



Original Investigation | Psychiatry

# Acceptance and Commitment Therapy Among Informal Caregivers of People With Chronic Health Conditions

## A Systematic Review and Meta-Analysis

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### Abstract

**IMPORTANCE** Although there is substantial evidence to suggest the health benefits of acceptance and commitment therapy (ACT) among informal caregivers of people with chronic health conditions, the great variation in intervention designs among published studies limits its application.

**OBJECTIVES** To identify intervention characteristics of ACT that are associated with improved psychological health and to assess the acceptability of ACT among informal caregivers.

**DATA SOURCES** Seven English- and 3 Chinese-language databases without limits on publication dates, the reference lists of previous reviews, and gray literature were searched up to February 2023.

**STUDY SELECTION** Randomized clinical trials comparing the effect of ACT vs control groups on improving psychological health among informal caregivers.

**DATA EXTRACTION AND SYNTHESIS** Two reviewers independently screened searched records and extracted data from eligible studies. Random-effects meta-analysis and mixed-effects metaregression were performed. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guideline was followed.

**MAIN OUTCOMES AND MEASURES** Psychological health outcomes (eg, depressive symptoms) measured by valid measurements and the acceptability of ACT based on identified parameters.

**RESULTS** A total of 29 studies with 2010 participants, published between 2015 and 2023, were identified. ACT showed moderate to large effect sizes for improving psychological health at postintervention assessments (Hedges  $g$  range,  $-0.55$  [95% CI,  $-0.98$  to  $-0.12$ ] to  $-1.14$  [95% CI,  $-1.83$  to  $-0.45$ ]) and at 1-to-3-month and 4-to-6-month follow-ups (Hedges  $g$  range,  $-0.47$  [95% CI,  $-0.69$  to  $-0.25$ ] to  $-1.29$  [95% CI,  $-2.33$  to  $-0.24$ ]). Multivariable metaregression analysis regarding intervention characteristics found that ACT delivered in a mixed individual- and group-based format, face-to-face, or through more intervention sessions was associated with greater improvements for experiential avoidance (face-to-face:  $\beta = -1.170$  [95% CI,  $-2.020$  to  $-0.319$ ]; number of sessions:  $\beta = -0.242$  [95% CI,  $-0.353$  to  $-0.130$ ]), depressive symptoms (mixed delivery format:  $\beta = -2.583$  [95% CI,  $-4.845$  to  $-0.321$ ]; face-to-face:  $\beta = -1.555$  [95% CI,  $-3.002$  to  $-0.108$ ]), or anxiety symptoms (face-to-face:  $\beta = -1.241$  [95% CI,  $-2.337$  to  $-0.146$ ]). In general, ACT had low attrition rates (11%), and participants' adherence (51%-80%) and satisfactory ratings (72%-95%) lend support to its acceptability.

**CONCLUSIONS AND RELEVANCE** This systematic review and meta-analysis found that ACT was consistently associated with improvements in psychological health, supporting its application to

*(continued)*

### Key Points

**Question** Which intervention characteristics are associated with the efficacy of acceptance and commitment therapy (ACT) in improving the psychological health of informal caregivers of people with chronic health conditions, and what is the acceptability of ACT?

**Findings** This systematic review and meta-analysis of 29 studies with 2010 participants suggested that ACT with mixed delivery format, face-to-face modality, and more intervention sessions was associated with greater improvements in psychological health. ACT was acceptable according to attrition rate, adherence, and caregivers' satisfaction.

**Meaning** In this study, ACT seemed to achieve better therapeutic outcomes when it was individualized by including more face-to-face encounters and when intensive interventions with a mixed delivery format to facilitate peer support were applied.

### + Supplemental content

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Abstract (continued)

improve informal care for chronic disease management. This review provides specific details on the design parameters of ACT for achieving greater efficacy.

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## Introduction

The World Health Organization (WHO) reports that 349 million people are care dependent.<sup>1</sup> This situation is largely due to rapid global aging, the high prevalence of noncommunicable diseases, and injury.<sup>2</sup> Rising life expectancy and long-term care dependency place heavy loads on the current informal care system, which buffers the burden on formal services.<sup>3-5</sup> Unprepared informal caregivers must cope with various competing roles and multiple stressors when taking care of patients throughout the deteriorating and debilitating chronic disease trajectory, leading to a higher psychological burden than formal caregivers and noncaregivers.<sup>6-9</sup> Meta-analyses have consistently reported that the prevalence of depressive and anxiety symptoms in this cohort is as high as 21% to 57%,<sup>10-12</sup> leading to decreased care quality,<sup>13</sup> greater economic impacts,<sup>4,14</sup> poor quality of life for both caregivers and care recipients,<sup>15,16</sup> and even caregivers' suicide.<sup>17,18</sup> Moreover, the overwhelming and unavoidable caregiving burden can diminish caregivers' self-awareness of their own needs and hinder help-seeking.<sup>19-21</sup> Proactive support to promote the psychological wellness of caregivers is urgently needed to sustain the informal care resource.

