

Psychological interventions for depression and anxiety in patients with coronary heart disease, heart failure or atrial fibrillation: Cochrane systematic review and meta-analysis

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Aims

Depression and anxiety occur frequently in individuals with cardiovascular disease and are associated with poor prognosis. This Cochrane systematic review and meta-analysis assessed the effectiveness of psychological interventions on psychological and clinical outcomes in adults with coronary heart disease (CHD), heart failure (HF) or atrial fibrillation (AF).

Methods and results

CENTRAL, MEDLINE, Embase, PsycINFO, and CINAHL databases were searched from January 2009 to July 2022 for randomized controlled trials of psychological interventions vs. controls in adults with CHD, HF, or AF. Twenty-one studies ($n = 2591$) were assessed using random-effects models. We found psychological interventions reduced depression [standardized mean difference (SMD) -0.36 ; 95% confidence interval (CI) -0.65 to -0.06 ; $P = 0.02$], anxiety (SMD -0.57 ; 95% CI -0.96 to -0.18 ; $P = 0.004$), and improved mental health-related quality of life (HRQoL) (SMD 0.63 , 95% CI 0.01 to 1.26 ; $P = 0.05$) (follow-up 6–12 months), but not physical health-related quality of life, all-cause mortality or major adverse cardiovascular events compared with controls. High heterogeneity was present across meta-analyses. Meta-regression analysis showed that psychological interventions designed to target anxiety, were more effective than non-targeted interventions.

Conclusion

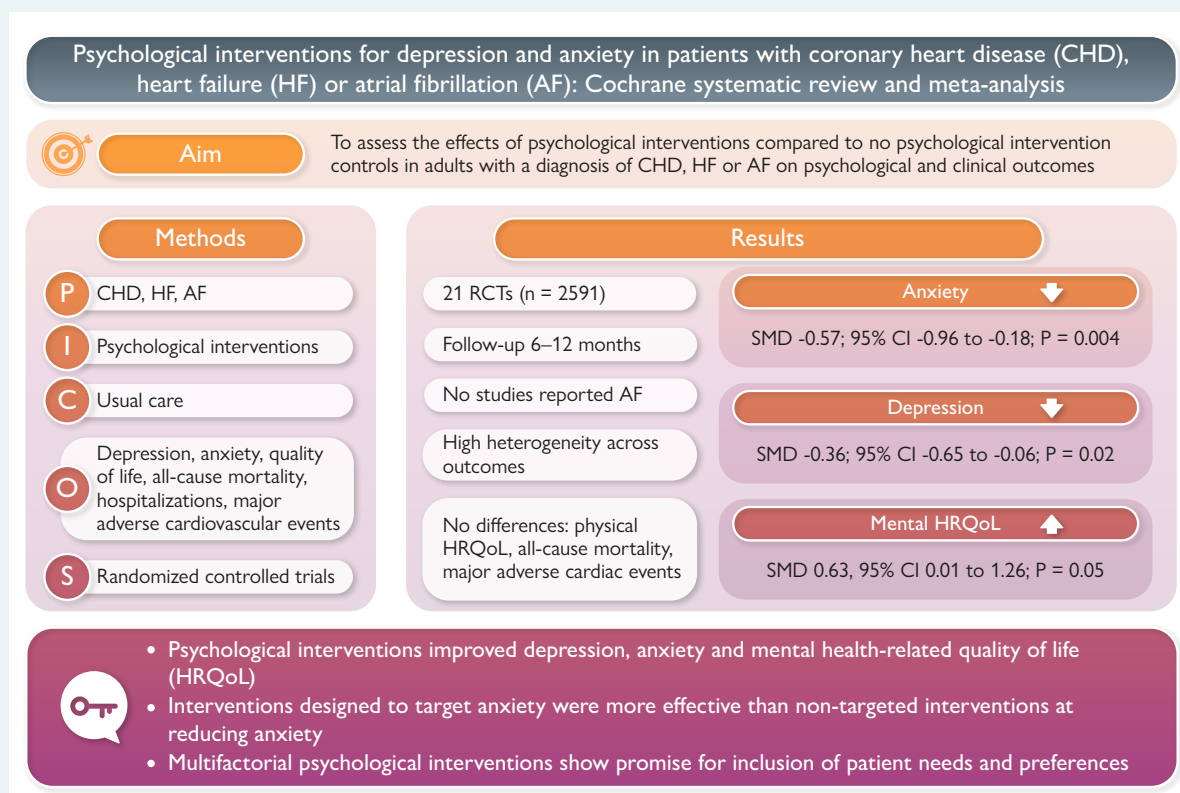
This review found that psychological interventions improved depression, anxiety and mental HRQoL, with those targeting anxiety to show most benefit. Given the statistical heterogeneity, the precise magnitude of effects remains uncertain. Increasing use of multifactorial psychological interventions shows promise for incorporating patient needs and preferences. Investigation of those at high risk of poor outcomes, comparison of intervention components and those with AF is warranted.

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Graphical Abstract



Keywords

Anxiety • Atrial fibrillation • Coronary heart disease • Depression • Heart failure • Meta-analysis • Psychological interventions

Novelty

- This is the first review to systematically evaluate the impact of psychological interventions on depression and anxiety in patients with coronary heart disease, heart failure or atrial fibrillation (21 studies; n = 2591).
- Psychological interventions improved depression, anxiety and mental health-related quality of life, but did not appear to influence physical health-related quality of life, all-cause mortality or major adverse cardiovascular events.
- Psychological interventions designed to target anxiety (in those with or without psychological symptoms) were shown to be more effective than non-targeted interventions at reducing anxiety.
- These findings demonstrate the value of psychological interventions in improving mental health of people with cardiovascular disease.

