



# Cognitive-behavioral therapy and acceptance and commitment therapy for anxiety and depression in patients with fibromyalgia: a systematic review and meta-analysis

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## Abstract

**Introduction.** Defined by chronic, musculoskeletal pain, fibromyalgia is often comorbid with depression and anxiety. In these cases, the first line medical treatment can be successfully combined with psychological interventions. Cognitive-behavioral therapy and acceptance and commitment therapy are among the most widely studied approaches in relation to chronic pain, including fibromyalgia. The objective of this review is to analyze the efficiency of these psychological treatments for alleviating emotional distress in fibromyalgia.

**Method.** The search was conducted on the PubMed, Scopus and Web of Science online databases. Clinical trials that fulfilled eligibility criteria were included in this review. A meta-analysis was performed on depression and anxiety scores at post-test. Heterogeneity was assessed using the Chi<sup>2</sup> and I<sup>2</sup> indicators. For evaluating publication bias, we resorted to a funnel plot graph.

**Results.** A total of 17 reports were selected, among which 4 articles studied the efficiency of acceptance and commitment therapy. Main demographic characteristics were homogenous throughout the included samples. The overall effect was -0.31 (95% CI: -0.47 to -0.15) for depression, and -0.15 (95%: -0.29 to -0.02), reaching statistical significance.

**Conclusions.** Both psychological interventions proved to be efficient for decreasing depression and anxiety in fibromyalgia. For this reason, we believe psychotherapeutic protocols can be reliably implemented within multicomponent treatments, facilitating emotional adjustment in the context of physical disability and pain. Future research directions include the exploration of change processes and multiple moderators, enabling the development of tailored psychological treatments in fibromyalgia.

**Keywords:** fibromyalgia, depression, anxiety, psychotherapy, cognitive-behavioral therapy, acceptance and commitment therapy

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## Introduction

Fibromyalgia represents a rheumatologic condition characterized by chronic, widespread pain, of varying severity [1]. Other common symptoms include fatigue, weakness, sleep problems, and reduced cognitive functioning [2]. The prevalence of this medical condition in the general population was estimated between 1.7% and 5.4%, presenting an increased frequency among women [3]. Given its multiple implications for the quality of life, besides the numerous physical comorbidities, emotional disorders such as depression and anxiety are frequently co-occurring with fibromyalgia [4]. The first line pharmacological treatment for fibromyalgia involves the administration of antidepressants (e.g., Duloxetine, Milnacipran), anticonvulsants (e.g., Pregabalin), muscle relaxants, analgesics, but also hypnotic (e.g., Zolpidem) or antipsychotic drugs like Quetiapine [5].

Along with the recommended medical treatment, several psychological interventions proved to be successful in the management of fibromyalgia [6]. Particularly, cognitive-behavioral therapy (CBT), which emphasizes the role of thoughts in the occurrence of emotions and behaviors, accumulated a large body of evidence in terms of its efficiency for treating various psychopathologies [7]. Interventions based on CBT were found to be successful in chronic pain conditions, including fibromyalgia and co-occurring anxiety and depression [8,9]. Specifically, CBT strategies in fibromyalgia target pain catastrophizing, defined as a common cognitive error contributing to the onset of emotional disorders, by exacerbating potential consequences of the pain sensation [10,11]. In addition, acceptance and commitment therapy (ACT) is a new generation CBT approach aiming to decrease rigid behavioral patterns, while improving psychological flexibility as a healthier alternative for dealing with prolonged pain and disability [12,13]. In this approach, the tendency to avoid unpleasant internal experiences or various activities due to pain-related fear, called experiential avoidance, is replaced with the development of pain acceptance, together with the promotion of values-based action [14]. Moreover, important objectives in ACT interventions focus on mindfulness skills, by improving present moment awareness, as well as cognitive defusion strategies that concentrate on changing one's attitude towards own thoughts and facilitate an observer's perspective towards distressing cognitive content [15]. When applied within the chronic pain population and fibromyalgia, ACT strategies were found to decrease disability and depression scores, while increasing pain acceptance [16].

To date, research demonstrated the efficiency of CBT and ACT intervention either separately, or integrated within combined and multicomponent treatment protocols [17,18]. Importantly, benefits in terms of wellbeing and

treatment adherence were maintained, regardless of the format in which the psychotherapy was delivered [19,20]. Furthermore, there is promising evidence related to the ratio between costs and effectiveness of psychological approaches in fibromyalgia, emphasizing their health economic utility and role within an integrated medical care paradigm [21]. Although both CBT and ACT interventions were reliably applied in patients with fibromyalgia syndrome, their implications for anxiety and depression entail further exploration. In this way, the objective of this review and meta-analysis is to analyze the effectiveness of standard CBT and ACT interventions for patients with fibromyalgia, focusing on correlated anxiety and depressive symptoms.

## Method

The present research was conducted according to the revised Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) 2009 checklist, as well as the Cochrane Collaboration guidelines for systematic reviews of interventions [22,23]. The review protocol was registered on the PROSPERO database, with the ID number CRD42022354119.

