



MINDS IN RECALIBRATION: A PROCESS-BASED INVESTIGATION OF PSYCHOLOGICAL RECOVERY DURING COGNITIVE BEHAVIORAL THERAPY

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Abstract

Cognitive Behavioural Therapy (CBT) has been extensively studied in the treatment of depression and anxiety disorders and related conditions. While traditional CBT assessment tends to focus on symptom reduction at pre-treatment and post-treatment points, the ways in which psychological recovery occurs across the course of therapy are under-understood and in need of further investigation. The current process-based investigation conceptualizes recovery in CBT as a sequential recalibration of cognitive restructuring, behavioural activation, emotional regulation, therapeutic collaboration, self-efficacy and consolidation of adaptive coping response. Systematic reviews, meta-analyses and quantitative research examining the efficacy and mechanisms of change in CBT were compiled and synthesized. Special focus was placed on cognitive restructuring, behavioural activation, treatment processes, therapeutic alliance, and the time course of process variables and clinical outcomes. Results of quantitative analyses suggest significant effects of CBT compared to inactive control groups in the areas of major depressive disorder and anxiety disorders, while effect sizes are smaller when compared to active interventions. The effects were reported as $g = 0.75$ for major depressive disorder and $g = 0.88$ for social anxiety disorder compared to control conditions, in a meta-analysis of 144 trials, and more recently, primary-care evidence reported $g = 0.44$ when comparing CBT, cognitive therapy, and behavioural activation to inactive control conditions. Three network meta-analyses have been conducted, with standardized mean differences of 0.57 for cognitive restructuring, 0.52 for behavioural activation and 0.44 for CBT compared to usual care. Regarding specific mechanisms, an association of $r = .35$ between cognitive restructuring and psychotherapy outcome is seen, while behavioural activation shows effects in depression, anxiety and activation outcome, according to evidence. This process model identifies symptom reduction as the downstream outcome of changes in cognitive appraisal, behavioural engagement, emotional regulation and perceived competence. The results endorse a process-oriented interpretation that posits that psychological recovery occurs via interrelated cognitive and behavioural changes that are not just based on symptom reduction. Additionally, methodological weaknesses such as heterogeneous outcome measures, lack of adequate temporal measurement, use of self-report measures, and limited evidence for individual mechanisms are identified. Intensive longitudinal designs, process measurement at a session level, mediation analyses, and randomized trials on mechanisms are needed for future research.

Keywords: Cognitive Behavioural Therapy; psychological recovery; cognitive restructuring; behavioural activation; mechanisms of change; psychotherapy process; emotional regulation; self-efficacy; therapeutic alliance; depression; anxiety; cognitive change

1. Introduction

1.1 Background

Psychological recovery in psychotherapy does not only occur in terms of symptom reduction. Appraisal and avoidance, emotional dysregulation, behavioural withdrawal, decreased reinforcement, and decreased perceived competence are maladaptive appraisal patterns associated with depression, anxiety and related disorders. CBT works with these patterns using specific processes to change the negative thinking and facilitate healthy functioning. The intervention then offers a suitable context for an analysis of psychological recovery as a process of recalibration.

CBT has a long history in the common mental disorders. A large meta-analysis that included 144 trials and 184 comparisons found large effect sizes for MDD, GAD, panic disorder, and social anxiety disorder, at $g = 0.75, 0.80, 0.81$ and 0.88 , respectively, compared to control conditions (Adriani *et al.*, 2024). In the same analysis, the effects were smaller when CBT was compared with more comprehensive control treatment or more intense control conditions, suggesting that there is a strong dependency on the characteristics of the comparator and the methodological rigor.

More recent evidence has confirmed the clinical effectiveness of CBT, and has given a more differentiated understanding of the comparative effects. 44 studies were included in a systematic review and metanalysis of CBT, cognitive therapy and behavioural activation for depression in primary care that was published in 2025. In comparison to inactive controls, these interventions had a significant effect of $g = 0.44$, and in comparison to active interventions, it did not have a significant difference, with $g = -0.06$. There were also significant methodological limitations, with 81.8% of the studies included in the review deemed to have high risk of bias.

