et al.*[206] 2003	A total of 42% would recommend the course to other students, 31% would maybe recommend it and 27% would not recommend the course. A total of 34% expected to use the skills learnt, 49% thought that they would maybe use the skills, and 17% did not think that they would use the skills in their everyday life
Rivet-Duval *et al.*[202] 2011	Intervention participants rated the usefulness and acceptability of the programme as high (mean score 4.57, SD 0.78). (No detail provided on scale)
Britton *et al.*[123] 2014	A total of 82% of students felt more focused, more able to concentrate or less distracted, and 88% reported feeling more relaxed and calmer
Calear *et al.*[127] 2016	*Over 60% of participants found the website to be useful or very useful . . . over 50% . . . reported they would use the website again and a further 10% had already recommended the website to a friend*
Poppelaars *et al.*[221] 2016	On a five-point scale, the mean response for liking OVK was 3.13 (SD 1.09); for SPARX, it was 3.16 (SD 1.35). The mean response for programme usefulness in daily life was 3.07 (SD 1.19) for OVK and 2.72 (SD 1.26) for SPARX
Cova *et al.*[162] 2011	A total of 71.6% strongly agreed or agreed that participation was enjoyable, and 8.7% strongly disagreed or disagreed. A total of 79.0% strongly agreed or agreed that the intervention was useful, and 13.5% strongly disagreed or disagreed
Livheim *et al.*[217] 2015	A total of 91% of participants 'gave exclusively positive feedback' about the intervention. Half stated that it was 'very valuable' and the remainder that it was 'quite valuable'. All would recommend the course to a friend
Woods and Jose[227] 2011	Participants reported the following positive aspects of the intervention: confectionery rewards, missing lessons and playing games. Negative aspects: amount of reading and writing required and 'out-of-date' scenarios
Ahlen *et al.*[145] 2018	A total of 80% of participants in the high level of supervision group, compared with 68% in the low level of supervision group, enjoyed Friends for Life 'much or some'
Mendelson *et al.*[210] 2010	The authors conducted focus groups: *. . . students generally had a positive experience in the program and felt they learned skills that helped them in their day-to-day lives*
Pophillat *et al.*[156] 2016	The proportion of children who enjoyed the intervention was 92%
Soffer[212] 2003	A total of 100% of participants in the behavioural intervention and 79% in the attention control group responded that they 'would like to be in a program like this again'
Attwood *et al.*[146] 2012	*Participants were generally positive about 'Think, Feel, Do' and no sessions were identified as unhelpful* Most reported applying the skills learnt in their daily life. However, the authors note that content was challenging for some younger participants
Stallard *et al.*[159] 2014	A total of 934 participants in the active arm responded that the intervention was fun, 742 thought that it had helped them and 787 would recommend the intervention to a friend
Essau *et al.*[150] 2012	The authors state that children were asked whether or not they enjoyed the programme and if they used the skills taught. However, no results are reported
Ruttledge *et al.*[158] 2016	A total of 68% of respondents found FRIENDS for Life 'very useful' or 'somewhat useful'
Schoneveld *et al.*[116] 2018	On a five-point scale, participants were asked to rate (1) 'I found it fun to participate in the intervention' [CBT: mean score 2.35 (SD 1.39); biofeedback: mean score 2.77 (SD 1.18)] and (2) 'I can use what I learned in my daily life well' [CBT: mean score 2.96 (SD 0.95); biofeedback: mean score 2.13 (SD 1.38)]
Schoneveld *et al.*[115] 2016	On a five-point scale, participants were asked to rate (1) 'I liked to play the game' [control: mean score 2.74 (SD 1.24); biofeedback: mean score 1.90 (SD 1.38); $p \leq 0.001$) and (2) 'I can use what I learned in my daily life well' [control: mean score 1.72 (SD 1.28); biofeedback: mean score 1.68 (SD 1.29)]

M, mean; OTS, optimistic thinking skills; OVK, Op Volle Kracht; PSHE, personal, social and health education; RAP, Resourceful Adolescent Program; SLS, social life skills; SPARX, smart, positive, active, realistic, X-factor thoughts.
Note
Details reported by study, and as reported in original publications.

of a CBT intervention, Adolescents Coping with Emotions. The focus groups were conducted in New Zealand, with the majority of participants being Maori and Pacific Islander students and identifying trust in the group as an important benefit of the intervention. In addition, some participants noted that the insight gained about thinking processes was useful. Participants liked the use of confectionery as a reward, and identified the games played and missing class as good aspects of the programme. However, they also felt that the intervention used out-of-date scenarios and that there was too much reading and writing involved in the sessions. Livheim *et al.*[217] reported that most participants (91%) gave exclusively positive feedback on the evaluation of the acceptance and commitment therapy-based intervention and all reported that they would recommend it to a friend. The majority of students included in Cova *et al.*'s[162] study enjoyed (71.6%) and found the CBT intervention useful (79%).

Two studies provided information on enjoyment in a targeted primary setting.[115,116] Schoneveld *et al.*[116] noted that children enjoyed both the experimental and control interventions equally (CBT vs. biofeedback). However, in an earlier trial, in which the control intervention was a commercially available computer game, children clearly preferred the control intervention.[115]

Attendance and dropouts from intervention

Only one study explicitly mentioned attendance as a proxy for acceptability of the intervention to participants. Congleton[215] noted that attendance was excellent and that this reflected how much the students enjoyed the course and the importance of convenient timetabling.

Across all other studies, attendance was reported descriptively. Study-specific attendance details, as reported by trial author, are reported in *Appendix 7*.

Parent-reported child anxiety, depression or internalising outcomes

A post hoc decision was made to analyse parent-reported child anxiety, depression or internalising symptoms. For some of the studies, participants were considered too young for self-reported measures and parents were the primary respondents. In universal primary settings, five studies[145,146,156,158,242] provided baseline and follow-up data on parent-reported child anxiety outcomes. From a random-effects NMA, there was no evidence that CBT-based interventions reduced parent-reported child anxiety symptoms relative to usual curriculum (SMD −0.10, 95% CrI −2.13 to 1.83).

Six studies[115,116,176,177,181,182] provided both baseline and follow-up data to enable a NMA for targeted primary settings. There was no evidence that CBT-based interventions (SMD −0.43, 95% CrI −1.08 to 0.14), biofeedback (SMD −0.48, 95% CrI −1.76 to 0.72) or occupational therapy (SMD 0.05, 95% CrI −1.07 to 1.19) reduced parent-reported child anxiety symptoms relative to a waiting list.

Academic attainment

Seven studies reported academic attainment data.[131,136,137,145,159,168,174] Various measures of attainment were used; we report study-specific results in *Table 16*. Across all studies, there was no evidence of an effect of intervention on academic outcomes.

Problem behaviours

Few studies reported problem behaviours, and those that did reported substance use. The following results are reported as per the original publications. In a universal secondary setting, Stallard *et al.*[142] reported that there was evidence of a beneficial effect of CBT + IPT on cannabis use at 6 months (OR 0.56, 95% CI 0.38 to 0.82) and at 12 months (OR 0.70, 95% CI 0.48 to 0.93), but not on alcohol or 'street drug' use. In targeted secondary settings, Stice *et al.*[224] reported that CBT reduced 'substance use' (F[6,674] 3.60; $p = 0.002$) relative to control and Topper *et al.*[173] reported that there was 'no significant difference' between the intervention and control groups for binge drinking (Cohen's d 0.22). In a tertiary/university setting, Reynolds *et al.*[233] reported results from the Alcohol Use Disorders Identification Test (AUDIT)

TABLE 16 Author-reported academic achievement and attainment

Study	Measure	Results, mean difference (95% CI)
Ahlen *et al.*[145] 2018	Teacher-rated five-point scale	0.01 (–0.10 to 0.12)
Cooley-Strickland *et al.*[174] 2011	WIAT-reading (age equivalent)	0.30 (–0.24 to 0.83)
Cooley-Strickland *et al.*[174] 2011	WIAT-mathematics (age equivalent)	0.30 (–0.20 to 0.80)
Hodas[131] 2016	Mathematics computation (age equivalent)	Results reflect an older age of students in a waiting list group
Hodas[131] 2016	Reading comprehension	Results reflect an older age of students in a waiting list group
Kiselica *et al.*[168] 1994	Quarterly GPA	*Univariate F tests revealed [no] significant differences between the treatment and control participants for GPA*
Perry *et al.*[136] 2017	Final exam results (standardised)	*Notably, academic outcomes did not differ between the 2 groups* p = *0.41*
Potek[137] 2012	SAT language assessment	–0.10 (–1.60 to 1.40)
[a]Stallard *et al.*[159] 2014	SAT reading	0.10[b] (–0.56 to 0.76)
[a]Stallard *et al.*[159] 2014	SAT mathematics	1.83[b] (1.13 to 2.53)
[a]Stallard *et al.*[159] 2014	SAT writing	0.68[b] (0.02 to 1.34)
[a]Stallard *et al.*[159] 2014	SAT reading	0.93[b] (0.30 to 1.57)
[a]Stallard *et al.*[159] 2014	SAT mathematics	1.15[b] (0.45 to 1.85)
[a]Stallard *et al.*[159] 2014	SAT writing	1.48[b] (0.84 to 2.12)

GPA, grade point average; SAT, Scholastic Aptitude Test; WIAT, Wechsler Individual Achievement Test®.
a Stallard *et al.*[159] is a three-arm trial and results are for each of the two 'active' CBT interventions relative to the control.
b Final values used to calculate mean difference.
Note
When feasible, the mean difference was calculated as a change from baseline.

and concluded that there was 'no significant difference' observed between the intervention and control groups for alcohol consumption or alcohol problems, although they also report that:

> *. . . a significant interaction of the orientation group effect with the linear effect of time was found, suggesting differential change for the [intervention] and [control] groups across the three time points. The overall percentage of youth above the clinical cut off for the BATD [behavioural activation treatment for depression] group generally decreased over time.*

Mental health-related stigma

During our initial PPI work, reducing the stigma associated with mental health problems was identified as an important outcome for young people. Only one study reported a mental health-related stigma outcome. In Perry *et al.*,[136] stigma was measured using a nine-item subscale of the Depression Stigma Scale, an 18-item scale that assesses personal and perceived stigma towards depression, on which higher scores indicate greater stigma. At the immediate post-intervention time point, there was no evidence of a reduction in personal or perceived stigma in the SPARX (smart, positive, active, realistic, X-factor thoughts) computerised CBT group, compared with the attention control intervention (mean difference –0.50, 95% CI –2.90 to 1.90).

Chapter 7 Effectiveness of educational setting-based interventions for preventing conduct disorder

Systematic review results

Studies included in the review

The overall PRISMA flow diagram for the project is reported in *Figure 2*. Twenty-seven papers relating to five studies met our eligibility criteria for inclusion in the conduct disorder review. Included studies were published between 1999 and 2018, and randomised between 225 and 891 participants (median 245 participants). All studies were cluster randomised, of which four reported results from appropriate models incorporating the multilevel nature of the data.

One study was classified as universal[243] and four were classified as targeted[244–247] (all indicated). All studies were conducted in primary school settings, with age at baseline ranging from 4.2 to 7.91 years. The majority of study participants were boys. In the four indicated studies, the proportion of boys ranged from 69% to 74% of participants. Four studies were conducted in HICs,[243,244,246,247] and one was conducted in a MIC.[245] Of the studies conducted in HICs, all were conducted in lower-income settings, as specified by the trial authors.

Owing to intervention complexity and the flexible nature of the intervention implementation, we were not able to calculate an average 'dose', as was done for anxiety and depression outcomes.

Risk-of-bias assessments are reported in *Figure 15* by individual study. Three studies were judged as having unclear risk of bias for random sequence generation and allocation concealment.[243,244,247] All studies were judged to be at high risk of bias for participant and outcome assessor blinding. Prospective trial registrations were available for one study.[245] For cluster randomised trials we also considered how recruitment, randomisation and analysis were conducted under the Cochrane Risk of Bias tool heading of 'other bias'. Four studies were judged to be at high or unclear risk for 'other bias'.

Owing to the diversity of interventions, outcome measures and time points reported by the studies, results are reported narratively by trial, and by date of publication. Owing to this diversity, intervention components are also described narratively, by study, where these could be identified from trial reports. Unless otherwise stated, statistical summaries are reported as described in the original publications.

Fast Track: the Conduct Problems Prevention Research Group[247]

The Fast Track trial[247] was a cluster randomised trial of 54 primary schools in the USA. Beginning in 1991, the trial followed participants for > 20 years. The indicated prevention intervention was delivered over 10 years, targeting children in primary school settings with early-starting disruptive behaviour. The aim of the intervention was to prevent long-term severe and chronic conduct problems, including psychological disorder. The study compared a multicomponent intervention ($n = 445$) with a no-intervention control ($n = 446$). Children who were within the top 10% of a combined parent–teacher screen for externalising behaviour problems were invited to take part. The mean age of child participants was 6.5 years (SD 0.48 years); 69% were boys, 51% were African American and 47% were European American. The schools were in areas of high crime and poverty.

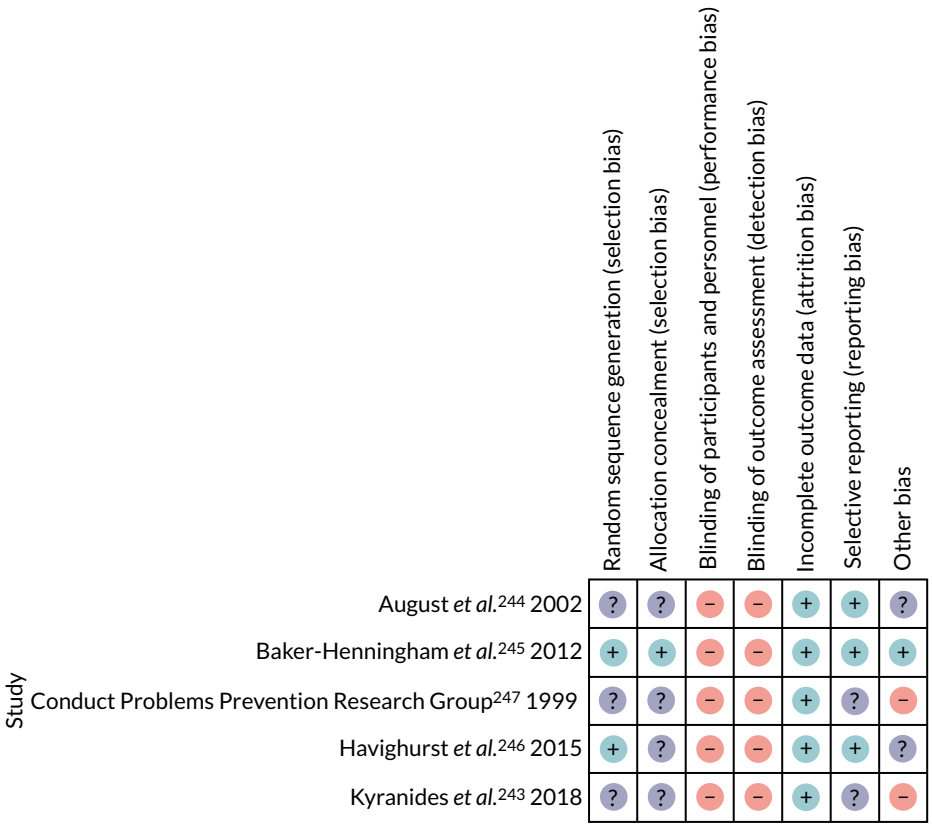

FIGURE 15 Conduct disorder risk-of-bias assessments by domain and study. +, Low risk of bias; –, high risk of bias; ?, unclear risk of bias.

Seven intervention components were implemented, the content of which changed each year to be developmentally appropriate for the children and based on the families' needs. There was insufficient detail provided in the reports to describe the exact nature of these changes. The intervention described subsequently is from the primary school phase of the project (i.e. grades 1–3, ages 6–9 years).

The school-based component was delivered to whole classrooms, and not just to the students enrolled in the Fast Track trial. The PATHS® (Promoting Alternative THinking Strategies) intervention was delivered by classroom teachers across two or three lessons per week across the whole school year. PATHS is a social and emotional learning intervention that focuses on children managing and understanding their behaviour and emotions and includes social and problem-solving skills training. Fidelity was checked by Fast Track educational co-ordinators via weekly classroom and teacher visits. Educational co-ordinators were usually ex-teachers.

There were five parent and/or child components: parent groups, child social skills training groups, parent–child sharing time, child–peer pairing and academic tutoring. Parent groups, child social skills training groups and parent–child sharing time ran during a weekly 2-hour enrichment programme held at school but outside school hours. A total of 22 sessions was offered. Average attendance was 78% for the child group and 71% for the parent group. The child groups focused on reviewing and practising skills in emotional understanding and communication, friendship-building, self-control and social problem-solving. The parent groups focused on parenting skills, self-control and building positive family–school relationships.

Individual support was provided to children and parents by family co-ordinators; this formed the home visiting component. Visits focused on problem-solving and encouraging parental empowerment and self-efficacy. Family co-ordinators typically had advanced degrees in counselling or social work. Home visits were typically every other week across the first year of the intervention. Children were also provided with academic tutoring three times each week for 30-minute sessions during school hours, delivered by 'paraprofessional tutors'.

Seventy-two per cent of participants received > 50% of each of the following intervention components: parent group, child social skills group, peer pairing and tutoring. Overall, 81% of participants received at least 50% of the recommended number of home visits (i.e. at least six visits). All programme staff attended a 3-day cross-site workshop. Fidelity was monitored using intervention manuals, weekly supervisory telephone calls and weekly staff meetings.

Multiple assessment scales were administered; primary outcomes were not specified. Appropriate multilevel models were conducted for the end of year 1 analyses, but not for later time points. At the end of grade 1 (i.e. 1 year into the intervention), the following effect sizes (Cohen's *d*) were reported by the Conduct Problems Prevention Research Group,[247] as computed from the *F*-value and degrees of freedom. Parent ratings of child behaviour change (Cohen's *d* 0.50, 95% CI 0.25 to 0.76) and teacher ratings of child behaviour change (Cohen's *d* 0.53, 95% CI 0.28 to 0.79) suggested a beneficial effect of the intervention, compared with the control. However for externalising behaviours, parent ratings on the Child Behaviour Checklist (CBCL) (Cohen's *d* 0.04, 95% CI −0.15 to 0.26) and teacher ratings on the Teacher Report Form (Cohen's *d* 0.02, 95% CI −0.19 to 0.24) suggested no evidence of a difference between intervention and control groups at the end of grade 1. At the end of grade 3, parent ratings of child behaviour change (β 0.18, 95% CI 0.04 to 0.32) and teacher ratings of child behaviour change (β 0.24, 95% CI 0.12 to 0.35) also suggested a beneficial effect for the intervention, compared with the control. However, the parent-rated CBCL was not reported and the teacher-rated Teacher Report Form (β −0.05, 95% CI −1.42 to 1.32) externalising problems scales suggested no evidence of a difference between the intervention and control groups at the end of grade 3.

Three further measures were reported at the end of grade 3. Academic progress in reading (β 0.06, 95% CI −0.06 to 0.17) and mathematics (β 0.08, 95% CI −1.42 to 1.32), and clinical diagnosis of oppositional defiant disorder (ODD) or conduct disorder (β 0.02, 95% CI −0.04 to 0.08). There was no evidence to suggest an intervention effect on these outcomes. Note that the 95% CIs for these effect sizes and regression coefficients are an approximation[248] based on data reported by the Conduct Problems Prevention Research Group across two papers.[247,249]

In grades 7 and 8, there was no evidence of a difference between intervention and control groups for the parent-rated CBCL (β 1.50, 95% CI −0.15 to 3.15) or the teacher-rated Teacher Report Form (β −0.33, 95% CI −2.45 to 1.79) externalising problems scales. Hyperactivity was also reported and was reduced in the intervention group, compared with the control group.

An independent analysis of the data suggests that there was also little evidence of an effect on mental health outcomes during 'the high school years' (i.e. between 9 and 13 years of follow-up).[250] However, the Fast Track trial team conducted a further follow-up, 20 years from baseline (when participants were aged 25 years). On the basis of self-reported outcomes, there was strong evidence for a beneficial effect of the intervention for a composite outcome of any externalising, internalising or substance use problem (OR 0.59, 95% CI 0.43 to 0.81). The authors of the paper state that this is equivalent to a number needed to treat of 8. For diagnosis of antisocial personality disorder, there was a benefit of the intervention, relative to the control (OR 0.60, 95% CI 0.39 to 0.93), but not for attention deficit hyperactivity disorder (OR 0.65, 95% CI 0.39 to 1.08). There was no evidence to suggest that the intervention prevented diagnoses of anxiety (OR 0.79, 95% CI 0.47 to 1.33) or depression (OR 0.68, 95% CI 0.42 to 1.08). Analyses were based on the intention-to-treat principle and appropriately accounted for clustering.

Substance use outcomes included alcohol abuse (OR 0.69, 95% CI 0.48 to 0.99), binge drinking (OR 0.75, 95% CI 0.55 to 1.01), heavy marijuana use (OR 0.76, 95% CI 0.45 to 1.30) and serious substance use (OR 0.58, 95% CI 0.36 to 0.92). There was no evidence of a difference between intervention and control groups for having graduated from high school (OR 0.93, 95% CI 0.68 to 1.27) or currently being in full-time education or employment (OR 0.84, 95% CI 0.60 to 1.18).

Early Risers Skills for Success: August *et al.*[244]

The Early Risers 'Skills for Success' study[244] was a cluster randomised trial for the prevention of serious behaviour problems, as indicated by aggressive–disruptive behaviour. Ten schools were randomised to a multicomponent intervention and 10 were randomised to no intervention. Participants were screened prior to trial entry, to ensure that they were at high risk of a serious conduct problem, as assessed by a *T*-score of ≥ 58 on the CBCL aggression subscale (which was teacher rated). A total of 245 children were included in the trial: 124 in intervention schools and 121 in control schools. The mean age of participants at baseline was 6.6 years (SD 0.6 years) and 69% were male. Schools were in semirural midwestern USA, in low to low–middle socioeconomic areas. There have been multiple follow-ups of the participants, the latest being 10 years from the start of intervention (i.e. 5 years post intervention).

The intervention was multicomponent and multiphase. Beginning in the summer preceding grade 1 (i.e. year 1 of the intervention) and continuing over the next 2 years (i.e. 3 years in total), students attended a 6-week summer school, equivalent to 432 hours of programme content. Participants received academic content, enrichment activities and small-group social skills training. Peer mentoring was also used. It is not clear who delivered the summer school component of the intervention. In years 4 and 5, 'booster' summer camps were offered, each of 6 days' duration.

The second intervention component was a monitoring and mentoring programme overseen by 'family advocates', who provided weekly support to the participants and teachers in their regular school setting. Support provided was flexible, depending on student needs. The third component was a biweekly family programme, based on the Incredible Years intervention, delivered concurrently, but separately, to parents and children. The Incredible Years programme is described elsewhere as being based on CBT principles, but was not described as such here.[251] Twenty-nine sessions, over 3 years, were offered, and were equivalent to 58 hours in total. However, attendance was low [mean 39% (SD 29%)]. In years 4 and 5, six family sessions were offered. In addition to the previously mentioned core intervention components, a personalised home visitation component was available on the basis of individual need.

Approximately 60% participated across all three intervention components in the first 3 years, and 67% participated in three or more components offered during the booster phase. The intervention was manualised, and training was provided to all staff. Intervention fidelity was measured via log books and checked during unannounced visits by 'fidelity technicians'.

At the end of the main intervention (year 3), externalising outcomes were reported as a composite across a maximum of four measurement scales for outcomes of (1) aggression, (2) hyperactivity and (3) impulsivity. The scales were the Teacher Observation of Classroom Adaptation, the Parent Observation of Classroom Adaptation, the Behavior Assessment System for Children (BASC) – Teacher Rating Scale (BASC-TRS) and the BASC – Parent Rating Scale (BASC-PRS). Teacher-reported academic achievement was also a composite outcome combined across four separate scales (the broad reading and applied problems composite scores from the Woodcock–Johnson Tests of Achievement-Revised, the Learning Problems scale of the BASC-TRS, and the Cognitive Competence scale of the Teacher's Scale of Child's Actual Competence and Social Acceptance). An intention-to-treat, three-level model was appropriately conducted, given the clustered nature of the data; however, the school level was retained for the aggression analysis only.

At the end of year 3, intervention participants ($n = 199$) showed a greater improvement in academic achievement than control participants. However, there was no evidence of an effect for aggression, hyperactivity or impulsivity, and quantitative results were not reported. At the end of year 6 ($n = 151$), outcomes included self-reported conduct disorder symptoms and diagnosis, ODD symptoms and diagnosis, and self-reported drug use. Based on the means and SDs reported by the authors, we calculated that there was no evidence that the intervention prevented self-reported conduct disorder symptoms

(mean difference −0.20, 95% CI −0.91 to 0.51). However, there was evidence to suggest that, for ODD symptoms, the intervention was beneficial (mean difference −1.53, 95% CI −2.58 to −0.48). The authors reported that the ODD effect size was 0.47 ($p \leq 0.01$). The effect size for conduct disorder symptoms was not reported. There was no evidence that conduct disorder or ODD diagnoses differed across the intervention and control groups. There was no evidence of an effect for tobacco or alcohol use.

At 10 years from baseline ($n = 129$), self-reported conduct disorder and ODD were reported. The authors report that the Early Risers intervention was associated with fewer conduct disorder and ODD symptoms in late high school. The estimated mean number of conduct disorder symptoms per participant was 1.81 lower (95% CI 0.34 to 3.30) in the programme group than in the control group and the mean number of ODD symptoms was 1.56 lower (95% CI 0.47 to 2.63).

Incredible Years teacher programme: Baker-Henningham *et al.*[245]

Baker-Henningham *et al.*[245] reported a cluster randomised trial for the indicated prevention of disruptive and aggressive/destructive behaviours. Twenty-four preschools were included and were randomised to either the Incredible Years intervention group ($n = 12$) or a control group ($n = 12$). It was not clear from the paper what intervention the control group received, although the trial registration (ISRCTN 35476268) suggests that it was information only. Children were selected for inclusion by a teacher-rated scale based on the ICD-10 criteria for conduct disorder. Three children with the highest scores in each class were enrolled in the study. A total of 225 children aged 3–6 years were included (113 in the intervention group and 112 in the control group). The mean age of participants was 4.2 years (SD 0.9 years), and 69% of participants were boys. Schools were in Kingston, Jamaica, and in 'disadvantaged' inner-city areas with high levels of community violence.

The intervention evaluated was the Incredible Years Teacher Training programme, tailored to a Jamaican context. Few details on the intervention were provided in the paper, but it included collaborative and experiential learning; individual goal-setting and self-monitoring; building teachers' self-efficacy; a focus on teachers' cognitions, behaviour and emotions; and emphasis on teachers' ability to generalise the skills learnt. The Incredible Years programme has been described elsewhere as being based on CBT principles, but we note that it was not described as such here.[251] The intervention lasted for 6 months. To ensure fidelity, intervention teachers attended eight full-day training workshops over the period of the intervention and received in-class support from a psychology graduate with previous experience in Incredible Years. The authors reported that teachers attended a median of eight workshops (range 2–8 workshops), with 95% attending at least six workshops; 89% of teachers received all four in-class consultations.

The primary outcome was directly observed in-class child behaviour and reported as frequency of aggressive/destructive behaviours (as defined by a study manual). Secondary outcomes of interest were teacher and parent reports of child behaviour. Teacher-reported child conduct problems were measured using the Sutter–Eyberg Student Behavior Inventory™ (SESBI), and the SDQ was used to measure behaviour difficulties and prosocial skills. Parent-reported child conduct problems were measured using the Eyberg Child Behavior Inventory™ (ECBI), and the SDQ was used to measure behaviour difficulties and prosocial skills. Hyperactivity and attention difficulties were also measured using Conners Global Index. These scales formed a composite outcome of 'behavioural difficulties'. Child school attendance was taken from school records.

Statistical analyses appropriately accounted for the clustered nature of the data. For the author-reported primary outcome, the intervention reduced the number of directly observed conduct problems (effect size 0.42, 95% CI 0.12 to 0.71). For author-reported secondary outcomes, the intervention reduced the number of teacher-reported behavioural difficulties (effect size 0.47, 95% CI 0.18 to 0.76) and parent-reported behavioural difficulties (effect size 0.22, 95% CI 0.03 to 0.42), relative to the control group. School attendance was also higher in the intervention group than in the control group (effect size 0.30, 95% CI 0.05 to 0.55). Children in the intervention group were less likely to be rated in the clinical range for conduct disorder by teachers (OR 0.31, 95% CI 0.11 to 0.92) than by parents (OR 0.56, 95% CI 0.27 to 1.16).

Multisystemic early intervention: Havighurst *et al.*[246]

Havighurst *et al.*[246] reported a cluster RCT of a multisystemic indicated intervention for primary school-aged children at risk of presenting with conduct disorder. Thirty-three schools in lower socioeconomic areas of Victoria, Australia, were included and were randomised to either the intervention ($n = 14$) or to a waiting list group ($n = 19$). Children between the ages of 5 and 9 years were eligible, and those scoring in the top 8% on a joint parent–teacher screen for behaviour problems (using the Conduct Problems Risk Screen) were invited to participate in the study. A total of 113 child participants were randomised to the intervention, and 118 were randomised to the waiting list control group. The mean age was 7.05 years (SD 1.06 years) and 74% of participants were boys.

The intervention contained separate parent, child and school components. The parent component was delivered across eight 2-hour sessions and focused on emotion socialisation coaching, whereby parents learn to respond positively to their children's emotions. Average parent attendance was six sessions, with 78% of parents attending five or more. The intervention was delivered by clinical or educational psychologists, social workers, speech and language therapists, or occupational therapists. To ensure fidelity, intervention facilitators attended 2-day training, followed an intervention manual and completed weekly checklists. Intervention fidelity was rated as consistently high, with 100% of the foundation skills delivered and 78% of the optional skills delivered.

The child component focused on skills in emotional competence, de-escalation of anger and social problem-solving. Eight sessions were delivered to small groups during school time. Groups were facilitated by two professionals: an intervention clinician and a member of school staff (often a school psychologist or teacher). Average attendance was 7.3 sessions, with 84 children (92.3%) attending at least six sessions. To ensure fidelity, intervention facilitators attended a half-day training, followed a structured intervention manual and completed weekly checklists. One hundred per cent of the child programme content was covered in all groups.

In addition to the parent and child components, schools were also offered the choice between two universal interventions. Seven schools (32 children) received the PATHS intervention, and an additional seven schools received a Professional Learning Package (59 children). Fidelity was not measured.

Follow-up assessments were conducted 10 months post baseline. The following effect estimates are based on adjusted means as reported by the authors. Primary outcomes of interest included parent-reported child behaviour, as measured by the Eyberg Child Behavior Inventory (ODD, conduct disorder and hyperactivity subscales), and teacher-reported child behaviour, as measured by the total SDQ score. Statistical analyses appropriately accounted for the clustered nature of the data and were based on the intention-to-treat principle. For parent-reported child behaviour, there was a beneficial effect of the intervention for conduct disorder (mean difference −2.94, 95% CI −3.43 to −2.45), ODD (mean difference −4.75, 95% CI −5.51 to −3.99) and hyperactivity (mean difference −3.47, 95% CI −3.89 to −3.05), relative to a waiting list control. For teacher-reported child behaviour, the intervention reduced the total SDQ score, relative to the control group (mean difference −1.56, 95% CI −1.80 to −1.32).

Kyranides *et al.*[243]

Kyranides *et al.*[243] reported a small (three schools) cluster RCT of a universal intervention for preventing conduct disorder and callous unemotional traits among children between the ages of 7 and 9 years. Three schools in areas of low SES were randomised to either a skills-building intervention ($n = 1$) or usual curriculum control ($n = 2$). Ninety-four children were allocated to the intervention and 210 to the control. The mean age was 7.9 years (SD 0.74 years) and 51% of participants were female.

The (unnamed) intervention was 8 weeks long, with one 45-minute session delivered each week during school hours. The intervention was based on CBT with an added emotional component and aimed to increase children's awareness of their own and others' emotions, teach self-control and emotion regulation, promote a positive self-concept, improve social skills and peer relations, and develop

problem-solving and communication skills. The intervention was delivered to whole classes by PhD (Doctor of Philosophy) students with master's degrees in school psychology. An intervention manual was provided, and fidelity was monitored by the research supervisor.

Primary outcomes of interest to this review are the parent-reported Checkmate Child Symptom Inventory-4 to assess symptoms of conduct disorder and the Antisocial Process Screening Device to assess impulsivity. Analyses did not consider clustering. Immediately post intervention (mean difference −0.67, 95% CI −1.30 to −0.04) and at 9 months post intervention (mean difference −0.93, 95% CI −1.32 to −0.55), there was evidence to suggest that conduct disorder symptoms were reduced in the intervention group, relative to the control group. Impulsivity was reported for the post-intervention time point only: the result suggested that there was a beneficial effect of the intervention, relative to the usual curriculum control (mean difference −1.03, 95% CI −1.72 to −0.34).

Summary

Only two studies clearly specified a post-intervention time point.[243,245] Results for all studies at the time point most closely approximating post intervention are summarised in *Table 17*. All studies reported parent- or teacher-reported outcomes. Only one study reported the primary review outcome of conduct disorder symptoms;[243] the remainder reported externalising behaviours or behaviour difficulties.

TABLE 17 Summary of post-intervention results from conduct disorder prevention studies

Study	Time point	Outcome	Scale	Results
[a]Conduct Problems Prevention Research Group[247]	3 years from baseline[a]	Child behaviour change	Not clear	• Parent: β 0.18 (95% CI 0.04 to 0.32) • Teacher: β 0.24 (95% CI 0.12 to 0.35)
	3 years from baseline	Externalising behaviours	CBCL	• Parent: NR • Teacher: β 0.05 (95% CI −1.42 to 1.32)
August *et al.*[244] 2002	3 years from baseline[a]	Externalising behaviours	Multiscale composite	*. . . no overall Intervention X Time interaction for aggression, hyperactivity or impulsivity*
Baker-Henningham *et al.*[245] 2012	Post intervention	Observations of child behaviour	DPICS and MOOSES	Effect size 0.42 (95% CI 0.12 to 0.71)
	Post intervention	Behaviour difficulties	Multiscale composite	• Parent: effect size 0.22 (95% CI 0.03 to 0.42) • Teacher: effect size 0.47 (95% CI 0.18 to 0.76)
Havighurst *et al.*[246] 2015	10 months from baseline[b]	Child behaviour	Eyberg Child Behavior Inventory (subscales)	Parent: • Conduct disorder, MD −2.94 (95% CI −3.43 to −2.45) • ODD, MD −4.75 (95% CI −5.51 to −3.99) • Hyperactivity, MD −3.47 (95% CI −3.89 to −3.05)
	10 months from baseline	Child behaviour	SDQ	Teacher: MD −1.56 (95% CI −1.80 to −1.32)
Kyranides *et al.*[243] 2018	Post intervention	Conduct disorder symptoms	Checkmate Child Symptom Inventory-4	Parent: MD −0.67 (95% CI −1.30 to −0.04)

DPICS, Dyadic Parent–Child Interaction Coding System; MD, mean difference; MOOSES, MultiOption Observation System for Experimental Studies; NR, not reported.

a The 95% CIs for the Fast Track study have been calculated from published data[247,249] and should be regarded as an approximation.

b When not clearly stated in the trial reports, we have included a time point most closely approximating post intervention.

Two studies[243,245] implemented school-only interventions, one of which described the intervention as based on CBT principles.[243] For the primary time point of post intervention, both studies reported evidence of a beneficial effect of intervention. One study[245] was judged to be at low risk of bias for allocation concealment and randomised sequence generation; the other[243] was judged to be at unclear risk of bias for both domains.

Three studies implemented multisystemic, multicomponent and multiphase 'packages' of interventions.[244,246,247] Based on the components reported, it is possible that the child-focused school-based components of these interventions were informed by cognitive–behavioural principles. However, none of the authors identified them as CBT-based interventions and their results were reported at the combined 'package' level. The studies also reported different follow-up time points. At the (presumed) post-intervention time point, Havighurst *et al.*[246] reported strong evidence of a beneficial effect of the intervention for parent-reported child behaviour, relative to a waiting list control. This study was rated as having a low risk of bias for randomised sequence generation, but an unclear risk of bias for allocation concealment. No further follow-up time points were reported.

Two studies[244,247] reported interventions that, in addition to being multisystemic, were implemented in stages over several years, so it is difficult to discern a 'post-intervention' time point. The Fast Track[247] study did not clearly specify a primary outcome, and the outcome measures reported vary at each time point. At 1 year and 3 years from baseline, the authors reported a beneficial effect of intervention for child behaviour change, but not for externalising behaviours. At 7 years' follow-up, the authors reported no evidence of an effect of the intervention for reducing externalising behaviours. Finally, at 20 years' follow-up, the authors reported a composite internalising, externalising and substance use self-reported outcome and concluded that there was strong evidence of an effect of the intervention. The Fast Track[247] study rated as having an unclear risk of bias for both randomised sequence generation and allocation concealment.

At 3 years from baseline, August *et al.*[244] reported that there was no evidence that the Early Risers intervention reduced teacher-/parent-reported externalising behaviours. At 6 years from baseline, there was no evidence that the intervention prevented self-reported conduct disorder symptoms, although there was a beneficial effect for self-reported ODD symptoms. At 10 years from baseline, the authors reported that there was evidence that the intervention was associated with fewer self-reported conduct disorder symptoms, relative to no intervention. The study was rated as having an unclear risk of bias for both randomised sequence generation and allocation concealment.

Chapter 8 Economic evaluation

As described in *Chapter 1*, the aim of the economic study was to assess the costs and consequences for intervention components, or combinations of components, that were found to be effective, compared with usual curriculum, in the NMA. Costs and consequences were considered separately for:

- targeted interventions to prevent anxiety, depression or conduct disorders among (1) primary school-aged children, (2) secondary school-aged children/young people and (3) university-aged young people
- universal interventions for (1) primary school-aged children, (2) secondary school-aged children and (3) university-aged young people.

For the economic evaluation, we included interventions for which there was robust evidence of an intervention effect in one of the populations considered in the NMA. The intervention-level NMA results (see *Chapters 4* and *5*) found that CBT interventions (including those combined with IPT) were effective, compared with usual curriculum, at the post-intervention follow-up time point for universal secondary populations. There was also evidence that mindfulness/relaxation interventions reduced symptoms of anxiety. However, the findings were not considered robust because of small study size and unclear risk of bias for the key domains of randomisation and allocation concealment. Similarly, there was evidence that exercise reduced symptoms of anxiety in the targeted secondary analysis. However, this was based on a single study on a network 'spur', which was judged to be at unclear risk of bias. There was potential inconsistency in the tertiary/university setting analyses and NMA findings were not reported. We therefore analysed costs and consequences for CBT and CBT + IPT in a universal secondary population. For completeness, we extrapolate the costs for CBT interventions to primary and targeted secondary settings (as CBT was included in the NMA for these settings).

Results from the component NMA suggested that the only intervention component for which there was robust evidence of effectiveness, compared with usual curriculum, was the inclusion of a psychoeducation component in CBT interventions in a universal secondary school setting. We therefore only present costs and consequences for the inclusion of a psychoeducation component in a CBT intervention in the universal secondary population.

If sufficient evidence was available, we planned to conduct full model-based cost-effectiveness analyses for all identified groups. However, there was no robust evidence that any of the interventions were effective at ≥ 6 months post intervention, based on the NMAs. We therefore did not consider that a full model-based cost-effectiveness analysis would be of value, as it was unlikely to demonstrate cost-effectiveness of any of the interventions, compared with usual curriculum, in any of the populations, based on the evidence identified in our review.

The economic study also aimed to review previous economic evaluations of school-based interventions to provide up-to-date and rigorously collated information on costs and cost-effectiveness to inform both future intervention development and implementation decisions. We aimed to complement the effectiveness results by reviewing current literature describing the costs and cost-effectiveness of educational setting-based interventions for preventing anxiety, depression or conduct disorder among CYP. We also aimed to undertake a microcosting study for effective interventions, assigning appropriate costs to the constituent components of the interventions when feasible, for use in the cost–consequence analysis.

Methods

We first describe the methods for the narrative review of previous economic evaluations of educational setting-based interventions that aimed to prevent anxiety, depression or conduct disorder among CYP. We then describe the methods for the microcosting study of the inclusion of a psychoeducation component in universal secondary CBT interventions described in a cost–consequence analysis.

Narrative review

Search strategy

We searched for relevant studies describing economic evaluations of educational setting-based preventative interventions in several ways:

- The body of abstracts identified in the detailed systematic review described in *Chapter 2* was restricted by terms to identify costing studies (e.g. 'economic evaluation', 'cost').
- The search strategy used for the systematic review (described in *Chapter 2* and *Appendix 1*, and carried out on 4 April 2018) was reproduced and applied to the full extent of the NHS Economic Evaluation Database (NHS EED; date range searched: 1968 to 2014) on 22 May 2019 (see *Appendix 8*).
- Potentially relevant articles were sought by searching for economic evaluations of interventions described in the clinical effectiveness studies included in the NMA (see *Chapters 4* and *5*). The 142 included articles were inspected for details of trial registration and, when present, the registration record was searched for 'cost' or 'economic', which might have indicated an intention to conduct an economic analysis. References to the words 'cost' or 'economic' in the text of the included articles themselves were followed up when appropriate. Authors were contacted to request details of publications if we believed that an economic study may have been carried out but were unable to locate the report.
- As a supplemental search, economic evaluations associated with the interventions tested in the 142 included effectiveness articles were sought using the Google Scholar (Google Inc., Mountain View, CA, USA) forward citation search functionality.[252,253]

The original searches described in *Chapter 2* were based on RCTs and may have missed relevant decision models. Therefore, a scoping search was carried out in MEDLINE to assess the likelihood of modelling articles having been missed (see *Appendix 8*), with the intention of reproducing and repeating the initial searches without the RCT restriction if it appeared that a substantial body of modelling articles had been missed.

Inclusion criteria

The following inclusion criteria were agreed by Joanna C Thorn, Deborah M Caldwell and Nicky J Welton prior to screening articles:

- educational setting-based intervention
- intervention designed explicitly to prevent anxiety, depression or conduct disorder
- intervention aimed at CYP aged 4–18 years
- original study based on a RCT with an embedded economic evaluation or an economic decision model.

All population, intervention, comparator and outcome inclusion criteria for the effectiveness review were reflected in the economic search. We did not include papers that were written in languages other than English, conference abstracts or review papers. Titles and abstracts were screened for inclusion, and full texts were obtained for all articles that either clearly met the inclusion criteria or for which inclusion was unclear. Screening of both abstracts and full texts was carried out by one author (JT), with a second opinion (DMC) sought when necessary. Reasons for exclusion were recorded for articles rejected after full-text screening.

Data extraction and quality control

Data covering study characteristics (publication date, unit of randomisation, location, setting, study design, type of model, model time horizon or empirical follow-up period, size of study, comparator), intervention details (description of intervention, intervention cost, condition targeted, population, type of intervention) and economic details (type of economic analysis, outcomes measured, sources of outcomes, discount rate, resources included and source of resources, cost year, currency, perspective) were extracted from included studies using a bespoke form in Microsoft Access® (Microsoft Corporation,

Redmond, WA, USA). Verbatim descriptions of the study conclusions were also extracted. The quality of the included studies was qualitatively assessed against the Drummond *et al.*[254] 10-point checklist for RCTs and the Philips *et al.*[255] checklist for decision models. Costs were converted to Great British pounds using purchasing power parity figures[256] and inflated to 2018 equivalents[257] for comparison purposes.

Data synthesis

Included interventions were categorised as targeted (indicated or selective) or universal, and the cost-effectiveness analyses were described in a narrative review.

Intervention costing

The NMA results (see *Tables 3*, *4*, *7* and *8*) suggested that CBT-based interventions were the most likely to produce positive outcomes, with CBT + IPT-based interventions also showing some indication of effect for preventing depression in a universal secondary-age population. Results from the component NMA indicated that the only component for which there was evidence of a beneficial effect in universal secondary CBT interventions was a psychoeducation component, with CBT interventions with psychoeducational components reducing the standardised anxiety score by −0.39 (95% CrI −0.78 to 0.01). Therefore, our intervention costing analysis (and subsequent component breakdown) focused on CBT interventions that incorporated identifiable psychoeducation components and CBT + IPT interventions. As there are considerable similarities between interventions designed to prevent depression and those focusing on anxiety (with some interventions explicitly targeting both), we included both depression and anxiety interventions in the costing estimate without distinguishing between them.

Studies describing universal secondary CBT interventions with a psychoeducation component were identified from the systematic review described in *Chapter 2*. Details of the interventions were extracted (i.e. year of publication, number of sessions offered, average session duration, size of group, number of group leaders, professional background of leaders, provision of a manual, training, materials, provision of parent sessions and other costs). Further details of the interventions were sought from intervention websites and from linked papers describing the branded interventions in more detail. Through scrutinising the extracted data, an 'indicative' intervention was developed. Unit costs for the individual elements for a universal intervention in a secondary population were identified in the UK context, and cost estimates were calculated for the 'indicative' intervention. The CBT cost estimates were extrapolated to primary populations and targeted interventions. A similar extraction process was carried out for CBT + IPT interventions.

Component costing

When the CBT intervention was described in sufficient detail (either in the paper itself or by consulting the intervention manual), the approximate proportion of each intervention devoted to psychoeducation elements was estimated. Psychoeducation was defined to include the provision of information, the explanation of symptoms, advice on managing the condition and the provision of written materials,[258] while excluding practical experiences (such as role play) and activities based on the individual's own life experience. Intervention descriptions and manuals were scrutinised carefully, and elements of psychoeducation were identified. The approximate time commitment to each psychoeducation element was estimated, summed for each intervention and expressed as a proportion of the whole intervention. An approximate estimate of the cost that could be ascribed to psychoeducation components was derived based on the overall cost of the indicative intervention.

Cost–consequence analysis

The intervention costs and consequences (SMD relative to usual curriculum post intervention) that could be ascribed to the 'indicative' interventions and psychoeducation components are presented as a cost–consequence table (*Table 19*). If no effectiveness estimates are available relative to usual curriculum, the results relative to a waiting list are reported; if these are also not available, then the results relative to no intervention are presented.

Results

Narrative review of previous economic evaluations

Article selection

A flow diagram summarising the identification and selection of articles is given in *Figure 16*. A total of 434 titles and abstracts were screened for inclusion; full texts were obtained for 36 articles. Eight articles, reporting on six study time points, were deemed to meet the inclusion criteria.

Only 3 of the 137 depression and anxiety effectiveness articles (2.2%) included in *Chapters 4* and *5* were found to have published economic evaluations. Three further authors of effectiveness papers were contacted to request details of potential economic evaluations. All three authors confirmed that no economic study had been published, although one is still planning to complete and publish the study in future. Of the five included conduct disorder studies (see *Chapter 7*), only one (i.e. Fast Track[247]) had undergone economic evaluation. The additional scoping search carried out in MEDLINE to identify economic decision model papers returned 186 potentially relevant articles. The search identified both of the modelling papers that had already been identified in the original review,[259,260] but did not identify any additional articles. Based on this finding, we did not conduct further searches for economic decision model papers in the other databases searched in the systematic review. Although there is a possibility that we may have missed some decision model papers, we think that this is unlikely.

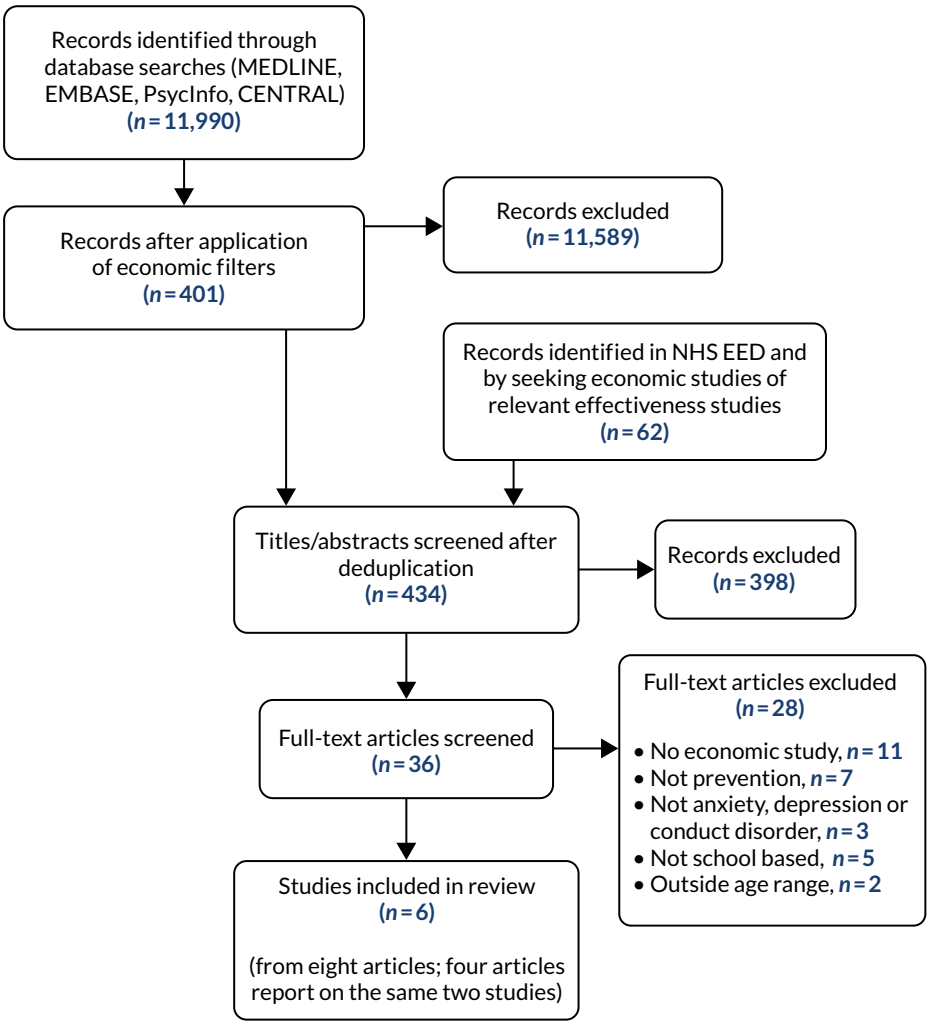

FIGURE 16 Study selection process: flow diagram for review of economic evaluations.