### Eligibility criteria

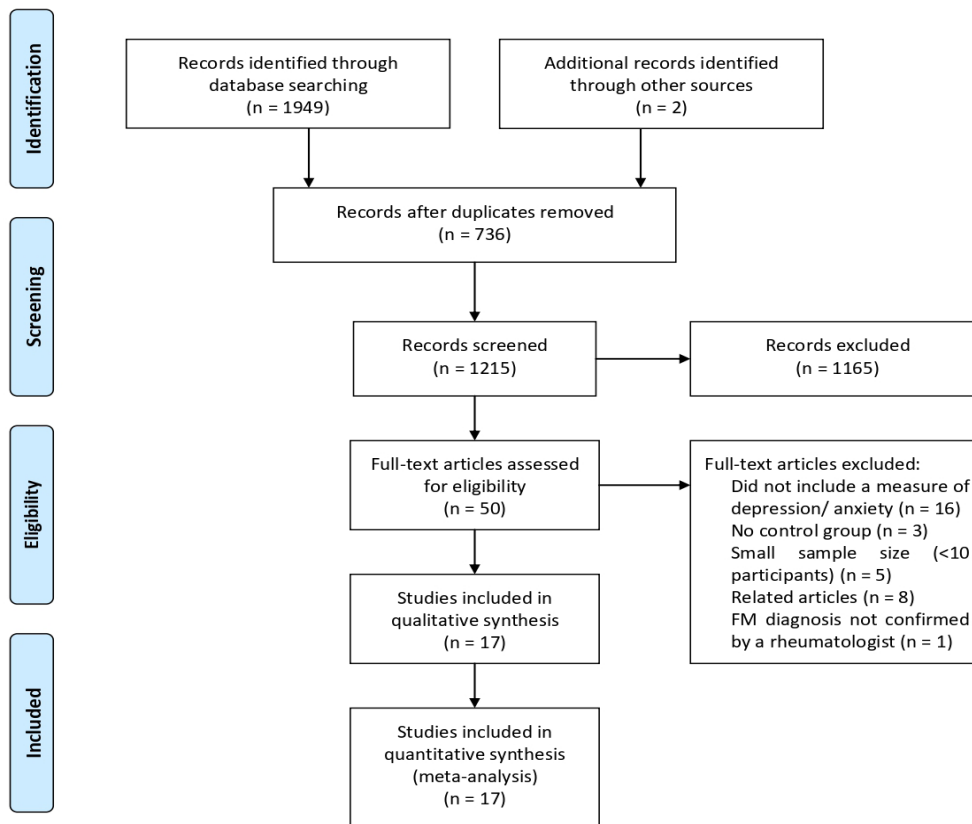
Inclusion criterion for selected articles were the following: (1) randomized clinical trials written in English language and available in a full text format; (2) sample comprised of adults with a diagnosis of fibromyalgia established by a specialized physician (i.e. rheumatologist), according to the American College of Rheumatology Criteria [24] in use at the time when the research was performed; (3) studies including at least 10 participants; (4) the efficiency of standard CBT and ACT protocols, delivered individually or in a group format, as well as using various modalities (e.g., face-to-face, telephonic, or online delivery) was investigated; (5) a control group was involved; (6) a measure of depression and/or anxiety symptom severity was used. Exclusion criteria were: (1) samples that involved children and adolescents, adults with severe cognitive impairment and/or severe psychiatric disorders (i.e. psychotic disorders); (2) articles with a single-subject design or case reports; (3) studies that did not include a control group; (4) no measure of anxiety/depression symptom severity; (5) not available full-text in English language; (6) the diagnosis of fibromyalgia was not confirmed by a rheumatologist.

### Search strategy, selection process and data extraction

We searched reports on the electronic databases PubMed, Scopus and Web of Science, the last search being conducted in March 2023. The keywords “fibromyalgia” AND “cognitive behavioral therapy”, along with “fibromyalgia” AND “acceptance commitment therapy” were used. Articles published from January 2020 to the present were considered.



## PRISMA 2009 Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit [www.prisma-statement.org](http://www.prisma-statement.org).

**Figure 1.** PRISMA Flow diagram of included studies.

Additionally, our search involved the Association for Contextual Behavioral Science (ACBS) website [25] for identifying articles on ACT interventions for fibromyalgia, using the same keywords.

The selection of studies involved a screening phase, when two of the review authors independently screened the titles and abstracts. If abstracts did not include enough information to document a further decision, the articles were extensively read. Reports considered eligible after screening were subjected to further independent assessment by the same review authors. Any disagreement was resolved through discussion, and the involvement of a third review author, when necessary.

Extracted data from each study included the sample characteristics (number of participants, age, gender), intervention type and duration, control group, and specific measures of depression and/ or anxiety.

#### **Risk of bias assessment, summary measures and synthesis of results**

The risk of bias was assessed at the study level based on the major domains integrated within the Cochrane Collaboration's tool [26]. According to existing recommendations concerning the specificity of the psychotherapeutic treatment, we did not assess the risk of bias related to "blinding participants and personnel" [27,28]. Specific outcomes analyzed were the effect of CBT and ACT

interventions on depression and anxiety scores at post-test. We performed a meta-analysis on these results using the Review Manager (RevMan) software, version 5.4, obtaining an overall effect estimate by calculating standardized mean differences (SMD) based on the means and standard deviations reported in each study. When an article reported multiple measures for the same variable, we selected the measures treated as primary outcomes in the original research. For incomplete results, we used the Intention-to-Treat (ITT) data, if available. Also, when there was an active comparison group involving an alternative intervention in addition to a passive condition, we integrated data based on the active group in our analysis. Heterogeneity was established by using the  $\text{Chi}^2$  and  $I^2$  indicators. For addressing potential heterogeneity, the random effect model was applied in this meta-analysis. Funnel plots were inspected for evaluating publication bias related to the effect of psychological interventions on depressive symptoms at post-test, with all included studies reporting this outcome.