Introduction

Over the past two decades, significant reductions in mortality have been achieved in people with cardiovascular disease (CVD) through pharmacological and device therapy.^{1,2} At the same time, CVD and depressive disorders are listed among the top ten most burdensome diseases, with cardiovascular, depressive, and anxiety disorders each increasing >50% in disability-adjusted life years between 1990 and 2019.³ Thus, the focus has shifted towards psychological outcomes.^{4–6} Depression and anxiety are highly prevalent in people with CVD (reported prevalence rates ~40%) and result in worse outcomes, such as poorer health-related quality of life (HRQoL), and increased morbidity and mortality.^{7–9} To improve patient outcomes, psychological interventions (used to modify

behaviour, thoughts, and feelings) are included in cardiovascular prevention guidelines internationally (e.g. British Association for Cardiovascular Prevention and Rehabilitation;¹⁰ European Society of Cardiology and Other Societies on CVD Prevention in Clinical Practice;¹¹ National Institute for Health and Care Excellence¹²).

The 2017 Cochrane review of psychological interventions for coronary heart disease (CHD) found improvements in psychological symptoms (depression, anxiety) and cardiovascular mortality rates.¹³ However, considerable uncertainty was found regarding the quality of included studies and who would benefit most from treatment (i.e. people with or without psychological disorders). Including people across the spectrum of disease severity is essential for determining who benefits the most from psychological interventions. Further, adjunct use of

pharmacological therapy for underlying psychological conditions has been shown to increase intervention effectiveness compared with those without pharmacotherapy.^{6,14}

Previous reviews on psychological aspects of heart disease have focused on specific cardiovascular diagnoses e.g. heart failure (HF) or CHD.^{6,15,16} To provide a more representative CVD population the current review included the three most prevalent cardiovascular conditions with growing global health and economic challenges: CHD, HF, and atrial fibrillation (AF).^{17–19} Of significance is the growing recognition of the role of psychological determinants in cardiac illness and recovery, which has implications for psychological interventions, subsequent adoption and maintenance of healthy lifestyle behaviours, and potential for improved clinical outcomes in those with heart disease.^{8,20} To assist in determining whether those in greatest need benefit most from psychological interventions, this review focused on adults with a diagnosis of heart disease, with and without depression and anxiety. The aim of the review was to assess the effects of psychological interventions compared to no psychological intervention controls in adults with a diagnosis of CHD, HF, or AF, on psychological (e.g. depression, anxiety) and clinical outcomes (e.g. all-cause mortality, hospitalizations, major adverse cardiovascular events).

Methods

Protocol registration

The study protocol was registered in the Cochrane Database for Systematic Reviews.²¹ The review was conducted in accordance with the Cochrane Collaboration guidelines²² and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement guidelines.²³

Inclusion and exclusion criteria

We restricted inclusion in this review to studies that met the following criteria: (i) randomized controlled trials (RCTs); (ii) outcomes reported for a minimum of 6 months post-randomization; (iii) adult patients with CHD, HF, or AF; (iv) psychological interventions delivered by healthcare workers trained in their delivery; (v) for those delivered online, development by psychologists or healthcare workers with training in psychological techniques; (vi) adjunct therapies of cardiac rehabilitation or pharmacotherapy as long as this was part of usual care offered to both trial arms; and (vii) comparator group receiving usual care with no psychological intervention. We excluded non-RCTs and studies with: (i) >50% of participants who did not have a diagnosis of CHD, HF, or AF; (ii) baseline assessments of depression and/or anxiety not reported; (iii) non-psychological intervention, i.e. less specific approaches, such as therapeutic counselling or educational intervention; (iv) intervention solely directed at improving adherence to other cardiovascular efficacious treatments (e.g. medications, exercise) or modifying lifestyle factors (e.g. smoking, diet); and (v) co-intervention not offered in usual care (cardiac rehabilitation; pharmacotherapy).

Search strategy and screening

We systematically searched MEDLINE, CINAHL, Embase, PsycINFO, and Cochrane Central Register of Controlled Trials to identify articles meeting the inclusion criteria published from 2009 to 7 July 2022. In late 2008²⁴ and early 2009²⁵ recommendations and guidelines were published advocating a more structured approach to delivery of psychological interventions for depression and heart disease. Trial registries, World Health Organization (WHO) International Clinical Trials Registry Platform (ICTRP; trialsearch.who.int) and the US National Institutes of Health Ongoing Trials Register (ClinicalTrials.gov) were searched on 7 July 2022. Databases were searched using variations and combinations of the following keywords: clinical trial; psychological/psychosocial; CHD/HF/AF; depression/anxiety. We also used backward and forward snowballing of reference lists of included studies and previous systematic reviews to identify further studies or related articles. No language limitations were imposed on searches. The detailed search syntax used for individual databases is provided in [Supplementary material online](#). Additional filters were used if applicable.

Articles were assessed for eligibility, independently by two authors (C.F.S.; K.M.G.; S.H.R.). First, title and abstract were screened for eligibility

using the systematic review software, Covidence.²⁶ If deemed appropriate for inclusion, the full text was screened independently by authors (C.F.S.; K.M.G.; S.H.R.). Any disagreements in abstract screening or full text were resolved by a third author (J.D.L.). Reasons for exclusion were recorded during the full-text review.

Data extraction

Data were extracted using Covidence.²⁶ A customized data extraction form was piloted using two studies to ensure usability and appropriateness for this review as per Cochrane guidance.²² Two review authors (C.F.S.; K.M.G.) independently extracted data on: study aim, design, setting, location, date, and duration; participants randomized, lost to follow-up, and analysed; age; gender; diagnosis; severity of condition; inclusion and exclusion criteria; intervention (including type, goals, and components); comparison and co-interventions; and primary (depression and anxiety; symptom levels, clinical or self-report) and secondary outcomes [HRQoL (mental and physical component scores), all-cause mortality, all-cause hospitalizations, cardiovascular mortality, cardiovascular morbidity, major adverse cardiovascular events (MACE) defined as the composite of all-cause death, nonfatal myocardial infarction (MI) or unplanned revascularization, intervention acceptability, return to work, and cost-effectiveness]. Time points were grouped as per: short-term (up to 6 months), medium-term (6 to 12 months), and long-term (more than 12 months) with longest follow-up recorded. Any disagreements were resolved by a third author (J.D.L.). Data were transferred (C.F.S.) to Review Manager Web (Version 4.10.0)²⁷ and checked for accuracy (K.M.G.) with original studies.

