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Research Article

Which emotion regulation strategies are mediating the outcome of acceptance and commitment therapy compared to cognitive-behaviour therapy in the treatment of anxiety symptoms?

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Abstract
Objective: To examine multiple emotion regulation strategies as mediators in ACT compared to CBT for anxiety. It was hypothesized that augmenting acceptance and reducing suppression, distraction, and perseverative thinking would mediate the effect of ACT compared to CBT. Cognitive reappraisal was included as a competitive mediator.
Method: Data were collected as part of a randomized controlled trial comparing ACT and CBT in a sample of 314 older adults with anxiety symptomatology. Participants filled in self-report questionnaires assessing anxiety symptom severity (Generalized Anxiety Disorder-2) and the putative mediators a total of five times over the course of treatment. Latent growth curve models, parallel process models, random intercept-cross lagged panel models, and autoregressive latent trajectory models were used to model the hypothesized prospective and mediational relationship.
Results: ACT differentially affected acceptance, suppression, and distraction, and changes in all mediators (except acceptance) showed significant cross-sectional associations with outcome. Only cognitive reappraisal predicted subsequent anxiety levels and vice versa, irrespective of treatment. However, none of the emotion regulation variables mediated the effect of ACT.
Conclusions: The discrepancy with previous positive findings on emotion regulation as a mediator may be attributed to earlier studies not using a longitudinal design and analysis on the within-person level.

Keywords: ACT; CBT; emotion regulation; anxiety; mediation

Clinical or methodological significance of this article: This is an analysis of possible mediators of ACT compared to CBT for anxiety in older adults. In these analyses, within-person state and between-person trait effects were disentangled. Although ACT differentially affected various emotion regulation strategies (such as acceptance, suppression, and distraction) and most within-person changes in mediators were associated with concurrent changes in anxiety, none of the within-client changes in mediating variables mediated subsequent reductions in anxiety. Longitudinal designs with repeated assessments and analyses on the within-person level are needed to enable causal inferences.

Introduction

Anxiety disorders and symptoms form the most prevalent class of adult psychological problems (Kessler et al., 2005; Kessler et al., 2012). During the last decades, cognitive behavioral therapy (CBT) has become the strongest empirically supported psychological treatment for anxiety (Carpenter et al., 2018; Norton & Price, 2007; Stewart & Chambless, 2009).

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More recent studies have demonstrated that Acceptance and Commitment Therapy (ACT) has similar effects as CBT in the treatment of anxiety disorders and symptoms in adults (Arch et al., 2021; Avdagic et al., 2014; Forman et al., 2012). Recently, the first large-scale randomized controlled trial (RCT) comparing ACT and CBT in a large sample of *older* adults with anxiety symptomatology has been conducted (Witlox et al., 2021). No important differences between the two interventions regarding their effects on anxiety severity and associated clinical outcomes were observed. Significant reductions of anxiety symptom severity (effect sizes $d \geq .96$) were observed in both the CBT and the ACT condition between baseline and posttreatment and were sustained at the one-year follow-up. Research so far thus suggests that ACT and CBT do not differ regarding their effectiveness in treating adults with anxiety.

ACT does not directly focus on changing or reducing anxious feelings and thoughts but instead stimulates active acceptance of all internal experiences, including those we tend to label as "negative," "unwanted," or "harmful." A more accepting stance towards internal experiences leads to less use of cognitive and behavioral strategies aimed at changing or controlling emotions or thoughts that actually sustain or exaggerate anxiety (e.g., perseverative thinking, distraction, suppression, behavioral/experiential avoidance) (Twohig et al., 2005). ACT restructures the emotion regulation process of persons from avoiding or attenuating unpleasant emotions to directly experiencing and accepting these negative emotions (Blackledge & Hayes, 2001). This focus differs from that of second-wave cognitive–behavioral therapy (CBT), which aims to reduce the frequency and intensity of anxiety symptoms by identifying and adapting anxiety-related cognitions. Through a process of cognitive reappraisal, unrealistic negative thoughts concerning the threat posed by certain situations, events, or bodily sensations are replaced with more nuanced and adaptive thoughts (Clark & Beck, 2010). Besides studies into the effectiveness of ACT for anxiety, several studies have also tried to examine the proposed mechanisms through which ACT leads to anxiety symptom change. Several systematic reviews and meta-analyses on the working mechanisms of ACT concluded that changes in constructs related to the acceptance of inner experiences are related to outcome, but that strong causal evidence is lacking (e.g., Ciarrochi et al., 2010; Ruiz, 2010; Ren et al., 2019; Stockton et al., 2019; Johanssen et al., 2022).

A recent comprehensive meta-analytic review of the growing number of studies examining dimensions of psychological flexibility as treatment mechanisms for Acceptance and Commitment Therapy (ACT) concluded that ACT interventions led to reduced inflexibility and increased flexibility (Macri & Rogge, 2024) and that these changes are related to outcome in the expected direction. A major shortcoming of available studies mentioned in the reviews, however, is that almost no studies included repeated assessments of outcome and putative mediators in the course of therapy. This precludes the establishment of a timeline that shows that the candidate mediator precedes the outcome, which is a necessary (but not sufficient) condition for mediation (Kazdin, 2007, 2009). More specifically, studies of ACT using correlation-based mediation approaches showed statistically significant mediating effects, while the few studies using causal time-lag analyses did not yield statistically significant mediating effects (Johanssen et al., 2022). Although the superiority of causal time-lag analyses is widely recognized, debate exists about the most appropriate statistical analyses. Although the cross-lagged panel model (CLPM) was the preferred modelling approach for many years, it has been criticized for its inability to separate within-person dynamics from stable between-person differences (Hamaker, 2012, 2023). Recently, various alternative models that are able to disentangle these forms of variability have been developed (Falkenström, 2024). In these alternative models, state-like components reflect within-client processes of change and may point to active ingredients of successful treatment, while trait-like components may represent prescriptive or prognostic variables of successful treatment (Zilcha-Mano & Webb, 2021).

The purpose of the present study was to examine emotion regulation strategies that promote (i.e., acceptance) or hinder the direct experience of negative emotions (i.e., perseverative thinking, suppression, and distraction) as variables mediating the effect ACT compared to CBT in the treatment of older adults with anxiety symptoms. In addition, we examined cognitive reappraisal as a competitive mediator of relevance for the working mechanisms of CBT (in contrast to ACT). We tried to overcome the limitations of previous studies by including repeated assessments of outcome and putative mediating variables during the course of therapy and by analyzing the robustness of the mediating effects by using different statistical methods. It was hypothesized that augmented acceptance and reduced suppression, distraction, and perseverative thinking would mediate the effect of ACT compared to CBT. Cognitive reappraisal was hypothesized to be a competitive mediator, with more positive reappraisals mediating the effects of CBT compared to ACT.

Method

This study uses data collected in a cluster-randomized single-blind controlled trial in the Netherlands.

The trial evaluated the effectiveness of face-to-face CBT compared to a blended ACT intervention in treating anxiety symptoms in older adults recruited in a primary care setting. The study was powered to detect a difference between the conditions on the primary outcome anxiety symptom severity as measured with the Generalized Anxiety Disorder-7 (GAD-7) (Kroenke et al., 2007). Randomization took place at the level of the mental health counselors who provided the interventions (n = 40). The mental health counselors were randomized to provide only CBT (n = 20) or ACT (n = 20) to study participants. Details about the study design and methods have been published (Witlox et al., 2018). The trial was registered in the Netherlands Trial Register (NL6131 (NTR6270)) and approved by the medical ethics committee of Leiden University Medical Center (LUMC; no. P16.248).