Acceptance and commitment therapy (ACT), an evolving cognitive behavioral intervention that has consistently demonstrated robust efficacy in addressing psychological distress,<sup>21-23</sup> targets psychological inflexibility (eg, experiential avoidance and lack of value clarity) to promote psychological well-being.<sup>22</sup> Experiential avoidance of various private events, including psychological suffering, may inhibit life functioning and lead to the avoidance of difficult tasks (eg, caregiving role).<sup>23</sup> Compared with conventional psychotherapy, ACT places greater emphasis on acceptance and mindfulness, rather than changing the cognitive content, to enhance caregivers' capacity and flexibility to adapt to long-term committed actions.<sup>24-28</sup> A previous meta-analysis reported that ACT showed superior effects to traditional cognitive behavioral therapy for transdiagnostic conditions ( $g = 0.40$ ).<sup>28</sup> Furthermore, the American Psychological Association has recognized ACT as an evidence-based therapy to promote psychological (eg, depressive symptoms) and physical (eg, chronic pain) health.<sup>29</sup>

Two previous meta-analyses involving randomized clinical trials (RCTs) and quasi-experimental designs have indicated the beneficial effects of ACT on psychological health and quality of life among informal caregivers.<sup>24,25</sup> Despite such substantial evidence, the clinical application of ACT in caregiving supportive practice is limited by wide variations in its design in empirical tests. As such, the overall aim of this review was to identify the crucial intervention characteristics that contributed to the success of ACT and users' acceptance of the intervention. The evidence is urgently needed to promote the adoption of ACT in clinical practice.

## Methods

This review followed updated guidance of the Cochrane Handbook for Systematic Reviews of Intervention<sup>30</sup> and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines.<sup>31</sup> Study protocol was registered a priori on the PROSPERO (CRD42022352783).

## Eligibility Criteria

This review included RCTs that examined the effects of ACT on improving psychological health among informal caregivers, including family members, friends, or neighbors. Eligible care recipients

should have any chronic health condition (eg, function disabilities) that requires particular attention,<sup>32</sup> regardless of when it was initially diagnosed or what stage it was in. Studies must report psychological health outcomes of informal caregivers, including psychological flexibility (eg, experiential avoidance) and other psychological health outcomes (eg, depressive symptoms) using any validated measurement. A detailed description is available in eMethods 1 in [Supplement 1](#).

### Identification, Selection of Studies, and Data Extraction

Paired reviewers (F.Y. and D.D.X.) systematically searched for RCTs in PubMed, Embase, PsycInfo, British Nursing Index, CINAHLPlus, Web of Science, Cochrane Library, and 3 Chinese databases (China National Knowledge Infrastructure, Wanfang, and Weipu) without limits on publication dates (updated in February 2023) and with language restrictions to English or Chinese. Search strategies are available in eTable 1 in [Supplement 1](#). The reference lists of published and topic-related reviews were manually screened. Additionally, gray literature on the official website of the Association for Contextual Behavioral Science was inspected. Records were screened and selected by the paired reviewers, with discrepancies resolved by consensus among 2 reviewers (eMethods 2 in [Supplement 1](#)). Paired reviewers extracted and coded various study-level data using 2 data forms with afterward cross-verification, including study design, participant characteristics, intervention characteristics, psychological health outcomes at the postintervention assessment and longest postintervention follow-up, and parameters reflecting acceptability. Further details are available in eMethods 3 in [Supplement 1](#).

### Quality Assessment

Paired reviewers independently assessed the quality of included studies using the Cochrane Collaboration's Risk of Bias Tool for RCTs.<sup>33</sup> The quality of intervention implementation was assessed using the following criteria outlined by Chambless and Hollon<sup>34</sup>: (1) treatment protocol (either a published protocol or a protocol especially developed for informal caregivers), (2) facilitator training, and (3) checking integrity by supervision, recording, or screening of the intervention or protocol adherence. Disagreements were settled through discussion among 2 reviewers.

### Statistical Analysis

All analyses comprised RCTs with available data and were performed with R Studio, version 2022.07.0 + 548 (R Project for Statistical Computing). Further explanations are available in eMethods 4 in [Supplement 1](#). A narrative synthesis was carried out if evaluation outcomes or parameters of the acceptability could not be included in meta-analyses.

### Effect Size Calculation and Sensitivity Analysis

The pooled pre-post effect size for psychological health outcome is reported as a standardized mean difference (SMD) with 95% CI after performing random-effects meta-analyses.<sup>35,36</sup> Hedges *g* was used to adjust the SMD due to small sample sizes, and heterogeneity was indicated using  $I^2$  and *Q* statistics, with interpretations in accordance with the Cochrane Handbook.<sup>30</sup> A 95% prediction interval (95% PI) was generated to show the effect size ranges within which future studies would fall.<sup>37</sup> Publication bias was assessed visually and quantitatively using a funnel plot and Egger test, respectively.<sup>38</sup> Post hoc sensitivity analyses were performed using the leave-one-out method to test the robustness of the findings by excluding studies with the largest and smallest sample size and effect size.<sup>39</sup>

### Subgroup and Metaregression Analyses

When at least 10 RCTs were identified for specific psychological health outcomes at postintervention and follow-up assessments,<sup>30</sup> subgroup analyses and metaregression were performed to explore heterogeneity and examine how intervention characteristics were associated with the outcomes. Subgroup analyses for prespecified categorical moderators were conducted using random-effects

models. Potential continuous moderators were explored through univariable meta-regression analysis using the mixed-effects model with restricted maximum likelihood estimation. To prevent overfitting and ensure a stable model, intervention-level characteristics were included in the primary multivariable meta-regression analysis. Sensitivity analyses that incorporated all study-level characteristics into multivariable meta-regression models were also conducted. The multivariable meta-regressions were performed using the forward selection method, adding factors with  $P < .10$ , starting with the factors the smallest  $P$  value derived from the results of univariable analyses.<sup>40</sup> Multicollinearity was checked and controlled using the variance inflation factor ( $VIF < 2.5$ ). To ensure robustness of findings and to adjust for multiple comparisons, thereby reducing the risk of type I error, the Holm-Bonferroni method was applied. Additionally,  $P$  values using the Higgins and Thompson permutation test method while accounting for multiplicity adjustment (10 000 permutations) were calculated.<sup>41</sup>