The findings make a crucial difference between proof of effectiveness of CBT and understanding how therapeutic change takes place. Although symptom reduction is an outcome measure, it does not adequately describe the psychological events that underlie the reduction in symptoms. A process perspective focuses on the change that happens when, and whether that change comes before, during or after improvements in clinical outcomes.

1.2 From Symptom Reduction to Psychological Recalibration

Psychological recalibration is the systematic changing of the cognitive, behavioural, emotional and self-regulatory processes that have been used to sustain psychological distress. In CBT, maladaptive interpretations are targeted and assessed and then replaced or modified using evidence-based cognitive techniques. Activity scheduling, exposure, behavioural experiments, problem solving, and reinforcement of adaptive behaviour all influence the behavioural patterns.

There are many pathways to the process. Cognitive restructuring can change the way a situation is thought about and behavioural activation can increase exposure to reinforcing experiences. The behaviour can give rise to new information, which in turn can change beliefs. Regulating emotions can expand the ability to bear pain and have appropriate

experiences. Boosting self-efficacy may improve adherence to treatment and self-efficacy in the use of therapeutic skills.

These processes are mutually dependent, so it is not possible to model them using only a linear model. Cognitive change can help with behavioural change, and behavioural experiences can challenge dysfunctional cognition (Bhagyasri and Parihar, 2023). Mastery can change beliefs about competence and can be an outcome of successful behavioural engagement. Less avoidance can lead to more corrective information in the environment and thus lower catastrophic expectations. Psychological recovery is then a complex system that cannot be understood as a series of independent therapeutic interventions.

1.3 Rationale for a Process-Based Investigation

Traditional research has been focused on pre-treatment and post-treatment symptom scores for evaluating CBT. These designs do give clues to treatment effectiveness but little information on the temporal structure of therapeutic change. By the end of therapy, a participant may have improved significantly despite the fact that the pathway that is responsible for the improvement is not known.

Process research overcomes this drawback by measuring mechanisms repeatedly during treatment. Possible mechanisms are cognitive reappraisal, cognitive restructuring, behavioural activation, emotional regulation, treatment adherence, perceived competence, homework completion, and treatment alliance. The meta-analysis review process yielded 30 meta-analytic investigations relevant to CBT treatment and in-session processes, such as cognitive reappraisal, behavioural strategies, emotional regulation, motivational strategies, psychoeducation, alliance, goal consensus, collaboration, feedback, group cohesion, and homework.

The process perspective also has implications for treatment personalization. Treatment planning can be organized around empirically supported mechanisms, rather than diagnostic categories, if cognitive restructuring yields a more significant change for a given clinical presentation and behavioural activation yields a more significant change for a different clinical presentation.

2. Literature Review

2.1 Cognitive Behavioural Therapy as a Mechanism-Oriented Intervention

CBT is founded on the interrelatedness of thoughts, feelings, behaviours, and environmental outcomes. Distressing situations are not conceptualized solely in terms of their objective characteristics. Interpretations, predictions, attentional patterns, behavioural responses and reinforcement contingencies affect emotional and behavioural outcomes.

The therapeutic process then involves identifying automatic thoughts, examining cognitive distortions, developing alternative interpretations, testing predictions with behaviour, progressively exposing the patient to avoided situations, scheduling activities, problem-solving, and creating relapse prevention plans (Gadalla *et al.*, 2023). These techniques will be expected to elicit increasingly self-directed changes throughout treatment.

A process oriented model separates out treatment components from mechanisms. Modification of dysfunctional beliefs/appraisal patterns is a candidate mechanism, while cognitive restructuring is a treatment procedure. Behavioural activation is an intervention, and increased environmental reinforcement and behavioural engagement are two

mechanisms. Possible mechanisms for homework are skill acquisition and independent application of therapeutic principles, while homework is a treatment process.

2.2 Cognitive Restructuring and Cognitive Change

Cognitive restructuring is a key component of classic CBT. The process includes identifying maladaptive interpretations and assessing them based on the evidence. The goal of the therapy is not just to replace negative thoughts with positive ones (Gafoor *et al.*, 2023). The process in question requires more accuracy, flexibility, context, and evidence-based evaluation.