Included studies characteristics

The six included studies were published between 2006 and 2017, with costs reported in currency years from 2003 to 2014. The numbers of participants in the studies describing RCTs ranged from 308 to 3357. Two studies described universal interventions, three studies reported on an indicated intervention (of which two included a universal component) and the final study considered both universal and indicated interventions. Two analyses were based on economic decision models (both Markov models) and four analyses were based on data from RCTs. The follow-up period ranged from 6 months to 14 years for the trial-based analysis, and the model horizons were 5 or 10 years. Interventions were compared with usual provision ($n = 4$) or no intervention ($n = 2$). Additional characteristics are summarised in *Table 18*, and the extracted data are provided in *Appendix 8*.

Quality of articles

The study by Mihalopoulos *et al.*[260] met the majority of the Philips checklist criteria.[255] However, the intervention was not described in adequate detail, half-cycle corrections were neither incorporated nor discussed and there were weaknesses in both the assessment of uncertainty and description of data incorporation. Lee *et al.*[259] published a very detailed supplementary document alongside the article, thereby meeting most of the reporting requirements, although the cycle length was not explicitly stated and parameter distribution choices were stated but not justified. Structural uncertainty and heterogeneity did not appear to have been explored in either article.

The analysis reported by Anderson *et al.*[261] lacked sensitivity analyses for exploring uncertainty and did not discuss generalisability, but was otherwise well reported. Although there was no discussion of generalisability or comparison with other studies and no subgroups were considered, the study by

TABLE 18 Characteristics of included studies for review of economic evaluations

Characteristic	*n*
Condition	
Anxiety	1
Depression	3
Conduct disorder	2
Economic evaluation type	
Cost-effectiveness analysis	3
Cost–utility analysis	4
Cost–consequence analysis	1
Setting	
Primary school	4
Secondary school	5
Study design	
RCT	4
Decision model	2
Jurisdiction	
USA	2
UK	2
Australia	2

Stallard *et al.*[262] generally conformed to the requirements of the Drummond checklist.[254] The 2006/7 articles by Foster and Jones[263,264] did not adequately report the effectiveness of the intervention, and did not include all costs that might have been relevant. Discounting was neither described fully nor justified, and results were not compared with those of other studies. As no incremental analysis was conducted in the 2010 study,[250] the study quality was not assessed.

Costs and cost-effectiveness

A range of economic analysis perspectives was studied, including the health, social services, education and criminal justice sectors, leading to a wide range of resources being included in the analyses. Interventions were typically complex and ranged in cost from approximately £45 per participant to > £60,000. The intervention for conduct disorder involved multisystemic, multicomponent and sequentially delivered individual and group interventions over a 10-year period, whereas the interventions for depression and anxiety were all based on CBT methods. Outcomes considered in the economic analyses included utilities [either quality-adjusted life-years (QALYs) or DALYs averted], as well as other clinical outcomes. The studies are described in more detail below.

Prevention of anxiety

Stallard *et al.*[159,262] studied a universal intervention for anxiety prevention in primary schools in the UK. The FRIENDS intervention is a CBT-based programme that teaches children to recognise anxiety and develop strategies to address anxious feelings. The intervention was delivered by either a teacher or an external health educator, and both were compared against usual curriculum provision in a three-arm trial. The cost-effectiveness of the programme was assessed at 6 months in terms of the cost per unit reduction in primary outcome (RCADS score), and a cost–utility analysis was conducted using the Child Health Utility-9 Dimensions (CHU-9D) instrument to measure health-related quality-of-life data from which QALYs were derived. The economic analyses were carried out from the joint health, social services and education sectors perspective. Therefore, resources considered in the study (measured using an adapted Client Service Receipt Inventory instrument administered by parental interview) included hospital stays, accident and emergency visits, outpatient appointments, general practitioner (GP) visits and visits to psychology practitioners or social workers, and medications. The scope of the study appeared to be condition-specific resource use, except for hospital events, which encompassed all-cause resource use. It was unclear whether use of social services was condition specific or all cause. A very detailed breakdown of the intervention costs was provided, leading to a total of £62.96 per child if the intervention was delivered by school staff and £59.16 per child if delivered by external health staff (inflated to 2018 costs). Point estimates suggested that the intervention was more costly, but less effective (by 0.004 QALYs), than the control, that is the intervention was dominated. The economic analysis provided further evidence that the intervention was unlikely to be cost-effective, with a probability of cost-effectiveness of < 35% at all societal willingness-to-pay values for the intervention delivered by health staff. Furthermore, the analysis was based on complete cases for CHU-9D measurements. This may have led to bias, as it is possible that those individuals without complete data were less likely to have benefited from the programme. The cost of teacher time for delivering the intervention was treated as zero. This strategy implies that there was no opportunity cost associated with alternative learning activities from the teachers' point of view.

Prevention of depression

Three studies (one RCT and two decision models) addressed interventions aiming to prevent depression. The RCT evaluated the CBT-based Resourceful Adolescent Program (RAP) from the perspective of the NHS and social care in the UK.[261] We note that, in the present review, the RAP was classified as CBT + IPT, a combined intervention type, in line with the description of the intervention in Merry *et al.*[197] and Hetrick *et al.*[68] The study was described in both a report to the funder and a journal article. The more recently published paper has been treated here as the primary account, with the funder report consulted for further detail when necessary. The RAP is a universal intervention that was delivered in secondary schools, recruiting young people aged 12–16 years. Cost-effectiveness was assessed after 12 months of follow-up in relation to both QALYs (measured using the EuroQoL-5

Dimensions questionnaire) and clinical symptoms of low mood (measured using the Mood and Feelings Questionnaire-Short Version). Resources considered in the study included hospital stays, accident and emergency visits, outpatient appointments, GP visits and visits to psychology practitioners. Details of medications were collected but not reported, as the data were considered unreliable. The cost associated with delivering the intervention (£46.15 per child in 2018 equivalent) was relatively small, and a detailed breakdown was reported. For both the cost-effectiveness and cost–utility analyses, the point estimates suggested that the intervention was both more costly and less effective than the control (usual class provision within school), albeit with considerable uncertainty around the results. The intervention was deemed 'highly unlikely' to be cost-effective.

The two model-based analyses were conducted in the Australian context following the Assessing Cost-Effectiveness in Prevention framework.[259,260] The studies shared a common author, and both were based on 'hypothetical' interventions developed by the project team following a literature review and meta-analysis. In both cases, the intervention was compared with no intervention, focused on children aged 11–17 years, considered DALYs averted as the economic outcome measure and used Markov models. The earlier (2012) study[260] involved a model time horizon of 5 years and a health sector perspective. The more recent (2017) model[259] was extended to 10 years and included both health and education sectors in the perspective. Intervention costs were estimated by Lee *et al.*[259] at £12.90 per child for the universal intervention and £259.25 per child for the indicated intervention (2018 prices). The incremental cost-effectiveness ratios (ICERs) were found to be AU$7350 per DALY averted for a universal intervention and AU$19,550 per DALY averted for the indicated intervention in Lee *et al.*,[259] and AU$5400 per DALY averted for an indicated intervention in Mihalopoulos *et al.*[260] Assessed against a standard societal willingness-to-pay threshold of $50,000 per DALY averted, both studies concluded that school-based preventative interventions represent good value for money. However, as the studies focused on the prevention of major depression with three health states only (healthy, diseased and dead), the lack of granularity in terms of addressing the spectrum of disease severity limits the usefulness of the analyses in informing implementation decisions.

Prevention of conduct disorder

Three articles, all by the same author group and relating to the same study, described the Fast Track intervention, designed to prevent conduct disorder in the USA. The intervention was assessed at two time points (10 years[263,264] and 13 years[250] post randomisation). Two articles described the same study at the same time point, with one reporting an ICER and the other reporting the net monetary benefit statistic. As these cost-effectiveness statistics would usually be reported together, and the articles are identical in many aspects, the two articles have been treated as one for the purposes of this review. The Fast Track intervention took a long-term approach to the prevention of conduct disorder. Children were identified as 'at risk' at age 6–7 years and were given intensive support through multiple activities over a 10-year period, including parent training, group meetings, friendship development and promotion of reading skills (see *Chapter 7*). The multifaceted intervention was very costly, at US$58,283 (cost year: 2014) (£60,478 in 2018 Great British pounds) per child.

The stated perspective of the economic analysis was that of a third-party payer, but the intervention cost was the only resource included. Cost-effectiveness at 10 years was found to be US$3,481,433 per case of conduct disorder averted, with only a 1% probability of cost-effectiveness at an assumed societal willingness-to-pay value of US$1M. However, the authors explicitly note that the intervention was designed for effectiveness, not cost-effectiveness. Possible future effects were addressed approximately by estimating the costs associated with an enduring criminal lifestyle, and incorporating this estimate into the societal willingness-to-pay value, but no other potential offsets (such as the effect on health or social care, or directly on the education system) were included in the analysis. Only the intervention was costed. A subgroup analysis suggested that the intervention may be cost-effective for children at the highest risk of developing conduct disorder; however, it was unclear whether this analysis was prespecified or conducted post hoc.

By the 13-year follow-up, evidence for cost-effectiveness had dissipated, and the study concluded that '[t]he most intensive psychosocial intervention ever fielded did not produce meaningful and consistent effects on costly outcomes'.[250] This study took a much broader perspective than previously, but, citing the lack of intervention effect as a justification, the authors presented marginal effects for group differences for a number of resources, instead of deriving any formal cost-effectiveness statistics combining costs and outcomes. Relevant resources included health-care use, criminal justice interactions, substance use and educational service use. Full data sets were not available for all variables. For example, medication use was available for years 4–13 only, and health-care use was available for years 7–13 only. Costs associated with health-care use and delinquency were investigated, although no unit costs were reported for the resources used. Both outpatient mental health-care use and general any-cause health service use costs were higher in the control group, these costs being, respectively, US$1344 and US$1106 lower per participant in the intervention group. Costs associated with the criminal justice system showed no difference between the groups. Weaknesses in the trial development and conduct were identified, and tension arising from the differing background perspectives of the study team was apparent. For example, the author was critical of developmental psychology as a discipline, of the lack of data-sharing in the project and of the lack of prespecified analysis plans, leading to concerns over chance findings.

Intervention costs

Extracted elements of the interventions described in 20 papers evaluating universal CBT interventions with a psychoeducation component identified via the ICA (see *Chapters 4* and *5*) are given in *Appendix 8*. The number of sessions for children ranged from 3 to 30, with a median of 10 sessions. Session duration ranged from 35 to 120 minutes (median 50 minutes). Group sizes ranged from 4 to 30 participants, with a median of 25. Parent sessions formed part of the intervention in only five studies, with low attendance cited as an issue in two of these studies. The group leaders included teachers ($n = 8$), psychologists ($n = 11$) and students ($n = 5$) (sometimes in combination). Groups were led by either one ($n = 12$) or two ($n = 7$) individuals (the exact leadership was unclear in one study). Of the 12 groups led by one individual, four were led by psychologists and eight by teachers. Training for delivering the intervention (when described) took a number of forms, including self-participation in the intervention, workshops varying from 90 minutes to 5 days ($n = 9$, median 1 day) and co-leading a cohort. A facilitator manual was provided in 16 out of 20 interventions, and workbooks or worksheets were supplied in 13 out of 20 interventions.

A 'typical' universal secondary CBT intervention might, therefore, comprise 10 sessions of 50 minutes, each session each delivered to 25 children at a time by one teacher who had received 1 day of specific intervention training. Typically a manual would be provided for facilitators, and workbooks for the participants. Unit costs associated with these elements in the UK context are given in *Appendix 8*. This leads to an estimated overall intervention cost of £43 per student from the school budget perspective. At the school level, this would represent approximately £1825 per (small) two-form entry school, or £7300 per larger eight-form entry school in the first year. A two-form entry school is one that has an annual intake of two classes of approximately 30 students each, who then progress through the school as a stable cohort. An eight-form entry school is approximately four times as large. If this universal intervention were delivered in a primary school, the teacher costs would be slightly lower, leading to an approximate cost of £42 per student. Assuming that a targeted (indicated or selective) intervention would be delivered to a smaller group of students (e.g. 10), the cost per student would be £95 in a secondary setting or £91 in a primary setting. Similarly, based on three articles describing universal secondary CBT + IPT interventions, a typical CBT + IPT intervention might have both workbooks and a manual, and consist of 11 sessions of 60 minutes each, delivered by one teacher to 10 students after 2 days' training. This leads to an estimated cost of £157 per student.

Component analysis

Seven CBT interventions were described in sufficient detail to attempt to assign a very approximate proportion of the intervention devoted to psychoeducation: e-couch (33%), ThisWayUp (40%),

Penn Resilience Program (30%), LARS&LISA (20%), Op Volle Kracht (50%) and two unnamed interventions (12% and 100%). Overall, approximately one-third of the 'typical' intervention could be assigned as psychoeducation. The potential cost of incorporating a psychoeducation component might, therefore, represent approximately £14 per student (i.e. approximately £600 per two-form entry school or £2400 per eight-form entry school).

Cost–consequence analysis

Intervention costs and consequences in SMDs that could be ascribed to the 'indicative' CBT interventions for a universal secondary population are presented in *Table 19*, alongside extrapolated intervention costs for similar interventions in primary and targeted populations. Adding IPT to CBT in a universal secondary population is more costly than CBT alone, driven mainly by additional teacher training and delivery to smaller groups of students. Although the estimated SMD shows a bigger reduction in depression score, compared with usual curriculum, than for CBT alone, the estimate is very uncertain. There is no evidence for the effect of CBT + IPT on anxiety in the universal secondary population. Further evidence on the relative efficacy of CBT and CBT + IPT would be required to justify the additional intervention cost. No studies used a usual curriculum control in either secondary or primary targeted populations. There is some evidence that CBT is effective compared with a waiting list for reducing anxiety in a targeted primary population, but this difference may not extend to comparisons with usual curriculum.

In *Table 20*, we report the intervention costs and consequences (SMD) for CBT with or without a psychoeducation component in a universal secondary population. Because all of the CBT interventions in the NMA for this population contained cognitive and behavioural components, the comparison is

TABLE 19 Cognitive–behavioural therapy intervention cost estimates and consequences (SMDs), compared with usual curriculum

Setting/intervention	Intervention cost per student (£)	CBT for, SMD (95% CrI)	
		Anxiety	Depression
Secondary			
Universal			
CBT	43	−0.145 (−0.342 to 0.042) vs. usual curriculum	−0.040 (−0.156 to 0.074) vs. usual curriculum
CBT + IPT	157	N/A	−0.184 (−0.454 to 0.085) vs. usual curriculum
Targeted			
CBT	95	0.028 (−0.108 to 0.164) vs. no intervention	−0.217 (−0.579 to 0.1307) vs. no intervention
Primary			
Universal			
CBT	42	−0.072 (−0.234 to 0.051) vs. usual curriculum	−0.131 (0.441 to 0.174) vs. usual curriculum
Targeted			
CBT	91	−0.384 (−0.846 to 0.067) vs. waiting list	−0.477 (−2.486 to 1.50) vs. waiting list

N/A, not available.
Note
If comparisons were not available against usual curriculum, results are reported relative to a waiting list control; if that is also not available, then the results are reported relative to no intervention.
CBT + IPT was not present in the NMA for universal, secondary, anxiety.

TABLE 20 Costs and consequences (SMD relative to usual curriculum) of a universal secondary CBT intervention that contains cognitive and behavioural components with and without a psychoeducation component

Population/setting/intervention	Intervention cost per student (£)	Intervention vs. usual curriculum, SMD (95% CrI)	
		Anxiety	Depression
Secondary			
Universal			
CBT (cognitive + behavioural)	29	0.092 (−0.171 to 0.357)	−0.112 (−0.278 to 0.052)
CBT (cognitive + behavioural + psychoeducation)	43	−0.301 (−0.593 to −0.014)	0.005 (−0.118 to 0.132)

between CBT with just cognitive and behavioural components and CBT with cognitive, behavioural and psychoeducation components. We give results for both anxiety and depression outcomes, although the NMA results only show evidence of a difference for the anxiety outcome. We also report estimated intervention costs, based on our microcosting of typical interventions with these components as described in the RCTs. Adding a psychoeducation component increases intervention costs, but there is evidence that anxiety symptom scores improve post intervention.

Discussion

Review of previous economic studies

The body of evidence described in this review is both small and heterogeneous. Conditions being targeted, interventions and cost-effectiveness analyses were all variable. It was, therefore, not possible to synthesise the results numerically. Multiple perspectives for the analyses were taken, leading to the resources included in the analyses varying widely. The potential long-term costs associated with missing school[15,16] (such as lifetime earning capacity) were not estimated in any of the studies. All included studies appropriately compared the intervention with usual provision, or with no intervention (i.e. the model-based studies). Although an active control comparator is appropriate (and necessary) for investigating effectiveness mechanisms, economic analyses are most informative for decision-makers when compared with usual care/curriculum. The two model-based analyses suggested that hypothetical interventions could be cost-effective in the Australian context. However, the trial-based analyses suggested that the interventions were unlikely to be cost-effective in the UK or the USA. For the one intervention that was considered potentially cost-effective in a high-risk subgroup at an interim point of the study, the effect disappeared with longer-term follow-up. There was little empirical costing evidence to inform decisions on the implementation of preventative interventions.

Cost–consequences analysis

The figures used to obtain intervention costs were based on a highly stylised, 'indicative' universal intervention that was assumed to be delivered as specified, and there are many ways in which differences might occur in the real world. Although it was assumed that there would be no room hire costs if the intervention were delivered on school premises, there could be heating, lighting or security overheads if the intervention were delivered outside school hours. It is possible that a project manager or administrator would be required to oversee the intervention if it were rolled out across the country. The salary of the teacher delivering the intervention could vary according to experience. Delivery by a psychologist instead of a teacher would affect the salary costs, and psychologists additionally undergo supervision meetings as part of their professional conduct. The intervention would be more costly if two individuals led it instead of one. The detailed intervention cost breakdown by Stallard *et al.*[262] illustrated the variability in individual components that go into making up an intervention, with small changes in delivery method (e.g. the requirement for travel) leading to big differences in costs between methods.

Stallard *et al.*'s[262] work suggested that it is a fallacy to assume that delivery by schoolteachers is less costly than delivery by health-care specialists. None of the interventions described here explicitly mentioned a licence fee, and potential administration costs have not been considered. Deriving a value for the opportunity cost of time diverted from other learning activities in school is currently considered problematic and has not been taken into account here. Despite these caveats, this simplistic model serves to give an idea of the costs that might accrue to a school budget in the first year of implementation. Subsequent years would incur lower training outlay, assuming that the same teachers deliver the course. The limited details of interventions described in the published reports meant that it was challenging to assign accurate proportions to psychoeducation components.

Implementation might be more attractive if it could be demonstrated that the intervention has a positive effect on educational outcomes or reduces the need to pay for educational psychologists in the future. However, the systematic review found that few studies of effectiveness had considered educational attainment outcomes (see *Chapter 6*). Future work should consider developing methodologies for evaluating both effectiveness and cost-effectiveness in terms of school outcomes, as well as the outcomes more typically encountered in health-care studies.

The cost–consequence analysis was based only on the intervention costs (i.e. the effect on health-care use was not addressed). It is worth noting that the beneficial effects of an intervention that aims to prevent or reduce symptoms of anxiety may also extend to reducing depression, and vice versa, which would increase the value of such an intervention. A comparison of costs and standardised outcomes in a cost–consequence analysis is difficult to interpret; ideally, a full cost-effectiveness analysis based on a recognised clinical outcome would be conducted. However, we did not find sufficient evidence for the efficacy of these interventions at 6 months' post-intervention (and longer) follow-up for the development of a cost-effectiveness model to be useful at the present time. An economic model needs to capture long-term costs and benefits, which may be substantial, as issues with mental health and conduct disorder during school years have been shown to be associated with a range of health and behavioural problems as adults,[4] which are costly to society.[265] However, further research is needed to develop and evaluate effective interventions for the prevention of mental health and conduct disorders in school-age children before the longer-term consequences of such interventions can be fully assessed.

To ensure high-quality information for decision-makers, it is imperative that future reports of school-based interventions to prevent anxiety, depression or conduct disorder are described in some detail and that the cost implications of interventions are adequately measured.

Chapter 9 Summary and interpretation of key findings

In this chapter, we draw together the findings from the systematic review, NMA and economic evaluation. Based on the criteria for interpretation described in *Chapter 2*, we summarise our overall interpretation of the evidence from the NMA for the primary time point of immediately post intervention. This summary forms the basis for the implications for practice, implications for research and the conclusions reported in *Chapter 10*.

Systematic review

The full results of the systematic review are reported in *Chapters 4–7* and are summarised briefly here. The effectiveness results are based on searches conducted in April 2018. A total of 11,990 citations were screened, and 1512 full-text articles were retrieved for screening. The review included 142 studies of > 63,500 randomised participants. Of the 142 studies, 92 were judged to be at unclear risk of bias for random sequence generation, 115 were judged to be at high or unclear risk of bias for allocation concealment and 133 were judged to be at high or unclear risk of bias for blinding of participants. We identified a protocol or trial registration for only 32 studies. This represents 23% of included studies published post 2000.

Of the 142 eligible studies, 71 contributed data to the NMA for the prevention of anxiety, 86 were included for the NMA for depression and five contributed to the narrative summary for the prevention of conduct disorder. Note that there was an overlap of studies contributing to the anxiety and depression NMA, with 47 studies reporting both an anxiety and a depression outcome.

Network meta-analyses by population and setting

This is a large and complex review, with 32 possible intervention-level NMAs conducted (condition × setting × population × time point), from which we reported 57 intervention effect estimates of the primary outcomes of self-reported symptoms of anxiety or depression. This number of analyses does not include the component NMAs or subgroup or sensitivity analyses, and does not include the additional and secondary outcomes. Below we report the findings for our primary outcomes at the primary time point of post intervention, for the intervention-level and component-level NMA. Note that, to ensure conciseness in this chapter, we concentrate on interpreting findings for which the relevant results chapter has indicated that there may be statistical evidence of an effect, as described in *Chapter 2*. However, for full reporting of all results and intervention effect estimates, see *Chapters 4* and *5*.

Anxiety: universal population, secondary setting

This was a well-populated network of 21 studies and 10,208 participants. The between-study heterogeneity was moderate across the network. The risk of bias for random sequence generation and allocation concealment was deemed to be mostly unclear. At the post-intervention time point, we found weak evidence of a small beneficial effect of CBT-based interventions (SMD −0.15, 95% CrI −0.34 to 0.04), relative to usual curriculum. There was statistical evidence that mindfulness/relaxation interventions (SMD −0.65, 95% CrI −1.14 to −0.19) were effective in preventing symptoms of anxiety. However, the CrIs for the mindfulness/relaxation effect estimate were relatively imprecise, and the effect estimate is based on two small studies, which were judged to be at unclear risk of bias for the domains of random sequence generation and allocation concealment. We also note that there was variation between the study-level effect estimates of the two mindfulness/relaxation studies. One study[130] (with 30 participants) reports a large effect estimate of mindfulness/relaxation relative to a waiting list (SMD −1.01, 95% CrI −1.67 to −0.35).

The second study[137] compared mindfulness/relaxation with an attention control and reports a smaller effect (79 participants, SMD −0.32, 95% CrI −0.72 to 0.08). Finally, the statistical findings for both CBT and mindfulness/relaxation should be interpreted considering the possible evidence of asymmetry from the comparison-adjusted funnel plots, which suggests the presence of small-study effects or other non-reporting bias.

Anxiety: universal population, primary setting

This was a small network of 15 studies, but with a reasonable number of participants ($n = 5605$). There was moderate between-study heterogeneity across the network. Thirteen studies were judged to be at unclear risk of bias for random sequence generation and allocation concealment, one was judged to be at low risk of bias for both domains and one was judged to be at low risk of bias for random sequence generation only. There was weak evidence for a very small beneficial effect of CBT (SMD −0.07, 95% CrI −0.23 to 0.05), relative to usual curriculum. The comparison-adjusted funnel plot was suggestive of small-study effects or other non-reporting bias.

Anxiety: targeted population, secondary setting

This was a small network of 15 studies (2383 participants). There was mild to moderate between-study heterogeneity across the network. Three studies were judged to be at low risk of bias and seven were judged to be at unclear risk of bias for randomised sequence generation and allocation concealment. Four studies were judged to be at low risk of bias for randomised sequence generation and at unclear risk of bias for allocation concealment. There was evidence that exercise was effective in reducing self-reported anxiety in targeted secondary settings, relative to no intervention (SMD −0.47, 95% CrI −0.86 to −0.09). However, the width of the CrI indicates a relatively imprecise estimate, and exercise was evaluated in only one small study[170] (with 121 participants) that was judged to be at unclear risk of bias for random sequence generation and allocation concealment. We caution against overinterpreting the finding for exercise-based interventions in this network. There was no evidence of effectiveness for the other interventions. The comparison-adjusted funnel plot did not suggest the presence of small-study effects or other non-reporting bias.

Anxiety: targeted population, primary setting

The targeted primary network was the smallest of all those considered for the prevention of anxiety with only 11 studies (1314 participants). There was substantial between-study heterogeneity (τ 0.42, 95% CrI 0.21 to 0.89) across the network. Three studies were judged to be at low risk of bias and six studies at unclear risk of bias for both the randomisation and allocation concealment domains. A further two studies were judged to be at unclear risk of bias for allocation concealment, but at low risk of bias for random sequence generation. Although there was weak evidence of a beneficial effect for CBT relative to a waiting list (SMD −0.38, 95% CrI −0.84 to 0.07), the CrI for the estimate is relatively wide. There was no evidence of small-study effects or other non-reporting biases for this network; however, the number of studies is at the lower end required for this analysis to be meaningful.[266]

Anxiety: tertiary/university setting

There was evidence of (statistical) inconsistency in the NMA for the prevention of anxiety in tertiary settings; therefore, we do not report effectiveness findings. The inclusion criterion that interventions needed to be implemented in the educational setting may have limited the number of eligible studies, which, in turn, may have contributed to the lack of model fit observed. The limitations are discussed further in *Chapter 10*.

Depression: universal population, secondary setting

At the post-intervention time point, this was the most connected network, including the greatest number of studies (34 studies; 18,094 participants), of which 25 included an intervention based on CBT. Most studies were rated as having an unclear risk of bias for at least one domain. The between-study heterogeneity was moderate across the entire network. There was weak evidence of a very

small beneficial effect for CBT, compared with usual curriculum (SMD −0.04, 95% CrI −0.16 to 0.07). There was also some evidence that CBT + IPT (SMD −0.18, 95% CrI −0.46 to 0.08) was effective at reducing depressive symptoms. The comparison-adjusted funnel plots did not indicate small-study effects or other non-reporting biases.

Depression: universal population, primary setting

This was a small network of 12 studies (4116 participants) of six interventions. Only one study did not include a CBT comparator, yet the between-study heterogeneity was considered to be moderate to substantial. One study was rated as having a low risk of bias and 11 studies were rated as having an unclear risk of bias for both random sequence generation and allocation concealment. There was no evidence of an effect for any intervention relative to usual curriculum. The comparison-adjusted funnel plots did not indicate small-study effects or other non-reporting biases.

Depression: targeted population, secondary setting

Twenty-four studies contributed to this NMA. However, it was small in terms of participants ($n = 3669$). There was evidence of moderate to substantial between-study heterogeneity across the network. Most studies were rated as having a low risk of bias on at least one of the domains; however, allocation concealment was rated as having an unclear risk of bias in 18 studies. There was no evidence of an effect for any intervention relative to no intervention. The comparison-adjusted funnel plot did not indicate small-study effects or other non-reporting biases.

Depression: targeted population, primary setting

There were five studies (497 participants) in this NMA. Between-study heterogeneity was substantial. One study was judged to be at low risk of bias for both random sequence generation and allocation concealment, and three studies were judged to be at unclear risk of bias. One study was rated as having a low risk of bias for random sequence generation, but an unclear risk of bias for allocation concealment. There was no evidence of an effect for either CBT or occupational therapy, relative to a waiting list. A funnel plot was reported but not interpreted because of the small number of studies included.

Depression: tertiary/university setting

We observed evidence of inconsistency in the NMA for the prevention of anxiety in tertiary settings; therefore, it was not appropriate to report effectiveness findings. As a consequence of the inclusion criteria, few studies were included, which may have contributed to the lack of model fit. The limitations of the inclusion criteria are discussed in *Chapter 10*.

Anxiety and depression: component network meta-analysis

The taxonomy of intervention components was reported in *Chapter 3*. We report the anxiety and depression component NMA findings in *Chapters 4* and *5*. There was little robust evidence that specific combinations of components were more effective than others. The exception was a psychoeducation component: it appears that the addition of a psychoeducation component to CBT may result in a more effective preventative intervention. The mechanism for this finding is not clear. In the psychotherapeutic literature, Pompoli *et al.*[72] found that the addition of a psychoeducation component to CBT decreased the odds of remission from adult panic disorder symptoms (i.e. made remission less likely), whereas López-López *et al.*[82] found no evidence that adding psychoeducation to CBT changed the effectiveness for treatment of depression in adults (SMD 0.04, 95% CrI −0.66 to 0.75). Both the Pompoli *et al.*[72] and López-López *et al.*[82] studies were conducted in clinical adult populations, and the present study is in non-clinical child and adolescent populations, and mechanisms of psychoeducation may vary. To aid future intervention development, investigation of the potential mechanism(s) of psychoeducation should be conducted and could also explore the possibility that the mechanism of effect is likely to vary across adult and CYP populations.

Anxiety and depression: subgroup analyses

For the primary time point of post intervention, we explored whether or not effects observed in the NMA varied by mode of delivery, facilitator and focus of the intervention. On balance, there was a lack of evidence of effect modification by facilitator or mode of delivery for any population or setting combination. There was weak evidence that interventions facilitated by MHPs may be more effective. There was some evidence to suggest that interventions focused on preventing anxiety had a larger effect on reducing self-reported symptoms of anxiety than those focused on both depression and anxiety, or depression alone, and that interventions focused on preventing depression had a larger effect on reducing symptoms of depression than those focused on both depression and anxiety, or anxiety alone. However, this was not a formal statistical comparison, and, owing to the absence of participant blinding, we cannot rule out possible Hawthorne effects. Therefore, we do not consider this as providing evidence for, or against, the transdiagnostic hypothesis.

Anxiety and depression: additional primary and secondary outcomes

Additional primary and secondary outcomes were also analysed for the primary time point. There was no evidence to suggest that primary or secondary educational setting-based interventions to prevent anxiety or depression improved well-being, reduced suicidal ideation or self-harm, improved academic attainment or improved parent reports of child mental disorder symptoms. Subgroup analyses to examine whether or not intervention effects varied according to SES suggested that interventions delivered in lower SES settings may be slightly less effective than those delivered in higher/mixed SES settings. However, this is based on low SES subgroups with a maximum of four studies, and these findings may not be considered reliable. We did not test for subgroup differences. As regards intervention acceptability, most studies reported that participants were satisfied with their intervention assignment and interventions were rated by the students as reasonably enjoyable. It is of note that only two studies reported the comparative or relative enjoyment across all intervention arms. In both studies, participants preferred the control interventions.

Conduct disorder

Owing to the diversity of interventions, outcome measures and time points reported by the conduct disorder studies, results were reported narratively. Five studies were included, of which three were judged as having an unclear risk of bias for random sequence generation and allocation concealment. One study was judged as having a low risk of bias for both domains, and one was judged to be at low risk of bias for randomisation and unclear risk for allocation concealment. No study reported the primary outcome of self-reported conduct disorder symptoms at post intervention. Instead, results from parent and teacher reports and secondary measures of externalising behaviours at post intervention were summarised. There was evidence from two studies of classroom-based interventions and one study of a multisystemic intervention that externalising behaviours were reduced post intervention. Evidence of a beneficial effect was mixed from two studies of multisystemic, multicomponent and multiphase interventions. In the short term (between 1 and 3 years), there was no evidence to support intervention effectiveness. However, both studies reported evidence over the longer term (5–20 years) of a beneficial effect of the interventions for preventing self-reported conduct disorder symptoms.

Interpretation of network meta-analysis results across all networks: post intervention

With regard to comparative effectiveness at the primary post-intervention time point, we conclude that there is weak statistical evidence to support the effectiveness of school-based anxiety and depression prevention interventions, that effect sizes are modest and the evidence is not robust. CBT-based interventions were the most commonly used across the networks analysed. Despite this, across most networks, there was only weak statistical evidence to suggest that CBT-based interventions may be effective. There was evidence from the universal secondary analyses that mindfulness/relaxation interventions are effective in preventing symptoms of anxiety, and evidence from the targeted secondary

anxiety analyses that exercise is effective. However, we are cautious about the overinterpretation of these results because they are based on few studies (two and one, respectively), which were judged to be at unclear risk of bias. We note that there was also weak evidence from the universal secondary depression NMA that CBT + IPT is effective at preventing depressive symptoms. However, the three studies including a CBT + IPT intervention were also rated as having mostly unclear risk of bias.

The evidence base is not robust and further weakens the statistical findings. We note that the risk of bias for random sequence generation and allocation concealment was rated as unclear across most of the networks. Meta-epidemiological evidence suggests that, for subjective outcomes (such as self-rated anxiety or depression), inadequate or unclear allocation concealment exaggerates intervention effect estimates.[267] In the context of this review, the observed intervention-level effects are beneficial relative to control, but they are 'small'.[268] The potential impact of selection bias on these effect estimates should be considered in their interpretation. Future work using bias-adjusted NMA could explore the likely impact further.[269]

The possibility of non-reporting bias in the universal anxiety analyses, in particular, must be considered in the interpretation of the statistical findings. There was some evidence that small negative studies were absent from the anxiety analyses. Adjusting for these studies would probably further attenuate the modest effects observed.

The between-study heterogeneity was at least moderate in 9 of the 10 primary analyses, and mild to moderate in one. It is broadly accepted that statistical heterogeneity is inevitable in meta-analysis.[270] However, steps should be taken to minimise potential sources of heterogeneity in advance of analysis, for example by defining coherent review inclusion and exclusion criteria. This is because the extent of between-study heterogeneity has implications for the interpretation and generalisability of results.[43,103] To illustrate the difficulties heterogeneity causes for the decision-maker, we can consider a predictive interval.[271,272] A 95% prediction interval estimates where the true intervention effects are expected to lie in a new study, or if the intervention were to be rolled out to similar populations (as those included in the analysis). In the presence of heterogeneity, the prediction interval fully encapsulates the uncertainty in intervention effect and will be wider than the CI or CrI. For example, in the universal secondary anxiety analysis (see *Chapter 4*), the 'best-bet' intervention for preventing anxiety is CBT [SMD −0.15 (95% CrI −0.34 to 0.04) vs. usual curriculum]. However, the corresponding 95% prediction interval is−0.47 to 0.16. We can interpret this interval as the 95% range of true SMDs to be expected if we were to implement CBT in secondary schools. That is, having considered the heterogeneity in the existing evidence for a narrowly defined set of interventions, we cannot rule out the possibility that a real-world implementation of CBT to school children might be harmful. We note that the observed heterogeneity was not explained by the subgroup analyses or metaregression, adding to the uncertainty for decision-makers seeking to implement a disorder-specific preventative intervention.

Key findings of the economic evaluation

The body of evidence described in the review of economic evidence was small (six studies) and heterogeneous. The CMD addressed, intervention type and cost-effectiveness analyses differed across the studies identified in the review. It was, therefore, not possible to quantitatively synthesise the findings. Across the studies reviewed, multiple perspectives for the analyses were taken, leading to the resources included in the analyses also varying widely. The potential long-term costs associated with missing school (such as lifetime earning capacity) were not estimated in any of the studies. The two model-based analyses reviewed suggested that hypothetical interventions could be cost-effective in the Australian context. However, the trial-based analyses suggested that the interventions were unlikely to be cost-effective in the UK or the USA. For the one intervention that was potentially cost-effective in a high-risk subgroup at an interim point of the study, the effect had disappeared with longer-term follow-up. There was very little empirical costing evidence to inform decisions on the implementation of preventative interventions.

We developed a highly stylised, 'indicative' CBT intervention for a microcosting study based on a universal secondary school setting. Taking the perspective of a single secondary school budget, an estimated intervention cost of £43 per student was derived. Although there are several ways in which a 'real-world' CBT intervention may differ, the simplistic model provides an indication of the costs that might accrue to a school budget in the first year of implementation. We also considered the costs of including a psychoeducation component within a CBT intervention, on the basis of the component NMA effectiveness results. We estimated that the potential cost of incorporating a psychoeducation component in the indicative CBT intervention might represent approximately £14 per student. Adding a psychoeducation component increases intervention costs, but this may be offset by the slightly greater improvement in anxiety scores post intervention. However, there was only weak evidence for an improvement in symptoms of depression post intervention in universal secondary settings.

Chapter 10 Discussion

In this chapter, we place the findings summarised in the *Chapter 9* in context, with reference to the existing literature, and we discuss the limitations of the study. The implications for practice and research are discussed and conclusions presented.

Comparison with other studies

Depression and anxiety

In placing the findings reported here in context, it may be informative to compare the effect sizes from the present analysis with those observed in psychotherapeutic meta-analyses for the treatment of childhood depression and anxiety. The most robust evidence observed in our primary analyses was in universal secondary settings, in which there was weak evidence of a small benefit for CBT-based interventions (anxiety: SMD −0.15, 95% CrI −0.34 to 0.04; depression: SMD −0.04, 95% CrI −0.16 to 0.07). This can be contrasted with the evidence for group CBT relative to treatment as usual, observed by Zhou *et al.*[273,274] from a NMA of psychotherapies for treatment of anxiety[274] (SMD −0.84, 95% CI −1.47 to −0.21) and depression[273] (SMD −0.32, 95% CI −0.60 to −0.08).

Our results are largely consistent with the findings from large-scale RCTs of school-based prevention of anxiety and depression. Twelve RCTs included in our NMA had sample sizes of > 1000 at baseline.[118,119,125,126,141,142,151,159,196,204,206,207] All were passive-controlled RCTs (in two studies the control was a waiting list, in two it was no intervention and in eight it was the usual curriculum). Eight of the 12 RCTs concluded that there was no evidence of an effect of the intervention on self-reported symptoms of anxiety and/or depression, of which five were at low risk of bias for both random sequence generation and allocation concealment (*Table 21*). We also compared our findings with those of 20 systematic reviews of RCTs published since 2005. A summary of the review characteristics is provided in *Appendix 9*. Reviews were identified via a combination of non-systematic scoping searches in MEDLINE, PsycInfo, EMBASE and Google Scholar. Nineteen concluded that there were beneficial effects of anxiety and depression prevention programmes for CYP. Most noted that effect sizes were small; however, some were interpreted as showing 'significant reductions',[113] as 'consequential',[275] of 'practical relevance'[276] or providing 'strong support'[111] for the effect of interventions. Only one review reported that 'Results of the various programs . . . are not particularly positive . . . the effects (if there are any) are not sustained over time'.[277] Two reviews were more cautious in their interpretation of the small positive effects, noting that when preventative interventions were compared with an attention control, they 'showed a sobering lack of effect'.[68,278] We consider possible reasons for the difference in our findings and those of some systematic reviews below.

Confirmation and developer bias

Confirmation bias may explain the differing interpretations between the present study and previously published reviews.[279] There has been debate about whether systematic reviews should be carried out by those with no conflicts of interest or by subject experts, who are best placed to understand the nuances of study inclusion/exclusion and interpretation of findings.[280] In an empirical study in which subject experts and methodologists were shown the same meta-analysis, Panagiotou and Ioannidis[281] observed that subject experts were more likely than methodologists to over-interpret the pooled effect from a meta-analysis. Furthermore, subject experts who had also published a 'statistically significant' study showing a positive intervention effect were even more likely to over-interpret findings and to overlook the importance of the between-study heterogeneity on the overall interpretation.

TABLE 21 Previous large-scale RCTs of school-based prevention of anxiety and depression

Study	Randomised[a] (*n*)	Consent/ baseline (*n*)	Risk of bias		Author reported that intervention was effective
			Random sequence generation	Allocation concealment	
Araya *et al.*[118] 2013	2512	2508	Low	Unclear	✗
Calear *et al.*[127] 2016	Not clear	1767	Low	Low	✗
Kindt *et al.*[196] 2014	1440	1343	Low	Low	✗
Sawyer *et al.*[204] 2010	8873	5633	Unclear	Low	✗
Sheffield *et al.*[141] 2006	2479	1226	Low	Low	✗
Stallard *et al.*[142] 2013	5761	5030	Low	Low	✗
Stallard *et al.*[159] 2014	1448	1362	Low	Unclear	✗
Tak *et al.*[207] 2016	1390	1341	Unclear	Low	✗
Aune and Stiles[119] 2009	2148	1748	Unclear	Unclear	✓
Calear *et al.*[125] 2009	NR	1477	Low	Low	✓
Gallegos[126] 2008	1070	1030	Unclear	Unclear	✓
Spence *et al.*[206] 2003	Not clear	1500	Unclear	Unclear	✓

NR, not reported.

a In some cluster randomised trials, schools are randomised to the intervention before consent is sought from participants. Therefore, there are fewer participants assessed at baseline than originally randomised. For example, in Stallard *et al.*,[142] 5761 participants were randomised; however, 5030 participants consented. In other trials this is not well reported, and it was not possible to distinguish between the number randomised, the number consented and the number providing a baseline measure.

There was some evidence to suggest that preventative RCTs involving the original intervention developer(s) observed stronger intervention effects, although the mechanism was not clear.[282,283] For example, it is possible that implementation and fidelity to intervention are superior in developer-led trials. The impact of so-called 'developer bias' on systematic reviews is unknown; however, in the case of 14 of the 20 reviews we identified, the first or senior author was a researcher who subsequently developed/published a school-based RCT to prevent anxiety or depression. Owing to an increased emphasis on reducing research waste,[284] it is increasingly common for intervention developers or triallists to first conduct a systematic review. Further research could consider the role of developer bias in systematic reviews.

Inclusion criteria and meta-analytic method

Differences in inclusion criteria should also be considered. We investigate whether or not there was a discrepancy between the studies included in the present review and the 20 reviews described above (see *Appendix 9*). Reviews for which there was a > 40% discrepancy were Horowitz and Garber[285] (57%), Neil and Christensen[111] (42%), Neil and Christensen[112] (48%), Stice *et al.*[113] (46%) and Teubert[276] (58%). For example, of the 30 studies included in Horowitz and Garber,[285] only 13 were included in the present review. The main inclusion differences related to the earlier reviews having broader inclusion criteria, for example severity of symptoms;[113,276] inclusion of interventions for children of divorce or alcoholics;[113,285] and interventions to address situational (state) anxiety, such as test and public speaking[276] or stress reduction.[111,112,276]

The choice of meta-analytic method could be a further explanation for findings differing across reviews. Of the 14 reviews conducting a meta-analysis, 10 used a random-effects model, two used a fixed-effects model and two used an undefined model to estimate a pooled effect. Nine summarised intervention effects using Cohen's *d* and nine using Hedges' *g*. In the present review, we fitted both

fixed- and random-effects models, but presented results from the random-effects models based on statistical evidence of heterogeneity. We summarised effects using Hedges' *g*, which is observed to be less biased in the presence of small studies (i.e. < 20 participants). Durlak[286] states that the Hedges' *g* correction typically amounts to a 4% reduction in effect when the total sample size is 20 participants, and around 2% when the sample size is 50. In the present analysis, four studies had sample sizes of ≤ 20 participants, and 19 had sample sizes of ≤ 50. Therefore, the impact of the adjustments made by Hedges' *g* is likely to be small.

There are several ways to estimate the SMD; here we used the (standardised) difference in mean change from baseline (also known as change score) and we standardised using the pooled baseline SD. A common alternative is to use the final values (also known as post-intervention score, or follow-up score). It is not clear which approach was taken in the previous meta-analyses. However, using final values may not be appropriate when randomisation is questionable or when there is baseline imbalance in factors that may interact with the outcome. For example, if participants randomised to the control arm have higher depression symptom scores at baseline than those in the active arm, one cannot confidently conclude that the final values reflect the effect of the intervention, rather than severity of initial illness. In such cases, using final values may overestimate the effect of an intervention. In addition, our analyses were conducted in a Bayesian framework, in contrast to all 20 previous reviews, which took a frequentist approach. In a Bayesian analysis, the uncertainty in all parameters is fully represented. In particular, it takes full account of uncertainty in the between-studies SD in a random-effects model. Frequentist methods typically assume that the between-studies SD is known with certainty; as a result, Bayesian CrIs tend to be wider than frequentist CIs for random-effects models.[287]

Standard pairwise meta-analysis and network meta-analysis

A further difference between the present review and those described previously is that we separated intervention and control groups into their distinct types. We a priori identified four distinct control conditions: attention control, waiting list, no intervention and usual curriculum. This was based on the psychotherapeutic literature, in which it was established that control group choice contributes to differences in effect size estimate.[73,74] To explore the possible impact of this decision, we ran a simple analysis 'lumping' these control conditions to form a single comparator. To emulate previous analyses more closely, we also included psychoeducation and psychosupport conditions in the conflated 'control' condition. Primary and secondary settings were also combined, but we kept universal and targeted populations separate. We also ran a second analysis combining psychological interventions, to form a 'psychological intervention versus control'-type analysis.

When control conditions were conflated, our results were consistent with previous reviews, that is intervention effects for CBT versus 'control' now indicated a beneficial effect of CBT in every network at post intervention (see *Appendix 9*). This suggests that previously observed beneficial effects may have been a consequence of differential control group effects being obscured by 'lumping'. However, the impact of lumping control groups in meta-analyses of public mental health interventions should be explored further. Certainly, in the psychotherapeutic literature, the use of a waiting list has been called a 'nocebo'[73] and a technique 'to prove your therapy is effective, even when it is not'.[74] Future preventative and public health trials should also consider the importance of control groups at the feasibility or pilot stages of development.

Conduct disorder

The preliminary signs of conduct problems often emerge during early childhood. As a result, school-based interventions specifically aimed at the prevention of conduct disorder have been implemented in primary school settings. In recent years, however, interventions for preventing conduct disorders have largely focused on parenting skills, in community or home settings (e.g. Family Check-up, Nurse Family Partnership, Triple P).[288] The 2013 NICE guidelines on recognition of, intervention for and management

of conduct disorders among CYP[289] included a review of classroom-based interventions for selective and indicated prevention of conduct disorders. Noting that only 53% of the eligible studies included sufficient data for inclusion in a meta-analysis, the NICE guidelines concluded that, for selective interventions, the mean teacher-rated antisocial behaviour in the intervention groups was SMD −0.43 (95% CI −0.96 to −0.09). However, it is unlikely that teachers could have been blinded to intervention allocation. Conversely, there was no evidence of an effect when rated by an external observer (SMD −0.43, 95% CI −0.96 to 0.09) or for parent-reported antisocial behaviour (SMD −0.13, 95% CI −0.39 to 0.13).

