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Review article

Effects of group Acceptance and Commitment Therapy (ACT) on anxiety and depressive symptoms in adults: A meta-analysis

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ABSTRACT

Background: A comprehensive meta-analysis quantitatively examining the effects of group Acceptance and Commitment Therapy (ACT) on anxiety and depressive symptoms is required to advance our understanding of its efficacy and moderating factors.

Methods: Four electronic databases were searched in August 2018. An update search was conducted in November 2021. Forty-eight randomised controlled trials (RCTs) were included in this review (3292 participants: anxiety = 34 RCTs, depression = 40 RCTs).

Results: The overall effect size for anxiety symptoms was medium-to-large ($g = 0.52$, $p < 0.001$; 95% CI = 0.30–0.73), while the overall effect size was small-to-medium for depressive symptoms ($g = 0.47$, $p < 0.001$; 95% CI = 0.31–0.64). Subgroup analyses demonstrated that group ACT was significantly superior to non-active controls (e.g., waiting list) in reducing anxiety and depressive symptoms. Group ACT was only significantly superior to active controls (e.g., CBT) in reducing depressive symptoms. Subgroup analyses also demonstrated that the effect size can vary depending on the number of sessions provided and the primary condition of participants recruited.

Limitations: The number of studies included in each category of subgroup analyses was small and the risk of bias varied across studies. There was high heterogeneity among the included studies, and this might have affected the results.

Conclusion: The current evidence suggests that group ACT may be effective in treating anxiety and depressive symptoms, perhaps more so for depressive symptoms when compared to other well-established treatments. The intensity of treatment and the targeted population may need to be considered when delivering group ACT.

1. Introduction

The number of people living with common mental health problems such as anxiety and depression are increasing worldwide. It is estimated that between 2005 and 2015 there was an increase of 18.4% in the number of people living with depressive disorders and 14.9% in the number of people living with anxiety disorders (GBD 2015 Disease and Injury Incidence and Prevalence Collaborators, 2016). Unequal access to mental health services is prominent across the world, particularly in low- and middle-income countries where people have less access to mental health services compared to those living in high-income countries due to the availability of resources such as qualified mental health professionals (World Health Organization, 2018).

Due to the increasing prevalence, there is a greater need for a more cost-effective way of delivering evidence-based treatment such as group-based therapy rather than individualised interventions, particularly in

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countries where resources are limited including high-income countries. Group-based therapy has several known benefits. Most importantly, the group format can be time- and cost-efficient (Kalodner and Hanus, 2011). Group-based therapy also has unique therapeutic benefits such as reducing feelings of isolation and providing the opportunity to learn from the experiences of other attendees and model new coping strategies and behaviours based on such shared learnings (Rath et al., 2017).

There is considerable evidence supporting that Cognitive Behavioural Therapy (CBT) is the most well-established psychological treatment for anxiety and depression (Hofmann et al., 2012). However, while the evidence for individualised CBT for common mental health problems is well established, the efficacy of CBT can be limited when it is delivered in a group format. For example, Cuijpers et al. (2008) conducted a meta-analysis of 15 studies in which group-based CBT and individual CBT were directly compared. The findings demonstrated that individual CBT may be more effective than group-based CBT in the treatment of depressive disorders and depressive symptoms in the short term. The findings also suggested a lower drop-out rate in individual CBT compared to group-based CBT, which was one of the possible reasons for the difference between individual and group therapies. A more recent meta-analysis (Cuijpers et al., 2019), which included 155 studies, also supported similar findings and pairwise comparisons of individual and group therapies demonstrated that group-based CBT was statistically significantly less effective than individual CBT.

Acceptance and Commitment Therapy (ACT) is a form of CBT that aims to reduce avoidance and enhance goal-directed behaviour by promoting one's psychological flexibility – the ability to choose to do what matters most, even in the presence of painful obstacles (Hayes et al., 2012). Individual ACT is considered to be effective for the treatment of various conditions including somatic health problems (Veehof et al., 2016) and common mental health problems (Fledderus et al., 2011). A recent review demonstrated that the comparison between ACT and well-established treatments such as CBT did not reveal any significant differences, suggesting that ACT may be as effective in treating people with mental health or somatic health problems as established psychological interventions (A-Tjak et al., 2015).

Furthermore, a meta-analysis that investigated the dropout rate during individual ACT across 56 randomised controlled trials (RCTs) demonstrated a pooled dropout rate of 16% (Ong et al., 2018). A similar meta-analysis of 115 RCTs of CBT demonstrated a pooled dropout rate of 26.2% during treatment (Fernandez et al., 2015). Considering that the efficacy of group CBT is limited, it may be worth investigating the efficacy of group ACT as a potential alternative to such conventional group approaches since individual ACT may be as effective as individual CBT and the dropout rate for individual ACT may be comparative or lower than individual CBT.

There is a recently published systematic review (Coto-Lesmes et al., 2020), which included 15 studies exploring the efficacy of group ACT on depressive and anxiety symptoms. This systematic review included studies that recruited children and adults and combined the findings from RCTs and non-RCTs, and thus quantitative synthesis was not conducted. Although this comprehensive review provided a valuable understanding of group ACT, reaching a more valid conclusion based on a more appropriate comparison metric may help direct focus on the important clinical task of understanding the efficacy of group ACT.

Therefore, the present meta-analysis only focuses on the RCTs of group-based ACT and aims to quantitatively examine the efficacy of group-based ACT, delivered face-to-face, on anxiety and depressive symptoms in adults aged 18 or older. This study also aims to identify possible moderating factors that may influence the efficacy of group-based ACT (e.g., type of control condition, number of sessions, instrument used to measure outcomes, and the primary condition of participants recruited) to provide wider clinical implications.

2. Methods

This meta-analysis adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (Moher et al., 2009).

2.1. Inclusion criteria

To be included in the meta-analysis, studies had to meet the following criteria:

2.1.1. Population

Participants had to be aged 18 years or older. Both clinical (e.g., individuals with chronic pain or psychosis) and non-clinical (e.g., university students, healthy controls) populations were eligible. Studies that recruited participants with cognitive impairment were excluded.

2.1.2. Intervention

Participants had to be randomised to either a treatment condition or a control condition. Treatment conditions had to involve ACT techniques and be delivered in a face-to-face group format. Treatment conditions that combined ACT techniques with other approaches (e.g., brief education) were also eligible if the majority (more than 60%) of the treatment was based on ACT. If non-group components (e.g., online learning materials) were incorporated, more than 60% of the sessions had to be delivered in a face-to-face group format.

2.1.3. Control

Both active and non-active control conditions that did not involve any ACT techniques were eligible.

2.1.4. Outcome

Studies had to report the efficacy of the intervention on anxiety or depressive symptoms as one of the outcome measures. These outcomes had to be assessed using a validated standardised measure. Studies had to report pre- and immediately post-therapeutic results. When the data needed for calculating effect sizes (i.e., means, standard deviations, and sample sizes) were not reported, the corresponding author was contacted for further details. Studies were excluded if further information was not provided by the corresponding author. The search was limited to studies written in English, Spanish or Portuguese and published in peer-reviewed journals. No restrictions were applied to publication date.

