Cochrane Library

Cochrane Database of Systematic Reviews

Psychological interventions for asthma in children and adolescents (Protocol)

Sharrad KJ, Sanwo O, Carson-Chahhoud KV, Pike KC

Sharrad KJ, Sanwo O, Carson-Chahhoud KV, Pike KC.
Psychological interventions for asthma in children and adolescents.
Cochrane Database of Systematic Reviews 2019, Issue 9. Art. No.: CD013420.
DOI: 10.1002/14651858.CD013420.

www.cochranelibrary.com

WILEY

TABLE OF CONTENTS

[Intervention Protocol]

Psychological interventions for asthma in children and adolescents

Kelsey J Sharrad[1], Olatokunbo Sanwo[2], Kristin V Carson-Chahhoud[1], Katharine C Pike[3]

[1]School of Health Sciences, University of South Australia, Adelaide, Australia. [2]East Kent Hospitals University NHS Foundation Trust, William Harvey Hospital, Ashford, UK. [3]Respiratory, Critical Care & Anaesthesia, UCL Great Ormond Street Institute of Child Health, London, UK

Contact address: Kelsey J Sharrad, School of Health Sciences, University of South Australia, Adelaide, Australia. Kelsey.Sharrad@unisa.edu.au.

Editorial group: Cochrane Airways Group.
Publication status and date: New, published in Issue 9, 2019.

Citation: Sharrad KJ, Sanwo O, Carson-Chahhoud KV, Pike KC. Psychological interventions for asthma in children and adolescents. *Cochrane Database of Systematic Reviews* 2019, Issue 9. Art. No.: CD013420. DOI: 10.1002/14651858.CD013420.

ABSTRACT

This is a protocol for a Cochrane Review (Intervention). The objectives are as follows:

Main objectives

To determine the efficacy of psychological interventions in modifying health and behavioural outcomes in children with asthma, compared with usual treatment.

Secondary objectives

To compare efficacy of different types of psychological interventions for children with asthma.

To assess the comparative efficacy of individual and group formats of psychological therapy for children with asthma.

BACKGROUND

Description of the condition

Asthma is a complex and phenotypically diverse disease, characterised by chronic inflammation of the airways (GINA 2018). Though a universally-accepted definition of asthma is lacking, asthma is generally defined as "a history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time" (GINA 2018).

Asthma contributes substantially to the global burden of disease. It is currently estimated that 300 million people worldwide experience symptoms of asthma (Masoli 2004). Countries with the highest prevalence rates include Brazil, the Netherlands, UK, Sweden, and Australia (To 2012).

Individuals with asthma may experience exacerbations of asthma symptoms or 'attacks'; these attacks can be life-threatening, and therefore impose significant psychological burdens on patients and their communities (GINA 2018). Furthermore, asthma which is not under adequate control can increase this psychological burden (Goodwin 2013), and likewise psychological distress can trigger

or exacerbate symptoms of asthma (Van Lieshout 2008).

Rates of asthma are high in children and adolescents. Current global prevalence rates indicate that 10.2% of children aged 6 to 7 years, and 11.3% of children aged 13 to 14 experience symptoms of asthma (ISAAC 1998b). The highest rates of asthma in these age groups were observed in the UK, Australia, New Zealand, and Republic of Ireland (ISAAC 1998a). Young people with asthma generally report poorer health outcomes than those without asthma (Blanchard 2014). A 2014 survey of Australians aged 12 to 25 years found that half of young people with asthma experienced symptoms of heightened psychological distress (the experience of symptoms of anxiety and depression at sub-clinical levels (Drapeau 2012)). This is double the rate of the wider community (Blanchard 2014); and a figure that has been significantly increasing (Mission Australia 2017). In addition, both poor asthma outcomes and poor mental health outcomes disproportionately affect those from poorer backgrounds (AIHW 2016; Evans 2012 GINA 2019).

Contributing to their increased experience of psychological distress, a range of challenges faced by children and adolescents with asthma may include social isolation, restricted life choices, limitations on personal potential, embarrassment and shame about their condition or treatment (or both), self-consciousness, potential mortality threat, and fear of disease exacerbation (Blanchard 2014). These complex, interconnected issues compound the social, psychological and developmental challenges experienced by people during this life stage (Cohen 2003; de Benedictis 2007). This combined symptom profile contributes to higher levels of functional impairment (Akinbami 2002), lower quality of life (Goldney 2003), and higher rates of preventable hospitalisation and mortality compared to people without asthma (Calmes 1998).

Description of the intervention

It is likely that a bidirectional relationship exists between asthma and symptoms of psychological distress (Baiardini 2015). Psychological factors and negative life events can exacerbate inflammation and symptoms of asthma (French 1943; Sandberg 2000; Van Lieshout 2008). It has been suggested that psychological distress may exacerbate the immune response to external stimuli via increased activation of endocrine pathways - the sympathetic and adrenomedullary (SAM) system and the hypothalamic-pituitary-adrenocortical (HPA) axis (Chen 2007). Long periods of exposure to stress hormones can lead to down-regulation of receptors to these molecules and dysregulation of inflammatory responses to asthma triggers. Production of Th2 cytokines and recruitment of eosinophils can be exaggerated under these conditions, promoting output of neurotransmitters which can increase inflammation (Wright 1998; Wright 2005).