Statistical analyses

The Cochrane Collaboration guidelines for meta-analysis were followed, and effect sizes are based on comparisons between intervention and control groups at a specified time point. Given the expected between-study heterogeneity, a random-effects model was preferred for all endpoints (Mantel-Haenszel model for dichotomous outcomes). Continuous outcomes relating to psychological outcomes were expressed as SMDs with 95% CIs. The direction of effect was calculated based on the intended effect, e.g. for Hospital Anxiety and Depression Scale (HADS), a lower value was coded favourable, while for HRQoL, e.g. for Short-form (SF-36) a higher value was coded favourable. Results are presented by forest plots with 95% CI for overall effects. Dichotomous outcomes relating to all-cause mortality and MACE were expressed as risk ratios with 95% CIs. For secondary outcomes where there were insufficient data, a narrative review was presented.

We conducted meta-regression, where data permitted (≥ 10 studies),²² for the following pre-specified subgroups for the two primary outcomes of depression and anxiety. Studies of psychological interventions: targeting populations with depression and/or anxiety vs. without; targeting heart disease populations (CHD or AF or HF); intervention designed to target depression or anxiety vs. non-targeted interventions; mode of psychological intervention (e.g. individual or group); with co-intervention of cardiac rehabilitation, or pharmacotherapy vs. without; and with family involved in the intervention vs. without. All statistical analyses were performed using Review Manager Web version 4.10.0²⁷ and STATA version 16.0.²⁸

Risk of bias and quality assessment

Three review authors (C.F.S., K.M.G., and L.L.) independently assessed the risk of bias using Version 2 of the Cochrane risk of bias tool.²² Discrepancies were resolved by discussion or by a third author (J.D.L.). We assessed the risk of bias across the following domains: randomization; deviations from intervention; missing data; measurement of outcome; and reported results. As per Cochrane guidance, 'Low risk of bias' overall was reached when the outcome was assessed as low risk across all domains; 'High risk of bias' was reached when any individual domain led was judged at high risk of bias; and 'Some concerns of bias' for an individual domain led to, some concerns overall. However, when some concerns were judged across multiple domains the overall result could be overridden to high risk, with justification.²²

The Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) tool²⁹ was used by two authors (L.L., C.F.S.) independently to assess the level of certainty of the evidence in this review, with categorizations ranging from high to very low. Disagreements were resolved

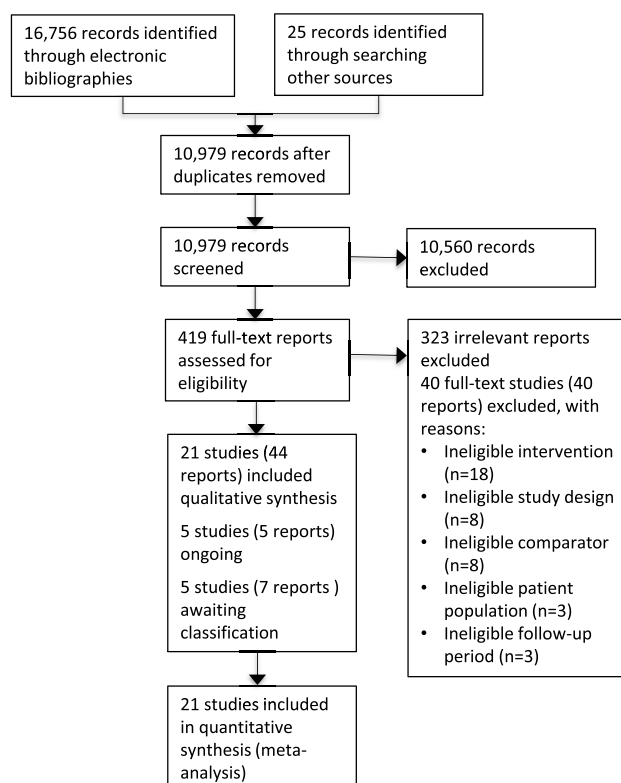


Figure 1 Preferred reporting items for systematic reviews and meta-analysis flow chart.

by consensus, or by a third author (R.S.T.). We investigated publication bias through a funnel plot analysis and Egger's test of the primary outcomes.

Results

Study selection and characteristics

Our initial search yielded 16 756 results, with an additional 25 records obtained via searching of other resources, including trial registries and hand searching. After removing duplicate records and ineligible studies, 419 remained and were reviewed based on our pre-defined inclusion criteria. Of these, 21 RCTs with a total of 2591 participants met the inclusion criteria.^{30–50} A flow diagram summarizing the study selection is presented in [Figure 1](#). During the data collection, we contacted five authors for additional data, and all provided the requested information.

[Table 1](#) summarizes the characteristics of included studies. Sample sizes ranged from 29 participants⁴⁶ to 430 participants.⁴⁴ The mean age of participants ranged from 56 years⁴⁸ to 71 years.³⁰ The proportion of females in studies ranged from 14.3%³⁴ to 58.1%,³⁷ with an average of 30.8% across all studies. Five studies were conducted in the USA^{31,35–37,42} four in the UK,^{46,47,49,50} three in Australia^{43,44,48} three in Sweden^{30,39,41} and single studies in China,³³ Germany,³⁴ Hong Kong,³² Italy,⁴⁵ Iran,⁴⁰ and the Netherlands.³⁸ Of the 21 studies, the study population in 16 of them was individuals with CHD, including MI, acute coronary syndrome (ACS), and coronary artery bypass grafting (CABG),^{32–36,39,40,42–50} and in five studies individuals with HF.^{30,31,37,38,41} No studies of individuals with AF were identified.