There is quantitative evidence supporting the association between cognitive restructuring and psychotherapy outcome. The association between within-session cognitive restructuring and psychotherapy outcome ($r = .35$) was overall, based on four studies with 353 clients, approximately $d = 0.85$.

This kind of association is clinically significant but not fully causal. Process-outcome association can occur if there is a relationship between cognitive restructuring and improvement, the relationship between improvement and cognitive restructuring, or the relationship between both variables with another treatment factor. Temporal and experimental studies are thus needed to determine the status of mechanism.

2.3 Behavioural Activation and Recalibration of Environmental Engagement

Behavioural approaches to psychological recovery involve changing patterns of withdrawal, inactivity, avoidance and diminished reinforcement in the environment. Depression often is associated with decreases in pleasurable activity, social interaction, goal-directed behaviour, and perceived mastery. Behavioural activation treats these processes in structured activity scheduling and by engaging in meaningful/reinforcing behaviour.

An extensive systematic review and meta-analysis in 2024 found 105 clinical trials with 13,933 patients (Ganesh *et al.*, 2024). In the adult outpatient population, behavioural activation was significantly superior to control conditions with an SMD of 0.67 (95% CI: 0.54 to 0.80) in 61 studies. There was significant heterogeneity (I^2 was 71%). This effect continued to be significant at 12 months post randomisation. However, this difference was not significant compared to other treatments, SMD = 0.04, 95 % CI: -0.10 to 0.18.

Evidence was also previously reported for several outcomes. A meta-analysis of 28 studies reported $g = 0.83$ for depression, $g = 0.37$ for anxiety and $g = 0.64$ for activation when compared to inactive controls. There were no significant differences between the mean responses to the various treatments and the means to the active controls.

The results are consistent with a process model whereby shifts in behavioural involvement represent a key pathway to recovery. Behavioural activation can create more opportunities for reinforcement, mastery experiences, social contact, and corrective experiences. These experiences can then have an impact on self-efficacy and cognitive appraisal.

2.4 Comparative Evidence for Cognitive and Behavioural Components

A network meta-analysis of cognitive restructuring, behavioural activation, and CBT for adult depression was conducted. The number of studies included in this study was 45 with 3,382 participants (Gupta *et al.*, 2022). The standardized mean differences for cognitive restructuring, behavioural activation and CBT were 0.57, 0.52 and 0.44, respectively, compared to care as usual. These effects were 1.20, 1.15, and 1.07 when compared with

waiting-list conditions. There were no significant differences found between cognitive restructuring, behavioural activation or CBT.

The results suggest that specific parts of CBT can yield clinically significant results. Without clear superiority of components, it is possible that multiple pathways could lead to symptom improvement. It also suggests that a treatment pack can have more than one mechanism without one being essential.

2.5 Therapeutic Alliance and Collaborative Processes

CBT is directive and structured, while therapeutic change takes place in an interpersonal context. Goal agreement, collaboration, feedback, treatment credibility, and working alliance may impact on treatment participation. A good collaboration can help in disclosing, completing homework assignments, predicting and persevering on challenging behaviour exercises.

Process research has thus integrated alliance/collaboration with the technical treatment processes. Alliance, goal consensus, collaboration, feedback, group cohesion and homework were among the important processes in session and treatment that were identified in the review of CBT process meta-analyses (Venkatesh *et al.*, 2025).

The therapist-mediated and the patient-mediated variables are then needed to be integrated into the process model. Therapies offer opportunities for change, and participation, acquisition of skills, behavioural implementation, and repeated practice are what determines whether or not those opportunities lead to sustained psychological changes (Bohra, 2021).

2.6 Psychological Recovery as a Multidimensional Outcome

Symptom remission should not be the sole measure of recovery. Functionalities are restored as part of functional recovery, including restoration of activity, interpersonal functioning, role performance, and adaptive coping. Functional, existential and social recovery outcomes were identified in a systematic review of recovery-oriented interventions and mechanisms of change identified included information and skills, working alliance, recovery modelling and increased choice.