Participants and Procedure

Participants were recruited from 38 general practices between November 2017 and March 2019. Patients aged 55–75 from the participating general practices were sent a letter containing information about the study and an invitation to participate. If people were interested in participation, they could register on a study website, after which they entered the screening procedure, comprising an online questionnaire and a telephone interview. Inclusion criteria were: age between 55 and 75 years, presence of mild to moderate anxiety symptoms (GAD-7 score between 5 and 15 (Spitzer et al., 2006)), mastery of the Dutch language, internet access, and the possibility to spend up to 30 min per day on the intervention. Exclusion criteria were: unstable severe medical condition(s); Alzheimer's disease or other severe cognitive impairments; very high or low anxiety symptom severity (GAD-7 score < 5 / > 15 (Spitzer et al., 2006)); severe depressive symptoms (PHQ-9 (Kroenke et al., 2001) score ≥ 20); psychological or psychopharmacological treatment (stable benzodiazepine or SSRI use excepted) within the last three months; severe role impairment in at least two life areas (score of ≥ 8 on two or three items of the Sheehan Disability Scale (SDS) (Leon et al., 1997); high suicide risk (M.I.N.I.-Plus (Lecrubier et al., 2020)); substance use disorder (M.I.N.I.-Plus); lifetime diagnosis of bipolar disorder or schizophrenia (medical record and M.I.N.I.-Plus).

Eligible participants signed an online informed consent form and subsequently completed the baseline assessment, after which they were informed about their treatment allocation. Participants completed four main assessments: at baseline, posttreatment (three months after baseline, 6 months after baseline, and 12 months after baseline). In the current study, data from the 6- and 12-month follow-ups are not used in the analysis.

During treatment, participants were asked to complete a short questionnaire assessing anxiety symptom severity and potential mechanisms of change multiple times. During treatment, participants in both groups were repeatedly asked to complete a brief online questionnaire assessing anxiety symptom severity and potential mechanisms of change. In the CBT group, this questionnaire was emailed to participants after each face-to-face session with their mental health counselor. In the blended ACT group, the same questionnaire was integrated into the online module and presented at the beginning of each online lesson.

To enable comparison of the hypothesized temporal and mediational pathways across groups, we selected data from comparable time points. Specifically, for the current study, we used the baseline assessment, the post-session questionnaires completed after the first three face-to-face sessions, and the posttreatment assessment (shortly after the fourth face-to-face session). For the ACT group, this meant selecting the questionnaire responses from the first online module completed after each face-to-face session.

Interventions

Therapists. Treatment was provided by mental health counselors. The counselors provide short-term psychological treatment to patients with mild to moderately severe psychological complaints in general practice. The occupation is fulfilled by mental health professionals with varying educational backgrounds. Of the counselors participating in this study, most were graduates of psychology (n = 13), social psychiatric nurses (n = 14), or social workers (n = 5). The years of experience in providing individual psychological therapy ranged from three to 42, with a median of 16 years.

Blended acceptance and commitment therapy. Participants in the Blended ACT condition were provided with the online ACT-module "Living to the Full" (Bohlmeijer & Hulsbergen, 2008, 2015) and four face-to-face sessions with the mental health counselor at their general practice. The online module comprises nine lessons that focus on the six core processes of ACT: acceptance, cognitive defusion, contact with the present moment, self-as-context, personal values, and committed action. Participants completed the module in eight to twelve

weeks, which required them to dedicate 15-30 min to the program on a daily basis. The four face-to-face sessions with the mental health counselor were based on a protocol developed by the authors of Living to the Full and focused on increasing motivation, repeating key exercises, and discussing potential problems the client faced in working with the online module.

Cognitive behavioral therapy. Participants in the CBT condition attended four face-to-face sessions with the mental health counselor and completed homework exercises in between the sessions. The sessions took place in a time span between eight to twelve weeks. The sessions followed a protocol (developed by authors N.G., M.W., V.K., and P.S.) that focused on identifying and challenging negative cognitions and reducing anxiety-related avoidance behavior. The protocol mainly consisted of worksheets and exercises related to specific types of anxiety (e.g., panic, worrying, social anxiety). Additionally, some worksheets/exercises focused on common side effects of anxiety (e.g., sleeping problems, physical tension). After the first session, which served as an intake, the counselor and client collaboratively set treatment goals. In the second and third sessions, homework was evaluated and prepared, and main exercises/information were repeated. The last session was dedicated to evaluating the progress of the client and formulating a relapse prevention plan.

Measures

Anxiety symptom severity. Anxiety symptom severity at baseline, during treatment, and posttreatment was measured with the Generalized Anxiety Disorder-2 (Kroenke et al., 2007). The GAD-2 consists of the first two items of the Generalized Anxiety Disorder-7 ("Feeling nervous, anxious, or on edge" and "Not being able to stop or control worrying"). The GAD-2 is a reliable, valid, and sufficiently sensitive and specific instrument (Plummer et al., 2016).

Emotion regulation strategies. The emotion regulation strategies of cognitive reappraisal, acceptance, perseverative thinking, distraction, and suppression were each measured with one self-developed item. We choose straightforward items mostly based on questions from validated instruments. See Table I for the items. Participants were asked to rate how often they used the strategy during the preceding week on a scale ranging from 0 (never) to 5 ((almost) always).

Table I. Overview of the examined emotion regulation strategies.

Candidate mechanism	Item wording	Adapted from
Acceptance	I tried to accept my feelings without judging them	AAQ-2 (Bond et al., 2011)
Perseverative thinking	I could not stop thinking about my feelings	CERQ (Garnefski & Kraaij, 2007)
Distraction	I tried to distract myself from my feelings	BERQ (Kraaij & Garnefski, 2019)
Suppression	I tried to suppress my feelings	ERQ (Gross & John, 2003)
Cognitive reappraisal	I tried to change how I think about the cause of my feelings	CERQ (Garnefski & Kraaij, 2007)

Data Analysis

Descriptive statistics were calculated in SPSS 29.0 (IBM Corp, 2017). All other statistical procedures were performed using Mplus v. 8 (Muthén & Muthén, 1998-2017). Changes over time in both the putative mediators and the outcome variable were estimated from the observed data using Latent Growth Modelling (LGM) to ensure that the factor scores for the slope factor *(*with factor loadings set to 0, 1, 2, 3, and 4) represented the observed trajectory. In order to test the association of treatment allocation with the intercept and slope of these variables, condition (CBT = 0, ACT = 1) was entered as a covariate to the model. Subsequently, the LGM of each mediator was combined with the LGM of anxiety into separate Parallel Process Models (PPMs), so that the relationship of this mediator with outcome could be investigated. As a last step, PPMs were used to estimate the mediating effect of the slope of emotion regulation strategies in the association of treatment allocation with the slope of anxiety using 5000 bias-corrected bootstrapped samples to estimate 95% Confidence Intervals (CIs).

Because LGM is a correlational technique, it remains undecided whether the effect is in the hypothesized direction. Consequently, these analyses were followed by Random Intercept Cross Lagged Panel Models (RI-CLPM) (Hamaker et al., 2015) to test whether the emotion regulation strategies at t-1 prospectively predicted anxiety symptoms at t over the course of treatment.