2.2. Search strategies

The following electronic databases were searched between July and August 2018: LILACS (all text), PubMed (all text), Scopus (title, abstract, keywords) and PsycINFO (all text). An updated search was conducted in November 2021 using the same databases. Additionally, hand searches were conducted on the reference list of relevant systematic reviews and the website of the Association for Contextual Behavioral Science, a fundamental source of ACT materials.

Search terms were used for Acceptance and Commitment Therapy (acceptance and commitment therapy OR acceptance based OR acceptance-based OR value based OR value-based), group intervention (group*) and psychological outcomes (depression OR anxiety OR depressive OR distress OR stress OR strain). The detailed search strategy can be found in the supplementary material (See Supplementary material - Supplementary Table 1).

2.3. Data extraction

A checklist outlining the inclusion criteria was developed in order to facilitate the screening process. Two authors (MGF and NK) piloted the checklist to ensure the accurate screening of eligible studies. For the initial searches conducted in August 2018, records were first screened by the first author (MGF), who, after removing duplicates, read all the titles

and abstracts, and excluded 627 articles. The remaining 223 articles were assessed in full text independently by the first author (MGF) and one of three co-authors (JVR, LIM and NK), providing two independent coders for each paper. Disagreements between authors were discussed and a consensus was obtained. For the updated searches conducted in November 2021, records were screened by the first author (MGF), who, after removing duplicates, read all the titles and abstracts, and excluded 431 articles. The remaining 157 articles were assessed in full text by the first author (MGF). The list of included articles was checked by one of the co-authors (NK).

2.4. Coding procedure

For each included study, information was recorded on: (a) the country where research was conducted; (b) participants mean age and standard deviation; (c) main characteristics and presenting conditions of the study sample (e.g., students with stress, prisoners with substance use disorder, adults with vascular disease risk, older people with chronic pain); (d) characteristics of the ACT group intervention (i.e., number of ACT sessions, length of time per ACT session, total duration of intervention, number of participants per ACT group); (e) type of control condition; (f) outcome measure used to assess anxiety and depressive symptoms; (g) means, standard deviations and sample sizes for the outcome measures in treatment and control conditions at pre-test and post-test; (h) whether the study used intention-to-treat or completer analysis.

Information was extracted using a purposely designed electronic data extraction sheet. First, two authors (MGF and NK) read a random set of five papers from the dataset and independently completed an electronic data extraction sheet in order to ensure the accurate coding of included studies. For the studies identified following the initial searches conducted in August 2018, data were then extracted independently from each study by the first author (MGF) and one of three coders (NK and two research assistants). Disagreements between coders were discussed and a consensus was obtained. For the studies identified following the updated searches conducted in November 2021, data were extracted from each study by the first author (MGF). One of the coders (NK) extracted data from randomly selected two papers (10% of identified studies) to check the accuracy of the dataset.

2.5. Risk of bias in individual studies

The risk of bias in individual studies was assessed using the Cochrane risk of bias tool for randomised trials (Higgins and Green, 2011). The tool assesses six aspects of methodological quality: (1) random sequence generation; (2) allocation concealment; (3) blinding of the participants and investigators during the intervention; (4) blinding of the outcome assessor during the post-test; (5) complete outcome data; and (6) selective reporting. Each of the six aspects of methodology is graded as low risk, high risk or unclear.

First, a detailed guideline was developed based on the Cochrane tool to facilitate the assessment process. Two independent authors (MGF and NK) read a random set of three papers and independently assessed the methodological quality based on the guidelines in order to ensure the accurate assessment of the risk of bias in individual studies. For the studies identified following the initial searches conducted in August 2018, two independent assessors, the first author (MGF) and one of two co-authors (JVR, LIM), assessed the methodological quality of each study. Disagreements were discussed and a consensus was obtained. For the studies identified following the updated searches conducted in November 2021, the first author (MGF) assessed the methodological quality of each study. One of the co-authors (NK) assessed the methodological quality of randomly selected two papers (10% of identified studies) to check the accuracy of ratings.

2.6. Statistical methods

Data were analysed using the Open Meta-Analyst (Wallace et al., 2012). Effect sizes for the differences between treatment and control conditions were calculated for each study using Hedge's *g*. A fixed effect model was used to provide a pooled estimated effect for each outcome (i.e., anxiety and depressive symptoms). Heterogeneity was assessed using the *Q*-statistic, and the I^2 statistic. If significant heterogeneity was found, a random effect model analysis was performed.

A subgroup analysis was performed to examine sources of variance if data were clearly heterogeneous. A series of subgroup analyses using the following moderators were conducted: type of control condition (active or non-active); type of outcome measure used; and the number of ACT group sessions provided. The main characteristic of the study sample was also used as a moderator. Based on the primary characteristic and the presenting condition of the study sample, each study was classified into the following seven sample categories: mental health, physical health, forensic, student, work, parents or physical and mental health. For example, if participants of the included study were adults with vascular disease and this was a primary presenting condition of the sample, the study was classified as “physical health”. If participants presented both physical and mental health conditions (e.g., cancer survivors presenting anxiety symptoms), the study was classified as “physical and mental health”.

3. Results

3.1. Study selection

Fig. 1 presents the flow diagram illustrating the study selection process. The initial searches conducted in August 2018 resulted in the identification of 31 studies. The update searches conducted in November 2021 resulted in the identification of additional 17 studies. Although additional 18 studies were considered eligible for the current meta-analysis, means and standard deviations required for calculating the effect sizes were not reported in these studies. We contacted the authors of these potentially eligible studies via email, but the data required were not provided and therefore these studies were excluded from the current review. Of the total 48 studies included, 34 studies reported the efficacy on anxiety symptoms and 40 studies reported the efficacy of group ACT on depressive symptoms.

3.2. Study characteristics

Tables 1 and 2 present the characteristics of the included studies. Although there was not limit for the year of publication, all included studies, except for one, were published after 2010.

3.2.1. Population

The majority of the studies ($n = 22$) were conducted in Europe, followed by Asia ($n = 10$), North America ($n = 10$), Oceania ($n = 4$) and South America ($n = 2$). When comparing the data from 2018 and the new search performed in 2021, an increase in the number of studies conducted outside of Europe (mostly in Asia) was observed. Of the 47 studies that reported sociodemographic information, the mean age of participants was between 18 and 65 years in 45 studies, while only two studies recruited participants aged 65 or above. Of the 45 studies that reported biological sex distribution, more than 60% of the participants were female in most studies ($n = 35$). Therefore, the majority of the participants included in the analysis were working age females living in European developed countries.