We found few reviews explicitly referring to the prevention of conduct disorder, and most were conducted in the 1990s.[290–294] Instead, authors have focused on the prevention of collections of behaviours associated with conduct disorder, for example interventions that aim to prevent multiple risk behaviours such as substance misuse, aggression and stealing.[295] For example, in an early review of the prevention of ODD and conduct disorder, Tremblay *et al.*[293] state:

> *To our surprise, we found no preventative interventions that met our selection criteria . . . We thus broadened the scope and selected studies with outcome measures related to CD [conduct disorder]/ODD symptoms including court recorded or self-report delinquency, self-, parent- or teacher-rated measures of aggressive externalising behaviour and observer measures of aversive behaviour in the classroom. We generally refer to these outcomes using the term Disruptive Behaviour Disorders.*
>
> *Tremblay* et al.[293]

More recent reviews taking this broader approach for school settings, such as Park-Higgerson *et al.*,[296] suggest that there is no evidence of an effect for interventions reducing aggression and violence, compared with the control (effect size −0.09, 95% CI −0.23 to 0.05).[296] de Vries *et al.*[297] examined prevention programmes for adolescents showing early signs of antisocial and disruptive behaviour problems. For interventions in a school setting, there was no evidence of an effect relative to usual curriculum [β −0.19 (SE 0.33)]. However, in a 2018 Cochrane review[84] of interventions to prevent multiple risk behaviours, a positive effect of universal school-based interventions to prevent a composite outcome of 'anti-social behaviour and offending' was observed (OR 0.81, 95% CI 0.66 to 0.98).[84] We note that studies contributing to such reviews may not even reference conduct or disruptive behaviour disorders in their aims or backgrounds. We return to the issue of defining conduct disorder subsequently, in the limitations section.

Strengths and limitations of the study

To the best of our knowledge, this is the first NMA of preventative mental health interventions and the first to review the comparative effectiveness of distinct psychological, educational and physical interventions in a single analysis for CYP.

Limitations relating to search strategy

There is growing interest in improving the efficiency of study identification in systematic reviews.[54,298–302] However, there is no consensus on the number of databases to search or for defining appropriate 'stopping rules' or abbreviated search strategies.[52,53] A limitation of the present study is, therefore, that we searched only four electronic health-related and psychology databases. The selection of databases was consistent with the Cochrane MECIR conduct standards for searching, and included reference list searching of published systematic reviews and scoping searches to inform the 'stopping' strategy. The electronic database searches retrieved all but two eligible studies previously included in published systematic reviews; neither of these contributed to the NMA.[188,303] The scoping searches of two educational databases (ERIC and BEI) did not identify any further eligible studies. However, the possibility that potentially eligible studies have been missed cannot be ruled out emphatically.

Limitations relating to inclusion criteria

The inclusion and exclusion criteria were specified to minimise the potential for between-study heterogeneity and to address the assumption of consistency for the NMA. This condition was satisfied in 8 of the 10 networks, with inconsistency being noted in the two tertiary/university-level analyses. Nevertheless, we consider the implications of the narrow inclusion criteria below.

Definition of disorder

To be eligible for inclusion in the present review, the explicit aim of a study had to be the prevention of anxiety, depression or conduct disorder. These might be considered as 'disorder-specific' prevention interventions, although, in practice, some sought to prevent both anxiety and depression. The focus of the present review was the prevention of anxiety, depression and conduct disorder, and not specific diagnostic subtypes of disorders. Although we did not exclude studies focusing on specific disorders (e.g. social anxiety), our preferred outcome was a total symptom score. This approach is consistent with a population health perspective,[304] the existing trial literature and previous systematic reviews. Only one study[119] focused on the prevention of a specific anxiety disorder (social anxiety), and none addressed the prevention of subtypes of depression or conduct disorder.

To reduce the risk of selective outcome reporting, studies were not selected on the basis of reported outcomes. That is, studies were not selected on the basis of whether or not they reported anxiety, depression or conduct disorder outcomes. Selective outcome reporting can occur when studies measure multiple outcomes but select only those that are 'statistically significant' for publication. In turn, this can cause bias in a body of evidence and overestimate the effect of interventions. Prospective trial registration and protocols reduce the likelihood of selective reporting; however, this was not made a mandatory requirement in medicine until 2008. We are not aware of a current similar requirement within psychological science. As noted in *Chapter 9*, only 32 of the 142 studies included in this review had protocols or trial registrations readily available. We therefore chose a conservative approach of including studies based on the stated intent of the trial, as written in the publication.

The decision to restrict inclusion to disorder-specific prevention interventions is likely to have had the biggest impact for the review of conduct disorder. Fairchild *et al.*[305] note that conduct disorder is a highly heterogeneous disorder and they state there are > 32,000 different symptom profiles that could lead to a diagnosis. Such clinical variation is likely to pose an even bigger problem for primary preventative studies with regard to defining a target population. Over the preceding 25 years (since the publication of the DSM-IV), clinical language has evolved and, in the present review, it was not easy to judge whether or not study authors were using the terms 'problems' and 'disorders' interchangeably. Again, in the absence of trial registrations and protocols, we chose a conservative approach and restricted to 'disorders'. A related concern refers to our reliance on DSM-5 criteria and the decision to exclude neurodevelopmental and neurobiological conditions. In DSM-III, -IV and -IV Text Revision (spanning 1980–2012), conduct disorders were categorised together with ADHD under 'Attention-deficit and disruptive behavior disorders'. In DSM-5,[61] they were separated. Conduct disorders are now grouped under 'Disruptive, Impulse-Control, and Conduct Disorders' and ADHD is separately considered under the 'Neurodevelopmental Disorders' heading. It is not clear whether or not older studies considered 'conduct disorder' as a catch-all for 'disruptive behaviour disorders', which historically included ADHD. In a NMA of psychosocial interventions for the treatment of childhood disruptive behaviour disorders, Epstein *et al.*[306] conclude that future studies must more clearly identify the target population for intervention. We echo their conclusion here, for preventative interventions.

Intervention focus

To minimise potential between-study heterogeneity and to address the assumption of consistency for the NMA, we included a narrowly defined set of interventions. Unless it was clear that the aim of the intervention was to prevent anxiety, depression or conduct disorder, we excluded interventions focused on mental health promotion. Similarly, we excluded studies addressing the related constructs of social and emotional well-being and positive mental health. Here we followed the NAM's definition

of mental health promotion as interventions that 'aim to enhance an individual's ability to achieve developmentally appropriate tasks and a positive sense of self-esteem, mastery, well-being and social inclusion, and strengthen their ability to cope with adversity'.[27] Recent evidence has suggested that well-being is only weakly correlated ($r = 0.2$) with mental illness in children,[64] raising doubts that interventions targeting one will necessarily affect the other.[63] However, some interventions may aim to address both prevention and promotion, for example the Aussie Optimism Program.[152] In such instances, we referred to trial registrations and protocols to inform our inclusion decision. However, given the absence of trial registrations or protocols, it was difficult to operationalise this distinction, and this is a limitation of the review.

In common with previously published systematic reviews that focused on disorder-specific prevention of anxiety, depression or conduct disorder,[36–39,68] we did not include interventions that primarily addressed the prevention of substance use, bullying or stress, although these factors have been shown to be associated with later mental ill health. We also excluded classroom management and social and emotional learning interventions. Classroom management interventions use conditioning and reinforcement to encourage prosocial behaviours and reduce challenging behaviours in their classrooms (e.g. providing clear expectations and routines, stating clear rules and consequences, and consistently using praise and other rewards). Consequently, interventions such as the Good Behaviour Game were not included in our review. However, there is recent evidence that these interventions do affect general conduct outcomes for children and are cost-effective in a UK context.[307] This could be considered a limitation of the findings for conduct disorder.

Mental health is multifaceted, with biological and environmental factors contributing to the development of a disorder. A further limitation of this review is that the interventions included are largely 'downstream'. That is, they are focused on changing an individual's cognitions, emotions or mood, without addressing the wider 'upstream' social determinants of mental health or the complex adaptive systems in which interventions are implemented.[308] It is, therefore, important to situate our findings in the context that there are calls to reframe preventative mental health towards a broader dimensional approach[309,310] and incorporate other perspectives, such as a developmental psychopathological perspective to prevention.[311] In psychology and psychiatry, this has manifested in calls for a 'paradigm shift' away from the categorical approach to diagnosing mental disorders (e.g. ICD and DSM).[312–314] In public health, the focus has shifted to whole-school, systemic interventions as a wider, structural approach to tackle the increasing prevalence of CYP with mental health problems. Whole-school interventions have shown promise for physical health outcomes[83] and emotional well-being;[315] however, there is limited evidence, to date, that they are effective in the prevention of CMDs.[83,316] The present review is limited by the absence of these perspectives; future work should be considered to evaluate the comparative effectiveness of such interventions.

Defining population

We followed the NAM's intervention spectrum for mental disorders, which defines three populations: universal, selective and indicated. By definition, participants in universal interventions are included irrespective of diagnostic status; consequently, studies included in the universal analyses will have included CYP with diagnosed mental health conditions at baseline. As noted in *Chapter 1*, a definitive boundary between indicated prevention and early intervention (i.e. treatment) is difficult to draw. Our eligibility criteria sought to minimise the inclusion of CYP with clinical conditions in the 'targeted' analyses, but, in the absence of clearly defined scale cut-off points or diagnostic tests for anxiety, depression or conduct disorder, we relied on author descriptions of participants. As a result, we cannot rule out the possibility that some of the participants in the 'targeted' analyses may also have had clinically diagnosable conditions. Here we reflect that the distinction between indicated prevention and early intervention is a qualitative one and is likely to rest with the intent of the triallist. If the intent of a study is to decrease the likelihood of the onset of a mental disorder or decrease detectable, but subclinical, symptoms, it can be considered prevention. If the aim of the study is to reduce existing, clinically meaningful or diagnosed symptoms, it can be considered treatment.

The inclusion criteria meant that there were few studies of eligible university-based interventions. In the original protocol, we stated that the upper age limit for eligible studies was 25 years, which was intended to allow for follow-up time points. As described in *Table 1*, this was difficult to operationalise, and was modified to be ≤ 19 years at baseline. In turn, this limited the eligible university population and is likely to have excluded interventions specifically aimed at older undergraduate and postgraduate students. The inclusion criterion that the intervention should be educational setting based was also restrictive. In tertiary education institutions, many interventions were delivered in health-care settings (e.g. primary care, psychology clinics) or remotely, without supervision (e.g. via mobile phone, internet). As a comparison, a 2019 review with broader inclusion criteria included 62 studies of preventing anxiety and depression in university students.[317] This larger review concluded that the overall effect size was moderate (Hedges' *g* 0.65, 95% CIs 0.57 to 0.73). In combination with the potential for inconsistency observed in the tertiary NMAs, the small number of included tertiary/university studies is a further limitation of the present review; therefore, we do not make inferences about the effect of interventions in that setting.

Limitations relating to outcomes

Although agreement between parent- and child-reported symptoms is typically low, multi-informant measures of mental disorder symptoms among CYP are often considered preferable to single report.[318–320] Therefore, it may be considered a limitation that our primary outcomes were only symptoms self-reported by CYP. Parent-reported child symptoms were included as a secondary outcome; however, only 12% of the anxiety and depression studies included a parent report. All studies included for the prevention of conduct disorder included a parent and/or teacher report. Self-reported outcomes may be at higher risk of performance bias than observer-rated outcomes owing to lack of blinding to intervention allocation. In trials of school-based interventions, however, it is also questionable whether or not parents and teachers can be successfully blinded. Furthermore, the outcome of interest for decision-makers wanting to reduce the burden of common mental disorders is likely to be clinical diagnosis or service use, not symptoms. Clinical diagnosis was infrequently reported for the anxiety and depression studies, but was reported for the longer-term follow-ups in the conduct disorder studies.

Other limitations

The typology of interventions was based on previous literature, piloting and discussion among our team. However, the use of the constant comparative method was time-consuming and, inevitably, subjective. We sought greater objectivity by one reviewer initially drawing up a list of components, which was refined by a second reviewer through discussion. The list was further reviewed by two additional members of the team. Their suggested modifications were piloted and a final classification scheme constructed. This scheme was then applied and further refined during data extraction, until no further components were identified (saturation). Relying on published papers also generated problems for classifying components. To ensure a consistent approach across all studies, we did not assume the presence of a component unless it was explicitly stated in the paper or confirmed via correspondence with the authors. Inevitably, the taxonomy reflects the narrow set of interventions on which it is based, and it may not generalise to other preventative mental health interventions, as a result of the inclusion and exclusion criteria adopted here. Owing to the subjectivity of classification and lack of a consistent format for reporting of intervention details, there is potential for component misclassification.[321] It is also of note that the classification scheme that we developed for anxiety and depression did not generalise to conduct disorder interventions. As a result, we do not claim this as a definitive taxonomy, but a contribution to the growing literature.

Few studies reported sufficient detail to judge how randomisation or allocation concealment had been conducted; consequently, the risk of bias for these domains are mostly judged to be unclear. Many studies also had short follow-up periods, and it was not always clear whether reported follow-up periods referred to post intervention or from baseline. Only 13% of studies of anxiety and depression prevention studies reported a follow-up of > 1 year, and 5% reported a follow-up of > 2 years. For conduct disorder, two studies reported longer-term follow-ups and both indicated strong evidence of an effect (although they were not cost-effective; see *Chapter 8*).

Implications for practice

In this review, we conclude that there is weak evidence to support the effectiveness of school-based anxiety, depression or conduct disorder prevention interventions, but that it is not robust evidence. The available economic evidence for a UK context suggests that school-based anxiety and depression prevention interventions are 'highly unlikely' to be cost-effective, compared with usual curriculum, especially when the usual curriculum already contains a personal, social and health education aspect.[261,322] For conduct disorder, the US-based Fast Track cost-effectiveness evaluation suggests that it is unlikely that such a comprehensive, multisystemic approach would be implemented in practice.[250,263,264]

However, the policy environment in the UK has recently placed schools front and centre in the prevention, early detection and support of students with mental health needs. Therefore, schools and local authorities may need access to comprehensive and independent sources of information to ensure that they are not susceptible to exaggerated claims or 'trends' about what works for the mental health of CYP.[323,324] Examples of freely accessible, evidence-based repositories and services include Evidence for Impact[325] and the Early Intervention Foundation.[326] However, bespoke evidence-based services could also be useful to support schools that have identified specific mental health needs, and could emulate those run by AskFuse[327] for Public Health and the Avon and Wiltshire Mental Health Partnership NHS Trust's BEST in Mental Health[328] evidence service for treatment of mental disorders.

Local government, education authorities, schools and universities should be made aware that few studies have measured potential harms or side effects of the interventions. This may include explicit harms, social harms or equity harms.[329] For example, in our study, we observed weak evidence that depression and anxiety prevention interventions may be more beneficial in higher-income settings than in low-income settings. The opportunity cost of implementing a potentially harmful intervention (one that has the potential to increase symptoms) should be considered by those commissioning interventions. Lorenc and Oliver[329] describe this as 'the potential benefits which may be forgone as a result of committing resources to ineffective or less effective interventions'.

Implications for research

The following implications for research are described in priority order.

Although overall evidence was weak, and risk of bias was judged to be unclear, the component NMA provided evidence that CBT interventions including a psychoeducation component may be effective for the prevention of anxiety and depression in universal secondary settings. There was also evidence that exercise and mindfulness/relaxation interventions were effective for symptoms of anxiety in universal secondary settings, although this was not robust. In the light of these findings, a future RCT in a secondary school setting might consider a multiarm design comparing CBT with mindfulness/relaxation with an attention control. It may also be of interest to explore the impact of including an active exercise component. However, before progression to a RCT, further work is undoubtedly necessary to optimise the content of such an intervention,[330] including exploring the mechanisms of action for psychoeducation components for CYP. Such work should be conducted in consultation with CYP. What is clear is that any future RCTs of preventative mental health interventions must be well designed and include an economic evaluation.

Further research on the importance of control conditions for all public health interventions should also be a priority. Until then, we echo Merry and Hetrick's[331] conclusions and suggest that RCTs of interventions to prevent CMDs should use an active control (attention control or alternative intervention) and that waiting list controls should be discouraged.

It has been suggested that intervention effects can emerge over a longer time period in public health.[332,333] However, the majority of studies included in this report reported a post-intervention time point only, and we are not able to confirm or refute this observation. For anxiety and depression, only 18 trials from the 137 included had outcomes available at > 12 months post intervention and only seven trials reported time points at > 24 months. Follow-up periods were longer for the conduct disorder studies, and the positive study-level findings from the 20-year follow-up of Fast Track[247] suggest that school-based RCTs should plan for longer follow-up periods. The possibility of using data linkage could be considered as an adjunct or substitute for primary data collection where resources are a concern.

Future preventative intervention studies should also include measurements of potential harms and/or side effects. However, it is not clear from our review what harms or side effects should be measured, and further research on core outcome sets should consider this issue.[334] Consideration of prevention of common mental health disorders from a systems perspective[335] may also help to identify such unintended consequences.

Finally, the reporting of basic methodological aspects of the included studies was inadequate and scientific journals should ensure that the Consolidated Standards of Reporting Trials (CONSORT) guidance,[336] and its extension to Social and Psychological interventions,[337] is fully adhered to. To improve reporting of intervention components, authors should be encouraged to complete TIDieR reporting guideline for complex interventions and comparator conditions. The work reported in this monograph contributes to the growing literature around components of mental health interventions. However, the field lacks consensus and future work should focus on agreeing a taxonomy for preventative mental health interventions and control conditions.

Conclusions

With regard to the comparative effectiveness of school-based anxiety, depression and conduct disorder prevention interventions, there is a lack of robust evidence that any one type of intervention can be preferred across all populations and settings. However, in making this statement, we reiterate that the present review specifically addressed prevention of clinically referenced disorders. These conclusions, therefore, relate to a narrowly defined set of largely 'downstream' interventions, which focus on changing an individual's cognitions, emotions or behaviours, without addressing wider 'upstream' social determinants of mental health (e.g. SES) or the complex, adaptive systems in which interventions are implemented.[288]

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Data-sharing statement

Requests for access to extracted study data should be addressed to the corresponding author. Intervention and component-level NMA WinBUGS code is available from https://research-information.bris.ac.uk/en/persons/deborah-m-caldwell/projects/ or by contacting the corresponding author.

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Appendix 1 Methods for systematic review and network meta-analysis

Decision rule for choosing between multiple-report scales

Decision rule for depression scales

- Scores that combine depression and other symptoms will be excluded (e.g. scales that measure 'internalising symptoms' or combined anxiety and depression scores).
- Choice between multiple scales:
    - use self-reports in preference to clinician-rated scales
    - use instruments with well-studied psychometric properties
    - use inventories aimed at paediatric populations in preference to inventories aimed at the general population
    - use instruments specifically targeted to measure depressive symptoms in preference to instruments with a broader scope
    - use most commonly reported scale across studies.

Decision rule for anxiety scales

- Scores that combine anxiety and other symptoms will be excluded (e.g. total RCADS score would be excluded as it is a combined depression and anxiety score, whereas the RCADS total anxiety subscale score would be included in preference).
- Use total anxiety scores when available:
    - If total anxiety score is not available but a generalised anxiety subscale score is available, we will use the subscale score. (For universal populations, we think that most interventions are likely to be targeting non-specific anxiety and are not sure what the importance of separation and social anxiety are. Furthermore, some other subscales, e.g. post-traumatic stress disorder, obsessive–compulsive disorder, are no longer considered anxiety disorders in the DSM-5.)
- Choice between multiple scales:
    - use inventories of general symptoms in preference to instruments targeting specific anxiety domains.
    - if several inventories of general symptoms are available, use those aimed at the general population in preference to instruments aimed at identifying patients with anxiety disorders.
    - use most commonly reported scale across studies.

Search strategies used for each database

MEDLINE

Date range searched: inception to 4 April 2018.

Date searched: 4 April 2018.

Search strategy

1. CHILD, PRESCHOOL/or CHILD/or ADOLESCENT/or YOUNG ADULT/
2. (child* or boy* or girl* or kids or juvenil* or minors or paediatric* or pediatric* or adolesc* or preadolesc* or preadolesc* or pubert* or pubescen* or prepube* or prepube* or teen* or (young adj (adult* or people or patient* or men* or women* or male or female or survivor* or offender* or minorit*)) or youth* or student* or undergrad*).ti,ab,kf.
3. (child* or adolesc* or paediatr* or pediatr*).jn.
4. or/13
5. EDUCATION/
6. SCHOOLS/or SCHOOLS, NURSERY/
7. SCHOOL HEALTH SERVICES/or SCHOOL NURSING/
8. STUDENTS/or UNIVERSITIES/
9. (preschool or kindergarten or school* or college* or campus* or classroom* or curricul* or teacher or gatekeeper or pupil*).ti,ab,kf.
10. PEER GROUP/
11. ((peer or peers) adj (education or group or relation* or support* or intervention* or leader*)).ti,ab,kf.
12. student* union.ti,ab,kf.
13. ((church or communit* or holiday* or religi* or spiritual* or youth or vacation) adj2 (camp or club or group)).ti,ab,kf.
14. ((church or communit* or holiday* or religi* or spiritual* or youth or vacation) adj based).ti,ab,kf.
15. or/5-14
16. ADAPTATION, PSYCHOLOGICAL/
17. EMOTIONS/
18. MENTAL HEALTH/
19. SOCIAL ADJUSTMENT/
20. exp STRESS, PSYCHOLOGICAL/
21. (mental health or mental* ill* or psychiatric).ti,ab,kf.
22. (wellbeing or well being).ti,ab,kf.
23. (stress* or distress*).ti,ab,kf.
24. or/16-23
25. DEPRESSION/
26. DEPRESSIVE DISORDER
27. MOOD DISORDERS
28. (depress* or dysthymi* or affective disorder* or affective symptom* or mood* or mental).ti.
29. (depress* adj2 (adolescent* or child* or anaclitic* or episode* or disorder or scale* or score* or symptom* or unipolar)).ti,ab,kf.
30. ((depress*or mood* or mental or psychological or wellbeing or well being or emotion*) adj2 (improve* or onset or prevent* or reduc*)).ti,ab,kf.
31. ((Axis 1 or Axis I) adj disorder*).ab.
32. or/25-31
33. exp ANXIETY DISORDERS/
34. ANXIETY/
35. anxi*.ti.
36. (anxi* adj3 (adolescent* or child* or disorder* or general* or interpersonal or separation or social*)).ti,ab,kf.
37. (phobi* or agoraphobi* or PTSD or post trauma* or posttrauma or panic* or OCD or obsess* or compulsi* or GAD or stress disorder* or stress reaction* or acute stress or neurosis or neuroses or neurotic or psychoneuro* or (school adj2 (refusal or avoid*)) or social avoidance or mutism).ti,ab,kf.
38. (((anxi* or fear or fright) adj3 (perform* or athlet* or music* or act* or test* or exam*)) or math* anxiety).ti,ab,kf.
39. (public adj3 (speak* or speech)).ti,ab,kf.
40. or/33-39

41. CONDUCT DISORDER/
42. CHILD BEHAVIOR DISORDERS/
43. JUVENILE DELINQUENCY/
44. SOCIAL BEHAVIOR/
45. SOCIAL BEHAVIOR DISORDERS/
46. ((behavi* or conduct or personalit*) adj2 (agressi* or nonagressi* or antisocial or anti social or dyssocial or defiant or delinquen* or disturb* or disrupt* or disorder* or internali#ing or externali#ing or problem*)).ti,ab,kf.
47. ((conduct or behavi* or antisocial or anti social or dyssocial or emotional* or internali#ing or externali#ing) adj3 (problem* of difficult* or psychopathol*)).ti,ab,kf.
48. (oppositional adj3 (defiant* or disorder*)).ti,ab,kf.
49. or/41-48
50. PREVENTIVE HEALTH SERVICES/or "EARLY INTERVENTION (education)"/or HEALTH LITERACY/ or PATIENT EDUCATION AS TOPIC/or HEALTH PROMOTION/or PRIMARY PREVENTION/or SECONDARY PREVENTION/
51. prevention & control.fs.
52. prevent*.ti,kf.
53. prevention of.ab,kf.
54. (prevent* adj2 (intervention or educat* or pilot or program* or project or protocol* or training or universal or targeted or primary or secondary or selective or indicated or study or trial)).ti,ab,kf.
55. ((early or brief) adj intervention*).ti,ab,kf. 56 ((universal or targeted) adj2 (program* or intervention*)).ti,ab,kf.
56. (vulnerabl* or at risk or (risk adj2 reduc*)).ti,ab,kf.
57. RISK/or RISK FACTORS/
58. exp ACCIDENTS/
59. BEREAVEMENT/or GRIEF/
60. SOCIAL PROBLEMS/
61. BULLYING/
62. CHILD OF IMPAIRED PARENTS/
63. CHILD, ORPHANED/
64. CRIME VICTIMS/
65. exp DISASTERS/
66. DIVORCE/
67. LIFE CHANGE EVENTS/
68. RUNAWAY BEHAVIOR/
69. URBAN POPULATION/
70. RURAL POPULATION/
71. SURVIVORS/
72. VIOLENCE/
73. WARFARE/
74. social problems/or exp civil disorders/or exp crime/or exp human rights abuses/or exp parental death/or poverty/or exp social behavior disorders/or domestic violence/or exp child abuse/or exp ethnic violence/or physical abuse/or exp terrorism/or torture/or exposure to violence/or exp "warfare and armed conflicts"/
75. "dissent and disputes"/or family conflict/or psychosocial deprivation/
76. or/50-76
77. RANDOMIZED CONTROLLED TRIAL/or PRAGMATIC CLINICAL TRIAL/
78. Randomized Controlled Trial.pt.
79. (randomi#ed or randomi#ation).ab,ti,kf.
80. (RCT or (random* adj3 (administ* or allocat* or assign* or class* or cluster* or control* or determine* or divide* or distribut* or expose* or fashion or number* or place* or recruit* or subsitut* or treat*))).ab.
81. at random.ab.

82. placebo.ab.
83. trial.ti,kf.
84. or/78-84
85. (treatmentasusual or (treatment* adj2 usual) or (standard adj2 care) or (standard adj2 treatment) or (routine adj2 care) or (usual adj2 medication*) or (usual adj2 care) or TAU).ti,ab,kf.
86. (waitlist* or waitlist* or waitinglist* or wait* list* or (waiting adj (condition or control)) or WLC).ti,ab,kf.
87. (((delay* adj3 (start or treatment*)) or no intervention or no treatment* or notreatment or non treatment* or nontreatment* or nontreatment or minim* treatment* or untreated group* or untreated control* or without any treatment) and (control* or group*)).ti,ab,kf.
88. ((no intervention* or non intervention* or nonintervention* or without any intervention*) and (control* or group*)).ti,ab,kf.
89. or/86-89
90. 85 or 90
91. 4 and 15 and (24 or 32 or 40 or 49) and 77 and 91
92. ((universal or indicated or targeted or at risk) and prevent* and (anxiety or depress* or conduct) and (child* or adolesc* or school*)).mp.
93. ((prevent* adj (program* or intervention)) and (anxiety or depress* or conduct) and (child* or adolesc* or school*)).mp.
94. 93 or 94.

PsycInfo

Date range searched: inception to 4 April 2018.

Date searched: 4 April 2018.

Search strategy

1. "3580".cc. [= Classification Code: Educational/Vocational Counseling & Student Services]
2. exp school based intervention/
3. school*.ti.
4. or/1-3
5. (child* or boy* or girl* or kids or juvenil* or minors or paediatric* or pediatric* or adolesc* or preadolesc* or pre-adolesc* or pubert* or pubescen* or prepube* or pre-pube* or teen* or (young adj (adult* or people or patient* or men* or women* or male or female or survivor* or offender* or minorit*)) or youth* or student* or undergrad*).ti,ab,id.
6. pediatrics/
7. child psychiatry/or child psychopathology/or child psychology/
8. adolescent psychiatry/or adolescent psychopathology/or adolescent psychology/
9. child psychotherapy/or adolescent psychotherapy/
10. childhood development/or early childhood development/or adolescent development/
11. students.hw.
12. ("160" or "180" or "200" or "320").ag. [= Age Group Field/Codes: preschool 2–5; school age 6–12; adolescence 13–17; young adulthood 18–29]
13. or/5-12
14. education/
15. education/or elementary education/or high school education/or higher education/or middle school education/or multicultural education/or nontraditional education/or preschool education/or private school education/or public school education/or secondary education/or special education/
16. schools/or academic settings/or boarding schools/or charter schools/or exp colleges/or elementary schools/or graduate schools/or high schools/or institutional schools/or junior high schools/or kindergartens/or middle schools/or nongraded schools/or nursery schools/
17. school environment/or college environment/
18. school facilities/or campuses/or classrooms/or "learning centers (educational)"/or school libraries/
19. community facilities/or community mental health centers/or exp libraries/

20. "summer camps (recreation)"/
21. curriculum/
22. exp extracurricular activities/or exp after school programs/
23. (preschool or nursery or kindergarten or school* or college* or university or universities or campus* or classroom* or curricul* or gatekeeper or pupil*).ti,ab,id.
24. peers/or peer counseling/or peer tutoring/
25. ((peer or peers) adj (education or group or relation* or support* or intervention* or leader*)).ti,ab,id.
26. student* union.ti,ab,id.
27. ((church or communit* or holiday* or religi* or spiritual* or youth or vacation) adj3 (camp* or club*1 or group*1)).ti,ab,id.
28. ((primary or secondary or tertiary) adj educat*).ti,ab,id.
29. ((detention or refugee*) adj (camp*1 or centre*1 or center*1)).ti,ab,id.
30. or/14-29
31. "3300".cc. [= Classification Code: Health & Mental Health Treatment & Prevention]
32. primary mental health prevention/
33. mental health/or well being/
34. Stress/or Distress/
35. emotional adjustment/
36. "resilience (psychological)"/or coping behavior/or psychological stress/
37. *affective disorders/
38. major depression/or dysthymic disorder/or reactive depression/or "depression (emotion)"/
39. (depress* adj3 (adolescent* or infant* or child* or student* or anaclitic* or episode* or disorder or scale* or score* or symptom* or unipolar)).ti,ab,id.
40. ((depress* or mood* or mental or psychological or wellbeing or well being or emotion*) adj3 (improve* or onset or prevent* or reduc*)).ti,ab,id.
41. (depress* or dysthymi* or affective disorder* or affective symptom* or mood* or mental).ti,id.
42. ((axis 1 or axis I) adj disorder*).ti,ab,id.
43. exp anxiety/
44. anxiety disorders/or acute stress disorder/or death anxiety/or generalized anxiety disorder/or exp obsessive compulsive disorder/or panic disorder/or post-traumatic stress/or exp posttraumatic stress disorder/or separation anxiety disorder/
45. phobias/or acrophobia/or agoraphobia/or claustrophobia/or ophidiophobia/or school phobia/or social phobia/
46. fear/or panic/or panic attack/
47. (anxi* adj3 (adolescent* or child* or disorder* or general* or interpersonal or separation or social*)).ti,ab,id.
48. (phobi* or agoraphobi* or PTSD or post trauma* or posttrauma* or panic* or OCD or obsess* or compulsi* or GAD or stress disorder* or stress reaction* or acute stress or neurosis or neuroses or neurotic or psychoneuro* or (school adj3 (refusal or avoid*)) or social avoidance or mutism).ti,ab,id.
49. (((anxi* or fear or fright) adj3 (perform* or athlet* or music* or act* or test* or exam*)) or math* anxiety).ti,ab,id.
50. (public adj3 (speak* or speech)).ti,ab,id.
51. conduct disorder/or explosive disorder/or oppositional defiant disorder/
52. *behavior disorders/
53. exp juvenile delinquency/
54. exp antisocial behavior/
55. ((behavi* or conduct or personalit*) adj3 (agressi* or nonagressi* or antisocial or anti social or dyssocial or defiant or delinquen* or disturb* or disrupt* or disorder* or internalizing or externalizing or internalising or externalising or problem*)).ti,ab,id.
56. ((conduct or behavi* or antisocial or anti social or dyssocial or emotional* or internalizing or externalizing or internalising or externalising) adj3 (problem* of difficult* or psychopathol*)).ti,ab,id.
57. (oppositional adj3 (defiant* or disorder*)).ti,ab,id.
58. or/33-57

59. early intervention/
60. "onset (disorders)"/
61. health promotion/or exp health education/or health knowledge/or health literacy/
62. mental health programs/
63. public health/
64. prevention/or preventive medicine/
65. "3365".cc.
66. prevent*.ti,id.
67. prevention of.ab.
68. (prevent* adj3 (intervention or educat* or pilot or program* or project or protocol* or training or universal or targeted or primary or secondary or selective or indicated or study or trial)).ti,ab,id.
69. ((early or brief) adj3 intervention*).ti,ab,id.
70. ((universal or targeted) adj3 (program* or intervention*)).ti,ab,id.
71. (vulnerabl* or at risk or (risk adj3 reduc*)).ti,ab,id.
72. at risk populations/or predisposition/or risk factors/or "susceptibility (disorders)"/
73. orphans/or orphanages/
74. bullying/or conflict/or emotional abuse/or school violence/or teasing/or threat/or victimization/
75. school dropouts/
76. runaway behavior/
77. exp Crime Victims/
78. exp violent crime/
79. exp violence/
80. trauma/
81. rural environments/
82. urban environments/
83. exp neighborhoods/
84. exp social issues/
85. war/or conflict/
86. accidents/or exp disasters/
87. exp transportation accidents/
88. survivors/
89. bereavement/or grief/
90. divorce/or child custody/
91. parental death/or exp parental absence/
92. life changes/
93. child abuse/or abandonment/or child neglect/
94. family conflict/or domestic violence/or emotional abuse/
95. (bereave* or bullying or divorce or foster care or grief or humanitarian or orphan* or RTA or refugee* or survivor* or victim* or war).ti,ab,id.
96. (stigma or help seeking).ti,ab,id,hw.
97. or/59-96
98. treatment effectiveness evaluation.sh.
99. clinical trials.sh.
100. mental health program evaluation.sh.
101. placebo.sh.
102. randomi#ed.ti,ab.
103. (random* adj3 (administ* or class* or control* or determine* or divide* or distribut* or expose* or fashion or number* or place* or recruit* or subsitut* or treat*)).ab.
104. RCT.ab,id.
105. (waitlist* or wait-list* or waiting-list* or wait* list* or (waiting adj (condition or control)) or WLC).ti,ab,id.
106. placebo.ti,ab,id.
107. at random.ab.

108. ((no intervention* or non intervention* or non-intervention* or without any intervention*) adj3 (control* or group*)).ti,ab,id.
109. (reference group or observation group or control group).ti,ab,id.
110. trial.ti.
111. or/98-110
112. (4 or (13 and 30)) and (31 or 58) and 97 and 111
113. (4 or (13 and 30)) and 32 and 111
114. 4 and 58 and 111
115. or/112-114.

EMBASE

Date range searched: inception to 4 April 2018.

Date searched: 4 April 2018.

Search strategy

1. juvenile/or exp child/or exp adolescent/or young adult/
2. (child* or boy* or girl* or kids or juvenil* or minors or paediatric* or pediatric* or adolesc* or preadolesc* or preadolesc* or pubert* or pubescen* or prepube* or prepube* or teen* or (young adj (adult* or people or patient* or men* or women* or male or female or survivor* or offender* or minorit*)) or youth* or student* or undergrad*).ti,ab,kw.
3. (child* or adolesc* or paediatr* or pediatr*).jn.
4. or/1-3
5. school/or college/or community college/or high school/or kindergarten/or middle school/or nursery school/or primary school/or university/
6. education/or curriculum/or education program/or learning environment/or exp special education/
7. school health service/
8. exp student/
9. (preschool or kindergarten or school* or college* or campus* or classroom* or curricul* or teacher or gatekeeper or pupil*).ti,ab,kw.
10. peer group/
11. ((peer or peers) adj (education or group or relation* or support* or intervention* or leader*)).ti,ab,kw.
12. student* union.ti,ab,kw.
13. ((church or communit* or holiday* or religi* or spiritual* or youth or vacation) adj2 (camp or club or group)).ti,ab,kw.
14. ((church or communit* or holiday* or religi* or spiritual* or youth or vacation) adj based).ti,ab,kw.
15. or/5-14
16. mental health/or community mental health/or psychological well being/
17. mental stress/or *stress/
18. (mental health or mental* ill* or psychiatric).ti,kw.
19. (wellbeing or well being).ti,kw.
20. (stress* or distress*).ti,kw.
21. *wellbeing/
22. or/16-21
23. depression/or dysthymia/or *major depression/or “mixed anxiety and depression”/
24. mood disorder/
25. mood/or *emotion/
26. (depress* or dysthymi* or affective disorder* or affective symptom* or mood* or mental).ti.
27. (depress* adj2 (adolescent* or child* or anaclitic* or episode* or disorder or scale* or score* or symptom* or unipolar)).ti,ab,kw.
28. ((depress* or mood* or mental or psychological or wellbeing or well being or emotion*) adj2 (improve* or onset or prevent* or reduc*)).ti,ab,kw.

29. ((Axis 1 or Axis I) adj disorder*).ab.
30. or/23-29
31. *anxiety/
32. exp anxiety disorder/
33. anxi*.ti.
34. (anxi* adj3 (adolescent* or child* or disorder* or general* or interpersonal or separation or social*)).ti,ab,kw.
35. (phobi* or agoraphobi* or PTSD or post trauma* or posttrauma or panic* or OCD or obsess* or compulsi* or GAD or stress disorder* or stress reaction* or acute stress or neurosis or neuroses or neurotic or psychoneuro* or (school adj2 (refusal or avoid*)) or social avoidance or mutism).ti,ab,kw.
36. (((anxi* or fear or fright) adj3 (perform* or athlet* or music* or act* or test* or exam*)) or math* anxiety).ti,ab,kw.
37. (public adj3 (speak* or speech)).ti,ab,kw.
38. or/31-37
39. conduct disorder/
40. *behavior disorder/
41. psychosocial disorder/
42. juvenile delinquency/or delinquency/
43. problem behavior/
44. *social adaptation/
45. ((behavi* or conduct or personalit*) adj2 (agressi* or nonagressi* or antisocial or anti social or dyssocial or defiant or delinquen* or disturb* or disrupt* or disorder* or internali#ing or externali#ing or problem*)).ti,ab,kw.
46. ((conduct or behavi* or antisocial or anti social or dyssocial or emotional* or internali#ing or externali#ing) adj3 (problem* of difficult* or psychopathol*)).ti,ab,kw.
47. (oppositional adj3 (defiant* or disorder*)).ti,ab,kw.
48. oppositional defiant disorder/
49. or/39-48
50. Prevention/or Preventive Medicine/
51. Prophylaxis/
52. primary prevention/or secondary prevention/
53. health promotion/or health education/or health literacy/
54. pc.fs.
55. prevent*.ti,kw.
56. prevention of.ab.
57. (prevent* adj2 (intervention or educat* or pilot or program* or project or protocol* or training or universal or targeted or primary or secondary or selective or indicated or study or trial)).ti,ab,kw.
58. ((early or brief) adj intervention*).ti,ab,kw.
59. ((universal or targeted) adj2 (program* or intervention*)).ti,ab,kw.
60. (vulnerabl* or at risk or (risk adj2 reduc*)).ti,ab,kw.
61. risk/or risk factor/
62. risk of developing.ab.
63. exp “accidents and accident related phenomena”/
64. exp emotional deprivation/
65. exp grief/
66. social problem/or exp abuse/or bullying/or exp crime/or divorce/or exp human rights abuse/or exp social discrimination/or exp social exclusion/or exp violence/
67. orphaned child/
68. exp victim/
69. exp disaster/
70. life event/
71. coping behavior/or runaway behavior/

72. "population and population related phenomena"/or high risk population/or minority group/or rural population/or urban population/or vulnerable population/
73. exp survivor/
74. exp warfare/
75. conflict/or family conflict/
76. early intervention/
77. or/50-76
78. randomized controlled trial/
79. (randomi#ed or randomi#ation).ab,ti,kw.
80. (RCT or (random* adj3 (administ* or allocat* or assign* or class* or cluster* or control* or determine* or divide* or distribut* or expose* or fashion or number* or place* or recruit* or subsitut* or treat*))).ab.
81. at random.ab.
82. trial.ti,kw.
83. or/78-82
84. 4 and 15 and (22 or 30 or 38 or 49) and 77 and 83.

Cochrane Central Register of Controlled Trials

Date range searched: inception to 4 April 2018.

Date searched: 4 April 2018.

Search strategy

#1 MeSH descriptor: [Child] explode all trees

#2 MeSH descriptor: [Adolescent] this term only

#3 MeSH descriptor: [Young Adult] this term only

#4 (child* or boy* or girl* or kids or juvenil* or minors or paediatric* or pediatric* or adolesc* or preadolesc* or pre-adolesc* or pubert* or pubescen* or prepube* or pre-pube* or teen* or (young next (adult* or people or patient* or men* or women* or male or female or survivor* or offender* or minorit*)) or youth* or student* or undergrad*):ti,ab,kw (Word variations have been searched)

#5 child* or adolesc* or paediatr* or pediatr*:so

#6 (#1 or #2 or #3 or #4 or #5)

#7 MeSH descriptor: [Education] this term only

#8 MeSH descriptor: [Schools] this term only

#9 MeSH descriptor: [Schools, Nursery] this term only

#10 MeSH descriptor: [Students] this term only

#11 MeSH descriptor: [Universities] this term only

#12 (preschool or kindergarten or school* or college* or campus* or classroom* or curricul* or teacher or gatekeeper or pupil*):ti,ab,kw (Word variations have been searched)

#13 MeSH descriptor: [Peer Group] this term only

#14 ((peer or peers) next (education or group or relation* or support* or intervention* or leader*)):ti,ab,kw (Word variations have been searched)

#15 "student* union":ti,ab,kw (Word variations have been searched)

#16 ((church or communit* or holiday* or religi* or spiritual* or youth or vacation) near/3 (camp or club or group)):ti,ab,kw (Word variations have been searched)

#17 ((church or communit* or holiday* or religi* or spiritual* or youth or vacation) near/3 based):ti,ab,kw (Word variations have been searched)

#18 university or universities:ti,ab,kw (Word variations have been searched)

#19 (primary or secondary or tertiary) next educat*:ti,ab,kw (Word variations have been searched)

#20 (#7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19)

#21 MeSH descriptor: [Depression] this term only

#22 MeSH descriptor: [Depressive Disorder] this term only

#23 MeSH descriptor: [Mood Disorders] this term only

#24 depress* or dysthymi* or affective disorder* or affective symptom* or mood* or mental:ti (Word variations have been searched)

#25 depress* near/3 (adolescent* or child* or anaclitic* or episode* or disorder or scale* or score* or symptom* or unipolar):ti,ab,kw (Word variations have been searched)

#26 ((depress* or mood* or mental or psychological or wellbeing or well being or emotion*) near/3 (improve* or onset or prevent* or reduc*)):ti,ab,kw

#27 (axis 1 or axis I) next disorder*

#28 MeSH descriptor: [Anxiety Disorders] explode all trees

#29 MeSH descriptor: [Anxiety] this term only

#30 MeSH descriptor: [Performance Anxiety] this term only

#31 (anxi* near/3 (adolescent* or child* or disorder* or general* or interpersonal or separation or social*))

#32 (phobi* or agoraphobi* or PTSD or post trauma* or posttrauma or panic* or OCD or obsess* or compulsi* or GAD or stress disorder* or stress reaction* or acute stress or neurosis or neuroses or neurotic or psychoneuro* or (school near/3 (refusal or avoid*)) or social avoidance or mutism)

#33 (((anxi* or fear or fright) near/3 (perform* or athlet* or music* or act* or test* or exam*)) or math* anxiety)

#34 (public near/3 (speak* or speech))

#35 MeSH descriptor: [Conduct Disorder] this term only

#36 MeSH descriptor: [Child Behavior Disorders] this term only

#37 MeSH descriptor: [Juvenile Delinquency] this term only

#38 MeSH descriptor: [Social Behavior] this term only

#39 MeSH descriptor: [Social Behavior Disorders] explode all trees

#40 ((behavi* or conduct or personalit*) near/3 (agressi* or nonagressi* or antisocial or anti social or dyssocial or defiant or delinquen* or disturb* or disrupt* or disorder* or internalizing or externalizing or internalising or externalising or problem*))

#41 ((conduct or behavi* or antisocial or anti social or dyssocial or emotional* or internalizing or externalizing or internalising or externalising) adj3 (problem* of difficult* or psychopathol*))

#42 (oppositional near/3 (defiant* or disorder*))

#43 ((conduct disorder*) near/3 (onset or prevent*))

#44 MeSH descriptor: [Adaptation, Physiological] this term only

#45 MeSH descriptor: [Emotions] this term only

#46 MeSH descriptor: [Mental Health] this term only

#47 MeSH descriptor: [Social Adjustment] this term only

#48 MeSH descriptor: [Stress, Psychological] this term only

#49 (mental health or mental* ill* or psychiatric)

#50 (wellbeing or well-being or "well being")

#51 stress* or distress*

#52 (#21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 or #37 or #38 or #39 or #40 or #41 or #42 or #43 or #44 or #45 or #46 or #47 or #48 or #49 or #50 or #51)

#53 (#6 and #20 and #52) [Population + Setting + Condition] (n = 10686 Trials)

[Prevention/Risk Factors]

#54 MeSH descriptor: [Preventive Health Services] this term only

#55 MeSH descriptor: [Early Intervention (Education)] this term only

#56 MeSH descriptor: [Health Literacy] this term only

#57 MeSH descriptor: [Patient Education as Topic] this term only

#58 MeSH descriptor: [Health Promotion] this term only

#59 MeSH descriptor: [Primary Prevention] this term only

#60 MeSH descriptor: [Secondary Prevention] this term only

#61 prevent*:ti (Word variations have been searched)

#62 prevent*:kw (Word variations have been searched)

#63 "prevention of"

#64 (prevent* near/3 (intervention or educat* or pilot or program* or project or protocol* or training or universal or targeted or primary or secondary or selective or indicated or study or trial))

#65 ((early or brief) next intervention*)

#66 ((universal or targeted) near/3 (program* or intervention*))

#67 (vulnerabl* or "at risk" or (risk near/3 reduc*))

#68 MeSH descriptor: [Risk] explode all trees

#69 MeSH descriptor: [Accidents] explode all trees

#70 MeSH descriptor: [Bereavement] explode all trees

#71 MeSH descriptor: [Bullying] this term only

#72 MeSH descriptor: [Child of Impaired Parents] this term only

#73 MeSH descriptor: [Child, Orphaned] this term only

#74 MeSH descriptor: [Crime Victims] this term only

#75 MeSH descriptor: [Disasters] explode all trees

#76 MeSH descriptor: [Divorce] explode all trees

#77 MeSH descriptor: [Life Change Events] this term only

#78 MeSH descriptor: [Runaway Behavior] this term only

#79 MeSH descriptor: [Urban Population] this term only

#80 MeSH descriptor: [Rural Population] this term only

#81 MeSH descriptor: [Survivors] this term only

#82 MeSH descriptor: [Violence] explode all trees

#83 MeSH descriptor: [Warfare] explode all trees

#84 MeSH descriptor: [Family Conflict] this term only

#85 MeSH descriptor: [Psychosocial Deprivation] this term only

#86 MeSH descriptor: [Poverty] this term only

#87 (bereave* or bullying or divorce or foster care or grief or humanitarian or orphan* or RTA or refugee* or survivor* or victim* or war)

#88 (#54 or #55 or #56 or #57 or #58 or #59 or #60 or #61 or #62 or #63 or #64 or #65 or #66 or #67 or #68 or #69 or #70 or #71 or #72 or #73 or #74 or #75 or #76 or #77 or #78 or #79 or #80 or #81 or #82 or #83 or #84 or #85 or #86 or #87 or #87)

#89 #53 and #88 [Population + Setting + Condition + Prevention/Risk Factors] (n = 3575)

#90 (#26 or #43) and #6 and #20 [(MH or Conduct Disorder Prevention) + Population + Setting] (*n* = 1273)

#91 #89 or #90.

Scoping searches of educational databases

Following our updated protocol, a scoping search of the ERIC was conducted. A simple search was conducted on 29 March 2018 and no further relevant studies were identified. On this basis, we considered the likely 'law of diminishing returns'[52] and determined that further formal literature searches would be increasingly unlikely to return further eligible citations. However, in response to reviewers' comments on the draft version of this report, we conducted formal scoping searches on 11 April 2020 using the ERIC and BEI. The full search strategy is described subsequently. The total citations returned were 2570. One reviewer screened the titles and abstracts of a random 10% of the citations returned and 18 full texts were retrieved. Of these, eight studies were identified as eligible for inclusion in the review. However, all had been identified via the original search strategy and were previously included.

