Respiratory Medicine (2007) **101**, 1–14

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REVIEW

Psychological interventions for adults with asthma: A systematic review

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Received 20 January 2006; accepted 4 April 2006

KEYWORDS
Asthma;
Psychological;
Systematic review

Summary
Aim: The purpose of this study was to conduct a systematic review of randomized controlled trials where the efficacy of psychological interventions in modifying health and behavioural outcomes for adults with asthma was investigated.
Method: A review of randomized controlled trials was designed. The literature search was conducted until May 2005.
Results: Fourteen studies, involving 617 adults, were included in the review. The use of 'as needed' medications was reduced by relaxation therapy (OR 4.47, CI 1.22–16.44), quality of life, measured using the Asthma Quality of Life Questionnaire, showed a positive effect following cognitive behavioural therapy (WMD 0.71, CI 0.23–1.19), and peak expiratory flow outcome data indicated a significant difference in favour of bio-feedback therapy (SMD 0.66, CI 0.09–1.23).
Conclusions: Some promising results did emerge from meta-analyses performed. However, due to heterogeneity and the low quality of included studies, this review was unable to draw firm conclusions for the role of psychological interventions in asthma. We recommend that larger and well-conducted randomized trials use valid outcome measures to evaluate the effectiveness of psychological interventions for adults with asthma.

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doi:10.1016/j.rmed.2006.04.003

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Introduction

Asthma has a psychological component, including emotion,[1] so the treatment of asthma in adults increasingly needs to focus on the whole person, taking account of psychological as well as physiological elements. It is suggested that psychological interventions may be appropriate for adults with asthma. Several psychological interventions may be employed to ameliorate health problems associated with asthma. These include behavioural therapies, cognitive therapies, cognitive behavioural therapy, relaxation techniques, psychodynamic psychotherapies, and counselling, in both individual and group formats. These have been identified as the procedure by which a therapist systematically attempts to influence a patient by psychological means so that the patient's symptoms decrease or there is a positive change in behaviour.[2]

This means that evidence to support decisions about the type, format and frequency of psychological techniques is needed. The aim of these strategies is to help reduce panic or fear, improve breathing and respiratory function and impact positively on general health and quality of life. Literature is growing on the relationship between psychosocial factors and asthma,[3,4] and review methodologies are being used to assess the impact of a range of psychosocial interventions in asthma. For example, reviews have been undertaken on self-management education for asthmatic adults,[5] psycho-educational interventions for adults and children,[6] family therapy for asthma in children[7] and psychological interventions for children with asthma.[8]

These reviews do not answer questions specifically about psychological interventions for adults with asthma and therefore a systematic review of the effectiveness of such interventions is also required. When managing patients, clinical staff need to have reliable information on whether psychological techniques work, and if so which are the most effective, for which patients. Clinically, psychological interventions are required in medical conditions for general adjustment to the demands of symptom management and when psychological factors impede conventional courses of medical treatment, such as in those patients with genuine psychopathology. In particular, psychological co-morbidity has been demonstrated to have high prevalence (49%) in patients referred with difficult-to-control asthma.[9] However, these same authors also report that psychological co-morbidity is often not diagnosed.

It is also important to know whether interventions work best alone or in combination with each other, and whether it is better that patients are taught individually or in a group. If possible it would also be useful for staff and patients to know what benefits might be expected, and whether they are short-lived or last in the longer term. Of note, psychological interventions receive little or no mention in international guidelines, such as the British Thoracic Society (BTS),[10] Global Initiative for asthma (GINA)[11] for the management of asthma. Therefore, we conducted a systematic review to provide health care professionals with an evidence base in relation to psychological intervention for adults with asthma.

Methods

Objective

The purpose of this study was to conduct a systematic review and meta-analysis of randomised controlled trials where the efficacy of psychological interventions in modifying health and behavioural outcomes for adults with asthma was investigated.

Types of studies

Randomized controlled trials (RCT) comparing the effects of psychological interventions for adults with asthma were considered for inclusion. Cross-over trials were considered inappropriate for studies using psychological interventions as the influence of a treatment might continue after the intervention has been stopped and were therefore excluded.

Individual and group formats were included but patient education programmes were only accepted where psychotherapy formed the major part of the intervention. Breathing retraining, yoga and massage therapies were not incorporated, as these therapies were not considered to be primarily psychological in nature.

Types of participants

Adults, both male and female, over the age of 16 years of age, with asthma that has been diagnosed by a physician, although the accuracy can be variable, or diagnosed using internationally established criteria.[10] Treatments in both in and outpatient settings were included.

Types of interventions

Psychotherapy models were grouped according to their theoretical frameworks or methods of operation.

Approaches included:

1. Behavioural therapies.
2. Cognitive therapies.
3. Cognitive behaviour therapy.
4. Relaxation techniques (including progressive relaxation, autogenic training, hypnosis, and biofeedback).
5. Psychodynamic psychotherapies (including psychoanalysis, psychosomatic therapy).
6. Counselling.