## Results

### Main characteristics of included studies

The flow diagram of the screening process is represented in Figure 1. Our search resulted in 1951 articles that were subsequently screened for meeting the eligibility criteria. After the selection process, 17 studies were included in this review and meta-analysis, comprising a total number of 1499 participants diagnosed with fibromyalgia. Among individual articles, sample sizes varied from 31 to 230 participants that shared similar socio-demographic particularities in terms of age, gender, occupational and marital status. Among the included references, 13 applied CBT [29-41], while 4 implemented ACT protocols [42-45]. The mean duration of interventions was 10 sessions / modules, lasting for an average of 95 minutes, depending on the delivery format. Regarding the comparison groups, 11 studies implemented an active group consisting of an alternative psychological intervention, prescribed medical treatment, or educational programs. The main characteristics of included studies are summarized in table I.

**Table I.** Characteristics of included studies.

Reference	N	Age (M,SD)	Gender (% Women)	Intervention <sup>a</sup>	Duration	Control <sup>a</sup>	Follow-up	Depression <sup>b</sup>	Anxiety <sup>b</sup>
Aguilera et al. (2022)	106	54.5 (9)	100%	Hybrid CBT	18 sessions/ 60 minutes	Active (PCT)	6-month	HADS	HADS
Alda et al. (2011)	169	46.83 (6.49)	94%	Group CBT	10 sessions/ 90 minutes	Active (RPT) + Passive (TAU)	3- and 6-month	HRSD	HARS
Ang et al. (2013)	58	46.59 (10.39)	93%	Telephone-delivered CBT	8 sessions/ 35 minutes	Active (RPT + Education)	9- and 21-week	PHQ-9	-
Falcao et al. (2008)	60	45.67 (11.09)	100%	Group CBT	10 sessions	Passive (UMC)	3-month	BDI-II	STAI
Friesen et al. (2017)	60	48 (11)	95%	Online CBT	5 modules	Passive (WL)	1-month	PHQ-9; HADS	GAD-7; HADS
Govillard et al. (2022)	88	50.16 (9.13)	100%	Group CBT	10 sessions/ 75 minutes	Active (Biofeedback) + Passive (WL)	6-month	SCL-90-R	SCL-90-R
Jensen et al. (2012)	43	45.6 (6.4)	100%	Group ACT	12 sessions/ 90 minutes	Passive (WL)	3-month	BDI-II	STAI
Karlsson et al. (2015)	48	48.55 (9)	100%	Group CBT	20 sessions/ 180 minutes	Passive (WL)	12-month	MADRS	-
Lami et al. (2018)	126	50.19 (8.24)	100%	Group CBT for Insomnia	9 sessions/ 90 minutes	Active (CBT for Pain) + Passive (UMC)	3-month	SCL-90-R	SCL-90-R
Luciano et al. (2014)	156	48.31 (5.84)	96%	Group ACT	8 sessions/ 150 minutes	Active (RFT) + Passive (WL)	6-month	HADS	HADS
Lumley et al. (2017)	230	49.13 (12.22)	94%	Group CBT	8 sessions/ 90 minutes	Active (EAET + Education)	6-month	CES-D	GAD-7
Martínez et al. (2014)	64	47.58 (6.82)	100%	Group CBT for Insomnia	6 sessions/ 90 minutes	Active (SH Education)	3- and 6-month	SCL-90-R	SCL-90-R
McCrae et al. (2019)	113	53 (10.9)	97%	Individual CBT for Insomnia	8 sessions/ 50 minutes	Active (CBT for Pain) + Passive (WL)	6-month	BDI-II	STAI
Miró et al. (2011)	31	46.45 (7.03)	100%	Group CBT for Insomnia	6 sessions/ 90 minutes	Active (SH Education)	-	HADS	HADS
Redondo et al. (2004)	40	Not provided	100%	Group CBT	8 sessions/ 150 minutes	Active (PE)	6- and 12-month	BDI-II	BAI
Simister et al. (2018)	67	39.7 (9.36)	95%	Online ACT	6 modules	Passive (TAU)	3-month	CES-D	-
Wicksell et al. (2013)	40	45.1 (6.6)	100%	Group ACT	12 sessions/ 90 minutes	Passive (WL)	3-month	BDI-II	STAI

<sup>a</sup>Abbreviations for interventions and control groups: CBT, Cognitive-Behavioral Therapy; ACT, Acceptance and Commitment Therapy; PCT, Personal Construct Therapy; RPT, Recommended Pharmacological Treatment; TAU, Treatment as Usual; UMC, Usual Medical Care; WL, Waitlist; EAET, Emotional Awareness and Expression Therapy; SH, Sleep Hygiene; PE, Physical Exercise.

<sup>b</sup>Abbreviations for measures of depression and/ or anxiety symptom severity: HADS, Hospital Anxiety and Depression Scale; HRSD, Hamilton Rating Scale for Depression; HARS, Hamilton Anxiety Rating Scale; PHQ-9, Patient Health Questionnaire-9; BDI-II, Beck Depression Inventory; STAI, State-Trait Anxiety Inventory; GAD-7, Generalized Anxiety Disorder-7; SCL-90-R, Symptom Checklist-90-Revised; MADRS, Montgomery-Asberg Depression Rating Scale; CES-D, Center for Epidemiologic Studies Depression Scale.