We used EBSCO*host* databases to search the ERIC and BEI. The following search terms were used:

S26 S19 AND S25 (*n* = 2570)

S25 (S20 OR S21 OR S22 OR S23 OR S24) [Prevention/Promotion or Risk Factors]

S24 TI (orphan* or "school dropout*" or runaway* or "run away*" or bullying or conflict or abuse or abused or abandonment or "abandoned child*" or (child* N2 neglect*) or "foster care" or (parent* N2 absen*) or violence or teasing or threatened or victim* or crime or criminal or trauma or rural or urban or environment* or neighborhood* or neighbourhood* or "social issues" or poverty or war or accidents or RTA or humanitarian or refugee* or disaster* or survivor* or death or bereavement or grief or grieving or divorce or custody or stigma or "help seeking") OR AB (orphan* or "school dropout*" or runaway* or "run away*" or bullying or conflict or abuse or abused or abandonment or "abandoned child*" or "child neglect" or "edge of care" or "foster care" or (parent* N2 absen*) or violence or teasing or threatened or victim* or crime or criminal or trauma or rural or urban or environment* or neighborhood* or neighbourhood* or "social issues" or poverty or war or accidents or RTA or humanitarian or refugee* or disaster* or survivor* or death or bereavement or grief or grieving or divorce or custody or stigma or "help seeking")

S23 TI (vulnerabl* or “at risk” or (risk N3 reduc*)) or “risk population*” or predisposition or pre-disposition or “risk factor” or “susceptibility) OR AB (vulnerabl* or “at risk” or (risk N3 reduc*)) or “risk population*” or predisposition or pre-disposition or “risk factor” or “susceptibility)

S22 TI (intervention or ((universal or targeted) W3 (program* or intervention*))) OR AB ((universal or targeted) W3 (program* or intervention*)) OR SU Intervention

S21 TI (promot* or prevent*) OR AB (prevention OR (prevent* N3 (intervention or educat* or pilot or program* or project or protocol* or training or universal or targeted or primary or secondary or selective or indicated or study or trial)))

S20 TI (onset or ((early or brief) N3 intervention*) or “health promotion” or “health education” or “health knowledge” or “health literacy” or “mental health program*” or “public health”) OR AB (((early or brief) N3 (onset or intervention*)) or “health promotion” or “health education” or “health knowledge” or “health literacy” or “mental health program*” or “public health”)

S19 (S10 AND S18)

S18 (S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17) [RCT Filter]

S17 TI (trial) OR AB (trial)

S16 TI (placebo) OR AB (placebo)

S15 TI (“reference group” or “observation group” or “control group”) OR AB (“reference group” or “observation group” or “control group”)

S14 TI ((“no intervention*” or “non intervention*” or “without any intervention*”) and (control* or group*)) OR AB ((“no intervention*” or “non intervention*” or “without any intervention*”) and (control* or group*))

S13 TI (WLC or waitlist* or (wait* W2 (list or condition or control))) OR AB (WLC or waitlist* or (wait* W2 (list or condition or control)))

S12 TI (randomized or randomised or “at random” or RCT or (random* N3 (administ* or class* or control* or determine* or divide* or distribut* or expose* or fashion or number* or place* or recruit* or subsitut* or treat*))) OR AB (randomized or randomised or “at random” or RCT or (random* N3 (administ* or class* or control* or determine* or divide* or distribut* or expose* or fashion or number* or place* or recruit* or subsitut* or treat*)))

S11 TI ((program* N3 (evaluat* or effectiveness))

S10 (S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9) [Depression/Anxiety/Conduct]

S9 TI ((behavi* or dyssocial or emotional* or internalizing or externalizing or internalising or externalising) N3 (problem* of difficult* or psychopathol*)) OR AB ((conduct or behavi* or antisocial or “anti social” or dyssocial or emotional* or internalizing or externalizing or internalising or externalising) N3 (problem* of difficult* or psychopathol*))

S8 TI ((behavi* or conduct or personalit*) N3 (agressi* or nonagressi* or dyssocial or defiant or delinquen* or disturb* or disrupt* or disorder* or internalizing or externalizing or internalising or externalising or problem*)) OR AB ((behavi* or conduct or personalit*) N3 (agressi* or nonagressi* or antisocial or “anti social” or dyssocial or defiant or delinquen* or disturb* or disrupt* or disorder* or internalizing or externalizing or internalising or externalising or problem*))

S7 TI (conduct or delinquen* or defiant or antisocial* or anti-social* or "explosive disorder*" or (behavio* W2 disorder*) OR AB ("conduct disorder*" or "explosive disorder*" or (oppositional W3 (defiant or disorder*)) or (behavio* W2 disorder*) or "juvenile delinquency" or "antisocial behavior")

S6 TI (PTSD or "post-trauma*" or posttrauma* or "stress disorder*" or "stress reaction*" or "acute stress") OR AB (PTSD or "post-trauma*" or posttrauma* or "stress disorder*" or "stress reaction*" or "acute stress")

S5 TI (neurosis or neuroses or neurotic or psychoneuro* or (school N3 (refusal or avoid*)) or "social avoidance" or mutism) OR AB (neurosis or neuroses or neurotic or psychoneuro* or (school N3 (refusal or avoid*)) or "social avoidance" or mutism)

S4 TI (anxiety or GAD or fear or panic or phobi* or acrophobi* or agoraphobi* or claustrophobi* or ophidiophobi* or obsess* or compulsi or OCD) OR AB (anxiety or GAD or fear or panic or phobi* or acrophobi* or agoraphobi* or claustrophobi* or ophidiophobi* or obsess* or compulsi or OCD)

S3 TI ((affective W2 disorder*) or depressi* or depressed or dysthymi* or mood* or (("axis 1" or "axis I") W2 disorder*)) OR AB ((affective W2 disorder*) or depressi* or depressed or dysthymi* or mood* or (("axis 1" or "axis I") W2 disorder*))

S2 TI (distress or "psychological stress" or "psychological adjustment" or "emotional adjustment" or resilience or (coping N2 behavio*)) OR AB ("psychological distress" or "psychological stress" or "psychological adjustment" or "emotional adjustment" or (coping N2 behavio*))

S1 TI (mental* or psychological or wellbeing or "well being") OR AB ((mental* or psychological) W2 (health* or wellbeing or "well being").

Further statistical details for intervention-level and component-level network meta-analysis models

For each study i and arm k, the mean outcome is denoted by $y_{i,k}$ with SE $se_{i,k}$. The baseline SD pooled across arms is sd_i and Hedges' g adjustment factor:

$$J_i = \left(1 - \frac{3}{4(n_{i,1} + n_{i,2}) - 9}\right), \quad (1)$$

where $n_{i,k}$ is the number assessed in study i and arm k (i.e. complete cases).

The likelihood for the observed data is assumed to be normally distributed:

$$y_{i,k} \sim Normal(\theta_{i,k} s_i J_i, se^2_{i,k}), \quad (2)$$

where $\theta_{i,k}$ is the standardised mean outcome for the intervention in arm k. The NMA model is put on the standardised mean scale so that intervention effects are SMDs.

We fitted three different NMA models that differed in the level of detail with which the intervention effects were modelled: (1) an intervention-level model, (2) an additive component model and (3) a full interaction component model. These three models are described subsequently. The models are fitted using a Bayesian Monte Carlo Markov chain approach evaluated in WinBUGS. WinBUGS code differed slightly for each population and outcome because of the evidence available for each of the possible intervention/component combinations.

Intervention-level network meta-analysis model

The intervention-level model is the standard NMA model,[338] whereby the effect of each intervention is estimated as a 'clinically meaningful' unit. For example, here we estimate a CBT effect that is assumed to be the same regardless of the components comprising the CBT interventions. We describe a random-effects model because, although fixed-effects models were fitted, there was substantial heterogeneity, and so only results from random-effects models are presented. The standardised mean outcome for study i, arm k, is the sum of a standardised mean outcome on arm 1, μ_i, and a SMD, $\delta_{i,k}$, for the intervention on arm k relative to the intervention on arm 1:

$$\theta_{i,k} = \mu_i + \delta_{i,k}. \tag{3}$$

The random-effects NMA model assumes that the SMDs, $\delta_{i,k}$, come from a common normal distribution with a mean that represents the appropriate SMD for the intervention comparison made, and a between-study SD, τ:

$$\delta_{i,k} \sim Normal(d_{Int_{i,k}} - d_{Int_{i,1}}, \tau^2), \tag{4}$$

where $Int_{i,k}$ indicates the intervention on arm k of study i, and d_k is the pooled estimate of intervention k. Flat normal priors are given to the μ_i and d_k parameters, and a uniform(0,5) prior is given to τ. A standard correction is applied to incorporate correlations in the estimates from trials with three or more arms.

Additive component level (nested within interventions)

For a given intervention, the SMD comprises a sum of SMDs for the components that it includes (see Welton *et al.*[46]). *Equation 4* then becomes:

$$\delta_{i,k} \sim Normal((d_{Int_{i,k}} + \beta_{Int_{i,k},1}C_{i,k,1} + \beta_{Int_{i,k},2}C_{i,k,2} + \ldots) - (d_{Int_{i,1}} + \beta_{Int_{i,1},1}C_{i,1,1} + \beta_{Int_{i,1},2}C_{i,1,2} + \ldots), \tau^2), \tag{5}$$

where $C_{i,k,j}$ is an indicator for whether the intervention on arm k of study i contains component j ($C_{i,k,j} = 1$) or not ($C_{i,k,j} = 0$), and $\beta_{k,j}$ is the additional SMD for intervention k when component j is included. Flat normal priors are given to the $\beta_{k,j}$ parameters, and all other priors are as for the intervention-level model.

Note that, for the model to be identifiable, a reference combination of components is defined for each intervention, with SMD d_k, and the regression coefficients $\beta_{k,j}$ are only estimated for additional components over and above the reference combination of components. For example, for universal interventions in the secondary population with anxiety as an outcome, all CBT interventions contain a cognitive and a behavioural component, and so this (cognitive + behavioural) forms the reference CBT intervention. Additional effects of psychoeducation, mindfulness and relaxation are estimated.

For some interventions, sets of components always co-occur, and so only a single regression coefficient can be estimated for the joint inclusion of components in that set. For example, for universal interventions in the secondary population with anxiety as an outcome, third-wave interventions were either with or without both mindfulness and relaxation components. Third-wave without any additional components, therefore, forms the reference intervention, and an additional effect is estimated for the addition of both mindfulness and relaxation components.

Full interaction component model (nested within interventions)

Equation 5 assumes that the inclusion of additional components has an additive effect, so that, for example, adding a psychoeducation component to a CBT intervention with cognitive and behavioural components has the same change in SMD as addition of a psychoeducation component to a CBT with

cognitive, behavioural and relaxation components. The full interaction model[46] relaxes this assumption and estimates a separate effect for each combination of components. *Equation 5* then becomes:

$$\delta_{i,k} \sim Normal((d_{Int_{i,k}} + \beta_{Int_{i,k},C_{i,k,1},C_{i,k,2},\ldots}) - (d_{Int_{i,1}} + \beta_{Int_{i,1},C_{i,k,1},C_{i,k,2},\ldots}), \tau^2), \quad (6)$$

where β_{k,c_1,c_2} is the additional SMD for intervention k when components are included as indicated by c_1,c_2. Flat normal priors are given to the β_{k,c_1,c_2} parameters, and all other priors are as for the intervention-level model.

Note that, as for the additive model, a reference combination of components is defined for each intervention, with SMD d_k, and the regression coefficients β_{k,c_1,c_2} are estimated only for combinations of components that are different from the reference combination.

Code for the network meta-analysis components models

The code on which the component level models are based is available in Dias *et al.*[338] The adaptation to component-level NMA is based on WinBUGS code reported in Welton *et al.*[46]

The WinBUGS code for all three models implemented in this report and an example dataset are available from https://research-information.bris.ac.uk/en/persons/deborah-m-caldwell/projects or by contacting the corresponding author.

Appendix 2 Results from systematic review

Primary reference for studies included in the review

This list of references provides the primary reference only for the studies included in the review.

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Details of studies included in systematic review of anxiety and depression prevention

Tables 22 and *23* report the focus of the intervention, study design, population, setting and age range (if reported) for 137 studies included in the review for depression and anxiety prevention. A total of 79 studies reported an anxiety outcome and 105 reported a depression outcome.

TABLE 22 Study characteristics of included studies: anxiety

Study	Target	Study design	Population	Setting	Age (SD) (years)	Anxiety scale	In NMA?[a]	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Aune and Stiles[119] 2009	Anxiety	Cluster randomised	Universal	Secondary	10–15	SCARED	Yes	0				
Baker and Butler[120] 1984	Anxiety	Cluster randomised	Universal	Secondary	16–18	STAI	Yes	0				
Calear *et al.*[126] 2016	Anxiety	Cluster randomised	Universal	Secondary	12–18	SCAS, GAD-7	Yes	0		6, 12		
Calear *et al.*[127] 2016	Anxiety	Cluster randomised	Universal	Secondary	13–17	SCAS, GAD-7	Yes	0	3			
Hiebert *et al.*[130] 1989	Anxiety	Individually randomised	Universal	Secondary	13–14	STAI	Yes	0				
Lock and Barrett[134] 2003	Anxiety	Cluster randomised	Universal	Secondary	Not clear	RCMAS, SCAS	Yes	0		12		
Potek[137] 2012	Anxiety	Individually randomised	Universal	Secondary	14–17	MASC	Yes	0				
Rodgers and Dunsmuir[140] 2015	Anxiety	Individually randomised	Universal	Secondary	12–13	SCAS	Yes	0	4			
Calear *et al.*[125] 2009	Anxiety and depression	Cluster randomised	Universal	Secondary	12–17	RCMAS	Yes	0		6		
Gillham *et al.*[128] 2006	Anxiety and depression	Individually randomised	Universal	Secondary	11–13	RCMAS	Yes	0		6, 12		
Gucht *et al.*[129] 2017	Anxiety and depression	Cluster randomised	Universal	Secondary	14–21	YSR-anxiety	Yes	0		12		
Hodas[131] 2016	Anxiety and depression	Individually randomised	Universal	Secondary	12–14	RCMAS	Yes	0		6		
Johnson *et al.*[132] 2016	Anxiety and depression	Cluster randomised	Universal	Secondary	13.63 (0.43)	DASS-anxiety	Yes	0	3			
Johnson *et al.*[133] 2017	Anxiety and depression	Cluster randomised	Universal	Secondary	13.44 (0.33)	DASS-anxiety	Yes	0		6,12		

Study	Target	Study design	Population	Setting	Age (SD) (years)	Anxiety scale	In NMA?[a]	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Lowry-Webster *et al.*[135] 2001	Anxiety and depression	Cluster randomised	Universal	Secondary	10–13	RCMAS, SCAS	Yes	0		12		
Roberts *et al.*[139] 2010	Anxiety and depression	Cluster randomised	Universal	Secondary	11–13	RCMAS	Yes	0		6	18	
Tomba *et al.*[143] 2010	Anxiety and depression	Cluster randomised	Universal	Secondary	11.41	RCMAS	Yes	0		6		
Wong *et al.*[144] 2014	Anxiety and depression	Cluster randomised	Universal	Secondary	14–16	GAD-7	Yes	0				
Araya *et al.*[118] 2013	Depression	Cluster randomised	Universal	Secondary	14.5 (0.90)	RCADS-anxiety	Y-12		3	12		
Perry *et al.*[136] 2017	Depression	Cluster randomised	Universal	Secondary	16–17	SCAS	Yes	0		6	18	
Roberts *et al.*[138] 2003	Depression	Cluster randomised	Universal	Secondary	11–13	RCMAS	Yes	0		6	18	30
Sheffield *et al.*[141] 2006	Depression	Cluster randomised	Universal	Secondary	13–15	SCAS	Yes	0		6, 12		
Stallard *et al.*[142] 2013	Depression	Cluster randomised	Universal	Secondary	12–16	RCADS-GA	Y-12			6, 12		
Barrett *et al.*[121] 2005	Anxiety	Cluster randomised	Universal	Secondary	9–16	SCAS	No					
Bonhauser *et al.*[122] 2005	Anxiety and depression	Cluster randomised	Universal	Secondary	15.3 (0.92)	HADS	No	0				
Britton *et al.*[123] 2014	Anxiety and depression	Individually randomised	Universal	Secondary	11.79 (0.41)	STAI	No	0				
Burckhardt *et al.*[124] 2015	Anxiety and depression	Cluster randomised	Universal	Secondary	14–16	DASS-anxiety	No	0	5			
Attwood *et al.*[146] 2012	Anxiety	Individually randomised	Universal	Primary	10–12	SCAS	Yes	0				

continued

TABLE 22 Study characteristics of included studies: anxiety (*continued*)

Study	Target	Study design	Population	Setting	Age (SD) (years)	Anxiety scale	In NMA?[a]	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Barrett and Turner[147] 2001	Anxiety	Cluster randomised	Universal	Primary	10–12	RCMAS, SCAS	Yes	0				
Bouchard *et al.*[148] 2013	Anxiety	Individually randomised	Universal	Primary	9–12	MASC	Yes	0				
Collins *et al.*[149] 2014	Anxiety	Cluster randomised	Universal	Primary	9–10	SCAS	Yes	0		6		
Essau *et al.*[150] 2012	Anxiety	Cluster randomised	Universal	Primary	9–12	SCAS	Yes	0		6, 12		
Miller *et al.*[153] 2010	Anxiety	Cluster randomised	Universal	Primary	7–12	MASC	Yes	0				
Miller *et al.*[154] 2011	Anxiety	Cluster randomised	Universal	Primary	7–13	MASC	Yes	0		6		
Miller *et al.*[154] 2011	Anxiety	Cluster randomised	Universal	Primary	7–13	SCAS	Yes	0		12		
Ruttledge *et al.*[158] 2016	Anxiety	Cluster randomised	Universal	Primary	9–13	SCAS	Yes	0	3			
Stallard *et al.*[159] 2014	Anxiety	Cluster randomised	Universal	Primary	9–10	RCADS-GA	Y-12			12	24	
Ahlen *et al.*[145] 2018	Anxiety and depression	Cluster randomised	Universal	Primary	8–11	SCAS	Yes	0		12		
Gallegos[151] 2008	Anxiety and depression	Cluster randomised	Universal	Primary	9–11	SCAS	Yes	0		6		
Johnstone *et al.*[152] 2014	Anxiety and depression	Cluster randomised	Universal	Primary	9–10	SCAS	Yes	0		6	18	30, 42, 54
Pophillat *et al.*[156] 2016	Anxiety and depression	Cluster randomised	Universal	Primary	6–8	SCAS	Yes	0				
Pattison and Lynd-Stevenson[155] 2001	Depression	Individually randomised	Universal	Primary	9–12	STAI	Yes	0		8		

Study	Target	Study design	Population	Setting	Age (SD) (years)	Anxiety scale	In NMA?[a]	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Rooney *et al.*[157] 2006	Depression	Cluster randomised	Universal	Primary	8–9	RCMAS	Yes	0		9	18	
Velásquez *et al.*[189] 2015	Anxiety and depression	Individually randomised	Universal	M	NR	Modified SDQ-anxiety	No	0				
Balle and Tortella-Feliu[160] 2010	Anxiety	Individually randomised	Targeted	Secondary	11–17	SCAS	Yes	0		6		
Berry and Hunt[161] 2009	Anxiety	Cluster randomised	Targeted	Secondary	12–15	SCARED	Yes	0				
Fitzgerald *et al.*[114] 2016	Anxiety	Individually randomised	Targeted	Secondary	15–18	SCARED	Yes	0	3			
Hiebert *et al.*[130] 1989	Anxiety	Individually randomised	Targeted	Secondary	15–17	STAI	Yes	0				
Hunt *et al.*[166] 2009	Anxiety	Cluster randomised	Targeted	Secondary	11–13	RCMAS, SCAS	Y-24	0			24	48
Kiselica *et al.*[168] 1994	Anxiety	Individually randomised	Targeted	Secondary	14–15	STAI	Yes	0	3			
Rice[171] 2009	Anxiety	Individually randomised	Targeted	Secondary	10–18	MASC	Yes	0	2			
Scholten *et al.*[172] 2016	Anxiety	Individually randomised	Targeted	Secondary	11–15	SCAS	Yes	0	3			
Sportel *et al.*[117] 2013	Anxiety	Cluster randomised	Targeted	Secondary	12–15	RCADS-social anxiety	Yes	0		6, 12		
Owen and Lanning[169] 1982	Anxiety	Individually randomised	Targeted	Secondary	15–16	STAI	No	0				
Dobson *et al.*[163] 2010	Anxiety and depression	Individually randomised	Targeted	Secondary	13–18	BAI	Yes	0	3	6		
Jordans *et al.*[167] 2010	Anxiety and depression	Cluster randomised	Targeted	Secondary	11–14	SCARED	Yes	0				

continued

TABLE 22 Study characteristics of included studies: anxiety (*continued*)

Study	Target	Study design	Population	Setting	Age (SD) (years)	Anxiety scale	In NMA?[a]	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Peng *et al.*[170] 2015	Anxiety and depression	Cluster randomised	Targeted	Secondary	14.2 (2.34)	Mental Health Test-anxiety	Yes	0				
Topper *et al.*[173] 2017	Anxiety and depression	Individually randomised	Targeted	Secondary	15–22	MASQ	Yes	0	3	12		
Cova *et al.*[162] 2011	Depression	Individually randomised	Targeted	Secondary	14–15	BAI	Yes	0				
Gaete *et al.*[164] 2016	Depression	Individually randomised	Targeted	Secondary	13–18	RCADS	No		3			
Gillham *et al.*[165] 2012	Depression	Individually randomised	Targeted	Secondary	10–15	RCMAS	Yes	0		6		
Sheffield *et al.*[141] 2006	Depression	Cluster randomised	Targeted	Secondary	13–15	SCAS	Yes	0		6, 12		
Cooley-Strickland *et al.*[174] 2011	Anxiety	Individually randomised	Targeted	Primary	9–10	RCMAS	Yes	0				
McLoone *et al.*[176] 2012	Anxiety	Individually randomised	Targeted	Primary	7–10	SCAS	Yes	0		12		
Mifsud and Rapee[177] 2005	Anxiety	Cluster randomised	Targeted	Primary	8–11	SCAS	Yes	0		6		
Miller *et al.*[178] 2011	Anxiety	Cluster randomised	Targeted	Primary	7–12	SCAS	Yes	0	3	12		
Schoneveld *et al.*[115] 2016	Anxiety	Individually randomised	Targeted	Primary	8–13	SCAS	Yes	0	3			
Schoneveld *et al.*[116] 2018	Anxiety	Individually randomised	Targeted	Primary	7–12	SCAS	Yes	0	3	6		
van Starrenburg *et al.*[182] 2017	Anxiety	Individually randomised	Targeted	Primary	7–13	SCAS	Yes	0	3			
Manassis *et al.*[175] 2010	Anxiety and depression	Individually randomised	Targeted	Primary	8–11	MASC	Yes	0		12		

Study	Target	Study design	Population	Setting	Age (SD) (years)	Anxiety scale	In NMA?[a]	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Simpson[179] 2008	Anxiety and depression	Individually randomised	Targeted	Primary	7–11	MASC	Yes	0				
Siu[180] 2007	Anxiety and depression	Individually randomised	Targeted	Primary	7–10	SCARED	Yes	0				
Tokolahi *et al.*[181] 2018	Anxiety and depression	Cluster randomised	Targeted	Primary	7–12	MASC	Yes	0				
Cui *et al.*[183] 2016	Depression	Individually randomised	Targeted	University	19.42 (1.66)	Zung	Yes	0		6		
Ellis *et al.*[184] 2011	Depression	Individually randomised	Targeted	University	18–25	DASS-anxiety	Yes	0				
Higgins[185] 2007	Anxiety	Individually randomised	Targeted	University	17–19	BAI, GAD	Yes	0	1	6, 12		
Seligman *et al.*[186] 1999	Anxiety and depression	Individually randomised	Targeted	University	19 (NR)	BAI	Yes	0	3			36
Seligman *et al.*[187] 2007	Anxiety and depression	Individually randomised	Targeted	University	19 (NR)	BAI	Yes	0	1,3			
Liddle and Macmillan[188] 2010	Anxiety	Individually randomised	Targeted	M	8–14	SCAS	No	0				

BAI, Beck Anxiety Inventory; DASS, Depression, Anxiety and Stress Scale; GA, generalised anxiety; GAD-7, Generalised Anxiety Disorder-7; HADS, Hospital Anxiety and Depression Scale; M, mixed/multiple age groups; MASC, Multidimensional Anxiety Scale for Children; MASQ, Mood and Anxiety Symptom Questionnaire-D30; NR, not reported; RCMAS, Revised Children's Manifest Anxiety Scale; SCARED, Screen for Child Anxiety Related Disorders; SCAS, Spence Children's Anxiety Scale; STAI, State–Trait Anxiety Inventory; YSR, Achenbach Youth Self Report; Zung, Zung self-rating scale (anxiety and depression).

a Y-12 means that the study was included in the NMA but in the 12-month analysis only; Y-24 means it was in the 24-month NMA only.

Age is reported as a range, in years. If the range was not reported, we extracted the mean (SD) where available.

TABLE 23 Study characteristics of included studies: depression

Study	Target	Study design	Population	Setting	Age (SD) (years)	Depression scale	In NMA?	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Ahlen *et al.*[145] 2018	Anxiety and depression	Cluster randomised	Universal	Primary	8–11	CDI	Yes	0		12		
Araya *et al.*[118] 2013	Depression	Cluster randomised	Universal	Secondary	14.5 (0.90)	BDI	Y-12		3	12		
Arnarson and Craighead[213] 2009	Depression	Individually randomised	Targeted	Secondary	14–15	CDI	No					
Aune and Stiles[119] 2009	Anxiety	Cluster randomised	Universal	Secondary	10–15	SMFQ	Yes	0				
Balle and Tortella-Feliu[160] 2010	Anxiety	Individually randomised	Targeted	Secondary	11–17	CDI	Yes	0		6		
Barrett and Turner[147] 2001	Anxiety	Cluster randomised	Universal	Primary	10–12	CDI	Yes	0				
Barrett *et al.*[121] 2005	Anxiety	Cluster randomised	Universal	Secondary	9–16	CDI	No					
Barry *et al.*[190] 2017	Depression	Individually randomised	Universal	Secondary	15–16	CES-D	Yes	0				
Berry and Hunt[161] 2009	Anxiety	Cluster randomised	Targeted	Secondary	12–15	CES-D	Yes	0				
Bonhauser *et al.*[122] 2005	Anxiety and depression	Cluster randomised	Universal	Secondary	15.3 (0.92)	HADS	No	0				
Burckhardt *et al.*[124] 2015	Anxiety and depression	Cluster randomised	Universal	Secondary	14–16	DASS-depression	No	0	5			
Burckhardt *et al.*[191] 2016	Anxiety and depression	Cluster randomised	Universal	Secondary	15–18	DASS-depression	No	0				
Calear *et al.*[125] 2009	Anxiety and depression	Cluster randomised	Universal	Secondary	12–17	CES-D	Yes	0		6		
Calear *et al.*[126] 2016	Anxiety	Cluster randomised	Universal	Secondary	12–18	CES-D	Yes	0		6, 12		

Study	Target	Study design	Population	Setting	Age (SD) (years)	Depression scale	In NMA?	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Calear *et al.*[127] 2016	Anxiety	Cluster randomised	Universal	Secondary	13–17	CES-D	Yes	0	3			
Cardemil *et al.*[208] 2007	Depression	Individually randomised	Universal	Primary	10–12	CDI	Yes	0	3	6		
Chaplin *et al.*[192] 2006	Depression	Individually randomised	Universal	Secondary	11–14	CDI	Yes	0				
Clarke *et al.*[193] 1993	Depression	Cluster randomised	Universal	Secondary	14–16	CES-D	Yes	0	3			
Clarke *et al.*[193] 1993	Depression	Cluster randomised	Universal	Secondary	14–16	CES-D	Yes	0	3			
Clarke *et al.*[214] 1995	Depression	Individually randomised	Targeted	Secondary	14–16	CES-D	Yes	0		6, 12		
Congleton[215] 1995	Depression	Individually randomised	Targeted	Secondary	12–14	CDI	Yes	0				
Cova *et al.*[162] 2011	Depression	Individually randomised	Targeted	Secondary	14–15	BDI	Yes	0				
Cowell *et al.*[231] 2009	Depression	Cluster randomised	Targeted	Primary	10.4 (0.78)	CDI	No	0		95		
Cui *et al.*[183] 2016	Depression	Individually randomised	Targeted	University	19.42 (2.43)	Zung	Yes	0		6		
Dobson *et al.*[163] 2010	Anxiety and depression	Individually randomised	Targeted	Secondary	13–18	CDI, CES-D	Yes	0	3	6		
Ellis *et al.*[184] 2011	Depression	Individually randomised	Targeted	University	18–25	DASS-depression	Yes	0				
Essau *et al.*[150] 2012	Anxiety	Cluster randomised	Universal	Primary	9–12	RCADS-depression	Yes	0		6, 12		
Fitzgerald *et al.*[114] 2016	Anxiety	Individually randomised	Targeted	Secondary	15–18	RCADS-depression	Yes	0	3			

continued

TABLE 23 Study characteristics of included studies: depression (*continued*)

Study	Target	Study design	Population	Setting	Age (SD) (years)	Depression scale	In NMA?	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Fung *et al.*[216] 2016	Anxiety and depression	Individually randomised	Targeted	Secondary	12–14	PHQ-9	No	0				
Gaete *et al.*[164] 2016	Depression	Individually randomised	Targeted	Secondary	13–18	BDI	No		3			
Gallegos[151] 2008	Anxiety and depression	Cluster randomised	Universal	Primary	9–11	CDI	Yes	0		6		
Gillham[209] 1994	Depression	Individually randomised	Universal	Primary	10–12	CDI	Yes	0				
Gillham *et al.*[128] 2006	Anxiety and depression	Individually randomised	Universal	Secondary	11–13	CDI, CDRS	Yes	0		6, 12		
Gillham *et al.*[194] 2007	Depression	Individually randomised	Universal	Secondary	11–14	CDI, CDRS	Yes	0		6, 12	18, 24	36
Gillham *et al.*[165] 2012	Depression	Individually randomised	Targeted	Secondary	10–15	CDI, RADS	Yes	0		6		
Gucht *et al.*[129] 2017	Anxiety and depression	Cluster randomised	Universal	Secondary	14–21	YSR-affect	Yes	0		12		
Higgins[185] 2007	Anxiety	Individually randomised	Targeted	University	17–19	BDI	Yes	0	1	6, 12		
Hodas[131] 2016	Anxiety and depression	Individually randomised	Universal	Secondary	12–14	CDI	Yes	0		6		
Horowitz *et al.*[195] 2007	Depression	Individually randomised	Universal	Secondary	14–15	CDI, CES-D	Yes	0		6		
Hunt *et al.*[166] 2009	Anxiety	Cluster randomised	Targeted	Secondary	11–13	CDI	Y-24	0			24	48
Jaycox *et al.*[232] 1994	Depression	Cluster randomised	Targeted	Primary	10–13	CDI, RCDS	Yes	0		6, 12	18, 24	
Johnson *et al.*[132] 2016	Anxiety and depression	Cluster randomised	Universal	Secondary	13.63 (0.43)	DASS-depression	Yes	0	3			

Study	Target	Study design	Population	Setting	Age (SD) (years)	Depression scale	In NMA?	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Johnson *et al.*[133] 2017	Anxiety and depression	Cluster randomised	Universal	Secondary	13.44 (0.33)	DASS-depression	Yes	0		6, 12		
Johnstone *et al.*[152] 2014	Anxiety and depression	Cluster randomised	Universal	Primary	9–10	CDI	Yes	0		6	18	30, 42, 54
Jordans *et al.*[167] 2010	Anxiety and depression	Cluster randomised	Targeted	Secondary	11–14	DSRS	Yes	0				
Kindt *et al.*[196] 2014	Depression	Cluster randomised	Universal	Secondary	11–16	CDI	Yes	0		6, 12		
Liddle and Macmillan[188] 2010	Anxiety	Individually randomised	Targeted	M	8–14	CDI	No	0				
Livheim *et al.*[217] 2015	Depression	Individually randomised	Targeted	Secondary	12–17	RADS	Yes	0				
Lock and Barrett[134] 2003	Anxiety	Cluster randomised	Universal	Secondary	NR	CDI	Yes	0		12		
Lowry-Webster *et al.*[135] 2001	Anxiety and depression	Cluster randomised	Universal	Secondary	10–13	CDI	Yes	0		12		
Manassis *et al.*[175] 2010	Anxiety and depression	Individually randomised	Targeted	Primary	8–11	CDI	Yes	0		12		
McCarty *et al.*[218] 2011	Depression	Individually randomised	Targeted	Secondary	13 (0.38)	MFQ, CDRS	Yes	0		6, 12	18	
McCarty *et al.*[219] 2013	Depression	Individually randomised	Targeted	Secondary	11–15	MFQ	Yes	0		6, 12		
McLaughlin[236] 2011	Depression	Individually randomised	Targeted	M	10–15	CES-D, BDI	No	0				
Mendelson *et al.*[210] 2010	Depression	Cluster randomised	Universal	Primary	9–11	SMFQ	No	0				
Merry *et al.*[197] 2004	Depression	Individually randomised	Universal	Secondary	13–15	RADS, BDI	Yes	0		6, 12	18	

continued

TABLE 23 Study characteristics of included studies: depression (*continued*)

Study	Target	Study design	Population	Setting	Age (SD) (years)	Depression scale	In NMA?	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Noël *et al.*[220] 2013	Depression	Individually randomised	Targeted	Secondary	13–15	CES-D	No	0				
Pattison and Lynd-Stevenson[155] 2001	Depression	Individually randomised	Universal	Primary	9–12	CDI	Yes	0		8		
Peden *et al.*[234] 2000	Depression	Individually randomised	Targeted	University	18–24	CES-D, BDI	No	0		6	18	
Peng *et al.*[170] 2015	Anxiety and depression	Cluster randomised	Targeted	Secondary	14.2 (2.34)	Mental Health Test-depression	Yes	0				
Perry *et al.*[136] 2017	Depression	Cluster randomised	Universal	Secondary	16–17	MDI	Yes	0		6	18	
Pophillat *et al.*[156] 2016	Anxiety and depression	Cluster randomised	Universal	Primary	6–8	CDI	Yes	0				
Poppelaars *et al.*[221] 2016	Depression	Cluster randomised	Targeted	Secondary	11–16	RADS	Yes	0	3	6, 12		
Pössel *et al.*[198] 2004	Depression	Cluster randomised	Universal	Secondary	13–14	CES-D	Yes	0	3	6		
Pössel *et al.*[200] 2013	Depression	Cluster randomised	Universal	Secondary	14–16	CDI	Yes	0	4	8, 12		
Pössel *et al.*[199] 2011	Depression	Cluster randomised	Universal	Secondary	12–13	Self-reported questionnaire – depression	Yes	0		6, 12		
Puskar *et al.*[222] 2003	Depression	Individually randomised	Targeted	Secondary	14–18	RADS	Yes	0		6, 12		
Quayle *et al.*[211] 2001	Depression	Individually randomised	Universal	Primary	11–12	CDI	Yes	0		6		
Raes *et al.*[201] 2014	Depression	Cluster randomised	Universal	Secondary	13–20	DASS-depression	Yes	0		6		
Reynolds *et al.*[233] 2011	Depression	Cluster randomised	Universal	University	17.9 (0.53)	DASS-depression	No	0		6		

Study	Target	Study design	Population	Setting	Age (SD) (years)	Depression scale	In NMA?	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Rivet-Duval *et al.*[202] 2011	Depression	Individually randomised	Universal	Secondary	12–16	RADS	Yes	0		6		
Roberts *et al.*[138] 2003	Depression	Cluster randomised	Universal	Secondary	11–13	CDI	Yes	0		6	18	30
Roberts *et al.*[139] 2010	Anxiety and depression	Cluster randomised	Universal	Secondary	11–13	CDI	Yes	0		6	18	
Rohde *et al.*[223] 2014	Depression	Individually randomised	Targeted	Secondary	13–19	CES-D	Yes	0		6, 12	18, 24	
Rooney *et al.*[157] 2006	Depression	Cluster randomised	Universal	Primary	8–9	CDI	Yes	0		9	18	
Rose *et al.*[203] 2014	Depression	Cluster randomised	Universal	Secondary	9–14	CDI, RADS	Yes	0		6, 12		
Sawyer *et al.*[204] 2010	Depression	Cluster randomised	Universal	Secondary	13.1 (0.50)	CES-D	Yes					24
Seligman *et al.*[186] 1999	Anxiety and depression	Individually randomised	Targeted	University	19 (NR)	BDI	Yes	0	3			36
Seligman *et al.*[187] 2007	Anxiety and depression	Individually randomised	Targeted	University	19 (NR)	BDI	Yes	0	1, 3			
Shatté[205] 1997	Depression	Individually randomised	Universal	Secondary	12–14	CDI	Yes	0	4	8, 12		
Sheffield *et al.*[141] 2006	Depression	Cluster randomised	Universal	Secondary	13–15	CDI, CES-D	Yes	0		6, 12		
Sheffield *et al.*[141] 2006	Depression	Cluster randomised	Targeted	Secondary	13–15	CDI, CES-D	Yes	0		6, 12		
Simpson[179] 2008	Anxiety and depression	Individually randomised	Targeted	Primary	7–11	CDI	Yes	0				
Siu[180] 2007	Anxiety and depression	Individually randomised	Targeted	Primary	7–10	RCDS	Yes	0				

continued

TABLE 23 Study characteristics of included studies: depression (*continued*)

Study	Target	Study design	Population	Setting	Age (SD) (years)	Depression scale	In NMA?	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Soffer[212] 2003	Depression	Individually randomised	Universal	Primary	10–11	RCDS	Yes	0	1			
Spence *et al.*[206] 2003	Depression	Cluster randomised	Universal	Secondary	12–14	BDI	Yes	0		12	24	36, 48
Stallard *et al.*[142] 2013	Depression	Cluster randomised	Universal	Secondary	12–16	RCADS-depression	Y-12			6, 12		
Stallard *et al.*[142] 2013	Depression	Cluster randomised	Targeted	Secondary	12–16	RCADS-depression	No			6, 12		
Stallard *et al.*[159] 2014	Anxiety	Cluster randomised	Universal	Primary	9–10	RCADS-depression	Y-12			12	24	
Stice *et al.*[237] 2006	Depression	Individually randomised	Targeted	M	15–22	BDI	No	0	1	6		
Stice *et al.*[224] 2008	Depression	Individually randomised	Targeted	Secondary	14–19	BDI	Yes	0		6, 12	24	
Stoppelbein[225] 2003	Depression	Cluster randomised	Targeted	Secondary	15 (NR)	CDI	No	0		6		
Tak *et al.*[207] 2016	Depression	Cluster randomised	Universal	Secondary	12–14	CDI	Yes	0		6, 12	18, 24	
Takagaki *et al.*[235] 2016	Depression	Individually randomised	Targeted	University	18–19	BDI	Yes	0				
Tokolahi *et al.*[181] 2018	Anxiety and depression	Cluster randomised	Targeted	Primary	7–12	CDI	Yes	0				
Tomba *et al.*[143] 2010	Anxiety and depression	Cluster randomised	Universal	Secondary	11.41 (0.56)	Kellner's	Yes	0		6		
Topper *et al.*[173] 2017	Anxiety and depression	Individually randomised	Targeted	Secondary	15–22	CDI	Yes	0	3	12		
Velásquez *et al.*[189] 2015	Anxiety and depression	Individually randomised	Universal	M	NR	Modified SDQ-depression	No	0				

Study	Target	Study design	Population	Setting	Age (SD) (years)	Depression scale	In NMA?	Follow-up time point(s) (months)				
								Post intervention	1–5	6–12	13–24	≥ 25
Wijnhoven *et al.*[226] 2014	Depression	Individually randomised	Targeted	Secondary	11–15	CDI, CES-D	Yes	0	1	6		
Wong *et al.*[144] 2014	Anxiety and depression	Cluster randomised	Universal	Secondary	14–16	PHQ-9	Yes	0				
Woods and Jose[227] 2011	Depression	Individually randomised	Targeted	Secondary	14 (NR)	CDI	Yes	0	2	12		
Young *et al.*[228] 2006	Depression	Individually randomised	Targeted	Secondary	11–16	CES-D	Yes	0	3	6		
Young *et al.*[229] 2010	Depression	Individually randomised	Targeted	Secondary	13–17	CES-D, CDRS	Yes	0		6, 12	18	
Young *et al.*[230] 2016	Depression	Individually randomised	Targeted	Secondary	13.42 (1.23)	CES-D	Yes	0		6		
Yu[238] 2002	Depression	Individually randomised	Targeted	M	8–15	CDI	No	0	3	6		

BDI, Beck Depression Inventory; CDI, Children's Depression Inventory; CDRS, Children's Depression Rating Scale; CES-D, Center for Epidemiologic Studies Depression Scale; DASS, Depression, Anxiety and Stress Scale; DSRS, Depression Self-Rating Scale; HADS, Hospital Anxiety and Depression Scale; MDI, Major Depression Inventory; MFQ, Mood and Feelings Questionnaire; NR, not reported; PHQ-9, Patient Health Questionnaire-9 items; RADS, Reynolds Adolescent Depression Scale; RCDS, Reynolds Child Depression Scale; SMFQ, Short Mood and Feelings Questionnaire; YSR, Achenbach Youth Self Report; Zung, Zung self-rating scale (anxiety and depression).
Age is reported as a range, in years. If the range was not reported, we extracted the mean (SD) where available.

TABLE 24 Studies not included in the anxiety or depression NMA, but which were eligible for inclusion in review

Study	Reason	Not included in anxiety NMA	Not included in depression NMA
Arnarson and Craighead[213] 2009	Data not available	–	✗
Barrett *et al.*[121] 2005	Data not useable	✗	✗
Bonhauser *et al.*[122] 2005	Not connected to network	✗	✗
Britton *et al.*[123] 2014	Data not available	✗	–
[a]Burckhardt *et al.*[124] 2015	Data not available	✗	✗
[a]Burckhardt *et al.*[191] 2016	Data not available	–	✗
Cowell *et al.*[231] 2009	Not connected to network	–	✗
Fung *et al.*[216] 2016	Data not available	–	✗
Gaete *et al.*[164] 2016	Post-intervention time point not reported	✗	✗
Liddle and Macmillan[188] 2010	Mixed age group (8–14 years)	✗	✗
McLaughlin[236] 2011	Mixed age group (10–15 years)	–	✗
Mendelson *et al.*[210] 2010	Data not available	–	✗
Noël *et al.*[220] 2013	Data not available	–	✗
Owen and Lanning[169] 1982	Baseline measures not reported	✗	–
Peden *et al.*[234] 2000	Data not available	–	✗
Reynolds *et al.*[233] 2011	Not connected to network	–	✗
Stallard *et al.*[142] 2013	Study used in universal analysis only	–	✗
Stice *et al.*[237] 2006	Mixed age group (15–22 years)	–	✗
Stoppelbein[225] 2004	Data not available	–	✗
Velásquez *et al.*[189] 2015	Mixed age group (ages not reported)	✗	✗
Yu[238] 2000	Mixed age group (8–15 years)	–	✗

a Data were provided by author but analyses had been completed.