The primary inclusion criteria for the trial varied across studies. Forty-two per cent of the studies ($n = 20$) recruited participants with a physical condition (e.g., musculoskeletal pain) and 25% of the studies ($n = 12$) recruited participants with a mental health condition (e.g., generalized anxiety disorder). Eight per cent of the studies ($n = 4$)

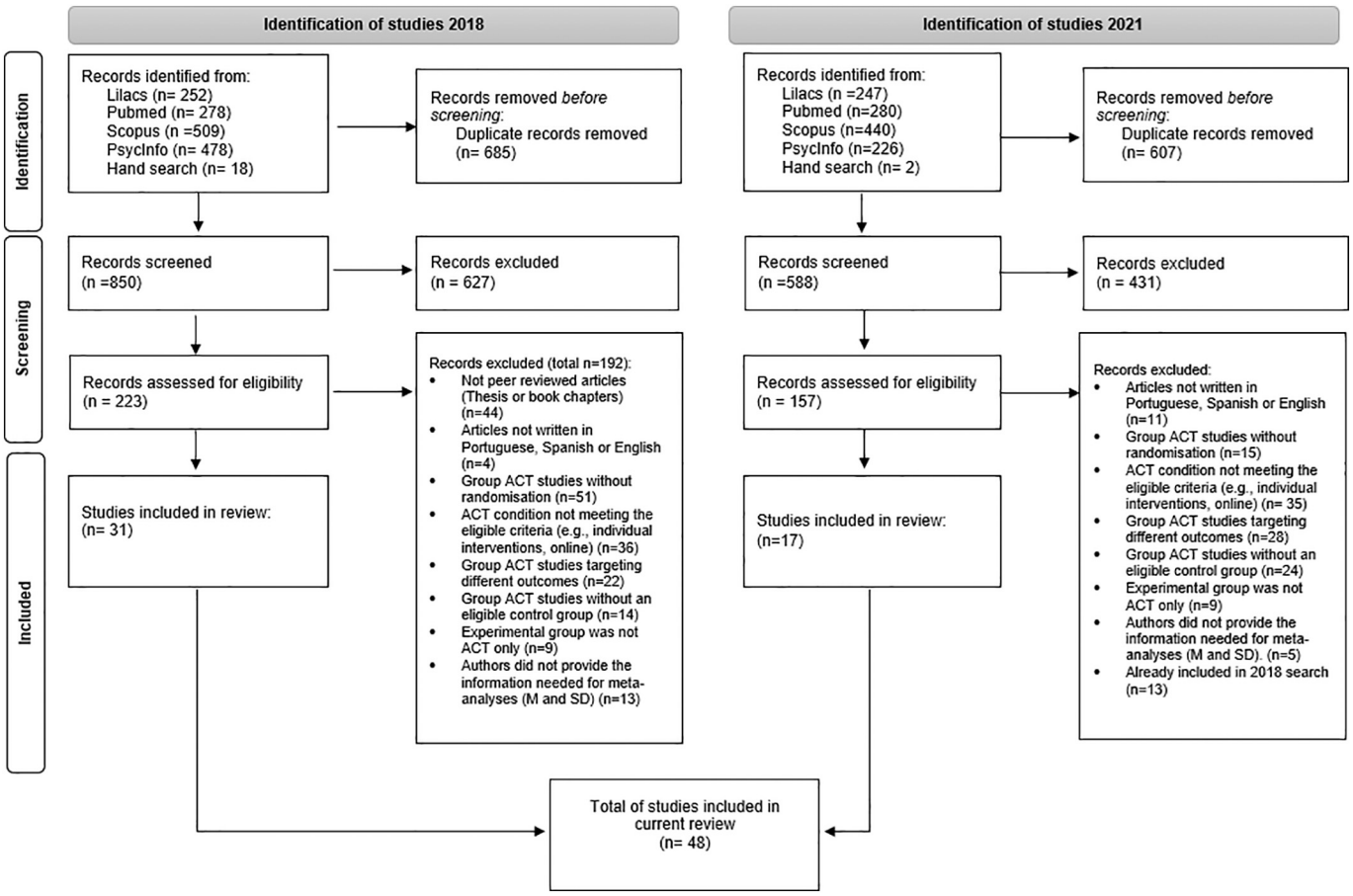

Fig. 1. Flowchart of the Selection of Studies.

included participants with a physical condition together with a mental health condition (e.g., cancer survivors with anxiety or depression). The remaining articles included participants who were student populations (e.g., first-year Nursing students) ($n = 3$), parents caring for children with a disability or chronic illness ($n = 3$); forensic populations (e.g., male offenders) ($n = 3$) and other three articles were conducted in the workplace (e.g., employees from a media organisation).

3.2.2. Intervention

Sixty-seven per cent of the studies ($n = 32$) provided 6–12 sessions of group ACT. Of the 36 studies that reported the duration of ACT sessions, the length of each group ACT session was 90 min in 37% of the studies ($n = 18$) and 120 min in 29% of the studies ($n = 14$). Therefore, the most common formats utilised were 6–12 sessions of 90- or 120-min group ACT delivered on a weekly basis.

Nineteen studies did not report the number of participants per ACT group. The remaining 29 studies reported different numbers of participants ranging from three to 16 participants per ACT group. Only four studies report that a consistent number of participants were allocated to each group during the trial, while the remaining 25 studies reported that the number of participants varied across groups during the trial.

3.2.3. Control

Nine of the included studies utilised more than one control condition; therefore, 57 control groups were identified in total. The control conditions were classified into active control groups ($n = 20$) and non-active control groups ($n = 37$). Active control conditions included: CBT ($n = 10$), pharmacological treatment ($n = 1$), and other specific techniques that focused on teaching participants ways to manage anxiety and depressive symptoms, such as relaxation or behavioural activation ($n = 9$). Non-active conditions included: waiting list ($n = 18$), treatment as usual ($n = 12$), and other forms of non-psychotherapeutic approach such as education and discussion groups ($n = 7$).

3.2.4. Outcomes

Thirty-four studies reported the efficacy of group ACT on anxiety symptoms. Eight different measures were used to evaluate anxiety symptoms across included studies with only one of them being a clinician-reported measure (Hamilton Rating Scale for Anxiety; HRSA). The Hospital Anxiety and Depression Scale - Anxiety (HADS-A) was the most commonly used measure for anxiety symptoms (32%), followed by the Depression, Anxiety and Stress Scale (DASS) (18%), the Beck Anxiety Inventory (BAI) (12%), the General Anxiety Disorder (GAD-7) (12%) and the State Trait Anxiety Inventory - Trait (STAI-T) (12%).

Forty studies reported the efficacy of group ACT on depressive symptoms. Nine different measures were used to evaluate depressive symptoms across included studies with only one of them being a clinician-reported measure (Hamilton Rating Scale for Depression; HRSD). The Beck Depression Inventory (BDI) was the most commonly used measure of depressive symptoms (29%), followed by the Hospital Anxiety and Depression Scale - Depression (HADS-D) (21%) and the Patient Health Questionnaire (PHQ-9) (12%) (see Table 2).

3.3. Risk of bias within studies

Fig. 2 summarises the results of risk of bias assessments for the six aspects of methodological quality proposed by Higgins and Green (Higgins and Green, 2011). The risk of bias for each study is provided in the supplementary material (See Supplementary material - Supplementary Table 2).

Table 1
Sample characteristics and main inclusion criteria for each study.