First, a separate RI-CLPM model was created for each candidate mechanism. RI-CLPM is an extension of the original Cross Lagged Panel Model that accounts for time-invariant, trait-like stability in the modeled variables by including random intercepts

(Hamaker et al., 2015), as many psychological variables are trait-like to a certain extent. In RI-CLPM the variance of the observed score is divided into variance due to a between-person stable invariant trait (by adding a random intercept) and variance due to within-person fluctuation. By separating within-person variance from between-person variance, RI-CLPM allows for statements regarding within-person processes, which are more likely to reflect causal effects than between-person associations (Hamaker et al., 2015; Usami et al., 2019). The RI-CLPM was created, by first regressing the observed scores for anxiety symptom severity and the candidate mechanism on their own latent factor (loading fixed to 1). Residual variances of the observed variables were set to zero, so that the latent factor structure captured the within- and between-person variance. Two random intercepts (one for anxiety symptom severity, one for the candidate mechanism) were added to the model, with factor loadings constrained at one. These random intercepts reflect the time-invariant deviation from the grand means of an individual and, therefore, indicate stable trait-like differences between participants regards the modeled variables. The correlation between the random intercepts represents the association between stable between-person differences in the candidate mechanism variable and stable between-person differences in anxiety symptom severity.

The latent factors were used to model autoregressive paths, cross-sectional paths, and cross-lagged paths. Parameters representing auto-regressive and cross-lagged paths were set equal to each other for each variable. Moreover, time-specific correlations between residuals were set equal over time. To test the hypotheses concerning the temporal precedence of the candidate mechanisms, the cross-lagged paths are of primary interest. They indicate to what extent deviations from expected scores on the candidate mechanism variable are associated with deviations from expected anxiety symptom severity at the next measurement moment and vice versa. The indirect effect of the intervention condition on anxiety symptoms severity at assessment wave *t* via the hypothesized mediating emotion regulation strategies at *t-1* was tested using a bootstrapping procedure (n = 5000). The mediation test required that we also add the direct effects of intervention condition on the within-person "state" scores for emotion regulation at all assessment waves after baseline to these models. This resulted in 3 indirect effects in each mediation model (anxiety symptom severity at T4 via mediator at T3; anxiety symptom severity at T3 via mediator at T2; anxiety symptom severity T2 via mediator at T1). Next, we used Autoregressive Latent Trajectory (ALT) growth modeling (Bollen & Curran, 2004) as a sensitivity analysis to estimate time-specific autoregressive, cross-sectional and cross-lagged effects of emotion regulation strategies on succeeding anxiety levels, while accounting for stable, trait-like trajectories over time (see the supplementary material for a more detailed description of the method used).

Analyses were performed on the basis of the intention-to-treat principle, including all randomized participants with baseline assessments. Full information maximum likelihood (FIML) estimations were used to handle missing data. We used four model fit indices to evaluate the fit of the LGM, RI-CLPM, and ALT models: the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean squared Residual (SRMR), the Comparative Fit Index (CFI) and the Tucker–Lewis Index (TLI). For the RMSEA and SRMR values smaller than 0.08 and 0.05 were considered indicators of respectively acceptable and good model fit (Hooper et al., 2008; Hu & Bentler, 1999). For the CFI and TFI model fit was considered adequate for values higher than 0.90 and good for values higher than 0.95 (Hooper et al., 2008; Hu & Bentler, 1999).

Results

Assessments were completed by 314 participants at baseline (T0) (CBT n = 164; ACT n = 150), 238 after session 1 (T1) (CBT n = 131; ACT n = 107) 204 after session 2 (T2) (CBT n = 102; ACT n = 102), 153 after session 3 (T3) (CBT n = 91; ACT n = 62) and 222 at posttreatment (T4) (CBT n = 121 ACT n = 101). See Table II for the means and standard deviations of the observed scores for the total sample and two treatment conditions at each assessment wave (SD = 1.02).

Latent Growth Modelling

As a first step, the individual trajectories of emotion regulation strategies and anxiety were examined by fitting separate growth curves. The growth parameters in the unconditional LGMs showed a statistically significant slope factor of anxiety and each of the emotion regulation strategies. These significant slopes indicate that in the combined group treatment produced a significant reduction of anxiety, perseverative thinking, distraction, and suppression and a significant increase in cognitive reappraisal and acceptance. Including treatment allocation as a covariate showed that treatment significantly affected the slope of acceptance, distraction, and suppression. ACT resulted in a larger increase in acceptance and

Table II. Mean scores and standard deviations for both conditions on all measurement waves.

Variable	Condition	T0 (baseline) M (SD)	T1 M (SD)	T2 M (SD)	T3 M (SD)	T4 (posttreatment) M (SD)	Within-group Cohen's d
Anxiety	CBT	2.40 (1.62)	2.33 (1.61)	2.22 (1.42)	1.65 (1.51)	1.48 (1.23)	.51
	ACT	2.24 (1.52)	2.40 (1.51)	1.67 (1.19)	1.29 (0.98)	1.48 (1.21)	.45
	Total	2.33 (1.57)	2.37 (1.55)	1.94 (1.33)	1.50 (1.33)	1.48 (1.22)	.49
Reappraisal	CBT	1.44 (1.03)	1.68 (1.04)	2.05 (1.08)	2.30 (1.40)	2.38 (1.40)	.76
	ACT	1.58 (1.11)	1.97 (0.99)	2.28 (1.20)	2.76 (1.35)	2.57 (1.43)	.74
	Total	1.51 (1.07)	1.84 (1.02)	2.16 (1.14)	2.48 (1.30)	2.47 (1.41)	.75
Acceptance	CBT	2.29 (1.22)	2.28 (1.20)	2.24 (1.28)	2.69 (1.25)	2.65 (1.36)	.32
	ACT	2.23 (1.32)	2.24 (1.01)	2.83 (1.31)	3.05 (1.49)	2.80 (1.51)	.48
	Total	2.26 (1.27)	2.26 (1.09)	2.53 (1.32)	2.84 (1.36)	2.72 (1.43)	.40
Rumination	CBT	2.27 (1.26)	2.70 (1.36)	2.07 (1.32)	1.65 (1.16)	1.67 (1.31)	.40
	ACT	2.06 (1.29)	2.61 (1.27)	1.69 (1.18)	1.36 (1.26)	1.42 (1.21)	.42
	Total	2.12 (1.27)	2.65 (1.31)	1.88 (1.26)	1.53 (1.20)	1.56 (1.27)	.37
Distraction	CBT	2.41 (1.11)	2.78 (1.17)	2.40 (1.19)	2.33 (1.24)	1.98 (1.30)	.30
	ACT	2.40 (1.24)	2.70 (1.04)	1.99 (1.22)	1.53 (1.18)	1.76 (1.27)	.43
	Total	2.41 (1.17)	2.74 (1.10)	2.20 (1.22)	2.01 (1.27)	1.88 (1.29)	.42
Suppression	CBT	2.38 (1.16)	2.58 (1.25)	2.17 (1.28)	2.08 (1.17)	1.77 (1.28)	.51
	ACT	2.29 (1.19)	2.60 (1.08)	1.66 (1.12)	1.11 (1.12)	1.30 (1.15)	.81
	Total	2.33 (1.18)	2.59 (1.15)	1.92 (1.23)	1.69 (1.24)	1.56 (1.24)	.63

larger decrease in distraction and suppression compared to CBT. No significant differences between conditions regarding the slope of anxiety, cognitive reappraisal and perseverative thinking were found. Moreover, no significant associations between condition and intercept factors were identified, suggesting that randomization was successful (see Supplementary Table 1 and Table III).