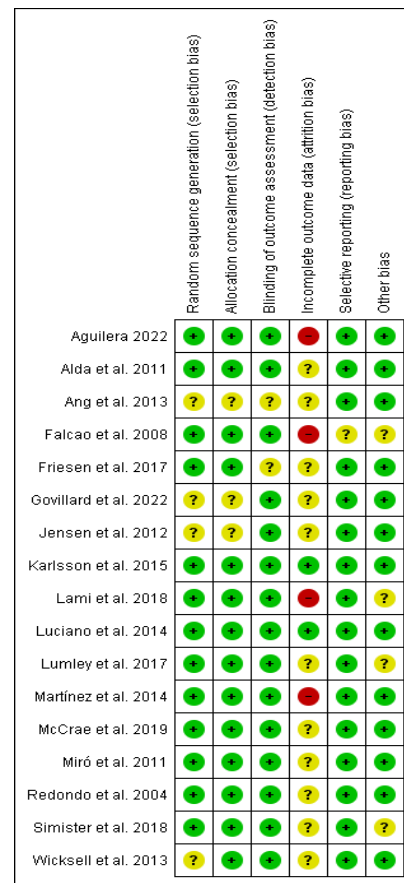
**Risk of bias in selected studies**

Two independent review authors investigated the risk of bias for each report, any serious discrepancy that was not solved through discussion implying the participation of a third review author. The assessment for each domain is depicted in figure 2. The majority of evidence stems from studies with an unclear overall risk of bias. The domain with the lowest risk of bias was “selective reporting”, most articles providing data for all included outcomes. Conversely, “incomplete outcome data” was the domain that presented the highest risk of bias in our review, pointing to an increased attrition rate in relation to psychological interventions.

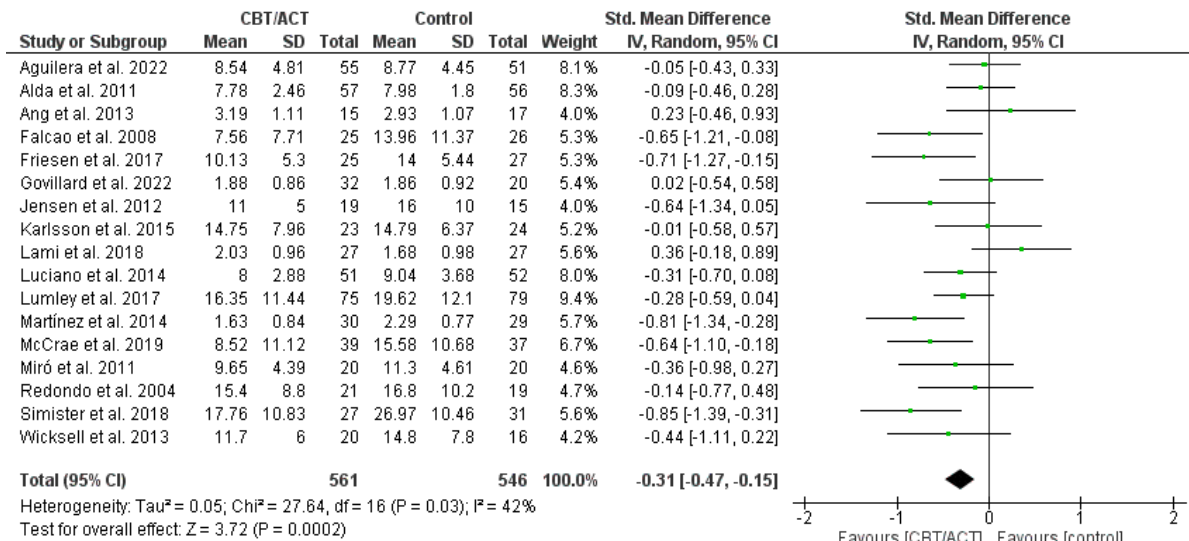
**Meta-analysis**

The summary effect of CBT/ACT interventions on the intensity of depressive symptoms was -0.31 (95% CI: -0.47 to -0.15),  $Z = 3.72$ ,  $p = 0.0002$ , indicating a statistically significant impact of the psychological treatments. As shown in figure 3, individual effect sizes were significant in 3 studies implementing a passive control condition. As expected, heterogeneity measured by  $I^2$  was 42%, and  $\text{Chi}^2 = 27.64$  ( $df = 16$ ),  $p = 0.03$ , indicating considerable variability among outcome reports.

