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Prothero, Louise, Barley, Elizabeth ORCID logoORCID: https://orcid.org/0000-0001-9955-0384, Galloway, James, Georgopoulou, Sofia and Sturt, Jackie (2018) The evidence base for psychological interventions for rheumatoid arthritis: a systematic review of reviews. International Journal of Nursing Studies, 82. pp. 20-29. ISSN 0020-7489

http://dx.doi.org/10.1016/j.ijnurstu.2018.03.008

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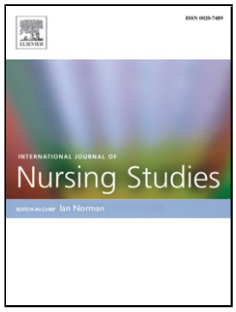

Title: The Evidence Base for Psychological Interventions for Rheumatoid Arthritis: A Systematic Review of Reviews

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PII: S0020-7489(18)30059-2
DOI: https://doi.org/10.1016/j.ijnurstu.2018.03.008
Reference: NS 3111

To appear in:

Received date: 8-8-2017
Revised date: 4-3-2018
Accepted date: 9-3-2018

Please cite this article as: Prothero, Louise, Barley, Elizabeth, Galloway, James, Georgopoulou, Sofia, Sturt, Jackie, The Evidence Base for Psychological Interventions for Rheumatoid Arthritis: A Systematic Review of Reviews.International Journal of Nursing Studies https://doi.org/10.1016/j.ijnurstu.2018.03.008

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The Evidence Base for Psychological Interventions for Rheumatoid Arthritis: A Systematic Review of Reviews

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Abstract

Background: Psychological interventions are an important but often overlooked adjunctive treatment option for patients with rheumatoid arthritis. Findings from systematic reviews of psychological interventions for this patient group are conflicting. A systematic review of reviews can explain inconsistencies between studies and provide a clearer understanding of the effects of interventions.

Objectives: To: 1) determine the effectiveness of psychological interventions in improving biopsychosocial outcomes for adults with rheumatoid arthritis, 2) determine the relationship between the intensity of the psychological interventions (number of sessions, duration of sessions, duration of intervention) on outcomes, and 3) assess the impact of comparator group (usual care, education only) on outcomes.

Design: We conducted a systematic review of reviews using the following inclusion criteria: 1) randomised controlled trials of psychological interventions (including cognitive behavioural therapy, supportive counselling, psychotherapy, self-regulatory techniques, mindfulness-based cognitive therapy and disclosure therapy) provided as an adjunct to medication, 2) included rheumatoid arthritis patients aged ≥ 18 years, 3) reported findings for at least 1 of the primary outcomes: pain, fatigue, psychological status, functional

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disability and disease activity and 4) were published in English between January 2000 and March 2015 (updated January 2018).

Data sources: We searched in MEDLINE, EMBASE, CINAHL, PsycINFO, the Cochrane Database of Systematic Reviews and the Database of Abstracts of Reviews of Effects. Reference lists were searched for additional reviews.

Review methods: Study selection and 50% of the quality assessments were performed by two independent reviewers. Methodological quality was measured using the Assessment of Multiple Systematic Reviews checklist. Data extraction was conducted by one reviewer using a predesigned data extraction form.

Results: Eight systematic reviews met inclusion criteria (one review was excluded due to its low-quality score). Small post intervention improvements in patient global assessment, functional disability, pain, fatigue, anxiety and depression were observed. The effect on coping, self-efficacy and physical activity was greater. Improvements in depression, coping and physical activity were maintained (8.5-14 months). Interventions delivered over a longer period with a maintenance component appeared more effective. Attention, education, and placebo control groups produced some improvements but not as large as those produced by the psychological interventions.

Conclusions: Psychological interventions result in small to moderate improvements in biopsychosocial outcomes for patients with rheumatoid arthritis in addition to those achieved by standard care. Several priorities for future research were identified, including determining the cost effectiveness of non-psychologically trained health professionals delivering psychological interventions.

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List of abbreviations

AMSTAR: Assessment of Multiple Systematic Reviews, **CBT**: Cognitive Behavioural Therapy, **MI**: Motivational Interviewing, **OMERACT**: Outcome Measures in Rheumatology, **OT**: Occupational Therapy, **RA**: Rheumatoid Arthritis, **RCT**: Randomized Controlled Trial, **TAU**: Treatment As Usual

Key words: Assessment of Multiple Systematic Reviews checklist; evidence-based practice; mental health status; physical health status; psychological interventions; rheumatoid arthritis; systematic review of reviews.

Background

Rheumatoid arthritis is a chronic autoimmune disease characterised by persistent joint pain and swelling. Uncontrolled active rheumatoid arthritis leads to decreased quality of life, disability, and comorbidity (e.g. heart disease and diabetes) (1). The global prevalence of rheumatoid arthritis in 2010 was estimated to be 0.24%; and was approximately twice as common in females (0.35%) than in males (0.13%) (2). Despite pharmacological intervention, many patients with rheumatoid arthritis continue to experience symptoms such as pain, fatigue, and psychological distress (3). Rheumatoid arthritis medications also have side-effects especially when taken over long periods making psychological interventions an important but often overlooked adjunctive treatment option.