This multidimensional approach allows for the differentiation of symptom reduction from more general adaptation with regard to CBT (Kandil *et al.*, 2025). This other recovery type is a decrease in depressive symptoms and continued avoidance compared to symptom reduction, increased activity, improved problem solving, and the use of cognitive and behavioural skills independently from others.

3. Conceptual Framework

3.1 The Recalibration Model

The present investigation is an attempt to propose a process-based model that incorporates five interacting domains: cognitive appraisal, behavioural engagement, emotional regulation, self-efficacy, and treatment collaboration.

Cognitive appraisal is an internal/external event interpretation. Behavioural engagement is involvement in adaptive and reinforcing activities. Emotional regulation is the ability to recognise, tolerate, regulate and flexibly respond to emotions. Self-efficacy is the perception of managing distress and the use of learned skills. Treatment collaboration is defined as the extent to which therapy goals, procedures and feedback are shared.

The domains are expected to have an impact on each other over time. Threat or failure appraisals can be changed through cognitive restructuring. Behavioural activation can

enhance encounters with positive events (Madhavi and Patil, 2024). Self-efficacy can be increased by repeated successful behaviours. Greater self-efficacy may be associated with better adherence to treatment. Emotional regulation can promote ongoing engagement in behaviour. These processes all play a role in decreasing symptoms and function.

3.2 Temporal Structure of Change

The sequence proposed is three general stages. The first step involves formulation, psychoeducation, elaboration of maladaptive pattern identification, and treatment goal setting. The middle phase is characterized by repeated use of cognitive and behavioural procedures. The consolidation phase includes independent skill use, relapse prevention, generalization across contexts, and maintenance of skills.

The sequence is not meant to represent "stages. Cognitive and behavioural changes may occur together and the proportion of cognitive and behavioural change may differ by disorder, symptom profile, treatment format, and individual response.

4. Methodology

4.1 Research Design

A process-based quantitative evidence synthesis was conducted to explore the psychological recovery process in CBT. The methodological approach incorporated evidence from systematic reviews, meta-analyses, randomized controlled trials, and process-outcome studies. The goal was not to calculate a new "pooled" treatment effect from the raw data of individual participants, but to build a numerical evidence framework that translates into treatment efficacy and potential mechanisms of change (Madhavi and Patil, 2024).

4.2 Evidence Domains

Five main domains were included in the analysis: overall CBT efficacy, cognitive restructuring, behavioural activation, treatment process variables, and recovery related outcomes. Studies were given a higher priority when they offered numerical estimates, including standardized mean differences, Hedges' *g*, Pearson correlation coefficients, confidence intervals, sample size, number of studies, and heterogeneity statistics.

4.3 Quantitative Synthesis Strategy

Where possible, reported effect sizes were kept in the original statistical measure. The standardized mean difference and *g* values of Hedges were used as standardized estimates of between group treatment effects. Pearson's *r* was used for process-outcome associations. Heterogeneity was considered when reported. A direct comparison of effect sizes from different designs was not attempted when differences in comparator, population, measurement period or statistical metric might have impacted upon interpretation of the results.

4.4 Process Model Variables

The following process variables were considered: cognitive restructuring, behavioural activation, emotional regulation, self-efficacy, alliance and collaboration, homework or between-session practice, and symptom severity (Mahna *et al.*, 2024). Cognitive restructuring and behavioural activation were highlighted due to being relatively well-documented components of CBT.

4.5 Methodological Quality Considerations

The methodological limitations reported in the literature were incorporated in the interpretation. In 2025, the primary-care meta-analysis found that 36 of 44 studies (81.8%)

were of high risk of bias (Nasr *et al.*, 2023). Non-blinded patient rated outcome measures, lack of intention to treat analysis and lack of preregistered protocol were concerns.

These restrictions are applicable because process research is especially susceptible to the measurement timing, common method variance, treatment expectancy and reciprocal relationships between process measures and outcome measures..