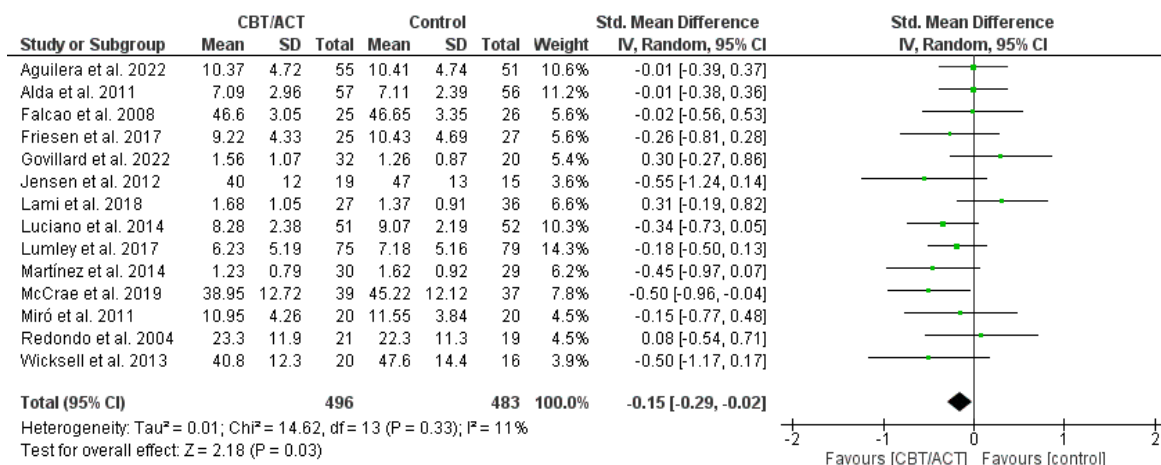
Regarding the severity of anxiety symptoms, the overall effect of CBT/ACT interventions was -0.15 (95%: -0.29 to -0.02),  $Z = 2.18$ ,  $p = 0.03$ , also proving a statistically significant, but weaker general efficiency of psychotherapy. The individual improvement was substantial in one study comparing a CBT protocol with an educational program (Figure 4). Our analysis did not indicate a substantial heterogeneity among studies, with  $I^2 = 11\%$ , and  $\text{Chi}^2 = 14.62$ ,  $df = 13$ ,  $p = 0.33$ .



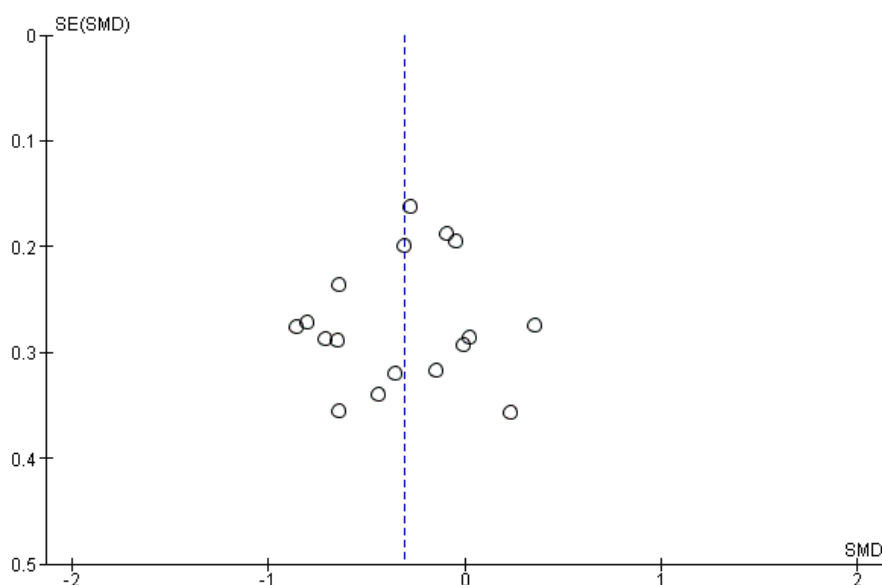
**Figure 2.** Risk of bias summary.



**Figure 3.** Forest plot of Standardized Mean Difference (SMD): CBT/ACT interventions versus Control conditions on the severity of depressive symptoms in fibromyalgia.



**Figure 4.** Forest plot of Standardized Mean Difference (SMD): CBT/ACT interventions versus Control conditions on the severity of anxiety symptoms in fibromyalgia.



**Figure 5.** Funnel plot of depression scores at post-treatment. SE, Standard Error; SMD, Standardized Mean Difference.

The funnel plot of depression scores at post-treatment permitted us to evaluate publication bias in this meta-analysis. The horizontal axis depicts the standardized mean difference and the vertical axis indicates the standard error, or precision of the results, while the central line represents the pooled effect size (Figure 5). Given the symmetrical distribution of studies above and below the overall effect size, we assumed a reduced likelihood of publication bias and an accurate estimation of improvements associated with CBT/ACT psychological interventions, according to selected articles.

### Discussion

The majority of trials included in this review and meta-analysis involved CBT protocols, applying specific techniques like cognitive restructuring, planning behaviors according to important personal goals, relaxation and coping skills training. At the same time, newer generation ACT interventions facilitate psychological flexibility in fibromyalgia patients, by focusing on pain acceptance, mindfulness, cognitive defusion and action plans based on personal values. The main difference between the CBT and ACT paradigms refers to a transition from cognitive

modification to a selection of an appropriate response in a challenging life context, which may address the specific needs of fibromyalgia patients [13,46]. The discrepancy in the quantity of identified research papers could be associated to the temporal emergence of the two interventions, the CBT approach presenting a longer tradition and well-established efficiency within the chronic pain population [47]. However, this also highlights the idea that ACT interventions require further exploration in patients with fibromyalgia and comorbid emotional disorders.

Despite this imbalance related to the number of reports on CBT compared to ACT interventions, we demonstrated that both approaches are efficient in the treatment of depressive and anxiety symptoms in fibromyalgia. This is in line with previous research showing that CBT and ACT interventions are associated with moderate improvements for emotional symptoms in fibromyalgia patients [28,48,49]. Also, our findings are concordant with other reviews that outlined the benefits of psychological treatment in various formats, especially online CBT and ACT programs [50,51].