Approaches excluded:

1. *Family therapy*: this is the subject of another review recently updated by our group.[7]
2. *Educational approaches*: such approaches are already the subject of several reviews.[5] For this reason, patient education programmes were only included where they comprised only part of a more complex psychological intervention.
3. *Breathing re-training exercises*: a review has already been completed on this topic.[12]

Outcome measures

Primary:

- Health service utilisation (e.g. hospitalisation, emergency room visits and, GP visits)

Secondary:

- Asthma symptoms
- Lung function measures
- Medication use
- Absenteeism from school/work
- Psychological health status (e.g. coping skills, anxiety, depression, asthma related behaviour, locus of control, self-esteem, self efficacy, quality of life and psychological status)

Search strategy

The primary source of studies was from the Cochrane Airways Review Group trials register. In addition, the psychological database PSYCHINFO was searched. A detailed description of the search terms applied to these databases is available in the Cochrane Database of Systematic Reviews.[10] Bibliographies of each trial identified were searched for additional relevant

trials. Authors of all identified RCTs were contacted and asked for information on further published or unpublished work. All searches were restricted to cases aged 16 years of age or more. Studies found up to the end of May 2005 were included.

Study selection

Two reviewers (SF and CS or JY and CS) established independently whether each study met the inclusion criteria. Disagreements were resolved by discussion and 14 RCTs were included.

Methodological quality

The methodological quality of the studies (allocation concealment) was assessed independently by two reviewers (SF and CS or JY and CS) using the Cochrane criteria for allocation concealment (Table 1) and a modified 0–5 scale developed by Jadad et al.[14] (Table 2). Modification of this scale was essential as, due to the nature of the psychological interventions, it would be difficult to conduct double-blinded trials. Therefore in step 2 and 5 'double-blind' has been changed to 'blind'.

Data analysis

Data were extracted and entered into RevMan 4.2. For continuous outcomes, we pooled data with a fixed effect mean difference and 95% confidence intervals (CIs). Where heterogeneity was present ($>0\%$) we performed a random effects analysis to incorporate statistical heterogeneity into the pooled estimate. Where this altered the significance of the effect we have reported both sets of results. Where data were not available as *N*s, means and SDs or SEMs, we have attempted to derive effect estimates based on the mean difference and an estimate for the variance based upon the published *P* value. This was subsequently entered as generic inverse variance data (GIV).

Dichotomous outcomes were entered as simple event rates for treatment and control groups. We pooled data with a fixed effect odds ratio (OR). Where heterogeneity was present ($>0\%$) we performed a random effects analysis to incorporate statistical heterogeneity in to the pooled estimate. Where this altered the significance of the effect we have reported both sets of results. For significant outcomes, we calculated a number needed to treat (benefit) (NNT(b)) or number needed to treat (harm) (NNT(h)), based upon the OR with Visual Rx.

Table 1 Allocation concealment.

Grade A: adequate concealment
Grade B: uncertain
Grade C: clearly inadequate concealment
Grade D: not used

Results

The literature search identified 85 papers, of which 14 (Table 3) met our inclusion criteria[15–29] with two publications from one study reporting different outcomes.[16,17] All were randomised and conducted over a variety of durations (3 days–12 months). A full reference list for excluded papers can be found in the Cochrane Database of Systematic Reviews.[13]

Methodological quality of included studies

The methodological quality of the studies was poor with only two recent studies allocated a Jadad score of four (Table 3).[24,26] Allocation concealment was often not described (Table 3).

Study participants

A total of 617 participants were included in this review (Table 3). The studies were generally small with only one having more than a 100 people included[23] and the smallest had 12.[17] In some studies a description of withdrawals was not given.[15,19,25] Others gave the numbers who withdrew but no details of their characteristics. The

Table 2 Modified Jadad scale.[3]

- Was the study described as randomised (1 = yes;0 = no)?
- Was the outcome assessment blinded (1 = yes;0 = no)?
- Was there a description of withdrawals and dropouts (1 = yes;0 = no)?
- Was the method of randomisation well described and appropriate (1 = yes;0 = no)?
- Was the method of blinding well described and appropriate (1 = yes;0 = no)?
- Deduct one point if methods for randomisation or blinding were inappropriate.

Table 3 Characteristics of included studies.

