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Title: The efficacy of psychologically based interventions to improve anxiety, depression and quality of life in COPD: A systematic review and meta analysis

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The efficacy of psychologically based interventions to improve anxiety, depression and quality of life in COPD: A Systematic Review & Meta Analysis

Paper Revisions
Patient Education & Counseling

Author's response to comments from reviewer 1

1. Provide a checklist or advice for future studies due to level of diversity of the research in this area.

   We have incorporated advice/guidance into the discussion regarding both the direction of future research as well as methodological issues that should be addressed in studies in this area (p18).

2. A slightly pedantic point relates to the introduction where if we are going to take a global view I think it is more relevant to include domestic exposure to biomass fuels as a factor other than smoking and there is a very good recent review on this subject by Salvi S and Barnes PJ in the Lancet (2009, 345, 733-743).

   We have incorporated details of biomass fuel as a major risk factor for COPD in the introduction (p4).

3. There is also some newer prevalence data which suggests the prevalence in Europe may be even higher than quoted here with some data suggesting a figure of 10% in over forty year olds (Miravitlles M et al. Thorax 2009 (Prevalence of COPD in Spain).

   We have incorporated prevalence data into the introduction. We did agree with this, that as we are taking considering the global problem of COPD, evidence of increasing prevalence is valuable background information to the current review.

4. The authors might wish to comment on how fatigue might need to be addressed in this group for there are studies suggesting very high rates of fatigue (Breslin E et al. Chest 1998, 114; 958-964).

   We have incorporated a recommendation to consider fatigue as part of psychological interventions to address reduced quality of life for patients with COPD (p19).

5. The potential for benefit from psychological interventions does as mentioned above of course reflect in part upon its causation. We also rarely see good studies looking at the prevalence of anxiety and depression in a disease compared with the rates of a normal population. There is a suggestion in severe COPD that depression might be 2.5 times commoner in a matched control (Manen JG et al. Thorax 2002, 57; 412-416) but if I recall that study properly leaving alone was a significant causative factor.

Issues of causation have been addressed in the concluding paragraph of the discussion, with recommendations regarding measurement of psychological outcomes in this population (p18).

6. The authors chose to exclude pulmonary rehabilitation studies from their review. The availability of pulmonary rehabilitation does vary quite significantly from country to country but so presumably does the availability of CBT and other psychological interventions. If I did not have either it would be helpful to me to know which of those is most likely to be helpful always taking into account that pulmonary rehabilitation is also going to help symptoms and has a proven effect on quality of life. The discussion could include some further reference to the effect of pulmonary rehabilitation on anxiety and depression.

   We have referred to reasons for excluding pulmonary rehabilitation as well as discussed its effect on anxiety and depression from a recent systematic review and meta-analysis in the discussion. We have talked about its efficacy in the light of the reviewers previous comments about the causation of psychological morbidity (i.e. relation to physical symptoms (p18).

The efficacy of psychologically based interventions to improve anxiety, depression and quality of life in COPD: A Systematic Review & Meta Analysis

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Abstract

Objective: To systematically evaluate the efficacy of psychologically based interventions for addressing psychological outcomes in patients with chronic obstructive pulmonary disease (COPD).

Methods: Electronic databases, key journals and reference lists of included studies were scrutinised for inclusion; in addition authors were contacted for potential unpublished research. Nine studies were identified for inclusion. Data was extracted by two reviewers independently using a standardised extraction sheet and a series of meta-analyses completed for measures of anxiety, depression and quality of life.

Results: Eight studies evaluated a cognitive behavioural- or psychotherapeutically-based intervention and one study evaluated taped progressive muscle relaxation. The studies revealed some evidence for the interventions' impact on anxiety, but, taken together interventions had limited effectiveness. The meta-analyses that were conducted revealed a small effect for anxiety only.

Conclusion: The results are discussed considering the limitations of the research and previous work in this area. A systematic evaluation of psychological interventions on psychological co-morbidity in patients with COPD is recommended.

Practice Implications: There is some evidence that psychological interventions impact anxiety and this should be explored further and more interventions should target quality of life.

Keywords: COPD, anxiety, depression, quality of life, psychological interventions.