### Meta-Analysis (Metaprop) for Attrition Rate

Attrition rate as an indicator of acceptability was defined as the percentage of informal caregivers who had not completed the postintervention assessment after being randomized to different groups. Estimated attrition rates with 95% CIs and PIs were pooled using random-effects meta-analyses with the generalized linear mixed model (GLMM).<sup>42</sup> GLMM, as a 1-step approach of combining proportions and fully accounting for within-study variances, is particularly critical for limited sample sizes, zero counts, and result interpretation.<sup>43</sup> This review set a 2-sided alpha at .05 to determine statistical significance.

## Results

### Selection, Study Characteristics, and Quality of Included Studies

The systematic selection procedures (**Figure 1**) resulted in 29 eligible RCTs conducted in 11 countries (eFigure 1 in [Supplement 1](#)),<sup>44-72</sup> comprising 2010 participants. The median sample size was 59 (range, 18-203), the mean age of participants was 46.4 years (range, 30.5-62.0 years), and the mean percentage of women was 77% (range, 38%-100%).

The main facilitators of ACT included trained professionals (eg, psychiatrist, psychologist, counselor, nurse, and social worker; 16 studies [55%])<sup>44,46-48,50,53,54,57,60,62,64-68,71</sup> and trained students (eg, psychological and nursing students; 6 studies [21%]),<sup>49,55,58,61,69,70</sup> whereas the other studies (7 [24%])<sup>45,51,52,56,59,63,72</sup> adopted a self-help approach. Individual-based (16 studies [55%]),<sup>45-47,49,51,52,54,56,57,59,60,63,65,68,70,72</sup> group-based (10 studies [34%]),<sup>44,48,53,55,61,62,64,66,67,69</sup> and mixed (a combination of individual- and group-based delivery; 3 studies [10%])<sup>50,58,71</sup> formats were used to deliver ACT. Most studies (22 [76%])<sup>44,46-49,52,53,55,57,58,60-62,64-72</sup> used a face-to-face modality, while the others used telephone calls, online platform, and email. Approximately 55% of included studies (16 studies)<sup>44,46,47,50,53-55,57,58,61,65,68-72</sup> used an active control group. The median intervention duration, number of intervention sessions, and time of therapeutic encounter were 8 weeks (range, 1-24 weeks), 6 sessions (range, 1-24 sessions), and 300 minutes (range, 0-2160 minutes), respectively. Further details are available in eResults 1 and 2 and eTables 2, 3, and 4 in [Supplement 1](#).

Six of the RCTs had a low risk of bias,<sup>50,51,53,56,62,65</sup> 16 had some concerns,<sup>44,46,49,54,55,57-60,63,64,66-69,72</sup> and 7 had a high risk of bias.<sup>45,47,48,52,61,70,71</sup> The risk of bias was mainly due to minimal baseline differences in the participants' characteristics, uncertainty about concealment, the use of an inappropriate analysis method without dealing with missing data, the unavailability of data for almost all participants, and the lack of a published protocol or trial registration (eFigure 2 in [Supplement 1](#)).

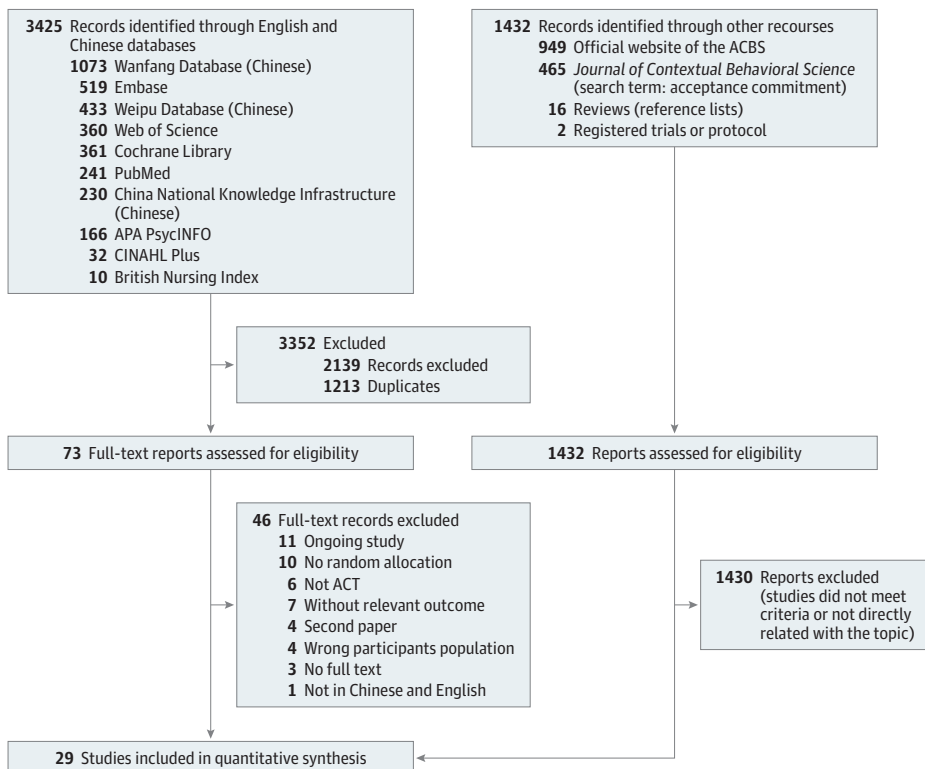
### Overall Efficacy and Sensitivity Analysis