TABLE 25 Studies not reporting a primary review outcome: anxiety and depression

Study	Target	Study design	Population	Setting	Age (years)	Outcome
Anticich *et al.*[339] 2013	Anxiety	Cluster randomised	Universal	Primary	4–7	Preschool Anxiety Scale
Dadds and Roth[303] 2008	Anxiety	Cluster randomised	Universal	Primary	3–7	Anxiety Disorders Interview Schedule-Parent Version
Eather *et al.*[340] 2016	Anxiety and depression	Cluster randomised	Universal	Secondary	15–16	SDQ-total
Haden *et al.*[341] 2014	Anxiety and depression	Individually randomised	Universal	Primary	10–11	CBCL-parent rated
Khalsa *et al.*[239] 2012	Anxiety and depression	Cluster randomised	Universal	Secondary	15–19	Behaviour Assessment System for Children
Pahl and Barrett[242] 2010	Anxiety	Cluster randomised	Universal	Primary	4–6	Preschool Anxiety scale
Roberts *et al.*[240] 2018	Anxiety and depression	Cluster randomised	Universal	Primary	9–12	SDQ-total

TABLE 26 Study characteristics for included studies: process and delivery

Study	Type	Setting	Age (years)	Country	Control	Intervention			Sessions (*n*)	Intensity (minutes)	Delivered by	Format	
						1	2	3				1	2
Ahlen *et al.*[145] 2018	Universal	Primary	8–11	HIC	Usual curriculum	CBT			10	600	Teacher	Face to face	Group
Anticich *et al.*[339] 2013	Universal	Primary	4–7	HIC	Waiting list	Psychosupport	CBT		10	NR	Teacher	Face to face	Group
Araya *et al.*[118] 2013	Universal	Secondary	14.5	MIC	Usual curriculum	CBT			11	660	Psychologist	Face to face	Group
Attwood *et al.*[146] 2012	Universal	Primary	10–12	HIC	Attention control	CBT			6	270	Researcher	Multimedia/ computer based	Group/ individual
Aune and Stiles[119] 2009	Universal	Secondary	10–15	HIC	No intervention	CBT			3	135	Psychologist	Face to face	Group
Baker and Butler[120] 1984	Universal	Secondary	16–18	HIC	CBT self-help	CBT			8	360	Teacher	Face to face	Group
Barrett and Turner[147] 2001	Universal	Primary	10–12	HIC	Usual curriculum	CBT	CBT		10	750	Teachers or Psychologist	Face to face	Group
Barrett *et al.*[121] 2005	Universal	Secondary	9–16	HIC	No intervention	CBT			10	525	Psychologist	Face to face	Group
Barry *et al.*[190] 2017	Universal	Secondary	15–16	HIC	Usual curriculum	CBT			4	Not clear	'Coach'	Face to face	Group
Bonhauser *et al.*[122] 2005	Universal	Secondary	15.3	MIC	Exercise	Exercise			120	10,800	Teacher	Face to face	Group
Bouchard *et al.*[148] 2013	Universal	Primary	9–12	HIC	Waiting list	CBT			10	750	Psychologist	Face to face	Group
Britton *et al.*[123] 2014	Universal	Secondary	11.79	HIC	Attention control	Mindfulness/ relaxation			30	225	Teacher	Face to face	Group
Burckhardt *et al.*[124] 2015	Universal	Secondary	14–16	HIC	Attention control	Mindfulness/ relaxation			6	360	NA	Multimedia/ computer based	Group

continued

TABLE 26 Study characteristics for included studies: process and delivery (*continued*)

Study	Type	Setting	Age (years)	Country	Control	Intervention			Sessions (*n*)	Intensity (minutes)	Delivered by	Format	
						1	2	3				1	2
Burckhardt *et al.*[191] 2016	Universal	Secondary	15–18	HIC	Usual curriculum	Third wave			16	480	Psychologist	Face to face	Group
Calear *et al.*[125] 2009	Universal	Secondary	12–17	HIC	Waiting list	CBT			5	150	Teacher	Multimedia/ computer based	Group
Calear *et al.*[126] 2016	Universal	Secondary	12–18	HIC	Waiting list	CBT	CBT		6	210	Teacher or MHP supported	Multimedia/ computer based	Group
Calear *et al.*[127] 2016	Universal	Secondary	13–17	HIC	Waiting list	CBT			6	210	Teacher	Multimedia/ computer based	Group
Cardemil *et al.*[208] 2007	Universal	Primary	10–12	HIC	Usual curriculum	CBT			12	1080	Psychologist	Face to face	Group
Chaplin *et al.*[192] 2006	Universal	Secondary	11–14	HIC	No intervention	CBT	CBT		12	1080	Teacher and researchers	Face to face	Group
Clarke *et al.*[193] 1993	Universal	Secondary	14–16	HIC	Usual curriculum	Psychoeducation			3	150	Teacher	Face to face	NA
Clarke *et al.*[193] 1993	Universal	Secondary	14–16	HIC	Usual curriculum	Behavioural therapy			5	250	Teacher	Face to face	NA
Collins *et al.*[149] 2014	Universal	Primary	9–10	HIC	Usual curriculum	CBT			10	NR	Teacher or school counsellor	Face to face	Group
Dadds and Roth[303] 2008	Universal	Primary	3–7	HIC	No intervention	CBT			6	NR	Psychologist	Face to face	Group
Eather *et al.*[340] 2016	Universal	Secondary	15–16	HIC	Waiting list	Exercise			16	960	Fitness instructor	Face to face	Group
Essau *et al.*[150] 2012	Universal	Primary	9–12	HIC	Waiting list	CBT			10	600	Psychologist	Face to face	Group
Gallegos[151] 2008	Universal	Primary	9–11	MIC	Usual curriculum	CBT			10	600	Teacher	Face to face	Group

Study	Type	Setting	Age (years)	Country	Control	Intervention 1	Intervention 2	Intervention 3	Sessions (*n*)	Intensity (minutes)	Delivered by	Format 1	Format 2
Gillham[209] 1995	Universal	Primary	10–12	HIC	No intervention	CBT			12	1440	Psychologist	Face to face	Group
Gillham *et al.*[128] 2006	Universal	Secondary	11–13	HIC	No intervention	CBT			8	720	Researchers and psychologist	Face to face	Group
Gillham *et al.*[194] 2007	Universal	Secondary	11–14	HIC	No intervention	Attention control + psychosupport	CBT		12	1080	Teachers, school counsellors and psychologists	Face to face	Group
Gucht *et al.*[129] 2017	Universal	Secondary	14–21	HIC	Usual curriculum	Third wave			4	480	Teacher	Face to face	Group
Haden *et al.*[341] 2014	Universal	Primary	10–11	HIC	Usual curriculum	Mindfulness/ relaxation			36	3240	Teacher	Face to face	Group
Hiebert *et al.*[130] 1989	Universal	Secondary	13–14	HIC	Attention control	Mindfulness/ relaxation			11	660	Teacher and school counsellor	Face to face	Group
Hodas[131] 2016	Universal	Secondary	12–14	HIC	Waiting list	CBT			7	455	Psychologist	Face to face	Group
Horowitz *et al.*[195] 2007	Universal	Secondary	14–15	HIC	Usual curriculum	IPT	CBT		8	720	Psychologist	Face to face	Group
Johnson *et al.*[132] 2016	Universal	Secondary	13.63	HIC	Usual curriculum	Third wave			9	495	Psychologist	Face to face	Group
Johnson *et al.*[133] 2017	Universal	Secondary	13.44	HIC	Usual curriculum	Third wave	Third wave		9	450	Psychologist	Face to face	Group
Johnstone *et al.*[152] 2014	Universal	Primary	9–10	HIC	Usual curriculum	CBT			10	600	Teacher	Face to face	Group
Khalsa *et al.*[239] 2012	Universal	Secondary	15–19	HIC	Usual curriculum	Mindfulness/ relaxation			27.5	825	Yoga trainer	Face to face	Group
Kindt *et al.*[196] 2014	Universal	Secondary	11–16	HIC	Usual curriculum	CBT			16	NR	Teacher	Face to face	Group
Lock and Barrett[134] 2003	Universal	Secondary	NR	HIC	No intervention	CBT			10	750	Teacher	Face to face	Group

continued

TABLE 26 Study characteristics for included studies: process and delivery (*continued*)

Study	Type	Setting	Age (years)	Country	Control	Intervention			Sessions (*n*)	Intensity (minutes)	Delivered by	Format	
						1	2	3				1	2
Lowry-Webster *et al.*[135] 2001	Universal	Secondary	10–13	HIC	Waiting list	CBT			10	600	Teacher	Face to face	Group
Mendelson *et al.*[210] 2010	Universal	Primary	9–11	HIC	Waiting list	Mindfulness/ relaxation			48	2160	Yoga trainer	Face to face	Group
Merry *et al.*[197] 2004	Universal	Secondary	13–15	HIC	Attention control	CBT + IPT			11	NR	Teacher	Face to face	Group
Miller *et al.*[153] 2010	Universal	Primary	7–12	HIC	Waiting list	CBT			NR	NR	Teacher	Face to face	Group
Miller *et al.*[154] 2011	Universal	Primary	7–13	HIC	Waiting list	CBT			9	NR	Teacher and school counsellor	Face to face	Group
Miller *et al.*[154] 2011	Universal	Primary	7–13	HIC	Attention control	CBT			9	540	Teacher and school counsellor	Face to face	Group
Pahl and Barrett[242] 2010	Universal	Primary	4–6	HIC	Waiting list	CBT			9	270	Psychologist	Face to face	Group
Pattison and Lynd-Stevenson[155] 2001	Universal	Primary	9–12	HIC	No intervention	Attention control	CBT	CBT	10	1200	Child MHPs	Face to face	Group
Perry *et al.*[136] 2017	Universal	Secondary	16–17	HIC	Attention control	CBT			7	175	NA	Multimedia/ computer based	Group
Pophillat *et al.*[156] 2016	Universal	Primary	6–8	HIC	Usual curriculum	CBT			10	NR	Teacher	Face to face	Group
Pössel *et al.*[198] 2004	Universal	Secondary	13–14	HIC	Usual curriculum	CBT			10	900	Psychologist or graduate students	Face to face	Group
Pössel *et al.*[199] 2011	Universal	Secondary	12–13	HIC	Usual curriculum	CBT			10	900	Psychologist or graduate students	Face to face	Group

Study	Type	Setting	Age (years)	Country	Control	Intervention 1	Intervention 2	Intervention 3	Sessions (*n*)	Intensity (minutes)	Delivered by	Format 1	Format 2
Pössel *et al.*[200] 2013	Universal	Secondary	14–16	HIC	Usual curriculum	Attention control	CBT		10	900	Psychologist or graduate students	Face to face	Group
Potek[137] 2012	Universal	Secondary	14–17	HIC	Waiting list	Mindfulness/ relaxation			6	270	Psychologist	Face to face	Group
Quayle *et al.*[211] 2001	Universal	Primary	11–12	HIC	Waiting list	CBT			8	640	Psychologist	Face to face	Group
Raes *et al.*[201] 2014	Universal	Secondary	13–20	HIC	Usual curriculum	Third wave			8	800	Psychologist	Face to face	Group
Reynolds *et al.*[233] 2011	Universal	University	17.9	HIC	Usual curriculum	Behavioural therapy			14	1680	Psychologist	Face to face	Group
Rivet-Duval *et al.*[202] 2011	Universal	Secondary	12–16	MIC	Waiting list	CBT + IPT			11	660	Teacher	Face to face	Group
Roberts *et al.*[138] 2003	Universal	Secondary	11–13	HIC	Usual curriculum	CBT			12	NR	Psychologist	Face to face	Group
Roberts *et al.*[139] 2010	Universal	Secondary	11–13	HIC	Usual curriculum	CBT			20	1200	Teacher	Face to face	Group
Roberts *et al.*[240] 2018	Universal	Primary	9–12	HIC	Usual curriculum	CBT	CBT		20	1200	Teacher	Face to face	Group
Rodgers *et al.*[140] 2015	Universal	Secondary	12–13	HIC	Waiting list	CBT			10	600	Psychologist	Face to face	Group
Rooney *et al.*[157] 2006	Universal	Primary	8–9	HIC	No intervention	CBT			8	480	Psychologist	Face to face	Group
Rose *et al.*[203] 2014	Universal	Secondary	9–14	HIC	Waiting list	CBT + IPT	CBT + IPT		11	495	Psychologist	Face to face	Group
Ruttledge *et al.*[158] 2016	Universal	Primary	9–13	HIC	Waiting list	CBT			10	NR	Teacher	Face to face	Group
Sawyer *et al.*[204] 2010	Universal	Secondary	13.1	HIC	Usual curriculum	CBT			30	900	Teacher	Face to face	Group

continued

TABLE 26 Study characteristics for included studies: process and delivery (*continued*)

Study	Type	Setting	Age (years)	Country	Control	Intervention			Sessions (*n*)	Intensity (minutes)	Delivered by	Format	
						1	2	3				1	2
Shatté[205] 1997	Universal	Secondary	12–14	HIC	No intervention	Attention control	CBT		12	1440	Teachers and psychologist	Face to face	Group
Sheffield *et al.*[141] 2006	Universal	Secondary	13–15	HIC	No intervention	CBT			8	380	Teachers and psychologist	Face to face	Group
Soffer[212] 2003	Universal	Primary	10–11	HIC	No intervention	Attention control	Behavioural therapy		8	320	Psychologist	Face to face	Group
Spence *et al.*[206] 2003	Universal	Secondary	12–14	HIC	Usual curriculum	CBT			8	380	Teacher	Face to face	Group
Stallard *et al.*[142] 2013	Universal	Secondary	12–16	HIC	Usual curriculum	Attention control	CBT + IPT		9	495	Facilitator	Face to face	Group
Stallard *et al.*[159] 2014	Universal	Primary	9–10	HIC	Usual curriculum	CBT	CBT		9	540	Teacher and facilitator	Face to face	Group
Tak *et al.*[207] 2016	Universal	Secondary	12–14	HIC	Usual curriculum	CBT			16	800	Teacher and psychologist	Face to face	Group
Tomba *et al.*[143] 2010	Universal	Secondary	11.41	HIC	CBT	CBT			6	720	Psychologist	Face to face	Group
Velásquez *et al.*[189] 2015	Universal	Primary/ secondary	NR	MIC	Waiting list	Mindfulness/ relaxation			24	2880	Yoga trainer	Face to face	Group
Wong *et al.*[144] 2014	Universal	Secondary	14–16	HIC	Usual curriculum	CBT	CBT		6	240	Teacher	Multimedia/ computer based	Group
Arnarson and Craighead[213] 2009	Indicated	Secondary	14–15	HIC	No intervention	CBT + IPT			14	NR	Psychologist	Face to face	Group
Balle and Tortella-Feliu[160] 2010	Selective	Secondary	11–17	HIC	Waiting list	CBT			6	270	Psychologist	Face to face	Group
Berry and Hunt[161] 2009	Indicated	Secondary	12–15	HIC	Waiting list	CBT			8	480	Psychologist	Face to face	Group

Study	Type	Setting	Age (years)	Country	Control	Intervention			Sessions (*n*)	Intensity (minutes)	Delivered by	Format	
						1	2	3				1	2
Clarke *et al.*[214] 1995	Indicated	Secondary	14–16	HIC	No intervention	CBT			15	675	School psychologist	Face to face	Group
Congleton[215] 1995	Selective	Secondary	12–14	HIC	Waiting list	CBT			8	480	Psychologist	Face to face	Group
Cooley-Strickland *et al.*[174] 2011	Indicated	Primary	9–10	HIC	Waiting list	CBT			13	780	Psychologist	Face to face	Group
Cova *et al.*[162] 2011	Indicated	Secondary	14–15	MIC	No intervention	CBT			11	990	Psychologist	Face to face	Group
Cowell *et al.*[231] 2009	Selective	Primary	10.4	HIC	No intervention	Psychosupport			6	NR	Nurse	Face to face	Group
Cui *et al.*[183] 2016	Indicated	University	19.42	MIC	Waiting list	CBT	Psychosupport		8	960	Psychologist	Face to face	Group
Dobson *et al.*[163] 2010	Indicated	Secondary	13–18	HIC	Attention control	CBT			15	675	Psychologist	Face to face	Group
Ellis *et al.*[184] 2011	Indicated	University	18–25	HIC	No intervention	CBT	Psychosupport		3	300	NA	Multimedia/ computer based	Individual
Fitzgerald *et al.*[114] 2016	Indicated	Secondary	15–18	HIC	Attention control	BM			4	NR	Researcher	Multimedia/ computer based	Group
Fung *et al.*[216] 2016	Indicated	Secondary	12–14	HIC	Waiting list	Third wave			12	720	Psychologist	Face to face	Group
Gaete *et al.*[164] 2016	Indicated	Secondary	13–18	MIC	Usual curriculum	CBT			8	360	Psychologist	Face to face	Group
Gillham *et al.*[165] 2012	Indicated	Secondary	10–15	HIC	No intervention	CBT	CBT		10	900	Teacher and school counsellor	Face to face	Group
Hiebert *et al.*[130] 1989	Indicated	Secondary	15–17	HIC	Waiting list	Mindfulness/ relaxation	BIO		8	320	Psychologist	Face to face	Individual

continued

TABLE 26 Study characteristics for included studies: process and delivery (*continued*)

Study	Type	Setting	Age (years)	Country	Control	Intervention			Sessions (*n*)	Intensity (minutes)	Delivered by	Format	
						1	2	3				1	2
Higgins[185] 2007	Indicated	University	17–19	HIC	No intervention	CBT			2	240	Psychologist	Face to face	Group
Hunt *et al.*[166] 2009	Indicated	Secondary	11–13	HIC	No intervention	CBT			10	500	Teacher and school counsellor	Face to face	Group
Jaycox *et al.*[232] 1994	Indicated	Primary	10–13	HIC	Waiting list	CBT			12	1080	Psychologist	Face to face	Group
Jordans *et al.*[167] 2010	Selective	Secondary	11–14	LIC	Waiting list	Mixed			15	900	Researcher	Face to face	Group
Kiselica *et al.*[168] 1994	Indicated	Secondary	14–15	HIC	Psychoeducation	CBT			8	480	Counsellors	Face to face	Group
Liddle and Macmillan[188] 2010	Selective	Primary/ secondary	8–14	HIC	Waiting list	CBT			10	NR	Psychologist	Face to face	Group
Livheim *et al.*[217] 2015	Indicated	Secondary	12–17	HIC	Psychosupport	Third wave			8	NR	Psychologist	Face to face	Group
Manassis *et al.*[175] 2010	Indicated	Primary	8–11	HIC	Attention control	CBT			12	720	Psychologist	Face to face	Group
McCarty *et al.*[218] 2011	Indicated	Secondary	13	HIC	Usual curriculum	CBT			12	NR	Not clear	Face to face	Group
McCarty *et al.*[219] 2013	Indicated	Secondary	11–15	HIC	Psychosupport	CBT			12	600	Therapists	Face to face	Group
McLaughlin[236] 2011	Indicated	Primary/ secondary	10–15	HIC	Psychosupport	CBT			10	500	Psychologist	Face to face	Group
McLoone *et al.*[176] 2012	Indicated	Primary	7–10	HIC	Waiting list	CBT	CBT		10	600	School counsellors	Face to face	Group
Mifsud and Rapee[177] 2005	Indicated	Primary	8–11	HIC	Waiting list	CBT			8	480	School counsellors	Face to face	Group
Miller *et al.*[178] 2011	Indicated	Primary	7–12	HIC	Attention control	CBT			9	540	Teacher and school counsellor	Face to face	Group

Study	Type	Setting	Age (years)	Country	Control	Intervention 1	Intervention 2	Intervention 3	Sessions (*n*)	Intensity (minutes)	Delivered by	Format 1	Format 2
Noël *et al.*[220] 2013	Indicated	Secondary	13–15	HIC	Waiting list	CBT			12		Students	Face to face	Group
Owen and Lanning[169] 1982	Indicated	Secondary	15–16	HIC	Waiting list	Mindfulness/ relaxation	CBT	CBT	6	180	Counsellors	Face to face	Group
Peden *et al.*[234] 2000	Indicated	University	18–24	HIC	No intervention	CBT			NR	NR	NA	Face to face	Group
Peng *et al.*[170] 2015	Selective	Secondary	14.2	MIC	No intervention	Exercise			24	NR	NR	Face to face	Group
Poppelaars *et al.*[221] 2016	Indicated	Secondary	11–16	HIC	Waiting list	CBT	CBT	CBT	8	480	Psychologist	Face to face	Individual
Puskar *et al.*[222] 2003	Indicated	Secondary	14–18	HIC	No intervention	CBT			10	450	Nurse	Face to face	Group
Rice[171] 2009	Indicated	Secondary	10–18	HIC	Attention control	CBT	Mindfulness/ relaxation		16	560	Psychologist	Face to face	Group
Rohde *et al.*[223] 2014	Indicated	Secondary	13–19	HIC	Psychoeducation	CBT	CBT		6	360	Psychologist or self-help	Face to face	Group
Scholten *et al.*[172] 2016	Indicated	Secondary	11–15	HIC	Attention control	Biofeedback			6	360	Researcher	Multimedia/ computer based	Individual
Schoneveld *et al.*[115] 2016	Indicated	Primary	8–13	HIC	Attention control	Biofeedback			5	300	Researcher	Multimedia/ computer based	Group
Schoneveld *et al.*[116] 2018	Indicated	Primary	7–12	HIC	CBT	Biofeedback			6	360	Master's students and psychologist	Multimedia/ computer based	Group
Seligman *et al.*[186] 1999	Selective	University	19	HIC	No intervention	CBT			8	960	Psychologist	Face to face	Group/ individual
Seligman *et al.*[187] 2007	Selective	University	19	HIC	No intervention	CBT			8	960	Psychologist	Face to face/ multimedia	Group

continued

TABLE 26 Study characteristics for included studies: process and delivery (*continued*)

Study	Type	Setting	Age (years)	Country	Control	Intervention			Sessions (*n*)	Intensity (minutes)	Delivered by	Format	
						1	2	3				1	2
Sheffield *et al.*[141] 2006	Indicated	Secondary	13–15	HIC	No intervention	CBT	CBT	CBT	8	380	Teachers or school counsellor or both	Face to face	Group
Simpson[179] 2008	Indicated	Primary	7–11	HIC	Attention control	CBT			12	1080	NR	Face to face	Group
Siu[180] 2007	Indicated	Primary	7–10	HIC	Waiting list	CBT			8	NR	Counsellors	Face to face	Group
Sportel *et al.*[117] 2013	Indicated	Secondary	12–15	HIC	No intervention	BM	CBT		20	900	NA	Multimedia/ computer based	Individual
Stallard *et al.*[142] 2013	Indicated	Secondary	12–16	HIC	Usual curriculum	Usual curriculum	CBT + IPT		9	495	Facilitator	Face to face	Group
Stice *et al.*[237] 2006	Indicated	Secondary/ university	15–22	HIC	Waiting list	CBT			4	240	Psychologist	Face to face	Group
Stice *et al.*[224] 2008	Indicated	Secondary	14–19	HIC	No intervention	CBT self-help	Psychosupport	CBT	6	360	Self-help or psychologist	Face to face	Group
Stoppelbein[225] 2003	Indicated	Secondary	15	HIC	Attention control	CBT			10	500	Psychologist	Face to face	Group
Takagaki *et al.*[235] 2016	Indicated	University	18–19	HIC	No intervention	Behavioural therapy			5	300	Psychologist	Face to face	Group
Tokolahi *et al.*[181] 2018	Selective	Primary	7–12	HIC	Waiting list	Occupational therapy			8	480	Occupational therapist	Face to face	Group
Topper *et al.*[173] 2017	Selective	Secondary	15–22	HIC	Waiting list	CBT			6	540	Psychologist	Face to face	Group
van Starrenburg *et al.*[182] 2017	Indicated	Primary	7–13	HIC	Waiting list	CBT			12	720	Psychologist	Face to face	Group

Study	Type	Setting	Age (years)	Country	Control	Intervention			Sessions (*n*)	Intensity (minutes)	Delivered by	Format	
						1	2	3				1	2
Wijnhoven *et al.*[226] 2014	Indicated	Secondary	11–15	HIC	Waiting list	CBT			8	400	Therapist	Face to face	Group
Woods and Jose[227] 2011	Indicated	Secondary	14	HIC	Usual curriculum	CBT			8	720	School counsellors	Face to face	Group
Young *et al.*[228] 2006	Indicated	Secondary	11–16	HIC	Psychosupport	CBT			10	900	Psychologist/ social worker	Face to face	Group/ individual
Young *et al.*[229] 2010	Indicated	Secondary	13–17	HIC	Psychosupport	IPT			10	900	Psychologist	Face to face	Group/ individual
Young *et al.*[230] 2016	Indicated	Secondary	13.42	HIC	Psychosupport	IPT			11	450	Psychologist	Face to face	Group/ individual
Yu[238] 2002	Indicated	Primary/ secondary	8–15	MIC	No intervention	CBT			10	1200	Teacher	Face to face	Group

NA, not applicable; NR, not reported.

Risk-of-bias assessments for studies reporting anxiety or depression outcome

Risk-of-bias judgements were made for 137 studies included in the review of studies to prevent anxiety and/or depression. Each study was assessed using the Cochrane Risk of Bias tool, version 1.0,[79] which rates the risk of bias as low, unclear or high. For 'other bias', we considered cluster trials only, and examined bias arising from the timing of identification and recruitment of participants (recruitment bias). We also considered unit-of-analysis errors (not accounting for clustering) and possibility of contamination across clusters.

TABLE 27 Risk-of-bias assessment for all studies reporting an anxiety and/or depression outcome

Study	Population	Setting	Risk of bias						
			Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Selective reporting	Incomplete outcome data	Other bias (cluster RCTs)
Ahlen *et al.*[145] 2018	Universal	Primary	Low	Low	High	High	Low[a]	High	High
Anticich *et al.*[339] 2013	Universal	Primary	Unclear	Unclear	High	High	Unclear	Low	Unclear
Araya *et al.*[118] 2013	Universal	Secondary	Low	Unclear	High	High	Low[b]	Low	Unclear
Arnarson and Craighead[213] 2009	Indicated	Secondary	Unclear	Unclear	High	High	Unclear	High	NA
Attwood *et al.*[146] 2012	Universal	Primary	Unclear	Unclear	Unclear	Unclear	Unclear	High	NA
Aune and Stiles[119] 2009	Universal	Secondary	Unclear	Unclear	High	High	Unclear	Unclear	High
Baker and Butler[120] 1984	Universal	Secondary	Unclear	Unclear	High	High	Unclear	Unclear	High
Balle and Tortella-Feliu[160] 2010	Selective	Secondary	Unclear	Unclear	High	High	Unclear	Low	NA
Barrett and Turner[147] 2001	Universal	Primary	Unclear	Unclear	High	High	High	High	High
Barrett *et al.*[121] 2005	Universal	Secondary	Unclear	Unclear	High	High	Unclear	High	Unclear
Barry *et al.*[190] 2017	Universal	Secondary	Unclear	Unclear	High	High	Unclear	Low	NA
Berry and Hunt[161] 2009	Indicated	Secondary	Low	Unclear	High	High	Unclear	Low	Low
Bonhauser *et al.*[122] 2005	Universal	Secondary	Unclear	Unclear	High	High	High	Low	High
Bouchard *et al.*[148] 2013	Universal	Primary	Unclear	Unclear	High	High	Unclear	Low	Unclear

continued

TABLE 27 Risk-of-bias assessment for all studies reporting an anxiety and/or depression outcome (*continued*)

Study	Population	Setting	Risk of bias						
			Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Selective reporting	Incomplete outcome data	Other bias (cluster RCTs)
Britton *et al.*[123] 2014	Universal	Secondary	Low	High	High	High	Unclear	Low	NA
Burckhardt *et al.*[124] 2015	Universal	Secondary	Low	Unclear	Unclear	Unclear	Unclear[b]	High	Low
Burckhardt *et al.*[191] 2016	Universal	Secondary	Unclear	Unclear	High	High	High	High	High
Calear *et al.*[125] 2009	Universal	Secondary	Low	Low	High	High	Low[b]	Low	Low
Calear *et al.*[126] 2016	Universal	Secondary	Low	Low	High	High	Unclear[b]	Low	Low
Calear *et al.*[127] 2016	Universal	Secondary	Unclear	Unclear	High	High	Low[b]	Low	Unclear
Cardemil *et al.*[208] 2007	Universal	Primary	Unclear	Unclear	High	High	Unclear	High	NA
Chaplin *et al.*[192] 2006	Universal	Secondary	Low	Unclear	High	High	Unclear	High	NA
Clarke *et al.*[193] 1993	Universal	Secondary	Unclear	Unclear	High	High	High	Low	High
Clarke *et al.*[193] 1993	Universal	Secondary	Unclear	Unclear	High	High	High	High	High
Clarke *et al.*[214] 1995	Indicated	Secondary	Unclear	Unclear	High	High	Unclear	High	NA
Collins *et al.*[149] 2014	Universal	Primary	Unclear	Unclear	High	High	Unclear	High	High
Congleton[215] 1995	Selective	Secondary	Unclear	Unclear	High	High	Low[a]	High	NA
Cooley-Strickland *et al.*[174] 2011	Indicated	Primary	Unclear	Unclear	High	High	High	Unclear	High
Cova *et al.*[162] 2011	Indicated	Secondary	Unclear	Unclear	High	High	Unclear	Unclear	NA
Cowell *et al.*[231] 2009	Selective	Primary	Unclear	Unclear	High	High	Unclear	Unclear	High
Cui *et al.*[183] 2016	Indicated	University	Unclear	Unclear	High	High	Unclear	Low	High
Dadds and Roth[303] 2008	Universal	Primary	Unclear	Unclear	High	High	Unclear	High	High

Study	Population	Setting	Risk of bias						
			Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Selective reporting	Incomplete outcome data	Other bias (cluster RCTs)
Dobson *et al.*[163] 2010	Indicated	Secondary	Low	Unclear	Low	Low	Low[b]	Unclear	NA
Eather *et al.*[340] 2016	Universal	Secondary	Low	Low	High	High	Unclear[b]	Unclear	High
Ellis *et al.*[184] 2011	Indicated	University	Unclear	Unclear	High	High	Unclear	Unclear	NA
Essau *et al.*[150] 2012	Universal	Primary	Unclear	Unclear	High	High	Unclear	High	Unclear
Fitzgerald *et al.*[114] 2016	Indicated	Secondary	Unclear	Unclear	Low	Low	Low[b]	Unclear	NA
Fung *et al.*[216] 2016	Indicated	Secondary	Unclear	High	High	High	Unclear	Low	NA
Gaete *et al.*[164] 2016[b]	Indicated	Secondary	Low	Low	High	High	Low[b]	Unclear	NA
Gallegos[151] 2008	Universal	Primary	Unclear	Unclear	High	High	Low[a]	Unclear	High
Gillham[209] 1995	Universal	Primary	Unclear	Unclear	High	High	Low[a]	Unclear	NA
Gillham *et al.*[128] 2006	Universal	Secondary	Unclear	Unclear	High	High	Unclear	Unclear	NA
Gillham *et al.*[194] 2007	Universal	Secondary	Low	Unclear	High	High	Unclear	Unclear	NA
Gillham *et al.*[165] 2012	Indicated	Secondary	Low	Unclear	High	High	Low[b]	Unclear	NA
Gucht *et al.*[129] 2017	Universal	Secondary	Low	Unclear	High	High	Unclear	High	High
Haden *et al.*[341] 2014	Universal	Primary	Unclear	High	High	High	Unclear	Low	NA
Hiebert *et al.*[130] 1989	Indicated	Secondary	Unclear	Unclear	High	High	Unclear	Unclear	NA
Hiebert *et al.*[130] 1989	Universal	Secondary	Unclear	Unclear	High	High	Unclear	Unclear	NA
Higgins[185] 2007	Indicated	University	Unclear	Unclear	High	High	Unclear	High	NA
Hodas[131] 2016	Universal	Secondary	Unclear	Unclear	High	High	Low[a]	High	NA

continued

TABLE 27 Risk-of-bias assessment for all studies reporting an anxiety and/or depression outcome (*continued*)

Study	Population	Setting	Risk of bias						
			Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Selective reporting	Incomplete outcome data	Other bias (cluster RCTs)
Horowitz *et al.*[195] 2007	Universal	Secondary	Low	High	High	High	Unclear	Low	NA
Hunt *et al.*[166] 2009	Indicated	Secondary	Unclear	Unclear	High	High	Unclear	Low	NA
Jaycox *et al.*[232] 1994	Indicated	Primary	Unclear	Unclear	High	High	Unclear	High	NA
Johnson *et al.*[132] 2016	Universal	Secondary	Low	Unclear	High	High	Unclear	Low	NA
Johnson *et al.*[133] 2017	Universal	Secondary	Low	Unclear	High	High	Low[b]	Low	NA
Johnstone *et al.*[152] 2014	Universal	Primary	Unclear	Unclear	High	High	Unclear	Low	Low
Jordans *et al.*[167] 2010	Selective	Secondary	Low	Low	High	High	Low[b]	Low	Low
Khalsa *et al.*[239] 2012	Universal	Secondary	Unclear	Unclear	High	High	Unclear	High	High
Kindt *et al.*[196] 2014	Universal	Secondary	Low	Low	High	High	Low[b]	High	Low
Kiselica *et al.*[168] 1994	Indicated	Secondary	Unclear	Unclear	High	High	Unclear	Unclear	NA
Liddle and Macmillan[188] 2010	Selective	Primary/ secondary	Unclear	Unclear	High	High	Unclear	Unclear	NA
Livheim *et al.*[217] 2015	Indicated	Secondary	Low	Unclear	High	High	High	Unclear	NA
Lock and Barrett[134] 2003	Universal	Secondary	Unclear	Unclear	High	High	Unclear	High	High
Lowry-Webster *et al.*[135] 2001	Universal	Secondary	Unclear	Unclear	High	High	High	High	High
Manassis *et al.*[175] 2010	Indicated	Primary	Low	Unclear	Low	Low	Low[b]	Low	NA

Study	Population	Setting	Risk of bias						
			Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Selective reporting	Incomplete outcome data	Other bias (cluster RCTs)
McCarty *et al.*[218] 2011	Indicated	Secondary	Unclear	Unclear	High	High	Low[b]	Unclear	NA
McCarty *et al.*[219] 2013	Indicated	Secondary	Low	Low	Unclear	Unclear	Unclear	Unclear	NA
McLaughlin[236] 2011	Indicated	Primary/ secondary	Low	High	Low	Low	Low[a]	Unclear	NA
McLoone *et al.*[176] 2012	Indicated	Primary	Low	Unclear	High	High	High	Unclear	High
Mendelson *et al.*[210] 2010	Universal	Primary	Unclear	Unclear	High	High	Unclear	High	High
Merry *et al.*[197] 2004	Universal	Secondary	Low	Low	Low	Low	Unclear	High	NA
Mifsud and Rapee[177] 2005	Indicated	Primary	Unclear	Unclear	High	High	High	High	High
Miller *et al.*[153] 2010	Universal	Primary	Unclear	Unclear	High	High	Unclear	Low	High
Miller *et al.*[154] 2011	Universal	Primary	Unclear	Unclear	High	High	Unclear	Unclear	High
Miller *et al.*[178] 2011	Indicated	Primary	Unclear	Unclear	High	High	Unclear	Low	High
Miller *et al.*[154] 2011	Universal	Primary	Unclear	Unclear	High	High	Unclear	Low	Low
Noël *et al.*[220] 2013	Indicated	Secondary	Low	Unclear	High	High	Unclear	Low	NA
Owen and Lanning[169] 1982	Indicated	Secondary	Unclear	Unclear	High	High	Unclear	Low	NA
Pahl and Barrett[242] 2010	Universal	Primary	Unclear	Unclear	High	High	Unclear	High	High
Pattison and Lynd-Stevenson[155] 2001	Universal	Primary	Unclear	Unclear	High	High	Unclear	Low	NA
Peden *et al.*[234] 2000	Indicated	University	Unclear	Unclear	High	High	Unclear	Unclear	NA
Peng *et al.*[170] 2015	Selective	Secondary	Unclear	Unclear	High	High	Unclear	Low	Unclear

continued

TABLE 27 Risk-of-bias assessment for all studies reporting an anxiety and/or depression outcome (*continued*)

Study	Population	Setting	Risk of bias						
			Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Selective reporting	Incomplete outcome data	Other bias (cluster RCTs)
Perry *et al.*[136] 2017	Universal	Secondary	Unclear	Low	Low	Low	Low[b]	Low	Low
Pophillat *et al.*[156] 2016	Universal	Primary	Unclear	Unclear	High	High	Unclear	High	Low
Poppelaars *et al.*[221] 2016	Indicated	Secondary	Unclear	Low	High	High	Low[b]	Low	Low
Pössel *et al.*[198] 2004	Universal	Secondary	Unclear	Unclear	High	High	Unclear	High	Unclear
Pössel *et al.*[199] 2011	Universal	Secondary	Unclear	Unclear	High	High	High	High	Unclear
Pössel *et al.*[200] 2013	Universal	Secondary	Unclear	Unclear	High	High	Unclear	High	Unclear
Potek[137] 2012	Universal	Secondary	Unclear	Unclear	High	High	Unclear	Low	NA
Puskar *et al.*[222] 2003	Indicated	Secondary	Low	Unclear	High	High	Unclear	High	NA
Quayle *et al.*[211] 2001	Universal	Primary	Unclear	Unclear	High	High	Unclear	High	NA
Raes *et al.*[201] 2014	Universal	Secondary	Low	Low	High	High	Unclear	Low	Unclear
Reynolds *et al.*[233] 2011	Universal	University	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low
Rice[171] 2009	Indicated	Secondary	Unclear	Unclear	Unclear	Unclear	Low[a]	High	NA
Rivet-Duval *et al.*[202] 2011	Universal	Secondary	Unclear	High	High	High	Unclear	Low	NA
Roberts *et al.*[138] 2003	Universal	Secondary	Unclear	Unclear	High	High	Unclear	Low	Unclear
Roberts *et al.*[139] 2010	Universal	Secondary	Unclear	Unclear	High	High	Unclear	High	Unclear
Roberts *et al.*[240] 2018	Universal	Primary	Unclear	Unclear	High	High	Unclear	Low	Unclear

Study	Population	Setting	Risk of bias						
			Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Selective reporting	Incomplete outcome data	Other bias (cluster RCTs)
Rodgers *et al.*[140] 2015	Universal	Secondary	Unclear	Unclear	High	High	High	Unclear	NA
Rohde *et al.*[223] 2014	Indicated	Secondary	Low	Unclear	High	High	Unclear	Low	NA
Rooney *et al.*[157] 2006	Universal	Primary	Unclear	Unclear	High	High	Unclear	Unclear	Unclear
Rose *et al.*[203] 2014	Universal	Secondary	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Unclear
Ruttledge *et al.*[158] 2016	Universal	Primary	Low	Unclear	High	High	Unclear	Low	Unclear
Sawyer *et al.*[204] 2010	Universal	Secondary	Unclear	Low	High	High	Unclear	Unclear	Low
Scholten *et al.*[172] 2016	Indicated	Secondary	Low	Unclear	Unclear	Unclear	Low[b]	Low	NA
Schoneveld *et al.*[115] 2016	Indicated	Primary	Low	Low	Unclear	Unclear	Low[b]	Low	NA
Schoneveld *et al.*[116] 2018	Indicated	Primary	Low	Low	Low	Low	Low[b]	Low	NA
Seligman *et al.*[186] 1999	Selective	University	Unclear	Unclear	High	High	Unclear	Unclear	NA
Seligman *et al.*[187] 2007	Selective	University	Unclear	Unclear	High	High	Unclear	Unclear	NA
Shatté[205] 1997	Universal	Secondary	Unclear	Unclear	High	High	Unclear	Low	NA
Sheffield *et al.*[141] 2006	Universal	Secondary	Low	Low	High	High	Unclear	Low	High
Sheffield *et al.*[141] 2006	Indicated	Secondary	Low	Low	High	High	Unclear	Low	High
Simpson[179] 2008	Indicated	Primary	Unclear	Unclear	Low	Low	Unclear	Low	NA
Siu[180] 2007	Indicated	Primary	Unclear	Unclear	High	High	Unclear	Low	NA

continued

TABLE 27 Risk-of-bias assessment for all studies reporting an anxiety and/or depression outcome (*continued*)

Study	Population	Setting	Risk of bias						
			Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Selective reporting	Incomplete outcome data	Other bias (cluster RCTs)
Soffer[212] 2003	Universal	Primary	Unclear	Unclear	High	High	Low[a]	Unclear	NA
Spence *et al.*[206] 2003	Universal	Secondary	Unclear	Unclear	High	High	Unclear	High	Unclear
Sportel *et al.*[117] 2013	Indicated	Secondary	Low	Low	High	High	Low[b]	High	Unclear
Stallard *et al.*[142] 2013[b]	Universal	Secondary	Low	Low	High	High	Low[b]	High	Low
Stallard *et al.*[142] 2013[b]	Indicated	Secondary	Low	Low	High	High	Low[b]	High	Low
Stallard *et al.*[159] 2014[b]	Universal	Primary	Low	Low	High	High	Low[b]	Low	Low
Stice *et al.*[237] 2006	Indicated	Secondary/ university	Unclear	Unclear	High	High	Unclear	Low	NA
Stice *et al.*[224] 2008	Indicated	Secondary	Low	Unclear	High	High	Low[b]	Low	NA
Stoppelbein[225] 2003	Indicated	Secondary	Unclear	Unclear	Unclear	Unclear	Low[a]	High	Low
Tak *et al.*[207] 2016	Universal	Secondary	Unclear	Low	High	High	Low[b]	Unclear	Low
Takagaki *et al.*[235] 2016	Indicated	University	Low	Low	High	High	Low[b]	Low	NA
Tokolahi *et al.*[181] 2018	Selective	Primary	Low	Low	High	High	Low[b]	Low	Low
Tomba *et al.*[143] 2010	Universal	Secondary	Unclear	Unclear	Unclear	Unclear	Unclear	Low	High
Topper *et al.*[173] 2017	Selective	Secondary	Unclear	Low	High	High	Low[b]	Low	NA
van Starrenburg *et al.*[182] 2017	Indicated	Primary	Unclear	Unclear	High	High	Unclear[b]	Low	NA

Study	Population	Setting	Risk of bias						
			Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Selective reporting	Incomplete outcome data	Other bias (cluster RCTs)
Velásquez *et al.*[189] 2015	Universal	Primary/ secondary	Unclear	Unclear	High	High	Unclear	Low	Unclear
Wijnhoven *et al.*[226] 2014	Indicated	Secondary	Low	Low	High	High	Unclear	Low	NA
Wong *et al.*[144] 2014	Universal	Secondary	Low	Unclear	High	High	Low[b]	High	Unclear
Woods and Jose[227] 2011	Indicated	Secondary	Low	Unclear	High	High	Unclear	High	NA
Young *et al.*[228] 2006	Indicated	Secondary	Low	Unclear	Unclear	Unclear	Unclear	Low	NA
Young *et al.*[229] 2010	Indicated	Secondary	Low	Unclear	Unclear	Unclear	Low[b]	Low	NA
Young *et al.*[230] 2016	Indicated	Secondary	Low	Unclear	Unclear	Unclear	Unclear	Low	NA
Yu[238] 2002	Indicated	Primary/ secondary	Unclear	Unclear	High	High	Unclear	Unclear	NA

NA, not applicable.
a Thesis.
b Trial registration or protocol located and viewed.
Notes
Risk-of-bias assessments for studies reporting a conduct disorder outcome are reported in *Figure 16*. Where 'NA' is given in 'other bias', the trial was individually randomised.

Studies reporting facilitator fidelity and integrity measures

TABLE 28 Author-reported facilitator fidelity and/or integrity for studies reporting an anxiety or depression outcome

Study	Facilitator fidelity/integrity
Ahlen *et al.*[145] 2018	Teachers received regular e-mails and visits to check schedule adherence. Most teachers ($n = 17$) completed all 10 sessions, two completed eight sessions and one completed six of the 10 scheduled sessions. Sessions were not recorded satisfactorily
Aune and Stiles[119] 2009	Adherence and competence were rated as very good to excellent (adherence: mean = 5.33, competence: mean = 5.67)
Barrett and Turner[147] 2001	88–92% concordance reported
Barrett *et al.*[121] 2005	88.8–95.6% concordance between session and manual content was reported
Burckhardt *et al.*[191] 2016	Sessions were audio-recorded. Adherence to acceptance and commitment therapy was scored on a four-point Likert scale where 1 = minimal and 4 = very high adherence. The mean across all session components was 3.0
Clarke *et al.*[193] 1993	Mean compliance for evaluated sessions was 86.2% (range 61–100%) compliance
Clarke *et al.*[214] 1995	Sessions were audio-recorded. Adherence averaged 93.9% compliance (SD 5.2%, range 77.8–100% protocol compliance)
Collins *et al.*[149] 2014	Authors reported a high level of fidelity to intervention content by lesson and facilitator groups. Mean fidelity rating across all sessions: 6.31 (on a seven-point scale)
Dadds and Roth[303] 2008	Across all sessions, mean adherence to the manual/ intended intervention was 96% (range 83–100%)
Dobson *et al.*[163] 2010	Adherence to intervention protocol was assessed by audio-tape. The first author listened to randomly selected tapes and tried to identify the intervention. Identification was 100% accurate. The authors stated that this suggests 'strong adherence to treatment protocols'
Essau *et al.*[150] 2012	*Adherence to the intervention content ranged from 78[%] to 97%*
Gallegos[151] 2008	Compliance with the programme manual was reported by classroom. The mean compliance across all classrooms was 2.07 (four-point scale, 1 = extremely well and 4 = not at all)
Gillham *et al.*[194] 2007	Sessions were audio-taped and integrity scores rated on a seven-point scale (7 = excellent coverage). Integrity score for degree of items covered: PRP mean 4.9 (SD 0.48); PEP mean 4.4 (SD 0.36). Integrity score for percentage of items covered satisfactorily: PRP 80% (SD 7.5%); PEP 68% (SD 5.7%)
Gillham *et al.*[165] 2012	PRP sessions were audio-taped: *On average, group leaders covered 68% of the integrity items to some degree (rated $\geq$ 2) and 47% of the items satisfactorily (rated $\geq$ 4)*
Hunt *et al.*[166] 2009	Facilitators were asked to rate their compliance to intervention content and aims. A total of 49.0% complied 'extremely well' and 44.8% 'moderately well'. Sessions were also audio-recorded; however, only 40% of schools provided usable audio-tapes. Of these, only half (55%) were rated as complying moderately or extremely well to the intervention content and activities
Johnson *et al.*[133] 2017	An average proficiency score of 5 out of 6 was given for facilitator adherence and competence
Johnstone *et al.*[152] 2014	Implementation integrity was recorded by 88.46% of teachers in a logbook. The average content covered was mean 95.6% (SD 5.31%)
Kindt *et al.*[196] 2014	A total of 16 out of 28 teachers filled out adherence reports for OVK. On average, 80.5% of lessons were taught (95.3% of the first eight and 65.5% of the last eight lessons)

TABLE 28 Author-reported facilitator fidelity and/or integrity for studies reporting an anxiety or depression outcome (*continued*)

Study	Facilitator fidelity/integrity
McCarty *et al.*[219] 2013	For the Positive Thoughts and Actions intervention, video-recordings were reviewed; the mean facilitator adherence to core concepts of the intervention was 92%, (range 73–100%). For the control intervention, audio-recorded interviews were reviewed; the mean facilitator adherence was 92% (range 80–96%)
Miller *et al.*[154] 2011	Two sessions were audio-recorded. Adherence to intervention content and objectives ranged from 96.4% (session 3) to 83.3% (session 6)
Miller *et al.*[178] 2011	Sessions were audio-recorded and rated by graduate students using a Likert scale. Adherence to programme objectives ranged from 76.85% to 79.51%
Miller *et al.*[154] 2011	Sessions were audio-recorded and rated by graduate students using a Likert scale. Adherence to programme objectives ranged from 76.85% to 79.51%
Pahl and Barrett[242] 2010	Facilitators completed logbooks. Mean adherence to the manual was 94% (range 90–98%)
Pössel *et al.*[200] 2013	Facilitators recorded their adherence to the intervention manual after each session. Adherence was 91.6% in the CBT intervention and 92.4% in the control intervention
Roberts *et al.*[138] 2003	Facilitators completed integrity checklists. The mean percentage of content covered was 74.11%. Sessions were also audio-recorded. No difference between facilitator-rated adherence and independent assessment of session recordings was reported
Roberts *et al.*[139] 2010	The mean percentage of teacher-reported intervention adherence in the SLS lessons was 95.3% (range 87.3–98.3%). The mean percentage of teacher-reported content adherence in the OTS lessons was 98.04% (range 97.5–100%). Independent assessment agreed with teachers' reporting (100% agreement)
Roberts *et al.*[240] 2018	Intervention content comprised 10 modules. Average module implementation for SLS: teacher training-only arm, 9.16 (SD 2.02); teacher training + coaching, 9.24 (SD 1.74). Average module implementation for OTS: teacher training-only arm, 7.92 (SD 3.25); teacher training + coaching arm, 8.06 (SD 3.56)
Rodgers and Dunsmuir[140] 2015	Random sessions were video-recorded. Protocol fidelity and integrity checks 'showed concordance between session and manual content (89%)'
Rohde *et al.*[223] 2014	Sessions were recorded. Adherence and competence were rated on 10-point scales, on which higher scores indicated higher adherence/competence. The mean adherence was 7.0 (SD 0.7) and mean competence was 7.1 (SD 0.7)
Rose *et al.*[203] 2014	*No deviations from the manualized programs were observed*
Ruttledge *et al.*[158] 2016	*All teachers returned the fidelity checklist confirming that they had delivered all 10 sessions of the programme in sequence and covered the key components*
Sawyer *et al.*[204] 2010	Session materials were manualised, and teachers completed checklists on session content completion. Checklists were returned by 36–44% of teachers across the 3 years. Teachers covered a mean of 70% of content and activities in Year 8 (range 17–100%), a mean of 70% in Year 9 (range 21–100%) and a mean of 74% in Year 10 (range 20–100%)
Sheffield *et al.*[141] 2006 (universal)	*The mean number of program elements completed each session was 85%*
Sheffield *et al.*[141] 2006 (indicated)	*The mean number of program elements completed each session was > 92%*
Soffer[212] 2003	Sessions were audio-taped and were evaluated by independent assessors, who concluded that 'All sessions met 100% adherence to the treatment manuals'
Spence *et al.*[206] 2003	All teachers reported 100% of the materials were completed in five sessions (sessions 1, 2, 6, 7 and 8). Half of the teachers did not complete the remaining sessions or only partially completed the content (sessions 3–5)

continued

TABLE 28 Author-reported facilitator fidelity and/or integrity for studies reporting an anxiety or depression outcome (*continued*)

Study	Facilitator fidelity/integrity
Stallard *et al.*[142] 2013	*Of the 36 classroom-based CBT sessions observed to assess intervention fidelity, 31 covered all the core tasks, with at least 75% of core tasks being covered in the remaining five sessions*
Stallard *et al.*[159] 2014	One session from each school was audio-taped and evaluated independently. In the health-led intervention, 100% of sessions delivered the core intervention tasks and home activities. In the school-led intervention, 60% of the sessions implemented all the core tasks and home activities and 32% delivered all core tasks, but not home activities
Stice *et al.*[224] 2008	Adherence to intervention components and facilitator competence were evaluated. Cognitive behavioural intervention: 96% of intervention components were delivered and 94% of items were delivered with good competence. Supportive–expressive intervention: 100% of components were fully adhered to and 94% of items were delivered with good competence
Tak *et al.*[207] 2016	Facilitators completed a self-reported questionnaire for assessing fidelity: *Program fidelity was 80%*
Takagaki *et al.*[235] 2016	Sessions were audio-recorded. A checklist was used to evaluate the facilitators' adherence to intervention content and protocol: *. . . the therapist's adherence to the protocol was 100%*
Topper *et al.*[173] 2017	Sessions were audio-taped: *On average, 93% of the essential and required elements of the protocol were completed per session*
Young *et al.*[230] 2016	Sessions were audio-recorded and followed a manual. Sessions were rated by an 'experienced clinician'; 98.5 % of techniques were delivered with fidelity. A total of 49% of techniques were satisfactorily delivered and 49.5% were rated superior for delivery

OTS, optimistic thinking skills; OVK, Op Volle Kracht; PEP, Penn Enhancement Program; PRP, Penn Resilience Program; SLS, social life skills.
Note
As reported by study authors (if available).

Appendix 3 Network meta-analysis results

Model fit tables: by population, setting and outcome

Tables 29–46 report model fit statistics for each population, setting and time point analysis. Model fit for depression (*Tables 38–46*) and anxiety outcomes (*Tables 29–37*) are reported in separate tables. We assessed both fixed- and random-effects models on the basis of model fit. Component-level models were fitted assuming consistency and random-effects only. Heterogeneity was evaluated by examining the posterior median between-study SD (τ) and 95% CrIs from the random-effects model, and by comparing model fit of the fixed- and random-effects models. Model fit was measured by the posterior mean of residual deviance. In addition, we examined the DIC, which penalises model fit with model complexity. Differences of ≥ 5 points for posterior mean residual deviance and DIC were considered meaningful, with lower values preferred.[101] Inconsistency was assessed by comparing the goodness of fit of a model, assuming consistency with one allowing for inconsistency (i.e. a model that provides effect estimates based on direct evidence only). A common between-study variance was also assumed for both the consistency and inconsistency models.

TABLE 29 Model fit statistics: universal population, secondary setting: anxiety

Population	Setting	Time point	Model	Data points[a]	Residual deviance[b]	DIC	P_D[c]	SD (τ) (95% CrI)	Convergence[d]	Chains
Intervention-level NMA										
Universal	Secondary	Post intervention	Fixed effect, consistency	45	92.9	112.8	27	–	40,000	3
		Post intervention	Random effects, consistency		49.5	102.0	35.4	0.11 (0.02 to 0.22)	100,000	3
		Post intervention	Random effects, inconsistency		49.9	102.2	35.2	0.15 (0.01 to 0.20)	30,000	3
Component-level NMA (random effects, consistency)										
Universal	Secondary	Post intervention	Intervention[e]	45	49.3	101.7	35.3	0.11 (0.02 to 0.22)	20,000	2
		Post intervention	Additive component level[f]		47.6	100.5	35.8	0.06 (0.00 to 0.21)	40,000	2
		Post intervention	Full interaction component level		48.2	102.6	37.7	0.09 (0.01 to 0.24)	200,000	2

BGR, Brooks–Gelman–Rubin.
a Number of data points (equivalent to total number of study arms).
b Posterior mean residual deviance.
c Effective number of parameters in model parameters.
d Convergence: number of iterations before convergence occurred, on X chains, observed using BGR diagnostic tool in OpenBUGS.
e Intervention = main effects or intervention-level NMA model.
f Additive component model (components nested within the intervention).

Note

Intervention-level, additive-component and full interaction-component models fitted assuming random effects and consistency.
Priors:

- between-study SD: uniform(0,5)
- treatment effect: normal(0,1000).

TABLE 30 Regression coefficients estimated from additive and full interaction component models: universal, secondary, anxiety

Component model	Intervention	Regression coefficient	95% CrI
Additive	CBT + psychoeducation	−0.39	−0.78 to 0.01
	CBT + mindfulness	0.57	0.08 to 1.03
	CBT + relaxation	0.07	−0.21 to 0.38
Full interaction	CBT + relaxation	−31.58	−144.30 to 90.75
	CBT + psychoeducation	−0.39	−0.83 to 0.06
	CBT + psychoeducation + relaxation	−0.30	−0.84 to 0.27
	CBT + psychoeducation + mindfulness + relaxation	−31.41	−144.10 to 90.93

Additive and full interaction component models were fitted assuming consistency and random effects.