We identified diversity in the psychological interventions across the 21 studies as shown in [Table 1](#). Of the included studies, 14 used cognitive behavioural therapy (CBT),^{30,33–39,41,43,45,47,48,50} two motivational

interviewing,^{31,32} one mindfulness,⁴² one behavioural social cognitive therapy,⁴⁴ one meta-cognitive therapy,⁴⁹ one eye movement desensitization and reprocessing (EMDR),⁴⁰ and one behavioural activation and mental healthcare co-ordination.⁴⁶ Six studies included co-interventions in both intervention and control arms: five cardiac rehabilitation^{31,32,41,46,49} and one pharmacotherapy.³⁵

Six studies included participants with existing depression, i.e. depression was listed within the eligibility criteria,^{35–37,43,45,46} one study targeted participants with existing anxiety,⁴⁰ and two studies included participants with existing anxiety or depression.^{39,49} The remaining 12 studies did not specify existing depression or anxiety as inclusion criteria.^{30–34,38,41,42,44,47,48,50} Further, the majority of studies excluded patients with psychiatric or related diseases apart from four studies,^{34,40,42,47} which did not specify this as an exclusion criteria.

Risk of bias assessment

The overall risk of bias of outcomes across studies was assessed as 'some concerns', with one exception that was judged as of 'high concern' overall.⁴⁷ For the majority assessed as 'some concerns', there was inadequate describing of randomization procedure, allocation concealment, blinding, and statistical analysis i.e. some studies did not report ITT analyses or how they handled missing data. The study assessed as 'high concern' was primarily due to a high level of missing data for both primary outcomes.⁴⁷ Further to this, those in the intervention group were significantly more likely to have lower anxiety and self-criticism scores at baseline. No studies were assessed as 'low risk of bias' across all domains.

The overall risk of bias for all outcomes was assessed as 'some concerns', apart from mortality, which was assessed as 'low risk of bias'.

Table 1 Characteristics of included studies

Reference, year	Country	Sample size	Age (mean)	Female (%)	Study population	Dep or Anx at baseline	Type of intervention	Co-intervention	Outcome/s of interest
Agren 2012 ³⁰	Sweden	155	I = 69 C = 73	24.6	HF	Mixed (D)	CBT	None	Depression, HRQoL
Bekelman 2018 ³¹	USA	317	I = 64.5 C = 66.5	21.4	HF	Mixed (D)	CBT	CR	Depression, Anxiety, HRQoL, all-cause mortality
Chair 2013 ³²	Hong Kong	146	I = 66.8 C = 66	31.6	CHD	Mixed (D)	CBT	CR	Depression, Anxiety, HRQoL, SE
Chang 2020 ³³	China	80	I = 59.7 C = 59	25	CAD	Mixed (D)	CBT + relaxation	None	Depression, Anxiety, HRQoL
Crossman 2010 ³⁴	Germany	134	I = 60.6 C = 61.1	14.3	ICD	Mixed (D)	CBT	None	Depression, Anxiety, HRQoL
Davidson 2010 ³⁵	USA	157	I = 59.3 C = 61.1	53.5	ACS	Depression	PST	Pharmacotherapy	Depression, MACE
Freedland 2009 ³⁶	USA	123	I = 62 C = 59	49.6	CABG	Mixed (D)	CBT, SM	None	Depression, Anxiety, HRQoL
Gary 2010 ³⁷	USA	74	I = 65.8 C = NR	58.1	HF	Mixed	CBT	None	Depression, HRQoL
Habibovic 2017 ³⁸	Netherlands	289	I = 58.2 C = 58.6	18.7	ICD	Mixed	CBT?	None	Depression, Anxiety, HRQoL
Humphries 2021 ³⁹	Sweden	239	I = 58.4 C = 60.8	33.5	MI	Mixed	CBT	None	Depression, Anxiety, MACE all-cause mortality
Moradi 2016 ⁴⁰	Iran	60	N = 50.97 I = 72.2 C = 69	16.7	MI	Anxiety	EMDR	None	Anxiety
Nahlen-Bose 2016 ⁴¹	Sweden	103	I = 72.2 C = 69	31	CHF	Mixed	CBT	None	Depression, Anxiety, HRQoL
Nijjar 2017 ⁴²	USA	47	I = 57.5 C = 60.7	38.3	CAD, HF, CSVR	Mixed	CBT/MBSR?	None	Depression, Anxiety
O'Neil 2014a ⁴³	Australia	121	I = 61 C = 69	24.8	ACS	Depression	CBT	None	Depression, HRQoL
O'Neil 2014b ⁴⁴	Australia	430	I = 62 C = 59.7	20.9	MI	Mixed	BT, SCT	None	Depression, Anxiety
Rafanelli 2020 ⁴⁵	Italy	100	I = 57.6 C = 60	31	ACS	Mixed	CBT	None	Depression, Anxiety, MACE all-cause mortality
Richards 2018 ⁴⁶	UK	29	I = 62.7 C = 68.1	48.3	ACS, other	Mixed	CT, BA	CR	Depression, Anxiety, HRQoL, MACE
Tagney 2013 ⁴⁷	UK	49	I = 67.5 C = 63	18.4	ICD	Mixed	CBT, Mindfulness	None	Depression, Anxiety