Conversely, asthma in young people is associated with increased psychological distress and clinical diagnoses of psychological disorders (Dudeney 2017; Katon 2007; Pinquart 2010). Although some experience of anxiety in people with asthma is healthy, this can develop into chronic and excessive psychological distress (Thomas 2011). Asthma may negatively affect psychological and mental health outcomes, as individuals with asthma may experience heightened psychological distress due to the persistent fear of asthma attacks (GINA 2018).

Psychological interventions refer to theoretically informed psychological strategies underpinned by clinical formulation. Various types of interventions exist, underpinned by distinct theoretical frameworks. This review will explore the following types of intervention: behavioural, cognitive, cognitive behavioural, relaxation, psychodynamic psychotherapy, counselling, group therapy, and family therapy. Behavioural therapies focus on identifying and changing learned behaviours, cognitive therapies identify and manage thoughts and perceptions, while cognitive behavioural therapy (CBT) incorporates aspects of both of these models. Relaxation techniques are designed to control psychological distress, though in this situation may also improve respiratory functioning. Psychodynamic therapy, counselling, group therapy and family therapy all involve the discussion of issues with a licensed professional in group or individual formats. The current evidence assessing the efficacy of individual versus group therapy formats is generally mixed, and may differ based on which symptoms of psychological distress are experienced (Craigie 2009; Flannery-Schroeder 2000; Manassis 2002; Wierzbicki 1987). All interventions can be delivered in person, via printed self-help materials, or via the internet. Online or technology-delivered psychological interventions (also known as e-psychology, e-health or e-mental health) have been shown to be an effective option for psychiatric care and support, which may increase access to and improve quality of care (RANZCP 2019), and can be a cost-effective treatment option for both patients and providers (Solomon 2015).

How the intervention might work

From a behavioural perspective, children and adolescents with psychological distress might not manage their condition as well as those not exposed to adverse life events or experiencing psychological distress. Psychological distress may impact negatively upon self-efficacy and symptom perception and, in turn, upon medication adherence and other health behaviours, including frequency of health utilisation. In general, individuals experiencing symptoms of anxiety tend to overuse medications, while individuals experiencing symptoms of depression may over- or underuse medications - both of which can result in poor asthma outcomes (Rietveld 2003). Psychological interventions may provide young people with techniques and strategies to manage psychological distress and therefore symptoms of asthma as they arise, in order to avoid exacerbations (Duff 2001). These interventions might include, for example, behaviour therapy to increase adherence to treatment, cognitive therapy to address emotional reactions, relaxation techniques such as progressive muscle relaxation to reduce psychological distress, or family therapy to question and

discuss familial concerns and allow for increased understanding and support by family members (Duff 2001). Positive cognitive experiences regarding asthma - specifically self-efficacy, outcome expectations, and perceptions of barriers - are associated with better asthma control and adherence to medication in young people (Rhee 2018). Psychological interventions may also be effective in reducing asthma symptoms using some of the interventions described above (Kew 2016; Knapp 1978; Moore 1965).

Psychological interventions can reduce asthma-related anxiety and increase positive experiences regarding asthma. In turn, this can reduce psychological distress, which can improve behavioural outcomes such as self-efficacy and medication adherence, while reducing inflammation, with the overall effect of reducing medical contacts and asthma attacks in children and adolescents.

Why it is important to do this review

Despite evidence that psychological interventions are beneficial in the treatment of psychological distress and psychological disorders, reports indicate that four out of five young people who could potentially benefit from psychological intervention are reportedly not accessing it (Bekker 2017). This systematic review aims to fill a gap in the literature by evaluating the effectiveness of psychological interventions as a treatment method for children and adolescents with asthma. It is intended that evidence gained from this review can address these issues and be used to inform best practice guidelines and recommendations for health professionals treating patients with asthma, and aid in efforts to increase uptake of psychological interventions in this age group.

The current review builds on a previous systematic review investigating psychological interventions for children with asthma (Yorke 2005). The main objectives of these reviews are similar; however this review will use the latest Cochrane methodology and focus on different types of psychological interventions. The primary and secondary outcomes have also been amended to align with current clinical practice. Additionally, meta-analyses on primary outcomes were not possible due to limitations in number and quality of studies included in the previous review; we now plan to undertake these meta-analyses with the addition of new studies published in the 14 years since the original review.

OBJECTIVES

Main objectives

To determine the efficacy of psychological interventions in modifying health and behavioural outcomes in children with asthma, compared with usual treatment.

Secondary objectives

To compare efficacy of different types of psychological interventions for children with asthma.

To assess the comparative efficacy of individual and group formats of psychological therapy for children with asthma.

METHODS

Criteria for considering studies for this review

Types of studies

We will include randomised controlled trials (RCTs), including cluster-randomised trials where the data has been or can be adjusted for clustering. We will include studies reported as full text, abstract only, and unpublished data. We will not restrict studies by duration of follow-up.

Types of participants

We will include both male and female children and adolescents aged between 5 and 18 years with asthma diagnosed by a physician or as per international or national guidelines. Studies will be included irrespective of psychological symptoms at baseline. We will include participants from both inpatient and outpatient settings.

Types of interventions

We will include trials which assess all psychological interventions of any duration compared with a control. Psychological interventions must have been created or delivered by a qualified professional, and may include in-person or online formats. We will include studies with co-interventions (e.g. prescribed medications), provided they are not part of the randomised treatment. Treatments may include the following.