As a final step, we fitted single PPMs with treatment allocation as covariate for each of the emotion regulation strategies. Model fit was acceptable for all PPMs (RMSEA: 0.05–0.05; SRMR: 0.05–0.06; CFI: 0.88–0.95; TLI: 0.92–0.96) (see Table IV). Although not every index suggested a good fit, the PPMs were judged to be acceptable on the results of all the different indices considered together, with most of the indices suggesting an adequate fit. In the PPMs the slope of anxiety was significantly predicted by the slope of cognitive reappraisal (−0.69, $p < .001$), perseverative thinking (0.99, $p < .001$), distraction (0.65, $p < .001$), and suppression (0.96, $p < .05$). The prediction of slope of anxiety by slope of acceptance was not significant (−0.58, $p = .08$) (see Table IV). These results indicate that a positive outcome is associated with less perseverative thinking, distraction, and suppression and more positive cognitive reappraisal. However, mediation analyses showed that none of the slope factors of emotion regulation strategies mediated the effect of treatment condition on the slope of anxiety.

Table III. Conditional latent curve growth model with rate of change (slope) in total sample and intervention condition as predictor of rate of change on outcome and mediating variables.

	Slope		Slope on intervention	
Variables	B	*p*	B	*P*
GAD-2	−0.79	**<.001**	−0.02	.85
Cognitive reappraisal	0.91	**<.001**	0.07	.49
Acceptance	0.39	**.02**	0.23	**.03**
Perseverative thinking [1]	−1.314	**<.001**	−0.20	.22
Distraction	−0.69	**.01**	−0.36	**.03**
Suppression	−0.92	**.002**	−0.51	**.002**

Note: GAD-2 = Generalized Anxiety Disorder scale (2 items); [1] = factor loadings set to 0, 0, 1, 2, and 3 to achieve model convergence.

Random Intercept - Cross Lagged Panel Modeling

Outcomes of the RI-CLPM are presented in Table V. Model fit was acceptable or good for all RI-CLPM's (RMSEA: 0.01–0.05; SRMR: 0.06–0.07; CFI: 0.94–0.99; TLI: 0.86–0.99). At the between-person level, we found statistically significant associations between the random intercept of anxiety on the one hand and the random intercepts of the variables perseverative thinking, distraction, and suppression on the other hand. This indicates that participants who had higher anxiety symptom severity scores across the five measurement waves (i.e. higher trait-like anxiety) also reported higher levels of perseverative thinking, distraction, and suppression across the assessments. The random intercepts of acceptance and cognitive reappraisal were not significantly associated with the random intercept of anxiety symptom severity.

Auto-regressive paths of anxiety, cognitive reappraisal and acceptance were statistically significant,

Table IV. Outcomes of the Parallel Process Model examining the temporal and mediational relationships of the emotion regulation strategies and anxiety symptom severity.

	Cognitive reappraisal	Acceptance	Perseverative thinking	Distraction	Suppression
Model fit					
RMSEA	0.05	0.05	0.05	0.05	0.05
CFI	0.88	0.91	0.95	0.92	0.94
TLI	0.92	0.94	0.96	0.94	0.96
SRMR	0.06	0.06	0.05	0.05	0.05
Direct paths					
condition → Ianx	−0.06 (0.08)	−0.06 (0.09)	−0.11 (0.08)	−0.06 (0.08)	−0.06 (0.08)
condition →Sanx	−0.09 (0.35)	0.23 (0.33)	0.30 (0.23)	0.26 (0.19)	0.56 (0.63)
condition → Imed	0.21 (0.22)	−0.14 (0.30)	−0.03 (0.09)	−0.06 (0.13)	−0.10 (0.11)
condition → Smed	0.13 (0.15)	0.28 (0.13) *	−0.29 (0.17)	−0.39 (0.13) **	−0.58 (0.15) ***
Ianx ↔ Imed	−0.58 (0.16) ***	−0.71 (0.17) ***	0.88 (0.04) ***	0.90 (0.05) **	0.88 (0.07) ***
Smed → Sanx	−0.69 (0.19) ***	−0.58 (0.33)	0.99 (0.13) ***	0.65 (0.14) ***	0.96 (0.27) ***
Mediational paths					
cond → Sanx via Smed	−0.179 (−0.47 – 0.14)	−0.09 (−0.33 – 0.14)	−0.28 (−0.73 – 0.39)	−0.25 (−0.81 – 0.31)	−0.56 (−1.80 – 0.68)

Note: RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; SRMR = Standardized Root Mean Square Residual; Estimates are standardized.

indicating a consistent relation between within-person fluctuations at successive assessment waves for these variables. Regarding cross-sectional associations, each of the emotion regulation strategies (accept acceptance) showed a consistent relationship with anxiety symptom severity on a within-person level in the expected direction. This indicates that within-person change in anxiety symptom severity was related to within-person change in cognitive reappraisal, perseverative thinking, distraction, and suppression at the same assessment wave. Crucially, regarding cross-lagged paths, perseverative thinking at the second, third, and last assessment wave was predicted by anxiety symptom severity at respectively the first, second and third wave and not vice versa, suggesting that the reduction of perseverative thinking represents a consequence of anxiety reduction. Moreover, cognitive reappraisal at the second, third, and last assessment wave was predicted by anxiety symptom severity at respectively the first, second, and third wave and vice versa, suggesting a bi-directional relationship of anxiety reduction with more positive cognitive reappraisal (see Figure 1).

Lastly, the mediation hypotheses regarding the emotion regulation strategies of acceptance, perseverative thinking, distraction, suppression, and cognitive reappraisal, were not confirmed: none of the modeled indirect paths were statistically significant.

Autoregressive Latent Trajectory (ALT) Growth Modeling

Results of ALT models estimating time-specific autoregressive, cross-sectional, and cross-lagged effects of emotion regulation strategies on succeeding anxiety levels, while simultaneously accounting for stable, trait-like trajectories over time, were in line with those of the RI-CLPM analyses (see Supplementary Table 2).

Discussion

This study examined emotion regulation strategies as potential mechanisms of change in ACT compared to CBT for adults aged 55–75 years with mild to moderately severe anxiety symptoms recruited in primary care. Data on emotion regulation strategies and anxiety levels were collected at multiple assessments during treatment, which enabled the examination of the (prospective) relationships between the candidate mechanisms and the outcome variable anxiety symptom severity.

In accordance with the outcome of the randomized controlled trial, both interventions resulted in comparable reductions in anxiety levels (Witlox et al., 2021). Consistent with study hypotheses based on the theories of change in ACT (Blackledge & Hayes, 2001; Twohig et al., 2005), LGMs showed that the rate of improvement of emotion regulation strategies specifically targeted by ACT (i.e., distraction, suppression, and acceptance) was larger in ACT then in CBT. Contrary to our hypotheses, however, the rate of improvement of perseverative thinking and cognitive reappraisal was comparable between conditions. Comparable reductions of perseverative thinking in the treatment of anxiety between second-wave interventions such as CBT and third-wave interventions such as ACT are in line with the results of a meta-analysis of the effect

Table V. Standardized results [a] of the random intercept cross-lagged panel models examining the temporal and mediational relationships of the emotion regulation strategies and anxiety symptom severity.