1. **Introduction**

Chronic obstructive pulmonary disease (COPD) is a preventable respiratory condition characterised by progressive and irreversible airflow obstruction. **Tobacco use has traditionally been cited as the primary risk factor for COPD [1] but a recent review of COPD in non-smokers has revealed exposure to biomass fuels may be a more significant risk factor [2]**. In the UK, COPD prevalence is reported at rates between 2% to 4% with general practices reporting prevalence at levels from 0% to 7.4% **[3]**. **More recently prevalence has been reported as high as 10.2% in Spain [4].** COPD is reported to cost the NHS £800 million per annum with a further loss of 24 million working days and 30,000 deaths per annum **[5]**. The disease is currently rated as the fourth leading cause of death worldwide, and is projected by the World Health Organisation (WHO) to increase to the third most likely cause of death by 2020 due to the continuation of, and increased exposure to, risk factors and the increasing age of the population **[6]**.

In addition to disabling physical symptoms, such as breathlessness, chronic cough and sputum production, a large proportion of patients also experience psychological distress **[7]**. Anxiety and depression are common; a systematic review and meta-analysis reported the prevalence of clinically significant anxiety and depression as approximately 36% and 40%, respectively **[8]**. There is also evidence that quality of life is significantly reduced in patients with COPD **[9]**. These psychological outcomes appear to be linked with the physical manifestations of the disease; for example breathlessness can precipitate anxiety, and vice versa **[10]**.

Despite the wealth of literature highlighting the problems of anxiety, depression and quality of life in COPD, medical management has focused on the physical characteristics of the disease **[11]**. This focus is reflected in the current treatment guidelines [1], despite evidence that patients exhibiting symptoms of psychological distress are at increased risk of relapse, re-admission and use disproportionately high levels of resources **[12]**. There is also evidence that COPD may be inadequately managed **[13]**. Less than 30% of treatment providers have been reported to follow treatment guidelines for the management of anxiety and depression in COPD **[14]**. Pulmonary rehabilitation is commonly accepted as effective for patients with COPD **[15; 16; 17]**, but anxiety and depression can lead to a reduction in engagement with it **[18; 19]**. Further, it has been recommended that the priority in COPD treatment should be optimising quality of life as the disease process is irreversible **[20]**; patients with COPD have a reduced quality of life exceeding that expected by disease severity or co-morbid medical illness **[21]**. Interventions targeting psychological distress can be expected to result in improvements in quality of life **[22]**.

The efficacy of psychologically based interventions to reduce anxiety and panic in patients with COPD has been reviewed **[23]**. Rose et al (2002) concluded that the evidence, including randomised control trials, was insufficient and not of quality to enable recommendations to be made. However, recent evaluations of cognitive behavioural and psychotherapeutic interventions have added to the evidence base in this area **[24; 25]**. Another recent review that focused on cognitive behavioural therapy for anxiety and depression in COPD also concluded that further research is needed to determine the efficacy of interventions for this patient group. However this review only included four studies and did not assess quality of life **[26]**.

The current review systematically examines the evidence concerning the efficacy of psychologically based interventions to improve anxiety, depression and quality of life in patients with COPD. It aims to ascertain the range of psychologically based interventions available for addressing anxiety, depression and quality of life in patients with COPD outside of comprehensive pulmonary rehabilitation interventions. Secondly it aims to assess the effectiveness of interventions in improving psychological outcomes for COPD patients suffering from psychological co-morbidity.

2. **Methods**

2.1 Search Protocol and Inclusion/Exclusion of Studies

Comprehensive searches of the following health and psychology databases were conducted to identify research studies for inclusion up to September 2009: *Blackwell Synergy, Index to Theses, PsycARTICLES, PsycINFO, Web of Science, Cochrane Library and Medline*. The contents lists for the preceding five years of key journals were reviewed online: *Thorax, Chest, European Respiratory Journal, Journal of Patient Education & Counseling, American Journal of Respiratory Critical Care Medicine and COPD: Journal of Chronic Obstructive Pulmonary Disease.* In addition, reference lists of included studies and previous reviews were scrutinised for additional studies. Key authors were contacted to obtain details of relevant unpublished studies in an attempt to address publication bias. Disease terms ('chronic obstructive pulmonary/airways disease', 'COPD', 'COAD', 'chronic bronchitis', 'respiratory disease', 'emphysema') were combined with terms relating to psychological outcomes ('depress*', 'anxi*', 'panic', '(health related) quality of life', 'health status', 'HRQOL', 'QOL') and interventions ('stress management', 'relax*', 'cognitive behavioural/behavioral therapy', 'CBT', 'psychotherapy', 'education', 'psychological

intervention') using a standardised protocol utilising Boolean commands to identify the most relevant literature. Where possible, searches were limited to human adult populations. The search protocol was piloted and minor changes made prior to the final systematic search.

