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Problem mastery and motivational clarification as mechanisms of change in cognitive-behavioral therapy for depression: Secondary analysis of a randomized controlled trial

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ABSTRACT

Objective: In process-outcome research, there is a growing body of literature investigating the therapeutic mechanisms underlying the promotion of positive change. This study investigated the between- and within-patient effects of problem mastery and motivational clarification on outcome in patients receiving two variations of cognitive therapies for depression.
Methods: This study drew on data of a randomized controlled trial conducted at an outpatient clinic and included 140 patients randomly assigned to 22 sessions of either cognitive-behavioral therapy or exposure-based cognitive therapy. To address the nested structure of the data and analyze mechanism effects, we used multilevel dynamic structural equations models.
Results: We found significant within-patient effects of both problem mastery and motivational clarification on subsequent outcome.
Conclusion: The results suggest that changes in problem mastery and motivational clarification precede symptom improvement during cognitive therapy for depressed patients and thus there may be benefit in fostering these putative mechanisms during psychotherapy.

1. Introduction

Several evidence-based treatments have shown to effectively treat major depressive disorders (MDD) (Barkham & Lambert, 2021; Cuijpers et al., 2014, 2020). Each of these therapies is assumed to work according to specific change mechanisms.

For instance, it has been hypothesized that cognitive-behavioral therapy's (CBT) effects on depression can be explained by several putative change mechanisms with partial empirical evidence supporting them (for an extensive review see Crits-Christoph & Connolly Gibbons, 2021). A systematic review showed that cognitive change in CBT for depressive disorders was associated with changes in depressive symptoms, although the specificity of cognitive change as a mediator of CBT effects was not supported (Garratt & Ingram, 2007). Similarly, a meta-analysis found that patients participating in CBT differed significantly in post-treatment dysfunctional thinking from patients of control groups but not from patients in other forms of therapy (Cristea et al., 2015). Additionally, some studies have shown that in the treatment of depression improvements in compensatory skills were related to CBT outcome (Barber & DeRubeis, 2001; Connolly Gibbons et al., 2009; Strunk et al., 2007). Furthermore, a study supported the specificity of this mechanism for CBT (i.e., in terms of mediation effects) when compared with psychodynamic therapy (Crits-Christoph et al., 2017). Finally, studies have shown that in CBT for depression enhancing behavioral activation (Christopher et al., 2009) and environmental rewards (Gawrysiak et al., 2009) were associated with changes in

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depressive symptoms, with one study supporting them as mediators of CBT effects when compared to treatment-as-usual (Dimidjian et al., 2017).

Besides these CBT approach-specific mechanisms of change, other empirically-supported change factors have been hypothesized that are common across different treatment approaches (Crits-Christoph & Gibbons, 2021). As an example, the working alliance represents a robust predictor of psychotherapy outcome across different treatment models (Flückiger et al., 2018), including CBT (see e.g., Gómez Penedo, Babl, et al., 2020; Kazantzis et al., 2017; Muran et al., 2018).

1.1. Common change mechanisms

Based on a meta-analytic review of more than 900 psychotherapy trials, Grawe et al. (1994) identified four general change factors/mechanisms that most consistently impact treatment outcome in psychotherapy above and beyond the working alliance:

1. Working with strengths *(Resource Activation* in Grawe's terms*),* i.e., the purposeful use of a patient's individual strengths and abilities;
2. Emotional awareness *(Problem Actuation)*, i.e., the momentary emotional experience of certain problems during the therapy session;
3. Agency (*Problem Mastery*), i.e., experiences of coping with specific problematic situations via behavioral strategies; and
4. Insight *(Motivational Clarification), i.e.,* becoming aware of the motivational determinants of one's own functioning.

For purposes of consistency with the original, we will use Grawe's terms in the following. Each of these change mechanisms may play a different role in the process of change over the course of therapy (Mander et al., 2013). While resource activation (as well as the working alliance) is generally thought to be a necessary supportive mechanism for the other mechanisms of change to unfold (Allemand & Flückiger, 2017, 2020; Flückiger, Wüsten, et al., 2010), problem actuation (e.g., schema activation) is viewed as an immediate precondition for change, as problems can be most effectively accessed and targeted in a therapy session while patients experience them emotionally (grosse Holtforth, 2017). The two change mechanisms of problem mastery and motivational clarification are assumed to be associated with specific corrective experiences leading to changes in symptoms and well-being (grosse Holtforth & Flückiger, 2012).

We have decided to focus this study on problem mastery and motivational clarification because these two mechanisms of change have been hypothesized in the literature as main interventional mechanisms (see e.g., Allemand & Flückiger, 2017, 2020; Flückiger et al., 2013; Lutz et al., 2020, 2022; Rubel et al., 2017; Schwartz et al., 2018), being directly targeted by therapists, while resource activation and problem actuation are conceptualized as facilitative mechanisms of patient change (e.g., grosse Holtforth & Flückiger, 2012).