	Cognitive reappraisal	Acceptance	Perseverative thinking	Distraction	Suppression
Model fit					
RMSEA	0.05	0.04	0.01	0.04	0.03
CFI	0.94	0.93	0.99	0.94	0.98
TLI	0.86	0.91	0.99	0.92	0.97
SRMR	0.06	0.07	0.06	0.07	0.06
Random intercepts					
RI anx ↔ RI m	0.43 (0.85)	−0.22 (0.18)	0.72 (0.07) ***	0.74 (0.13) ***	0.75 (0.11) ***
Autoregressive paths					
anx0 → anx1	0.19 (0.07) **	0.19 (0.07) **	0.17 (0.07) *	0.20 (0.07)**	0.20 (0.07) **
anx1 → anx2	0.23 (0.08) **	0.23 (0.07) **	0.21 (0.08) *	0.23 (0.08) **	0.23 (0.07) **
anx2 → anx3	0.19 (0.07) **	0.18 (0.07) **	0.16 (0.07) *	0.20 (0.07) **	0.18 (0.07) **
anx3 → anx4	0.21 (0.08) **	0.21 (0.08) **	0.17 (0.07) *	0.20 (0.07) **	0.21 (0.08) **
m0 → m1	0.19 (0.06) **	0.22 (0.06) ***	0.03 (0.05)	0.09 (0.06)	0.08 (0.07)
m1 → m2	0.17 (0.05) **	0.18 (0.05) ***	0.03 (0.06)	0.08 (0.05)	0.07(0.06)
m2 → m3	0.19 (0.06) **	0.20 (0.05) ***	0.03 (0.05)	0.09 (0.06)	0.08 (0.07)
m3 → m4	0.17 (0.05) **	0.20 (0.06) ***	0.03 (0.05)	0.08 (0.05)	0.07 (0.06)
Cross-sectional paths					
anx0 ↔ m0	−0.15 (0.03) ***	−0.03 (0.03)	0.23 (0.03) ***	0.11 (0.04) **	0.14 (0.04) ***
anx1 ↔ m1	−0.16 (0.04) ***	−0.03 (0.04)	0.25 (0.04) ***	0.12 (0.04) **	0.15 (0.04) ***
anx2 ↔ m2	−0.16 (0.04) ***	−0.04 (0.04)	0.36 (0.05) ***	0.15 (0.05) **	0.18 (0.05) ***
anx3 ↔ m3	−0.16 (0.04) ***	−0.04 (0.04)	0.33 (0.05) ***	0.16 (0.06) *	0.19 (0.05) ***
anx4 ↔ m4	−0.16 (0.04) ***	0.04 (0.04)	0.31 (0.04) ***	0.15 (0.05) **	0.19 (0.05) ***
Cross-lagged paths					
m0 → anx1	−0.09 (0.04) *	−0.06 (0.04)	0.04 (0.04)	−0.05 (0.04)	−0.06 (0.04)
m1 → anx2	−0.11 (0.05) *	−0.07 (0.05)	0.05 (0.06)	−0.05 (0.05)	−0.07 (0.05)
m2 → anx3	−0.12 (0.06) *	−0.07 (0.05)	0.05 (0.05)	−0.06 (0.05)	−0.07 (0.06)
m3 → anx4	−0.14 (0.06) *	−0.08 (0.06)	0.05 (0.05)	−0.06 (0.06)	−0.08 (0.06)
anx0 → m1	−0.13 (0.05) *	−0.05 (0.06)	0.21 (0.05) ***	0.09 (0.06)	0.09 (0.06)
anx1 → m2	−0.11 (0.04) *	−0.04 (0.05)	0.23 (0.06) ***	0.08 (0.06)	0.08 (0.05)
anx2 → m3	−0.09 (0.04) *	−0.03 (0.04)	0.18 (0.05) ***	0.07 (0.05)	0.07 (0.04)
anx3 → m4	−0.08 (0.04) *	−0.03 (0.04)	0.16 (0.04) ***	0.06 (0.04)	−0.07 (0.04)
Path condition to mediator					
cond → m1	0.11 (0.07)	−0.03 (0.07)	−0.01 (0.07)	−0.02 (0.07)	0.03 (0.07)
cond →m2	0.05 (0.07)	0.24 (0.07) ***	−0.09 (0.07)	−0.13 (0.08)	−0.16 (0.07) *
cond → m3	0.14 (0.08)	0.07 (0.09)	−0.05 (0.09)	−0.30 (0.09) ***	−0.37 (0.09) ***
cond → m4	0.04 (0.06)	0.03 (0.07)	−0.10 (0.07)	−0.05 (0.07)	−0.16 (0.07) *
Mediational paths					
cond → anx2 via m1	−0.01 (−0.03 – 0.01)	0.00 (−0.01 – 0.01)	−0.00 (−0.01 – 0.01)	0.00 (−0.01 – 0.01)	−0.00 (−0.02 – 0.01)
cond → anx3 via m2	−0.01 (−0.03 – 0.01)	−0.02 (−0.05 – 0.01)	−0.00 (−0.02 – 0.01)	0.01 (−0.01 – 0.02)	0.01 (−0.01 – 0.03)
cond → anx4 via m3	−0.02 (−0.05 – 0.01)	−0.01 (−0.02 – 0.01)	0.00 (−0.02 – 0.11)	0.02 (−0.02 – 0.05)	0.03 (−0.01 – 0.07)

Note: [a]Equality constraints were imposed on the unstandardized coefficients of the autoregressive, cross-sectional and cross-lagged paths. Minor differences in standardized estimates across time points reflect variation in time-specific variances used in the standardization procedure; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; SRMR = Standardized Root Mean Square Residual; * $p < .05$, ** $p < .01$, *** $p < .001$; RI = random intercept; anx = anxiety symptom severity; m = candidate mechanism.

of different types of interventions for anxiety on worry, rumination, and perseverative thinking (Monteregge et al., 2020). Striking is the comparable effect of ACT and CBT on cognitive reappraisal as there are almost no studies on ACT for anxiety that tested competing mediators (Johanssen et al., 2022), while cognitive change is theorized to constitute one of the main mechanisms of change in CBT (Clark & Beck, 2010).

Correlational mediation analysis using bootstrapping procedures within PPMs examining the pathway from treatment condition to the slope of anxiety reduction via the slope of emotion regulation strategies showed that the rate of anxiety reduction was significantly and positively associated with the rate of distraction, suppression, and perseverative thinking reduction and negatively with the rate of increase of cognitive reappraisal. However, none of