English language studies detailing an evaluation of a psychologically based intervention aimed at reducing anxiety and/or depression and/or improving (health related) quality of life, for patients with a confirmed diagnosis of COPD on spirometry were included. Papers were excluded if they did not contain a psychological component to the intervention or if the research population had co-morbidities of asthma or other significant health problems that might impact on their ability to engage with psychological interventions. Papers evaluating PR were excluded since this would duplicate existing work. Electronic database searches of study titles identified 15,772 possible studies that were filtered through the search process summarised in figure 1. No additional studies were identified from the contents of key journals. 21 studies were initially included for review. 13 were excluded because they: failed to evaluate an intervention or contained no psychological component to intervention (n=3); were PR (n=2); had inappropriate outcomes (n=1); had duplication of participants from other included studies (n=2); were detailed in abstracts from conference proceedings (n=3); had no confirmation of COPD diagnosis (n=1); and had inclusion of patients with other respiratory disease (n=1) **[24; 25; 27-37]**. One study was identified from the reference list of included studies. Nine studies were included in the review and meta-analyses (table 1) **[38-46]**.

2.2 Quality Assessment

All included studies were subjected to a quality assessment to estimate potential bias that could result from combining studies of varying methodological quality, which might lead to misleading conclusions **[47]**. Quality criteria were developed based on recommendations made elsewhere **[48; 49]**. Each study was assessed according to: clear aims, randomisation techniques, concealment of treatment allocation, comparability of groups at baseline, blinding of interventionists and participants, eligibility for intervention assessed, description of intervention provided to allow replication, attrition, effect size, details of long term follow up and sustained change, analysis of confounding variables, power analysis, definition of all outcomes, measured with reliable measurement tools and results provided for each, and appropriate statistical analysis. A score of 0-2 was awarded for each item (0 = no detail, 1 = partial detail, 2 = full and adequate detail): these were summed to create a score between 0 and 52. All studies included a pre- post- comparison. Studies did not have to report differences between intervention and comparator (control) groups, but this would have been reflected in the quality assessments.

2.3 Data extraction

Data was extracted using a standardised extraction sheet. A second reviewer (DS) independently extracted data from 50% of included studies to ensure accuracy and reliability, with reviewers meeting to confirm agreement of extraction and establish reliability. There were no discrepancies reported between the reviewers. Three studies were excluded by both reviewers: one study failed to confirm diagnosis of COPD with spirometry **[27]**; two studies included participants whose data was already reported in another included study **[24; 25]**.

Nine studies were included overall and form the basis of this review comprising seven published research studies and one unpublished study.

2.4 Data Analysis & Synthesis

The included studies reported similar research aims but utilised a variety of outcome measures and research designs. All nine studies made some measure of anxiety, eight measured depression, and five measured quality of life either as a generic or disease specific measure or both. Descriptive analysis and meta-analysis were carried out for each outcome measure.

3. Results

3.1 Participants

All nine studies utilised a clinical population of patients with a confirmed diagnosis of COPD on spirometry. Four studies included patients with moderate to severe COPD **[40; 41; 42; 43]** and one study included patients with mild to severe COPD **[44]**. The remaining four studies confirmed diagnosis with spirometry, but did not report disease severity **[38; 45; 46]**. The mean age of participants ranged from 66 years **[44]** to 71 years **[38]**. Five studies were conducted in the USA **[38; 39; 41; 45; 46]**, three were conducted in the UK **[41; 42; 44]** and one was conducted in Brazil **[40]**. The prevalence of male participants ranged from 31% **[45]** to 96.2% **[39]**. Existing psychological morbidity was reported in six studies although the level of detail provided was variable. One study reported the prevalence of anxiety or depression in the study population as 62.2% **[39]**, three studies reported the level of anxiety or depression less specifically detailing: mild anxiety and depression amongst the sample

[38], the impact of anxiety and depression as mild to moderate **[40]** or that there was a burden of anxiety and depression at baseline **[42]**. One study found 60% of participants could be reported as a probable psychiatric case **[44]**. One study set out to address clinically significant anxiety in patients with COPD, and high levels of anxiety were noted in this study **[41]**. Three studies did not report on baseline existing psychological morbidity **[43; 45; 46]**.