Interestingly, we observed that interventions with a narrower focus, such as reducing sleeping problems, proved to be highly useful for treating anxiety symptoms. In the same light, it has been proven that CBT treatments for insomnia may result in the improvement of general wellbeing and mental health difficulties in fibromyalgia [52]. In this way, we believe that the development of tailored psychotherapeutic programs for fibromyalgia patients with different patterns of depressive and anxiety symptoms would be a promising future direction.

From a clinical perspective, we discuss that the implementation of CBT/ACT interventions could be especially useful for optimizing medication doses according to the severity of symptoms, in terms of adjusting pharmacological treatments for both the physical features of fibromyalgia, and the associated emotional disorders [46,54,55].

### Limitations and implications for future research

This research has several methodological limitations. First, we included studies with homogenous sample characteristics, which does not allow the generalizability of our findings to the entire population of fibromyalgia patients experiencing anxiety and depression symptoms. Since there is evidence that some particularities, such as age, may differentiate outcomes following CBT and ACT interventions [53], we suggest that broadening the range of inclusion criteria could advance knowledge in this field. Second, the exploration of change processes, like the reduction of pain catastrophizing in CBT, along with the increase of pain acceptance in ACT, was beyond the scope of our analysis, as only few included studies reported these outcomes. Future investigations could address such aspects in detail, by highlighting the relation between change mediators and modification in emotional distress. Third,

we did not include studies on the effects of multimodal treatments, integrating CBT and ACT strategies within complex interventions that address multiple components, including pharmacological treatment and physical therapy. A direction for further analyses would be to study the impact of such interventions on symptoms of depression and anxiety in fibromyalgia. Finally, different outcomes of psychological treatments in fibromyalgia patients could be targets of future reviews, such as their association with treatment adherence, lifestyle modification, or problematic behaviors related to medication consumption.

### Conclusions

This review outlined the efficiency of CBT and ACT interventions for reducing emotional distress associated with fibromyalgia. All included studies reported the effects on the intensity of depressive symptoms, and the majority of articles investigated the change of anxiety symptoms severity following psychotherapy, obtaining a modest to moderate overall effect size. We consider that both CBT and ACT techniques can be reliably applied in integrated care programs for improving the quality of life in fibromyalgia, with the possibility of adjusting psychological interventions according to the particularities of various patient groups. Finally, the implementation of CBT/ACT interventions in clinical practice could be particularly useful for the augmentation of the standard medical treatment in fibromyalgia associated with emotional disorders.

### References

1. Bair MJ, Krebs EE. Fibromyalgia. *Ann Intern Med.* 2020;172:ITC33–48.
2. Häuser W, Ablin J, Fitzcharles MA, Littlejohn G, Luciano JV, Usui C, et al. Fibromyalgia. *Nat Rev Dis Primers.* 2015;1:15022.
3. Jones GT, Atzeni F, Beasley M, Fließ E, Sarzi-Puttini P, Macfarlane GJ. The prevalence of fibromyalgia in the general population: a comparison of the American College of Rheumatology 1990, 2010, and modified 2010 classification criteria. *Arthritis Rheumatol.* 2015;67:568-575.
4. Kleykamp BA, Ferguson MC, McNicol E, Bixho I, Arnold LM, Edwards RR, et al. The Prevalence of Psychiatric and Chronic Pain Comorbidities in Fibromyalgia: an ACTION systematic review. *Semin Arthritis Rheum.* 2021;51:166-174.
5. Sarzi-Puttini P, Giorgi V, Marotto D, Atzeni F. Fibromyalgia: an update on clinical characteristics, aetiopathogenesis and treatment. *Nat Rev Rheumatol.* 2020;16:645-660.
6. Albajes K, Moix J. Psychological interventions in fibromyalgia: an updated systematic review. *Mediterr J Clin Psychol.* 2021;9:1-57.
7. Butler AC, Chapman JE, Forman EM, Beck AT. The empirical status of cognitive-behavioral therapy: a review of