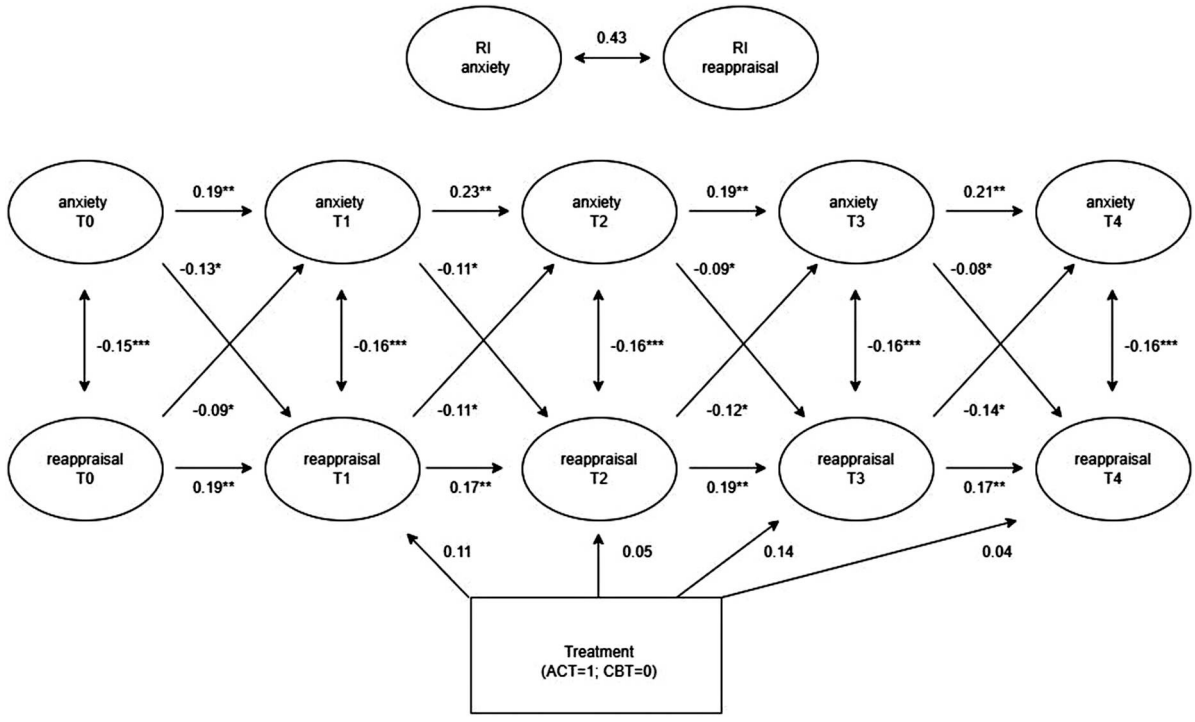

Figure 1. Simplified RI-CLPM diagram with cognitive reappraisal as the proposed mediator.

the mediational pathways from treatment condition to a reduction in anxiety via these emotion regulation strategies was significant. Subsequent prospective RI-CLPM mediation analyses in which mediators at t-1 predicted outcome at t while disentangling between-person and within-person effects showed that the significant cross-sectional associations of mediators (i.e., perseverative thinking, distraction, suppression, and cognitive reappraisal) with outcome (i.e., anxiety) as observed in the PPM's remained significant also after disentangling between and within-persons effect. However, prospective cross-lagged associations were not significant except for the effect of anxiety reduction at t-1 on perseverative thinking at t and the bidirectional effect of cognitive reappraisal at t-1 on anxiety at t and vice versa. Crucially, in line with the results of our PPM mediation analyses, mediation analyses using bootstrapping procedures within RI-CLPMs also failed to show any significant pathway from treatment condition to outcome at T4, T3, or T2 via a mediator at respectively T3, T2, and T1.

Given the growing number of alternative mediation models with differences in conceptualisation of mediating variables and statistical characteristics (Falkenström, 2024; Orth et al., 2021), we performed sensitivity analyses to examine to what extent the results of the RI-CLPM mediation analyses critically depended on the statistical approach used.

ALT sensitivity analyses yielded comparable results regards the cross-lagged association of cognitive reappraisal and perseverative thinking with anxiety and the absence of significant mediation effects. So, all formal mediation analyses used showed that emotion regulation did not mediate anxiety reduction, but the cross-lagged analyses additionally suggested -contrary to expectations- that cognitive reappraisal may be predictive of subsequent anxiety irrespective of treatment condition. Meta-analyses show that CBT for anxiety disorders leads to improvements in threat cognitive reappraisal (Draheim & Anderson, 2021) and that these improvements are associated with reductions in anxiety symptom severity (Smits et al., 2012). The present study results suggest that the impact of changes in cognitive reappraisal may not be restricted to traditional second-wave CBT but may also be involved in the working mechanisms of third-wave ACT.

As already pointed out by Stockton et al. (2019) in their review of mechanisms of change during ACT, many psychotherapies share some components of change with their theoretical cousins possibly diluting mediation effects. In line, mediation effects in studies comparing ACT with other active treatments (as in the present study) reported significantly smaller mediation effects than in studies comparing ACT with passive or active control conditions (Macri & Rogge, 2024). Precisely for this reason

Hayes et al. (2022) excluded comparisons between active treatments in their large review of mediational findings of randomized trials of psychological interventions for mental health outcomes. If two active treatments share the same mechanisms of change, the statistical power to find significant mediation effects can be reduced due to an artificially lowered value of the a path. The present study is one of the few studies designed to test a competing mediator (i.e., cognitive reappraisal), which proved to be the only cross-lagged variable predicting subsequent anxiety. Recent research suggestions for improving the measurement and evaluation of theorized processes of central importance for ACT emphasize processes that are sensitive or specific to ACT or mediate ACT outcomes specifically (Arch et al., 2023). Although this could significantly advance our understanding of ACT, more research attention for putative non-specific mediators (e.g., the therapeutic relationship), theoretically competing variables (e.g., cognitive reappraisal) or transdiagnostic processes (e.g., self-efficacy, anxiety sensitivity) is also needed for a more comprehensive and balanced view of mediating variables and underlying mechanisms of change in ACT.

To improve the examination and understanding of psychotherapeutic change, we prompt future research to use longitudinal designs and statistical procedures that separate between- and within-person variability. Only with such studies can we begin to elucidate whether hypothesized mechanisms of change indeed seem to play a causal role or if they are merely correlates of treatment outcomes (Zilcha-Mano, 2017). However, even with optimal research designs, it remains highly challenging to understand psychotherapeutic change. Psychotherapy is a complex and multi-level process that is likely to work through a complex chain of changes: different mechanisms of change (at either the physiological, cognitive, behavioral, or affective level or on multiple levels) occur at different time points and rates during treatment, and certain changes might occur suddenly instead of gradually (Aderka et al., 2012). Furthermore, it may be the case that treatment components and the mechanisms of action associated with them work differently at different points of treatment and that their workings differ between subgroups of people receiving treatment. Therefore, we may never be able to explain psychotherapeutic change using the relatively simplistic (causal) models of change and associated research designs that psychological science has relied upon so far (cp., Hayes et al., 2022).

This study has some limitations that are important to discuss. First, although the use of longitudinal data is an important advantage of this study, it is plausible that the data (based on five measurement moments) was not sufficiently fine-grained to accurately model mechanisms of therapeutic change. The current null findings might have resulted from the measurement waves being too far apart to adequately capture changes in the measured constructs during treatment. Future studies should, therefore, focus on establishing a more fine-grained analysis of the shape of therapeutic change. Experience Sampling Methods (ESM) are promising in this regard (Csikszentmihalyi & Larson, 2014). Second, like most studies in this field of research, all data in the current study came from self-report instruments. Self-report relies on people's ability to identify and remember their own mental processes – an ability that might be far from perfect (Paulhus & Vazire, 2007). A combination and integration of data collected with different types of measurement instruments (e.g., clinician rating scales, physiological measures, behavioral tasks, neuroimaging) is preferable over relying upon one assessment method (Kraemer et al., 2003). A third shortcoming is that we used self-developed one-item assessments for most candidate mechanisms. We opted for this type of measurement to avoid placing too large a burden on the participants because too many demands for data can lead to measurement artifacts as a result of study drop-out or unreliable completion of the measurements. Although we used straightforward items mostly based on questions from validated instruments, we cannot be certain that the self-developed items reliably measure the intended constructs and are sufficiently sensitive to change. Fifth, the generalizability of our findings might be limited because we tested our hypotheses in a sample of adults aged 55–75 years. The findings may not generalize to younger adult samples, although there is currently no strong theoretically or empirically valid reason to assume that ACT and CBT might work through different processes in older patient populations. Consequently, it cannot be excluded that future studies with a higher granularity using psychometrically sound instruments with known reliability and sensitivity to change for treatment-specific mediating variables could yield different results in finding evidence for treatment-specific change mechanisms (cp. Arch et al., 2023). Mechanisms that remained undetected because of limitations inherent in the present study approach.