1. Behavioural therapies: concerned with identifying the processes by which behaviour has been learned via association, reward or observation and modifying behaviour using methods such as systematic desensitisation, selective reinforcement and positive modelling. The behaviour itself, rather than the underlying motivations, is the focus of behavioural interventions.
2. Cognitive therapy: identification and constructive management of damaging thoughts, such as perceptions of helplessness or disproportionate fear of asthma attack that can trigger respiratory symptoms and/or asthma symptoms.
3. Cognitive behavioural therapy (CBT): incorporating the key elements of both behavioural and cognitive models.

4. Relaxation techniques: designed to control stress and anxiety which, in asthma, may improve breathing and respiratory function. The following approaches are used:

i) Progressive relaxation: systematically creating tension and release in different parts of the body and/or via guided imagery.

ii) Autogenic training: focuses on attending to bodily feelings and mentally controlling them.

iii) Hypnosis: deep relaxation that may be induced using mental imagery, often accompanied by autosuggestion to create positive thoughts and feelings.

iv) Biofeedback: feedback of biological indicators which the subject must control via relaxation. May also be considered a behavioural intervention since the feedback can act as a reinforcer.

5. Psychodynamic psychotherapy: including psychoanalysis, psychosomatic therapy, and hypnosis.

6. Counselling: involves talking over problems with a health professional. In supportive counselling, the counsellor aims to be a good listener and provide emotional support, rather than offering a more targeted psychotherapeutic intervention.

7. Group therapy: psychotherapeutic interventions conducted in groups (e.g. group psychosomatic therapy).

8. Family therapy: works to change the relationships within families to help them better deal with a wide range of problems.

We will include trials comparing psychological interventions with usual care, active control (e.g. self-help) or wait-list control groups. We will exclude treatments involving educational approaches, and breathing re-training techniques. These treatments have been independently reviewed previously (Haby 2001; Wolf 2003).

Types of outcome measures

The main objective will be explored through the following primary and secondary outcomes. The secondary objective(s) will be evaluated through subgroup analysis as appropriate.

Primary outcomes

1. Primary efficacy of intervention to reduce psychological distress: change in anxiety or depression (or both), as measured by standard validated questionnaires (e.g. the State-Trait Anxiety Inventory (STAI), Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), Kessler Psychological Distress Scale (K10)).

2. Medical contacts, as measured by presentation to hospital, emergency room or GP, singly or in combination.

3. Asthma attacks, as measured by number of children with one or more asthma attack (defined as an acute increase in asthma symptom severity requiring use of corticosteroids or hospital admission) during follow-up, or rate of asthma attacks.

Secondary outcomes

1. Self-reported asthma symptoms (e.g. asthma symptom scale such as Asthma Control Test (ACT) or Asthma Control Questionnaire (ACQ)).

2. Medication use (e.g. frequency of use, dosage). Use of preventer inhalers. Use of reliever inhalers.

3. Self-reported quality of life as measured by validated questionnaires (e.g. Paediatric Asthma Quality of Life Questionnaire (PAQLQ)).

4. Adverse events/side effects.

We will group outcomes reported at different time points in the following way: less than 3 months from baseline; 3 months to less than 6 months from baseline; 6 months to less than 12 months from baseline; and 12 months and over from baseline.

Reporting one or more of the outcomes listed here in the study is not an inclusion criterion for the review.

Search methods for identification of studies

Electronic searches

We will identify trials from the Cochrane Airways Group's Specialised Register (CAGR) (Cochrane Airways 2019), which is maintained by the Cochrane Information Specialist for the Group. The Register contains trial reports identified through systematic searches of bibliographic databases including:

1. monthly searches of the Cochrane Central Register of Controlled Trials (CENTRAL), through the Cochrane Register of Studies (CRS) from inception to date;

2. weekly searches of MEDLINE Ovid SP from 1946 to date;

3. weekly searches of Embase Ovid SP from 1974 to date;

4. monthly searches of PsycINFO Ovid SP from 1967 to date;

5. monthly searches of CINAHL EBSCO (Cumulative Index to Nursing and Allied Health Literature) from 1937 to date;

6. monthly searches of AMED EBSCO (Allied and Complementary Medicine) from inception to date;

7. handsearches of the proceedings of major respiratory conferences.

Studies contained in the Trials Register are identified through search strategies based on the scope of Cochrane Airways. Details of these strategies, as well as a list of handsearched conference proceedings are in Appendix 1. See Appendix 2 for search terms used to identify studies from the Trials Register for this review.

We will search all sources from their inception to the present, and we will impose no restriction on language of publication.

Searching other resources

We will check reference lists of all included studies and review articles for additional references. We will also conduct a search of the World Health Organization International Clinical Trials Registry

Platform and the US National Institutes of Health Ongoing Trials Register (ClinicalTrials.gov).
We will search for errata or retractions from included studies published in full text on PubMed, and report the date this was done within the review.