- meta-analyses. *Clin Psychol Rev*. 2006;26:17-31.
8. Bernik M, Sampaio TP, Gandarela L. Fibromyalgia comorbid with anxiety disorders and depression: combined medical and psychological treatment. *Curr Pain Headache Rep*. 2013;17:358.
  9. Heller HL, Borges AR, Franco LO, Aucelio JP, Vargas MI, Lorga RN et al. Role of cognitive behavioral therapy in fibromyalgia: A systematic review. *Open J Rheumatol Autoimmune Dis*. 2021;11:169-187.
  10. Galvez-Sánchez CM, Montoro CI, Duschek S, Del Paso GA. Pain catastrophizing mediates the negative influence of pain and trait-anxiety on health-related quality of life in fibromyalgia. *Qual Life Res*. 2020;29:1871-1881.
  11. Schütze R, Rees C, Smith A, Slater H, Campbell JM, O'Sullivan P. How Can We Best Reduce Pain Catastrophizing in Adults With Chronic Noncancer Pain? A Systematic Review and Meta-Analysis. *J Pain*. 2018;19:233-256.
  12. Hughes LS, Clark J, Colclough JA, Dale E, McMillan D. Acceptance and Commitment Therapy (ACT) for Chronic Pain: A Systematic Review and Meta-Analyses. *Clin J Pain*. 2017;33:552-568.
  13. Wicksell RK, Olsson GL, Hayes SC. Psychological flexibility as a mediator of improvement in Acceptance and Commitment Therapy for patients with chronic pain following whiplash. *Eur J Pain*. 2010;14:1059-e1-1059.e11.
  14. Vowles KE, Sowden G, Ashworth J. A comprehensive examination of the model underlying acceptance and commitment therapy for chronic pain. *Behav Ther*. 2014;45:390-401.
  15. Haugmark T, Hagen KB, Smedslund G, Zangi HA. Mindfulness-and acceptance-based interventions for patients with fibromyalgia - A systematic review and meta-analyses. *PLoS One*. 2019;14:e0221897.
  16. McCracken LM, Sato A, Taylor GJ. A trial of a brief group-based form of acceptance and commitment therapy (ACT) for chronic pain in general practice: pilot outcome and process results. *J Pain*. 2013;14:1398-1406.
  17. Samami E, Shahhosseini Z, Elyasi F. The Effect of Psychological Interventions on the Quality of Life in Women with Fibromyalgia: A Systematic Review. *J Clin Psychol Med Settings*. 2021;28:503-517.
  18. Serrat M, Sanabria-Mazo JP, Almirall M, Musté M, Feliu-Soler A, Méndez-Ulrich JL, et al. Effectiveness of a Multicomponent Treatment Based on Pain Neuroscience Education, Therapeutic Exercise, Cognitive Behavioral Therapy, and Mindfulness in Patients With Fibromyalgia (FIBROWALK Study): A Randomized Controlled Trial. *Phys Ther*. 2021;101:pzab200.
  19. Vallejo MA, Ortega J, Rivera J, Comeche MI, Vallejo-Slocker L. Internet versus face-to-face group cognitive-behavioral therapy for fibromyalgia: A randomized control trial. *J Psychiatr Res*. 2015;68:106-113.
  20. de la Coba P, Rodríguez-Valverde M, Hernández-López M. Online ACT intervention for fibromyalgia: An exploratory study of feasibility and preliminary effectiveness with smartphone-delivered experiential sampling assessment. *Internet Interv*. 2022;29:100561.
  21. Cabral CMN, Miyamoto GC, Franco KFM, Bosmans JE. Economic evaluations of educational, physical, and psychological treatments for fibromyalgia: a systematic review with meta-analysis. *Pain*. 2021;162:2331-2345.
  22. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med*. 2009;6:e1000097.
  23. Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). *Cochrane Handbook for Systematic Reviews of Interventions*, version 6.3 (updated February 2022). Cochrane 2022. Available from: <https://training.cochrane.org/handbook>.
  24. Wolfe F, Butler SH, Fitzcharles M, Häuser W, Katz RL, Mease PJ, et al. Revised chronic widespread pain criteria: development from and integration with fibromyalgia criteria. *Scand J Pain*. 2019;20:77-86.
  25. Association for Contextual Behavioral Science (ACBS). ACT Randomized Controlled Trials (1986 to present). Available from: [https://contextualscience.org/act-randomized\\_controlled\\_trials\\_1986\\_to\\_present](https://contextualscience.org/act-randomized_controlled_trials_1986_to_present).
  26. Higgins JP, Altman DG, Gøtzsche PC, Jüni P, Moher D, Oxman AD, et al. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ*. 2011;343:d5928.
  27. Williams AC, Eccleston C, Morley S. Psychological therapies for the management of chronic pain (excluding headache) in adults. *Cochrane Database Syst Rev*. 2012;11:CD007407.
  28. Bernardy K, Klose P, Welsch P, Häuser W. Efficacy, acceptability and safety of cognitive behavioural therapies in fibromyalgia syndrome - A systematic review and meta-analysis of randomized controlled trials. *Eur J Pain*. 2018;22:242-260.
  29. Aguilera M, Paz C, Salla M, Compañ V, Medina JC, Medeiros-Ferreira L, et al. Cognitive-Behavioral and Personal Construct Therapies for Depression in Women with Fibromyalgia: A Randomized Controlled Trial. *Int J Clin Health Psychol*. 2022;22:100296.
  30. Alda M, Luciano JV, Andrés E, Serrano-Blanco A, Rodero B, del Hoyo YL, et al. Effectiveness of cognitive behaviour therapy for the treatment of catastrophisation in patients with fibromyalgia: a randomised controlled trial. *Arthritis Res Ther*. 2011;13:R173.
  31. Ang DC, Jensen MP, Steiner JL, Hilligoss J, Gracely RH, Saha C. Combining cognitive-behavioral therapy and milnacipran for fibromyalgia: a feasibility randomized-controlled trial. *Clin J Pain*. 2013;29:747-754.
  32. Falcão DM, Sales L, Leite JR, Feldman D, Valim V, Natour, J. Cognitive behavioral therapy for the treatment of fibromyalgia syndrome: A randomized controlled trial. *Journal of Musculoskeletal Pain*. 2008;16:133-140.
  33. Friesen LN, Hadjistavropoulos HD, Schneider LH, Alberts NM, Titov N, Dear BF. Examination of an Internet-Delivered Cognitive Behavioural Pain Management Course for Adults with Fibromyalgia: A Randomized Controlled Trial. *Pain*. 2017;158:593-604.
  34. Govillard L, Gorbeña S, Iraurgi I. Cognitive behavioral