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Psychological interventions are broadly defined as being underpinned by psychological theory, having the intention of improving functioning and delivered via a therapeutically structured relationship (4). Findings from systematic reviews of psychological interventions for patients with rheumatoid arthritis are conflicting (3). A systematic review of reviews can explain inconsistencies between studies and provide a clearer understanding of the effects of interventions (5,6).

This work systematically reviewed the available evidence from systematic reviews on the effect of psychological interventions for adults with rheumatoid arthritis . The objectives were to: 1) determine the effectiveness of psychological interventions in improving outcomes for adults with rheumatoid arthritis, 2) determine the relationship between the intensity of the psychological interventions (number of sessions, duration of sessions, duration of intervention) on outcomes and 3) assess the impact of comparator groups (e.g. usual care, education only) on outcomes.

Methods

Search methods and identification of reviews

The search strategy followed that of one included in a protocol for a systematic review of self-management education programmes for rheumatoid arthritis (7). The search strategy, originally for Ovid MEDLINE, was modified for this review (see Supplementary File 1) and adapted for use with the other databases. All keywords in the search are based on Medical Subject Headings. Electronic searches of the following 6 databases were performed in March 2015 by the lead author to identify relevant articles: MEDLINE via Ovid , EMBASE via Ovid, CINAHL via EBSCOhost, PsycINFO via Ovid, CDSR and DARE. The reference lists of

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selected articles were also hand-searched. A further search of the same databases was conducted by the lead author in January 2018, to cover the three years since the previous search.

Eligibility criteria

The eligibility criteria were systematic reviews: 1) of randomized controlled trials , 2) which test the efficacy of ≥1 psychological component listed in Table 1 as an adjunct to medication, 3) with a population of adult participants ≥18 years, 4) with a diagnosis of rheumatoid arthritis (reviews of patients with other health conditions were included if data for rheumatoid arthritis patients were reported separately), 5) reporting findings for at least one of the following primary outcomes: pain, quality of life, functional disability, psychological status and disease activity (secondary outcomes included self-efficacy, coping and self-management behaviours), 5) published in the English language, 6) between January 2000 and March 2015 (updated to January 2018).

January 2000 was chosen as the earliest search date because psychological interventions have changed over time.

Table 1 lists the more prominent categories of psychological intervention and their techniques defined in the protocol. The interventions categories identified are commonly delivered by Clinical Psychologists, or, by people trained by Clinical Psychologists. Where systematic reviews included a sub-group analysis of psychological interventions, findings from the sub-group analysis were included. Where systematic reviews included a mixture of psychological interventions defined in the protocol (see Table 1) and other psychological

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interventions and/or educational interventions, they were included if at least 80% of studies included psychological interventions defined in the protocol.

Selection of reviews

The lead author screened retrieved titles and abstracts to identify potentially relevant reviews. The full texts of these reviews were assessed independently by the lead author and a second reviewer for eligibility. Discussion was used to resolve differences in selection. This was required for six of the full-texts

Quality assessment and data abstraction

The methodological quality of all reviews was measured using the validated Assessment of Multiple Systematic Reviews (AMSTAR) (8) checklist. The methodological quality of a 50% subsample of the reviews was assessed independently by the lead author and a second reviewer. As good agreement was reached the remaining reviews were assessed by the lead author only. We considered studies with a score between 0 and 4 to be low quality, studies with a score between 5 and 8 to be of moderate quality, and studies with a score between 9 and 11 to be of high quality, consistent with previous studies (9,10). Discussion was used to resolve small differences in scoring.

The following data were extracted by the lead author using a predesigned data extraction form: 1) review details (e.g. author, year of publication); 2) aim, inclusion/exclusion criteria; 3) interventions (e.g. psychological content, comparator group); 4) results (e.g. number of studies/ participants, findings relating to primary/secondary outcomes of this review) and 5) discussion points (e.g. key findings, suggestions for future research).

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Due to the heterogeneity of the interventions under investigation no meta-analyses were conducted. A narrative approach was used to describe the evidence relating to the chosen outcome measures. The effect sizes, confidence intervals and p-values were extracted where available (see Table 4).

Results

The electronic and reference list searches revealed 1,119 citations; 158 were removed using Endnote X6 via duplicate checking. Additionally, 924 articles were excluded following title and abstract filtering because they did not meet the eligibility criteria. This left 38 reviews which were potentially relevant and retrieved in full-text (3,11-47), 29 were excluded before data extraction (11-39) and 9 met the inclusion criteria (3,40-47). This process, and reasons for exclusion, is depicted in Figure 1.

Review characteristics

One of the reviews was excluded due to its low-quality score (45). The 8 selected reviews (3,40,41,42,43,44,46,47), which included 2 Cochrane reviews (42,47), were published between 2002 and 2016. For 5 reviews (40,41,42,46,47), only findings from sub-group analyses were included (see Table 2). For 3 of these (42,46,46) this was because a mixture of interventions were included e.g. psychoeducational and educational (46). For the fourth (40) and fifth review (41) this was because of a mixed patient group. Considering the complete and sub-group analyses, the number of randomized controlled trials included in the reviews ranged from 3 (41) to 34 (43) and the number of participants ranged from 194

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(41) to 2,021 (43) . A table of all unique primary studies identified and included (see Supplementary File 2) which details all the interventions reviewed, was compiled. In total 66 primary studies published between 1981 and 2014 and representing 7,279 participants were contained within this review of reviews.