**Table 1** presents the association of interventions with improved psychological health outcomes (eg, psychological flexibility). eFigures 3 to 9 in [Supplement 1](#) present the forest plots for the meta-analyses at postintervention and follow-up assessments. The included studies found small to large effect sizes for the efficacy of ACT in improving psychological health outcomes at the postintervention assessment (Hedges *g* range, -0.55 [95% CI, -0.98 to -0.12] to -1.14 [95% CI, -1.83 to -0.45]) and at 1-to-3-month and 4-to-6-month follow-up assessments (Hedges *g* range, -0.47 [95% CI, -0.69 to -0.25] to -1.29 [95% CI, -2.33 to -0.24]), with low to considerable heterogeneity ( $I^2 = 0\%-95\%$ ). However, no significant effect sizes were found for mindfulness (postintervention assessment) or value-based living (follow-ups). eFigures 10 and 11 in [Supplement 1](#) present the funnel plots. Egger tests showed no publication bias for outcomes with 10 studies or more studies. Sensitivity analyses yielded similar results and identified the influential studies (eTable 5 in [Supplement 1](#)). After eliminating each main outlier,<sup>44-48</sup> heterogeneity decreased, but significant results remained for value-based living, mindfulness, cognitive fusion, and stress symptoms (Hedges *g* range, -0.34 [95% CI, -0.49 to -0.19] to 1.23 [95% CI, 0.79 to 1.67];  $I^2 = 0\%-44\%$ ).

### Subgroup and Metaregression Analyses

eTables 6 and 7 in [Supplement 1](#) show the between-group differences in the efficacy of the interventions for psychological health outcomes ( $\geq 10$  studies), including experiential avoidance and depressive, anxiety, and stress symptoms at postintervention and follow-up assessments. The risk of bias, health context for caregiving (particularly among caregivers of children with chronic health conditions and adults with central nervous system [CNS] diseases), the number of applied ACT processes (involving 4-6 interconnected processes such as acceptance, cognitive defusion, being present, self-as-context, value, and committed action), delivery formats (individual-based, group-based, and mixed formats), a face-to-face modality, and self-help were significantly associated with

**Figure 1. Flow Diagram of Identification, Screening, and Selection Processes**



the effect sizes. Univariable metaregression (eTable 8 in Supplement 1) found significant associations between experiential avoidance, anxiety symptoms, or stress symptoms and factors such as the recruitment of younger caregivers, longer intervention duration, increased number of intervention sessions, longer time of therapeutic encounter, or lower attrition rate.

Multivariable metaregression analysis results regarding intervention characteristics are reported in Table 2. Statistically significant associations were found between the effect size for experiential avoidance at the postintervention assessment and a face-to-face modality ( $\beta = -1.170$  [95% CI,  $-2.020$  to  $-0.319$ ];  $P = .01$ ) and every increase in the number of sessions ( $\beta = -0.242$  [95% CI,  $-0.353$  to  $-0.130$ ];  $P < .001$ ). Greater effect size for depressive symptoms at the postintervention assessment was observed for a mixed individual- and group-based format ( $\beta = -2.583$  [95% CI,  $-4.845$  to  $-0.321$ ];  $P = .03$ ) and face-to-face modality ( $\beta = -1.555$  [95% CI,  $-3.002$  to  $-0.108$ ];  $P = .04$ ). A greater effect size of ACT on anxiety symptoms at the postintervention assessment was found for face-to-face modality ( $\beta = -1.241$  [95% CI,  $-2.337$  to  $-0.146$ ];  $P = .03$ ).

Table 1. Effect Sizes of ACT for Psychological Flexibility and Other Psychological Health Outcomes Among Informal Caregivers