- therapy with and without biofeedback in fibromyalgia: Assessment of functional and clinical change. *Health Psychol Open*. 2022;9:20551029221106044.
35. Karlsson B, Burell G, Anderberg UM, Svärdsudd K. Cognitive behaviour therapy in women with fibromyalgia: A randomized clinical trial. *Scand J Pain*. 2015;9:11–21.
  36. Lami MJ, Martínez MP, Miró E, Sánchez AI, Prados G, Cáliz R, et al. Efficacy of combined cognitive-behavioral therapy for insomnia and pain in patients with fibromyalgia: A randomized controlled trial. *Cognitive Therapy and Research*, 2018;42:63–79.
  37. Lumley MA, Schubiner H, Lockhart NA, Kidwell KM, Harte SE, Clauw DJ, et al. Emotional awareness and expression therapy, cognitive behavioral therapy, and education for fibromyalgia: a cluster-randomized controlled trial. *Pain*. 2017;158:2354–2363.
  38. Martínez MP, Miró E, Sánchez AI, Díaz-Piedra C, Cáliz R, Vlaeyen JWS, et al. Cognitive-behavioral therapy for insomnia and sleep hygiene in fibromyalgia: a randomized controlled trial. *J Behav Med*. 2014;37:683–697.
  39. McCrae CS, Williams J, Roditi D, Anderson R, Mundt JM, Miller MB, et al. Cognitive behavioral treatments for insomnia and pain in adults with comorbid chronic insomnia and fibromyalgia: clinical outcomes from the SPIN randomized controlled trial. *Sleep*. 2019;42:zsy234.
  40. Miró E, Lupiáñez J, Martínez MP, Sánchez AI, Díaz-Piedra C, Guzmán MA, et al. Cognitive-behavioral therapy for insomnia improves attentional function in fibromyalgia syndrome: a pilot, randomized controlled trial. *J Health Psychol*. 2011;16:770–782.
  41. Redondo JR, Justo CM, Moraleda FV, Velayos YG, Puche JJ, Zubero JR, et al. Long-term efficacy of therapy in patients with fibromyalgia: a physical exercise-based program and a cognitive-behavioral approach. *Arthritis Rheum*. 2004;51:184–192.
  42. Jensen KB, Kosek E, Wicksell R, Kemani M, Olsson G, Merle JV, et al. Cognitive Behavioral Therapy increases pain-evoked activation of the prefrontal cortex in patients with fibromyalgia [published correction in *Pain* 2012;153:1982]. *Pain*. 2012;153:1495–1503.
  43. Luciano JV, Guallar JA, Aguado J, López-Del-Hoyo Y, Olivan B, Magallón R, et al. Effectiveness of group acceptance and commitment therapy for fibromyalgia: a 6-month randomized controlled trial (EFFIGACT study). *Pain*. 2014;155:693–702.
  44. Simister HD, Tkachuk GA, Shay BL, Vincent N, Pear JJ, Skrabek RQ. Randomized Controlled Trial of Online Acceptance and Commitment Therapy for Fibromyalgia. *J Pain*. 2018;19:741–753.
  45. Wicksell RK, Kemani M, Jensen K, Kosek E, Kadetoff D, Sorjonen K, et al. Acceptance and commitment therapy for fibromyalgia: a randomized controlled trial. *Eur J Pain*. 2013;17:599–611.
  46. McCracken LM, Yu L, Vowles KE. New generation psychological treatments in chronic pain. *BMJ*. 2022;376:e057212.
  47. Ehde DM, Dillworth TM, Turner JA. Cognitive-behavioral therapy for individuals with chronic pain: efficacy, innovations, and directions for research. *Am Psychol*. 2014;69:153–166.
  48. Lami MJ, Martínez MP, Sánchez AI. Systematic review of psychological treatment in fibromyalgia. *Curr Pain Headache Rep*. 2013;17:345.
  49. Hegarty RSM, Fletcher BD, Conner TS, Stebbings S, Treharne GJ. Acceptance and commitment therapy for people with rheumatic disease: Existing evidence and future directions. *Musculoskeletal Care*. 2020;18:330–341.
  50. Terpstra JA, van der Vaart R, Ding HJ, Kloppenburg M, Evers AWM. Guided internet-based cognitive-behavioral therapy for patients with rheumatic conditions: A systematic review. *Internet Interv*. 2021;26:100444.
  51. van de Graaf DL, Trompeter HR, Smeets T, Mols F. Online Acceptance and Commitment Therapy (ACT) interventions for chronic pain: A systematic literature review. *Internet Interv*. 2021;26:100465.
  52. Climent-Sanz C, Valenzuela-Pascual F, Martínez-Navarro O, Blanco-Blanco J, Rubi-Carnacea F, García-Martínez E, et al. Cognitive behavioral therapy for insomnia (CBT-i) in patients with fibromyalgia: a systematic review and meta-analysis. *Disabil Rehabil*. 2022;44:5770–5783.
  53. Wetherell JL, Petkus AJ, Alonso-Fernandez M, Bower ES, Steiner AR, Afari N. Age moderates response to acceptance and commitment therapy vs. cognitive behavioral therapy for chronic pain. *Int J Geriatr Psychiatry*. 2016;31:302–308.
  54. Barry DT, Beitel M, Cutter CJ, Fiellin DA, Kerns RD, Moore BA, et al. An evaluation of the feasibility, acceptability, and preliminary efficacy of cognitive-behavioral therapy for opioid use disorder and chronic pain. *Drug Alcohol Depend*. 2019;194:460–467.
  55. Wiles N, Thomas L, Abel A, Ridgway N, Turner N, Campbell J, et al. Cognitive behavioural therapy as an adjunct to pharmacotherapy for primary care based patients with treatment resistant depression: results of the CoBaIT randomised controlled trial. *Lancet*. 2013;381:375–384.