1.2. Problem mastery

Problem mastery is often referred to as an action-oriented mechanism of change, which entails learning and practicing concrete behavioral strategies to cope with specific problems or difficult situations (Mander et al., 2013). The goal for the patient is to develop more adaptive problem-solving strategies by building new functional ways of thinking, feeling, and behaving (Beck, 2019). The therapist takes on an active role in teaching and guiding the patient towards acquiring and implementing these skills, thereby enabling him or her to make new and corrective experiences which, in turn, results in a better sense of mastery (Allemand & Flückiger, 2017). Hence, classical behavior therapy represents an approach that predominantly conceptualizes interventions targeting the mechanism of mastery (Grawe, 1997, 2004). Accordingly, a study based on expert interviews by Tschacher and coauthors (2014) showed that the experts associated central CBT interventions such as exposure with response prevention, problem-solving training, role play, cognitive restructuring, or positive reinforcement with promoting the mechanism of mastery.

1.3. Motivational clarification

Motivational clarification entails the conscious reflection on motives underlying one's own behavior and emotional reactions. Implicit motives may become the cause of a substantial amount of internal conflict, especially if a person is conflicted between two opposing motives, or when implicit motives and explicit personal goals do not align (Westermann et al., 2019). Therefore, the mechanism of motivational clarification aims to raise the patient's awareness of implicit motives, how they may conflict with other motives, and how one's motives relate to one's emotions. With this awareness, therapists and patients can discuss the motivational and emotional aspects that determine specific problematic behavioral patterns (Grawe, 1997, 2004). Patients can try to verbalize their own motives by answering questions like "Why is it so important for me that … ?", "What would I have needed in that particular situation?", "What do I want to get out of … ?". The role of therapists is to guide patients towards becoming more aware of their emotions, goals, and motives by focusing on the patients' experiences, how they evaluate those experiences, and which emotions arise when talking about them. In Tschacher and colleagues' (2014) interviews, experts identified interventions such as reality testing, verbalization of emotional reactions, or focusing (i.e., becoming aware of unresolved or unconscious emotional conflicts that manifest as vague pre-verbal bodily experience) as interventions associated with the common change factor of motivational clarification. Relatedly, Greenberg (2017) outlined various interventions that aim to enhance emotional processing and motivational clarification such as the empty-chair or two-chair dialogue.

1.4. The current study

Due to the complexity of showing how psychotherapy works, there is still a dearth of research as to how the mechanisms of change bring about change in patients (Cuijpers et al., 2019). Additionally, these mechanisms (e.g., mastery and clarification) may influence the therapeutic outcome differently through between- and within-patient effects (Gómez Penedo, Hilpert, et al., 2021). Between-patient (BP) effects examine inter-individual variations while within-patient (WP) effects examine intra-individual variations. Disentangling the BP and WP components may help elucidate differences in the role of the mechanisms of change (Zilcha-Mano, 2017, 2021). While BP effects establish to what degree the overall level of a putative mechanisms is associated with the overall level of outcome, the WP effects determine to what degree variations in the mechanisms are associated with variations in outcome. Thus, the WP effects (adjusting for BP effects) would be the most relevant to target when identifying mechanisms of change in psychotherapy (Falkenström et al., 2017; Gómez Penedo, Babl, et al., 2020; Zilcha-Mano, 2021).

A study conducted by Rubel et al. (2017) using the data of a naturalistic sample of patients mostly diagnosed with MDD and treated with a personalized CBT, showed significant BP and WP effects of coping experiences (a construct that merges mastery and motivational clarification mechanisms) on outcome. Of particular relevance for this study, Schwartz et al. (2018) found significant BP and WP effects of both problem mastery and motivational clarification on symptom change in a sample of depressed patients treated with CBT.

Although these two studies provide preliminary evidence to support problem mastery and motivational clarification as mechanisms of change in CBT for depression, in both cases they used multilevel models which have some inference limitations when studying mechanisms of change. Particularly, multilevel models do not allow to estimate bivariate models (i.e., estimating the effect of a mechanisms on outcome

while adjusting for the effect of outcome on the mechanisms). Furthermore, when testing cross-lagged effects to determine temporal precedence, multilevel models produce severely biased estimations (Falkenström et al., 2022). Dynamic structural equation modeling (DSEM; Asparouhov et al., 2018; McNeish & Hamaker, 2020) is a recently developed method that allows to overcome these limitations disaggregating BP and WP effects of mechanisms as latent variables in a multilevel structural equation modeling framework that allow to run bivariate cross-lagged effect models between the putative mechanisms and outcome (for more details on DSEM see the methods section).

Thus, the aim of this study was to test the impact of mastery and clarification on outcome and to supplement previous research findings by analyzing BP and WP effects on outcome in CBT treatments for depression using DSEM.

The following hypotheses were tested. Hypothesis #1: There will be significant positive WP effects of problem mastery on outcome, when adjusting for BP effects and cross-lagged effects of outcome on problem mastery. Hypothesis #2: There will be significant positive WP effects of motivational clarification on outcome, when adjusting for WP effects and cross-lagged effects of outcome on motivational clarification.

2. Methods

2.1. Study design

This secondary analysis draws on an RCT conducted by grosse Holtforth et al. (2019). The study compared two different cognitive-behavioral treatments for depression: cognitive behavioral therapy (CBT) and exposure-based cognitive therapy (EBCT-R). The results showed that both treatments were highly effective in reducing depression severity, with treatment effects that remained stable over the 12-months follow-up (grosse Holtforth et al., 2019). Neither during treatment nor follow-up did the two treatment conditions differ significantly regarding rates of change in outcome measures (grosse Holtforth et al., 2019). Data was collected at the psychotherapy outpatient clinic of the University of Bern over a 26-month period from January 2010 to February 2012.