Outcomes	Studies, No.	Sample size, No.	SMD (95% CI) [95% PI]	P value	Heterogeneity		P value	Publication bias (Eggers test)		
					I <sup>2</sup> , %	Q		$\beta$ (SE)	P value	
<b>Psychological flexibility</b>										
Experiential avoidance										
Postintervention	23	1422	-1.04 (-1.65 to -0.44) [-4.19 to 2.10]	<.001	90	243.05	<.001	-1.96 (1.71)	.26	
Follow-up <sup>a</sup>	15	979	-1.17 (-1.85 to -0.49) [-4.11 to 1.78]	<.001	89	139.58	<.001	-0.87 (2.04)	.68	
Value-based living										
Postintervention	9	305	0.98 (0.25 to 1.71) [-1.65 to 3.60]	.01	82	49.78	<.001	2.68 (1.96)	.21	
Follow-up <sup>a</sup>	5	159	0.27 (-0.29 to 0.84) [-1.20 to 1.95]	.34	60	12.52	.03	4.33 (1.15)	.02	
Mindfulness										
Postintervention	7	330	1.19 (-0.23 to 2.61) [-3.99 to 6.37]	.10	88	58.29	<.001	3.41 (2.20)	.17	
Follow-up <sup>a</sup>	3	125	0.90 (0.30 to 1.51) [-1.30 to 3.11]	.003	44	5.34	.15	-0.74 (2.04)	.75	
Cognitive fusion										
Postintervention	6	264	-0.61 (-1.06 to -0.15) [-2.00 to 0.79]	.01	70	16.41	.01	-0.31 (2.92)	.92	
Follow-up <sup>a</sup>	3	116	-0.68 (-1.05 to -0.30) [-3.12 to 1.77]	<.001	0	1.14	.57	1.00 (1.76)	.67	
<b>Other psychological health outcomes</b>										
Depressive symptoms										
Post-intervention	14	945	-1.14 (-1.83 to -0.45) [-4.00 to 1.72]	.001	93	198.96	<.001	-5.17 (3.00)	.11	
Follow-up <sup>a</sup>	9	668	-1.29 (-2.33 to -0.24) [-5.19 to 2.62]	.02	95	163.96	<.001	-4.13 (4.25)	.36	
Anxiety symptoms										
Post-intervention	13	885	-1.02 (-1.57 to -0.48) [-3.21 to 1.16]	<.001	90	123.18	<.001	-4.07 (2.66)	.15	
Follow-up <sup>a</sup>	10	708	-1.09 (-1.75 to -0.43) [-3.54 to 1.35]	.001	90	87.02	<.001	-1.73 (2.91)	.57	
Stress symptoms										
Post-intervention	18	1270	-0.55 (-0.98 to -0.12) [-2.54 to 1.44]	.01	82	103.73	<.001	-2.16 (1.49)	.17	
Follow-up <sup>a</sup>	12	874	-0.85 (-1.62 to -0.08) [-3.95 to 2.25]	.03	88	97.26	<.001	-2.68 (1.79)	.16	

Abbreviations: ACT, acceptance and commitment therapy; PI, prediction interval.

<sup>a</sup> Follow-up assessments included 1-to-3-month and 4-to-6-month follow-up assessments.

Table 2. Summary of Multivariable Meta-regression Analyses

Model	β (SE) [95% CI]	P value	P value			QM	P value	I <sup>2</sup> residual, %			
			Adjusted <sup>a</sup>	Permutation test <sup>b</sup>							
<b>Models regarding intervention characteristics</b>											
Experiential avoidance (post-intervention)											
Face-to-face	-1.170 (0.434) [-2.020 to -0.319]	.01	.01	.01	25.60	<.001	91				
No. of sessions	-0.242 (0.057) [-0.353 to -0.130]	<.001	<.001	.004							
Experiential avoidance (follow-up)											
Face-to-face	-1.182 (0.643) [-2.442 to 0.078]	.07	.13	.04	3.38	.07	94				
Depressive symptoms (postintervention)											
Delivery format											
Individual-based	-1.234 (0.683) [-2.572 to 0.105]	.07	.14	.09	9.52	.02	92				
Mixed	-2.583 (1.154) [-4.845 to -0.321]	.03	.10	.08							
Face-to-face	-1.555 (0.738) [-3.002 to -0.108]	.04	.11	.049							
Anxiety symptoms (postintervention)											
Face-to-face	-1.241 (0.559) [-2.337 to -0.146]	.03	.05	.04	4.93	.03	90				
<b>Models regarding study, participant, and intervention characteristics</b>											
Experiential avoidance (post-intervention)											
Risk of bias											
Low	1.268 (0.593) [0.106 to 2.429]	.03	.09	.04	36.31	<.001	89				
Some concern	1.219 (0.562) [0.118 to 2.319]	.03	.09	.04							
No. of sessions	-0.239 (0.055) [-0.348 to -0.131]	<.001	.001	.004	38.48	<.001	13				
Attrition rate	4.500 (1.364) [1.826 to 7.174]	.001	.004	.003							
Experiential avoidance (follow-up)											
Face-to-face	-0.613 (0.223) [-1.050 to -0.176]	.01	.03	.04	38.48	<.001	13				
No. of ACT processes											
6	-0.065 (0.400) [-0.849 to 0.718]	.87	.87	.87							
5	-0.970 (0.379) [-1.712 to -0.227]	.01	.03	.04							
Mean age	0.048 (0.017) [0.014 to 0.083]	.01	.03	.04							
No. of sessions	-0.168 (0.055) [-0.275 to -0.061]	.002	.01	.03							
Depressive symptoms (postintervention)											
Risk of bias											
Low	2.475 (0.783) [0.940 to 4.010]	.002	.01	.02	28.88	<.001	84				
Some concern	1.837 (0.679) [0.506 to 3.167]	.001	.04	.03							
Delivery format											
Individual-based	-0.934 (0.544) [-2.000 to 0.131]	.09	.29	.12	28.88	<.001	84				
Mixed	-2.255 (0.892) [-4.005 to -0.506]	.01	.06	.08							
Face-to-face	-1.170 (0.679) [-2.500 to 0.161]	.08	.29	.14							
Self-help	1.227 (0.685) [-0.115 to 2.570]	.07	.29	.12							
Anxiety symptoms (postintervention)											
Risk of bias											
Low	1.772 (0.673) [0.453 to 3.091]	.001	.03	.03	15.73	.001	82				
Some concern	0.625 (0.553) [-0.459 to 1.709]	.26	.52	.29							
Face-to-face	-1.723 (0.476) [-2.655 to -0.790]	<.001	.001	.01							
Anxiety symptoms (follow-up)											
6 ACT processes	0.787 (0.402) [-0.001 to 1.575]	.05	.05	.14	36.78	<.001	0				
Mean age	0.078 (0.015) [0.049 to 0.108]	<.001	<.001	.01							
No. of sessions	-0.239 (0.060) [-0.357 to -0.121]	<.001	<.001	.03							
Stress symptoms (postintervention)											
Attrition rate	3.106 (1.390) [0.383 to 5.829]	.03	.03	.05	5.00	.03	90				
Stress symptoms (follow-up)											
Mean age	0.033 (0.011) [0.012 to 0.053]	.002	.004	<.001	9.57	.01	0				
Self-help	-0.359 (0.187) [-0.727 to 0.008]	.06	.06	.11							

Abbreviation: ACT, acceptance and commitment therapy.