Data collection and analysis

Selection of studies

A pair of review authors (from KJS, OS, KVC, KP) will independently screen titles and abstracts for inclusion of all the potential studies we identify as a result of the search and code them as 'retrieve' (eligible or potentially eligible/unclear) or 'do not retrieve'. We will retrieve the full-text study reports/publication of all potentially eligible studies and two review authors (KJS, OS) will independently screen them for inclusion, and identify and record reasons for exclusion of ineligible studies. We will resolve any disagreement through discussion or, if required, we will consult a third review author (KVC or KP). We will identify and exclude duplicates and collate multiple reports of the same study so that each study, rather than report, is the unit of interest in the review. We will record the selection process in sufficient detail to complete a PRISMA flow diagram and 'Characteristics of excluded studies' table (Moher 2009).

Data extraction and management

We will use a data collection form for study characteristics and outcome data - which has been piloted on at least one study - in the review. A pair of review authors (from KJS, OS, KVC, KP) will extract study characteristics from included studies. We will extract the following study characteristics.

1. Methods: study design, study location, clustering adjustments and effect, methods of analysis.
2. Participants: number, withdrawals, mean age, age range, gender, inclusion criteria and exclusion criteria, socioeconomic data, severity of condition, diagnostic criteria, psychological symptomatology at baseline, smoking history.
3. Interventions: study setting, intervention description, comparison, concomitant pharmacotherapy, duration of intervention.
4. Outcomes: primary and secondary outcomes specified and collected, and time points reported.
5. Notes: funding for studies and notable conflicts of interest of trial authors.

A pair of review authors (from KJS, OS, KVC, KP) will independently extract outcome data from included studies. We will note in the 'Characteristics of included studies' table if outcome data were not reported in a usable way. We will resolve disagreements by consensus or by involving a third person (KVC or KP). One review author (KJS) will transfer data into the Review Manager 5 file (Review Manager 2014). We will double-check that data are entered correctly by comparing the data presented in the systematic review with the study reports. A second review author (OS) will spot-check study characteristics for accuracy against the study report.

Assessment of risk of bias in included studies

A pair of review authors (from KJS, OS, KVC, KP) will independently assess risk of bias for each study using the criteria outlined in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011). We will resolve any disagreements by discussion or by consultation with another author (KVC or KP). We will assess the risk of bias according to the following domains.

1. Random sequence generation
2. Allocation concealment
3. Blinding of participants and personnel
4. Blinding of outcome assessment
5. Incomplete outcome data
6. Selective outcome reporting
7. Other bias

We will grade each potential source of bias as high, low or unclear and provide a quote from the study report together with a justification for the judgement in the 'Risk of bias' table. We will summarise the risk of bias judgements across different studies for each of the domains listed. We will consider blinding separately for different key outcomes where necessary (e.g. for unblinded outcome assessment, risk of bias for asthma attack may be different than for a patient-reported symptom scale). Where information on risk of bias relates to unpublished data or correspondence with a trialist, we will note this in the 'Risk of bias' table.
When considering treatment effects, we will take into account the risk of bias for the studies that contribute to that outcome.

Assessment of bias in conducting the systematic review

We will conduct the review according to this published protocol and report any deviations from it in the 'Differences between protocol and review' section of the systematic review.

Measures of treatment effect

We will analyse dichotomous data as odds ratios (OR) and continuous data as the mean difference (MD). Where appropriate, we will use standardised mean difference (SMD) to pool results from various assessment scales. We will enter data presented as a scale with a consistent direction of effect.
We will undertake meta-analyses only where this is meaningful; that is, if the treatments, participants and the underlying clinical question are similar enough for pooling to make sense.

We will narratively describe skewed data reported as medians and interquartile ranges.

Where multiple trial arms are reported in a single study, we will include only the relevant arms. If two comparisons (e.g. intervention A versus usual care and intervention B versus usual care) are combined in the same meta-analysis, we will either combine the active arms, or the control group will be halved to avoid double-counting.

If adjusted analyses are available (ANOVA or ANCOVA) these will be used as a preference in the meta-analyses. If both change-from-baseline and endpoint scores are available for continuous data, we will use change-from-baseline unless there is low correlation between measurements in individuals. If a study reports outcomes at multiple time points, we will use the latest recorded time point. Intention-to-treat (ITT) or 'full analysis set' analyses will be used where they are reported (i.e. those where data have been imputed for participants who were randomly assigned but did not complete the study) instead of completer or per protocol analyses.

Unit of analysis issues

For dichotomous outcomes we will use participants, rather than events, as the unit of analysis (i.e. number of children admitted to hospital, rather than number of admissions per child). However, if rate ratios are reported in a study, we will analyse them on this basis. We will include relevant cluster-randomised trials, but we will meta-analyse only data from cluster-RCTs that have been adjusted (or can be adjusted) to account for clustering. Based on recommendations from the *Cochrane Handbook for Systematic Reviews of Interventions*, we will adjust cluster-randomised data by inflating standard errors using a design effect (DE) calculated with an intracluster correlation coefficient (ICC).

Dealing with missing data

We will contact investigators or study sponsors in order to verify key study characteristics and obtain missing numerical outcome data where possible (e.g. when a study is identified as abstract only). Where this is not possible, and the missing data are thought to introduce serious bias, we will explore the impact of including such studies in the overall assessment of results by a sensitivity analysis.

Assessment of heterogeneity

We will use the I^2 statistic to measure heterogeneity among the studies in each analysis. If we identify substantial heterogeneity, we will report it and explore possible causes by prespecified subgroup analyses. Furthermore, to aid interpretation of the pooled estimates, we will construct a summary table which outlines the key features of the included studies to allow easy comparison between trials contributing data to the review. We will explore possible clinical heterogeneity narratively in the discussion.