3.2 Aims

Each of the included studies detailed the aims and objectives of the research, and aimed to evaluate the efficacy of an intervention. The measures used to assess outcomes varied although all had been psychometrically tested. The aims of the studies included: improving anxiety, depression physical functioning and quality of life in older patients **[38]**, improving anxiety, depression disease specific and generic quality of life, physical functioning, health service use in patients with moderate-severe anxiety and/or depressive symptoms **[39]**, improving anxiety, depression, quality of life and exercise capacity in patients enrolled in PR **[40]**, improving anxiety, quality of life, dyspnoea and exercise tolerance in patients with moderately severe COPD **[41]**, assessing the change in levels of disability and cognitive distortion and improving anxiety, depression, somatic symptoms and hostility **[43]**, improving anxiety, depression and relieving dyspnoea in patients with disability attributable to dyspnoea **[44]**, and improving anxiety and dyspnoea **[45]**. One study examined the effect of a nurse administered intervention for patients with varying disease severity **[42]**. One study assessed changes in psychological and cognitive outcomes with a trial of exercise, with a comparator of education and stress management **[46]**. Four studies predicted that the psychological intervention would have a positive effect on psychological outcomes by reducing anxiety and depression and improving quality of life, **[38; 44; 45; 46;]**, one study

predicted that a psychological intervention would be of greater benefit than a non-psychological intervention **[39]** and four studies did not hypothesize as to the direction of effect **[40; 41; 42; 43]**.

3.3 Study Design

The nine studies included 523 participants; 270 were exposed to a psychological intervention. Participants were mainly recruited through medical clinics or lists **[38; 39; 40; 42; 44; 45]**. One study used a variety of recruitment methods including advertising, physician referral and support groups **[46]**. One study did not make it clear where the participants were recruited from **[43]** and one study did not report sampling methods **[41]**.

Four studies were described as randomized controlled trials (RCT) **[38; 39; 40; 46]** and two studies reported that randomisation methods were used to allocate participants to intervention and comparator groups **[44; 45]**. The remaining studies did not employ any randomisation methods **[41; 42; 43]**. One study used matched controls **[41]**. Two studies had a control group where participants received no intervention but were required to attend to complete outcome measures **[41; 45]**. Three studies made comparisons with participants engaged in a different intervention: two studies compared CBT to an education alone intervention **[38; 39]** and one study evaluated the added value of psychotherapy to PR and exercise **[40]**. Finally, one study had four comparison groups looking at three different styles and deliveries of psychotherapy and compared these to a control group **[44]**. Three studies incorporated a second, longer term follow-up (3 to 12 months) of patients **[39; 41; 44]**.

3.4 Interventions

Six studies evaluated cognitive behavioural based therapies: three interventions employed group cognitive behavioural therapy (CBT) **[38; 39; 41]**, one employed individual CBT **[42]** and two used a CBT based education intervention **[44; 46]**. Two studies utilised individual psychotherapy **[40; 44]** and one study used taped progressive muscle relaxation training **[45]**. The cognitive behavioural interventions were delivered over varying time frames, from a single two-hour intervention **[38]** to eight weekly sessions **[39; 43]**. The individual CBT was delivered weekly until the therapist and patient felt progress had been made, with a mean number of sessions of four (range 2-13) **[42]**. Individual psychotherapy sessions were offered over eight weeks **[44]** or twelve weeks when part of a PR programme **[40]**. The progressive muscle relaxation programme consisted of four weekly sessions.

Two CBT interventions were delivered by psychiatrists **[38; 41]**, one by a clinical psychologist **[46]**, one by psychology interns and post doctoral fellows **[39]**, and one by a nurse **[42]**. The final CBT intervention was delivered by the author of the paper but their clinical role was unclear **[43]**. One psychotherapy intervention was delivered by a psychologist **[40]**. The other psychotherapy intervention included three intervention groups whereby supportive and analytic psychotherapy was delivered by a psychotherapist, but a comparator intervention included nurse administered therapy although the nurse had not received any training in psychotherapy **[44]**. The progressive muscle relaxation was a taped intervention **[45]**. Six of the interventions were delivered at a medical clinic or physician's office **[38; 41; 42; 44; 45; 46]**; the remaining studies did not specify a venue.

3.5 Quality Assessment of Included Studies

A number of methodological factors were assessed for quality (table 2). Adequate randomisation procedures were utilised in four studies, using a random number table **[38; 46]**, randomisation blocks and flipping of a coin **[39]** and sealed labels assigned to patients off the waiting list **[44]**. Quality scores for randomisation methods of the remaining studies varied depending on whether a control group was utilised and how clear these procedures were reported. One study reported on treatment allocation concealment **[46]**. Due to the nature of the remaining studies, interventionists could not be blinded to the treatment allocation of participants. Only one study made an attempt to control for this through using the same interventionists to provide the psychological and control interventions **[39]**. Six studies ensured participants were blinded to the nature of the study and put adequate steps in place **[38; 39; 40; 44; 45; 46]**. Three studies reported that the assessor was blind to treatment allocation **[40; 44; 46]**; the remaining studies providing no details regarding blinding. Seven studies utilised a comparator group **[38; 39; 40; 41; 44; 45; 46]**, and each of these provided details of the treatment of control participants. Six of the seven studies reported that the groups were comparable at baseline **[38; 39; 40; 44; 45; 46]**. In the remaining study, the intervention had significantly higher prevalence of anxiety than the control group and so comparisons between these groups could not be made for anxiety outcome measures **[41]**.