<sup>b</sup> Higgins and Thompson permutation test (10 000 iterations).

<sup>a</sup> Holm-Bonferroni method for adjusting P value.

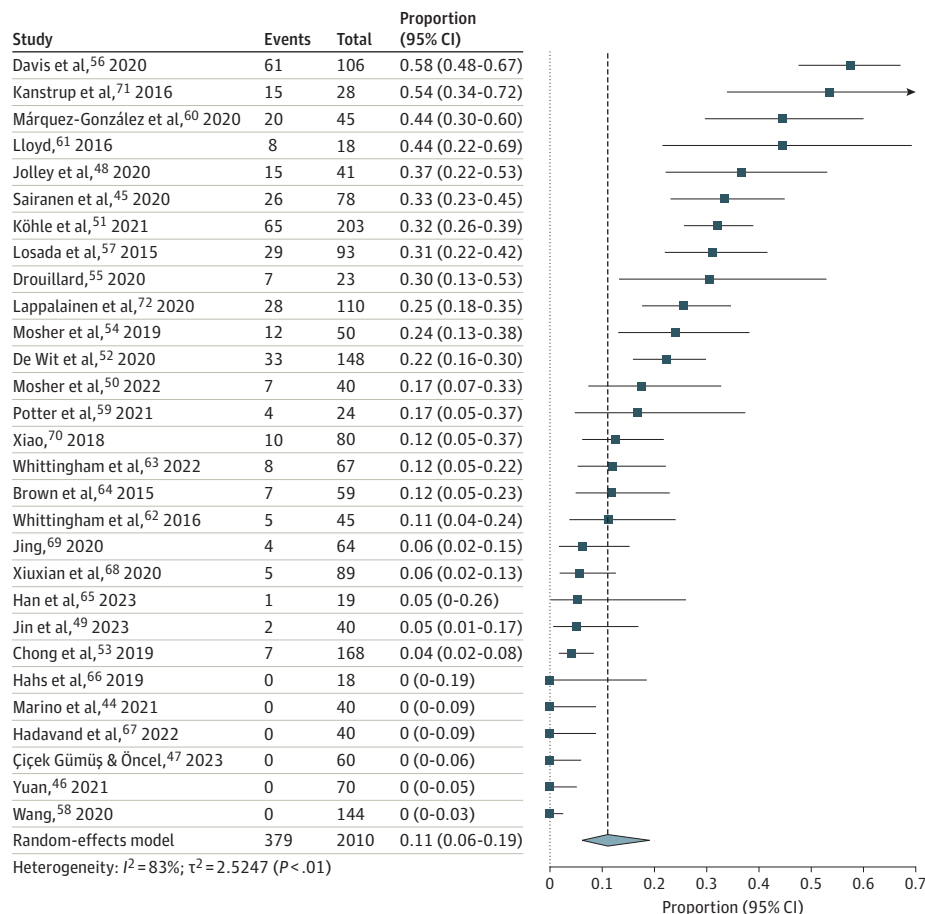
### Acceptability of ACT

The pooled attrition rate of all RCTs, as presented in **Figure 2**, was 11% (95% CI, 6%-19%;  $I^2 = 83%$ ). Adherence to all intervention sessions (median, 76%; range, 51%-80%) was reported in 8 studies.<sup>49-54,60,72</sup> Of the 10 studies that provided participants' feedback,<sup>45,48-52,55-57,72</sup> 4 studies<sup>49-51,72</sup> included self-reported satisfaction rates (72%-95%). Participants reported that ACT had beneficial effects on caregiving, improved psychological health, and provided helpful intervention content. They also provided feedback on the limitations and made suggestions for improving existing interventions (**Table 3**). Those participants thought ACT was unhelpful mainly because "it is not for me."<sup>56</sup>

### Discussion

This comprehensive review of RCTs identified associations between ACT intervention characteristics accounting for other study-level confounders and its efficacy in improving the psychological health of informal caregivers. Extant evidence derived from 29 RCTs revealed that ACT was associated with sustained improvements in experiential avoidance, cognitive fusion, depressive symptoms, anxiety symptoms, and stress symptoms persisting 1.5 to 6 months after the intervention. Sensitivity analyses and undetected publication bias showed the robustness of the evidence obtained from these results. This review highlights that intervention characteristics (eg, delivery format, face-to-face modality, and the number of sessions) and study and participant characteristics (eg, risk of bias,

**Figure 2. Meta-Analysis of Estimated Attrition Rates at the Postintervention Assessment**





caregivers' age, health context for caregiving, and attrition rate) are relevant to the efficacy of ACT, which is a prospective and viable psychological therapy that is well-accepted by informal caregivers.