Assessment of reporting biases

If we are able to pool more than 10 studies, we will create and examine a funnel plot to explore possible small-study and publication biases.

Data synthesis

We will use a random-effects model and perform a sensitivity analysis with a fixed-effect model.

'Summary of findings' table

We will create a 'Summary of findings' table using the following outcomes at longest follow-up point (maximum 1-year post-treatment): medical contacts, rate of asthma attack, symptoms of anxiety and depression, asthma symptoms, medication use, and quality of life. We will use the five GRADE considerations (risk of bias, consistency of effect, imprecision, indirectness, and publication bias) to assess the quality of a body of evidence as it relates to the studies that contribute data to the meta-analyses for the prespecified outcomes. We will use methods and recommendations described in Section 8.5 and Chapter 12 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011) using GRADEpro software (GRADEpro GDT). We will justify all decisions to down- or up-grade the quality of studies using footnotes, and we will make comments to aid the reader's understanding of the review where necessary.

Subgroup analysis and investigation of heterogeneity

We plan to carry out the following subgroup analyses.

1. Type of psychological interventions (e.g. behavioural intervention, cognitive behavioural therapy, psychodynamic therapy, etc.).
2. Individual vs group interventions.
3. Face-to-face vs online interventions.
4. School age (primary (ages 5 to 12) vs secondary (ages 13 to 18)).

We will use the following outcomes in subgroup analyses.

1. Primary efficacy of intervention to reduce psychological distress: change in anxiety and/or depression, as measured by standard validated questionnaires (e.g. the State-Trait Anxiety Inventory (STAI), Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), Kessler Psychological Distress Scale (K10)).
2. Medical contacts, as measured by presentation to hospital, emergency room visits, GP visits, alone or in combination.
3. Asthma attacks, as measured by number of children with one or more asthma attack (defined as an acute increase in asthma symptom severity requiring use of corticosteroids or hospital admission) during follow-up, or rate of asthma attacks.

We will use the formal test for subgroup interactions in Review Manager 5 (Review Manager 2014).

Sensitivity analysis

We plan to carry out the following sensitivity analyses.

1. Exclusion of trials with high risk of bias for randomisation, or allocation concealment, or both.
2. Exclusion of unpublished data/non-peer reviewed studies.
3. Investigation of the potential influence of study size on effect size, by removing small trials (those with fewer than 20 participants in each arm) in a sensitivity analysis (Fisher 2018).
4. Exclusion of trials in which the intervention is supportive rather than providing targeted psychotherapeutic input.

The results from a fixed-effect model will be compared with the random-effects model.

ACKNOWLEDGEMENTS

We would like to thank all staff at the Cochrane Airways Group for their ongoing help and support. We also wish to thank the peer reviewers for their time and valuable feedback.

The authors and Airways Editorial team are grateful to the following peer reviewers for their time and comments:

1. Emma Fisher, Centre for Pain Research, University of Bath; and
2. Kayleigh Kew, BMJ Technology Assessment Group.

Katy Pike's contribution to this protocol was supported by the National Institute for Health Research Biomedical Research Centre at Great Ormond Street Hospital for Children NHS Foundation Trust and University College London.

The Background and Methods sections of this protocol are based on a standard template used by Cochrane Airways and on a previously published Cochrane Review (Yorke 2005).

This project was supported by the National Institute for Health Research (NIHR), via Cochrane Infrastructure funding to the Cochrane Airways Group. The views and opinions expressed herein are those of the review authors and do not necessarily reflect those of the Systematic Reviews Programme, NIHR, NHS, or the Department of Health.

REFERENCES

Additional references

AIHW 2016
Australian Institute of Health and Welfare. Australia's health 2016. www.aihw.gov.au/reports/australias-health/australias-health-2016/contents/population-groups (accessed 15 July 2019).

Akinbami 2002
Akinbami LJ, Schoendorf KC. Trends in childhood asthma: prevalence, health care utilization, and mortality. *Pediatrics* 2002;**110**(2 Pt 1):315–22.

Baiardini 2015
Baiardini I, Sicuro F, Balbi F, Caconica GW, Braido F. Psychological aspects in asthma: do psychological factors affect asthma management?. *Asthma Research and Practice* 2015;**1**:7. DOI: doi.org/10.1186/s40733-015-0007-1

Bekker 2017
Bekker MJ, Griffiths KM, Barrett PM. Improving accessibility of cognitive behavioural therapy for children and adolescents: review of evidence and future directions. *Clinical Psychologist* 2017;**21**(3):157–64.

Blanchard 2014
Blanchard M, Morris J, Birrell E, Stephens-Reicher J, Third A, Burns J. National Young People and Asthma Survey: issues and opportunities in the health and wellbeing of young people with asthma. www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwiAwNvU-oviAhWsSxUIHZr5BxcQFjAAegQIBRAC&url=https%3A%2F%2Fwww.asthmaaustralia.org.au%2FArticleDocuments%2F160%2FNATIONAL-YOUNG-PEOPLE-AND-ASTHMA-SURVEY-REPORT.pdf.aspx&usg=AOvVaw2WIBNp31delRqnqkTIci_m (accessed prior to 13 March 2019).

Calmes 1998
Calmes D, Leake BD, Carlisle DM. Adverse asthma outcomes among children hospitalized with asthma in California. *Pediatrics* 1998;**101**(5):845–50.