Study	Quality assessment	Methods	Sample sizes	Participant characteristics
Deter[15]	Jadad: 1 AC: B	RCT, 3 groups, method of randomisation not described.	Eligible: 90 Randomised: 34 E1:9, E2: 10, C:12 DO: not stated	Age mean 43.5 yrs. Sex: M 14, F 17. Diagnosis: 64% allergy, 87% infection, 93% 'psychological troubles'.
Epstein[16]	Jadad: 2 AC: B	RCT, 2 groups, block design.	Eligible: 107 Randomised: 68 E:34, C:34 DO : E: 17, C: 18	Age: 25-55 yrs. Sex: E: M 27%, E: F 73%, C: M 43%, C: F 57%. Diagnosis: national asthma expert panel CRITERIA
Erskine[17]	Jadad: 2 AC: B	RCT, 2 groups, matched in pairs according to age, sex, FEV_1, and severity of asthma	Eligible: not stated Randomised: 12 E:6, C:6 DO : E: 1, C: 1	Age: 16–46, mean 30 yrs Sex: not described Diagnosis: ATS criteria Severity: moderate or severe.
Ewer[18]	Jadad: 3 AC: A	RCT, 5 groups, computerized (author correspondence)	Eligible: not stated Randomised: 44 E1:10, E2: 12, C:7 DO : E: 0, C: 5	Age: 18–44 yrs Sex: M 15, F 24 Diagnosis: Physician Severity: mild to moderate.
Henry[19]	Jadad: 1 AC: B	RCT, 2 groups, method of randomization not described	Eligible: not stated Randomised: 24 E: 12, C: 12 DO: not stated	Age: 18–58, mean: 39.66 Sex: M 3, F 21 Diagnosis: Physician Severity: moderate to severe
Hockemeyer[21]	Jadad: 3 AC: B	RCT, 3 groups, sealed envelopes	Eligible: 60 Randomised: 60 E:30, E: 30 DO : E: 3, C: 3	Age: 18-51 yrs , mean: 20.7 Sex: M 25, F 29 Diagnosis: ATS guidelines Severity: not described
Lehrer[22]	Jadad: 2 AC: B	RCT, 3 groups, method not stated	Eligible: 106 Randomised: 106 E1: 38, E2: 38, C: 30 DO: E1: 12, E2: 13, C: 9	Age: 18–65 yrs Sex: M 51, F 55 Diagnosis: Physician Severity: mild to moderate
Lehrer[23]	Jadad: 1 AC: D	RCT, 3 groups, method of randomization not described	Eligible: not stated Randomised: 17 E1:6, E2:5, C:6	Age 18–65 yrs, mean 37.8 Sex: M 5, F 12 Diagnosis: Physician

Table 3 (*continued*)

Study	Quality assessment	Methods	Sample sizes	Participant characteristics
			DO: 2	Severity: not described
Lehrer[24]	Jadad: 4 AC: B	RCT, 4 groups, restricted randomization	Eligible: not stated Randomised: 94 E1:23: E2: 22 C1: 24, C2: 25 DO: E1: 6, E2: 5, C1: 5, C2:2	Age: mean 37.3 yrs (10.2), Sex: M 30, F 64 Diagnosis: Physician Severity: mild
Payette[25]	Jadad: 1 AC: D	RCT, 2 groups, method of randomization not described	Eligible: not stated Randomised: 18 E: 11, C: 7 DO: not stated	Age: 22–67 yrs, mean not provided Sex: M 5, F 13 Diagnosis: Physician Severity: not stated
Put[26]	Jadad: 4 AC: B	RCT, 2 groups, envelope method	Eligible: 101 Randomised: 25 E: 12, C: 11 DO: 2	Age: E mean 43 yrs, C mean 48 yrs Sex: M 1, F 12 Diagnosis: ATS criteria Severity: mild 7, moderate 15, severe 1
Ross[27]	Jadad: 3 AC: B	RCT, 2 groups, method of randomisation not described	Eligible: 86 Randomised: 48 E: 24, C: 24 DO: 23, E: 9, C: 14	Age: E mean 37.87 yrs (10.49), C mean 40.7 yrs (12.57) Sex: M 0, F 48 Diagnosis: Physician Severity: on a 10 point likert scale: E mean 6.80 (1.97), C mean 3.89 (1.90)
Sommaruga[28]	Jadad: 2 AC: C	RCT, 2 groups, computerised method (author correspondence)	Eligible: not stated Randomised: 40 E: 20, C: 16 DO: 4	Age: mean 48 yrs Sex: M 21, F 19 Diagnosis: ATS criteria Severity: not stated
Wagaman[29]	Jadad: 2 AC: C	RCT, 4 groups, stratified according to hypnotic susceptibility	Eligible: 45 Randomised: 30 E1: 7, E2: 7, C1: 7, C2: 7 DO: 9	Age:19–65 yrs, mean 41.0 Sex: M 3, F 18 Diagnosis: Physician Severity: moderate to moderately severe (National Institute of Health Guidelines)

AC: allocation concealment
RCT: randomised controlled trial
E: experimental group
C: control group
M: male
F: female
DO: drop outs
SD: standard deviation.

severity of asthma varied from mild to severe, however not all studies reported this.

Method of randomisation

Studies were randomised with patients allocated to control and experimental groups; however the method of randomisation was not always mentioned.[15,19,22,23,25,27] Therefore it is difficult in all the studies to gauge whether the method of randomisation was appropriate. This is reflected in the Jadad scores (Table 3).

Interventions used

Diverse interventions were used (Table 4). Rarely was the theoretical underpinning of the therapy provided. Eight studies used some form of relaxation technique as their intervention[15–19,21,22,29] however techniques ranged from autogenic therapy to hypnosis and progressive muscle relaxation. Other psychological interventions included bio-feedback[22,24,25] and CBT.[26–28] In asthma, all of these techniques are used in combination with drug therapies.