Study first named author	Country	Sample size (Intervention)	Sample size[a] (Control)	Mean Age[b] (SD)	Total sample (% female)	Main inclusion criteria
Alonso-Fernandez et al., 2016	Spain	27	26	83.0 (6.8)	78.1%	Elderly with musculoskeletal pain
Arch et al., 2021	USA	68	67	56.1 (11.6)	88.1%	Adults who survived cancer with anxiety
Avdagic et al., 2014	Australia	19	19	36.2 (13.1)	66.7%	Adults with Generalized Anxiety Disorder
Bohlmeijer et al., 2011	Netherlands	49	44	49.02 (10.70)	81.7%	Adults with depressive symptomatology
Bond and Bunce, 2000	England	24	C1 = 21 C2 = 20	36.4 (9.7)	50.0%	Employees from a media organization who volunteered for a stress management program
Chew et al., 2018	Malaysia	53	71	55.7 (9.7)	61.0%	Adults with Type 2 diabetes with high stress level
Chong et al., 2019	China	84	84	38.4 (5.9)	88.00%	Parents of children with asthma
Clarke et al., 2014	UK	25	16	43.5 (12.4)	67.2%	Treatment resistant patients from a personality disorder clinic
Davoudi et al., 2020	Iran	20	20	*I* = 58.6 (9.3) C1 = 56.0 (9.7)	*I* = 45% C = 60%	Adults with painful diabetic neuropathy
Dindo et al., 2015	USA	30	C1 = 14 C2 = 26	45.0 (NR)	66.5%	Adults with vascular disease risk
Dindo et al., 2020	USA	56	47	*I* = 36.9 (14.9) C1 = 34.4 (12.6)	82.5%	Adults with migraine
Eisenbeck et al., 2016	Hungary	5	5	26.5 (8.1)	0.0%	Male offenders charged with violent crimes
El Rafihi-Ferreira et al., 2020	Brazil	17	14	40.2 (10.5)	60.0%	Adults with insomnia
England et al., 2012	USA	21	24	31.9 (10.5)	80.0%	Adults with public speaking anxiety
Fathi et al., 2017	Iran	20	20	*I* = 33.4 (3.7) C1 = 32.5 (5.7)	100.0%	Women with Generalized Anxiety Disorder
Fernández-Rodríguez et al., 2020	Spain	17	C1 = 22 C2 = 27	51.5	93.5%	Cancer survivors with depression and or anxiety
Folke et al., 2012	Sweden	18	16	43.2 (9.5)	88.2%	Unemployed adults with Depressive Disorder
Ghorbani et al., 2021	Iran	20	20	*I* = 46.10 (6.38) C1 = 44.55(9.12)	100.0%	Women with breast cancer
Giovannetti et al., 2021	Italy	20	19	45.7 (9.1)	59.0%	Adults with Multiple Sclerosis
Gloster et al., 2017	Switzerland	16	19	22.3 (NR)	71.4%	University students
Gonzalez-Fernandez et al., 2018	Spain	12	C1 = 17 C2 = 23	51.7 (6.8)	92.3%	Patients who have finished oncological treatment
González-Menéndez et al., 2014	Spain	18	19	33.6 (7.5)	100.0%	Female offenders with a drug dependency
Grazzi et al., 2021	Italy	18	17	*I* = 43.5 (38.2–48.8) C1 = 42 (36.5–47.5)	not reported	Adults with high frequency migraine without aura
Grégoire et al., 2018	Canada	72	72	31.7 (9.2)	73.6%	University students
Hahs et al., 2019	USA	9	9	45.1 (6.1)	72.2%	Parents of children with Autism Spectrum disorder
Heydari et al., 2018	Iran	15	15	NR	NR	Employees of a psychiatric clinic
Kemani et al., 2015	Sweden	30	30	40.3 (11.4)	73.3%	Adults with chronic pain (<6 months)
Kocovski et al., 2013	Canada	53	C1 = 53 C2 = 31	*I* = 34.9 (12.5) C1 = 32.7 (9.1) C2 = 36.6 (11.6)	54.0%	Adults with Social Anxiety Disorder
Lanza et al., 2014	Spain	18	C1 = 19 C2 = 13	33.2 (7.3)	100.0%	Female offenders with Substance Use Disorder
López-López and Alonso-Fernández, 2013	Spain	53	48	*I* = 82.0 (7) C1 = 84.0 (7)	79.7%	Elderly with pain related to arthrosis
Luciano et al., 2014	Spain	51	C1 = 52 C2 = 53	*I* = 48.9 (5.9) C1 = 47.8 (5.9) C2 = 48.3 (5.7)	15.0%	Adults with fibromyalgia
Majumdar and Morris, 2018	England	26	27	62.7 (13.9)	39.6%	Stroke survivors
McCracken et al., 2013	UK	31	27	58.0 (12.8)	68.5%	Adults with chronic pain (<3 months)
Mo'tamedi et al., 2012	Iran	15	15	*I* = 34.2 (7.4) C1 = 37.9 (8.7)	100.0%	Women diagnosed of primary chronic (migraine and tension-type) headache
Mohabbat-Bahar et al., 2015	Iran	15	15	*I* = 45.4 (NR) C1 = 49.7 (NR)	100.0%	Women diagnosed with breast cancer
Montaner et al., 2021	Spain	51	54	41.1 (1.2)	93.3%	Professional dementia caregivers
Morin et al., 2021	Canada	61	63	30.58 (8.67)	75.8%	University students
Morton et al., 2012	Australia	21	20	*I* = 35.6 (9.3) C1 = 34.0 (9.0)	92.7%	Adults with Borderline Personality Disorder
Rohani et al., 2018	Iran	16	16	27.91 (7.26)	100.0%	Women with Obsessive Compulsive Disorder on optimal dose of selective serotonin reuptake inhibitors
Sampaio et al., 2020	Brazil	21	23	36.5 (12.4)	73.9%	Adults with Generalized Anxiety Disorder
Spidel et al., 2017	Canada	30	20	40.4 (NR)	52.0%	Adults with psychosis and trauma history
Wetherell et al., 2011	USA	57	57	54.9 (12.5)	50.9%	Adults reporting chronic, non-malignant pain (<6 months)
Whitehead et al., 2017	New Zealand	39	C1 = 26 C2 = 41	*I* = 56.1 (6.9) C1 = 53.8 (8.7) C2 = 56.4 (7.0)	46.6%	Adults with type 2 diabetes and persistent, suboptimal glycaemic control
Whittingham et al., 2016	Australia	21	17		97.0%	Parents of children, aged 2–12 years, with a diagnosis of cerebral palsy

(*continued on next page*)

Table 1 (*continued*)

Study first named author	Country	Sample size (Intervention)	Sample size[a] (Control)	Mean Age[b] (SD)	Total sample (% female)	Main inclusion criteria
				I = 37.9 (9.4) C1 = 38.7 (5.5) C2 = 39.7 (6.1)		
Wicksell et al., 2013	Sweden	20	16	45.1 (6.6)	100.0%	Women with fibromyalgia
Wiklund et al., 2018	Sweden	64	C1 = 75 C2 = 61	54.2 (10.2)	NR	Adults with chronic (> 3 months) benign neck, low back, and/or generalized pain.
Wynne et al., 2019	Ireland	37	42	*I* = 39.9 (12.2) C1 = 40.6 (11.2)	54.43%	Adults with Inflammatory Bowel Disease
Zemestani and Mozaffari, 2020	Iran	23	29	*I* = 23.72 (4.18) C = 25.18(4.23)	73.3%	Adults with physical disabilities and depression

[a] Some studies had more than one control group and they were named C1 = Control group 1; C2 = Control group 2.
[b] Some studies did not report the mean age for the total sample, but reported the mean age for each group: I = Intervention group; C1 = Control group 1; C2 = Control group 2.