To summarize, the current study examined multiple putative mechanisms of change of an ACT intervention for older adults with anxiety symptoms compared to CBT as a competing condition. The hypothesis that the emotion regulation strategies of acceptance, perseverative thinking, distraction, and

suppression would mediate anxiety reduction was not confirmed. Instead, evidence was found that the competing mediator of cognitive reappraisal predicted subsequent anxiety reduction throughout treatment, irrespective of treatment condition. The current study positively distinguishes itself from many previous studies in the field because it used data collected at multiple time points during treatment and a statistical approach that examined the hypothesized relationships on the within-person level. Future studies are encouraged to use longitudinal designs that allow for a more fine-grained analysis of therapeutic change and to analyze the associations of potential ACT-specific and transdiagnostic mechanisms of change with treatment outcome on the within-person level.

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Disclosure Statement

No potential conflict of interest was reported by the author(s).

Trial Registration and Medical-ethical Approval

The study was registered in the Netherlands Trial Register (NL6131; NTR6270) and approved by the Medical Ethics Committee of Leiden University Medical Center (P16.248).

Informed Consent

Eligible patients gave their written informed consent.

Data Availability

The authors confirm that all data underlying the findings are fully available without restriction. Because of ethical and legal restrictions, our data involving clinical participants are not freely available in the manuscript, supplemental files, or in a public repository. However, data is available upon request via the first author (spinhoven@fsw.leidenuniv.nl)

Supplemental data

Supplemental data for this article can be accessed online at https://doi.org/10.1080/10503307.2025.2528031.

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References

Aderka, I. M., Nickerson, A., Bøe, H. J., & Hofmann, S. G. (2012). Sudden gains during psychological treatments of anxiety and depression: A meta-analysis. *Journal of Consulting and Clinical Psychology*, *80*(1), 93–101. https://doi.org/10.1037/a0026455

Arch, J. J., Eifert, G. H., Davies, C., Vilardaga, J. C. P., Rose, R. D., & Craske, M. G. (2021). Randomized clinical trial of cognitive behavioral therapy (CBT) versus acceptance and commitment therapy (ACT) for mixed anxiety disorders. *Journal of Consulting and Clinical Psychology*, *80*(5), 750–765. https://doi.org/10.1037/a0028310

Arch, J. J., Fishbein, J. N., Finkelstein, L. B., & Luoma, J. B. (2023). Acceptance and commitment therapy (ACT) processes and mediation: Challenges and how to address them. *Behavior Therapy*, *54*(6), 971–988. https://doi.org/10.1016/j.beth.2022.07.005

Avdagic, E., Morrissey, S., & Boschen, M. (2014). A randomised controlled trial of acceptance and commitment therapy and cognitive-behaviour therapy for generalised anxiety disorder. *Behaviour Change*, *31*(2), 110–130. https://doi.org/10.1017/bec.2014.5

Blackledge, J. T., & Hayes, S. C. (2001). Emotion regulation in acceptance and commitment therapy. *Journal of Clinical Psychology*, *57*(2), 243–255. https://doi.org/10.1002/1097-4679(200102)57:2

Bohlmeijer, E. T., & Hulsbergen, M. (2008). *Voluit leven mindfulness of de kunst van het aanvaarden*. Boom.

Bohlmeijer, E. T., & Hulsbergen, M. A. (2015). *A beginner's guide to mindfulness: Live in the moment*. McGraw-Hill.

Bollen, K. A., & Curran, P. J. (2004). Autoregressive latent trajectory (ALT) models: A synthesis of two traditions. *Sociological Methods & Research*, *32*(3), 336–383. https://doi.org/10.1177/0049124103260222

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., Waltz, T., & Zettle, R. D. (2011). Preliminary psychometric properties of the acceptance and action questionnaire – II: A revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy*, *42*(4), 676–688. https://doi.org/10.1016/j.beth.2011.03.007

Carpenter, J. K., Andrews, L. A., Witcraft, S. M., Powers, M. B., Smits, J. A. J., & Hofmann, S. G. (2018). Cognitive behavioral

therapy for anxiety and related disorders: A meta-analysis of randomized placebo-controlled trials. *Depression and Anxiety*, *35*(6), 502–514. https://doi.org/10.1002/da.22728

Ciarrochi, J., Bilich, L., & Godsel, C. (2010). Psychological flexibility as a mechanism of change in acceptance and commitment therapy. In R. Baer (Ed.), *Assessing mindfulness and acceptance: Illuminating the processes of change* (pp. 51–76). New Harbinger.

Clark, D. A., & Beck, A. T. (2010). *Cognitive therapy of anxiety disorders: Science and practice*. Guilford Press.

Csikszentmihalyi, M., & Larson, R. (2014). Validity and reliability of the experience- sampling method. *Journal of Nervous and Mental Disease*, *175*(9), 526–536. https://doi.org/10.1097/00005053-198709000-00004

Draheim, A. A., & Anderson, P. L. (2021). Does cognitive behavioral therapy for anxiety disorders improve threat reappraisal? A meta-analysis. *Journal of Behavioral and Cognitive Therapy*, *31*(2), 125–135. https://doi.org/10.1016/j.jbct.2020.12.004

Falkenström, F. (2024). Time-lagged panel models in the psychotherapy process and mechanisms of change research: Methodological challenges and advances. *Clinical Psychology Review*, *110*, 102435. https://doi.org/10.1016/j.cpr.2024.102435

Forman, E. M., Chapman, J. E., Herbert, J. D., Goetter, E., Yuen, E. K., & Moitra, E. (2012). Using session-by-session measurement to compare mechanisms of action for acceptance and commitment therapy and cognitive therapy. *Behavior Therapy*, *43*(2), 341–354. https://doi.org/10.1016/j.beth.2011.07.004

Garnefski, N., & Kraaij, V. (2007). Cognitive emotion regulation questionnaire. *European Journal of Psychological Assessment*, *23*(3), 141–149. https://doi.org/10.1027/1015-5759.23.3.141

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*(2), 348–362. https://doi.org/10.1037/0022-3514.85.2.348

Hamaker, E. L. (2012). Why researchers should think "within-person": A paradigmatic rationale. In M. R. Mehl, & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 43–61). Guilford Press.

Hamaker, E. L. (2023). The within-between dispute in cross-lagged panel research and how to move forward. *Psychological Methods*, Epub ahead of print. https://doi.org/10.1037/met0000600

Hamaker, E. L., Kuiper, R. M., & Grasman, R. P. (2015). A critique of the cross-lagged panel model. *Psychological Methods*, *20*(1), 102–116. https://doi.org/10.1037/a0038889

Hayes, S. C., Ciarrochi, J., Hofmann, S. G., Chin, F., & Sahdra, B. (2022). Evolving an idionomic approach to processes of change: Towards a unified personalized science of human improvement. *Behaviour Research and Therapy*, *156*, 104155. https://doi.org/10.1016/j.brat.2022.104155

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, *6*, 53–60.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indices in covariance structure analysis: Conventional versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

IBM Corp. (2017). *IBM SPSS statistics for windows, version 25.0*.