Attrition rates were reported and analysis performed concerning the differences between groups for three studies **[39; 45; 46]**. Partial details were given for a further five studies but analysis of differences could not be completed **[38; 41; 42; 43; 44]**. From the data that was extracted, 201 participants were lost from 364 assigned participants due to: not wanting to participate, medical reasons, time constraints, transport problems, no interest, financial

distress, non-attendance, unable to complete and inability protocol. Only one study conducted an *a priori* power analysis to determine the number of participants required in the study to achieve a required effect size **[39]**; the same study was unique in reporting effect sizes of change in measured outcomes.

The quality of the interventions was good, with few points lost on assessment. Details of what the interventions were, how they were delivered, and who by were clearly reported for each study. All but one study reported the eligibility criteria for participants to engage with the intervention, the remaining study being unclear on these details **[42]**. All of the interventions were sufficiently reported to enable replication.

3.6 Quantitative Analysis

The studies used similar statistical methods to assess the research questions, specifically MANOVA, ANOVA and t-tests, which were judged to be appropriate for the study designs utilised (table 2). One study used Wilcoxon, Mann-Whitney U and Kruskall Wallis analysis **[44]**. Anxiety measures were reported for each study. Improvement in anxiety scores was reported in four studies when comparing pre- and post-intervention scores within the groups **[38; 39; 40; 42]**, but was not confirmed in three studies **[41; 43; 46]**. Long term follow up of change was reported in one study, finding a sustained improvement in anxiety scores within groups at 44 weeks post intervention **[39]**. One study reported mixed results with significant improvement on one measure of general psychological health but anxiety increased significantly for the supportive psychotherapy group and decreased significantly for the control group, with analytic and nurse psychotherapy groups remaining unchanged **[45]**. A significant interaction was found between the relaxation and control groups, with anxiety

reducing significantly in the relaxation group and remaining stable in the control group **[45]**. One study did not show improvement over the comparator group **[39]** and comparison between groups could not be made for one study as the groups were not comparable at baseline with regard anxiety scores **[41]**.

The seven studies that assessed depression found mixed results. Four studies reported a statistically significant improvement in depression scores when comparing pre- and post intervention scores **[38; 39; 40; 42]**, but analysis between intervention and comparator groups were not significantly different **[39]**. Only one study assessed long term follow up of depression scores finding within group changes were maintained at 44 weeks **[39]**. Furthermore, two studies did not find within group differences in pre- post-intervention scores **[43; 46]**. Depression scores seemed to increase from baseline to post intervention in one study, the greatest increase seen in the analytic psychotherapy group **[44]**.

Only five studies considered quality of life in the analysis, again producing mixed results. Three studies measured generic quality of life **[38; 41; 46]**, one measured disease-specific quality of life **[40]** and one study measured both **[39]**. Statistical results for quality of life outcomes were unclear in some studies as the measure was usually secondary and so detailed analysis was not provided. Two studies revealed significant change on the mental health subscale of a generic measure of quality of life measure **[38; 39]**, one of these also reporting a significant improvement when the emotional subscales of the measure were amalgamated **[39]**. This improvement was not significant between groups. A disease specific measure also revealed significant improvements in quality of life but these differences were not significant between groups **[39]**. The addition of psychotherapy to PR seemed to significantly improve

quality of life in two groups, with no change in the PR alone intervention **[40]**. Two studies measuring generic quality of life found no change in quality of life scores when baseline and post intervention scores were compared for within-subjects analysis for intervention or control groups **[41; 46]**.

3.7 Meta Analysis

Six meta-analyses were conducted for within and between group anxiety, depression and quality of life. One meta-analysis based on pre-post intervention anxiety scores of intervention group participants from eight included studies (n = 222) revealed a combined effect size of r = -0.273 (CI -0.419 to -0.141, $p<0.00004$), representing a small effect size (table 3) **[50]**. The remaining five analyses revealed four file drawer problems and one heterogeneity problem.