The majority of the included studies used an intention-to-treat analysis or clearly reported the reasons for missing outcome data, therefore they demonstrated a low risk of bias in terms of complete outcome data (79%). The risk of bias in terms of the random sequence generation was low for more than half of the studies reported (56%), as they clearly reported how the randomisation process was performed. The majority of the included studies demonstrated a high risk of bias in terms of blinding of the participants and investigators (79%).

The other three aspects of the methodological quality assessment were unclear for the majority of the studies. Most studies (69%) did not describe if the outcome assessor was blinded or not to the randomisation status. The risk of bias in terms of selective reporting was unclear for most included studies (69%) as the studies did not report whether a study protocol has been published or the trial has been registered. Many included studies also did not report the details on how the allocation was concealed from participants and investigators and demonstrated unclear risk of bias (52%).

3.4. Synthesis of results

3.4.1. Anxiety symptoms

A total of 34 studies reported the efficacy of group ACT on anxiety symptoms. Of those, six studies used two different types of control conditions (i.e., active and non-active controls) within a single trial, and one study used two different outcome measures for anxiety symptoms which resulted in 41 comparisons to be included in the meta-analysis. A fixed model was used to evaluate the efficacy of group ACT on anxiety symptoms. There was high heterogeneity between study effect sizes (Q (40) = 273.68, $p < 0.001$; $I^2 = 85.38$). Therefore, a random effect model (Fig. 3) was used to calculate the pooled effect size. Overall effect size for anxiety symptoms was medium to large ($g = 0.52$, $p < 0.001$; 95% CI = 0.30–0.73).

3.4.2. Depressive symptoms

A total of 40 studies reported the efficacy of group ACT on depressive symptoms. Seven studies used two different types of control conditions within a single trial and three studies used two different outcome measures for depressive symptoms. This resulted in a total of 50 comparisons to be included in the meta-analysis. A fixed model was used to evaluate the efficacy of group ACT on depressive symptoms. There was moderate heterogeneity between study effect sizes (Q (49) = 247.82, $p < 0.001$; $I^2 = 80.23$). Therefore, a random effect model (Fig. 4) was used to calculate the pooled effect size. Overall effect size for depressive symptoms was small to large ($g = 0.47$, $p < 0.001$; 95% CI = 0.31–0.64).

3.5. Additional analysis

The forest plot for each subgroup analysis is presented in the supplementary material.

3.5.1. Anxiety symptoms subgroup analysis

Subgroup analysis demonstrated that group ACT was significantly effective in reducing anxiety symptoms compared to non-active controls ($g = 0.70$, $p < 0.001$), but not when compared to active controls ($g = 0.17$, $p = 0.369$.). Group ACT was significantly effective compared to control groups when anxiety symptoms were measured using HRSA ($g = 2.09$, $p = 0.013$), BAI ($g = 1.45$, $p = 0.002$) HADS-A ($g = 1.18$, $p = 0.039$) and GAD-7 ($g = 1.04$, $p = 0.034$). Sixteen studies used HADS-A, however, the other measures were used only in a small number of studies (three or four studies) and thus results must be interpreted with caution. Group ACT was not significantly effective compared to control groups when anxiety symptoms were measured using DASS-A, STAI-S/T or Anxiety Sensitivity Index (ASI).

Regarding the number of ACT sessions provided, group ACT was significantly effective when the studies provided one or two sessions in a workshop format (e.g., one-day workshop) ($g = 1.0$, $p = 0.040$) and also when the studies provided 6–12 group sessions ($g = 0.51$, $p < 0.001$). Group ACT was significantly effective compared to controls when the main presenting condition of participants was mental health problems ($g = 0.91$, $p = 0.011$), physical health problems ($g = 0.49$, $p = 0.003$) or when the studies recruited students ($g = 0.28$, $p = 0.016$).

3.5.2. Depressive symptoms subgroup analysis

Subgroup analyses showed that group ACT was significantly effective in reducing depressive symptoms compared to both non-active controls ($g = 0.55$, $p < 0.001$) and active controls ($g = 0.30$, $p = 0.041$). Group ACT was also significantly effective compared to control conditions when depressive symptoms were measured using HRSD ($g = 2.66$, $p < 0.001$); Depression, Anxiety and Stress Scale - Depression (DASS-D) ($g = 0.75$, $p = 0.005$); BDI ($g = 0.38$, $p < 0.001$); HADS-D ($g = 0.20$, $p = 0.021$), but not when other types of measures of depressive symptoms were used.

Group ACT was significantly effective compared to controls when they were delivered in a workshop format ($g = 1.70$, $p = 0.013$) and when the studies provided over 2–5 sessions ($g = 0.41$, $p = 0.001$) or 6–12 sessions ($g = 0.35$, $p < 0.001$). Only one study delivered more than 13 group ACT sessions, therefore no comparisons were possible within this group. Group ACT was significantly effective compared to controls in all sample categories, except when participants were from a work population. Only one study had a forensic population, therefore no comparisons were possible. The largest effect size was found for the studies that recruited parents ($g = 0.65$, $p = 0.046$), followed by those recruited individuals with physical health problems ($g = 0.59$, $p < 0.001$), physical and mental health problems ($g = 0.51$, $p = 0.012$) and mental health problems ($g = 0.24$, $p = 0.009$) and students ($g = 0.34$, $p = 0.006$).

Table 2
Characteristics of intervention, control type and outcome measures for each study.