Supplementary File 3 shows the overlap between interventions used in the individual studies included in the 8 reviews. Cognitive behavioural therapy was the most common intervention included in more than 3 reviews. There were no motivational interviewing interventions included in any of the reviews.

Review quality

The low-quality review (45) was excluded, leaving 8 included reviews. Three reviews met the predefined score for high quality (40,42,47) and 5 for moderate quality (3,41,43,44,46). Overall, the methodological quality of included reviews (Table 3) was moderate (mean AMSTAR score = 8).

1. Effectiveness of psychological interventions on outcomes (see Table 4 Summary of Effect Sizes)

Primary outcomes

Disease activity

Disease activity/severity

Nyssen et al. (2016) examined the effect of expressive writing on disease activity/severity (n=3) studies (40). They found that expressive writing showed no significant effects post

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intervention (d= -0.02; 95% CI: = -0.37, 0.32, P=0.89). Significant effects were, however, observed as follow-up averaged 10 weeks (d = -0.61; 95%CI: = -0.96, -0.26, P<0.001).

Patient global assessment

One review (n = 5 studies) examined Patient global assessment. Riesma et al. (47) found that a counselling intervention (1 study) showed no significant effects for scores on patient global assessment. Behaviour change interventions (4 studies) showed small significant effects for patient global assessment which were not maintained at follow-up (3-14 months).

Tender and/or swollen joints

Tender and/or swollen joints were examined in two reviews (n=9 studies). Astin et al. (3) found that psychological interventions had no effect on tender joints post-intervention (d = 0.15; 95% CI: = -0.09, -0.39); however, small significant effects were observed at follow-up averaged 8.5 months (d = 0.30; 95% CI: = 0.04, -0.56; P=0.005). The review by Cramp et al. (42) included 2 studies which reported on tender and swollen joint counts neither of which reported significant findings. One of these studies reported a statistically non-significant increase in scores on a measurement for joint tenderness (the Richie Articular Index) for patients in both the control and intervention arm.

Inflammation

One review (n=3 studies) examined the effects of expressive writing on Inflammation. Nyssen et al. (2016) found that expressive writing had no effect on inflammation post intervention.

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Functional disability

Four reviews (n = 41 studies) examined functional disability. Astin et al. (3) and Knittle et al. (44) both found that psychological interventions had a small effect on disability post intervention. . Astin et al. (3) tested this effect at follow-up (averaged 8.5 months) which was reduced to non-significance . Riesma et al. (47) found that counselling interventions did not significantly reduce disability whereas behaviour change interventions showed small reductions post intervention. . At follow-up (3-14 months) these effects were no longer significant, however, a trend favouring behaviour change interventions was observed . Cramp et al. (42) reported that 5 out of 6 studies did not have significant effects on disability.

Pain

Five reviews (n = 49 studies) considered pain. Riesma et al. (47) found that counselling and behaviour change interventions did not significantly reduce pain, however, a trend favouring behaviour change interventions was observed. Using Cohen's classification of effect sizes (48), the reviews by Astin et al. (3) and Knittle et al. (44) reported that psychological interventions had small effects on pain reduction post intervention. Astin et al. (3) tested the effect of psychological interventions on pain at follow-up (averaged 8.5 months) which was reduced to non-significance. Cramp et al. (42) found that 4 out of 6 studies did not show significant effects for pain. Niedermann et al. (46) found that 2 out of 4 studies showed a positive change both in the short-term (averaged 12.5 weeks) and the long-term (averaged 10.5 months). One study, which examined the effectiveness of cognitive behavioral therapy, showed a progressive worsening of pain at follow-up (6

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months) The final study's findings were non-significant post interventions and at 12-month follow-up.

Fatigue

One review (42) reported meta-analysis for fatigue based on findings from 13 studies. The authors found that psychosocial interventions reduced fatigue demonstrating a small effect. The impact of the psychosocial interventions on fatigue at follow-up was not measured.

Depression

Five reviews (n = 28 studies) examined depression. Astin et al. (3) and Knittle et al. (44) found that psychological interventions resulted in small reductions in depression post intervention. Astin et al. (3) tested this effect at follow-up (averaged 8.5 months) which remained significant. Riesma et al. (47) found that behaviour change interventions led to small reductions in depression which were not maintained at follow-up (3-14 months), however, a trend favouring behaviour change interventions was observed. Beltman et al. (41) and Cramp et al. (42) found that patients in 2 out of the 3 randomized controlled trials included in their reviews (both testing cognitive behavioral therapy) showed a significant reduction in depressive symptoms post intervention. The third study in the review by Cramp et al. (42) tested the effectiveness of group education and had no significant effects in relation to depression. The third study in the review by Beltman et al. (41) (also testing cognitive behavioral therapy) reported an increase in depressive symptoms post intervention.