4. Discussion

The literature evaluating the efficacy of psychological interventions to improve anxiety, depression and/or quality of life for patients with COPD is relatively sparse but growing. This systematic review identified nine studies for inclusion which compares favourably with Rose's **(2002) review (n=6) [23]**. The study population predominantly comprised patients with moderate-severe disease and with existing morbidity of mild-moderate anxiety and/or depression. Six interventions were based on cognitive behavioural therapy, two interventions were based on psychotherapy and one used progressive muscle relaxation training. None of the interventions focused on changing quality of life; it was considered a secondary outcome measure. Mixed results were observed for the efficacy of these interventions across all outcome measures of anxiety, depression and quality of life, with results not offering support

for psychological intervention. **Meta-analysis revealed a small but significant effect for the use of intervention in reducing anxiety but only when compared within groups.** This was not significant when compared with a control comparison.

Not all of the included studies reported each psychological outcome of interest: nine studies addressed anxiety, seven studies addressed depression and five studies addressed quality of life. Furthermore, the tools used to measure psychological distress were diverse; this was particularly true for quality of life measures which were further split into measures of disease-specific and generic quality of life. Two studies did not utilise a comparator group, which meant that confounding variables could not be controlled for and any changes in scores post intervention could not be attributed to the intervention alone. Only three studies reported measures taken subsequent to the initial post intervention assessment. Future studies should examine long term benefits in addition to initial changes.

The current review indicates that more recent studies are of a higher standard. However, although validated, a variety of measures were used making it difficult to interpret and combine the results of the studies. Therefore, we reiterate previous recommendations that psychological interventions must be systematically evaluated through studies of continued high methodological quality in order to establish the efficacy of psychological interventions in the routine management of patients with COPD **[23]**.

The results and limitations of the studies included in the current review indicate that future research should also include patients with mild to moderate disease and assess the impact of basic psychological intervention as part of routine management of patients with COPD on

their psychological functioning and quality of life. In the longer term, the effects of routine screening for psychological distress and interventions to address psychological outcomes in the early stages of disease should be considered. The included studies in this review did not evaluate the cost effectiveness of interventions. This should be considered to determine whether increased active management of psychological morbidity improves outcomes and reduces the financial burden to the NHS to a greater value than the cost of intervention.

Interventions that have been shown to be effective in treating anxiety and depression do not appear to be effective in reducing psychological morbidity in a COPD population. This may be due to the overlap between symptoms of disease and items used to measure these psychological outcomes (e.g., there is an overlap between fatigue and depression on some questionnaire measures). Additionally it is possible that aspects of therapy that are most effective in reducing these outcomes are not feasible for use in this population (e.g. voluntary hyperventilation). Future research should pay careful attention to the measures used in assessing psychological morbidity. Studies evaluating pulmonary rehabilitation were excluded from the current review as this has previously been shown to be more effective in reducing anxiety and depression than standard care in moderate to severe COPD [21]. As pulmonary rehabilitation also seeks to improve the physical functioning of patients, this again could be attributed to improvements in the symptoms of COPD such as breathlessness, and this should be addressed in future research. Intervention studies should be consistent in using the GOLD guidelines for determining the disease severity of patients [6], in selecting robust measures of anxiety, depression and quality of life, suitable for use in a COPD population and should aim to evaluate the long term benefits of intervention in terms of health outcomes and cost effectiveness.

Practice Implications

The benefit of psychological interventions in the management of patients with COPD remains largely unclear with mixed results being reported from studies of varying methodological quality. There was some evidence that psychological interventions impact anxiety in patients with COPD. However, whether this improves engagement with pulmonary rehabilitation has yet to be examined. High quality research is needed in this area to establish the efficacy of psychologically based interventions and how they impact **upon** the management of patients with COPD. Although guidelines recommend some element of psychological treatment within the management of COPD [1], it remains unclear what is effective outside of pulmonary rehabilitation, which is difficult to make available to all patients due to the intensity of the intervention. Additionally interventions should also target quality of life and evaluate their efficacy. Acceptance based approaches may be useful for these patients **[51] as well as investigating the usefulness of targeting fatigue which has been associated with increased respiratory disease severity, reduced exercise tolerance and quality of life [52]**.