Study first named author	Number of ACT sessions	Length of time per ACT session (minutes)	Total length of ACT intervention[a]	Number of participants per ACT group session	Control group description	Outcome measure Anxiety	Outcome measure Depression
Alonso-Fernandez et al., 2016	9	120	9 weeks	Up to 8	Minimal support group	–	GDS
Arch et al., 2021	7	120	7 weeks	5 to 6	TAU + email with education	HAD-A	CESD
Avdagic et al., 2014	6	120	6 weeks	4 to 6	CBT	DASS-A	DASS-D
Bohlmeijer et al., 2011	8	120	8 weeks	average 7	Wait list	HADS-A	CESD
Bond and Bunce, 2000	3	205	12 weeks	5 to 11	C1 = Innovation Promotion Program C2 = Wait list	–	BDI
Chew et al., 2018	6	120	30 weeks	10 to 12	Attention control group	–	PHQ-9
Chong et al., 2019	4	120	4 weeks	6 to 8	Asthma education	DASS-A	DASS-D
Clarke et al., 2014	16	100	16 weeks	Up to 11	CBT	–	BDI
Davoudi et al., 2020	8	90	8 weeks	NR	Psychoeducation	–	BDI
Dindo et al., 2015	1	360	1 day	7 to 10	Treatment as usual	HRSA	HRSD + IDAS
Dindo et al., 2020	1	300 a 360	1 day	4 to 8	Education about migraine + relaxation	HRSA	HRSD
Eisenbeck et al., 2016	6	NR	6 weeks	4 to 6	CBT for insomnia	HADS-A	HADS-D
El Rafihi-Ferreira et al., 2020	10	90	10 weeks	NR	CBT	BAI	BDI-SF
England et al., 2012	6	120	6 weeks	6 to 8	Exposure with habituation rationale	STAI-S	–
Fathi et al., 2017	12	NR	12 weeks	NR	Wait list	BAI	–
Fernández-Rodríguez et al., 2020	12	90	12 weeks	Up to 6	C1 =Behavioural Activation C2 = Wait List	HADS-A	HADS-D + BDI
Folke et al., 2012	5	120–180	NR	NR	Treatment as usual	–	BDI
Ghorbani et al., 2021	8	90	8 weeks	NR	Wait List	–	DASS-D
Giovannetti et al., 2021	8	150	8 weeks	NR	Relaxation Group	HADS-A	HADS-D
Gloster et al., 2017	2	360	2 weeks	6 to 10	Wait List	STAI-T	–
Gonzalez-Fernandez et al., 2018	12	90	12 weeks	Up to 6	C1 = Behavior activation C2 = Wait list	HADS-A	HADS-D
González-Menéndez et al., 2014	16	90	16 weeks	NR	CBT	ASI	–
Grazzi et al., 2021	8	90	8 weeks	5 to 7	Treatment as usual	HADS-A	HADS-D
Grégoire et al., 2018	4	150	4 weeks	8 to 15	Wait list	GAD-7	PHQ-9
Hahs et al., 2019	2	120	1 week	NR	Wait list	–	BDI
Heydari et al., 2018	8	90	8 weeks	NR	Wait list	BAI	BDI
Kemani et al., 2015	12	90	12 weeks	6	Applied relaxation	HADS-A	HADS-D
Kocovski et al., 2013	12	120	12 weeks	NR	C1 = CBT C2 = Wait list	–	BDI
Lanza et al., 2014	16	90	16 weeks	NR	C1 = CBT C2 = Wait List	ASI	–
López-López and Alonso-Fernández, 2013	9	90	9 weeks	NR	Minimal therapeutic support	–	GDS
Luciano et al., 2014	8	150	8 weeks	10 to 15	C1 = Pharmacological treatment C2 = Wait List	HADS-A	HADS-D
Majumdar and Morris, 2018	4	120	4 weeks	3 to 9	Treatment as usual	GAD-7	PHQ-9
McCracken et al., 2013	4	240	2 weeks	12 to 13	Treatment as usual	–	PHQ-9
Mo'tamedi et al., 2012	8	90	8 weeks	15	Treatment as usual	STAI-T	–
Mohabbat-Bahar et al., 2015	8	90	4 weeks	NR	No intervention	BAI	BDI
Montaner et al., 2021	6	90	6 weeks	6 to 14	Wait List	STAI-T	–
Morin et al., 2021	4	150	4 weeks	NR	Wait List	GAD-7	PHQ-9
Morton et al., 2012	12	120	12 weeks	NR	Treatment as usual	DASS	DASS-D
Rohani et al., 2018	8	NR	8 weeks	NR	Pharmacological treatment	–	BDI
Sampaio et al., 2020	10	120	14 weeks	11 to 12	Non-Direct Supportive Therapy	DASS -A + HRSA	DASS-D
Spidel et al., 2017	8	70–75	NR	8	Treatment as usual	GAD-7	–
Wetherell et al., 2011	8	90	8 weeks	4 to 6	CBT	–	BDI
Whitehead et al., 2017	1	390	1 day	NR	C1 = Education C2 = Treatment as usual	HADS-A	HADS-D
Whittingham et al., 2016	2	120	1 weekend	NR	C1 = Stepping Stones only C2 = Wait list	DASS	DASS-D
Wicksell et al., 2013	12	90	12 weeks	6	Wait List	STAI-T	BDI
Wiklund et al., 2018	7	120	7 weeks	7 to 10		HADS-A	HADS-D

(continued on next page)

Table 2 (*continued*)

Study first named author	Number of ACT sessions	Length of time per ACT session (minutes)	Total length of ACT intervention[a]	Number of participants per ACT group session	Control group description	Outcome measure Anxiety	Outcome measure Depression
Wynne et al., 2019	8	90	8 weeks	14–16	C1 = Exercise program; C2 = Discussion group Medical treatment as usual	DASS - A	DASS-D
Zemestani and Mozaffari, 2020	8	90	8 weeks	NR	Psychoeducation	–	BDI

NR = Not Reported; C1 = Control 1; C2 = Control 2; CBT = Cognitive Behaviour Therapy; DASS = Depression, Anxiety and Stress Scale; HRSA = Hamilton Rating Scale for Anxiety; BAI=Beck Anxiety Inventory; STAI-S=State Trait Anxiety Inventory -State; STAI-T = State Trait Anxiety Inventory - Trait; HADS-A = Hospital Anxiety and Depression Scale – Anxiety; GAD-7 = General Anxiety Disorder; ASI = Anxiety Sensitivity Index; GDS = Geriatric Depression Scale; BDI=Beck Depression Inventory; BDI-SF=Beck Depression Inventory – Short Form; PHQ-9 = Patient Health Questionnaire; HRSD=Hamilton Rating Scale for Depression; IDAS=Inventory of Depression and Anxiety Symptoms; HADS-D=Hospital Anxiety and Depression Scale –Depression.

[a] In order to facilitate comparison, studies that reported the length of ACT intervention in months, were transformed in weeks. It was considered that each month had four weeks.

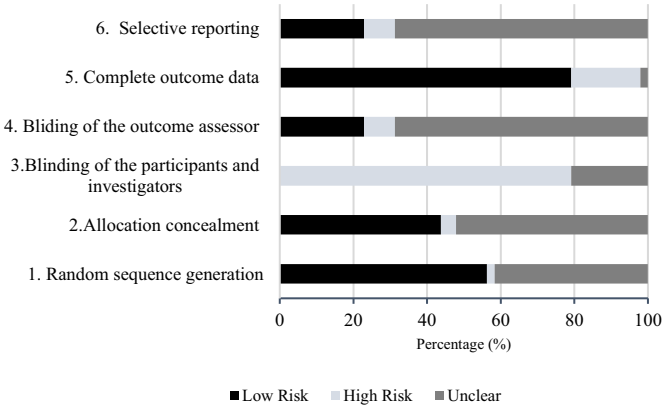

Fig. 2. Risk of Bias within Studies: Classification of Each Risk of Bias Item Presented as Percentage Across all Included Studies.