Chen 2007
Chen E, Miller GE. Stress and inflammation in exacerbations of asthma. *Brain, Behavior, and Immunity* 2007;**21**(8):993–9.

Cochrane Airways 2019
Cochrane Airways Trials Register. airways.cochrane.org/trials-register (accessed 26 March 2019).

Cohen 2003
Cohen R, Franco K, Motlow F, Reznik M, Ozuah P.O. Perceptions and attitudes of adolescents with asthma. *Journal of Asthma* 2003;**40**(2):207–11.

Craigie 2009
Craigie MA, Nathan P. A nonrandomized effectiveness comparison of broad-spectrum group CBT to individual CBT for depressed outpatients in a community mental health setting. *Behavior Therapy* 2009;**40**(3):302–14.

de Benedictis 2007
de Benedictis D, Bush A. The challenge of asthma in adolescence. *Paediatric Pulmonology* 2007;**42**(8):683–92.

Drapeau 2012
Drapeau A, Marchand A, Beaulieu-Prevost D. Epidemiology of psychological distress. In: Labate L editor(s). *Mental Illnesses: Understanding, Prediction and Control*. IntechOpen, 2012.

Dudeney 2017
Dudeney J, Sharpe L, Jaffe A, Jones EB, Hunt C. Anxiety in youth with asthma: A meta-analysis. *Pediatric Pulmonology* 2017;**52**(9):1121–9.

Duff 2001
Duff AJ. Psychological interventions in cystic fibrosis and asthma. *Paediatric Respiratory Reviews* 2001;**2**(4):350–7.

Evans 2012
Evans GW, Kim P. Childhood poverty, chronic stress, self-regulation, and coping. *Child Development Perspectives* 2012;**7**(1):43–8. DOI: 10.1111/cdep.12013

Fisher 2018
Fisher E, Law E, Dudeney J, Palermo TM, Stewart G, Eccleston C. Psychological therapies for the management of chronic and recurrent pain in children and adolescents. *Cochrane Database of Systematic Reviews* 2018, Issue 9. DOI: 10.1002/14651858.CD003968.pub5

Flannery-Schroeder 2000
Flannery-Schroeder EC, Kendall PC. Group and individual cognitive-behavioural treatments for youth with anxiety disorders: a randomized clinical trial. *Cognitive Therapy and Research* 2000;**24**(3):251–78.

French 1943
French TM, Alexander F. Psychogenic factors in bronchial asthma. *British Medical Journal* 1943;**1**(4291):416.

GINA 2018
Global Initiative for Asthma. Global strategy for asthma management and prevention. ginasthma.org/wp-content/uploads/2018/04/wms-GINA-2018-report-V1.3-002.pdf (accessed prior to 13 March 2019).

GINA 2019
Global Initiative for Asthma. Global strategy for asthma management and prevention. ginasthma.org/wp-content/uploads/2019/06/GINA-2019-main-report-June-2019-wms.pdf (accessed 15 July 2019).

Goldney 2003
Goldney RD, Ruffin R, Fisher LJ, Wilson DH. Asthma symptoms associated with depression and lower quality of life: a population survey. *Medical Journal of Australia* 2003;**178**(9):437–41.

Goodwin 2013
Goodwin RD, Robinson M, Sly PD, McKeague IW, Susser ES, Zubrick SR, et al. Severity and persistence of asthma and mental health: a birth cohort study. *Psychological Medicine* 2012;**43**(6):1313–22.

GRADEpro GDT [Computer program]
McMaster University (developed by Evidence Prime). GRADEpro GDT. Version accessed prior to 13 March 2018. Hamilton (ON): McMaster University (developed by Evidence Prime), 2015.

Haby 2001
Haby MM, Waters E, Robertson CF, Gibson PG, Ducharme FM. Interventions for educating children who have attended the emergency room for asthma. *Cochrane Database of Systematic Reviews* 2001, Issue 1. DOI: 10.1002/14651858.CD001290

Higgins 2011
Higgins JP, Green S (editors). Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 (updated March 2011). The Cochrane Collaboration, 2011. Available from handbook.cochrane.org.

ISAAC 1998a
ISAAC Steering Committee. Worldwide variation in prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and atopic eczema: ISAAC. The International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee.. *Lancet* 1998;**351**(9111):1225–32. [PUBMED: 9643741]

ISAAC 1998b
ISAAC Steering Committee. Worldwide variations in the prevalence of asthma symptoms: the International Study of Asthma and Allergies in Childhood (ISAAC). *European Respiratory Journal* 1998;**12**(2):315–35. DOI: 10.1183/09031936.98.12020315

Katon 2007
Katon W, Lozano P, Russo J, McCauley E, Richardson L, Bush T. The prevalence of DSM-IV anxiety and depressive disorders in youth with asthma compared with controls. *Journal of Adolescent Health* 2007;**41**(5):455–63.

Kew 2016
Kew KM, NashedM, Dulay V, Yorke J. Cognitive behavioural therapy (CBT) for adults and adolescents with asthma. *Cochrane Database of Systematic Reviews* 2016, Issue 9. DOI: 10.1002/14651858.CD011818.pub2

Knapp 1978
Knapp TJ, Wells LA. Behavior therapy for asthma: A review. *Behaviour Research and Therapy* 1978;**16**(2):103–5.