Johanssen, M., Nissen, E. R., Lundorff, M., & O'Toole, M. S. (2022). Mediators of acceptance and mindfulness-based therapies for anxiety and depression: A systematic review and meta-analysis. *Clinical Psychology Review*, *94*, 102156. https://doi.org/10.1016/j.cpr.2022.102156

Kazdin, A. E. (2007). Mediators and mechanisms of change in psychotherapy research. *Annual Review of Clinical Psychology*, *3*(1), 1–27. https://doi.org/10.1146/annurev.clinpsy.3.022806.091432

Kazdin, A. E. (2009). Understanding how and why psychotherapy leads to change. *Psychotherapy Research*, *19*(4-5), 419–428. https://doi.org/10.1080/10503300802448899

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM–IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry*, *62*(6), 593–602. https://doi.org/10.1001/archpsyc.62.6.593

Kessler, R. C., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Wittchen, H. U. (2012). Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. *International Journal of Methods in Psychiatric Research*, *21*(3), 169–184. https://doi.org/10.1002/mpr.1359

Kraaij, V., & Garnefski, N. (2019). The behavioral emotion regulation questionnaire: Development, psychometric properties and relationships with emotional problems and the cognitive emotion regulation questionnaire. *Personality and Individual Differences*, *137*, 56–61. https://doi.org/10.1016/j.paid.2018.07.036

Kraemer, H. C., Measelle, J. R., Ablow, J. C., Essex, M. J., Boyce, W. T., & Kupfer, D. J. (2003). A new approach to integrating data from multiple informants in psychiatric assessment and research: Mixing and matching contexts and perspectives. *American Journal of Psychiatry*, *160*(9), 1566–1577. https://doi.org/10.1176/appi.ajp.160.9.1566

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Kroenke, K., Spitzer, R. L., Williams, J. B. W., Monahan, P. O., & Lowe, B. (2007). Anxiety disorders in primary care: Prevalence, impairment, comorbidity, and detection. *Annals of Internal Medicine*, *146*(5), 317–325. https://doi.org/10.7326/0003-4819-146-5-200703060-00004

Lecrubier, Y., Sheehan, D. V., Weiller, E., Amorim, P., Bonora, I., Sheehan, K. H., Janvan, J., & Dunbar, G. C. (2020). The mini international neuropsychiatric interview (MINI): A short diagnostic structured interview: Reliability and validity according to the CIDI. *European Psychiatry*, *12*(5), 224–231. https://doi.org/10.1016/S0924-9338(97)83296-8

Leon, A. C., Olfson, M., Portera, L., Farber, L., & Sheehan, D. V. (1997). Assessing psychiatric impairment in primary care with the Sheehan disability scale. *International Journal of Psychiatry in Medicine*, *27*(2), 93–105. https://doi.org/10.2190/T8EM-C8YH-373N-1UWD

Macri, J. A., & Rogge, R. D. (2024). Examining domains of psychological flexibility and inflexibility as treatment mechanisms in acceptance and commitment therapy: A comprehensive systematic and meta-analytic review. *Clinical Psychology Review*, *110*, 102432. https://doi.org/10.1016/j.cpr.2024.102432

Monteregge, S., Tsagkalidou, A., Cuijpers, P., & Spinhoven, P. (2020). The effects of different types of treatment for anxiety on repetitive negative thinking: A meta-analysis. *Clinical Psychology-Science and Practice*, *27*, e12316. https://doi.org/10.1111/cpsp.12316

Muthén, L. K., & Muthén, B. O. (1998-2017). *Mplus user's guide. Eighth edition*. Muthén & Muthén.

Norton, P. J., & Price, E. C. (2007). A meta-analytic review of adult cognitive–behavioral treatment outcome across the anxiety disorders. *Journal of Nervous and Mental Disease*, *195*(6), 521–531. https://doi.org/10.1097/01.nmd.0000253843.70149.9a

Orth, U., Clark, D. A., Donnellan, M. B., & Robins, R. W. (2021). Testing prospective effects in longitudinal research:

Comparing seven competing cross-lagged models. *Journal of Personality and Social Psychology*, *120*(4), 1013–1034. https://doi.org/10.1037/pspp0000358

Paulhus, D. L., & Vazire, S. (2007). The self-report method. In R. W. Robins, R. C. Fraley, & R. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 224–239). Guilford Press.

Plummer, F., Manea, L., Trepel, D., & McMillan, D. (2016). Screening for anxiety disorders with the GAD-7 and GAD-2: A systematic review and diagnostic meta-analysis. *General Hospital Psychiatry*, *39*, 24–31. https://doi.org/10.1016/j.genhosppsych.2015.11.005

Ren, Z., Zhao, C., Bian, C., Zhu, W., Jiang, G., & Zhu, Z. (2019). Mechanisms of the acceptance and commitment therapy: A meta-analytic structural equation model. *Acta Psychologica Sinica*, *51*(6), 662–676. https://doi.org/10.3724/SP.J.1041.2019.00662

Ruiz, F. J. (2010). A review of acceptance and commitment therapy (ACT) empirical evidence: Correlational, experimental psychopathology, component and outcome studies. *International Journal of Psychology & Psychological Therapy*, *10*, 125–162.

Smits, J. A. J., Julian, K., Rosenfield, D., & Powers, M. B. (2012). Threat reappraisal as a mediator of symptom change in cognitive-behavioral treatment of anxiety disorders: A systematic review. *Journal of Consulting and Clinical Psychology*, *80*(4), 624–635. https://doi.org/10.1037/a0028957

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Lowe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, *166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

Stewart, R. E., & Chambless, D. L. (2009). Cognitive–behavioral therapy for adult anxiety disorders in clinical practice: A meta-analysis of effectiveness studies. *Journal of Consulting and Clinical Psychology*, *77*(4), 595–606. https://doi.org/10.1037/a0016032

Stockton, D., Kellett, S., Berrios, R., Sirois, F., Wilkinson, N., & Miles, G. (2019). Identifying the underlying mechanisms of change during acceptance and commitment therapy (ACT): A systematic review of contemporary mediation studies. *Behavioural and Cognitive Psychotherapy*, *47*(3), 332–362. https://doi.org/10.1017/S1352465818000553

Twohig, M. P., Masuda, A., Varra, A. A., & Hayes, S. C. (2005). Acceptance and commitment therapy as a treatment for anxiety disorders. In S. M. Orsillo & L. Roemer (Eds.), *Acceptance and mindfulness-based approaches to anxiety: Conceptualization and treatment* (pp. 101– 130).

Usami, S., Murayama, K., & Hamaker, E. L. (2019). A unified framework of longitudinal models to examine reciprocal relations. *Psychological Methods*, *24*(5), 637–657. https://doi.org/10.1037/met0000210

Witlox, M., Garnefski, N., Kraaij, V., de Waal, M. W. M., Smit, F., Bohlmeijer, E., & Spinhoven, P. (2021). Blended acceptance and commitment therapy versus face-to- face cognitive behavioral therapy for older adults with anxiety symptoms in primary care: Pragmatic single-blind cluster randomized trial. *Journal of Medical Internet Research*, *23*(3), e24366. https://doi.org/10.2196/24366

Witlox, M., Kraaij, V., Garnefski, N., Waal, M. W. M. d., Smit, F., Hoencamp, E., Gussekloo, J., Bohlmeijer, E. T., & Spinhoven, P. (2018). An internet-based acceptance and commitment therapy intervention for older adults with anxiety complaints: Study protocol for a cluster randomized controlled trial. *Trials*, *19*(1), 1–14. https://doi.org/10.1186/s13063-018-2731-3

Zilcha-Mano, S. (2017). Is the alliance really therapeutic? Revisiting this question in light of recent theoretical advances. *American Psychologist*, *72*(4), 311–325. https://doi.org/10.1037/a0040435

Zilcha-Mano, S., & Webb, C. A. (2021). Disentangling trait-like between-individual vs. State- like within-individual effects in studying the mechanisms of change in CBT. *Frontiers in Psychiatry*, *11*, 609585. https://doi.org/10.3389/fpsyt.2020.609585