Continued

Table 1 Continued

Reference, year	Country	Sample size	Age (mean)	Female (%)	Study population	Dep or Anx at baseline	Type of intervention	Co-intervention	Outcome/s of interest
Turner 2014 ⁴⁸	Australia	42	I = 55.6 C = 57	21.4	MI/PCI, CABG	Mixed	CBT	None	Depression, Anxiety, SE
Wells 2021 ⁴⁹	UK	332	I = 60.4 C = 60.3	34.3	ACS, HF	Mixed	MCT	CR	Depression, Anxiety, HRQoL
Zetta 2011 ⁵⁰	UK	233	I = 64.8 C = 65.9	31.7	CHD+/- Angina	Mixed	CBT	None	Depression, Anxiety

ACS, acute coronary syndrome; BA, behavioural activation; BT, behaviour therapy; CABG, coronary artery bypass graft surgery; CAD, coronary artery disease; CBT, cognitive behavioural therapy; CHD, coronary heart disease; CHF, chronic heart failure; CR, cardiac rehabilitation; CSVR, cardiac surgery valve replacement; CT, cognitive therapy; EMDRHF, heart failure; HRQoL, health-related quality of life; ICD, implantable cardioverter defibrillator; MACE, major adverse cardiac events; MBSR, mindfulness-based stress reduction; MCT, meta-cognitive therapy; MI, myocardial infarction; NR, not recorded; PCI, percutaneous coronary intervention; PST, psychotherapy; Relax, relaxation; SCT, social cognitive therapy; SE, self-efficacy; SM, stress management.

overall. These related mostly to bias in the measurement of outcomes and deviations from intended interventions. There were no outcomes judged as a high risk of bias overall. The assessment of 'some concerns' for depression outcomes (HADS-D, PHQ-9, and BDI-II) was largely due to bias in risk of measurement and deviations from intended interventions (Figure 2). The assessment of 'some concerns' for anxiety outcomes (BAI, HADS-A, and GAD-7) was primarily due to bias in risk of measurement and deviations from intended interventions (Figure 3).

Primary outcomes

The random-effects meta-analysis of 20 studies (2531 participants)^{30-39,41-50} found evidence that psychological interventions resulted in a moderate reduction in depression compared with no psychological intervention [standardized mean difference (SMD) -0.36; 95% CI; -0.65 to -0.06; *P* = 0.02; *I*² = 90%] in the medium term. Due to inconsistent directions of effect and substantial heterogeneity, the GRADE rating was reduced to moderate certainty (Figure 2).

The pooled analysis of 17 studies (2235 participants)^{31-34,36,38-42,44-50} found evidence that psychological interventions result in a moderate reduction in anxiety compared to no psychological intervention (SMD -0.57; 95% CI; -0.96 to -0.18; *P* = 0.004; *I*² 93%) in the medium term. Due to inconsistent directions of effect and substantial heterogeneity, the GRADE rating was reduced to moderate certainty (Figure 3).

Secondary outcomes

The pooled analysis of 12 studies (1454 participants)^{30-34,36-38,41,43,46,49} found evidence that psychological interventions result in a moderate reduction in HRQoL mental component summary (MCS) compared to no psychological intervention (SMD 0.63, 95% CI 0.01 to 1.26; *P* = 0.05; *I*² = 95%) in the medium term. There was a strong indication of publication bias (Eggers test: *P* = 0.012) and substantial heterogeneity, which reduced the GRADE rating to low-certainty (Figure 4).

Random-effects meta-analyses found no evidence that psychological interventions influence: HRQoL physical component summary (PCS) (12 studies, 1454 participants)^{30-34,36-38,41,43,46,49}; self-efficacy (two studies, 174 participants)^{32,48} at medium-term, major adverse cardiovascular events (MACE) (four studies, 450 participants) at long-term,^{35,39,45,46} and all-cause mortality (three studies, 615 participants) at medium to long-term.^{31,39,45}

All remaining secondary outcomes are reported narratively. Of the six studies that measured psychological intervention acceptability,^{37,42-44,46,49} most reported good rates of adherence ranging from 53.0%⁴⁶ to 96.3%,⁴² with an average of 71.1% across the studies. Three studies^{35,46,49} monitored adverse events, two studies reported all-cause hospitalizations,^{31,41} two studies reported cardiovascular morbidity,^{39,45} two studies reported cardiovascular mortality,^{39,45} and one study cardiovascular hospitalizations.⁴¹ For each outcome no evidence of a difference between intervention and no intervention was reported by all studies. One study⁴⁶ reported on costs, estimating £959 per patient for the psychological intervention; due to it being a pilot trial no costs were reported for the comparison group. No study measured cardiovascular morbidity or return to work.

Subgroup analyses

Univariate meta-regression sub-analyses yielded only one significant predictor variable, for the outcome of anxiety (7.41; 95% CI; 4.47 to 10.35; *P* < 0.001), when comparing psychological interventions designed to reduce depression or anxiety vs. more generalized interventions (not targeting depression or anxiety) for those with or without psychological symptoms. This effect was driven by one study,⁴⁰ where the psychological intervention targeted anxiety and showed a larger effect than the remaining 16 studies.