Manassis 2002
Manassis K, Mendlowitz SL, Scapillato D, Avery D, Fiksenbaum L, Freire M, et al. Group and individual cognitive-behavioural therapy for childhood anxiety disorders: a randomized trial. *Journal of the American Academy of Child and Adolescent Psychiatry* 2002;**41**(12):1423–30.

Masoli 2004
Masoli M, Fabian D, Holt S, Beasley R. The global burden of asthma: executive summary of the GINA Dissemination Committee report. *Allergy* 2004;**59**(5):469–78.

Mission Australia 2017
Mission Australia/Black Dog Institute. Youth Mental Health Report: Youth Survey 2012-2016. Available at bit.ly/33BzQtg.

Moher 2009
Moher D, Liberati A, Tetzlaff J, Altman D. Preferred reporting items for systematic reviews and meta-analyses:

the PRISMA statement. *PLoS Medicine* 2009;**6**(7): e1000097. DOI: 10.1371/journal.pmed.1000097

Moore 1965

Moore N. Behaviour therapy in bronchial asthma: A controlled study. *Journal of Psychosomatic Research* 1965;**9** (3):257–76.

Pinquart 2010

Pinquart M, Yuhui S. Depressive symptoms in children and adolescents with chronic physical illness: an updated meta-analysis. *Journal of Pediatric Psychology* 2010;**36**(4):375–84.

RANZCP 2019

The Royal Australian and New Zealand College of Psychiatrists. Benefits of e-mental health treatments and interventions. bit.ly/31KsvpP.

Review Manager 2014 [Computer program]

Nordic Cochrane Centre, The Cochrane Collaboration. Review Manager 5 (RevMan 5). Version 5.3. Copenhagen: Nordic Cochrane Centre, The Cochrane Collaboration, 2014.

Rhee 2018

Rhee H, Wicks MN, Dolgoff JS, Love TM, Harrington D. Cognitive factors predict medication adherence and asthma control in urban adolescents with asthma. *Patient Preference and Adherence* 2018;**12**:929–37.

Rietveld 2003

Rietveld S, Creer TL. Psychiatric factors in asthma: implications for diagnosis and therapy. *American Journal of Respiratory Medicine* 2003;**2**(1):1–10.

Sandberg 2000

Sandberg S, Paton JY, Ahola S, McCann DC, McGuinness D, Hilary CR, et al. The role of acute and chronic stress in asthma attacks in children. *Lancet* 2000;**356**(9234):982–7.

Solomon 2015

Solomon D, Proudfoot J, Clarke J, Christensen H. e-CBT (myCompass), antidepressant medication, and face-to-face psychological treatment for depression in Australia: a cost-effectiveness comparison. *Journal of Medical Internet Research* 2015;**17**(11):e255.

Thomas 2011

Thomas M, Bruton A, Moffatt M, Cleland J. Asthma and psychological dysfunction. *Primary Care Respiratory Journal* 2011;**20**(3):250–6.

To 2012

To T, Stanojevic S, Moores G, Gerson AS, Bateman ED, Cruz AA, et al. Global asthma prevalence in adults: findings from the cross-sectional world health survey. *BMC Public Health* 2012;**12**:204.

Van Lieshout 2008

Van Lieshout RJ, Macqueen G. Psychological factors in asthma. *Allergy, Asthma, and Clinical Immunology* 2008;**4** (1):12–28.

Wierzbicki 1987

Wierzbicki M, Bartlett TS. The efficacy of group and individual cognitive therapy for mild depression. *Cognitive Therapy and Research* 1987;**11**(3):337–42.

Wolf 2003

Wolf FM, Guevara JP, Grum CM, Clark NM, Cates CJ. Educational interventions for asthma in children. *Cochrane Database of Systematic Reviews* 2003, Issue 1. DOI: 10.1002/14651858.CD000326

Wright 1998

Wright RJ, Rodriguez M, Cohen S. Review of psychosocial stress and asthma: an integrated biopsychosocial approach. *Thorax* 1998;**53**(12):1066–74. [PUBMED: 10195081]

Wright 2005

Wright RJ. Stress and atopic disorders. *Journal of Allergy and Clinical Immunology* 2005;**116**(6):1301–6.

Yorke 2005

Yorke J, Fleming SL, Shuldham C. Psychological interventions for children with asthma. *Cochrane Database of Systematic Reviews* 2005, Issue 4. DOI: 10.1002/14651858.CD003272.pub2

* *Indicates the major publication for the study*

APPENDICES

Appendix 1. Sources and search methods for the Cochrane Airways Register of Trials

Electronic searches: core databases

Database	Dates searched	Frequency of search
CENTRAL (via the Cochrane Register of Studies (CRS))	From inception	Monthly
MEDLINE (Ovid)	1946 onwards	Weekly
Embase (Ovid)	1974 onwards	Weekly
PsycINFO (Ovid)	1967 onwards	Monthly
CINAHL (EBSCO)	1937 onwards	Monthly
AMED (EBSCO)	From inception	Monthly