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Table 1: Characteristics of Included studies (N=9)

Study ID ***(& reference)***	**Study Design** ***Sampling***	**Number of participants overall & in (intervention group). *Details of comparator***	**Characteristics of participants** *(age, gender, ethnicity, disease severity, psychological co-morbidity)*	**Intervention** *(what, where, duration, replicable, groups, individual or other, who delivered?)*	**Psychological outcomes and measures**	**Study quality score max 50**
(Kunik, Braun, Stanley, Wristers, Molinari, Stoebner & Orengo, 2001) ***[38]*** USA	RCT (single blind) *Recruited from veterans hospital & advertising*	48 (21) Comparator group *education* only	Mean age 71.3, 83% male, 90% Caucasian, FEV1/FVC <70%, mild anxiety and depression	Cognitive behavioural therapy, 2 hour single intervention with 6 week telephone follow up. Based at medical clinic, groups of 6-10, replicable. Delivered by gero-psychiatrist	Health related quality of life (SF-36) Depression (GDS) Anxiety (BAI)	35
(Kunik, Veazey, Cully, Souchek, Graham, Hopko, Carter, Sharafkhaneh, Goepfert, Wray & Stanley, 2007) ***[39]*** USA	RCT (single blind) *Recruited from veterans hospital & advertising*	238 (118) Comparator group *education* only	Mean age 66.3, 96.2% male, 81% white, mean FEV1/FVC 57.2%, 62.2% anxiety or depression	Cognitive behavioural therapy, 8 x 1 hour sessions, weekly basis. Groups of 10. Venue not specified, replicable, delivered by psychology interns, post doctoral fellows.	Disease specific QOL (CRQ) Generic QOL (SF-36) Anxiety (BAI) Depression (BDI-II)	36
(De Godoy, De Godoy, Becker Junior, Vaccari, Michelli, Teixeira & Palombini, 2005) ***[40]*** Brazil	RCT (single blind) *Consecutive patients being treated as outpatient, referred to PR*	33[1] (19) Comparator group *PR and exercise.*	Age 50yrs+, 73% male, 93% Caucasian, mean FVC 66%pr (mod-sev disease), mean impact of anxiety/dep mild-moderate	Individual psychotherapy 1hr/wk for 12 weeks as part of PR. Venue not specified, replicable, psychotherapy delivered by psychologist	Anxiety (BAI) Depression (BDI) Health related quality of life (SGRQ)	30
(Eiser, West, Evans, Jeffers & Quirk, 1997) ***[41]*** UK	Repeated measures pre-post *Sampling method not stated.*	18 (12) 10 participant completed and included in analysis. *Control group (n=8) attended weekly for outcome measures.*	Mean age 72, 55.5% female, 50% male: female in intervention group, severe but stable COPD, sig higher HADS anxiety score in treatment than control	Group based CBT, 6x90 minute sessions, groups 5-6 people, replicable, outpatients, delivery by psychiatrist.	Anxiety (HADS) Quality of life (MRCQ)	28

[1] Includes two groups receiving psychotherapy. Group 2 excluded as study 4 was based on the same participants as groups 1 & 3, and this data was utilised to ensure accuracy of extracted data from study 5.