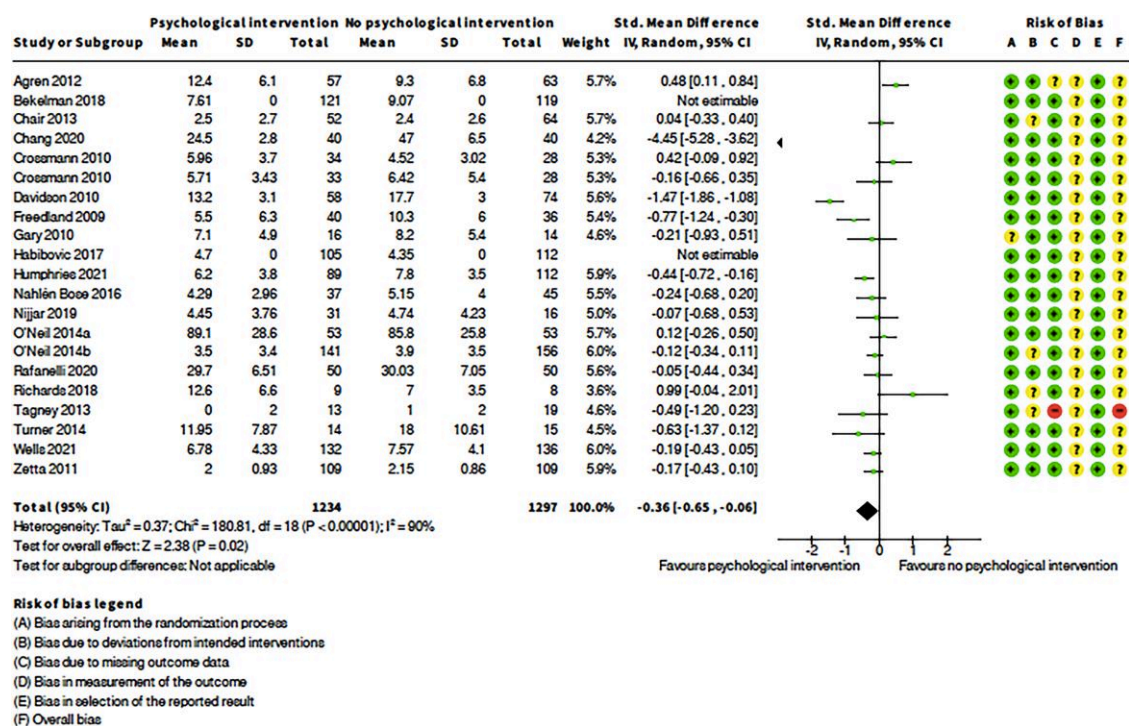


Figure 2 Effects of psychological interventions and risk of bias for depression. Psychological interventions show a moderate effect for reducing depression; overall risk of bias for depression outcomes was assessed as 'some concerns'; χ^2 , Chi-square statistic; CI, confidence interval; df, degrees of freedom; I^2 , I-square statistic heterogeneity; IV, weighted mean difference; P, P-value; SD, standard deviation; τ^2 , tau-square statistic; Z, Z statistic.

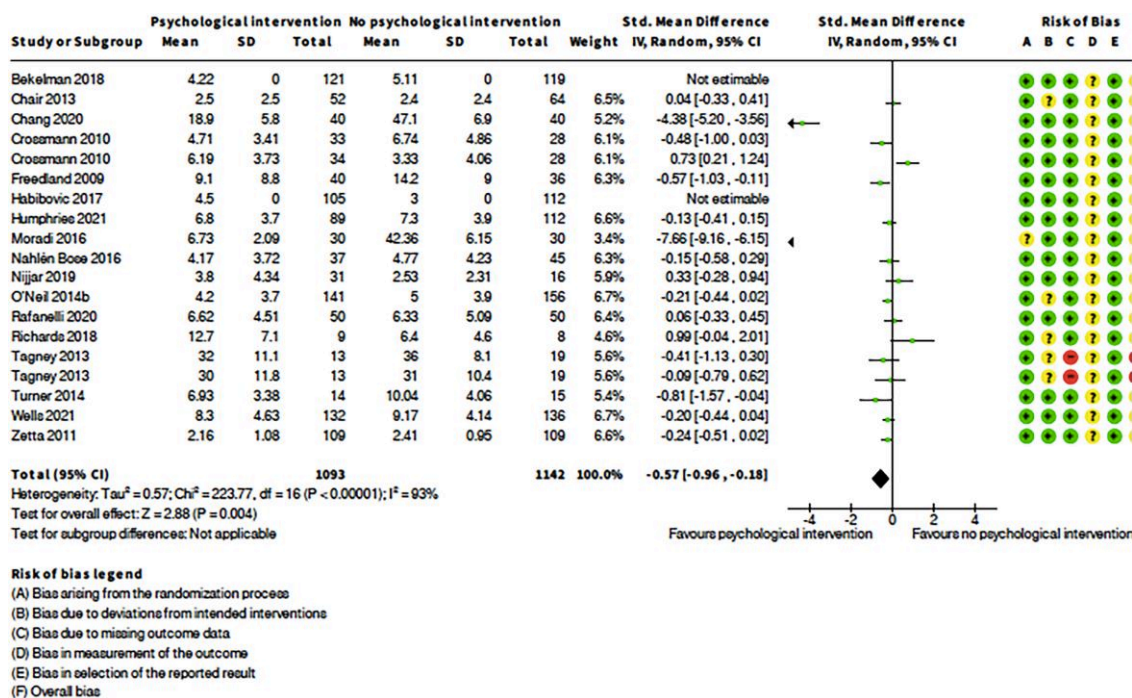


Figure 3 Effects of psychological interventions and risk of bias for anxiety. Psychological interventions show a moderate effect for reducing anxiety; overall risk of bias for anxiety was assessed as 'some concerns'; χ^2 , Chi-square statistic; CI, confidence interval; df, degrees of freedom; I^2 , I-square statistic heterogeneity; IV, weighted mean difference; P, P-value; SD, standard deviation; τ^2 , tau-square statistic; Z, Z statistic.