TABLE 31 Model fit statistics: universal population, primary setting: anxiety

Population	Setting	Time point	Model	Data points[a]	Residual deviance[b]	DIC	P_D[c]	SD (τ) (95% CrI)	Convergence[d]	Chains
Intervention-level NMA										
Universal	Primary	Post intervention	Fixed effect, consistency	34	43.0	145.7	19	–	20,000	3
			Random effects, consistency		37.4	145.8	24.6	0.10 (0.01 to 0.26)	100,000	3
			Random effects, inconsistency		39.7	148.4	25.0	0.08 (0.00 to 0.26)	200,000	3
Component-level NMA (random effects, consistency)										
Universal	Primary	Post intervention	Intervention[e]	34	37.6	145.7	24.6	0.09 (0.00 to 0.26)	20,000	2
			Additive component level[f]		36.0	147.5	27.8	0.13 (0.01 to 0.34)	20,000	2
			Full interaction component level		36.0	148.6	28.9	0.15 (0.01 to 0.36)	20,000	2

BGR, Brooks–Gelman–Rubin.
a Number of data points (equivalent to total number of study arms).
b Posterior mean residual deviance.
c Effective number of parameters in model parameters.
d Convergence: number of iterations before convergence occurred, on X chains, observed using BGR diagnostic tool in OpenBUGS.
e Intervention = main effects or intervention-level NMA model.
f Additive component model (components nested within the intervention).

Note

Intervention-level, additive-component and full interaction-component models fitted assuming random effects and consistency.
Priors:

- between-study SD: uniform(0,5)
- treatment effect: normal(0,1000).

TABLE 32 Regression coefficients estimated from additive and full interaction component models: universal, primary, anxiety

Component model	Intervention	Regression coefficient	95% CrI
Additive	CBT + psychoeducation	−0.13	−0.51 to 0.22
	CBT + relaxation	0.20	−0.17 to 0.55
Full interaction	CBT + psychoeducation	0.11	−0.53 to 0.74
	CBT + relaxation	−0.24	−0.97 to 0.49
	CBT + psychoeducation + relaxation	−0.01	−0.63 to 0.62

Additive and full interaction component models were fitted assuming consistency and random effects.

TABLE 33 Model fit statistics: targeted population, secondary setting: anxiety

Population	Setting	Time point	Model	Data points[a]	Residual deviance[b]	DIC	P_D[c]	SD (τ) (95% CrI)	Convergence[d]	Chains
Intervention-level NMA										
Targeted	Secondary	Post intervention	Fixed effect, consistency	36	38.0	104.4	23	–	50,000	3
			Random effects, consistency		36.3	105.8	26.1	0.06 (0.00 to 0.21)	100,000	3
			Random effects, inconsistency		37.7	110.1	28.9	0.06 (0.00 to 0.23)	150,000	3
Component-level NMA (random effects, consistency)										
Targeted	Secondary	Post intervention	Intervention[e]	36	36.01	105.4	26	0.06 (0.00 to 0.22)	20,000	2
			Additive component level[f]		37.6	109.5	28.6	0.08 (0.00 to 0.26)	30,000	2
			Full interaction component level		37.4	109.1	28.3	0.08 (0.00 to 0.26)	20,000	2

BGR, Brooks–Gelman–Rubin.
a Number of data points (equivalent to total number of study arms).
b Posterior mean residual deviance.
c Effective number of parameters in model parameters.
d Convergence: number of iterations before convergence occurred, on X chains, observed using BGR diagnostic tool in OpenBUGS.
e Intervention = main effects or intervention-level NMA model.
f Additive component model (components nested within the intervention).

Note

Intervention-level, additive-component and full interaction-component models fitted assuming random effects and consistency.
Priors:

- between-study SD: uniform(0,5)
- treatment effect: normal(0,1000).

TABLE 34 Regression coefficients estimated from additive and full interaction component models: targeted, secondary, anxiety

Component model	Intervention	Regression coefficient	95% CrI
Additive	CBT + psychoeducation	0.12	−0.53 to 0.74
	CBT + relaxation	−0.04	−0.29 to 0.23
Full interaction	CBT + psychoeducation	0.88	−193.90 to 196.50
	CBT + relaxation	0.12	−0.50 to 0.72
	CBT + psychoeducation + relaxation	0.08	−0.57 to 0.69

Additive and full interaction component models were fitted assuming consistency and random effects.

TABLE 35 Model fit statistics: targeted population, primary setting: anxiety

Population	Setting	Time point	Model	Data points[a]	Residual deviance[b]	DIC	P_D[c]	SD (τ) (95% CrI)	Convergence[d]	Chains
Intervention-level NMA										
Targeted	Primary	Post intervention	Fixed effects, consistency	25	53.3	83.8	15	–	100,000	3
			Random effects, consistency		23.9	61.5	22.2	0.42 (0.21 to 0.89)	60,000	3
			Random effects, inconsistency		24.0	61.8	22.2	0.43 (0.21 to 0.91)	50,000	3
Component-level NMA (random effects, consistency)										
Targeted	Primary	Post intervention	Intervention[e]	25	23.9	62.3	22.2	0.42 (0.21 to 0.89)	20,000	2
			Additive component level[f]		23.2	62.3	22.9	0.70 (0.31 to 2.28)	20,000	2
			Full interaction component level		23.3	62.6	23.0	0.69 (0.30 to 2.29)	20,000	2

BGR, Brooks–Gelman–Rubin.
a Number of data points (equivalent to total number of study arms).
b Posterior mean residual deviance.
c Effective number of parameters in model parameters.
d Convergence: number of iterations before convergence occurred, on X chains, observed using BGR diagnostic tool in OpenBUGS.
e Intervention = main effects or intervention-level NMA model.
f Additive component model (nested within the intervention).

Note

Intervention-level, additive-component and full interaction-component models fitted assuming random effects and consistency.
Priors:

- between-study SD: uniform(0,5)
- treatment effect: normal(0,1000).

TABLE 36 Regression coefficients estimated from additive and full interaction component models: targeted, primary, anxiety

Component model	Intervention	Regression coefficient	95% CrI
Additive	CBT + psychoeducation	0.08	−3.11 to 3.33
	CBT + behavioural	0.06	−2.54 to 2.63
	CBT + relaxation	−0.31	−1.84 to 1.16
Full interaction	CBT + behavioural + relaxation	−0.32	−3.75 to 3.24
	CBT + psychoeducation + behavioural	0.05	−2.46 to 2.64
	CBT + psychoeducation + relaxation	−0.26	−2.82 to 2.29

Additive and full interaction component models were fitted assuming consistency and random effects.

TABLE 37 Model fit statistics: targeted population, tertiary/university setting: anxiety

Population	Setting	Time point	Model	Data points[a]	Residual deviance[b]	DIC	P_D[c]	SD (τ) (95% CrI)	Chains	Convergence[d]
Intervention-level NMA										
Targeted	Tertiary/ university	Post intervention	Fixed effect, consistency	10	16.9	39.9	7.0	–	2	10,000
		Post intervention	Random effects, consistency		10.7	36.6	9.9	0.43 (0.05 to 2.24)	2	100,000
		Post intervention	Random effects, inconsistency		9.8	35.1	9.4	0.21 (0.01 to 2.68)	2	50,000

BGR, Brooks–Gelman–Rubin.
a Number of data points (equivalent to total number of study arms).
b Posterior mean residual deviance.
c Effective number of parameters in model parameters.
d Convergence: number of iterations before convergence occurred, on X chains, observed using BGR diagnostic tool in OpenBUGS.
Note
Priors:
- between-study SD: uniform(0,5)
- treatment effect: normal(0,1000).

TABLE 38 Model fit statistics: universal population, secondary setting: depression

Population	Setting	Time point	Model	Data points[a]	Residual deviance[b]	DIC	P_D[c]	SD (τ) (95% CrI)	Chains	Convergence[d]
Intervention-level NMA										
Universal	Secondary	Post intervention	Fixed effect, consistency	76	139.7	212.4	43.0	–	3	30,000
		Post intervention	Random effects, consistency		78.3	172.3	64.3	0.15 (0.10 to 0.22)	3	100,000
		Post intervention	Random effects, inconsistency		80.0	175.1	65.5	0.15 (0.09 to 0.23)	3	100,000
Component-level NMA (random effects, consistency)										
Universal	Secondary	Post intervention	Intervention[e]	76	78.3	172.3	64.3	0.15 (0.10 to 0.22)	2	20,000
		Post intervention	Additive component level[f]		77.2	173.9	67	0.14 (0.08 to 0.22)	2	20,000
		Post intervention	Full interaction component level		77.6	176.5	69.2	0.15 (0.10 to 0.23)	2	20,000

BGR, Brooks–Gelman–Rubin.
a Number of data points (equivalent to total number of study arms).
b Posterior mean residual deviance.
c Effective number of parameters in model parameters.
d Convergence: number of iterations before convergence occurred, on X chains, observed using BGR diagnostic tool in OpenBUGS.
e Intervention = main effects or intervention-level NMA model.
f Additive component model (components nested within the intervention).

Note

Intervention-level, additive-component and full interaction-component models fitted assuming random effects and consistency.
Priors:

- between-study SD: uniform(0,5)
- treatment effect: normal(0,1000).

TABLE 39 Regression coefficients estimated from additive and full interaction component models: universal, secondary, depression

Component model	Intervention	Regression coefficient	95% CrI
Additive	Cognitive + psychoeducation	0.12	−0.05 to 0.29
	Cognitive + behavioural	0.56	−0.21 to 1.34
	Cognitive + mindfulness	−0.03	−0.40 to 0.34
	Cognitive + relaxation	0.01	−0.17 to 0.20
	Third wave + psychoeducation	−0.45	−0.87 to −0.04
	Third wave + (mindfulness + relaxation)	−0.30	−0.77 to 0.17
Full interaction	Cognitive + behavioural	0.00	0.00 to 0.00
	Cognitive + behavioural + relaxation	−0.08	−0.36 to 0.19
	Cognitive + psychoeducation	−0.53	−1.31 to 0.25
	Cognitive + psychoeducation + behavioural + relaxation	0.05	−0.17 to 0.28
	Cognitive + psychoeducation + behavioural + mindfulness + relaxation	0.01	−0.42 to 0.44
	Third wave + psychoeducation	0.16	−0.26 to 0.58
	Third wave + mindfulness + relaxation	−0.30	−0.81 to 0.21

Additive and full interaction component models were fitted assuming consistency and random effects.

TABLE 40 Model fit statistics: universal population, primary setting: depression

Population	Setting	Time point	Model	Data points[a]	Residual deviance[b]	DIC	P_D[c]	SD (τ) (95% CrI)	Chains	Convergence[d]
Intervention-level NMA										
Universal	Primary	Post intervention	Fixed effect, consistency	29	66.4	127.3	17.0	–	3	30,000
		Post intervention	Random effects, consistency		28.9	98.7	26	0.32 (0.18 to 0.59)	3	100,000
		Post intervention	Random effects, inconsistency		28.8	98.4	25.7	0.28 (0.15 to 0.52)	3	200,000
Component-level NMA (random effects, consistency)										
Universal	Primary	Post intervention	Intervention[e]	29	28.8	98.6	26	0.33 (0.18 to 0.60)	2	20,000
		Post intervention	Additive component level[f]		28.8	99.5	26.9	0.37 (0.20 to 0.70)	2	20,000
		Post intervention	Full interaction component level		28.9	100.1	27.3	0.39 (0.21 to 0.78)	2	20,000

BGR, Brooks–Gelman–Rubin.
a Number of data points (equivalent to total number of study arms).
b Posterior mean residual deviance.
c Effective number of parameters in model parameters.
d Convergence: number of iterations before convergence occurred, on X chains, observed using BGR diagnostic tool in OpenBUGS.
e Intervention = main effects or intervention-level NMA model..
f Additive component model (components nested within the intervention).

Note

Intervention-level, additive-component and full interaction-component models fitted assuming random effects and consistency.
Priors:

- between-study SD: uniform(0,5)
- treatment effect: normal(0,1000).

TABLE 41 Regression coefficients estimated from additive and full interaction component models: universal, primary, depression

Component model	Intervention	Regression coefficient	95% CrI
Additive	CBT + psychoeducation	0.02	−0.91 to 0.96
	CBT + relaxation	−0.09	−0.73 to 0.52
Full interaction	CBT + psychoeducation	−0.35	−1.40 to 0.69
	CBT + relaxation	−0.36	−1.94 to 1.25
	CBT + psychoeducation + relaxation	−0.29	−1.72 to 1.16

Additive and full interaction component models were fitted assuming consistency and random effects.

TABLE 42 Model fit statistics: targeted population, secondary setting: depression

Population	Setting	Time point	Model	Data points[a]	Residual deviance[b]	DIC	P_D[c]	SD (τ) (95% CrI)	Chains	Convergence[d]
Intervention-level NMA										
Targeted	Secondary	Post intervention	Fixed effect, consistency	55	144.1	252.4	34.0	–	3	30,000
		Post intervention	Random effects, consistency		57.6	183.2	51.4	0.38 (0.25 to 0.58)	3	100,000
		Post intervention	Random effects, inconsistency		58.7	184.7	51.7	0.37 (0.24 to 0.58)	3	150,000
Component-level NMA (random effects, consistency)										
Targeted	Secondary	Post intervention	Intervention[e]	55	57.5	183.1	51.4	0.38 (0.25 to 0.58)	2	20,000
		Post intervention	Additive component level[f]		58.0	184.3	52.0	0.35 (0.21 to 0.58)	2	20,000
		Post intervention	Full interaction component level		58.1	185.8	53.5	0.38 (0.24 to 0.62)	2	20,000

BGR, Brooks–Gelman–Rubin.
a Number of data points (equivalent to total number of study arms).
b Posterior mean residual deviance.
c Effective number of parameters in model parameters.
d Convergence: number of iterations before convergence occurred, on X chains, observed using BGR diagnostic tool in OpenBUGS.
e Intervention = main effects or intervention-level model.
f Additive component model (components nested within the intervention).
Note
Intervention-level, additive-component and full interaction-component models fitted assuming random effects and consistency.
Priors:
- between-study SD: uniform(0,5)
- treatment effect: normal(0,1000).

TABLE 43 Regression coefficients estimated from additive and full interaction component models: targeted, secondary, depression

Component model	Intervention	Regression coefficient	95% CrI
Additive	CBT + cognitive	−0.20	−1.02 to 0.62
	CBT + psychoeducation	0.37	−0.09 to 0.84
	CBT+ behavioural	−0.10	−0.61 to 0.40
	CBT + relaxation	0.22	−0.24 to 0.71
Full interaction	Cognitive + behavioural	−0.11	−0.71 to 0.53
	Cognitive + behavioural + relaxation	−0.16	−0.95 to 0.64
	Cognitive + psychoeducation	0.55	−0.28 to 1.38
	Cognitive + psychoeducation + behavioural	0.11	−0.51 to 0.73
	Cognitive + psychoeducation + behavioural + relaxation	0.50	−0.27 to 1.29

Additive and full interaction component models were fitted assuming consistency and random effects.

TABLE 44 Model fit statistics: targeted population, primary setting: depression

Population	Setting	Time point	Model	Data points[a]	Residual deviance[b]	DIC	P_D[c]	SD (τ) (95% CrI)	Convergence[d]	Chains
Intervention-level NMA										
Targeted	Primary	Post intervention	Fixed effect, consistency	10	15.5	41.2	8.0	–	10,000	3
		Post intervention	Random effects, consistency		10.3	38.1	10.5	0.60 (0.08 to 3.80)	60,000	3
		Post intervention	Random effects, inconsistency		10.3	38	10	0.60 (0.07 to 3.79)	100,000	3
Component-level NMA (random effects, consistency)										
Targeted	Primary	Post intervention	Intervention[e]	10	10.3	38.1	10.1	0.62 (0.07 to 3.74)	20,000	2
		Post intervention	Additive component level[f]		10.0	37.8	10.4	2.48 (0.12 to 4.87)	50,000	2
		Post intervention	Full interaction component level		9.9	37.7	9.9	2.43 (0.12 to 4.87)	40,000	2

BGR, Brooks–Gelman–Rubin.
a Number of data points (equivalent to total number of study arms).
b Posterior mean residual deviance.
c Effective number of parameters in model parameters.
d Convergence: number of iterations before convergence occurred, on X chains, observed using BGR diagnostic tool in OpenBUGS.
e Intervention = main effects or intervention-level NMA model.
f Additive component model (components nested within the intervention).

Note

Intervention-level, additive-component and full interaction-component models fitted assuming random effects and consistency.
Priors:

- between-study SD: uniform(0,5)
- treatment effect: normal(0,1000).

TABLE 45 Regression coefficients estimated from additive and full interaction component models: targeted, primary, depression

Component model	Intervention	Regression coefficient	95% CrI
Additive	CBT + psychoeducation	−0.73	−9.65 to 8.19
	CBT + behavioural	−0.21	−9.10 to 8.59
	CBT + relaxation	−5.62	−144.70 to 144.50
Full interaction	Cognitive + behavioural + relaxation	−16.39	−99.72 to 96.58
	Cognitive + psychoeducation + behavioural	−0.28	−9.10 to 8.41
	Cognitive + psychoeducation + behavioural + relaxation	−17.12	−100.40 to 95.73

Additive and full interaction component models were fitted assuming consistency and random effects.

TABLE 46 Model fit statistics: targeted population, tertiary/university setting, depression

Population	Setting	Time point	Model	Data points[a]	Residual deviance[b]	DIC	P_D[c]	SD (τ) (95% CrI)	Convergence[d]
Intervention-level NMA									
Targeted	Tertiary/university	Post intervention	Fixed effect, consistency	12	22.4	51.0	9.0	–	30,000
		Post intervention	Random effects, consistency		12.5	44.0	12.0	0.51 (0.12 to 2.50)	70,000
		Post intervention	Random effects, inconsistency		11.8	43.0	11.6	0.26 (0.02 to 2.48)	150,000

BGR, Brooks–Gelman–Rubin.
a Number of data points (equivalent to total number of study arms).
b Posterior mean residual deviance.
c Effective number of parameters in model parameters.
d Convergence: number of iterations before convergence occurred, on X chains, observed using BGR diagnostic tool in OpenBUGS.
Note
Priors:
- between-study SD: uniform(0,5)
- treatment effect: normal(0,1000).

Appendix 4 Full network meta-analysis and standard pairwise meta-analyses

The following tables report the random-effects consistency results for all populations and settings and are presented alongside the pairwise meta-analyses, if data were available.

Pairwise meta-analyses were conducted for all intervention and control comparisons for which direct head-to-head evidence was available. The method of estimation is similar to the NMA, except that the consistency assumption is removed, such that intervention effects for separate comparisons are unrelated and separate intervention effects can be estimated. Estimates are reported for the immediate post-intervention main time point only and are from a random-effects model that assumes that the heterogeneity parameter is common across intervention comparisons. This better reflects the assumption made in the NMA and, therefore, allows a fair comparison of the intervention effect estimates obtained from both approaches. Vague prior distributions were used for all parameters, and convergence is reported in the model fit tables above (*Tables 29–46*).

Intervention effect estimates are reported as standardised mean differences and interventions labelled numerically. Intervention comparisons are interpreted as the 'higher' number relative to the 'lower' number, that is smd[1,5] is the relative intervention effect of 5 over 1. For example, smd[1,5] −0.15, (95% CrI −0.34 to 0.04) would be interpreted as intervention 5 is reducing anxiety, compared with intervention 1.

Analysis-specific intervention numbers are provided as footnotes to each table and differ across analyses.

TABLE 47 Results from network and pairwise meta-analyses: universal population, secondary setting, anxiety outcome

	NMA		Pairwise	
Intervention comparison[a]	SMD	95% CrI	SMD	95% CrI
smd[1,2]	−0.05	−0.28 to 0.18	NA	
smd[1,3]	−0.07	−0.34 to 0.19	NA	
smd[1,4]	−0.15	−0.51 to 0.15	NA	
smd[1,5]	−0.15	−0.34 to 0.04	−0.15	−0.33 to 0.02
smd[1,6]	0.03	−0.14 to 0.20	0.04	−0.10 to 0.19
smd[1,7]	−0.65	−1.14 to −0.19	NA	
smd[2,3]	−0.02	−0.25 to 0.21	NA	
smd[2,4]	−0.10	−0.43 to 0.17	NA	
smd[2,5]	−0.09	−0.24 to 0.03	−0.07	−0.19 to 0.04
smd[2,6]	0.08	−0.20 to 0.37	NA	
smd[2,7]	−0.60	−1.05 to −0.17	−1.08	−1.76 to −0.39
smd[3,4]	−0.08	−0.44 to 0.23	NA	
smd[3,5]	−0.07	−0.27 to 0.11	−0.07	−0.25 to 0.10

continued

TABLE 47 Results from network and pairwise meta-analyses: universal population, secondary setting, anxiety outcome (*continued*)

	NMA		Pairwise	
Intervention comparison[a]	SMD	95% CrI	SMD	95% CrI
smd[3,6]	0.10	−0.21 to 0.42	NA	
smd[3,7]	−0.58	−1.07 to −0.12	NA	
smd[4,5]	0.01	−0.24 to 0.30	−0.06	−0.32 to 0.19
smd[4,6]	0.18	−0.17 to 0.59	NA	
smd[4,7]	−0.50	−0.90 to −0.10	−0.29	−0.75 to 0.16
smd[5,6]	0.18	−0.07 to 0.44	NA	
smd[5,7]	−0.51	−0.94 to −0.08	NA	
smd[6,7]	−0.68	−1.20 to −0.19	NA	

NA, not available.
a 1 = usual curriculum, 2 = waiting list, 3 = no intervention, 4 = attention control, 5 = CBT and 6 = third wave, 7 = mindfulness/relaxation.
Note
'NA' denotes that there was no direct head-to-head RCT for that comparison.

TABLE 48 Results from network and pairwise meta-analyses: universal population, primary setting, anxiety outcome

	NMA		Pairwise	
Intervention comparison[a]	SMD	95% CrI	SMD	95% CrI
smd[1,2]	0.02	−0.20 to 0.22	NA	
smd[1,3]	0.23	−0.15 to 0.60	NA	
smd[1,4]	−0.17	−0.51 to 0.17	NA	
smd[1,5]	−0.07	−0.23 to 0.05	−0.08	−0.24 to 0.04
smd[2,3]	0.20	−0.18 to 0.58	NA	
smd[2,4]	−0.19	−0.54 to 0.16	NA	
smd[2,5]	−0.10	−0.26 to 0.06	−0.09	−0.25 to 0.05
smd[3,4]	−0.39	−0.83 to 0.04	−0.38	−0.97 to 0.22
smd[3,5]	−0.30	−0.65 to 0.05	−0.31	−0.65 to 0.03
smd[4,5]	0.09	−0.22 to 0.40	0.11	−0.27 to 0.47

NA, not available.
a 1 = usual curriculum, 2 = waiting list, 3 = no intervention, 4 = attention control and 5 = CBT.
Note
'NA' denotes that there was no direct head-to-head RCT for that comparison.

TABLE 49 Results from network and pairwise meta-analyses: targeted population, secondary setting, anxiety outcome

	NMA		Pairwise	
Intervention comparison[a]	SMD	95% CrI	SMD	95% CrI
smd[1,2]	0.30	0.09 to 0.53	NA	
smd[1,3]	−0.09	−0.39 to 0.22	NA	
smd[1,4]	1.08	0.52 to 1.64	NA	
smd[1,5]	0.03	−0.11 to 0.16	0.03	−0.10 to 0.16
smd[1,6]	−0.18	−0.55 to 0.21	NA	
smd[1,7]	0.03	−0.42 to 0.48	NA	
smd[1,8]	−0.17	−0.45 to 0.11	−0.21	−0.54 to 0.15
smd[1,9]	−0.47	−0.86 to −0.09	−0.47	−0.87 to −0.08
smd[2,3]	−0.40	−0.71 to −0.09	NA	
smd[2,4]	0.77	0.20 to 1.34	NA	
smd[2,5]	−0.28	−0.45 to −0.11	−0.27	−0.46 to −0.10
smd[2,6]	−0.48	−0.86 to −0.11	−0.58	−1.17 to 0.01
smd[2,7]	−0.28	−0.71 to 0.15	−0.24	−0.82 to 0.33
smd[2,8]	−0.48	−0.79 to −0.17	NA	
smd[2,9]	−0.77	−1.22 to −0.34	NA	
smd[3,4]	1.17	0.56 to 1.78	NA	
smd[3,5]	0.12	−0.17 to 0.40	−0.03	−0.43 to 0.38
smd[3,6]	−0.08	−0.38 to 0.20	−0.03	−0.36 to 0.30
smd[3,7]	0.12	−0.31 to 0.55	−0.10	−0.75 to 0.58
smd[3,8]	−0.08	−0.36 to 0.20	−0.01	−0.36 to 0.34
smd[3,9]	−0.38	−0.87 to 0.11	NA	
smd[4,5]	−1.05	−1.60 to −0.50	−1.05	−1.59 to −0.52
smd[4,6]	−1.25	−1.91 to −0.60		NA
smd[4,7]	−1.05	−1.75 to −0.36		NA
smd[4,8]	−1.25	−1.86 to −0.64		NA
smd[4,9]	−1.55	−2.23 to −0.87		NA
smd[5,6]	−0.20	−0.56 to 0.16		NA
smd[5,7]	0.00	−0.43 to 0.43		NA
smd[5,8]	−0.20	−0.46 to 0.07		NA
smd[5,9]	−0.50	−0.91 to −0.09		NA
smd[6,7]	0.20	−0.24 to 0.65		NA
smd[6,8]	0.00	−0.37 to 0.38		NA
smd[6,9]	−0.30	−0.84 to 0.25		NA
smd[7,8]	−0.20	−0.67 to 0.27		NA
smd[7,9]	−0.50	−1.09 to 0.09		NA
smd[8,9]	−0.30	−0.78 to 0.17		NA

NA, not available.
a 1 = no intervention, 2 = waiting list, 3 = attention control, 4 = psychosupport, 5 = CBT, 6 = biofeedback, 7 = mindfulness/relaxation, 8 = CBM and 9 = exercise.
Note
'NA' denotes that there was no direct head-to-head RCT for that comparison.

TABLE 50 Results from network and pairwise meta-analyses: targeted population, primary setting, anxiety outcome

	NMA		Pairwise	
Intervention comparison[a]	SMD	95% CrI	SMD	95% CrI
smd[1,2]	−0.35	−1.05 to 0.33	NA	
smd[1,3]	−0.38	−0.84 to 0.07	−0.35	−0.79 to 0.09
smd[1,4]	0.11	−0.91 to 1.14	0.11	−0.93 to 1.16
smd[1,5]	−0.38	−1.50 to 0.72	NA	
smd[2,3]	−0.03	−0.54 to 0.49	−0.03	−0.55 to 0.50
smd[2,4]	0.47	−0.77 to 1.71	NA	
smd[2,5]	−0.03	−1.16 to 1.11	NA	
smd[3,4]	0.50	−0.62 to 1.62	NA	
smd[3,5]	0.00	−1.01 to 1.01	0.00	−1.04 to 1.03
smd[4,5]	−0.50	−2.01 to 1.01	NA	

NA, not available.
a 1 = waiting list, 2 = attention control, 3 = CBT, 4 = occupational therapy and 5 = biofeedback.
Note
'NA' denotes that there was no direct head-to-head RCT for that comparison.

TABLE 51 Results from network and pairwise meta-analyses: universal population, secondary setting, depression outcome

	NMA		Pairwise	
Intervention comparison[a]	SMD	95% CrI	SMD	95% CrI
smd[1,2]	0.00	−0.19 to 0.19	NA	
smd[1,3]	0.02	−0.16 to 0.20	NA	
smd[1,4]	0.07	−0.12 to 0.26	0.31	−0.05 to 0.69
smd[1,5]	−0.04	−0.16 to 0.07	−0.05	−0.17 to 0.06
smd[1,6]	−0.03	−0.21 to 0.14	−0.02	−0.19 to 0.14
smd[1,7]	−0.19	−0.46 to 0.08	NA	
smd[1,8]	−0.03	−0.36 to 0.29	−0.10	−0.47 to 0.26
smd[1,9]	−0.13	−0.49 to 0.22	−0.13	−0.49 to 0.22
smd[1,10]	−0.02	−0.40 to 0.37	−0.02	−0.40 to 0.37
smd[2,3]	0.02	−0.18 to 0.23	NA	
smd[2,4]	0.07	−0.14 to 0.28	NA	
smd[2,5]	−0.04	−0.20 to 0.11	−0.02	−0.18 to 0.13
smd[2,6]	−0.04	−0.30 to 0.22	NA	
smd[2,7]	−0.19	−0.41 to 0.04	−0.21	−0.46 to 0.05
smd[2,8]	−0.03	−0.39 to 0.33	NA	
smd[2,9]	−0.14	−0.54 to 0.26	NA	
smd[2,10]	−0.02	−0.45 to 0.41	NA	

TABLE 51 Results from network and pairwise meta-analyses: universal population, secondary setting, depression outcome (*continued*)

	NMA		Pairwise	
Intervention comparison[a]	SMD	95% CrI	SMD	95% CrI
smd[3,4]	0.05	−0.15 to 0.24	−0.03	−0.30 to 0.23
smd[3,5]	−0.06	−0.21 to 0.08	−0.05	−0.20 to 0.10
smd[3,6]	−0.06	−0.31 to 0.19	NA	
smd[3,7]	−0.21	−0.49 to 0.07	NA	
smd[3,8]	−0.05	−0.41 to 0.30	NA	
smd[3,9]	−0.16	−0.55 to 0.24	NA	
smd[3,10]	−0.04	−0.47 to 0.38	NA	
smd[4,5]	−0.11	−0.27 to 0.05	−0.22	−0.56 to 0.12
smd[4,6]	−0.11	−0.36 to 0.15	NA	
smd[4,7]	−0.25	−0.51 to 0.00	−0.18	−0.55 to 0.18
smd[4,8]	−0.10	−0.46 to 0.26	NA	
smd[4,9]	−0.20	−0.60 to 0.19	NA	
smd[4,10]	−0.09	−0.51 to 0.34	NA	
smd[5,6]	0.00	−0.20 to 0.21	NA	
smd[5,7]	−0.14	−0.39 to 0.10	NA	
smd[5,8]	0.01	−0.32 to 0.33	NA	
smd[5,9]	−0.09	−0.46 to 0.28	NA	
smd[5,10]	0.02	−0.38 to 0.43	NA	
smd[6,7]	−0.15	−0.47 to 0.17	NA	
smd[6,8]	0.00	−0.37 to 0.37	NA	
smd[6,9]	−0.10	−0.49 to 0.29	NA	
smd[6,10]	0.02	−0.40 to 0.44	NA	
smd[7,8]	0.15	−0.25 to 0.56	NA	
smd[7,9]	0.05	−0.39 to 0.49	NA	
smd[7,10]	0.17	−0.30 to 0.64	NA	
smd[8,9]	−0.10	−0.58 to 0.37	NA	
smd[8,10]	0.02	−0.49 to 0.52	NA	
smd[9,10]	0.12	−0.40 to 0.64	NA	

NA, not available.
a 1 = usual curriculum, 2 = waiting list, 3 = no intervention, 4 = attention control, 5 = CBT and 6 = third wave, 7 = IPT + CBT, 8 = IPT, 9 = psychoeducation and 10 = behavioural therapy.
Note
'NA' denotes that there was no direct head-to-head RCT for that comparison.

TABLE 52 Results from network and pairwise meta-analyses: universal population, primary setting, depression outcome

	NMA		Pairwise	
Intervention comparison[a]	SMD	95% CrI	SMD	95% CrI
smd[1,2]	−0.09	−0.77 to 0.54	NA	
smd[1,3]	0.13	−0.40 to 0.65	NA	
smd[1,4]	−0.07	−0.79 to 0.62	NA	
smd[1,5]	−0.13	−0.44 to 0.17	−0.11	−0.37 to 0.16
smd[1,6]	−0.10	−1.04 to 0.80	NA	
smd[2,3]	0.22	−0.48 to 0.96	NA	
smd[2,4]	0.02	−0.83 to 0.88	NA	
smd[2,5]	−0.04	−0.60 to 0.56	−0.06	−0.56 to 0.49
smd[2,6]	−0.01	−1.05 to 1.04	NA	
smd[3,4]	−0.20	−0.79 to 0.37	−0.15	−0.71 to 0.39
smd[3,5]	−0.26	−0.69 to 0.17	−0.29	−0.66 to 0.08
smd[3,6]	−0.23	−1.03 to 0.55	−0.12	−0.88 to 0.64
smd[4,5]	−0.06	−0.68 to 0.59	NA	
smd[4,6]	−0.03	−0.84 to 0.78	NA	
smd[5,6]	0.03	−0.85 to 0.88	NA	

NA, not available.
a 1 = usual curriculum, 2 = waiting list, 3 = no intervention, 4 = attention control, 5 = CBT and 6 = behavioural therapy.
Note
'NA' denotes that there was no direct head-to-head RCT for that comparison.

TABLE 53 Results from network and pairwise meta-analyses: targeted population, secondary setting, depression outcome

	NMA		Pairwise	
Intervention comparison[a]	SMD	95% CrI	SMD	95% CrI
smd[1,2]	0.22	−0.27 to 0.70	NA	
smd[1,3]	0.04	−0.72 to 0.82	NA	
smd[1,4]	−0.81	−1.81 to 0.18	NA	
smd[1,5]	0.02	−0.62 to 0.66	NA	
smd[1,6]	−0.22	−0.58 to 0.13	−0.16	−0.47 to 0.15
smd[1,7]	−0.68	−1.83 to 0.47	NA	
smd[1,8]	−0.65	−1.50 to 0.16	NA	
smd[1,9]	−0.90	−2.20 to 0.40	NA	
smd[1,10]	−0.28	−1.13 to 0.58	−0.28	−1.12 to 0.57
smd[1,11]	0.12	−0.50 to 0.72	NA	
smd[2,3]	−0.18	−0.92 to 0.59	NA	
smd[2,4]	−1.03	−2.01 to −0.04	NA	
smd[2,5]	−0.20	−0.82 to 0.43	NA	

TABLE 53 Results from network and pairwise meta-analyses: targeted population, secondary setting, depression outcome (*continued*)

	NMA		Pairwise	
Intervention comparison[a]	SMD	95% CrI	SMD	95% CrI
smd[2,6]	−0.44	−0.77 to −0.11	−0.40	−0.71 to −0.08
smd[2,7]	−0.90	−2.03 to 0.25	NA	
smd[2,8]	−0.87	−1.70 to −0.06	NA	
smd[2,9]	−1.12	−2.40 to 0.17	NA	
smd[2,10]	−0.50	−1.48 to 0.49	NA	
smd[2,11]	−0.10	−0.70 to 0.49	NA	
smd[3,4]	−0.85	−2.02 to 0.28	NA	
smd[3,5]	−0.02	−0.90 to 0.83	NA	
smd[3,6]	−0.26	−0.95 to 0.41	−0.25	−0.94 to 0.40
smd[3,7]	−0.72	−2.01 to 0.56	NA	
smd[3,8]	−0.69	−1.73 to 0.30	NA	
smd[3,9]	−0.94	−2.37 to 0.46	NA	
smd[3,10]	−0.32	−1.47 to 0.81	NA	
smd[3,11]	0.08	−0.78 to 0.90	NA	
smd[4,5]	0.83	−0.24 to 1.91	NA	
smd[4,6]	0.59	−0.34 to 1.52	0.59	−0.34 to 1.52
smd[4,7]	0.14	−1.30 to 1.57	NA	
smd[4,8]	0.16	−1.05 to 1.35	NA	
smd[4,9]	−0.09	−0.92 to 0.75	−0.09	−0.91 to 0.74
smd[4,10]	0.53	−0.77 to 1.85	NA	
smd[4,11]	0.93	−0.13 to 1.98	NA	
smd[5,6]	−0.24	−0.78 to 0.30	−0.22	−0.71 to 0.26
smd[5,7]	−0.70	−1.65 to 0.26	−0.70	−1.65 to 0.25
smd[5,8]	−0.67	−1.21 to −0.16	−0.67	−1.20 to −0.16
smd[5,9]	−0.92	−2.28 to 0.43	NA	
smd[5,10]	−0.30	−1.36 to 0.76	NA	
smd[5,11]	0.09	−0.56 to 0.75	0.26	−0.55 to 1.08
smd[6,7]	−0.46	−1.55 to 0.64	NA	
smd[6,8]	−0.43	−1.19 to 0.31	NA	
smd[6,9]	−0.68	−1.93 to 0.57	NA	
smd[6,10]	−0.06	−0.98 to 0.86	NA	
smd[6,11]	0.33	−0.16 to 0.83	0.22	−0.59 to 1.02
smd[7,8]	0.02	−1.08 to 1.11	NA	

continued

TABLE 53 Results from network and pairwise meta-analyses: targeted population, secondary setting, depression outcome (*continued*)

	NMA		Pairwise	
Intervention comparison[a]	SMD	95% CrI	SMD	95% CrI
smd[7,9]	−0.22	−1.88 to 1.43	NA	
smd[7,10]	0.40	−1.03 to 1.83	NA	
smd[7,11]	0.79	−0.37 to 1.95	NA	
smd[8,9]	−0.25	−1.70 to 1.22	NA	
smd[8,10]	0.37	−0.80 to 1.57	NA	
smd[8,11]	0.77	−0.06 to 1.62	NA	
smd[9,10]	0.62	−0.92 to 2.18	NA	
smd[9,11]	1.02	−0.33 to 2.36	NA	
smd[10,11]	0.40	−0.65 to 1.44	NA	

NA, not available.
a 1 = no intervention, 2 = waiting list, 3 = usual curriculum, 4 = attention control, 5 = psychosupport, 6 = CBT, 7 = third wave, 8 = IPT, 9 = CBM, 10 = exercise and 11 = psychoeducation.
Note
'NA' denotes that there was no direct head-to-head RCT for that comparison.

TABLE 54 Results from network and pairwise meta-analyses: targeted population, primary setting, depression outcome

	NMA		Pairwise	
Intervention comparison[a]	SMD	95% CrI	SMD	95% CrI
smd[1,2]	−0.72	−3.56 to 2.10	NA	
smd[1,3]	−0.48	−2.49 to 1.50	−0.48	−2.48 to 1.47
smd[1,4]	−0.10	−2.94 to 2.71	−0.10	−2.87 to 2.69
smd[2,3]	0.25	−1.76 to 2.21	0.25	−1.73 to 2.21
smd[2,4]	0.62	−3.39 to 4.60	NA	
smd[3,4]	0.38	−3.06 to 3.84	NA	

NA, not available.
a 1 = waiting list, 2 = attention control, 3 = CBT and 4 = occupational therapy.
Note
'NA' denotes that there was no direct head-to-head RCT for that comparison.

Appendix 5 Further time points: results from the intervention-level network meta-analysis

TABLE 55 Results from the intervention-level network meta-analysis: further time points for anxiety outcome

Population and setting	Intervention	Reference	Follow-up (months)					
			6–12		13–24		≥ 25	
			SMD	95% CrI	SMD	95% CrI	SMD	95% CrI
Universal, secondary	CBT	Usual curriculum	−0.11	−0.34 to 0.11	−0.01	−2.84 to 2.81	−0.23	−0.55 to 0.08
	Third wave	Usual curriculum	−0.05	−0.32 to 0.22	–	–	–	–
	CBT + IPT	Usual curriculum	−0.02	−0.42 to 0.36	–	–	–	–
Universal, primary	CBT	Usual curriculum	−0.11	−0.35 to 0.11	0.00	−0.68 to 0.71	−0.12	−0.26 to 0.02
Targeted, secondary	CBT	No intervention	0.05	−0.12 to 0.20	−0.26	−0.52 to −0.01[a]	−0.39	−0.65 to −0.14[a]
	CBM	No intervention	−0.14	−0.53 to 0.24	–	–	–	–
Targeted, primary	CBT	Waiting list	−0.17	−1.37 to 1.06	–	–	–	–
	Biofeedback	Waiting list	−0.28	−2.49 to 1.93	–	–	–	–

a Single study.

TABLE 56 Results from the intervention-level network meta-analysis: further time points for depression outcome

Population and setting	Intervention	Reference	Follow-up (months)					
			6–12		13–24		≥ 25	
			SMD	95% CrI	SMD	95% CrI	SMD	95% CrI
Universal, secondary	CBT	Usual curriculum	−0.02	−0.10 to 0.06	−0.04	−0.20 to 0.14	−0.14	−2.89 to 2.63
	Third wave	Usual curriculum	−0.13	−0.27 to 0.01	–	–	–	–
	CBT + IPT	Usual curriculum	−0.10	−0.26 to 0.05	−0.10	−0.57 to 0.39	–	–
	IPT	Usual curriculum	0.11	−0.13 to 0.35	–	–	–	–
Universal, primary	CBT	Usual curriculum	−0.15	−0.43 to 0.09	−0.03	−0.62 to 0.55	−0.27	−0.42 to −0.13[a]
Targeted, secondary	CBT	No intervention	−0.04	−0.51 to 0.41	−0.18	−2.56 to 2.16	−0.27	−1.05 to 0.50[a]
	IPT	No intervention	−0.49	−1.49 to 0.48	0.09	−3.81 to 3.93	–	–
Targeted, primary	CBT	Waiting list	−0.34	−0.72 to 0.05[b]	−0.50	−0.96 to 0.05[a]	–	–

a Single study.
b Fixed effect.

Appendix 6 Exploring heterogeneity and publication bias

Comparison-adjusted funnel plots to explore potential small study effects

A funnel plot is a graph of the study-level treatment effect estimates plotted against their SE. In a standard funnel plot, the vertical axis (SE) is reported in reverse, so that studies with smaller SEs are seen at the top of the plot (typically larger studies). Comparison-adjusted funnel plots follow this convention, but are modified to allow for multiple treatments and multiple comparisons from NMA. In the following graphs, we plot active treatments versus inactive control only. The *x*-axis reports the difference of each study's estimate (yiXY) from the direct summary effect for each comparison (yiXY – μXY), and the *y*-axis reports the SE of yiXY. The red line represents the null hypothesis that the comparison-specific pooled effect estimates do not differ from the study-specific effect sizes. In the absence of small-study effects, all points should be symmetrical around the null.

Following Chaimani *et al.*,[98] the comparisons included in these funnel plots are for a control compared with an active intervention. Specific interventions are listed after each graph.

Meta regression, subgroup analysis and risk-of-bias sensitivity analysis

Facilitator delivering intervention: metaregression

Interventions were categorised as being delivered by a teacher or a MHP. There was considerable variation in the classification of 'MHP' and it should therefore be regarded as a simplification. Here, MHP includes school counsellors, qualified psychotherapists, and graduate and post-doctoral psychology students (which included general psychology, educational psychology or counselling psychology, if specified). In most studies, MHPs were external to the educational setting; however, this was not always the case.

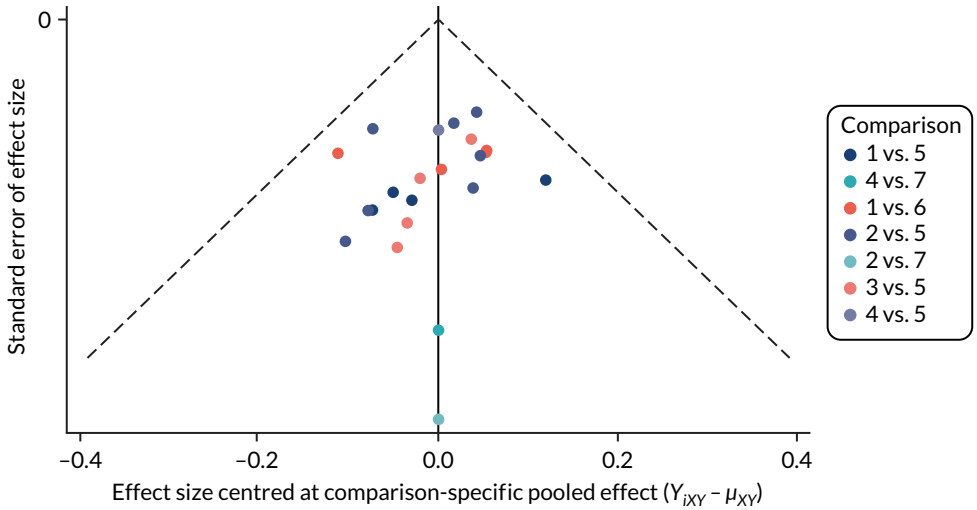

FIGURE 17 Comparison-adjusted funnel plot: universal population, secondary setting – anxiety. 1 = usual curriculum, 2 = waiting list, 3 = no intervention, 4 = attention control, 5 = CBT, 6 = third wave and 7 = mindfulness/relaxation.

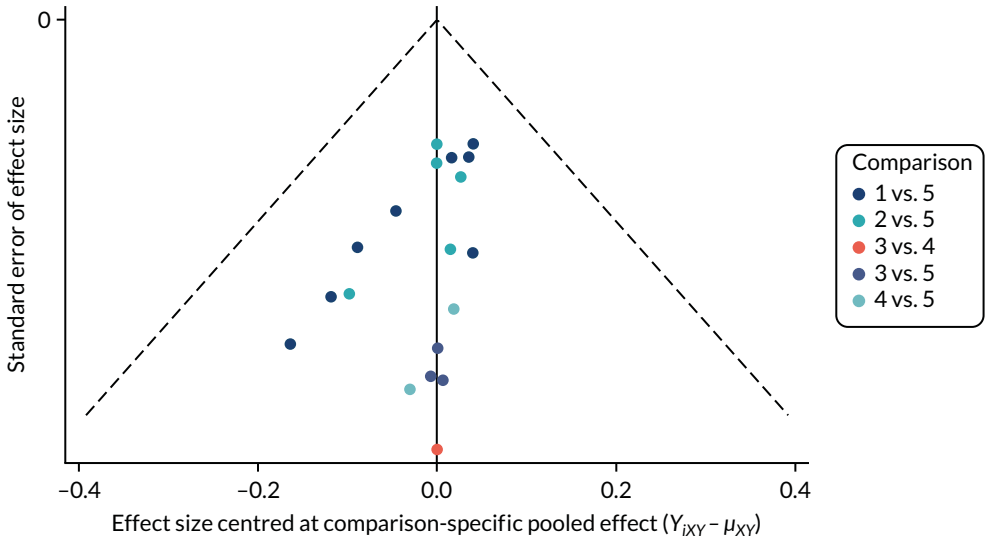

FIGURE 18 Comparison-adjusted funnel plot: universal population, primary setting – anxiety. 1 = usual curriculum, 2 = waiting list, 3 = no intervention, 4 = attention control and 5 = CBT.

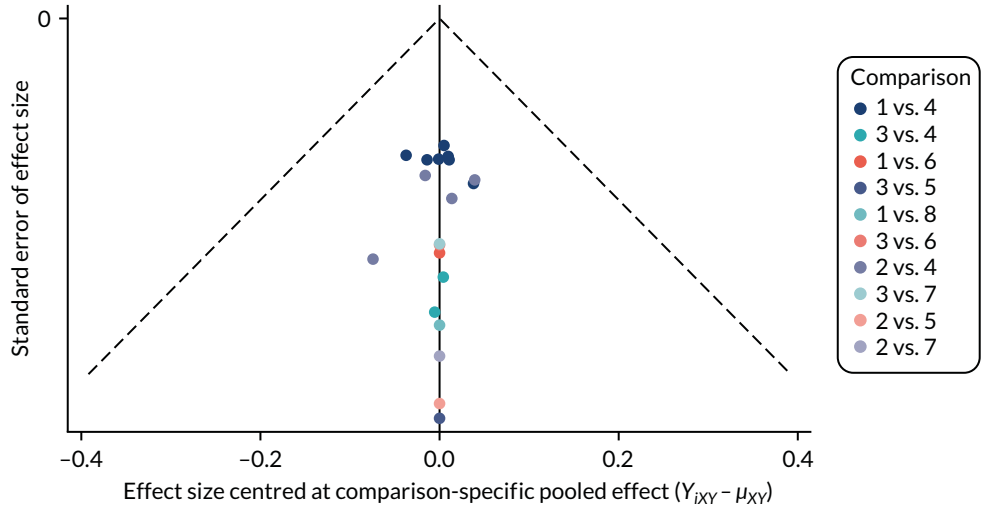

FIGURE 19 Comparison-adjusted funnel plot: targeted population, secondary setting – anxiety. 1 = no intervention, 2 = waiting list, 3 = attention control, 4 = CBT, 5 = mindfulness/relaxation, 6 = bias modification, 7 = biofeedback and 8 = exercise.