Study ID ***(& reference)***	**Study Design** ***Sampling***	**Number of participants overall & in (intervention group).** ***Details of comparator***	**Characteristics of participants** *(age, gender, ethnicity, disease severity, psychological co-morbidity)*	**Intervention** *(what, where, duration, replicable, groups, individual or other, who delivered)*	**Psychological outcomes and measures** (time of measurement)	**Study quality score max 50**
(Heslop, De Soyza, Baker, Stenton & Burns, unpublished) ***[42]*** UK	Repeated measures pre-post *Referred if anxiety/ depression felt to be contributing to symptoms*	10 (no comparator group)	Mean age 68 (48-81), 50% male, 80% severe COPD, 10% mild, 10% moderate disease, there was a burden of anxiety and depression at baseline	Individual cognitive behavioural therapy, outpatients based, delivered weekly, treatment length varied according to individual need. Nurse delivered, replicable.	Anxiety (HADS) Depression (HADS)	23
(Lisansky & Clough, 1996) ***[43]*** USA	Quasi-experimental one-group pre-post test *Self selected convenience sample*	8 (no comparator group)	Mean age 69.5 (58-83), 62.5% women, 37.5% men, moderate-severe COPD, mean yrs with COPD 13.5 (3-40)	Cognitive behavioural education intervention, 8x weekly sessions 90 mins Venue & interventionist not specified	Anxiety (SQ Kellner) Depression (SQ Kellner)	22
(Rosser, Denford, Heslop, Kinston, Macklin, Minty, Moynihan, Muir, Rein & Guz, 1983) ***[44]*** UK	Randomised trial (blinding not reported) *Patients screened for inclusion when attending respiratory clinic*	65 (3 interventions groups each with n=16). Comparison of analytic or supportive psychotherapy, nurse administered psychotherapy. *Also control group who had weekly lab tests.*	Mean age 66, 68% male, mild-severe disease severity, mean FEV1 0.9, 60% identified as probably psychiatric cases	8x45 minute sessions of analytic, supportive or nurse administered (without training) psychotherapy. Individual therapy, based in medical clinic unspecified. Analytic & supportive psychotherapy administered by therapist.	Anxiety (GHQ & VAR) Depression (GHQ & VAR)	35
(Gift, Moore & Soeken, 1992) ***[45]*** USA	Randomised *Recruited from patient list of 3 private physicians*	26 (13) *Control group required to sit quietly in room for same length of time as PMR*	Mean age 67 (36-86), 69.2% female, 100% white. COPD confirmed on spirometry according to ATS	Progressive muscle relaxation, 4x sessions on weekly basis, taped message to administer, venue physician's office, group	Anxiety (STAI)	36
Emery, Schein, Hauck & MacIntyre, 1998) ***[46]*** USA	Randomised controlled trial *Recruited from local better breathers clubs, TV & newspaper advertising, word of mouth, physician referral*	73 (25, 23 & 25) 3 x groups, exercise, education & stress management (SM); education and SM and control. Included education & SM and control group for review. *Control were waiting list,not to alter activity levels for 10 weeks.*	Mean age 66.6 (±6.5), 53% female, FEV_1/FVC <.70, clinical symptoms of COPD for >6/12.	Education and stress management comprising 16 educational sessions and 10 stress management classes.10 week course.	Anxiety (STAI, SCL-90 anxiety subscale) Depression (CES-D, Affect-Balance Scale, SCL-90 depression subscale) Quality of Life (SIP)	

Table 2

Table 2: Quality assessment of included studies

Quality Criteria	Study (reference)								
	38	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**
Clear definition of aims	2	2	2	2	1	2	2	2	2
Randomisation sequence (concealed)	2	2	1	0	0	0	2	1	2
Treatment allocation concealed	0	0	0	0	0	0	0	0	2
Analysis of baseline characteristics	2	2	2	2	2	2	2	2	2
Blinding of interventionists	0	0	0	0	0	0	0	0	0
Blinding of participants	2	2	2	0	0	0	2	2	2
Blinding of assessor	0	0	2	0	0	0	2	0	2
Clear description of intervention									
Eligibility assessed?	2	2	2	2	1	2	2	2	2
Where?	1	0	0	2	2	0	1	2	2
What?	2	2	2	2	2	2	2	2	2
How?	2	2	2	2	2	2	2	2	2
Replicable?	2	2	2	2	2	2	2	2	2
Control group utilised	2	2	2	2	0	0	2	2	2
Details of treatment of control group	2	2	2	2	0	0	2	2	2
Comparability of groups	2	2	2	0	0	0	2	2	2
Attrition	1	2	0	1	1	1	1	2	2
Power analysis done	0	2	0	0	0	0	0	0	0
Effect size reported	0	2	0	0	0	0	0	0	0
Confounding variables analysis	0	0	2	0	0	0	0	0	0
Reporting of outcomes:									
Clear definition of outcomes	2	2	2	2	2	2	2	2	2
Reliable measures of outcomes	2	2	2	2	2	1	2	2	2
Results provided for all outcomes	2	2	2	2	1	2	2	2	2
Details of timings of measures	2	2	2	2	2	2	2	2	2
Missing values dealt with	0	2	0	0	0	0	0	0	0
Appropriate statistical analysis	2	2	1	1	1	2	2	2	2
Intention to treat analysis	0	0	0	0	0	0	0	0	0
Total Score/56**	**34**	**40**	**34**	**28**	**21**	**22**	**36**	**35**	**40**

0 = no / unknown **1 = partial** **2 = yes**

(Adapted from recommendations of quality criteria by Khan (2001) and Oakley *et al* (1995), Criteria for assessing quality of experimental research). [47; 48]

Table 3

Groups compared Anxiety measures within groups	Number of studies	Total number of participants	Combined effect size (r)	Confidence interval	Combined z	Combined p	Fail safe N	Critical number for file drawer
All studies (homogeneous)	8	222	-0.273	-0.419 to -0.141	-3.927	0.00004	54	50

Table 3: Summary of meta-analysis based on anxiety scores of patients exposed to psychological intervention.

Figure 1

Figure 1: Overview of search process, identification of studies and data extraction