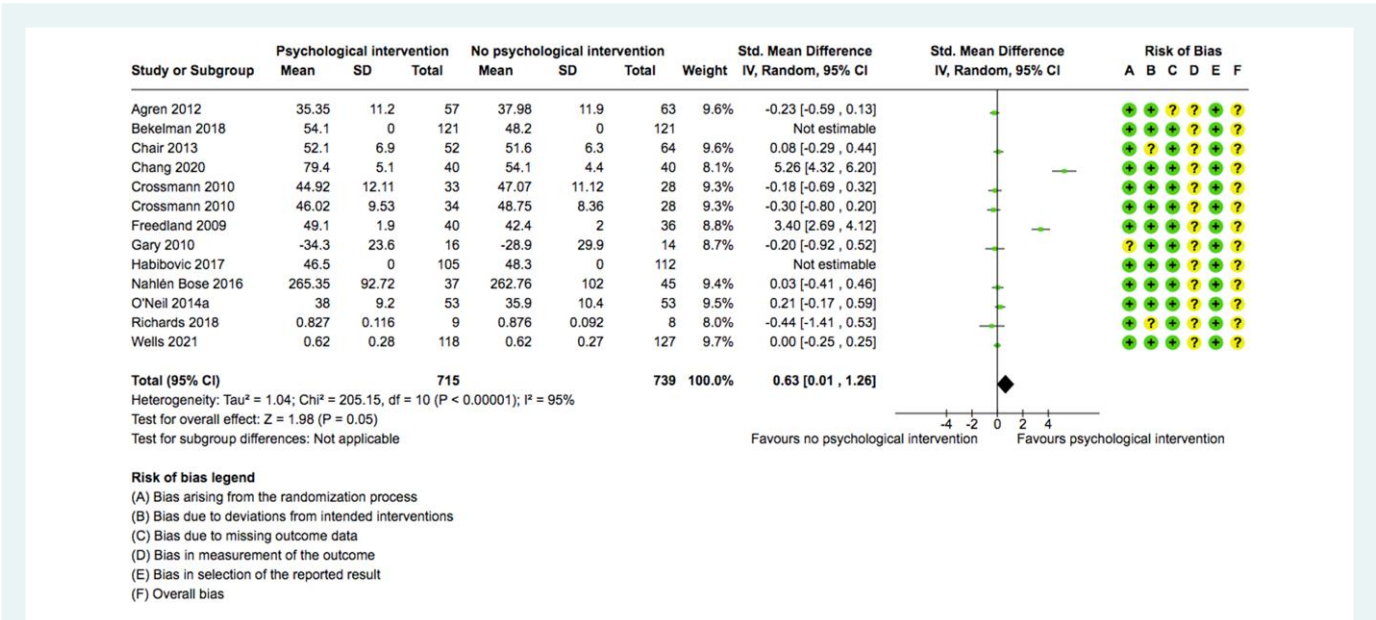


Figure 4 Effects of psychological interventions and risk of bias for HRQoL (MCS). Psychological interventions show a moderate effect for increasing HRQoL (MCS); overall risk of bias for HRQoL (MCS) was assessed as 'some concerns'; χ^2 , Chi-square statistic; CI, confidence interval; df, degrees of freedom; I^2 , I-square statistic heterogeneity; IV, weighted mean difference; P, P-value; SD, standard deviation; τ^2 , tau-square statistic; Z, Z statistic.

Discussion

In this Cochrane review and meta-analysis of 21 RCTs that compared a psychological intervention to no psychological intervention, a beneficial moderate effect in favour of psychological interventions for reducing depression and anxiety, and improving mental HRQoL for people with HF and CHD is evident at the medium term. Further, psychological interventions designed to target anxiety were shown to be more effective for reducing anxiety than non-targeted interventions. This effect was driven by one study,⁴⁰ where the psychological intervention (targeting anxiety) showed a larger effect than those not targeting anxiety. No evidence of a difference between psychological interventions and no psychological intervention were found for cardiovascular and all-cause mortality and hospitalizations, cardiovascular morbidity, HRQoL PCS, and self-efficacy. Given the high levels of heterogeneity, these pooled effects should be interpreted with caution. No studies included patients with AF. One study reported on costs limited to the intervention group, and no study measured cardiovascular morbidity or return to work.

Expanding and confirming results of existing studies

The current review expands the generalizability of previous systematic reviews of psychological interventions for people with heart disease with the inclusion of populations with CHD, HF, or AF; most reviews having limited their population to a specific cardiac condition i.e. CHD.^{13,15,51–56} A Cochrane review of psychological interventions for people with CHD found that psychological interventions targeting stress or emotional disorders, compared with usual care, had a beneficial effect on depression and anxiety, which is broadly comparable to the current review.¹³ Similarly, they identified that psychological interventions had no effect on all-cause mortality or cardiovascular morbidity, although, like our review, these outcomes were only assessed in a small number of studies.¹³ However, they also found a 22% reduction in the risk of MI in favour of psychological interventions,¹³ whereas no such evidence was present in the current review.

A recent network meta-analysis of RCTs of antidepressant drug therapy, psychotherapy alone and combined, exercise, and collaborative care for depression in people with CHD⁵² found that in terms of the primary outcomes (acceptability and change in depressive symptoms 8 weeks after treatment commencement), all treatments were equally acceptable, but the strongest effects were evident for combination therapy, exercise and drug therapy. However, a Cochrane Review of psychological and pharmacological interventions for depression in patients with CHD found low-certainty evidence that psychological intervention may result in a reduction in depression symptoms at the end of treatment.⁵³ Another systematic review of studies of collaborative care interventions for patients with CHD and depression found a reduction in major cardiac events in the short-term and a small-to-moderate effect on depression severity and an increased depression remission rate;⁵⁴ similar results were also found in an earlier systematic review for anxiety.⁵¹ In a recent systematic review of psychological interventions in CHD populations,⁵⁵ CBT and problem solving were found to have significant yet small-in-magnitude improvements in depression. Similar again, was an updated Cochrane Review of psychological interventions in CHD that found reduced standardized mean depression and anxiety scores.⁵⁶ Although these previous reviews report somewhat similar outcomes to ours, it is difficult to make direct comparisons with our Cochrane Review due to important differences in terms of differences in populations (cardiac condition/e.g. HF; CHD), psychological interventions (target outcomes e.g. anxiety; depression; stress) and primary outcomes (e.g. clinical vs. behavioural). In line with our findings, other reviews in this field have noted the increasing use of multifactorial therapies^{13,51,52,54} and highlighted the need for further rigorous research, particularly given the low methodological quality of the studies.^{13,52,53,56}