**Overall Efficacy**

Converging with the substantial evidence for the therapeutic effects of ACT on psychological health outcomes among informal caregivers,<sup>24,25</sup> this review identified moderate to large effect sizes of ACT on depressive, anxiety, and stress symptoms by adding 19 more RCTs than the number included in the prior reviews of which we are aware. This finding is comparable with the effect sizes of general medicines and psychiatric drugs reported in a frequently cited meta-analyses overview of psychological health,<sup>73</sup> even though the longer-term effect of ACT beyond 6 months is yet to be established. This result is encouraging, as 75% of people with psychological distress prefer nonpharmacological treatment with minimal adverse effects.<sup>74-76</sup> In addition, the current study identified positive effects of ACT on psychological flexibility of caregivers, including experiential avoidance, value-based living, mindfulness, and cognitive fusion. These outcomes suggest that ACT may cultivate psychological flexibility by improving the acceptance of emotions, clarifying a values-oriented life, promoting living in the present moment, distancing from negative feelings, and eventually, mediating the effects of the intervention on depressive, anxiety, and stress symptoms. However, ACT did not demonstrate a longer-term effect on value-based living, defined as the continuous embodiment and expression of chosen purposeful and meaningful action. As this construct is more about the existential aspect of being a caregiver, the stress-coping paradigm of the reviewed ACT may imply the inadequacy of the intervention content in fostering the positive aspects of caregiving (PAC), such as a sense of goal accomplishment, enhanced family dynamics, and finding meaning in life. A review on PAC indeed reported its role in improving the existential well-being of caregivers.<sup>77</sup>

**Table 3. Narrative Summary of Participants' Feedback on the Intervention**

Theme	Details
Impact on caregiving	<ul style="list-style-type: none"> <li>• Sharing experiences and connecting with caregivers<sup>48,55</sup></li> <li>• Realizing that self-care is essential for caregiving<sup>48</sup></li> <li>• Allowing greater space and personal time for caregivers<sup>48</sup></li> <li>• Realizing that others can help<sup>48</sup></li> <li>• Having a holistic understanding of the care recipient and their disease<sup>55</sup></li> </ul>
Psychological health	<ul style="list-style-type: none"> <li>• Relaxing<sup>48</sup></li> <li>• Reducing worry, anxiety, guilty, and stress<sup>48</sup></li> <li>• Facing and dealing with problems<sup>48</sup></li> <li>• Solving problems effectively<sup>48</sup></li> <li>• Changing the way of reacting or looking at things and responding<sup>48</sup></li> <li>• Being positive and hopeful<sup>55</sup></li> </ul>
Intervention content	<ul style="list-style-type: none"> <li>• Good quality<sup>51</sup></li> <li>• Telephone sessions for blended interventions, facilitators, online interventions, and contents (eg, number and length of sessions, topics, experiential exercises, or information provided) are helpful<sup>48,50,52,55,56</sup></li> <li>• Identifying caregivers' value<sup>48</sup></li> <li>• Favoring mindfulness and values sessions<sup>55</sup></li> <li>• Matching the caregivers' situation<sup>52</sup></li> <li>• Useful for daily life<sup>48</sup></li> <li>• Willing to participate in another comparable intervention<sup>48</sup></li> <li>• Willing to recommend interventions to other caregivers<sup>48,51,56,72</sup></li> </ul>
Limitation or suggestion	<ul style="list-style-type: none"> <li>• Difficulties with the language when reading the text<sup>59</sup></li> <li>• Difficulties with applying the concepts presented in the text<sup>59</sup></li> <li>• Difficulties with ACT exercises<sup>57</sup></li> <li>• Challenges with the text engagement and unsuitable content for caregivers<sup>56,59</sup></li> <li>• Improving peer contact and mindfulness exercises for the online intervention<sup>52</sup></li> <li>• Preferring the condensed version of the reading texts<sup>59</sup></li> <li>• Giving enough time for reading the text and providing brief content<sup>59</sup></li> <li>• Incorporating useful examples designed for caregivers<sup>59</sup></li> <li>• Calls or email conversations help motivate caregivers to complete text reading<sup>59</sup></li> <li>• A clear orientation is important for engagement<sup>59</sup></li> <li>• Need more therapeutic input for text reading<sup>59</sup></li> <li>• Need more interactive components for group-based intervention<sup>55</sup></li> </ul>

Abbreviation: ACT, acceptance and commitment therapy.

## Intervention Characteristics

The reviewed studies showed that using an in-person method to deliver ACT was associated with higher ACTs' efficacy than non-face-to-face modalities. The benefit may imply the increased relevance of an in-person encounter to optimize the caregivers' engagement through therapeutic counseling techniques such as confrontation, reflection, and behavioral activation.<sup>57</sup> The physical context also allows for sincere therapeutic interaction, enabling sensitive counseling and feedbacks, empathetic care, and partnership relationships to enrich the implementation of ACT. However, caregivers' high role demands may limit applicability of ACT in a face-to-face modality due to accessibility issues.<sup>25,78,79</sup> Although in-person interventions showed promising outcomes, further studies are needed to expand the evidence base for innovative interventions addressing accessibility obstacles, such as blending remote and face-to-face modalities.

This review identified a significant association of a mixed delivery format with ACT's efficacy. This format may underline the crucial interplay between personal introspection and group interaction, connecting caregivers' personal psychological processes to their engagement with external realities.<sup>80</sup> Incorporating a group format facilitates shared experience, peer learning and support, and collective commitment to change.<sup>81</sup> Furthermore, this review highlighted that ACT efficacy was associated with higher intensity (eg, increased number of sessions) and face-to-face modality in ACT delivery. This suggests that greater exposure to ACT principles and practices can yield more significant results. This aligns with the narrative synthesis results of caregivers' feedback, which showed that they have difficulties with certain ACT aspects (eg, experiential exercise), emphasizing the necessity for sufficient intervention exposure.