Anxiety

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Anxiety was examined in 3 reviews (n = 14 studies). Knittle et al. (44) found psychological interventions resulted in small significant reductions in anxiety. Niedermann et al. (46) included one study which tested for anxiety. The cognitive behavioral therapy group showed significant positive change at both 15 weeks and 6 months. In comparison, the social group therapy arm showed significant positive change at 15 weeks, but this effect was not maintained at 6 months. The 4 studies included in the review by Cramp et al. (42) which tested for anxiety did not find significant changes.

Secondary outcomes

Self-efficacy

Two reviews (n = 8 studies) examined this outcome. Astin et al. (3) reported that psychological interventions had a moderate effect on self-efficacy post intervention which was reduced to non-significance at follow-up (average 8.5 months). Niedermann et al. (46) reported that only 1 of the 4 psychoeducational intervention studies included self-efficacy as an outcome measure. The study, which examined the effectiveness of a stress management program, found significant improvements post interventions and at 15-month follow-up.

Coping

Coping was examined in 2 reviews (n=12 studies). Astin et al. (3) reported that psychological interventions had a moderate effect on improvements in coping post intervention (d = 0.46; 95% CI: = 0.09, -0.83; P=0.007). At follow-up (average 8.5 months) the effect size remained significant and had increased slightly (d = 0.52; 95% CI: -0.07, -1.11; P=0.04). Strong evidence for psychoeducational programmes was found by Niedermann et al. (46) for

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coping with pain. All 4 psychoeducational programs (3 of which were high quality studies) showed at least 1 pain-coping behavior that improved significantly after intervention. There was, however, limited evidence for long-term increase of coping behaviour (averaged 10 months) because of inconsistent results across studies.

Physical activity

Physical activity was examined by 1 review (n = 4 studies). Knittle et al. (44) reported that psychological interventions had a moderate effect on improvements in physical activity . Small significant improvements were observed at follow-up (10-14 month)..

2. Impact of intervention intensity on outcomes

There were limited available data to examine this objective. Dissanayake and Bertouch (43) subdivided cognitive behavioural therapy interventions according to the duration of the treatment: 'short' less than 6 weeks (6 studies), 'long' more than 6 weeks (5 studies) and cognitive behavioural therapy with maintenance therapy throughout the follow-up period (5 studies). They found consistent supportive evidence for cognitive behavioural therapy of more than 6 weeks duration with maintenance therapy; however, they advised that findings should be interpreted with caution due to the small number of studies. They also found supportive evidence for improvement with cognitive behavioural therapy of greater than 6 weeks duration in the short-term but conflicting evidence for its long-term efficacy. There was conflicting evidence for the benefits of cognitive behavioural therapy of less than 6 weeks duration.

3. Impact of the comparator group on outcomes

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Astin et al. (3) compared effect sizes in studies that used a wait list or treatment as usual control condition with those that employed an attention, education, or placebo control. For pain, disability, and psychological status the effects sizes were larger for studies that used a wait list or treatment as usual control condition compared to those which used attention, education, or placebo control. The effect sizes (with wait list or treatment as usual listed first) were pain 0.21, 0.05; disability 0.29, 0.12 and psychological status 0.29, 0.08. For tender joints, however, the reverse was found; -0.01, 0.31. Beltman et al. (41) found that for patients with depressive symptoms cognitive behavioural therapy

was superior to treatment as usual, however, was no better when compared to another psychological therapy.

Discussion

Principal findings

Primary outcomes

This review found that psychological interventions result in small post intervention improvements in patient global assessment, functional disability, pain, fatigue, anxiety, and depression. These small improvements were maintained at follow-up for depression (8.5 months), but not for functional disability (averaged 11.25 months) or pain (8.5 months). The effects of psychological interventions on fatigue and anxiety were not measured at follow-up. Interestingly, psychological interventions did not improve disease activity/severity or tender and swollen joints post intervention. At follow-up, however, small significant improvements were found after 10 weeks and 8.5 months, respectively. This may have

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occurred because post intervention improvements in mediating variables (e.g. depressions, coping) had time to produce long-term benefits in disease activity.

Secondary outcomes

The effect on secondary outcomes (e.g. coping, self-efficacy, physical activity) was greater, revealing moderate effect sizes post intervention. Moderate improvements were maintained at follow-up for coping (8.5 months) and small improvements for physical activity (10-14 months). No significant findings were found for self-efficacy (8.5 months). This finding is in line with evidence [2,36] that the effects of psychological interventions on outcomes are mediated by improvements in self-efficacy and coping.

None of the reviews included quality of life or medication adherence as outcome measures which is surprising as they are often selected as outcomes of randomized controlled trials and are associated with changes in disease activity.

Conclusions reached by systematic review authors indicate that cognitive behavioural therapy is no more effective than any other psychological therapies. Although the impact of cognitive behavioural therapy relative to other psychological therapies is not a stated aim of this research it is interesting to note this pattern across reviews. Beltman et al. (41) found that for patients with depressive symptoms cognitive behavioural therapy was superior to treatment as usual, however, it was no better when compared to another psychological therapy (mainly supportive-expressive therapies e.g. social support). This indicates a general therapeutic effect of psychological interventions which is not specific to cognitive behavioural therapy. This is supported by Astin et al. (3) and Knittle et al. (44) who compared the findings from cognitive behavioural therapy interventions to findings from other interventions and observed only minor differences on outcomes.