2.2. Participants

2.2.1. Patients

The study included 140 patients who were randomly assigned to receive either CBT or EBCT-R. The age span in this sample ranged from 18 to 65, with a mean age of 40. 71 (SD = 11.46). The sample consisted of 78 (55.71%) females and 62 (44.29%) males. The majority of the sample had either received a university degree (N = 54, 38.57%), or professional training (N = 54, 38.57%). Diagnoses were established using the Structured Clinical Interview for DSM-IV-R (First et al., 1997). All patients had a main diagnosis of major depressive disorder (MDD), with 35.71% (N = 50) suffering from a mild, 46.43% (N = 65) from a moderate, and 17.86% (N = 25) from a severe depressive episode. Out of the 140 patients, 120 provided information regarding their depression history. Most suffered from recurrent depression (N = 90, 75%), whereas 30 patients (25%) were experiencing a single depressive episode.

To be eligible for the study, participants had to be between 18 and 65 years old and meet the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2000, 4th Ed.) criteria for major depressive disorders. Patients taking antidepressants were eligible to participate if they had been taking a stable dose for a minimum of 1 month prior to the start of the study. Patients with bipolar disorder, psychotic spectrum disorders, antisocial personality disorder, borderline personality disorders, substance dependency or substance abuse were excluded. To increase the external validity, patients who were either: a) suffering from mood symptoms due to other medical conditions, such as taking medication that might enhance depressive symptoms or b) already participating in a concomitant psychotherapeutic treatment were also excluded as were suicidal patients. All excluded patients were informed about other therapeutic options in the region.

2.2.2. Therapists

The therapy sessions were delivered by a total of 25 master-level psychologists who were either in their 4-year postgraduate psychotherapy training or who had already completed their training. The therapists were recruited through a local CBT institute and were trained in CBT for depression. Prior to the study, all therapists received an additional refresher course, as well as courses in EBCT-R and training in emotion-focused therapy (EFT) interventions. The therapists were predominantly female (92%), and on average 31.4 years old (SD = 5.14). During the study, each therapist saw an average of 5.8 patients (SD = 2.8, n = 1–7). To control for therapist effects and to minimize potential confounding variables, grosse Holtforth et al. (2019) used a crossed-therapist design, in which all therapists carried out both treatments and were assigned an equal number of patients in both treatment conditions.

3. Materials

The *World Health Organization- Five Well-Being Index* ([WHO-5], WHO, 1998). To monitor the participants' severity of their depressive symptoms, the WHO-5 was administered repeatedly during the course of therapy. This questionnaire contains five items, and measures the (lack of) positive mood, vitality, general interest and engagement (Topp et al., 2015). The WHO-5 has shown to be a sensitive screening instrument and an inverse measure adequate to assess depression severity (Krieger et al., 2014; Primack, 2003), with lower scores in the WHO-5 representing greater depression severity. Patients completed the WHO-5 before each session (except for session 1), and the responses were measured on a 6-point Likert scale, ranging from 0 (never) to 5 (all the time). In the current sample, the ordinal Cronbach 's α of the between-patient (BP) WHO-5 was 0.90, while the within-patient (WP) α was 0.94, at baseline. The ordinal alpha is conceptually equivalent to the Cronbach's α. However, it is based on a polychoric correlation matrix, rather than the Pearson covariance matrix, and is therefore a more accurately reliability coefficient when estimating α for measurements involving Likert-like (i.e., ordinal) items (Gadermann et al., 2012).

The *Bern Post-Session Report, Therapist version* (BPSR-T; Flückiger, Regli, et al., 2010). The BPSR-T is a widely used measure that assesses the treatment mechanisms following Grawe's model (Grawe, 1997, 2004) and contains a total of 27 items on eight subscales: global alliance, openness, session outcome, interactional difficulty, problem mastery, motivational clarification, resource activation, problem actuation, receptiveness, and interpersonal perspective (Flückiger, Regli, et al., 2010). Mastery and clarification were assessed by the mastery and clarification subscales, which contain items such as "Today I specifically tried to improve the patient's coping skills" (3 items) and "Today I worked towards making important connections in the patient's experience and behavior clearer" (3 items). The questionnaire was completed by the therapists at the end of each session and items were rated on a Likert scale, ranging from 1 (not at all) to 5 (yes, exactly right). The session scores for mastery and clarification in the BPSR-T represent the average score of the items of each subscale. For this study's purposes, we used the therapist version of the BPSR to measure mastery and clarification because therapists usually discriminate between these two distinct interventional routes and patients may be less sensitized to differentiate these two mechanisms (Flückiger et al., 2013; Rubel et al., 2017). In the therapist version of the BPSR, mastery and clarification were only slightly correlated (r = 0.11; Flückiger et al., 2010). In addition, video-based observer ratings revealed that mastery (evaluated at the end of the session) was highly associated with in-session interventions to enhance patient competencies (r = 0.44), whereas clarification was associated with in-session interventions to enhance the

awareness of personal goals ($r = 0.49$; Flückiger et al., 2009). In the current sample, both mastery (BP mastery $\alpha = 0.90$, WP mastery $\alpha = 0.94$) and clarification (BP clarification $\alpha = 0.91$, WP clarification $\alpha = 0.59$) subscales showed adequate internal consistency.

