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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Scientific summary

Interventions for anxiety, depression and conduct disorder

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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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