4. Discussion

The current study quantitatively evaluated the efficacy of group-based ACT on anxiety and depressive symptoms in adults using a meta-analytic approach. The results indicated that group ACT had a medium to large effect on anxiety symptoms ($g = 0.52$) and a small to medium effect on depressive symptoms ($g = 0.47$). This study also explored possible moderating factors that may interfere with the efficacy of group ACT. Group ACT was significantly effective when compared to non-active controls in reducing anxiety symptoms. However, these effects were no longer statistically significant when compared to active controls (e.g., CBT, pharmacological treatment, relaxation). In contrast, group ACT was significantly effective in reducing depressive symptoms compared to both non-active and active controls. These results are consistent with findings from previous meta-analyses, which included both individual and group ACT. Previous meta-analyses demonstrated that ACT is significantly more effective in treating anxiety and depression compared to non-active controls (A-Tjak et al., 2015) and potentially even more effective than active controls in treating depression (Gloster et al., 2020). The patterns presented in the current study (i.e., ACT being superior to both active and non-active controls in reducing depressive symptoms) reflect the findings from the previous studies that focused on different formats of ACT such as individual ACT.

The efficacy of group ACT also varied depending on the number of treatment sessions provided. Group ACT delivered in a one-day or two-days workshop format (approximately five hours in total) was effective in reducing both anxiety and depressive symptoms. Group ACT comprised 6–12 sessions was significantly effective for treating both anxiety and depressive symptoms. However, group ACT comprised 2–5 sessions was only effective in reducing depressive symptoms.

Findings also demonstrated group ACT was effective for reducing anxiety symptoms in people with a mental health condition (e.g., anxiety disorders, substance use disorder, personality disorder) or with a physical condition (e.g., musculoskeletal pain, vascular disease, fibromyalgia), or when the studies recruited student population. Group ACT was effective in treating depressive symptoms in broader populations including those presenting both physical and mental health conditions and parents of children living with a disability or chronic illness.

A previous review reported that studies that utilise group CBT tend to demonstrate higher dropout rates than studies that employ individual CBT (Cuijpers et al., 2008, 2019). In the current review, we were able to calculate the dropout rate from 48 included studies. The mean dropout rate of group ACT was 18% (*SD* = 15%; *Range*: 0% - 63%), which was relatively similar to the reported dropout rate of individual ACT (16%) (Ong et al., 2018).

These findings from the current meta-analysis support that group ACT is a valid therapeutic option for the treatment of anxiety and depressive symptoms. The findings also suggest that the format of treatment such as the number of sessions and the targeted populations need to be carefully considered when delivering ACT in a group format.

4.1. Limitations and future directions

The current study has some important limitations. The majority of participants included in this meta-analysis were working age females living in European developed countries. It is not clear whether these findings can be generalised to people living in low- and middle-income countries where cost-effective approaches such as group-based psychotherapy may be particularly important. A previous meta-analysis (Van't Hof et al., 2011) suggested that psychological treatments for anxiety and depressive disorders are a worthwhile resource in low- and middle-income countries. However, the previous literature also highlights the importance of adapting psychotherapy considering the level of education among the targeted population and adapting the content to incorporate local cultural beliefs (Benish et al., 2011; Stein et al., 2019; Tol et al., 2018). Future studies are recommended to test the efficacy of group ACT in low- and mid-income countries and explore whether any adaptations may be required to meet the needs of culturally diverse populations.

Studies using group ACT with older adults were also limited. Only two studies explored ACT with participants aged 65 or over. Considering the growing number of the older adult population worldwide, more research targeting this population is warranted. The group format might be particularly interesting for this age group since groups can decrease the sense of isolation and provide an opportunity for social exercise and meaningful interpersonal interactions (Haigh and Burnside, 1994). In

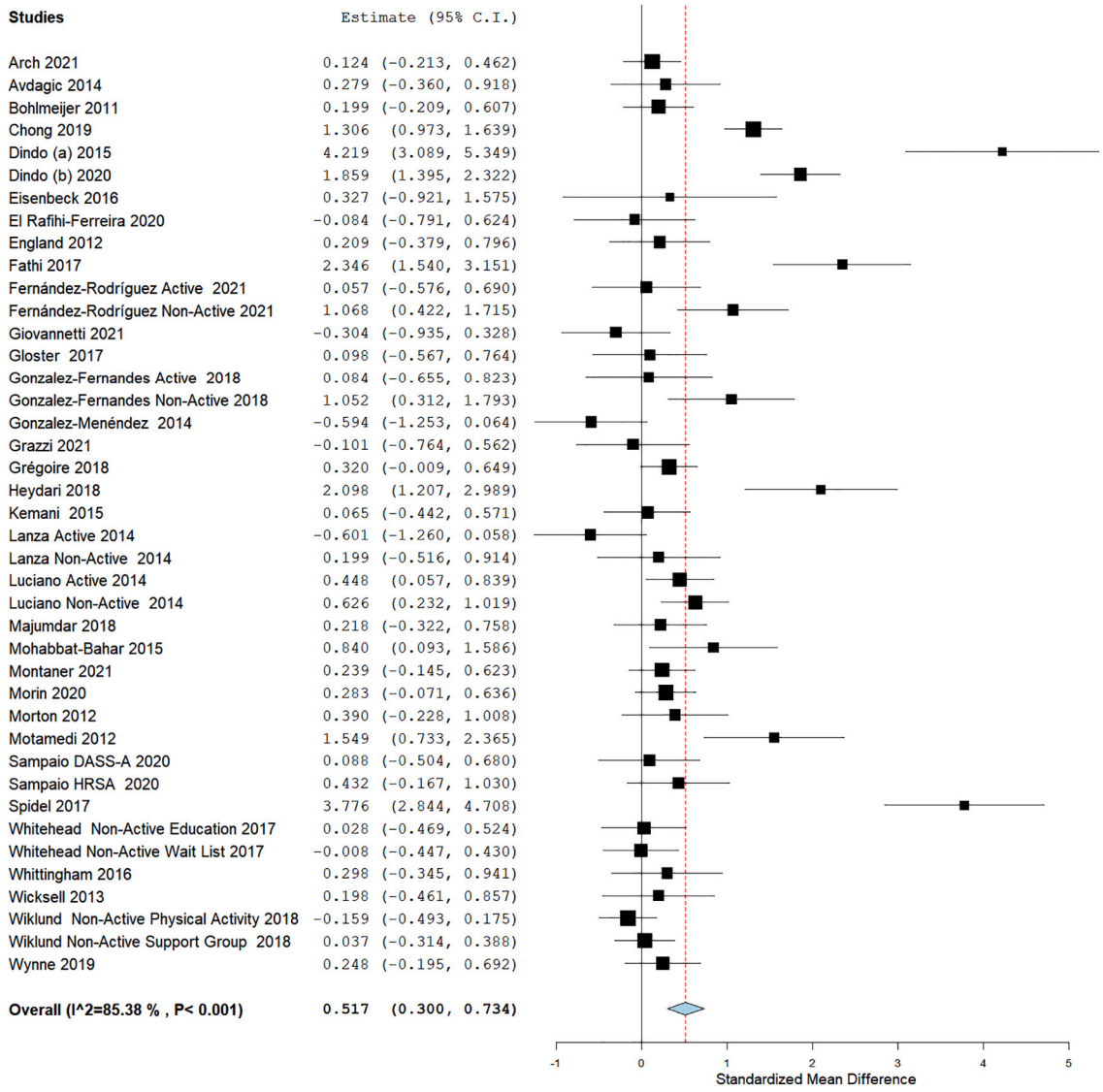

Fig. 3. Effect Sizes (Hedge's g) Derived from Studies Examine the Efficacy of Group ACT on Anxiety Symptoms (Random Effect Model).

this regard, a recent systematic review (Tavares and Barbosa, 2018) demonstrated that group therapy not only improved late-life depression but also showed significant improvement in social support, life satisfaction and well-being of the older participants.