4. Treatments

In the CBT treatment condition, therapists followed the German CBT depression manual by Hautzinger (2003), which is based on Beck 's original cognitive therapy (Beck & Rush, 1979). To compare the treatment conditions, the CBT treatment was also adjusted to a three-phase structure. As in EBCT-R, phase one (sessions 1–7) included psychoeducation and behavioral activation techniques. Phase two (sessions 8–14) aimed at identifying, challenging, and changing dysfunctional cognitions and assumptions. Phase three (sessions 15–22) focused on stabilization and relapse prevention. Although the interventions in the two conditions overlap, the therapists in the CBT treatment condition were explicitly told to refrain from using interventions specific to EBCT-R as well as other EFT techniques.

The EBCT-R treatment condition used a German adaptation of the original EBCT (Hayes, 2015; Hayes et al., 2005) augmenting emotion-focused techniques aiming to foster emotional processing within a cognitive-behavioral framework (grosse Holtforth & Krieger, 2014; Gómez Penedo, Coyne, et al., 2020). The therapy was divided into three phases: sessions 1–7 (phase one), sessions 8–14 (phase two) and sessions 15–22 (phase three). Phase one entailed psychoeducation and teaching skills to reduce automatic patterns of avoidance and rumination, as well as mindfulness meditation techniques aimed at increasing distress tolerance and a better engagement with emotions. Phase two involved imaginary exposure exercises followed by in-depth emotion-focused interventions. Patients were asked to recall events where they felt worthless and defective, and then tried to make sense of their emotional-behavioral response to these events. Within the CBT-framework, the manual augments two-chair and empty chair dialogue EFT techniques, to aid the processing of the avoided emotions and difficult experiences (Greenberg & Watson, 2006; Hayes, 2015). Phase three focused on strengthening the positive emotion system, consolidating treatment gains, and relapse prevention.

5. Procedure

Patients received a maximum of 22 sessions of either CBT or EBCT-R, as well as optional booster sessions at 3-, 6-, and 12-months post-treatment. During treatment the patients completed the WHO-5 *before* each session and the therapists completed the BPSR-T *after* each session. The treatment was free of charge and patients did not receive any financial or material compensation for their participation (for further details see (grosse Holtforth et al., 2019)). This study was approved by the local ethics committee (Ref. Nr. EK: E-57/2009).

6. Data analyses

The main hypotheses of this study were focused on analyzing how the WP variations in mastery (Hypothesis #1) and clarification (Hypothesis #2) were associated with subsequent WP variations in outcome (i.e., depression severity), as measured by the WHO-5. Considering the nested structure of our data (i.e., repeated measures nested within patients) and the intention of analyzing cross-lagged session-by-session effects (Hamaker et al., 2018), for the main analysis of the study we conducted DSEM models (Asparouhov et al., 2018) using the software Mplus Version 8.7 (Muthén & Muthén, 1998 – 2020).

The DSEM models provide some relevant advantages over classical multilevel models to estimate within- and between-patient effects of putative mechanisms of change on outcome (Falkenström et al., 2017). While for multilevel models the BP and WP components are computed empirically, in DSEM those components are estimated as latent variables from the models (Hamaker et al., 2018; McNeish & Hamaker, 2020).

In summary, the DSEM estimated cross-lagged (i.e., temporal) effects of each mechanism on outcome (i.e., if the mechanism at a session predicts subsequent outcome) while adjusting for the reverse cross-lagged effect (i.e., effect of outcome on subsequent mechanism). This provides evidence not only regarding the association between the mechanism and outcome but also about temporality of the effects, while adjusting for eventual reverse causality. Additionally, the model adjusted for the autoregressive effects both of the mechanisms and outcome. We conducted two separate DSEM models, one for each mechanism, while adjusting for the effect of the other as a covariate. Fig. 1 illustrates the DSEM model used in this study. To test the hypotheses of the study, we focused specifically on the $\text{Mechanism}_t \rightarrow \text{Outcome}_{t+1}$ path. For comparison purposes, we also conducted separate DSEM models estimating the cross-lagged effects of the other three putative mechanisms proposed in Grawe's model (i.e., working alliance, resource activation, and problem actuation) on outcome, while adjusting for auto-regressive effects and reverse causality.

The equations of the DSEM models to test the hypotheses of the study are presented and explained in the supplemental material. Further details of the DSEM models and how the WP and BP were calculated are also provided in the supplemental material. At the *open science framework* (OSF) we present the complete Mplus script of each model (https://osf.io/3dg8n/?view_only=49894d22d4cf41edb20cb278be727e2c).

Results were standardized based on WP variances (Schuurman et al., 2016). To enhance interpretability, we further reported standardized coefficients based on BP variability and R^2 from the dependent variables of each model as measures of effect size.

7. Results

7.1. Sample descriptives

At session 1, patients' mean level of WHO-5 was 1.35 (SD = 0.76). In the BPSR-T, at session 1 the therapist had an average mastery score of 2.03 (SD = 0.85) and an average clarification score of 2.68 (SD = 0.89). Across all sessions of treatment, the average level of WHO-5 was 2.07 (SD = 1.04). Additionally, during the whole therapy, the average level of mastery was 3.43 (SD = 1.10), while the average level of clarification was 3.62 (SD = 0.85). During treatment, the correlation between mastery and clarification was $r = 0.42$ ($p < .001$). Furthermore, the correlation between mastery and the WHO-5 was $r = 0.19$ ($p < .001$) and between clarification and the WHO-5 was $r = 0.11$ ($p < .001$).