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There were limited data examining the impact of intervention intensity and comparator group on outcomes. Dissanayake and Bertouch (43) found consistent supportive evidence for cognitive behavioural therapy of more than 6 weeks duration with maintenance therapy. However, they advised that findings should be interpreted with caution due to the small number of studies. Interventions delivered for longer with a maintenance component may therefore be more effective. Larger effect sizes were also observed in studies which used a wait list or treatment as usual control condition compared to those which employed an attention, education, or placebo control (3). This suggests that attention, education, or placebo control produce some improvements in outcomes, though not as large as those produced by psychological interventions.

Quality of the included reviews

The methodological quality of the selected systematic reviews is a strength. Apart from 1 review (45) which was excluded from further analysis, all were rated as either moderate or high quality. Apart from 1 (41), which categorised participants as either having depressive disorder or depressive symptoms, reviews did not identify the presence of any symptoms as specific inclusion criteria. It is, therefore, possible that these outcomes were not clinically significant problems for the participants thus resulting in a 'ceiling effect' and reducing the potential for improvement. It is also unclear whether the modest effects sizes found translate into clinically meaningful improvements.

Strengths and limitations of the study

This is the first systematic review of reviews of psychological interventions for adults with rheumatoid arthritis. The methodology of the review is a strength. Selection of reviews and

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quality assessment were carried out by two independent reviewers with good inter-rater reliability. The quality assessment was conducted using the AMSTAR tool (8).

Limitations of this review include the quality of the included primary studies. Review authors described the quality as being 'highly variable' (41) and 'not very high' (47) which may have confounded the results. Review authors criticized the studies for using multiple health status measurements with no defined primary outcome. This means the interventions may have not been targeted. Overlap between the analyses from the studies is also a limitation as it will have inflated their results. This was dealt with by acknowledging the number of studies which overlap and their corresponding interventions.

A limitation of the methodology is that the review does not only include the psychological interventions defined in the protocol i.e. some education interventions were included. The Cochrane Musculoskeletal Review Group's Trials Search coordinator helped to develop each search equation for the original search strategy (7); however, our modified version was not peer reviewed which is a limitation. The electronic database searches failed to identify one article (see Figure 1). It is possible that the search strategy did not identify further reviews. Further to this, our search did not include grey literature or non-English language reviews, although no non-English reviews were found in either search.

Some of the psychological interventions were delivered in a group setting, whereas other were facilitated in a one-to-one environment. Analysis of the effect this difference has on outcomes would have been useful for the further interpretation of the results. This question is, however, beyond the scope of this review but is noted as a limitation.

Recommendations for future practice

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The Outcome Measures in Rheumatology (OMERACT) group is an international organization which aims to develop optimal outcome measures for use in clinical trials (49). Recommendations for future practice identified by the review authors included randomized controlled trials using the core set of outcome measures agreed by the OMERACT group together with measures of psychological status. The reason for this recommendation is to aide comparisons of findings across studies. They also suggested researchers try to accurately report the techniques that have been used in psychological interventions and provide some form of fidelity assessment. This is so both the intervention content, and the level to which the techniques were successfully applied, is transparent. This transparency is helpful for other researchers who wish to comment on or synthesize the findings (49). Importantly, randomized controlled trials should have adequate statistical power and be high quality to not bias the review findings.

Gap in the evidence base

Gaps in the evidence base described in the reviews can be summarised across 5 themes: 1) 'Patient Characteristics', 2) 'Maintaining Improvements', 3) 'Longitudinal Research', 4) 'Mechanism of Action' and 5) 'Categories of Intervention'. There was consensus amongst review authors: themes numbered 1, 3 and 5 were cited in 4 reviews, and themes numbered 2 and 4 were cited in 3 reviews.

Patient Characteristics

Future studies should be disease specific and seek to identify characteristics (e.g. personality, illness perceptions) or coping styles that make patients responsive to psychological interventions. They should also examine how the permutations of the

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rheumatoid arthritis itself (e.g. disease severity, disease duration) affect the efficacy of psychological interventions.

Maintaining Improvements

Small short-term symptoms improvements were generally observed in the reviews but there was limited evidence for any long-term changes. Strategies to increase and better maintain small symptom improvements and behavioural changes should be considered (e.g. by building booster or relapse prevention strategies into the trial design). Interventions should include two treatment groups, one with and one without maintenance, in addition to standard medical care or attention controls.

Longitudinal Research

Longitudinal research was considered necessary to examine whether improvements in psychological status produce carry-over effects on physical outcomes (e.g. pain, disability). There may be a need to look at strategies which enhance patients' long-term adherence to programs.

Mechanism of Action.

Exploring the mechanisms through which these interventions work was suggested as an area for future research (e.g. whether observed changes are mediated by certain personality characteristics or coping styles).

Categories of Intervention

As psychological interventions are heterogeneous, based on different theoretical frameworks and assumptions, researchers should try to determine which interventions (and

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intervention components) are most effective. Authors suggested comparing different types of intervention to one another, planning meta-analysis in homogenous intervention sub-groups and studying the value of the many other types of psychological interventions available.