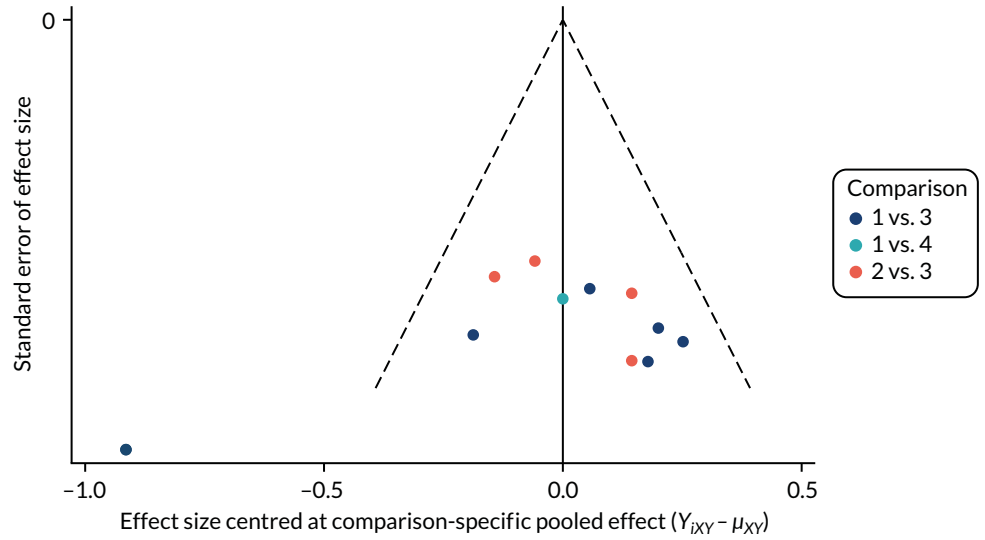

FIGURE 20 Comparison-adjusted funnel plot: targeted population, primary setting – anxiety. 1 = waiting list, 2 = attention control, 3 = CBT and 4 = occupational therapy.

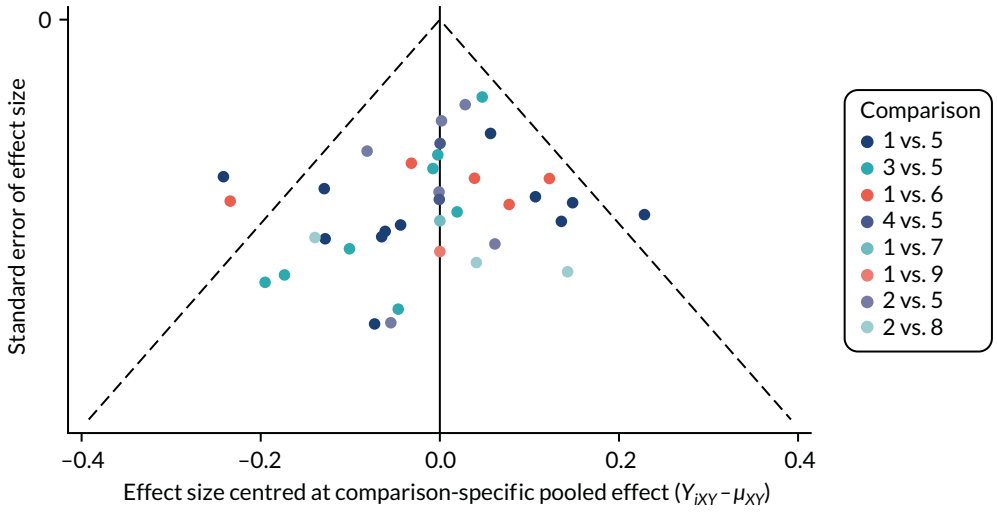

FIGURE 21 Comparison-adjusted funnel plot: universal population, secondary setting – depression. 1 = usual curriculum, 2 = waiting list, 3 = no intervention, 4 = attention control, 5 = CBT, 6 = third wave, 7 = IPT, 8 = IPT + CBT and 9 = behavioural therapy.

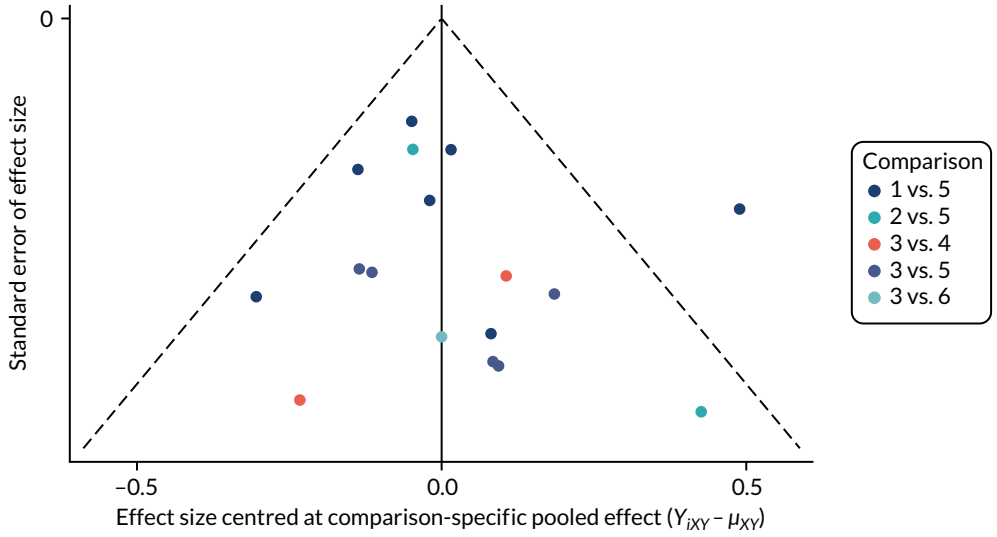

FIGURE 22 Comparison-adjusted funnel plot: universal population, primary setting – depression. 1 = usual curriculum, 2 = waiting list, 3 = no intervention, 4 = attention control, 5 = CBT and 6 = behavioural therapy.

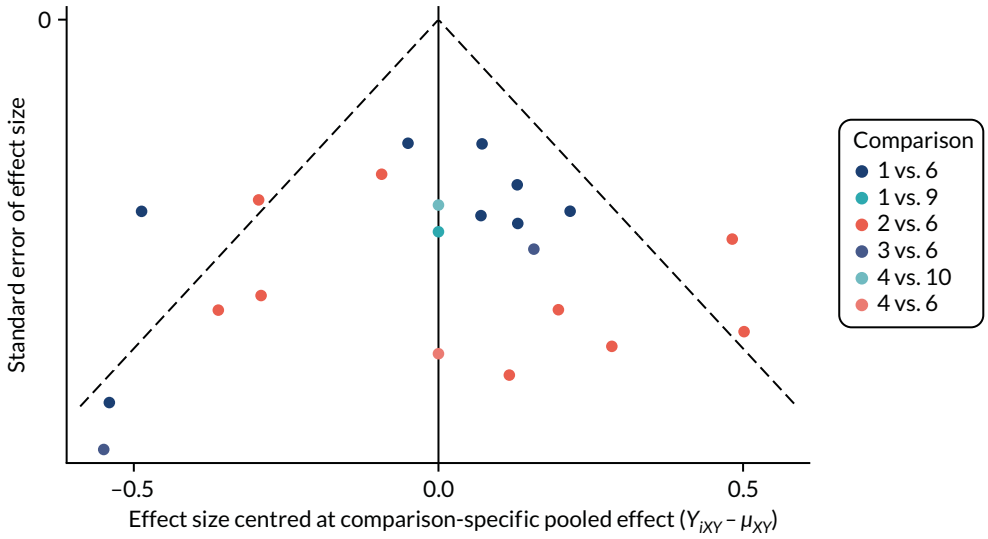

FIGURE 23 Comparison-adjusted funnel plot: targeted population, secondary setting – depression. 1 = no intervention, 2 = waiting list, 3 = usual curriculum, 4 = attention control, 6 = CBT, 9 = exercise and 10 = cognitive bias modification.

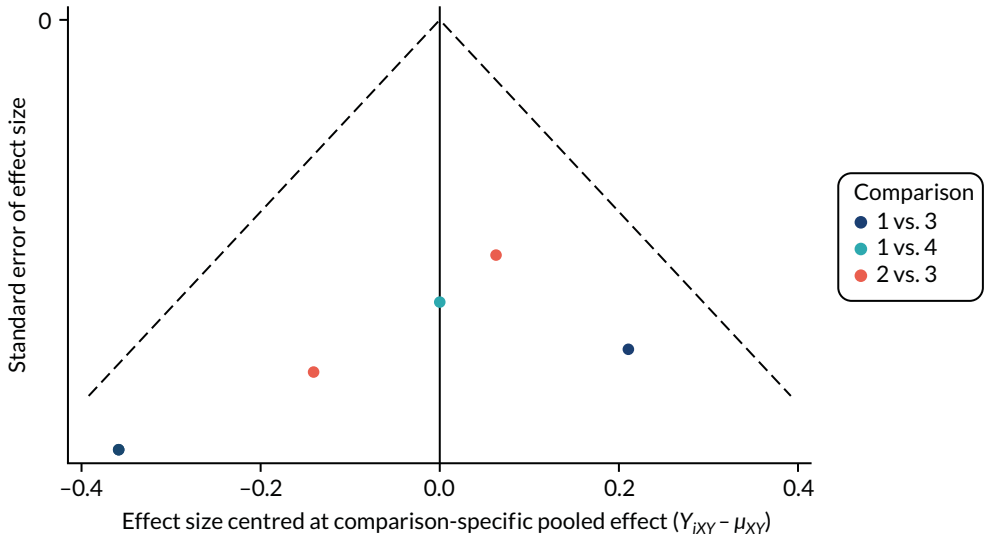

FIGURE 24 Comparison-adjusted funnel plot: targeted population, primary setting – depression. 1 = waiting list, 2 = attention control, 3 = CBT and 4 = occupational therapy.

Metaregression analyses

Facilitator metaregression

Meta-regression and subgroup analyses were performed in OpenBUGS following the Evidence Synthesis Technical Support Unit code available from the NICE Decision Support Unit website and described in Dias *et al.*[102,103] Interventions that varied by person of delivery were CBT, third-wave and mindfulness/relaxation interventions. To explore whether or not intervention effects were modified by person delivering the intervention (teacher or MHP), we fitted a metaregression model for intervention–teacher (0) and intervention–MHP (1). This enables us to estimate the intervention effect at each value of the covariate, for each intervention, including multiarm trials that compared the effect of both facilitators. When there were two or more interventions that were delivered by a teacher or MHP, a random-effects NMA model was fitted and we assumed a hierarchical model for the regression coefficient across interventions (CBT, third wave and mindfulness/relaxation), whereby the regression coefficients were assumed to come from

a normal distribution with mean (m.beta) and precision (tau.beta). The between-studies SD was assumed to be common for each value of the covariate. We estimated a between-intervention SD (sd.beta) for the covariate regression coefficients. Vague priors were specified.

When only a single intervention varied by person delivering it, a fixed covariate effect (as for mode of delivery) was fitted.

TABLE 57 Results from metaregression of intervention facilitator: universal population, secondary setting: anxiety

Intervention-facilitator	SMD	95% CrI	Number of studies
CBT – teacher	−0.13	−0.32 to 0.06	9
CBT – MHP	−0.17	−0.42 to 0.03	6
Third wave – teacher	−0.10	−0.38 to 0.19	1
Third wave – MHP	0.10	−0.10 to 0.29	2
Mindfulness/relaxation – teacher	−0.48	−1.02 to 0.08	1
Mindfulness/relaxation – MHP	−0.95	−1.68 to −0.27	1
Intervention	***Regression coefficient***	***95% CrI***	
CBT	−0.4	−0.23 to 0.10	
Third wave	0.20	−0.15 to 0.53	
Mindfulness/relaxation	−0.48	−1.39 to 0.22	
Parameter	***Posterior mean***	***95% CrI***	
m.beta	−0.11	−1.29 to 0.94	
sd.beta	0.58	0.04 to 1.83	
Posterior median between-study SD		0.10 (95% CrI 0.01 to 0.22)	

TABLE 58 Results from metaregression of intervention facilitator: universal population, primary setting: anxiety

Intervention-facilitator	SMD	95% CrI	Number of studies
CBT – teacher	−0.05	−0.21 to 0.08	6
CBT – MHP	−0.18	−0.42 to 0.00	4
Intervention	***Regression coefficient***	***95% CrI***	
CBT	−0.14	−0.33 to 0.03	
Posterior median between-study SD		0.10 (95% CrI 0.01 to 0.26)	

TABLE 59 Results from metaregression of intervention facilitator: targeted population, secondary setting: anxiety

Intervention-facilitator	SMD	95% CrI	Number of studies
CBT – other	0.01	−0.18 to 0.20	2
CBT – MHP	0.00	−0.22 to 0.22	7
Biofeedback – other	−0.04	−0.59 to 0.53	1
Biofeedback – MHP	−0.27	−0.88 to 0.32	1
Intervention	***Regression coefficient***	***95% CrI***	
CBT	−0.01	−0.23 to 0.20	
Biofeedback	−0.20	−0.96 to 0.39	
Parameter	***Posterior mean***	***95% CrI***	
m.beta	−0.08	−1.62 to 1.29	
sd.beta	0.57	0.00 to 1.89	
Posterior median between-study SD		0.08 (95% CrI 0.00 to 0.29)	

TABLE 60 Results from metaregression of intervention facilitator: universal population, secondary setting: depression

Intervention-facilitator	SMD	95% CrI	Number of studies
CBT – teacher	−0.07	−0.21 to 0.08	10
CBT – MHP	−0.01	−0.15 to 0.14	8
Third wave – teacher	−0.07	−0.37 to 0.23	1
Third wave – MHP	−0.02	−0.22 to 0.17	3
CBT + IPT – teacher	−0.21	−0.53 to 0.11	2
CBT + IPT – MHP	−0.07	−0.43 to 0.31	1
Intervention	***Regression coefficient***	***95% CrI***	
CBT	0.06	−0.10 to 0.22	
Third wave	0.05	−0.29 to 0.36	
CBT + IPT	0.13	−0.20 to 0.55	
Parameter	***Posterior mean***	***95% CrI***	
m.beta	0.08	−0.53 to 0.72	
sd.beta	0.18	0.01 to 1.48	
Posterior median between-study SD		0.14 (95% CrI 0.08 to 0.22)	

TABLE 61 Results from metaregression of intervention facilitator: universal population, primary setting: depression

Intervention-facilitator	SMD	95% CrI	Number of studies
CBT – teacher	−0.19	−0.52 to 0.14	4
CBT – MHP	0.08	−0.46 to 0.57	5
Intervention	***Regression coefficient***	***95% CrI***	
CBT	0.27	−0.30 to 0.80	
Posterior median between-study SD		0.30 (95% CrI 0.12 to 0.60)	

TABLE 62 Results from metaregression of intervention facilitator: targeted population, secondary setting: depression

Intervention-faciliator	SMD	95% CrI	Number of studies
CBT – other	−0.10	−0.49 to 0.27	14
CBT – MHP	−0.30	−0.67 to 0.06	2
Intervention	***Regression coefficient***	***95% CrI***	
CBT	−0.20	−0.52 to 0.13	
Posterior median between-study SD		0.35 (95% CrI 0.22 to 0.55)	

Mode of delivery metaregression

Interventions were categorised as being delivered face to face or via computer/internet (multimedia). Across all networks, the only intervention that varied by mode of delivery was CBT. To explore whether or not intervention effects were modified by mode of delivery, we fitted a metaregression model for CBT-face to face (covariate = 0) and CBT-multimedia (covariate = 1). This enabled us to estimate the intervention effect for both CBT-face to face and CBT-multimedia. A random-effects NMA model was fitted, but the regression coefficient for the covariate was assumed a fixed effect across studies. The between-studies SD was assumed to be common for CBT-face to face and CBT-multimedia.

Results are reported for universal secondary settings only, as there were insufficient data available for meaningful analysis in other populations/settings.

TABLE 63 Results from metaregression of intervention mode of delivery: universal population, secondary school setting: depression

Intervention-facilitator	SMD	95% CrI
CBT – face to face	−0.03	−0.14 to 0.09
CBT – multimedia	−0.15	−0.38 to 0.07
Intervention	***Regression coefficient***	***95% CrI***
CBT	−0.12	−0.34 to 0.10
Posterior median between-study SD		0.15 (95% CrI 0.09 to 0.22)

TABLE 64 Results from metaregression of intervention mode of delivery: universal population, secondary school setting: anxiety

Intervention-facilitator	SMD	95% CrI
CBT – face to face	−0.14	−0.36 to 0.07
CBT – multimedia	−0.16	−0.42 to 0.10
Intervention	***Regression coefficient***	***95% CrI***
CBT	−0.02	−0.27 to 0.23
Posterior median between-study SD		0.12 (95% CrI 0.02 to 0.24)

Subgroup analysis: examining whether or not intervention effect is modified by the intended focus of the intervention

For each population, setting and outcome combination, intervention estimates are compared across three subgroups: (1) interventions that aimed to prevent symptoms of anxiety (2) interventions that aimed to prevent only symptoms of depression and (3) interventions that aimed to prevent both symptoms of anxiety and symptoms of depression. The interest here is whether or not interventions designed specifically to prevent one clinical disorder might still affect the other. An intervention on the prevention of anxiety may also report the effect on depressive symptoms, for example.

TABLE 65 Results from subgroup analysis by focus of the intervention

Focus[a]	Comparison[b]	Studies[c] (*n*)	SMD[d]	95% CrI	SD[e]	95% CrI
Universal, secondary: self-reported depression						
Anxiety	CBT vs. no intervention	4	0.05	−0.13 to 0.22	0.04	0.00 to 0.33
Depression	CBT vs. no intervention	18	−0.14	−0.36 to 0.06	0.18	0.10 to 0.30
Anxiety + depression	CBT vs. no intervention	10	0.05	−0.33 to 0.47	0.13	0.01 to 0.32
Universal, secondary: self-reported anxiety						
Anxiety	CBT vs. no intervention	7	−0.12	−0.96 to 0.72	0.35	0.02 to 1.43
Depression	CBT vs. no intervention	4	0.00	−5.26 to 5.25	1.66	0.12 to 4.74
Anxiety + depression	CBT vs. no intervention	10	−0.05	−0.91 to 0.38	0.16	0.03 to 0.37
Universal, primary: self-reported depression						
Anxiety	CBT vs. usual curriculum	2	0.18	−0.06 to 0.41	Fixed-effects analysis	
Depression	CBT vs. usual curriculum	6	−0.57	−1.51 to 0.37	0.34	0.03 to 0.96
Anxiety + depression	CBT vs. usual curriculum	4	−0.16	−0.42 to 0.13	0.17	0 to 0.78
Universal, primary: self-reported anxiety						
Anxiety	CBT vs. usual curriculum	9	−0.37	−0.64 to −0.12	0.08	0.00 to 0.32
Depression	CBT vs. no intervention	2	−0.31	−0.61 to 0.00	Fixed-effects analysis	
Anxiety + depression	CBT vs. usual curriculum	4	0.04	−0.16 to 0.27	0.07	0.00 to 0.61
Targeted, secondary: self-reported depression						
Anxiety	CBT vs. waiting list	2	−0.21	−0.49 to 0.08	Fixed-effects analysis	
Depression	CBT vs. waiting list	17	−0.33	−0.86 to 0.20	0.38	0.24 to 0.62
Anxiety + depression	CBT vs. waiting list	3	−0.67	−3.65 to 2.33	0.78	0.00 to 4.56

TABLE 65 Results from subgroup analysis by focus of the intervention (*continued*)

Focus[a]	Comparison[b]	Studies[c] (*n*)	SMD[d]	95% CrI	SD[e]	95% CrI
Targeted, secondary: self-reported anxiety						
Anxiety	CBT vs. no intervention	8	0.13	−0.95 to 1.18	0.33	0.03 to 1.34
Depression	CBT vs. no intervention	3	0.00	−0.15 to 0.16	0.08	0.00 to 0.26
Anxiety + depression	CBT vs. waiting list	3	−0.21	−1.27 to 0.84	0.45	0.01 to 2.66
Targeted, primary: self-reported anxiety						
Anxiety	CBT vs. waiting list	7	−0.16	−0.41 to 0.09	0.14	0.00 to 0.48
Anxiety + depression	CBT vs. waiting list	4	−1.43	−5.47 to 2.60	1.19	0.02 to 4.52

a Focus: anxiety = focus of intervention was prevention of anxiety, depression = focus of intervention was prevention of depression, anxiety + depression = focus of intervention was prevention of both anxiety and depression.
b Comparison: when feasible, the intervention effect estimate has been reported for the same intervention vs. control comparison for each subgroup to allow for meaningful comparison.
c Studies: number of studies per subgroup.
d SMD for each subgroup (and 95% CrI).
e SD: between-study variation in effect for each subgroup (unless fixed-effects analysis).

Sensitivity analyses

TABLE 66 Sensitivity analysis for intracluster correlation coefficient

	ICC = 0.01		ICC = 0.06	
Intervention	**SMD**	**95% CrI**	**SMD**	**95% CrI**
Universal, secondary, depression (19/34 trials)				
CBT	−0.04	−0.16 to 0.07	−0.04	−0.16 to 0.08
Third wave	−0.04	−0.21 to 0.14	−0.03	−0.20 to 0.14
IPT + CBT	−0.18	−0.46 to 0.09	−0.18	−0.45 to 0.08
IPT	−0.03	−0.37 to 0.30	−0.03	−0.34 to 0.29
Behavioural therapy	−0.02	−0.40 to 0.37	−0.02	−0.41 to 0.38
Universal, primary, depression (7/12 trials)				
CBT	−0.13	−0.44 to 0.18	−0.13	−0.44 to 0.17
Behavioural therapy	−0.09	−1.04 to 0.82	−0.1	−1.03 to 0.79
Targeted, secondary, depression (5/24 trials)				
CBT	−0.21	−0.58 to 0.14	−0.21	−0.58 to 0.14
Third wave	−0.68	−1.83 to 0.47	−0.68	−1.84 to 0.48
IPT	−0.65	−1.50 to 0.16	−0.65	−1.50 to 0.17
CBM	−0.89	−2.20 to 0.41	−0.89	−2.21 to 0.41
Exercise	−0.28	−1.11 to 0.55	−0.28	−1.11 to 0.55
Targeted, primary, depression (1/5 trials)				
CBT	−0.47	−2.46 to 1.54	−0.48	−2.48 to 1.50
Occupational therapy	−0.1	−2.92 to 2.76	−0.1	−2.90 to 2.72

continued

TABLE 66 Sensitivity analysis for intracluster correlation coefficient (*continued*)

	ICC = 0.01		ICC = 0.06	
Intervention	**SMD**	**95% CrI**	**SMD**	**95% CrI**
Universal, secondary, anxiety (12/21 trials)				
CBT	−0.15	−0.34 to 0.04	−0.15	−0.34 to 0.04
Third wave	0.03	−0.15 to 0.21	0.04	−0.13 to 0.20
Mindfulness/relaxation	−0.66	−1.16 to −0.19	−0.64	−1.12 to −0.19
Universal, primary, anxiety (11/15 trials)				
CBT	−0.08	−0.24 to 0.04	−0.07	−0.23 to 0.06
Targeted, secondary, anxiety (5/15 trials)				
CBT	0.03	−0.10 to 0.16	0.03	−0.11 to 0.17
Biofeedback	−0.17	−0.55 to 0.21	−0.17	−0.55 to 0.21
Mindfulness/relaxation	0.04	−0.41 to 0.49	0.03	−0.41 to 0.48
CBM	−0.17	−0.44 to 0.10	−0.17	−0.45 to 0.13
Exercise	−0.47	−0.83 to −0.12	−0.47	−0.89 to −0.04
Targeted, primary, anxiety (2/11 trials)				
CBT	−0.39	−0.85 to 1.14	−0.38	−0.85 to 0.07
Occupational therapy	0.11	−0.93 to 0.72	0.11	−0.93 to 1.15
Biofeedback	−0.39	−1.50 to 0.72	−0.38	−1.51 to 0.73

TABLE 67 Sensitivity analysis for change from baseline standard deviation

	C = 0.6		C = 0.8	
Intervention	**SMD**	**95% CrI**	**SMD**	**95% CrI**
Universal, secondary, depression (34 trials)				
CBT	−0.04	−0.15 to 0.07	−0.04	−0.16 to 0.07
Third wave	−0.03	−0.2 to 0.13	−0.03	−0.21 to 0.14
IPT + CBT	−0.18	−0.44 to 0.08	−0.18	−0.45 to 0.08
IPT	−0.03	−0.34 to 0.28	−0.03	−0.36 to 0.29
Behavioural therapy	−0.02	−0.39 to 0.35	−0.02	−0.39 to 0.36
Universal, primary, depression (12 trials)				
CBT	−0.13	−0.44 to 0.17	0.13	−0.44 to 0.18
Behavioural therapy	−0.08	−1.04 to 0.84	0.12	−1.03 to 0.77
Targeted, secondary, depression (24 trials)				
CBT	−0.21	−0.57 to 0.13	−0.22	−0.59 to 0.13
Third wave	−0.67	−1.83 to 0.48	−0.68	−1.83 to 0.45
IPT	−0.63	−1.47 to 0.18	−0.71	−1.56 to 0.13
CBM	−0.89	−2.2 to 0.40	−0.91	−2.22 to 0.39
Exercise	−0.28	1.12 to 0.56	−0.28	−1.13 to 0.58

TABLE 67 Sensitivity analysis for change from baseline standard deviation (*continued*)

	C = 0.6		C = 0.8	
Intervention	**SMD**	**95% CrI**	**SMD**	**95% CrI**
Targeted, primary, depression (5 trials)				
CBT	−0.47	−2.46 to 1.45	−0.48	−2.55 to 1.57
Occupational therapy	−0.10	−2.85 to 2.64	−0.10	−3.00 to 2.77
Universal, secondary, anxiety (21 trials)				
CBT	−0.19	−0.41 to 0.01	−0.21	−0.45 to 0.00
Third wave	0.03	−0.15 to 0.21	0.03	−0.18 to 0.25
Mindfulness/relaxation	−0.69	−1.22 to −0.18	−0.77	−1.29 to −0.28
Universal, primary, anxiety (15 trials)				
CBT	−0.06	−0.21 to 0.06	−0.08	−0.24 to 0.04
Targeted, secondary, anxiety (15 trials)				
CBT	0.03	−0.11 to 0.17	0.03	−0.10 to 0.17
Biofeedback	−0.18	−0.59 to 0.17	−0.16	−0.52 to 0.17
Mindfulness/relaxation	0.02	−0.48 to 0.12	0.04	−0.36 to 0.44
CBM	−0.17	−0.42 to 0.11	−0.17	−0.42 to 0.11
Exercise	−0.47	−0.89 to −0.05	−0.47	−0.83 to −0.11
Targeted, primary, anxiety (11 trials)				
CBT	−0.38	−0.83 to 0.06	−0.39	−0.86 to 0.07
Occupational therapy	0.11	−0.88 to 1.10	0.11	−0.95 to 1.17
Biofeedback	−0.38	−1.45 to 0.68	−0.39	−1.53 to 0.75

C, correlation coefficient.

Appendix 7 Additional outcomes

Suicidal ideation, behaviour and self-harm outcomes

TABLE 68 Studies reporting that participants with suicidal behaviours or thoughts were excluded

Study	Population	Setting	Quotation/details
McCarty *et al.*[218] 2011	Indicated	Secondary	Suicidal ideation was an exclusion criterion
Tokolahi *et al.*[181] 2018	Selective	Primary	Reporting parasuicidal and/or suicidal thoughts or behaviours was an exclusion criterion
Young *et al.*[230] 2016	Indicated	Secondary	Reporting significant suicidal ideation or non-suicidal self-injury ($n = 11$) was an exclusion criterion
Kindt *et al.*[196] 2014	Universal	Secondary	The question on suicide was removed from the Child Depression Inventory. The authors reported that this was 'to optimize collaboration with school officials and parents'
McCarty *et al.*[219] 2013	Indicated	Secondary	Current suicidal ideation was an exclusion criterion
Peden *et al.*[234] 2000	Indicated	University	Current suicidal ideation was an exclusion criterion
Rohde *et al.*[223] 2014	Indicated	Secondary	Current/acute suicidal ideation was an exclusion criterion
Young *et al.*[229] 2010	Indicated	Secondary	Suicidal ideation or self-harm behaviours were exclusion criteria
Livheim *et al.*[217] 2015	Indicated	Secondary	Suicidality was an exclusion criterion
Cowell *et al.*[231] 2009	Selective	Primary	Suicidal ideation was an exclusion criterion
Wijnhoven *et al.*[226] 2014	Indicated	Secondary	Suicidal ideation was an exclusion criterion
Seligman *et al.*[186] 1999	Selective	University	Students who were considered at current suicide risk were excluded

TABLE 69 Studies reporting that schools requested suicidal behaviour or thought questions be excluded

Study	Population	Setting	Quotation/details
Hodas *et al.*[131] 2016	Universal	Secondary	The question on suicidal ideation was removed from the Child Depression Inventory
Johnstone *et al.*[152] 2014	Universal	Primary	The question on suicidal ideation was removed from the Child Depression Inventory. The authors note this was because school officials expressed concern about its appropriateness for primary-aged children
Pophillat *et al.*[156] 2016	Universal	Primary	The question on suicidal ideation was removed from the Child Depression Inventory. The authors note this was removed 'in accordance with the Western Australia Department of Education's standards'
Soffer *et al.*[212] 2003	Universal	Primary	The author reported not using the Children's Depression Inventory at all, as the Board of Education 'did not approve … due to its explicit assessment of suicidality'
Tak *et al.*[207] 2016	Universal	Secondary	The question on suicidal ideation was removed 'due to ethical considerations' (scale used: Child Depression Inventory)
Chaplin *et al.*[192] 2006	Universal	Secondary	The question on suicidal ideation was removed 'at the request of school administrators' (scale used: Child Depression Inventory)
Gillham *et al.*[165] 2012	Indicated	Secondary	Questions on suicidal ideation were removed 'at the request of school administrators' (scales used: Child Depression Inventory and Reynolds Adolescent Depression Scale)
Horowitz *et al.*[195] 2007	Universal	Secondary	Question on suicidal ideation was removed 'because of concerns of the participating schools' (scale used: Child Depression Inventory)
Pössel *et al.*[200] 2013	Universal	Secondary	Question on suicidal ideation was removed 'at the request of the school, as is common in school-based research' (scale used: Child Depression Inventory)

Socioeconomic status, biological sex and ethnicity

TABLE 70 Socioeconomic status, sex and ethnicity as extracted from authors' reports: universal interventions

Trial	Setting	Sex	Ethnicity	Socioeconomic Status
Ahlen *et al.*[145] 2018	Primary	Mixed	NC	Median of household income US$6000–7000/month
Anticich *et al.*[339] 2013	Primary	Mixed	Study conducted in Australia. Catholic preschools and primary schools in the greater metropolitan area of Brisbane. Participants described as 'white'	… *working to middle class*
Araya *et al.*[118] 2013	Secondary	Mixed	NC	'Socially deprived'. Author reported School Social Deprivation Index, mean (SD) 0.85 (0.1) 0.85 (0.1)
Attwood *et al.*[146] 2012	Primary	Boys	NC	NC
Aune and Stiles[119] 2009	Secondary	Mixed	Study conducted in Norway: … *less than 3% non-Caucasian*	NC
Baker and Butler[120] 1984	Secondary	Mixed	Caucasian	NC

TABLE 70 Socioeconomic status, sex and ethnicity as extracted from authors' reports: universal interventions (*continued*)

Trial	Setting	Sex	Ethnicity	Socioeconomic Status
Barrett and Turner[147] 2001	Primary	Mixed	*. . . predominantly from Anglo-Saxon families with English as their primary language*	75.35% dual-parent and 11.55% single-parent families *. . . varying levels of socio-economic advantage . . .*
Barrett *et al.*[121] 2005	Secondary	Mixed	*The majority of children . . . were white, Anglo-Saxon, Catholic or Protestant Christian*	*diverse levels of socio-economic status . . . working to middle class*
Barry *et al.*[190] 2017	Secondary	Boys	The majority of participants stated that they were 'white, white Irish or any other white background'	NR
Bonhauser *et al.*[122] 2005	Secondary	Mixed	No information provided. Study was conducted in Santiago, Chile	*. . . a low socioeconomic area . . . The percentage of the population living below the poverty level . . . is 15%*
Bouchard *et al.*[148] 2013	Primary	Mixed	NC	Schools were representative of 'low-, average-, high-, and very high-income neighbourhoods'
Britton *et al.*[123] 2014	Secondary	Mixed	NC	*an independent Quaker school*
Burckhardt *et al.*[124] 2015	Secondary	Mixed	NC	*. . . schools were among the highest . . . socioeconomic status compared to other schools in Australia*
Burckhardt *et al.*[191] 2016	Secondary	Mixed	NC	*76% of the students were in the top quartile of socio-economic advantage*
Calear *et al.*[125] 2009	Secondary	Mixed	94% of participants stated that English was their first language. Other languages were Chinese, Hindi, Arabic and Indonesian	*. . . a mix of public, private, coeducational, single-sex, metropolitan, and rural schools from six Australian states*
Calear *et al.*[126] 2016	Secondary	Mixed	88% reported that English was their first language. Other languages reported were Chinese, Vietnamese, Indian and Arabic	NC
Calear *et al.*[127] 2016	Secondary	Mixed	97% of participants reported English as their first language	NC
Cardemil *et al.*[208] 2007	Primary	Mixed	School 1: 77.2% Latino, 11.7% African American, 7.8% Caucasian and 2.8% Asian School 2: 98.9% African American, 0.6% Asian, 0.2% Latino and 0.2% Caucasian	School 1: 95.3% of students from low-income households School 2: 89.8% of students from low-income families
Chaplin *et al.*[192] 2006	Secondary	Girls	Mostly white (88.7%), with 4.1% African American, 1.5% Latino, 1% Asian American and 4.6% more than one race or ethnicity	Median family annual income was ≥ US$100,000

continued

TABLE 70 Socioeconomic status, sex and ethnicity as extracted from authors' reports: universal interventions (*continued*)

Trial	Setting	Sex	Ethnicity	Socioeconomic Status
Clarke *et al.*[193] 1993a	Secondary	Mixed	*90% of enrolled students identified as White*	*. . . schools were located in predominantly middle-class neighborhoods*
Clarke *et al.*[193] 1993b	Secondary	Mixed	*90% of enrolled students identified as White*	*. . . schools were located in predominantly middle-class neighborhoods*
Collins *et al.*[149] 2014	Primary	Mixed	Participants were described as 98% British white	6.9% of students were eligible for free school meals *. . . schools were located in relatively affluent suburbs*
Dadds and Roth[303] 2008	Primary	Mixed	86.8% of participants were described as white, Anglo-Saxon	The majority of participants are described as 'working to middle class'
Eather *et al.*[340] 2016	Secondary	Mixed	NC	NC
Essau *et al.*[150] 2012	Primary	Mixed	The majority were of German origin (95%). Others identified Southern and Eastern European backgrounds. A total of 63% identified as catholic and 10.9% as protestant	72% of parents reported having a high school or equivalent educational level
Gallegos[151] 2008	Primary	Mixed	The study was conducted in the metropolitan area of Monterrey, Northern Mexico. No further information is given	The author described most people living in the local area as being of a medium SES, 'ranked as number 6' [Instituto Nacional de Estadística Geografía e Informática (INEGI; National Institute of Statistics, Geography, and Information)]
Gillham[209] 1995	Primary	Mixed	NC	NC
Gillham *et al.*[128] 2006	Secondary	Mixed	Most students stated that they were from Caucasian backgrounds. Two students were of African American descent, one of Asian descent, and one student defined their ethnicity as 'other'	Suburban Philadelphia A total of 47% had household incomes of > US$100,000, 34% of US$60,000–99,999. 19% of < US$60,000
Gillham *et al.*[194] 2007	Secondary	Mixed	The majority of students were of Caucasian descent, < 10% African American descent, < 2% Latino descent and < 3% Asian descent	School 1: 39% reported income of > US$100,000; 72% of > US$60,000. In schools 2 and 3, 84% and 66%, respectively, reported family income of < US$60,000
Gucht *et al.*[129] 2017	Secondary	Mixed	The study was conducted in a Dutch-speaking region of Belgium	NC
Haden *et al.*[341] 2014	Primary	Mixed	Study was conducted in New York *Most participants were . . . White*	Most participants had a household income in the US$10,000–75,000 or > US$125,000 range
Hiebert *et al.*[130] 1989	Secondary	Mixed	The study was conducted in a large suburban area in Western Canada	NC

TABLE 70 Socioeconomic status, sex and ethnicity as extracted from authors' reports: universal interventions (*continued*)

Trial	Setting	Sex	Ethnicity	Socioeconomic Status
Hodas[131] 2016	Secondary	Girls	School 1: 72% of students were Caucasian School 2: 45% of students were African American and 43% were Caucasian	School 1: affluent households '… who are able to afford the nearly US$27,000 annual tuition' School 2: economically diverse
Horowitz *et al.*[195] 2007	Secondary	Mixed	79% Caucasian, 13% African American, 2% Latino, 1% Asian American, 1% Native American, 3% mixed heritage	Students came from working to middle class communities
Johnson *et al.*[132] 2016	Secondary	Mixed	NC	16.2% low SES, 39% medium SES, 44.8% high SES
Johnson *et al.*[133] 2017	Secondary	Mixed	NC	*… a broad range of socioeconomic (SES) demographics*
Johnstone *et al.*[152] 2014	Primary	Mixed	NC	Schools were in the 'poorest (bottom 30%) in the Western Australian Department of Education and Training School Database'
Khalsa *et al.*[239] 2012	Secondary	Mixed	Students attending the school were described as '90% white'	A total of 17% of students were described as from a low-income population
Kindt *et al.*[196] 2014	Secondary	Mixed	The authors report that approximately 50% of participants were classed as being an 'ethnic minority'	Schools were eligible for the study if ≥ 30% of their students came from low-income areas
Lock and Barrett[134] 2003	Secondary	Mixed	NC	The schools were described as being 'socio-economically diverse'
Lowry-Webster *et al.*[135] 2001	Secondary	Mixed	NC	No details on SES were given. The study was conducted in catholic schools in the Brisbane metropolitan area
Mendelson *et al.*[210] 2010	Primary	Mixed	A total of 83.5% of students self-identified as African American, 4.1% as Latino, 4.1% as white, and 7.2% as 'mixed race'	No details on SES were given. Study was conducted in Baltimore City public schools
Merry *et al.*[197] 2004	Secondary	Mixed	Children attending the school were predominantly from Maori and Pakeha backgrounds	School 1 was in a lower socioeconomic urban area; school 2 was in a middle-class rural district
Miller *et al.*[153] 2010	Primary	Mixed	*… a population that spoke English in 88% of homes …*	*… an unemployment rate of 5.5% …*
Miller *et al.*[154] 2011	Primary	Mixed	36% Canadian aboriginal – First Nations, Native American, Metis, and Inuit	NC
Miller *et al.*[154] 2011	Primary	Mixed	*18% spoke a language other than English in the home*	NC

continued

TABLE 70 Socioeconomic status, sex and ethnicity as extracted from authors' reports: universal interventions (*continued*)

Trial	Setting	Sex	Ethnicity	Socioeconomic Status
Pahl and Barrett[242] 2010	Primary	Mixed	NC	A total of 19% of families had an annual income of < US$40,000, 38.7% between US$40,001 and $80,000, and 28% between US$80,001 and US$100,000
Pattison and Lynd-Stevenson[155] 2001	Primary	Mixed	NC	The study is described as being based in 'a rural town south of Adelaide'
Perry *et al.*[136] 2017	Secondary	Mixed	*Roughly 43% spoke a language other than English at home*	Participants were from selective and partially selective state/public funded schools in metropolitan Sydney, Australia
Pophillat *et al.*[156] 2016	Primary	Mixed	NC	'. . . a very low socioeconomic status area in Perth,' Western Australia
Pössel *et al.*[198] 2004	Secondary	Mixed	NC	NC
Pössel *et al.*[199] 2011	Secondary	Mixed	NC	*. . . a wide range of social classes is likely to be represented . . . economically different regions of the area are represented*
Pössel *et al.*[200] 2013	Secondary	Mixed	The sample was 72.8% Caucasian, 14.7% African American, 5.4% Latino, 1.4% Asian/Pacific Islander, 0.8% Native American, 4.4% mixed heritage, and 0.6% 'other'	Participants were working to middle class. A total of 29% of the students were eligible for free or subsidised school meals
Potek *et al.*[137] 2012	Secondary	Mixed	Total sample was 77.4% white; 16.1% black; 3.2% Latino and 3.2% East Asian	NC
Quayle *et al.*[211] 2001	Primary	Girls	NC	The study was conducted in a private girls' school in a high socioeconomic suburb of Perth, Western Australia
Raes *et al.*[201] 2014	Secondary	Mixed	NC	NC
Reynolds *et al.*[233] 2011	University	Mixed	Participants were 57.7% white, 12.7% African American, 11.3% Hispanic, 8.5% Asian or Pacific Islander, 5.6% Asian Indian and 4.2% self-identified as 'other'	NC
Rivet-Duval *et al.*[202] 2011	Secondary	Mixed	A total of 97.5% of participants were Mauritian and were '. . . representative of the ethnic (primarily Creole, Hindu and Muslim) and religious (primarily Christian, Hindu and Muslim) backgrounds of the Mauritian population'	Household income: 10% < Rs5000, 19% between Rs5000 and Rs15,000, 33% between Rs15,000 and Rs25,000 and 38% > Rs25,000

TABLE 70 Socioeconomic status, sex and ethnicity as extracted from authors' reports: universal interventions (*continued*)

Trial	Setting	Sex	Ethnicity	Socioeconomic Status
Roberts *et al.*[138] 2003	Secondary	Mixed	Participants were 74% Australian, 3% Australian Aboriginal, 5% UK and Ireland, 3% European, 0.5% other non-English speaking and 15% not stated	Mothers' and fathers' level of education, respectively: • less than grade 10: 9% and 10% • between grades 10 and 12: 52% and 39% • grade 12: 18% and 17% • vocational college: 20% and 16% • university: 5% and 6%
Roberts *et al.*[139] 2010	Secondary	Mixed	Participants were 44% Australian, 4% other English speaking, 7% other non-English speaking and 44% not stated	*. . . schools were . . . sampled from the lowest decile of socio-economic status based on the Census Index of Relative Socio-economic Status* Annual family income (Aus$): 14% < $20,000, 30% $20,000–50,000; 13% > $50,000 and 43% not stated
Roberts *et al.*[240] 2018	Primary	Mixed	Participants were 80.7% Australian, 1.7% Australian Aboriginal, 9.2% other English-speaking countries, 5% Asian, 1.9% European, and 1.5% other non-English speaking countries	NC
Rodgers and Dunsmuir[140] 2015	Secondary	Mixed	School 1: 68% white Irish, 18% Irish travelling community and 14% foreign nationals School 2: 92% white Irish, 0% Irish travelling community and 8% foreign nationals School 3: 88% white Irish, 0% Irish travelling community and 12% foreign nationals	*. . . a socially disadvantaged catchment area in a major city in Ireland*
Rooney *et al.*[157] 2006	Primary	Mixed	NC	The study was conducted in schools in 'low socioeconomic areas'
Rose *et al.*[203] 2014	Secondary	Mixed	Mixed	Mixed
Ruttledge *et al.*[158] 2016	Primary	Mixed	NC	Mixed
Sawyer *et al.*[204] 2010	Secondary	Mixed	NC	*81% of participants had at least one parent in full-time employment*
Shatté[205] 1997	Secondary	Mixed	NC	NC
Sheffield *et al.*[141] 2006	Secondary	Mixed	*. . . a broad range of social and cultural backgrounds, consistent with the Australian population . . .*	NC
Soffer[212] 2003	Primary	Mixed	Participants were 60% Caucasian, 14% African American, 8% Hispanic American, 8% Asian American, 4% mixed ethnicity and 6% other ethnicity	Average Hollingshead Index: 35.37 (SD 11.67). Most parents reported occupations in the middle-income range

continued

TABLE 70 Socioeconomic status, sex and ethnicity as extracted from authors' reports: universal interventions (*continued*)

Trial	Setting	Sex	Ethnicity	Socioeconomic Status
Spence *et al.*[206] 2003	Secondary	Mixed	*90.1% of the students were born in Australia* Other students reported a 'variety of ethnic backgrounds typical of the Australian population'	Average SES score was 4.55 (SD 2.66). The authors describe this as 'typical of the SES distribution of Australia' and '… indicative of lower middle SES'
Stallard *et al.*[142] 2013	Secondary	Mixed	*… were representative of schools in the United Kingdom for ethnicity*	*… schools were representative of schools in the United Kingdom for deprivation (eligibility for free school meals), pupil absence rates, and academic ability (examination results and proportion of children with identified special educational needs)*
Stallard *et al.*[159] 2014	Primary	Mixed	Participants were 94% white British, 6% 'non-white'	'Family affluence': 2% low; 29% medium; 69% high. Eligibility for free school meals was lower than the national average (12.4% vs. 18.2%)
Tak *et al.*[207] 2016	Secondary	Mixed	A total of 79% described as Dutch, 21% 'other' and 16.9% were from ethnic minorities. The authors note this is lower than the general population (20.3 %)	NC
Tomba *et al.*[143] 2010	Secondary	Mixed	NC	NC
Velásquez *et al.*[189] 2015	Mixed (primary/ secondary)	Mixed	Study was conducted in Bogotá, Colombia	*… a disadvantaged area*
Wong *et al.*[144] 2014	Secondary	Mixed	NC	NC

TABLE 71 Socioeconomic status, sex and ethnicity as extracted from authors' reports: targeted interventions

Study	Setting	Sex	Ethnicity	SES
Arnarson and Craighead[213] 2009	Secondary	Mixed	NC	NC
Balle and Tortella-Feliu[160] 2010	Secondary	Mixed	NC	NC
Berry and Hunt[161] 2009	Secondary	Boys	74% of families were of an Anglo-Saxon, 17% were of Middle Eastern and 9% were from an Asian ethnic background	54% of parents had not completed tertiary education; 76% were from lower to middle-class backgrounds as classified by annual income
Clarke *et al.*[214] 1995	Secondary	Mixed	92.5% of participants were 'non-Hispanic white'	*Median parent education was 1 to 2 years of college*
Congleton[215] 1995	Secondary	Mixed	92% of participants were described as 'Caucasian'	25% of participants received subsidised or free school meals

TABLE 71 Socioeconomic status, sex and ethnicity as extracted from authors' reports: targeted interventions (*continued*)

Study	Setting	Sex	Ethnicity	SES
Cooley-Strickland *et al.*[174] 2011	Primary	Mixed	92% African American, 8% 'biracial'	The schools in this study were in disadvantaged areas. 90% of the students in the schools received subsidised or free school meals
Cova *et al.*[162] 2011	Secondary	Girls	NC	NC
Cowell *et al.*[231] 2009	Primary	Mixed	Not specifically referenced. However, schools were selected if the student body was ≥ 30% from Latino ethnic backgrounds	80% of families reported annual incomes of < US$26,000
Cui *et al.*[183] 2016	University	Mixed	NC	NC
Dobson *et al.*[163] 2010	Secondary	Mixed	NC	NC
Ellis *et al.*[184] 2011	University	Mixed	NC	NC (participants were university students)
Fitzgerald *et al.*[114] 2016	Secondary	Mixed	93% white; 2% black; 2% Asian; 0% Irish Traveller; 1% other and 2% unknown	Classified using 'School disadvantage status' (DEIS): non-DEIS 82%; DEIS 18%
Fung *et al.*[216] 2016	Secondary	Mixed	52.6% of students described themselves as self-identified Latino and 47.4% as Asian American	No details on participants but school district in an ethnically diverse, low-income area
Gaete *et al.*[164] 2016	Secondary	Mixed	NC	The majority of participants were from 'low socio-economic families'
Gillham *et al.*[165] 2012	Secondary	Mixed	Less than 1% Native American, 4% Asian, < 1% Pacific Islander/ Native Hawaiian, 12% African American, 77% European American, 3% Latino/a, 4% other	Reported mothers' and fathers' education level. The majority had 'some college' education and above (respectively): 79% and 69%
Hiebert *et al.*[130] 1989	Secondary	Mixed	NC	NC
Higgins[185] 2007	University	Mixed	95% of participants described themselves as Caucasian, 2.6% as Asian, 1.3% as African American and 1.3% as other	NC
Hunt *et al.*[166] 2009	Secondary	Mixed	No information given. Schools were Catholic secondary schools in Sydney	NC
Jaycox *et al.*[232] 1994	Primary	Mixed	Details provided for the intervention group: 80% Caucasian, 17% African American, 3% other	Total family income (intervention group): • 16%, < US$20,000 • 44%, US$20,001–40,000 • 26%, US$40,001–60,000 • 7%, US$60,001–80,000 • 7%, > US$80,000

continued

TABLE 71 Socioeconomic status, sex and ethnicity as extracted from authors' reports: targeted interventions (*continued*)