7.2. Mastery as a mechanism of change (Hypothesis #1)

In Table 1, we present point estimates (i.e., posterior means) and 95% credible intervals for all the fixed effects (i.e., means) and random effects (i.e., variances) of the DSEM model with mastery as a predictor.

The within-level standardized estimates supported Hypothesis #1 of the study, showing a significant positive WP effect of mastery on subsequent outcome, $\text{Mastery}_t \rightarrow \text{Outcome}_{t+1} = 0.15$, SD = 0.02, 95%CI [0.11, 0.20], $p < .001$[1,2]. Greater increases in mastery in a given session were associated with better outcome in the subsequent session. As a measure of effect size, the BP standardized estimate for this parameter

[1] As a sensitivity analysis, we replicated the DSEM model for mastery but using the patient version of the BPSR, instead of the therapist version. In this model, the within-patient effect of mastery on subsequent outcome remained significant, $\text{Mastery}_t \rightarrow \text{Outcome}_{t+1} = 0.20$, SD = 0.02, 95%CI [0.15, 0.24], $p < .001$.

[2] When replicating the analyses including treatment condition as a covariate, the within-patient effects of mastery on subsequent outcome remain significant, $\text{Mastery}_t \rightarrow \text{Outcome}_{t+1} = 0.13$, SD = 0.02, 95%CI [0.09, 0.17], $p < .001$.

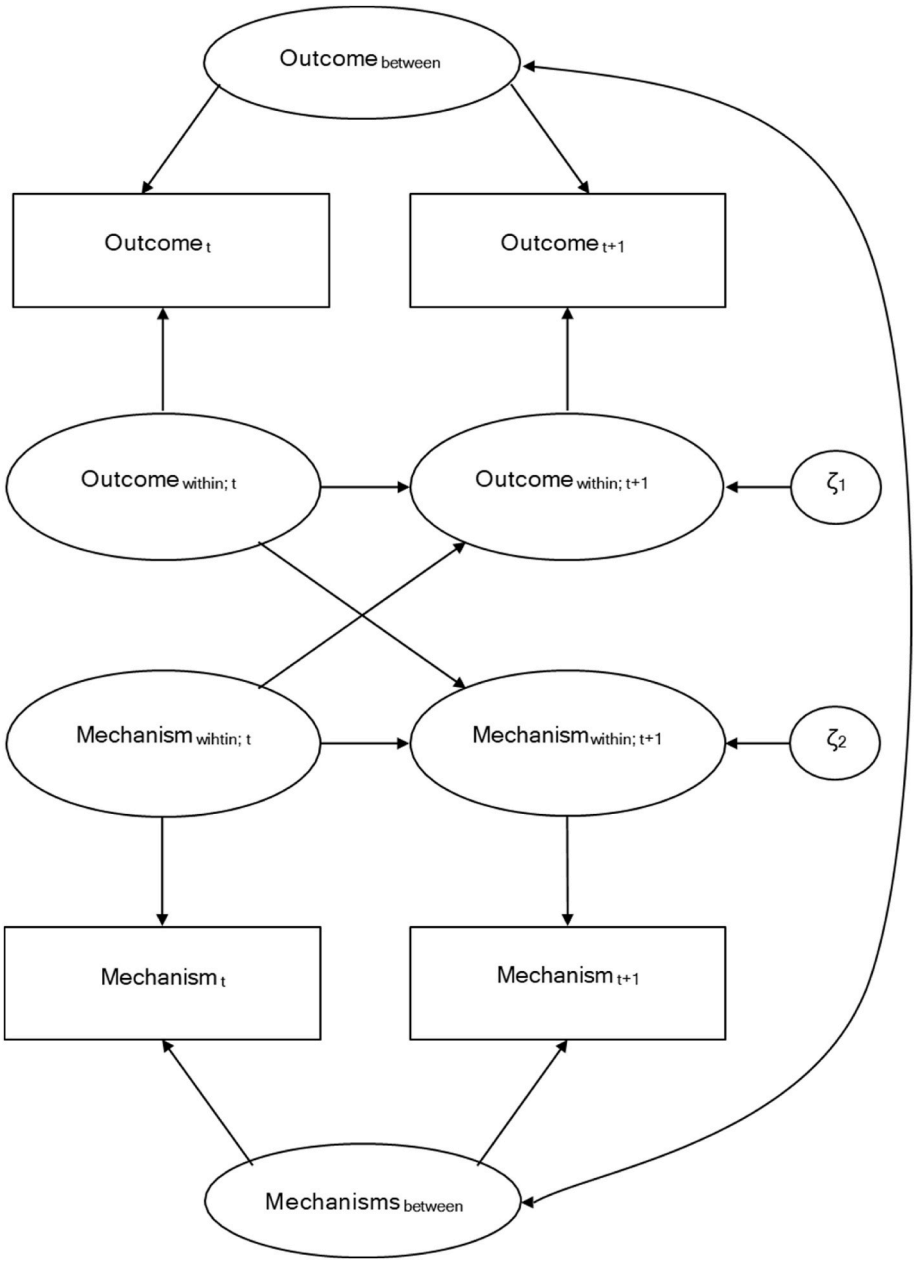

Fig. 1. Representation of the bivariate dynamic structural equation model conducted to estimate cross-lagged effects of the mechanisms on subsequent outcome.