Several additional gaps in the evidence base were identified in this review. Firstly, fatigue is an outcome which is important to patients but was only explored in one review (42). Similarly, none of the reviews examined medication adherence or quality of life. Future research into the effect of psychological interventions on rheumatoid arthritis should include fatigue, medication adherence and quality of life as outcome measures. Including quality of life measures will help to determine how valuable improvements resulting from psychological interventions are to patients.

Psychological interventions effect on disease specific outcomes are modest. However, with the advancement of rheumatoid arthritis treatment (e.g. biologics), many patients' disease activity is improved without psychological intervention. The psychological interventions included in this review, which were mainly cognitive behavioural therapy, improved depression. Future research should focus on finding psychological interventions that can improve other symptoms, such as pain and fatigue.

Psychological interventions improve depression, coping, self-efficacy, and physical activity for patients with rheumatoid arthritis. Their use should be more widespread; however, rheumatology departments do not always have the resources available to employ a psychologist. Future research could investigate the cost-effectiveness of other health professionals (e.g. nurses) delivering psychological interventions.

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Conclusions

Psychological interventions treat low mood in rheumatoid arthritis. Their effect on disease specific outcomes are modest and not sustained over time. Secondary outcomes show greater improvement and there is evidence that these benefits are sustained.

Priorities for future research include 'Patient Characteristics', 'Maintaining Improvements', 'Longitudinal Research', 'Mechanism of Action' and 'Categories of Intervention'. Future research should also examine interventions that improve pain and fatigue, and the cost effectiveness of non-psychologically trained health professionals delivering psychological interventions.

Contribution of the paper

What is already known about the topic?

•Psychological interventions have small but measurable effects upon rheumatoid arthritis outcomes.

•There is evidence that the effects of psychological interventions are mediated by improvements in self-efficacy and coping.

What this paper adds?

• Psychological interventions improve depression in patients with rheumatoid arthritis.

•The effects of psychological interventions on disease specific outcomes are modest and not sustained.

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•The effects of psychological interventions on secondary outcomes are significant and there is evidence that they are sustained.

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests

Acknowledgements

This research has been funded by the National Institute for Health Research (NIHR) as one of its Programme Grants for Applied Research (Grant Reference Number: RP-PG-0610-10066; Programme title: Treatment Intensities and Targets in Rheumatoid Arthritis Therapy: Integrating Patients' And Clinicians' Views–The TITRATE Programme). The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health. This work was also supported by the King's College Hospital Charity

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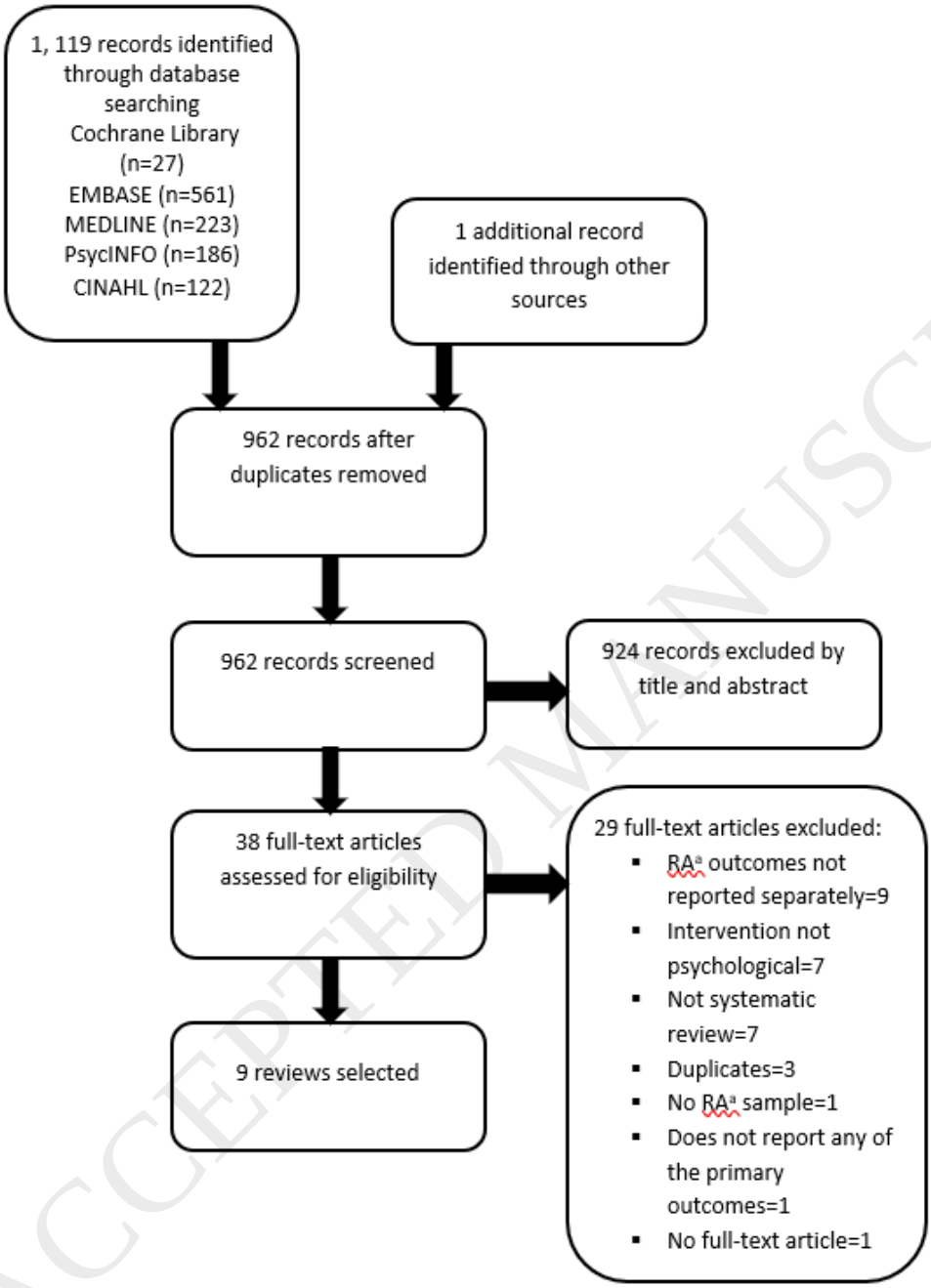
Figures