The current meta-analysis also has some methodological limitations, which require careful attention when interpreting the results. First, the number of studies included in each category was limited for some subgroup analyses (e.g., the type of the assessment measures). Second, heterogeneity was large in the outcomes, which may have affected the results. This was partially explained by moderating factors explored through subgroup analyses. However, there may be other potential sources of heterogeneity unexplored in the current meta-analysis, such as different types of anxiety and depressive disorders, different diagnoses of other mental health conditions or age groups. Further subgroup analyses were not possible in the current study not only due to the limited number of available studies but also due to inconsistent reporting of study characteristics across the included studies (e.g., the number of participants per ACT group, information on the professional background of those delivering the intervention).

Future research should consider reporting full details of treatment characteristics to provide a robust conclusion on how group ACT needs to be structured in order to bring the maximum effect on outcomes. It is also not clear if the level of professional qualification or previous experiences of clinicians can influence the treatment success. Ong et al. (2018) suggested that employing higher qualified professionals for delivering the intervention was associated with lower dropout rates in individual ACT. Future studies should clearly report what levels of training are required for therapists to deliver group ACT as such information can be helpful for countries where healthcare resources are limited.

Finally, the risk of bias varied across included studies. Future studies are recommended to publish the study protocol or register the trial to pre-determine the key clinical outcomes, clearly describe how the allocation was concealed and use blind outcome assessors. It is also important to note the key methodological limitation of the current study. The searches were conducted in 2018 and 2021 and due to the availability of research members at two different time points, different approaches were used for screening and coding for the initial and updated searches.

5. Conclusion

The current study supports the use of group ACT to treat anxiety and depressive symptoms in working age adults with mental health or

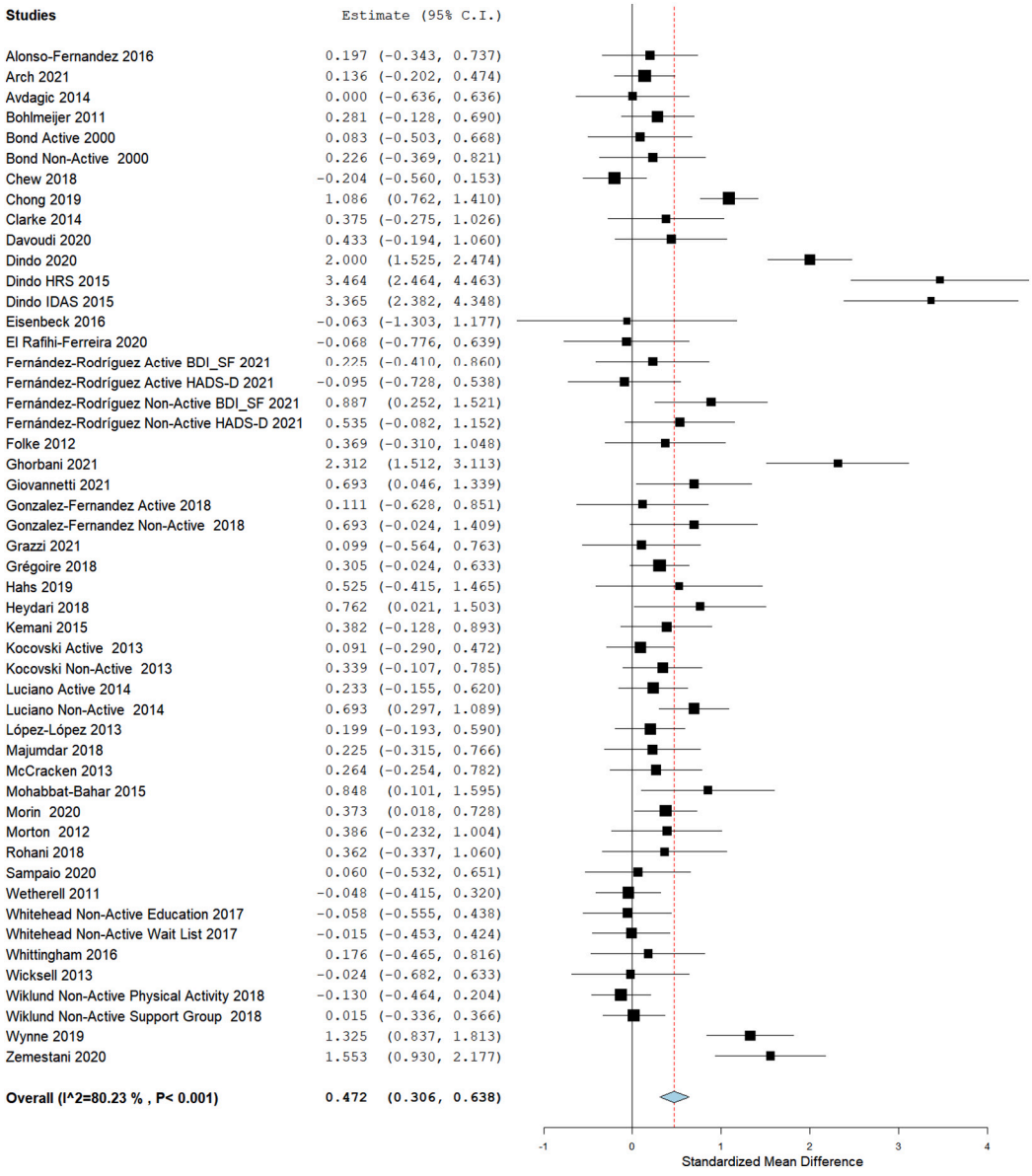

Fig. 4. Effect Sizes (Hedge's g) Derived from Studies Examine the Efficacy of Group ACT on Depressive Symptoms (Random Effect Model).

physical health conditions. However, due to high heterogeneity in the included studies, the overall estimates need to be interpreted with caution. Further research is required to better understand the moderating factors that may influence the efficacy of group ACT such as different diagnoses of mental health conditions and previous experiences of therapists. Future studies are recommended to explore the efficacy of group ACT in understudied populations such as older adults and people living in low- and middle-income countries.

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Michele Gomes Ferreira: Conceptualization, Methodology, Validation, Investigation, Formal analysis, Writing – original draft, Data curation. **Luciano Inácio Mariano:** Investigation, Writing – review & editing. **Junio Vieira de Rezende:** Investigation, Writing – review & editing. **Paulo Caramelli:** Conceptualization, Writing – review & editing, Supervision. **Naoko Kishita:** Conceptualization, Methodology, Validation, Formal analysis, Writing – original draft, Writing – review & editing, Supervision.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2022.04.134.

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