Handsearches: core respiratory conference abstracts

Conference	Years searched
American Academy of Allergy, Asthma and Immunology (AAAAI)	2001 onwards
American Thoracic Society (ATS)	2001 onwards
Asia Pacific Society of Respirology (APSR)	2004 onwards
British Thoracic Society Winter Meeting (BTS)	2000 onwards
Chest Meeting	2003 onwards
European Respiratory Society (ERS)	1992, 1994, 2000 onwards
International Primary Care Respiratory Group Congress (IPCRG)	2002 onwards
Thoracic Society of Australia and New Zealand (TSANZ)	1999 onwards

MEDLINE search strategy used to identify studies for the CAGR

Asthma search

1. exp Asthma/
2. asthma$.mp.
3. (antiasthma$ or anti-asthma$).mp.
4. Respiratory Sounds/
5. wheez$.mp.
6. Bronchial Spasm/
7. bronchospas$.mp.
8. (bronch$ adj3 spasm$).mp.
9. bronchoconstrict$.mp.
10. exp Bronchoconstriction/
11. (bronch$ adj3 constrict$).mp.
12. Bronchial Hyperreactivity/
13. Respiratory Hypersensitivity/
14. ((bronchial$ or respiratory or airway$ or lung$) adj3 (hypersensitiv$ or hyperreactiv$ or allerg$ or insufficiency)).mp.
15. ((dust or mite$) adj3 (allerg$ or hypersensitiv$)).mp.
16. or/1-15

Filter to identify RCTs

1. exp "clinical trial [publication type]"/
2. (randomised or randomised).ab,ti.
3. placebo.ab,ti.
4. dt.fs.
5. randomly.ab,ti.
6. trial.ab,ti.
7. groups.ab,ti.
8. or/1-7
9. Animals/
10. Humans/
11. 9 not (9 and 10)
12. 8 not 11

The MEDLINE strategy and RCT filter are adapted to identify studies in other electronic databases.

Appendix 2. Search strategy to identify relevant studies from the Cochrane Airways Trials Register

Cochrane Register of Studies (CRS)

Line number	Search term	Results
#1	AST:MISC1	22828
#2	MeSH DESCRIPTOR Asthma Explode All	11942
#3	asthma*:ti,ab	40629
#4	#1 OR #2 OR #3	44112

(*Continued*)

#5	MESH DESCRIPTOR Psychotherapy EXPLODE ALL	1081
#6	MESH DESCRIPTOR Psychology EXPLODE ALL	116
#7	MESH DESCRIPTOR Psychophysiologic Disorders	23
#8	MESH DESCRIPTOR Psychoanalysis	0
#9	MESH DESCRIPTOR Psychosomatic Medicine	1
#10	(behavior* OR behaviour*) NEAR3 (treatment* OR therap* or intervention* OR activat* or technique* or modif* or change*)	5312
#11	cognitiv* NEAR3 (behav* or treatment* or technique* or therap* or intervention* or restructur* or reappraisal*)	1967
#12	acceptance NEAR3 commitment	45
#13	(CBT or ACT):ti,ab	2192
#14	relaxation*	1431
#15	autogenic*	60
#16	hypnosis*	130
#17	biofeedback*	219
#18	psychotherap* or psycho-therap* or psychoanalytic* or psycho-analytic* or psychodynamic* or psycho-dynamic* or psychoanalysis or psycho-analysis or psychosomatic or psycho-somatic	1959
#19	counsel* or (talk* near3 therap*)	2741
#20	(group* or family*) near3 therap*	2147
#21	MESH DESCRIPTOR Family WITH QUALIFIER PX	21
#22	anxiety or depression or panic	10308
#23	#5 OR #6 OR #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 OR #20 OR #21 OR #22	22345
#24	#23 AND #4	3416

(*Continued*)

#25	MESH DESCRIPTOR Asthma WITH QUALIFIER PX	275
#26	#24 OR #25	3521
#27	INREGISTER	41095
#28	#26 AND #27	1563

CONTRIBUTIONS OF AUTHORS

KJS: initiating and coordinating review, production of protocol, data collection, undertaking searches, screening search results, organising retrieval of papers, screening papers against eligibility criteria, appraising quality of papers, extracting data from papers, data management for review, entering data into Review Manager 5, analysis of data, interpretation of data, write-up.

SO: providing input with protocol, data collection, screening search results, screening papers against eligibility criteria, extracting data from papers, write-up, contributing final comments to manuscript.

KVC-C: providing input with protocol, providing general advice on the review, providing advice on analysis of data, checking data, providing assistance with write-up, contributing final comments to manuscript.

KCP: providing input with protocol, providing clinical advice for the review, providing advice on analysis of data, checking data, providing assistance with write-up, contributing final comments to manuscript.

Contributions of editorial team

Rebecca Fortescue (Coordinating Editor): edited the protocol; advised on methodology; approved the protocol prior to publication.
Chris Cates (Coordinating Editor): checked the planned methods.
Emma Dennett (Managing Editor): coordinated the editorial process; advised on content; edited the protocol.
Emma Jackson (Assistant Managing Editor): conducted peer review; edited the references.
Elizabeth Stovold (Information Specialist): designed the search strategy.

DECLARATIONS OF INTEREST

KJS: none known.

SO: none known.

KVC-C: none known.

KCP: I have acted as a consultant on an advisory board for Respiri for development of a symptom monitoring device for asthma.

SOURCES OF SUPPORT

Internal sources

- University of South Australia, Translational Medicine and Technology Group, Australia.
Income for employment.

External sources

- The authors declare that no such funding was received for this systematic review., Other.