Study	Setting	Sex	Ethnicity	SES
Jordans *et al.*[167] 2010	Secondary	Mixed	• Caste/ethnicity (Nepal): 45% Brahmin/Chhetri/Thakuri • 25% Tharu • 16% Terai caste • 8% Dalit • 7% other Jannajati	Details of family income not provided. Nepal is classified as a LIC
Kiselica *et al.*[168] 1994	Secondary	Mixed	White	Participants lived in an area described as 'middle-class and lower middle-class'
Liddle and Macmillan[188] 2010	Mixed (primary/ secondary)	Mixed	NC (Scottish setting)	NC
Livheim *et al.*[217] 2015	Secondary	Girls	NC	NC
Manassis *et al.*[175] 2010	Primary	Mixed	Ethnicity as reported by families was 56.8% Caucasian, 12.8% Asian, 8.1% East Indian, 6.8% Hispanic, 5.4% Filipino, 3.3% black, and 6.8% mixed/other	*Our sample was [. . .] economically diverse*
McCarty *et al.*[218] 2011	Secondary	Mixed	Details provided for intervention group: • 67% white • 3% African American • 6% Asian • 6% Native American • 19% other 3% of particpants described themselves as Hispanic and 97% as non-Hispanic	Parental education was reported for the intervention group: 64% had a bachelor's degree or higher
McCarty *et al.*[219] 2013	Secondary	Mixed	Details provided for in intervention group: • 63% white • 5% African American • 15% Asian • 8% Native American • 2% Native Hawaiian/ Pacific Islander • 8% other 7% of participants described themselves as Hispanic and 93% as non-Hispanic	• Parental education in intervention group: 52% high school diploma/some college; 23% bachelor's degree; 26% higher degree • Annual household income (intervention group): 38%, < US$50,000; 26%, US$50,000–100,000; 36%, > US$100,000
McLaughlin[236] 2011	Mixed (primary/ secondary)	Mixed	94% Caucasian, 2% Hispanic, 2% African American, 2% Asian and/or Pacific Islander, and < 1% American Indian	Information not provided for sample. 11% of students in the school district were eligible for subsidised or free school meals
McLoone *et al.*[176] 2012	Primary	Mixed	NC	Reported for school-based intervention group, mothers' and fathers' occupational status (respectively): 25% and 2% unemployed, 32% and 15% trade/clerical, 44% and 84% professional

TABLE 71 Socioeconomic status, sex and ethnicity as extracted from authors' reports: targeted interventions (*continued*)

Study	Setting	Sex	Ethnicity	SES
Mifsud and Rapee[177] 2005	Primary	Mixed	Reported for the intervention group: 78% Australian, 17% other country, 5% Aboriginal	Sample details not reported. Intervention was run in areas with high levels of socioeconomic disadvantage
Miller *et al.*[178] 2011	Primary	Mixed	Ethnicity not reported. However, 48% of the sample did not speak English as their first language with their families (18% spoke Chinese, proportion of other languages not reported)	NC
Noël *et al.*[220] 2013	Secondary	Girls	Reported for intervention group only: 80% African American, 15% non-Hispanic white and 5% Hispanic	NC
Owen and Lanning[169] 1982	Secondary	Boys	NR	NR
Peden *et al.*[234] 2000	University	Girls	NC	NC
Peng *et al.*[170] 2015	Secondary	Mixed	NC	NC
Poppelaars *et al.*[221] 2016	Secondary	Girls	Detail not reported. Authors state that 94.7% of participants had been born in the Netherlands	NC
Puskar *et al.*[222] 2003	Secondary	Mixed	NC	NC
Rice[171] 2009	Secondary	Mixed	NC	NC
Rohde *et al.*[223] 2014	Secondary	Mixed	The participants are described as 6% Hispanic, 2% Asian Americans, 1% African Americans, 72% Caucasian, 1% Native American and 18% other or mixed ethnic background	Parental education 39% high school graduate or less, 26% some college, 22% college graduate and 13% graduate degree
Scholten *et al.*[172] 2016	Secondary	Mixed	Authors state that 97.8% of participants had been born in the Netherlands	'The majority' of students in the sample were academically high achievers ('high streamed education tracks')
Schoneveld *et al.*[115] 2016	Primary	Mixed	89.7% of participants were 'of Dutch descent'	NC
Schoneveld *et al.*[116] 2018	Primary	Mixed	91.4% of participants had been born in the Netherlands	NC
Seligman *et al.*[186] 1999	University	Mixed	NC	NC
Seligman *et al.*[187] 2007	University	Mixed	NC	NC

continued

TABLE 71 Socioeconomic status, sex and ethnicity as extracted from authors' reports: targeted interventions (*continued*)

Study	Setting	Sex	Ethnicity	SES
Sheffield *et al.*[141] 2006	Secondary	Mixed	Sample specific details not provided. Authors state that sample reflected the Australian population for social and cultural background	NC
Simpson[179] 2008	Primary	Mixed	56% 'Caucasian', 38% Asian/ South Asian descent and 6% were from other or mixed ethnic backgrounds	Household annual income: 35.2% > CAN$80,000 and 24.6% < CAN$35,000. Mothers' education: 68.5% some post-secondary education, 14% did not complete high school and 8.8% completed high school. Fathers' education: 40% some post-secondary education, 19.3% did not finish high school and 7% finished high school
Siu[180] 2008	Primary	Mixed	NC	NC
Sportel *et al.*[117] 2013	Secondary	Mixed	NC	NC
Stallard *et al.*[142] 2013	Secondary	Mixed	Information not explicitly provided. However, the schools are described as 'representative of schools in the United Kingdom for ethnicity'	Specific details not reported. However, schools are described as 'representative of schools in the United Kingdom for deprivation pupil attendance and academic ability'
Stice *et al.*[237] 2007	Mixed (secondary/ university)	Mixed	17% Asians, 6% blacks, 55% 'Caucasian', 15% Hispanics, 7% other/mixed ethnic background	Parental education level: 20% high school graduate or less, 20% some college, 34% college graduate, 26% graduate degree
Stice *et al.*[224] 2008	Secondary	Mixed	2% Asian, 9% African American, 46% 'Caucasian', 33% Hispanic and 10% other/mixed ethnic heritage	Parental education level: 26% high school graduate or less, 17% some college, 35% college graduate, 18% graduate degree
Stoppelbein[225] 2003	Secondary	Mixed	88% 'Caucasian', 10% African American, 2% Asian American	SES: 18% lower, 22% lower middle, 51% middle, 9% upper middle
Takagaki *et al.*[235] 2016	University	Mixed	NC	NC
Tokolahi *et al.*[181] 2018	Primary	Mixed	35% New Zealand English, 16% Maori, 18% Pacific, 10% Asian, 20% other	NC
Topper *et al.*[173] 2017	Secondary	Mixed	NC	NC
van Starrenburg *et al.*[182] 2017	Primary	Mixed	92.9% of participants and 90.8% of their mothers were born in the Netherlands	Mothers' education level: 55% completed a vocational education, 25% had college or higher education. 40% of the families had a household income considered 'low to average'
Wijnhoven *et al.*[226] 2014	Secondary	Girls	98% of the participants were 'of Dutch origin'	NC

TABLE 71 Socioeconomic status, sex and ethnicity as extracted from authors' reports: targeted interventions (*continued*)

Study	Setting	Sex	Ethnicity	SES
Woods and Jose[227] 2011	Secondary	Mixed	45% of participants identified themselves as Maori and 55% as Pacific	Schools were representative of a range of SESs
Young *et al.*[228] 2006	Secondary	Mixed	92.7% of participants identified as Hispanic	*[H]alf reported a gross household income of $25,000 or less*
Young *et al.*[229] 2010	Secondary	Mixed	73.7% Hispanic, 39% African American	NC
Young *et al.*[230] 2016	Secondary	Mixed	19.9% African American, 4.3% Asian and 8.1% other/mixed race. 38.2% Hispanic and 38.2% white 'non-minority, non-Hispanic'	Participants reported a wide range of annual household incomes: 17.3% < US$25,000, 38.4% US$25,000–90,000, and 44.3% > US$90,000
Yu[238] 2002	Mixed (primary/ secondary)	Mixed	NC	Intervention group parental education level: (father and mother, respectively) 5% and 4% primary school, 9% and 6% junior school, 29% and 34% senior school, 28% and 45% college, 28% and 11% more than college. Intervention group parental income level: 17% < 1000 yuan; 25% 1001–2000 yuan; 24% 2001–3000 yuan; 17% 3001–4000 yuan; 17% > 4001 yuan

NC, not clear; NR, not reported.

Intervention attendance and engagement

Table 72 reports student attendance figures, as reported by trial author.

TABLE 72 Attendance data for each study as reported by study author

Study	Attendance
Ahlen *et al.*[145] 2018	Non-attendance ranged between 4.2% and 6.1% (at class level)
Araya *et al.*[118] 2013	80.5% of intervention group participants attended ≥ 6 sessions
Bonhauser *et al.*[122] 2005	Authors report that 87% of the sessions were completed
Burckhardt *et al.*[124] 2015	8.0% of intervention group participants did not return any of their workbooks from any of the sessions, 15.5% returned 1–2 workbooks, 20.8% returned 3–4 workbooks and 55.6% returned 5–6 session workbooks
Calear *et al.*[125] 2009	62% of the intervention group completed three or more sections ('modules') of the intervention. 32.7% completed all sections. [mean number of sections completed, 3.16 (SD 1.68)]
Calear *et al.*[126] 2016	School-based intervention: 78% completed 2 weeks, 43% completed at least 4 weeks and 36% completed all 6 weeks of the intervention. Health service intervention: 87% completed 2 weeks, 65% completed at least 4 weeks and 50% completed all 6 weeks of the intervention

continued

TABLE 72 Attendance data for each study as reported by study author (*continued*)

Study	Attendance
Calear *et al.*[127] 2016	45% completed all 6 weeks of the intervention
Chaplin *et al.*[192] 2006	Single-sex PRP intervention: attendance mean = 7.03 sessions (SD 4.15). Co-educational PRP intervention: attendance = mean 5.04 sessions (SD 3.56)
Clarke *et al.*[214] 1995	Average intervention group attendance = 72% (range 13% to 100%)
Congleton[215] 1995	Except for one participant, all attended at least six of the eight sessions; 69% attended all eight sessions
Cooley-Strickland *et al.*[174] 2011	All participants attended at least 12 of the 13 sessions
Cova *et al.*[162] 2011	Universal intervention: 76.5% of the participants attended eight or more sessions; 3.4% attended six or fewer sessions (mean = 8.86 sessions). Indicated intervention: in the indicated modality of the programme, 43% attended six or fewer sessions and 8.9% did not attend any session (mean = 6 sessions)
Cowell *et al.*[231] 2009	Participants in the north side intervention groups attended an average of eight classes. Participants in the south side intervention group received an average of 4.72 classes ($t = -2.47$, df = 109, $p = 0.02$)
Cui *et al.*[183] 2016	Cognitive behavioural intervention: 56% of participants attended all eight sessions and 85% attended at least six sessions. Supportive group intervention: 53% of participants attended all sessions and 82% attended at least six sessions
Eather *et al.*[340] 2016	Across all sessions the attendance was 94% for the intervention group
Essau *et al.*[150] 2012	21 children missed one session, 14 missed two sessions, and 6 missed three sessions. All children missing as session had a 1 : 1 catch-up session before their next group session. All these children received an individual session before joining the next group session
Fung *et al.*[216] 2016	The average number of sessions attended was 10.28 out of 12 sessions (85.63%)
Gaete *et al.*[164] 2016	An average of 55.5% participants attended each session (SD = 5.9; range, 45.0–66.4%)
Gillham *et al.*[128] 2006	Average number of sessions attended was 5.5 out of eight; 14% of participants attended two or fewer sessions; 45% of participants attended seven or more sessions
Gillham *et al.*[194] 2007	PRP intervention: average number of sessions attended was 6.71 (SD = 4.22); 16% did not attend any sessions. PEP intervention: average number of sessions attended was 7.11 (SD = 4.43); 15% of participants did not attend any sessions
Gillham *et al.*[165] 2012	84% of students attended at least one session of the main intervention and 44% attended the booster session at 5 months
Johnson *et al.*[132] 2016	87% of participants attended six or more out of the eight sessions
Johnson *et al.*[133] 2017	For the first two sessions, attendance was 40%. By the end of the intervention, involvement was 9%
Johnstone *et al.*[152] 2014	The average number of sessions attended was 9.03 (SD 2.143)
Khalsa *et al.*[239] 2012	73.4% of sessions were attended (SD 0.2%)
Livheim *et al.*[217] 2015	Acceptance and commitment intervention: attended an average of 5.8 out of eight sessions
McCarty *et al.*[218] 2011	94% of parents received three or more sessions (out of four)
McCarty *et al.*[219] 2013	85% of parents participated in both home visit sessions, 38% attended both parent workshop sessions, 22% attended one workshop and 40% did not attend either workshop

TABLE 72 Attendance data for each study as reported by study author (*continued*)

Study	Attendance
Mendelson *et al.*[210] 2010	Intervention attendance varied by school. School 1: 73.5% completed at least 75% of sessions and school 2: 40% of students attended 75% of sessions
Mifsud and Rapee[177] 2005	A mean of 7.38 of eight sessions were attended (SD 0.58) by students
Perry *et al.*[136] 2017	88% of participants completed at least four sessions
Poppelaars *et al.*[221] 2016	Participants completed an average of 6.77 (SD 1.17) out of eight lessons. All participants received at least four sessions
Pössel *et al.*[200] 2013	Cognitive–behavioural prevention programme: participants attended a mean of 8.5 (SD 2.3) sessions. Non-specific control: mean of 8.6 (SD 2.0) sessions were attended
Puskar *et al.*[222] 2003	*Students attended an average of nine sessions*
Quayle *et al.*[211] 2001	Most participants attended 'three or four sessions.' 8.3% of participants attended seven sessions and 21% attended five or more sessions
Roberts *et al.*[138] 2003	Attendance ranged from 87% to 99% over the 12 sessions
Roberts *et al.*[139] 2010	SLS intervention: 5.2% of students missed at least 25% of the sessions. OTS intervention: 9% of students missed at least 25% of the sessions
Rohde *et al.*[223] 2014	Cognitive behavioural intervention: participants attended an average of 5.3 sessions (SD 0.9); 48% attended all six sessions. All students received at least three sessions
Schoneveld *et al.*[115] 2016	80.9% of participants completed all game sessions. Mean = 4.71 sessions (SD 0.69)
Seligman *et al.*[186] 1999	85% of participant attended the workshop
Seligman *et al.*[187] 2007	84% of participant attended the workshop
Sheffield *et al.*[141] 2006 (universal)	Mean number of sessions attended was > 90%
Sheffield *et al.*[141] 2006 (indicated)	Mean attendance rate was 75% of the sessions
Siu[180] 2008	Only eight students missed one session
Sportel *et al.*[117] 2013	A small proportion of participants ($n = 16$) did not complete the intervention
Stallard *et al.*[142] 2013	Classroom-based CBT intervention: median sessions attended was 89% (quartiles 67–100%); 80% of students attended at least 60% of planned sessions. Attention control group: median sessions attended was 100% (quartiles 88–100); 95% of students attended at least 60% of sessions
Stallard *et al.*[159] 2014	Classroom CBT intervention: 80% of participants attended at least 60% of the sessions. Attention control group: 93% of participants attended at least 60% of the sessions
Stice *et al.*[224] 2008	Cognitive–behavioural intervention: 44% of participants attended all sessions; 86% attended at least three of the six sessions. Supportive group intervention: 45% attended all sessions; 89% attended at least three of the six sessions
Tak *et al.*[207] 2016	Attendance data for main intervention not reported. However, 67.8% of participants completed the booster session
Takagaki *et al.*[235] 2016	98.4% of participants completed all sessions
Topper *et al.*[173] 2017	Group intervention: mean number of sessions attended was 4.59 (SD 1.43). Internet intervention: mean number of sessions attended was 3.96 (SD 1.65)
Velásquez *et al.*[189] 2015	21 participants were classified as low attenders and 47 were classified as high attenders
Young *et al.*[228] 2006	Intervention participants attended a mean of 6.9 sessions (SD 1.0)

continued

TABLE 72 Attendance data for each study as reported by study author (*continued*)

Study	Attendance
Young *et al.*[229] 2010	IPT-AST intervention: participants attended an average of 5.22 group sessions (SD 2.55). School counselling intervention: students attended an average of 3.76 sessions (SD 2.53)
Young *et al.*[230] 2016	IPT-AST intervention: mean number of sessions attended by participants was 6.80 (SD 1.85). Group counselling intervention mean sessions attended was 6.18 (SD 1.85)

CB, cognitive–behavioural; GC, group counselling; IPT-AST, Interpersonal Psychotherapy-Adolescent Skills Training; IT, information technology; M, mean; ns, not significant; OTS, optimistic thinking skills; OVK, Op Volle Kracht; PEP, Penn Enhancement Program; PRP, Penn Resilience Program; PTA, Positive Thoughts and Actions; SC, school counselling.

Appendix 8 Economic evaluation

Search carried out in the NHS Economic Evaluation Database

NHS Economic Evaluation Database (1968 to 2014) was searched on 22 May 2019.

Search strategy

1. MeSH DESCRIPTOR child, preschool
2. MeSH DESCRIPTOR child
3. MeSH DESCRIPTOR adolescent
4. MeSH DESCRIPTOR young adult
5. (child* or boy* or girl* or kids or juvenil* or minors or paediatric* or pediatric* or adolesc* or preadolesc* or pre-adolesc* or pubert* or pubescen* or prepube* or pre-pube* or teen* or (young NEAR0 (adult* or people or patient* or men or women or man or woman or male* or female* or survivor* or offender* or minorit*)) or youth* or student* or undergrad*)
6. (child* or adolesc* or paediatr* or pediatr*):so
7. #1 OR #2 OR #3 OR #4 OR #5 OR #6
8. MeSH DESCRIPTOR education
9. MeSH DESCRIPTOR schools
10. MeSH DESCRIPTOR schools, nursery
11. MeSH DESCRIPTOR school health services
12. MeSH DESCRIPTOR school nursing
13. MeSH DESCRIPTOR students
14. MeSH DESCRIPTOR universities
15. preschool or kindergarten or school* or college* or campus* or classroom* or curricul* or teacher* or gatekeeper* or pupil*
16. MeSH DESCRIPTOR peer group
17. ((peer or peers) NEAR0 (education or group or relation* or support* or intervention* or leader*))
18. student* union
19. ((church or communit* or holiday* or religi* or spiritual* or youth or vacation) NEAR1 (camp or club or group))
20. ((camp or club or group) NEAR1 (church or communit* or holiday* or religi* or spiritual* or youth or vacation))
21. ((church or communit* or holiday* or religi* or spiritual* or youth or vacation) NEAR0 based)
22. #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21
23. MeSH DESCRIPTOR adaptation, psychological
24. MeSH DESCRIPTOR emotions
25. MeSH DESCRIPTOR mental health
26. MeSH DESCRIPTOR social adjustment
27. MeSH DESCRIPTOR stress, psychological EXPLODE ALL TREES
28. mental health or mental* ill* or psychiatric
29. wellbeing or well being
30. stress* or distress*
31. #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30
32. MeSH DESCRIPTOR depression
33. MeSH DESCRIPTOR depressive disorder
34. MeSH DESCRIPTOR mood disorders
35. (depress* or dysthymi* or affective disorder* or affective symptom* or mood* or mental):ti

36. (depress* NEAR1 (adolescent* or child* or anaclitic* or episode* or disorder or scale* or score* or symptom* or unipolar)) or ((adolescent* or child* or anaclitic* or episode* or disorder or scale* or score* or symptom* or unipolar) NEAR1 depress*)
37. ((depress* or mood* or mental or psychological or wellbeing or well being or emotion*) NEAR1 (improve* or onset or prevent* or reduc*)) or ((improve* or onset or prevent* or reduc*) NEAR1 (depress* or mood* or mental or psychological or wellbeing or well being or emotion*)) 780
38. (Axis 1 or Axis I) NEAR0 disorder*
39. #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38
40. MeSH DESCRIPTOR anxiety disorders EXPLODE ALL TREES
41. MeSH DESCRIPTOR anxiety
42. anxi*:ti
43. (anxi* NEAR2 (adolescent* or child* or disorder* or general* or interpersonal or separation or social*)) or ((adolescent* or child* or disorder* or general* or interpersonal or separation or social*) NEAR2 anxi*)
44. (phobi* or agoraphobi* or PTSD or post trauma* or posttrauma or panic* or OCD or obsess* or compulsi* or GAD or stress disorder* or stress reaction* or acute stress or neurosis or neuroses or neurotic or psychoneuro* or (school NEAR1 (refusal or avoid*)) or ((refusal or avoid*) NEAR1 school) or social avoidance or mutism)
45. (((anxi* or fear or fright) NEAR2 (perform* or athlet* or music* or act* or test* or exam*)) or math* anxiety or ((perform* or athlet* or music* or act* or test* or exam*) NEAR2 (anxi* or fear or fright)))
46. (public NEAR2 (speak* or speech)) or ((speak* or speech) NEAR2 public)
47. #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46
48. MeSH DESCRIPTOR conduct disorder
49. MeSH DESCRIPTOR child behavior disorders
50. MeSH DESCRIPTOR juvenile delinqency
51. MeSH DESCRIPTOR social behavior
52. MeSH DESCRIPTOR social behavior disorders
53. ((behavi* or conduct or personalit*) NEAR1 (agressi* or nonagressi* or antisocial or anti social or dyssocial or defiant or delinquen* or disturb* or disrupt* or disorder* or internalising or internalizing or externalising or externalizing or problem*)) or ((agressi* or nonagressi* or antisocial or anti social or dyssocial or defiant or delinquen* or disturb* or disrupt* or disorder* or internalising or internalizing or externalising or externalizing or problem*) NEAR1 (behavi* or conduct or personalit*))
54. ((conduct or behavi* or antisocial or anti social or dyssocial or emotional* or internalising or internalizing or externalising or externalizing) NEAR2 (problem* or difficult* or psychopathol*)) or ((problem* or difficult* or psychopathol*) NEAR2 (conduct or behavi* or antisocial or anti social or dyssocial or emotional* or internalising or internalizing or externalising or externalizing))
55. oppositional NEAR2 (defiant* or disorder*)
56. #48 OR #49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55
57. MeSH DESCRIPTOR preventive health services
58. MeSH DESCRIPTOR early intervention (education)
59. MeSH DESCRIPTOR health literacy
60. MeSH DESCRIPTOR patient education as topic
61. MeSH DESCRIPTOR health promotion
62. MeSH DESCRIPTOR primary prevention
63. MeSH DESCRIPTOR secondary prevention
64. prevent*:ti
65. prevention of
66. (prevent* NEAR1 (intervention or educat* or pilot or program* or project or protocol* or training or universal or targeted or primary or secondary or selective or indicated or study or trial)) or ((intervention or educat* or pilot or program* or project or protocol* or training or universal or targeted or primary or secondary or selective or indicated or study or trial) NEAR1 prevent*)

67. (early or brief) NEAR0 intervention*
68. ((universal or targeted) NEAR1 (program* or intervention*))
69. vulnerabl* or at risk or (risk NEAR1 reduc*) or (reduc* NEAR1 risk)
70. MeSH DESCRIPTOR risk
71. MeSH DESCRIPTOR risk factors
72. MeSH DESCRIPTOR accidents EXPLODE ALL TREES
73. MeSH DESCRIPTOR bereavement
74. MeSH DESCRIPTOR grief
75. MeSH DESCRIPTOR social problems
76. MeSH DESCRIPTOR bullying
77. MeSH DESCRIPTOR child of impaired parents
78. MeSH DESCRIPTOR child, orphaned
79. MeSH DESCRIPTOR crime victims
80. MeSH DESCRIPTOR disasters EXPLODE ALL TREES
81. MeSH DESCRIPTOR divorce
82. MeSH DESCRIPTOR life change events
83. MeSH DESCRIPTOR runaway behavior
84. MeSH DESCRIPTOR urban population
85. MeSH DESCRIPTOR rural population
86. MeSH DESCRIPTOR survivors
87. MeSH DESCRIPTOR violence
88. MeSH DESCRIPTOR warfare
89. MeSH DESCRIPTOR civil disorders EXPLODE ALL TREES
90. MeSH DESCRIPTOR crime EXPLODE ALL TREES
91. MeSH DESCRIPTOR human rights abuses EXPLODE ALL TREES
92. MeSH DESCRIPTOR parental death EXPLODE ALL TREES
93. MeSH DESCRIPTOR poverty
94. MeSH DESCRIPTOR social behavior disorders EXPLODE ALL TREES
95. MeSH DESCRIPTOR domestic violence
96. MeSH DESCRIPTOR child abuse EXPLODE ALL TREES
97. MeSH DESCRIPTOR ethnic violence EXPLODE ALL TREES
98. MeSH DESCRIPTOR physical abuse
99. MeSH DESCRIPTOR terrorism EXPLODE ALL TREES
100. MeSH DESCRIPTOR torture
101. MeSH DESCRIPTOR exposure to violence
102. MeSH DESCRIPTOR warfare and armed conflicts EXPLODE ALL TREES
103. MeSH DESCRIPTOR dissent and disputes
104. MeSH DESCRIPTOR family conflict
105. MeSH DESCRIPTOR psychosocial deprivation
106. #57 OR #58 OR #59 OR #60 OR #61 OR #62 OR #63 OR #64 OR #65 OR #66 OR #67 OR #68 OR #69 OR #70 OR #71 OR #72 OR #73 OR #74 OR #75 OR #76 OR #77 OR #78 OR #79 OR #80 OR #81 OR #82 OR #83 OR #84 OR #85 OR #86 OR #87 OR #88 OR #89 OR #90 OR #91 OR #92 OR #93 OR #94 OR #95 OR #96 OR #97 OR #98 OR #99 OR #100 OR #101 OR #102 OR #103 OR #104 OR #105
107. MeSH DESCRIPTOR randomized controlled trial
108. MeSH DESCRIPTOR pragmatic clinical trial
109. randomised or randomized or randomisation or randomization
110. (RCT or (random* NEAR2 (administ* or allocat* or assign* or class* or cluster* or control* or determine* or divide* or distribut* or expose* or fashion or number* or place* or recruit* or substitut* or treat*)) or ((administ* or allocat* or assign* or class* or cluster* or control* or determine* or divide* or distribut* or expose* or fashion or number* or place* or recruit* or substitut* or treat*) NEAR2 random*))
111. at random

112. placebo
113. trial
114. #107 OR #108 OR #109 OR #110 OR #111 OR #112 OR #113
115. treatment-as-usual or (treatment* NEAR1 usual) or (usual NEAR1 treatment*) or (standard NEAR1 care) or (standard NEAR1 treatment) or (routine NEAR1 care) or (usual NEAR1 medication*) or (usual NEAR1 care) or TAU
116. waitlist* or wait-list* or waiting-list* or wait* list* or (waiting NEAR0 (condition or control)) or WLC
117. ((delay* NEAR2 (start or treatment*)) or ((start or treatment) NEAR2 delay*) or no intervention or no treatment* or no-treatment or non treatment* or nontreatment* or non-treatment* or minim* treatment* or untreated group* or untreated control* or without any treatment) and (control* or group*)
118. (no intervention* or non intervention* or non-intervention* or without any intervention*) and (control* or group*)
119. #115 OR #116 OR #117 OR #118
120. #114 OR #119
121. #7 AND #22 AND (#31 OR #39 OR #47 OR #56) AND #106 AND #120
122. (universal or indicated or targeted or at risk) and prevent* and (anxiety or depress* or conduct) and (child* or adolesc* or school*)
123. (prevent* NEAR0 (program* or intervention)) and (anxiety or depress* or conduct) and (child* or adolesc* or school*)
124. #122 OR #123
125. #120 AND #124
126. #121 OR #125
127. #126 IN NHSEED

Scoping search carried out in MEDLINE for economic decision models

As the original literature searches for the effectiveness analyses were conducted for RCTs only, we conducted an additional scoping search to ascertain if we were likely to have missed publications of model-based economic analyses. The following search strategy was implemented in MEDLINE. No additional citations were located, and a full search was not conducted. The scoping search of MEDLINE was 1946 to present, and the search was carried out on 17 June 2019.

Search strategy

1. decision model*.mp.
2. markov.mp.
3. Decision Trees/or decision tree*.mp.
4. economic model*.mp. or Models, Economic/
5. cohort model*.mp.
6. simulation model*.mp.
7. 1 or 2 or 3 or 4 or 5 or 6
8. depression.mp. or Depression/
9. Anxiety/or anxiety.mp. or Anxiety Disorders/
10. conduct disorder.mp. or Conduct Disorder/
11. 8 or 9 or 10
12. Child Psychiatry/or child*.mp. or Psychology, Child/or Child/
13. adolescent*.mp. or Adolescent Psychiatry/or Adolescent/
14. Young Adult/or young*.mp.
15. 12 or 13 or 14
16. 7 and 11 and 15

Characteristics of studies contributing to the economic evaluation

TABLE 73 Studies describing cost-effectiveness analyses of school-based interventions

	Study					
	Mihalopoulos *et al.*[260] 2012	Anderson *et al.*[261] 2014	Foster[250] 2010	Foster and Jones[263,264] 2006 and 2007	Lee *et al.*[259] 2017	Stallard *et al.*[262] 2015
Condition	Depression	Depression	Conduct disorder	Conduct disorder	Depression	Anxiety
Intervention type	Indicated	Universal	Indicated with a universal component	Indicated with a universal component	Universal and indicated	Universal
Intervention	'Representative' intervention, CBT based	RAP (CBT)	Fast Track (multicomponent)	Fast Track (multicomponent)	'Hypothetical' intervention (group psychological)	FRIENDS (CBT)
Comparator	No intervention	Usual PSHE	Usual provision	Usual provision	No intervention	Usual school provision
Setting (school)	Secondary	Secondary	Primary and secondary	Primary and secondary	Primary and secondary	Primary
Age range (years)	11–17	12–16	6–16	6–17	11–17	9–10
Type of economic analysis	CUA	CEA, CUA	CCA	CEA	CUA	CUA, CEA
Study type	Model	Trial	Trial	Trial	Model	Trial
Model type	Markov	N/A	N/A	N/A	Markov	N/A
Model time horizon	5 years	N/A	N/A	N/A	10 years	N/A
Follow-up period	N/A	12 months	12–14 years	10 years	N/A	6 months
Participants (*n*)	N/A	3357	891	891	N/A	308

continued

TABLE 73 Studies describing cost-effectiveness analyses of school-based interventions (*continued*)

	Study					
	Mihalopoulos *et al.*[260] 2012	Anderson *et al.*[261] 2014	Foster[250] 2010	Foster and Jones[263,264] 2006 and 2007	Lee *et al.*[259] 2017	Stallard *et al.*[262] 2015
Cost of intervention	AU$47M total	£41.96 per child	US$58,000 per child	US$58,283 per child		£55.92 per child for school led, £52.55 for health led
Perspective	Health sector	NHS and social care	Payer for intervention, criminal justice, education	Third-party payer	Health and education sector	Health sector (NHS) and the education/social services sector
Location	Australia	UK	USA	USA	Australia	UK
Resources included	Intervention, cost 'offsets' defined as average annual cost of treating depression, parental time and travel	Inpatient stays, A&E attendances, outpatient visits, GP for any reason, GP for psychological problems, GP nurse, school nurse, counsellor, community mental health service, child psychologist, social worker, other professional	Outpatient visits, nights as an inpatient, number of admissions (for emotional/behavioural or any other reason), medication, repeating a grade, special education, arrests, court appearances, police contacts, detention centre stays, jail stays	Intervention only	Intervention, 'cost offsets' (health care)	Overnight hospital stays, A&E visits, outpatient appointments, GP for any reason, GP for worry/anxiety/happiness, GP nurse, school nurse, counsellor, child mental health service, child psychologist, social worker, other professional, medication
Unit of randomisation	N/A	Year group	School	School	N/A	School
Currency	Australian dollars	GBP	US dollars	US dollars	Australian dollars	GBP
Publication year	2012	2014	2010	2006/7	2017	2015
Trial registration	N/A	ISRCTN19083628	NCT01653535 (follow-up)	NCT01653535 (follow-up)	N/A	ISRCTN23563048

	Study					
	Mihalopoulos *et al.*[260] 2012	Anderson *et al.*[261] 2014	Foster[250] 2010	Foster and Jones[263,264] 2006 and 2007	Lee *et al.*[259] 2017	Stallard *et al.*[262] 2015
Outcomes	DALYs averted	SMFQ, QALYs	Range of antisocial behaviour measures	Conduct disorder diagnosis averted	DALY	QALYs
Source of outcomes	N/A	EQ-5D	Self-reported, parent reported, agency records	Diagnostic Interview Schedule of Children	N/A	CHU-9D
Discount rate (%)	3	N/A	N/A	5	3	N/A
Cost year	2003	2014	Not stated	2004	2013	2013
Source of resource use	Literature	CSRI	Parent-completed Service Assessment for Children and Adolescents, adolescent self-reported, review of agency records, Life Changes assessment	Study records	N/A	CSRI parent interview
Conclusions	*After school screening, screening and the psychological intervention represent good value-for-money. Such an intervention needs to be seriously considered in any national package of preventive health services*	*. . . the universal provision of classroom-based CBT is unlikely to be either more effective or less costly than usual school provision*	*. . . the intervention lacked both the breadth and depth of effects on costly outcomes to demonstrate cost-effectiveness or even effectiveness*	*Results indicate the intervention is cost-effective for the children at highest risk*	*School-based psychological interventions appear to be cost-effective*	*. . . find limited evidence to support the universal provision of specific anxiety prevention programmes in UK primary schools. Although we found no evidence that the universal provision of the FRIENDS programme was cost-effective over a 6-month period, this conclusion needs to be treated with caution*

A&E, accident and emergency; CEA, cost-effectiveness analysis; CSRI, Client Service Receipt Inventory; CUA, cost–utility analysis; EQ-5D, EuroQoL-5 Dimensions; GBP, Great British pounds; ISRCTN, International Standard Randomised Controlled Trial Number; N/A, not applicable; NCT, National Clinical Trial; SMFQ, Short Mood and Feelings Questionnaire.

TABLE 74 Economic evaluation: characteristics of CBT interventions with a psychoeducation component

Study	Number of sessions	Average session time (minutes)	Group size (*n*)	Parent sessions	Facilitator (number)	Manual	Training	Materials	Other costs
Calear *et al.*[126] 2016	6	35	30		Teacher or specialist (1)	Yes	No training	Unclear	
Calear *et al.*[127] 2016	6	35	30		Teacher (1)	Yes	No training	Unclear	
Hodas[131] 2016	10	50	4		2 Doctoral students/ 1 psychologist and 2 undergraduates (2)	No	Unclear	Worksheets	
Rodgers and Dunsmuir[140] 2015	10	60	11		Psychologist (1)	Yes	1 day	Workbooks	
Lowry-Webster *et al.*[135] 2001	10	75	30	3 (low turnout)	Teacher (1)	Yes	1 day	Workbooks	2 booster sessions
Wong *et al.*[144] 2014	6.5	40	30		Teacher (1)	Yes	No training	Worksheets	
Gillham *et al.*[128] 2006	8	90	11	6 × 90 minutes	Psychologist (2)	Yes	Developer, junior staff were trained (no details)	Unclear	
Lock and Barrett[134] 2003	12	75	30	3 (low turnout)	Psychologist (1)	Yes	1 day	Workbooks	
Tomba *et al.*[143] 2010	6	120	20		Psychologist (2)	Yes	Training on recruitment	Handouts	
Horowitz *et al.*[195] 2007	8	90	11		Psychologist and student (2)	Yes	Training workshops (no details)	Workbooks	
Kindt *et al.*[196] 2014	16	50	25		Teacher (1)	Yes	4 days	Workbooks	Remote advice
Pössel *et al.*[198] 2004	10	90	16		Psychologist or postgraduates (2)	Yes	Participation	Unclear	

Study	Number of sessions	Average session time (minutes)	Group size (*n*)	Parent sessions	Facilitator (number)	Manual	Training	Materials	Other costs
Pössel *et al.*[199] 2011	10	90	27		Psychologist or postgrads (2)	Yes	Participation, co-presenting	Unclear	
Tak *et al.*[207] 2016	16	50	13		Psychologist (1)	No	5 days	Workbook	2-hour booster
Aune and Stiles[119] 2009	3	45	30	1 day, nurses; 60 minutes, parents; 90 minutes, carers	Teacher (1)	No	90 minutes, teachers	Booklet, website, handouts	Newspaper advertisement
Barrett *et al.*[121] 2005	10	50	25	4 × 2-hour sessions (10 participants)	Psychologist (1)	Yes	Training (unspecified amount)	Workbook, booklet	2 booster sessions
Barry *et al.*[190] 2017	4	40	13		Unclear (0)	No	Unclear		
Pössel *et al.*[200] 2013	10	90	8		Psychologist and postgraduate (2)	Yes	Participation		
Sawyer *et al.*[204] 2010	30	42	30		Teacher (1)	Yes	1 day	Workbook, poster, homework sheet, CD, DVD	
Sheffield *et al.*[141] 2006	8	47	30		Teacher (1)	Yes	1 day (6 hours)	Workbook, notes, poster, handouts	

CD, compact disc; DVD, digital versatile disc.

TABLE 75 Economic evaluation: characteristics of CBT + IPT interventions

Study	Number of sessions	Average session time (minutes)	Size of group (*n*)	Parent sessions	Facilitator (number)	Manual	Training	Materials	Other costs
Merry *et al.*[197] 2004	11	70	23	NA	Teacher (1)	Yes	2.5 days	Workbook	NA
Rivet-Duval *et al.*[202] 2011	11	60	10	NA	Teacher (1)	Yes	2 days (16 hours) plus 0.5-day booster	Unclear	NA
Rose *et al.*[203] 2014	20	45	9	NA	Psychologist students (1)	Yes	2 days (1 for each intervention)	Workbook	NA

NA, not applicable.

Cost data, assumptions and sources

TABLE 76 Unit costs associated with delivery of a school-based intervention (school funder perspective)

Cost type	Unit cost (2018)	Assumptions and sources
Average hourly rate for teachers in the UK	• Secondary school = £37.88 • Primary school = £34.80	Average salary[342] for secondary school classroom teacher (2018) = £37,700 Average salary[342] for primary school classroom teacher (2018) = £34,700 Employer National Insurance contribution[343] @ 13.8% over £8424 • Secondary school = £4040.09 • Primary school = £3626.09 Superannuation contribution = 16.4% (note that the rate rose to 23.6% in 2019, but is covered by a grant)[344] • Secondary school = £6182.80 • Primary school = £5690.80 • Total annual cost of employing secondary school teacher = £47,922.89 • Total annual cost of employing primary school teacher = £44,016.89 • Working hours = 1265 per year[345]
Workbook (per student)	£9	Costs for the workbooks varied between approximately £4 and £12
Manual (per teacher)	£25	Costs for the intervention manuals varied between approximately £5 and £40

Cost of training one teacher	• Secondary school = £520
	• Primary school = £500
		• Two-day training course @ £410 (https://bounceforward.com/teach-resilience/)
		• Training in mental health awareness @ £200 per teacher[346]
		• CPD for teachers @ £280 + VAT (https://cpdforteachers.com/)
		• Estimate £225 + VAT = £270 per teacher
		• Time of attendee = 1 day (6.5 hours)
		  ○ Secondary school = £246.22
		  ○ Primary school = £226.20
		
		• One-day course cost, plus time of attendee:
		  ○ Secondary = £516.22
		  ○ Primary = £496.20

Average number of students per school[347]		• Secondary school = 948 students • Primary school = 281 students
Average class size[347]		• Secondary school = 21.2 students • Primary school = 27.1 students

CPD, continuing professional development; VAT, value-added tax.

Appendix 9 Comparison of findings with previous systematic reviews

TABLE 77 Characteristics of previous systematic reviews of anxiety and depression prevention

Study	Condition[a]	Population[b]	Setting[c]	Intervention[d]	Comparator[e]	Design[f]	Summary effect[g]	Meta-analysis[h]	Adjusted cluster?[i]	Studies included in review (*n*)	Percentage of studies included[j]	Summary[k]
Wadell[275] 2007	Anxiety, depression and conduct disorder	Universal and targeted	All	Psychological	Not clear	RCT	NA[l]	No	NA[l]	6	83	Results presented by specific programme and *p*-value
Horowitz and Garber[285] 2006	Depression	Universal and targeted	Not clear	Not clear	Control	RCT	Hedges' *g*	Not clear	Not clear	30	43	Overall mean effect was 0.16
Neil and Christensen[111] 2007	Anxiety and depression	Universal targeted and early intervention	School	Psychological, educational	Not clear	RCT	Cohen's *d*	No	Not clear	24	58	The effect sizes for controlled trials varied from small (0.18) to moderate (0.83)
Neil and Christensen[112] 2009	Anxiety	Universal targeted and early intervention	School	Psychological, educational, physical	Not clear	RCT	Cohen's *d*	NA[l]	Not clear	27	52	• Adolescents: effect size = 0.11–1.37, median = 0.32 • Children: effect size = 0.41–0.96, median = 0.57
Calear and Christensen[109] 2010	Depression	Universal targeted and early intervention	School	Psychological, educational	Waiting list, no intervention, usual curriculum, attention control	RCT	Cohen's *d*	NA[l]	Not clear	42	71	Out of 42 trials, 23 (55%) significantly reduced participants' depressive symptoms at post test or follow-up, with effect sizes ranging from 0.21 to 1.40. The effect sizes of the 19 trials that did not obtain significant results ranged from −0.54 to 0.73
Stice *et al.*[113] 2009	Depression	Universal and targeted	All	Not clear	Attention control, no intervention, waiting list	RCT, quasi-RCT	*r*	Random effects	Not clear	46	54	$r = 0.15$ ($z = 4.96$; $p < 0.001$)
Fisak[348] 2011	Anxiety	Universal and targeted	All	Psychological	Not clear	RCT, pre–post[m]	Hedges' *g*	Fixed effects	Not clear	31	65	Anxiety: 0.18 (95% CI 0.13 to 0.23): • Universal: 0.17 (no CI) • Targeted: 0.26 (no CI)

Study	Condition[a]	Population[b]	Setting[c]	Intervention[d]	Comparator[e]	Design[f]	Summary effect[g]	Meta-analysis[h]	Adjusted cluster?[i]	Studies included in review (*n*)	Percentage of studies included[j]	Summary[k]
Teubert[276] 2011	Anxiety	Universal and targeted	Not clear	Not clear	Waiting list, attention control, placebo	RCT	Hedges' *g*	Random effects	Not clear	59	42	• Anxiety: Hedges' $g = 0.22$; $p < 0.001$ • Depression: Hedges' $g = 0.10$; $p < 0.01$
Corrieri[108] 2014	Anxiety and depression	Universal and targeted	School	Psychological		RCT (> 100)	Cohen's *d*	Not clear	Not clear	24	71	• Depression: −0.12 (range −0.57 to 0.30) • Anxiety: −0.29 (range −0.67 to 0.19)
Ahlen *et al.*[349] 2015	Anxiety and depression	Universal	Not clear	Psychological, educational	Not clear	RCT	Hedges' *g*	Random effects	Yes	30	83	• Anxiety: 0.13 (95% CI 0.01 to 0.26) • Depression: 0.11 (95% CI 0.03 to 0.20)
Brunwasser[350] 2016	Depression	Universal and targeted	Not clear	Psychological	No intervention, usual curriculum	RCT	Hedges' *g*	Fixed effects	Not clear	35	89	A review of each specific programme: only pools within each programme for which there were three or more RCTs
Stockings *et al.*[38] 2016	Anxiety and depression	Universal and targeted	All	Psychological, educational, physical	No intervention, usual curriculum, waiting list, attention control	RCT	Cohen's *d*	Random effects	Not clear	146	60	• Universal and depression: −0.11 (95% CI −0.16 to −0.05) • Universal and anxiety: −0.16 (95% CI −0.27 to −0.06) • Selective, depression: −0.23 (95% CI −0.36 to −0.09) • Selective, anxiety: 0.10 (95% CI −0.10 to 0.30) • Indicated, depression: −0.33 (95% CI −0.46 to −0.20) • Indicated, anxiety: −0.01 (95% CI −0.27 to 0.26)
Hetrick[68] 2016	Depression	Universal and targeted	All	Psychological	Usual curriculum, no intervention, waiting list, attention control, other	RCT	SMD	Random effects	Yes	83	73	• All: −0.21 (95% CI −0.27 to −0.15) • Universal: −0.11 (95% CI −0.17 to −0.05) • Targeted: −0.32 (95% CI −0.42 to −0.23)

continued

TABLE 77 Characteristics of previous systematic reviews of anxiety and depression prevention (*continued*)

Study	Condition[a]	Population[b]	Setting[c]	Intervention[d]	Comparator[e]	Design[f]	Summary effect[g]	Meta-analysis[h]	Adjusted cluster?[i]	Studies included in review (*n*)	Percentage of studies included[j]	Summary[k]
Lawrence *et al.*[278] 2017	Anxiety	Targeted	All	Not clear	Waiting list, active	RCT	Hedges' *g*	Random effects	Not clear	16	63	• Inactive: −0.43 (95%CI −0.73 to −0.12) • Attention: −0.09 (95% CI −0.28 to 0.10)
Waldron[351] 2018	Anxiety	Universal	School	Psychological	Waiting list, no intervention, attention control	RCT	Hedges' *g*	NA[l]	NA[l]	8	100	NA[l]
Werner-Seidler *et al.*[36] 2017	Anxiety and depression	Universal and targeted	School	Psychological, educational	No intervention, usual curriculum, waiting list, attention control	RCT	Hedges' *g*	Random effects	Not clear	81	81	• Depression: 0.23 (95% CI 0.19 to 0.28) • Anxiety: 0.20 (95% CI 0.14 to 0.25)
Rasing *et al.*[39] 2017	Anxiety and depression	Targeted	All	CBT	No intervention, usual curriculum, waiting list, attention control	RCT	Cohen's *d*	Random effects	Not clear	36	81	• Depression: −0.25 (95% CI −0.38 to −0.12) • Anxiety: −0.19 (95% CI −0.36 to 0.03)
Moreno-Peral *et al.*[110] 2017	Anxiety	Universal and targeted	All	Psychological, educational		RCT	SMD	Random effects	Not clear	9	77	Anxiety: −0.29 (95% CI −0.47 to −0.10)
Bernaras *et al.*[277] 2019	Depression	Universal and targeted	School	Psychological	Not clear	RCT	NA[l]	NA[l]	NA[l]	9	89	NA[l]
Johnstone *et al.*[37] 2018	Anxiety and depression	Universal	School	Psychological	Waiting list, usual curriculum, placebo	RCT	Hedges' *g*	Random effects	Not clear	14	100	• Anxiety: Hedges' $g = 0.09$ (95% CI − 0.07 to 0.26) • Depression: Hedges' $g = 0.17$ (95% CI 0.06 to 0.28)

NA, not applicable.
a Condition: which of anxiety, depression and conduct disorder the review considered.
b Population: if review included targeted and/or universal populations, or early intervention.
c Setting: whether review was restricted to school settings or wider.
d Intervention: which intervention review focused on – psychological, educational or physical.
e Comparator: which controls were included.
f Design: what types of study design were eligible for inclusion.
g Summary effect: if a meta-analysis was conducted, did the review use Cohen's *d*, Hedges *g*, SMD or other?
h Meta-analysis: if a meta-analysis was conducted, was it fixed effects, random effects or not clear?
i Adjusted cluster.
j The percentage of studies from the listed review that were included in the NMA.
k Summary: a brief description of the results from the review.
l Narrative review.
m A non-randomised pre–post design.

TABLE 78 Lumping and splitting of control and interventions

	Depression				Anxiety			
	Universal		Targeted		Universal		Targeted	
Comparison	SMD	95% CrI	SMD	95% CrI	SMD	95% CrI	SMD	95% CrI
CBT vs. control[a]	−0.08	−0.16 to −0.01	−0.25	−0.43 to −0.08	−0.07	−0.13 to −0.03	−0.19	−0.34 to −0.05
SD[b]	0.17	0.12 to 0.23	0.38	0.28 to 0.54	0.06	0.01 to 0.14	0.29	0.18 to 0.43
Psychological intervention[c] vs. control	−0.09	−0.15 to −0.02	−0.31	−0.48 to −0.14	−0.06	−0.12 to −0.02	NA[d]	
SD[b]	0.17	0.12 to 0.23	0.39	0.28 to 0.55	0.06	0.00 to 0.15		

NA, not applicable.

a The lumped 'control' condition varied depending on the population/setting/outcome, but could include usual curriculum, no intervention, waiting list, attention control, psychosupport or psychoeducation comparators.

b SD: between-study heterogeneity.

c The lumped 'psychological intervention' comparator varied across the networks, but could include CBT, third wave, IPT and CBT + IPT. We did not include behavioural therapy or CBM in the lumped psychological intervention comparator.

d There was only one psychological intervention in the targeted anxiety network (CBT) and so the two analyses were equivalent.

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