Primary outcome

Health service utilisation

Three studies[15,28,29] examined this outcome. Deter and Allert[15] found no significant decrease in health-care utilisation in the group receiving relaxation compared to the control group. Sommaruga et al.[28] found numbers of hospitalisation days and number of emergency visits were decreased for both the intervention group (an asthma rehabilitation programme) and the control group ($P < 0.05$). Numbers were too small in a study on hypnosis[29] to test for statistical differences for this outcome. Due to varying interventions and insufficient reporting of data a pooled effect on the primary outcome could not be performed.

Secondary outcomes

Asthma symptoms

These were measured in a variety of ways in a number of studies of which five used a form of relaxation therapy,[16–18,22,29] two used bio-feedback techniques[20,21] and three employed CBT.[26–28]

The Asthma Quality of Life Questionnaire (AQLQ),[30] which includes asthma symptom categories, was adapted as an outcome measure in three studies. A meta-analysis could be performed with the two CBT

Table 4 Effect of psychological interventions on outcome measures.

Study	Outcome and effect	Analysis	Intervention
	Healthcare utilisation		
	Hospital admission rates		
Deter[15]	–	Between groups	Relaxation therapy
Sommaruga[28]	+	Within group	CBT
	Emergency room visits		
Sommaruga[28]	+	Within group	CBT
	Asthma symptoms		
	Asthma Quality of Life Questionnaire		
	Total		
Put[26]	+	Between groups	CBT
Ross[27]	–	Between groups	CBT
Pooled effect	+		
Epstein[16]	–	Between groups	Relaxation therapy
	Asthma symptom checklist		
	All variables		
Lehrer[22]	+	Across all groups	Relaxation therapy
Lehrer[23]	–	Within group	Bio-feedback
	Hyperventilation		
Put[26]	–	Between groups	CBT
	Obstruction		
Put[26]	+	Between groups	CBT
	Fatigue		
Put[26]		Between groups	CBT
	Irritation		

Table 4 (*continued*)

Study	Outcome and effect	Analysis	Intervention
Put[26]	—	Between groups	CBT
	Dyspnoea		
Put[26]	—	Between groups	CBT
	Hyperventilation		
Put[26]	—	Between groups	CBT
	Anxiety		
Put[26]	—	Between groups	CBT
	Home diaries/self report		
	Sleep		
Ewer[18]	+	Within sub-group	Relaxation therapy
	Wheeze		
Ewer[18]	+	Within sub-group	Relaxation therapy
Epstein[16]	—	Between groups	Relaxation therapy
	Activity		
Ewer[18]	+	Within sub-group	Relaxation therapy
	Cough		
Ewer[18]	—	Within sub-group	Relaxation therapy
	Phlegm		
Ewer[18]	—	Within sub-group	Within sub-group
	Other symptom measures		
Lehrer[24]	+	Within group	Bio-feedback
	Lung Function		
	PEF		
Lehrer[23]	—	Between groups	Bio-feedback
Lehrer[22]	+	Between groups	Bio-feedback
Pooled effect	+		
	FEV_1		
Ewer[18]	—	Between groups	Relaxation therapy
Henry[19]	—	Between groups	Relaxation therapy
Epstein[16]	—	Between groups	Relaxation therapy
Pooled effect	—		
Payette[25]	—	Between groups	Bio-feedback
Hockemeyer[21]	—	Between groups	Bio-feedback
	FEV_1% predicted		
Henry[19]	+	Within group	Relaxation therapy
Hockemeyer[21]	—	Between groups	Bio-feedback
	FEV_1/FVC		
Hockemeyer[21]	+	Between groups	Relaxation therapy
Payette[25]	—	Between groups	Bio-feedback
	Medication use		
Epstein[16]	—	Between groups	Relaxation therapy
Wagaman[29]	—	Between groups	Relaxation therapy
Pooled effect	+	Within sub-group	Relaxation therapy
Ewer[18]	+		
Deter[15]	+	Between groups	Relaxation therapy
Lehrer[24]	+	Within group	Bio-feedback
Lehrer[23]	—	Between groups	Bio-feedback
	School/work absenteeism		
Sommaruga[28]	+	Within group	CBT
	Psychological Health Status		
	Anxiety	Between groups	CBT
Put[26]	—(ASC)	Between groups	CBT
Ross[27]	+ (SPRAS)	Between groups	CBT
Ross[27]	+ (number of panic attacks)	Between groups	CBT
Ross[27]	+ (ASI)	Between groups	Relaxation therapy
	Trait anxiety		
Epstein[16]	—(Spielberger)	Between groups	Relaxation therapy

Table 4 (*continued*)