Table 1
Point estimates (posterior means) and 95% credible intervals of fixed effects and random effects in the DSEM with mastery as predictor.

	Fixed effects (means)		Random effects (variances)	
Estimate	*Posterior means*	*Credible intervals*	*Posterior means*	*Credible intervals*
$\mu_{who,i}$	2.21	[2.06, 2.37]	0.58	[0.42, 0.82]
$\mu_{mastery,i}$	3.61	[3.48, 3.75]	0.36	[0.24, 0.55]
$\mu_{clarification,i}$	3.61	[3.53, 3.71]	0.30	[0.23, 0.40]
$\varphi_{ww,i}$	0.44	[0.37, 0.50]	0.08	[0.05, 0.12]
$\varphi_{wm,i}$	0.12	[0.08, 0.16]	0.01	[0.01, 0.03]
$\varphi_{mw,i}$	0.07	[0.01, 0.15]	0.05	[0.02, 0.09]
$\varphi_{mm,i}$	0.47	[0.41, 0.52]	0.04	[0.02, 0.06]

Note. The table presents estimates of mean who ($\mu_{who,i}$), mastery ($\mu_{mastery,i}$) and clarification ($\mu_{clarification,i}$), the autoregressive effects of who ($\varphi_{ww,i}$) and mastery ($\varphi_{mm,i}$), the cross-lagged effects of mastery on who ($\varphi_{wm,i}$) and the cross-lagged effects of who on mastery ($\varphi_{mw,i}$).

was 0.99.

Additionally, based on this model, we found significant positive WP effects of outcome on subsequent mastery, Outcome $_t \rightarrow$ Mastery$_{t+1}$ = 0.07, SD = 0.03, 95%CI [0.02, 0.12], $p = .004$, and a significant positive BP association between mastery and outcome, Mastery$_t \leftrightarrow$ Outcome$_t$ = 0.17, SD = 0.02, 95%CI [0.13, 0.22], $p < .001$.

Finally, the model explained 35% of the within-level variance on outcome, $R^2 = 0.35$, SD = 0.02, 95% CI [0.30, 0.40], $p < .001$, and 33% of the within-level variance on mastery, $R^2 = 0.33$ SD = 0.02, 95% CI [0.29, 0.38], $p < .001$.

7.3. Clarification as a mechanism of change (Hypothesis #2)

In Table 2, we present point estimates (i.e., posterior means) and 95% credible intervals for the fixed effects (i.e., means) and random effects (i.e., variances) of the DSEM model with clarification as a predictor.

The within-level standardized estimates supported Hypothesis #2 of

Table 2
Point estimates (posterior means) and 95% credible intervals of fixed effects and random effects in the DSEM with clarification as predictor.

	Fixed effects (means)		Random effects (variances)	
Estimate	*Posterior means*	*Credible intervals*	*Posterior means*	*Credible intervals*
$\mu_{who,i}$	2.20	[2.05, 2.36]	0.58	[0.40, 0.82]
$\mu_{clarification,i}$	3.67	[3.57, 3.77]	0.27	[0.19, 0.38]
$\mu_{mastery,i}$	3.43	[3.31, 3.54]	0.43	[0.32, 0.59]
$\varphi_{ww,i}$	0.48	[0.41, 0.55]	0.07	[0.05, 0.11]
$\varphi_{wc,i}$	0.09	[0.04, 0.14]	0.02	[0.01, 0.04]
$\varphi_{cw,i}$	0.08	[0.02, 0.14]	0.02	[0.01, 0.05]
$\varphi_{cc,i}$	0.29	[0.22, 0.35]	0.05	[0.03, 0.08]

Note. The table presents estimates of mean who ($\mu_{who,i}$), clarification ($\mu_{clarification,i}$) and mastery ($\mu_{mastery,i}$), the autoregressive effects of who ($\varphi_{ww,i}$) and clarification ($\varphi_{cc,i}$), the cross-lagged effects of clarification on who ($\varphi_{wc,i}$) and the cross-lagged effects of who on clarification ($\varphi_{cw,i}$).

the study, showing a significant positive WP effect of clarification on subsequent outcome, $Clarification_t \rightarrow Outcome_{t+1} = 0.08$, SD = 0.02, 95%CI [0.04, 0.13], $p < .001$. Greater increases in clarification in a given session were associated with greater outcome in the subsequent session. The BP standardized estimate for this parameter was 0.64.

Furthermore, the model showed significant positive WP effects of outcome on subsequent clarification, $Outcome_t \rightarrow Clarification_{t+1} = 0.10$, SD = 0.03, 95%CI [0.04, 0.15], $p = .001$[3,4], and a significant positive BP association between clarification and outcome, $Clarification_t \leftrightarrow Outcome_t = 0.05$, SD = 0.02, 95%CI [−0.002, 0.09], $p = .03$.