Figure 1: Progress through the stages of review selection



[a]RA = Rheumatoid Arthritis

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Tables

Table 1: List of psychological components defined in the protocol and their corresponding techniques

Category	**Example of techniques**
Motivational interviewing	Affirmations, reflections
Cognitive behavioural therapy	Cognitive restructuring, behavioural activation
Supportive counselling	Reflection, supportive listening
Psychotherapy	Interpretation, confrontation
Self-regulatory techniques	Goal-setting, action planning
Mindfulness-based cognitive therapy	Focus on changing relationship to thoughts
Disclosure therapy	Sharing information, often written down

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Table 2: Summary of characteristics of selected systematic reviews

Author year	Aim	Number of studies included	Total no. of participants	Interventions	Outcomes
Astin et al. (2002)	To carry out a meta-analytic review of studies that compared "psychosocial" (e.g. cognitive behavioural, psychoeducational) interventions to non-intervention controls (e.g. wait list, usual care, or attention placebo) in patients with RA[b]	25 RCTs[c]	1, 676 patients	CBT[a] (13), biofeedback (5), psychotherapeutic interventions (5), disclosure therapy (2).	Pain, functional disability, psychological status, coping, self-efficacy, tender joints
Beltman et al. (2010)	To conduct a meta-analysis of the effectiveness of CBT[a] for depression in people with underlying somatic disease	Sub-group of 3 RCTs[c] included patients with RA[b]	194 patients	CBT[a] (3)	Primary outcome depressive symptoms

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Cramp et al. (2013)	To evaluate the benefit and harm of non-pharmacological interventions for the management of fatigue in people with RA[b]	Sub-group of 13 RCTs[c] included psychosocial interventions	1, 556 patients	Self-management (3), group education (3) CBT[a] (3), benefit finding (1), expressive writing (2), mindfulness (1), lifestyle management (1), energy conservation (1).	Primary outcomes were self-reported fatigue and adverse events. Secondary outcomes were pain, anxiety, depression, disability, tender and swollen joints
Dissanaya ke and Bertouch (2010)	To identify individual psychological interventions for which there is high quality evidence	34 RCTs[c]	2, 021 patients	CBT[a] (16), disclosure therapy (4), counselling (3), biofeedback (2), relaxation training (2), meditation and mindfulness (2), psychotherapy (2).	Pain, biomedical and clinical markers of disease, disability, mood and cognition, behaviour, patient satisfaction
Knittle et	To determine the overall efficacy of	27 RCTs[c]	1, 663	Group education (8), CBT[a]	Physical activity, pain,

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al. (2010)	psychological interventions of increasing physical activity, as well as of reducing pain, disability, depressive symptoms, and anxiety among patients with RA[b]. Also, to determine whether interventions including more techniques derived from Self-Regulatory Theory produce greater treatment gains than those using fewer such techniques		patients	(7), Education (3), pain management (3), stress management (2), combination therapy CBT[a] and occupational therapy (1), relaxation (1), mindfulness (1), self-instruction (1).	disability, depressive symptoms and anxiety
Niederma nn et al. (2004)	To systematically collect RCTs examining educational and psychoeducational interventions for RA[b] patients, with focus on their long-term effectiveness	Sub-group of 4 RCTs[c] included psychoeduca	369 patients	CBT[a] (3), stress management (1)	Improved knowledge, health behaviour, or skills to influence psychological or

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		tional interventions			physical health status
Nyssen et al. (2016)	To review the clinical effectiveness and cost-effectiveness of therapeutic writing for people with long-term conditions compared with no writing, or other controls, reporting any relevant clinical outcomes.	Sub-group of 4 RCTs[c] included patients with RA[b]	380 patients	Therapeutic writing (4)	Studies reporting any relevant clinical outcomes including both disease-specific outcomes and generic outcomes.
Riemsma et al. (2003)	To examine the effectiveness of patient education interventions on health status in patients with RA[b]	Sub-group of 29 RCTs[c] included psychological interventions	5 Counselling RCTs[c]; 800 patients 24 Behavioural treatment	Counselling (5), Behavioural treatment (24).	Pain, functional disability, psychological well-being, disease activity

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						RCTs[c]; 1, 747 patients	

[a]CBT = Cognitive Behavioural Therapy. [b]RA = Rheumatoid Arthritis. [c]RCTs = Randomised Controlled Trials.