Study	Outcome and effect	Analysis	Intervention
Sommaruga[28]	+ (CBA)	Within group	CBT
	State anxiety		
Epstein[16]	—(Spielberger)	Between groups	Relaxation therapy
	Depression		
Epstein[16]	—(BDI)		
Ross[27]	+ (BDI)	Between groups	CBT
Sommaruga[28]	+ (CBA)	Within group	CBT
	Health locus of control		
Sommaruga[28]	—	Within group	CBT
	Respiratory Illness Questionnaire		
	External control		
Sommaruga[28]	+	Within group	CBT
	Psychological stigma		
Sommaruga[28]	+	Within group	CBT
	Vegetative state		
Henry[19]	+	Within group	Relaxation therapy
	Emotional state		
Henry[19]	—	Within group	Relaxation therapy
	Behavioural state		
Henry[19]	—	Within group	Relaxation therapy
	Reactivity to stress		
Henry[19]	—	Within group	Relaxation therapy
	Negative emotional state		
Put[26]	+	Between groups	CBT
	Perceived Stress Scale		
Hockemeyer[21]	—	Between groups	CBT
	Participant satisfaction		
Hockemeyer[21]	+	Between groups	CBT
	Withdrawals		
Sommaruga[28]	—	Between groups	CBT
Put[26]	—		
Pooled effect	—		
Erskine[17]	—	Between groups	Relaxation therapy
Ewer[18]	—		
Hockemeyer[21]	—		
Epstein[16]	—		
Pooled effect	—		

+: statistically significant effect; —: no statistically significant effect; CBT: cognitive behavioral therapy; PEF: peak expiratory flow; FEV_1: forced expiratory volume in 1 s; FEV_1%: forced expiratory volume in 1 s percent predicted; FEV_1/FVC: ratio of forced expired volume in one second to forced vital capacity; ASC: Asthma Symptom Checklist; SPRAS: Sheehan Patient-Rated Anxiety Scale; BDI: Beck Depression Index.

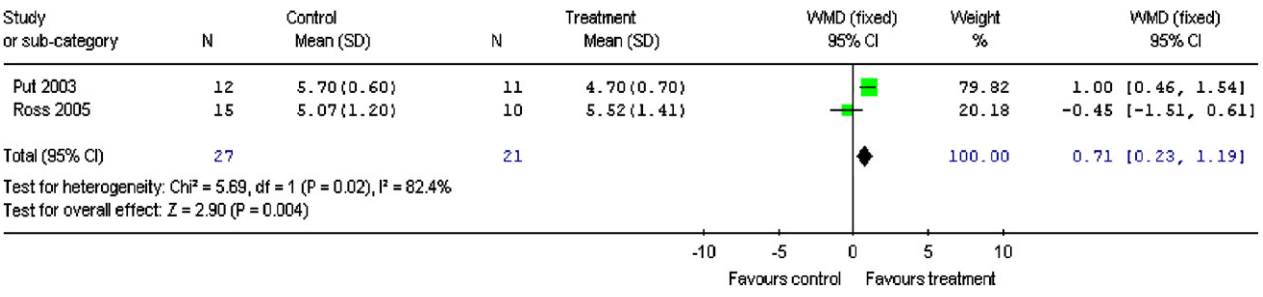

Figure 1 Quality of life scores (AQLQ).

studies.[26,27] This analysis indicated a significant difference in favour of CBT for the Total AQLQ (WMD 0.71, CI 0.23–1.19) (Fig. 1). One study[16] found no significant improvement in the relaxation group with a Total AQLQ mean 5.25 (SD 1.39) compared to the control group mean 4.89 (SD 1.45) (data available through author correspondence).

The Asthma Symptom Checklist (ASC)[31] was used as an outcome measure in a number of studies. Cognitive behavioural therapy[26] resulted in a significant improvement in the intervention group compared to the control group for the sub-categories of obstruction ($P = 0.04$), fatigue ($P < 0.001$) and irritation ($P = 0.03$) but not for dyspnoea, hyperventilation and anxiety.

Lung function

A number of studies included lung function as an outcome to measure the effectiveness of their intervention. Seven of these[16–19,21,22,29] used a form of relaxation as the intervention. A meta-analysis including three of these studies[16,18,20] could be performed indicating no significant difference in favour of relaxation therapy for forced expired volume in 1 s (FEV_1) (SMD −0.01, CI −0.41 to 0.40) (Fig. 2).

Lehrer[23] and Lehrer[24] used bio-feedback therapy and presented peak expiratory flow (PEF) outcome data that could be pooled for a meta-analysis. This indicated a significant difference in favour of bio-feedback therapy (SMD 0.66, CI 0.09–1.23) (Fig. 3).

Hockemeyer and Smyth[21] measured FEV_1/FVC (forced vital capacity ratio) following relaxation and found a statistically significant improvement in the intervention group mean 102.0 compared to the control mean 93.7 ($F(1, 54) = 4.57$, $P = 0.038$). The predicted FEV_1% was also measured by Hockemeyer and Smyth,[21] no statistically significant improvement was found in the intervention group mean 111.5 compared to the control mean 99.8 ($F(1, 54) = 3.41$, $P = 0.71$). Payette[25] also found no significant differences between groups for FVC, FEV_1, FEV_1/FVC after biofeedback training.