Up to 40% of patients with heart diseases are diagnosed with anxiety or depression with high overlap that complicates both diagnosis and treatment.^{8,9} Regardless, much uncertainty remains regarding the people who would benefit most from treatment, i.e. whether psychological interventions should target those with or without pre-existing depression and or anxiety.¹³ Thus, including cardiac populations across the spectrum of anxiety and depression symptoms was seen as an

important consideration to determine who would benefit most from psychological interventions. As such, we combined studies with those with and without pre-existing depression and/or anxiety. To account for pre-existing mood disorder on treatment effect, we performed a meta-regression for, effects of psychological interventions on populations with and without depression and/or anxiety, which found no evidence of association.

Implications for research and practice

For research, there is a need for better-designed, conducted, and reported studies of reproducible psychological interventions that target mood disorders in CHD and HF populations as well as those with AF and other heart conditions. The type of psychological intervention needs to be clearly described in terms of content, dose, duration, and delivery mode, and, if it is combined with other forms, the differential effects of psychological interventions could be examined in 'head-to-head' comparative studies. With an increase in multifactorial psychological interventions, further examination of the effectiveness of specific therapies (e.g. CBT, motivational interviewing, mindfulness) and of those at particularly high risk of poor outcomes (e.g. with established mood disorders) and may also be beneficial to identify what works best and for whom. In our review, timing of psychological intervention varied widely, including pre-discharge, within one week of hospitalization, and up to 3 and 6 months' post-discharge when somatic symptoms are more likely to be resolved. Determining optimal timing for psychological interventions may contribute to a personalized approach in the delivery of these interventions. There is also a need to gain consensus on the core outcome measures to assess depression and anxiety within these studies, including, for example, using a combination of generic and cardiac-specific outcome measures that have utility in current clinical practice, and where the impact of the underlying heart condition (e.g. the loading of somatic symptoms) are factored into the selection. Further, the choice of intervention and key outcomes should involve patients, take account of their preferences, and include outcomes such as acceptability, return to work and cost-benefit.

For practice, the included populations were mostly older, white, male patients not necessarily representative of the majority of the population treated for CHD and HF. As most studies evaluated multifactorial psychological interventions, this demonstrates an increase in tailoring to individual's needs, which may include offering people combinations of psychological therapies, pharmacological management, and cardiac rehabilitation. Whilst it is important to take into account patient values and preferences, also for consideration are healthcare settings, resources and costs, and any new evidence. Additionally, as is the case in the development and evaluation of any complex health intervention, essential to establishing effect is rigorous explanation and documentation of individual components. For example, to ensure that patients are receiving the same type of psychological intervention, its delivery might be improved by using a core standardized treatment protocol, with flexibility according to individual patient need and preference.

Strengths and limitations

We believe this Cochrane Review is the first to include only RCT data that specifically examines the effect of psychological interventions on depression and anxiety in people with CHD, HF, or AF. To ensure rigour we adopted an extensive search strategy, including several bibliographic databases and other sources relevant to the focus of the review, and inclusion of a wide range of types of psychological interventions. However, this variety also makes it difficult to identify which types of psychological interventions are most effective for reducing depression and anxiety. Study outcomes were pooled in spite of high level of clinical and statistical heterogeneity, albeit a random-effects model

was used. As heterogeneity is to be expected in psychological interventions due to the range in approaches and therapies used, we did exclude less specific approaches, i.e. therapeutic counselling or educational interventions or those aimed at solely improving adherence to cardiac risk factor modification (e.g. medicines, lifestyle change). Regardless, high levels of heterogeneity were found across studies, which aligns with previous reviews reporting an increasing number of multifactorial psychological interventions being used in populations with heart disease. Additionally, the applicability of evidence is limited for some secondary outcomes due to insufficient investigation or reporting, e.g. costs and cardiovascular hospitalizations being reported in a single study. Further, no studies investigated return to work or cardiovascular morbidity, more research is needed on these outcomes. Finally, the type, length and mode of delivery of psychological interventions examined in the included studies also varied greatly with none examining long-term outcomes of psychological outcomes.

Conclusions

Overall, there is evidence for a beneficial effect of psychological interventions on depression, anxiety, and HRQoL (MCS) outcomes for adults with CHD or HF, with those designed to target anxiety, especially effective at reducing anxiety symptoms. However, the evidence base is small and we cannot draw firm conclusions about the effects of these interventions on these outcomes given the high heterogeneity. Further research needed in AF populations. Increasing use of multifactorial psychological interventions shows promise for incorporating patient needs and preferences, however further research comparing individual components and those at high risk of poor outcomes is warranted.

Supplementary material

Supplementary material is available at *European Journal of Cardiovascular Nursing* online.

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Author contributions

C.F.S., R.S.T., S.H.R., and D.R.T. contributed to the design and conceptual focus of the review. C.F.S., K.M.G., S.H.R., and J.D.L. contributed to data selection and extraction. R.S.T. designed and supported the statistical analysis, L.L. led the assessment of certainty of evidence, and C.F.S., R.S.T., K.M.G., L.L., J.D.L., and D.R.T. contributed to interpretation of the data. All authors edited the manuscript, gave final approval, and agree to be accountable for all aspects of the work ensuring integrity and accuracy.

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Conflict of interest: S.H.R. is lead author for a study included in the review (Richards *et al.*, 2018) and was not involved in the assessment of this study. Other authors declare no conflict of interest.

Data availability

All data are extracted from published original articles and in some cases through correspondence with the authors. Data is available upon request.

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