Although the limited coverage of different health professionals among the reviewed studies did not allow an investigation of the effect of interveners' professional backgrounds on outcomes, individual studies revealed that ACT can be delivered effectively by trained health professionals (eg, nurses) and students (eg, psychological and nursing students) as well as by a self-help approach. Additionally, peer-led interventions, leveraging lived experiences and empathy, are emerging as a promising approach for delivering ACT.<sup>48</sup> These can also help diminish associated stigma. However, ensuring quality through adequate training and supervision is critical when using such task-shifting approaches. Health promoters with different backgrounds may effectively scale up ACT interventions to improve the psychological health of caregivers, especially in low- and middle-income countries with a scarcity of qualified psychologists.<sup>82</sup>

## Study and Participant Characteristics

Univariable analysis found that ACT's efficacy significantly varied by caregivers' age and health context for caregiving. Younger informal caregivers in particular benefitted from ACT, indicating that they may be more responsive to the intervention because they have a higher education level and are more receptive to learning new knowledge.<sup>83</sup> This review also identified that caregiving context, characterized by the diverse experiences and unique demands associated with different diseases of care recipients<sup>3</sup> were associated the efficacy of ACT. Particularly, caregivers of children with chronic health conditions and adults with CNS diseases demonstrated greater benefits from ACT. This could potentially be due to their adaptability to ACT techniques, prolonged caregiving durations, and ACT's role in enhancing psychological flexibility in the face of disease-specific challenges.

## Acceptability of ACT

Overall, ACT was acceptable among informal caregivers, with similar attrition rates for other psychotherapies (ranging from 17%-20%).<sup>84</sup> As the attrition rate is significantly associated with efficacy of ACT for experiential avoidance and stress symptoms, it is important to examine how to optimize the program design to best fit the caregivers' preferences. Among the reviewed studies, codesign, as an important approach that actively involved the end-users in meeting their needs for psychological services,<sup>85</sup> has seldom been used to guide the ACT program development. This may be an important perspective to optimize ACT design and improve its acceptability among caregivers.

## Implications

Our findings suggest that ACT is acceptable and effective in the caregiving context. However, high-quality trials should expand the research base to include caregivers with more challenging encounters in role fulfillment and to investigate the longer-term efficacy of ACT and the underlying mechanism explaining the psychological benefits of ACT. The RCTs included in this review applied 4 to 6 psychological flexibility processes together, due to the interconnected nature of these processes.<sup>22</sup> The combined application prevents the examination of single and different combinations of ACT processes. Future research should examine how each of the 6 psychological flexibility processes individually contributes to improving caregivers' psychological health, and how these processes interact and influence each other on a session-by-session basis. This understanding can inform the development of tailored ACT interventions, optimizing the sequence or combination of processes for maximum therapeutic efficacy. Additionally, the current review indicated that nonspecialists could master the techniques of administering ACT (eg, through workshops and self-learning).<sup>58</sup> Therefore, future studies could investigate effective enabling mechanisms for trainers to increase the availability of this important therapy for supporting psychological recovery and adaptation to challenging situations, which is feasible since no official certification is needed for an ACT intervener.

## Limitations

The findings of this review need to be interpreted in the light of several limitations. First, the effectiveness of ACT in improving caregivers' psychological health is still questionable when compared with an active psychological intervention (eg, cognitive behavioral therapy). Second, the effective ACT intervention characteristics for low-income countries with heavy caregiver burdens and for other psychological flexibility processes (ie, cognitive defusion, mindfulness, self-as-context, and commitment action) remain unknown. Third, the effect sizes of some subgroups also rendered the results uncertain because of an insufficient number of studies and unexplained heterogeneity. Despite an extensive multivariable meta-regression analysis considering all study-level characteristics to capture potential confounder interactions in the clinical setting, the limited number of included studies necessitates caution in result interpretation due to the potential risk of overfitting. Finally, there were inadequate descriptions of how dropouts and missing data were managed with a statement on whether per-protocol or intention-to-treat analyses were applied.

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## Conclusions

This review synthesized the available empirical evidence base, and the findings suggest that ACT has beneficial effects on the psychological health of informal caregivers of people with chronic health conditions. In accordance with WHO-recommended task sharing, it is feasible and beneficial to engage nonpsychological specialists (eg, nurses, social workers, and students) in the delivery of ACT for informal caregivers. However, the existing evidence does not explain the underlying mechanisms. The lack of evidence regarding engagement experience emphasizes the need for a vigorous process evaluation. Effective population-level psychotherapy is gaining prominence, and this review should serve as further impetus for the widespread adoption of effective ACT for informal caregivers to help them manage various forms of psychological distress.

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#### SUPPLEMENT 1.

**eMethods 1.** Eligibility Criteria

**eMethods 2.** Study Selection

**eMethods 3.** Data Extraction and Acquisition

**eMethods 4.** Statistical Analysis

**eResults 1.** Characteristics of Study Design and Participants of Included Studies

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**eFigure 10.** Funnel Plots Depicting Standard Error of Effect Sizes for Psychological Flexibility

**eFigure 11.** Funnel Plots Depicting Standard Error of Effect Sizes for Other Psychological Health Outcomes

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## SUPPLEMENT 2.

### Data Sharing Statement