Medication use

Six studies examined intervention effects on medication use.[15,16,18,23,24,29] A pooled effect from two studies[16,29] demonstrated a positive response to relaxation treatment by decreasing use of medication (OR 4.47, CI 1.22–16.44) (Fig. 4). This translates to a number needed to treat of 3 (95% CI 2–28). Deter and Allert,[15] using relaxation, found a significant difference in the numbers of people in the experimental group ($n = 4$) who required less bronchodilators when compared to the control ($n = 0$; $P < 0.05$).

Absenteeism from school/work

School/work absences were significantly decreased post-intervention for both the asthma rehabilitation group and the control group (data to support

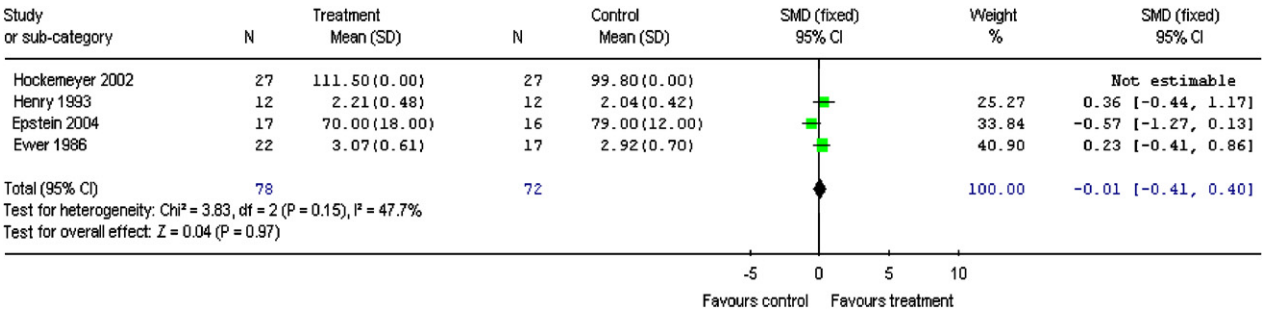

Figure 2 FEV_1.

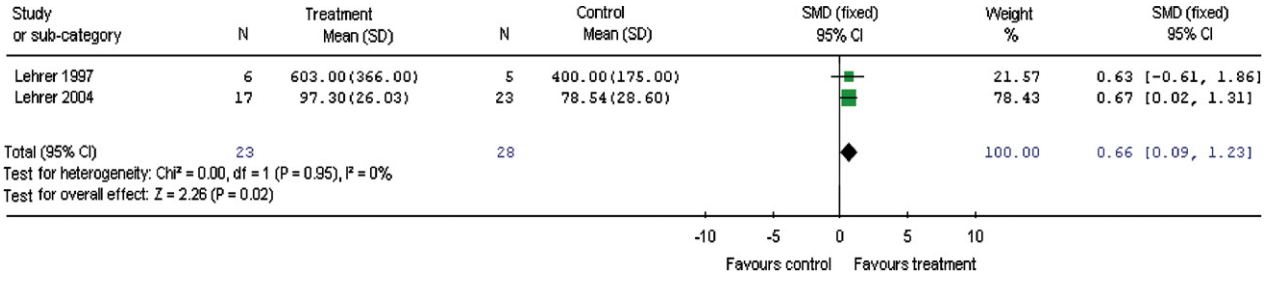

Figure 3 PEF.

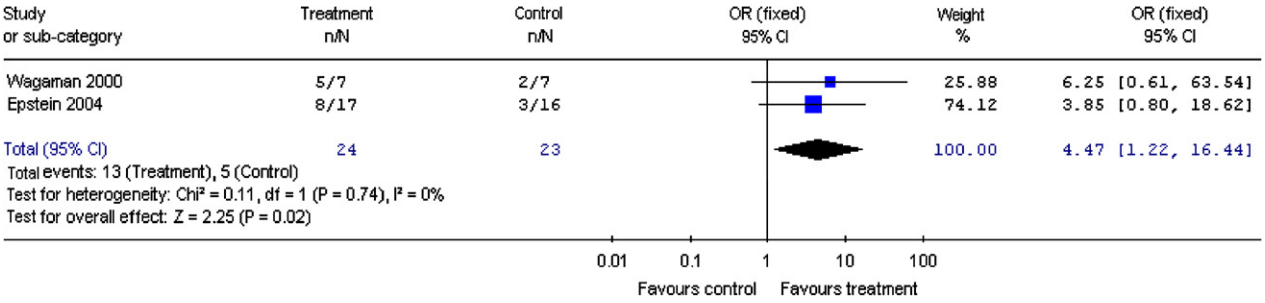

Figure 4 Medication decrease or discontinuation.

this are not provided, apart from $P<0.05$) in one study.[28]

Psychological health status

Anxiety. Anxiety was used as an outcome measure in a number of studies using a variety of interventions and measurement techniques.

Anxiety was measured using the State-trait Anxiety Inventory[32] by Epstein et al.[16] A narrative report of no significant difference between the groups was provided. Following author correspondence, data was provided for Trait Anxiety (intervention mean 42.0, SD 13.11 and control mean 38.63, SD 11.90) and State Anxiety (intervention mean 39.09, SD 13.0 and control mean 42.85, SD 15.24).