Finally, the model explained 34% of the within-level variance on outcome, $R^2 = 0.34$, SD = 0.02, 95% CI [0.29, 0.39], $p < .001$, and 18% of the within-level variance on clarification, $R^2 = 0.18$, SD = 0.02, 95% CI [0.14, 0.23], $p < .001$[5].

8. Discussion

The aim of this study was to investigate the BP and WP effects of two common change mechanisms (i.e., problem mastery and motivational clarification) on subsequent outcome during outpatient CBT for depression drawing on data from a randomized controlled trial with 140 depressed patients receiving 22 sessions of two variants of CBT (CBT and EBCT) using DSEM. Based on assumptions of consistency theory by Grawe (1997, 2004), we hypothesized significant positive WP cross-lagged effects of both mastery (Hypothesis #1) and clarification (Hypothesis #2) on outcome, when adjusting for BP effects and for the effects of outcome on problem mastery and motivational clarification, respectively. Both hypotheses were confirmed, suggesting that the association between mastery and clarification with outcome is to a large extent due to the session-specific changes in the mechanism variables, not just the overall level of mastery or clarification.

In the literature, there has been evidence partially supporting approach-specific mechanisms of change in CBT for depression such as changes on dysfunctional thinking (Cristea et al., 2015; Garratt & Ingram, 2007) improvements in compensatory skills (Barber & DeRubeis, 2001; Connolly Gibbons et al., 2009; Strunk et al., 2007), enhancing behavioral activation and improving environmental rewards (Christopher et al., 2009; Dimidjian et al., 2017; Gawrysiak et al., 2009). Going beyond these specific mechanisms, other studies have identified and supported common mechanisms across different therapeutic approaches, including CBT (see Crits-Christoph & Gibbons, 2021). Besides the well-established mechanism of the working alliance (Flückiger et al., 2018), grounded on a meta-analytic review, Grawe et al. (1994) identified four common change factors/mechanisms: (i) resource activation, (ii) problem actuation, (iii) problem mastery, and (iv) motivational clarification.

While problem actuation and resource activation are considered to be pre-conditions and supporting factors for change (Allemand & Flückiger, 2017, 2020; Flückiger, Wüsten, et al., 2010; grosse Holtforth, 2017), problem mastery and motivational clarification have been postulated as the main active mechanisms of change related to the application of certain interventions (grosse Holtforth & Flückiger, 2012; Flückiger et al., 2013; Lutz et al., 2020, 2022; Rubel et al., 2017; Schwartz et al., 2018).

The results of this study are in line with previous findings on the predictive value of mastery and clarification on CBT outcome for depression (Schwartz et al., 2018) and other disorders (Rubel et al., 2017). However, different from previous attempts using classical multilevel models, in this study we found significant positive WP effects on outcome of both mastery and clarification, when applying DSEM to estimate bivariate cross-lagged associations between the mechanisms and outcome. This evidence further supports both mastery and clarification as relevant change mechanisms in CBT treatments for depression. When compared with other mechanisms proposed by Grawe, the effect sizes of the targeting mechanisms of mastery (WP standardized = 0.15, BP standardized = 0.99) and clarification (WP standardized = 0.08, BP standardized = 0.64) were stronger than the ones of the working alliance (WP standardized = 0.06, BP standardized = 0.45) and problem actuation (WP standardized = -0.004, BP standardized = 0.01). Descriptively, mastery also presented a stronger effect size compared to resource activation (WP standardized = 0.10, BP standardized = 0.69), while the effect of clarification was weaker than the one of resource activation.

Although the results of the study showed average significant effects of mastery and clarification on subsequent CBT outcome for depression, it might be possible that these effects are not homogenous across patients and that there could be individual variability regarding to what degree fostering mastery or clarification is beneficial for a particular patient (Gómez Penedo, Schwartz, et al., 2021; Lutz et al., 2019, 2022; Rubel et al., 2020). Future research might explore differential individual effects of mastery and clarification in CBT for depression, trying to identify baseline patient characteristics that moderate these effects. That line of research would provide meaningful information to systematize evidence-based criteria for the personalization of CBT for patients with MDD (Constantino et al., 2020; Delgadillo & Lutz, 2020; Lutz et al., 2020).

Besides the cross-lagged effects of mastery and clarification on outcome, we also found significant cross-lagged effects of outcome on the putative mechanisms. In the process-outcome literature, reverse causation was usually seen as an indicator that the association between the process variable and outcome might be explained by the outcome producing an effect on the process variable (Barber, 2009; Barber et al., 2000; DeRubeis & Feeley, 1990). As in the DSEM models of this study we simultaneously estimated both effects, the cross-lagged effects of mechanisms on outcome reported where observed even when adjusting

[3] As a further sensitivity analysis, we replicated the DSEM model for clarification using the patient version of the BPSR. In this post hoc analysis, the within-patient effect of clarification on subsequent outcome also remained significant, $Clarification_t \rightarrow Outcome_{t+1} = 0.18$, SD = 0.02, 95%CI [0.13, 0.22], $p < .001$.

[4] When replicating the analyses including treatment condition as a covariate, the within-patient effects of clarification on subsequent outcome remained significant, $Clarification_t \rightarrow Outcome_{t+1} = 0.07$, SD = 0.02, 95%CI [0.03, 0.11], $p < .001$.