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Table 3: Quality of systematic reviews based on the 11-item AMSTAR[a] Checklist

Systematic reviews	1. Was an a priori design provided?	2. Was there duplicate study selection and data extraction?	3. Was a comprehensive literature search performed?	4. Did the search cover unpublished literature?	5. Was a list of included and excluded studies provided?	6. Were the characteristics of the included studies provided?	7. Was the scientific quality of the included studies assessed and documented?	8. Was the scientific quality used appropriately in formulating conclusions?	9. Were the methods used to combine findings of studies appropriate?	10. Was the likelihood of publication bias assessed?	11. We re potential conflicts of interest listed?	**Total score**
Astin et al. 2002	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	**6**
Beltman et al. 2010	No	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	**7**
Cramp et al. 2013	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**11**
Dissanayake & Bertouch 2010	No	Yes	Yes	No	No	Yes	Yes	Yes	NA[b]	No	No	**5**
Knittle et al. 2010	No	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes	No	**6**
Leverone & Epstein 2010	No	No	No	No	No	Yes	No	No	NA[b]	No	Yes	**2**

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Niedermann et al. 2004	No	Yes	Yes	No	No	Yes	Yes	Yes	NA[b]	No	No	**5**
Nyssen et al. 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	**10**
Riemsma et al. 2003	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**11**

[a]AMSTAR = Assessment of Multiple Systematic Reviews. [b]NA = Not applicable.

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Table 4: Summary of Effect Sizes

Outcome	Author	Measurement point	Effect size	95% Confidence Interval	Significance	Number of RCTs included in pooled result	Quality assessment
Disease activity/severity	Nyssen et al. (2016)	Post intervention	-0.02	-0.37, 0.32	P=0.89, NS	3	10
		Follow-up	-0.61	-0.96, -0.26	P<0.001	3	10
Patient global assessment	Riemsma et al. (2003)	Post intervention	-0.30	-0.55, -0.04	P=0.02	4	11
Tender and swollen joints	Astin et al. (2002)	Post intervention	0.15	-0.09, -0.39	NS	7	6
		Follow-up	0.30	0.04, -0.56	P=0.005	5	6
Inflammation	Nyssen et al. (2016)	Post intervention	0.10	-0.34, 0.53	P=0.67, NS	3	10
Functional disability	Astin et al. (2002)	Post intervention	0.27	0.12, -0.42	P<0.001	12	6
		Follow-up	0.12	-0.09, -0.33	NS	7	6
	Riemsma et al. (2003)	Post intervention	-0.23	-0.36, -0.10	P<0.001	27	11
		Follow-up	-0.10	-0.23, 0.02	P=0.10, NS	18	11
	Knittle et al. (2010)	Post intervention	0.32	0.13, 0.51	P<0.001	17	6
Pain	Astin et al. (2002)	Post intervention	0.22	0.07, -0.37	P=0.003	13	6
		Follow-up	0.06	-0.17, -0.29	NS	6	6
	Riemsma et al. (2003)	Post intervention	-0.09	-0.19, 0.02	P=0.10, NS	26	11
	Knittle et al. (2010)	Post intervention	0.18	0.08, 0.29	P<0.001	22	6
Fatigue	Cramp et al. (2013)	Post intervention	-0.24	-0.40, -0.07	Significant	13	11
Depression	Astin et	Post	0.15	-0.01, -0.31	P=0.03	12	6

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	al. (2002)	intervention					
		Follow-up	0.33	-0.07, -0.59	P=0.01	5	6
	Riemsma et al. (2003)	Post intervention	-0.14	-0.25, -0.04	P=0.009	13	11
	Riemsma et al. (2003)	Follow-up	0.12	-0.25, 0.01	P=0.07, NS	13	11
	Knittle et al. (2010)	Post intervention	0.23	0.06, 0.39	P=0.01	19	6
Anxiety	Knittle et al. (2010)	Post intervention	0.17	0.02, 0.32	P=0.03	11	6
Self-efficacy	Astin et al. (2002)	Post intervention	0.35	0.11, 0.59	P=0.017	5	6
		Follow-up	0.20	-0.08, -0.48	NS	3	6
Coping	Astin et al. (2002)	Post intervention	0.46	0.09, 0.83	P=0.007	4	6
		Follow-up	0.52	-0.07, -1.11	P=0.04	3	6
Physical activity	Knittle et al. (2010)	Post intervention	0.47	0.12, 0.83	P=0.009	4	6
		Follow-up	0.36	0.06, 0.67	P=0.02	4	6

[a]NS = Non-significant. [b]RCTs = Randomised Controlled Trials.

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