Anxiety is a sub-scale on the ASC[31] used by Put[26] following CBT. No significant differences between groups were found. Ross[27] measured anxiety using a panic attack diary, the Sheehan Patient-Rated Anxiety Scale (SPRAS)[33] and the Anxiety Sensitivity Index (ASI).[34]

Depression. Two studies used the Beck Depression Inventory (BDI)[35] as an outcome.[16,27] Epstein et al.[16] provided a narrative description of no statistical difference between groups (means and SDs were provided following author correspondence for the BDI (intervention group: mean 7.84, SD 6.98 and control group: mean 7.0, SD 6.74)). Ross et al.[27] examined the effects of CBT and found that the results of 2×2 ANOVA analysis demonstrated no statistical improvement in BDI levels ($F(1.22)=2.94$, $P<0.10$) between the two groups (except for external chance ($P<0.03$) in the control group).

Health locus of control. Health locus of control, including internal beliefs, and external control through powerful others and chance was measured using the Health Locus of Control Scale[36] in a study investigating the effects of CBT.[28] There were no significant differences between baseline and 1 year follow-up in the intervention group or control group.

A negative emotionality scale, which incorporates measures of negative affectivity as a personality trait, including irritability, nervousness, and emotional instability was used by Put et al.[26] People in the experimental group had a significant decrease in scores compared to the control group ($F(2,42)=10.8$, $P=0.0002$).

Hockemeyer and Smyth[21] measured participant stress levels using the Perceived Stress Scale[37] ANCOVA (controlling for age, age at diagnosis, and perceived stress levels at baseline) did not reveal any significant differences between groups in perceived stress levels at the end of a 4 week CBT programme ($F(1,54)=1.48$, $P=0.23$).

Patient satisfaction

Ross et al.[27] assessed participant satisfaction with their CBT programme using a scale of 1–4. Participants' mean (SD) ratings of their satisfaction are recorded in Fig. 5. Hockemeyer and Smyth[21] assessed participant satisfaction with a self-delivered workbook on relaxation, CBT exercises, and writing therapy. This was assessed using a pre-developed tool.[38] A greater satisfaction with therapy was found in the intervention group mean 33.73 (SD 6.91) compared to the placebo group mean 26.67 (SD 9.03) ($P<0.01$).

Withdrawals

Data relating to drop-outs was provided by seven studies.[16–18,21,24,26,28] A pooled effect for participant withdrawals was performed for relaxation[16–18,21] which demonstrated no significant difference between the intervention group and control group (OR 0.67, CI 0.32–1.38) (Fig. 5). Other withdrawal rates are provided in Fig. 5.

Discussion

This systematic review evaluated 14 trials of varied psychological interventions for adults with asthma.

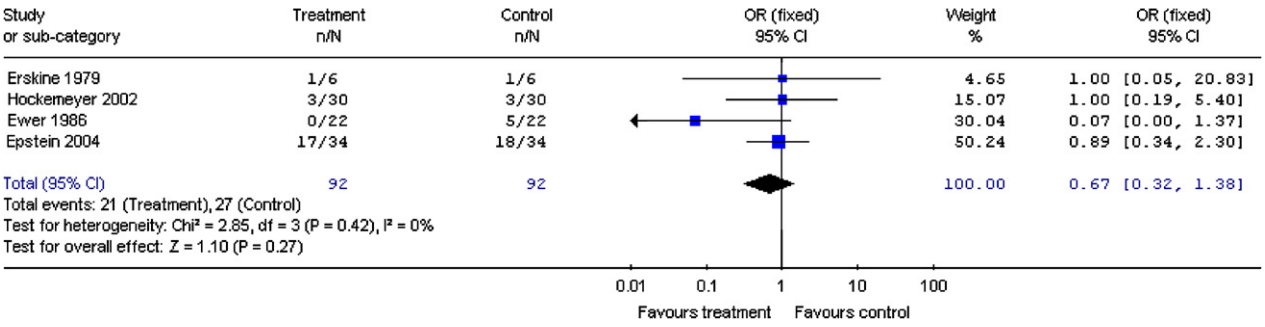

Figure 5 Withdrawals.