[5] When analyzing the other mechanisms proposed by Grawe, for comparison purposes, the DSEM models showed a significant positive WP effect of both the working alliance, $Alliance_t \rightarrow Outcome_{t+1} = 0.06$, SD = 0.02, 95%CI [0.02, 0.11], $p = .002$, BP standardized effect = 0.45 and resource activation, $Resource\ Activation_t \rightarrow Outcome_{t+1} = 0.10$, SD = 0.02, 95%CI [0.06, 0.14], $p < .001$, BP standardized effect = 0.69 on subsequent outcome. However, DSEM models showed no significant effect of problem actuation on subsequent outcome, $Problem\ Actuation\ t \rightarrow Outcome_{t+1} = -0.004$, SD = 0.02, 95%CI [-0.05, 0.03], $p = .43$, BP standardized effect = 0.01.

for reverse causality. Thus, the effects of the mechanisms were not a by-product of the outcome variable affecting the mechanisms. However, this finding might suggest a reciprocal relationship between the two putative mechanisms and outcome (Flückiger et al., 2020). This interpretation would imply that the mechanisms might facilitate subsequent improvements in patients' clinical condition, while this improvement also enhances the work focused on these mechanisms in the subsequent session.

9. Clinical implications

Conceptually, mastery as well as clarification might be seen as key transtheoretical and transdiagnostic change mechanism (Schwartz et al., 2018). Clinically, our results are consistent with the proposal that fostering mastery and clarification are key active mechanisms of change underlying improvement in psychotherapy for depression, although this requires experimental manipulation to be confirmed. Enabling the patient to master his or her problems is considered a major goal of CBT for depression (Strauman & Eddington, 2016). To attain this goal, therapists actively teach and guide depressive patients to learn behavioral strategies of problem-solving and coping via acquiring new functional ways of thinking, feeling, and behaving resulting in corrective experiences of mastery (Allemand & Flückiger, 2017; Beck, 1995). Additionally, using evidence-based strategies such as behavioral activation (Stein et al., 2021) might help to further enhance depressed patients' mastery experiences.

To realize the change factor of motivational clarification, therapists may promote the patients' level of conscious reflection on implicit motives and potential motivational conflicts underlying their behavior and their emotional reactions. To achieve corrective experiences of motivational clarification, therapists may use interventions originating for example from the emotion-focused tradition such as two-chair dialogue (Greenberg, 2017).

10. Limitations and future directions

The results of our study must be interpreted in the light of several limitations. One limitation concerns generalizability: First, the sample consisted of non-suicidal patients with MDD treated in the outpatient setting and without certain comorbidities. Second, both treatments were adapted into German and results may not entirely apply to the original versions of CBT and EBCT-R as well as to other therapeutic approaches. Future studies should include patients with other disorders or in inpatient facilities using different treatment approaches when investigating the effects of mastery and clarification. Third, mastery and clarification were both measured using the BPSR-T. Thus, only therapist ratings were used as an indicator of the therapeutic process, although there are some methodological concerns regarding the use of self-report scales. In order to obtain more reliable data, future research should consider the patient perspective and/or an observer-rated perspective when measuring mastery and clarification to control for potential response tendencies, biases, and ceiling effects. Fourth, focusing on the change mechanisms of mastery and clarification may also present a possible shortcoming of this study as other important process variables may have been neglected. Fifth, the results of the current study cannot justify strong causal inferences regarding mechanisms' effects on outcome, and should be interpret cautiously. The analyses of the study addressed two out of the three classical criteria to determine causality (i.e., determining association and temporal precedence between the predictors and outcome) but did not control for spuriousness (i.e., third variables affecting the predictors-outcome relation) (Antonakis et al., 2010). Future studies would need to replicate these findings manipulating the use of the mechanisms of mastery and clarification using experimental designs to justify stronger causal inferences regarding their effects on psychotherapy outcome. Finally, in extension of the presented study, future research may also investigate the association of common change factors and related corrective experiences with longer-term outcomes such as maintenance of treatment effects and depression relapse or recurrence.

11. Conclusions

To conclude, our research has shown that general change mechanisms such as those defined by Grawe (1997) can be productively used to investigate common process-outcome relations within theory-specific treatments for specific disorders such as CBT for depression, thereby making a contribution to developing and testing specific pathways for particular disorders (Bruijniks et al., 2022). More specifically, therapists might benefit from fostering patients' corrective experiences of problem mastery and motivational clarification throughout the therapy process, which, in turn, might be associated with continuous improvements in depression severity.

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CRediT authorship contribution statement

Juan Martín Gómez-Penedo: contributed to the overall design of the study, Formal analysis, worked on data and results interpretation, wrote the manuscript. **Anna Babl:** worked on data and results interpretation, wrote the manuscript. **Agnete Dyresen:** contributed to the overall design of the study, Formal analysis, worked on data and results interpretation, provided writing assistance and proof reading of the article. **Javier Fernández-Álvarez:** worked on data and results interpretation, provided writing assistance and proof reading of the article, All authors have approved the final manuscript. **Christoph Flückiger:** contributed to the overall design of the study, wrote the manuscript. **Martin grosse Holtforth:** contributed to the overall design of the study, involved in the data collection, provided writing assistance and proof reading of the article.

Declaration of competing interest

None.

Data availability

The authors do not have permission to share data.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.brat.2023.104343.

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