The ability to make firm conclusions as to the effectiveness of psychological interventions was limited by poor study quality, insufficient reporting of data and varied outcome measures. In addition, the psychological interventions themselves were varied, did not necessarily have a clear theoretical underpinning, and were not always well described. Additionally, the origin of the need for psychological intervention was rarely described making it difficult to discern whether the aim of treatment was for general adjustment to asthma or for psychological co-morbidity. Whilst psychological co-morbidity is recognised as being difficult to characterise and often not diagnosed,[9] it is imperative that studies evaluating the effects of psychological interventions define this characteristic as the aims and objectives will be different for each patient group. As such, any results and conclusions must be viewed with caution. These issues were also apparent in a recent review of psychological interventions for children with asthma.[8]

Some meta-analyses were performed which generally showed positive results. For instance, quality of life, as measured by the AQLA,[30] was improved following CBT. This is an important finding that requires further research in this patient population. Quality of life is an important outcome measure in patients with respiratory disease as whilst many interventions may not significantly improve physiological parameters, they have been found to cause a meaningful improvement in the patient, such as quality of life.[40] Further use of the AQLQ would be beneficial in assessing the effect of CBT and other psychological interventions on this outcome. A recently published RCT[6] examining the effects of a nurse-led psycho-educational intervention also measured quality of life. This paper concluded that treatment had a positive effect on quality of life but not physical functioning, symptom control, and other variables. However, the main component of the intervention in this RCT was educational and therefore not included in our systematic review.

The ASC[31] was also adopted more than once as an outcome measure.[18,21,29] Whilst these studies used relaxation therapy no meta-analysis could be performed due to small sample sizes[29] and the presentation of within group analysis only.[18] As such, no conclusion as to the benefits of relaxation therapy on the ASC outcomes can be provided. Future use of the ASC is recommended to enable the effectiveness of varied psychological interventions to be assessed using meta-analyses.

Health care utilisation is increasingly being used as a primary outcome in drug trials and other studies on patients with asthma. This being the case, the primary outcome of this review reflects this. However, few trials included in this review measured health care use. In addition, it is assumed that self-report measures were used, and these may not give accurate data. As stated in a similar review involving children,[8] health care utilisation is an important indicator of the effect of many interventions as utilisation may be expected to decrease if there is an improvement in other variables. This review is unable to make any conclusions as to the benefit of psychological interventions in reducing health care utilisation. This outcome needs to be included in future trials of psychological intervention for adults with asthma.

Lung function was measured as an outcome in a number of studies and two separate meta-analyses were performed. Although bio-feedback was found to improve PEF significantly, relaxation therapy did not have such an impact on FEV_1. Whilst lung function results are valuable in the assessment of clinical variables, the relationship between these and psycho-social variables remains questionable.[39]

The psychological outcomes examined were numerous and diverse and there seems to be no consensus as to which psychological outcomes are conceptually linked to asthma or to the psychological interventions being studied. The interventions used varied as did the anxiety measurement tools. This prevented any pooled result being analysed. In addition, depression was measured using the Beck

Depression Inventory[35] by two studies however; one used relaxation as the intervention[13] and the other CBT.[27]

As highlighted in the similar review for children[8] the aim of holistically orientated asthma management, incorporating psychological interventions, is not solely to affect health in itself, but rather to facilitate the patient's adjustment to the illness[37] which should include coping. The coping style of patients is an important predictor of asthma morbidity.[40] With increasing emphasis on patient self-management of asthma[10] coping should be considered as an outcome measure for trials of psychological interventions. We, therefore recommend that valid outcome measures for evaluating the effectiveness of psychological interventions for adults with asthma need to address adjustment to and coping with asthma, as well as other psychological indicators such as anxiety, depression, behaviour change, and quality of life.

Reviewers conclusions

This review highlights that the effects of psychological interventions are difficult to investigate and present challenges for the design of good RCTs. Researchers have to recruit sufficient numbers of subjects to show an effect if there is one, ensure appropriate randomisation and blinding techniques, and follow up subjects for a reasonable period.

RCTs evaluating this area are diverse. They study a mixed group of psychological techniques, which are difficult to classify due to the different methods used to deliver the intervention. This resulted in heterogeneous interventions even when the technique was given the same classification by study authors. The diversity of the interventions was also complicated by a multiplicity of outcomes and the tools used to measure these. In addition, this review highlights the need to classify patients according to the presence or absence of psychological co-morbidity. We recommend that studies evaluating the effects of psychological interventions state the origin of the need for treatment as these two different approaches have different study aims and objectives.

In addition, this body of work does not seem to have a clear direction where current work is influenced by previous studies. Most of these studies were done by trialists who, with the exception of Lehrer's team, did only one study. Research funding should target a range of good quality research, including well-designed RCTs, to determine the effectiveness and cost effectiveness of psychological techniques that have a sound theoretical base, with common taxonomy and outcome indicators. As evidenced by this review, no recommendations for clinical practise as to the efficacy of psychological interventions for asthma can be made. However, the mention of these non-pharmacological options in international guidelines for the management of asthma may act as a stimulus to research in this area.

Acknowledgements

The authors thank members of the Cochrane airways group; Toby Lasserson, Steve Milan, Karen Blackhall, Elizabeth Arnold, Phillipa Mills and Bettina Reuben for their support and encouragement. Thanks to the following for translating studies: Gianni Ferrara (Italian), Keiji Hayashi (Japanese), Toby Lasserson (French and German), Sam Lasserson (Spanish), Makiko Meguro (Spanish and Japanese). Claudia Pagliari advised on the psychological intervention classification and inclusion criteria. Rachel Churchill advised on the protocol and the inclusion criteria. Two anonymous peer reviewers gave valuable input for which we are grateful.

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