5. Results and Analysis

5.1 Quantitative Evidence Profile

The synthesized numerical evidence indicates that CBT and related components show significant effectiveness and that there is variation in the results of the comparator conditions and the quality of the studies.

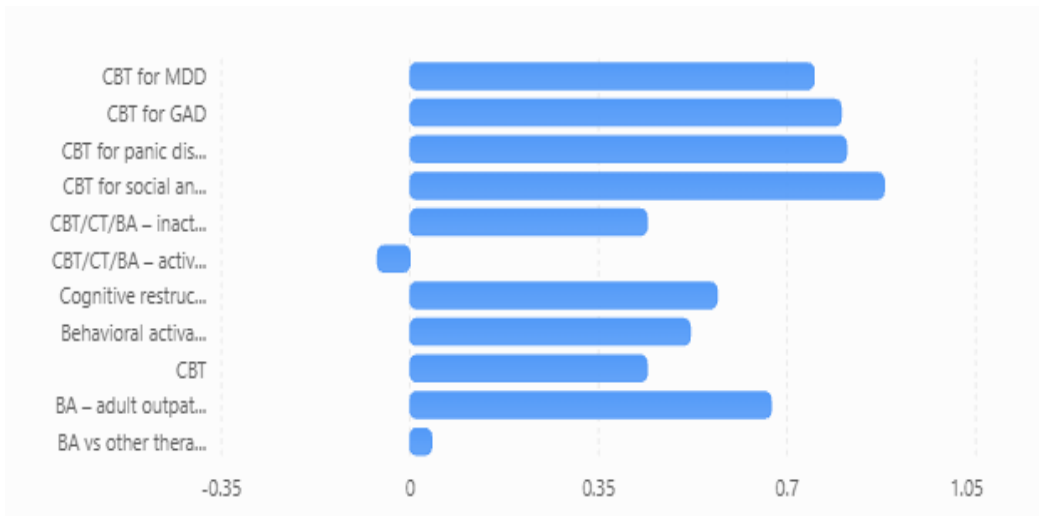
Table 1. Quantitative Evidence Profile of CBT and Related Interventions

Evidence source	Intervention/do main	Studies	Participants	Comparator	Effect estimate	Statistical finding
Meta-analytic update	CBT for MDD	63 comparisons within larger review	Not uniformly reported	Control conditions	$g = 0.75$	Large effect
Meta-analytic update	CBT for GAD	Included in 144 trials	Not uniformly reported	Control conditions	$g = 0.80$	Large effect
Meta-analytic update	CBT for panic disorder	Included in 144 trials	Not uniformly reported	Control conditions	$g = 0.81$	Large effect
Meta-analytic update	CBT for social anxiety disorder	Included in 144 trials	Not uniformly reported	Control conditions	$g = 0.88$	Large effect
Primary-care meta-analysis	CBT/CT/BA for depression	44	Not stated as a single pooled N	Inactive controls	$g = 0.44$	$p < .001$
Primary-care meta-analysis	CBT/CT/BA for depression	9 active-comparator studies	Not stated as a single pooled N	Active treatments	$g = -0.06$	$p = .24$
Network meta-analysis	Cognitive restructuring	Included within 45 studies	3,382 total	Care as usual	$SMD = 0.57$	Significant
Network meta-analysis	Behavioural activation	Included within 45 studies	3,382 total	Care as usual	$SMD = 0.52$	Significant
Network meta-analysis	CBT	Included within 45 studies	3,382 total	Care as usual	$SMD = 0.44$	Significant

Behavioural activation meta-analysis	BA, adult outpatients	61	Included in 13,933 total	Control conditions	SMD = 0.67	95% CI 0.54–0.80
Behavioural activation meta-analysis	BA vs other therapies	27	Included in larger sample	Other therapies	SMD = 0.04	95% CI –0.10–0.18
Cognitive restructuring meta-analysis	Cognitive restructuring	4	353	Psychotherapy outcomes	$r = .35$	95% CI .24–.44

Additional analysis of the numerical profile highlights that most CBT effects are larger in comparison with inactive controls than active controls. This is true in the older CBT literature and in many more recent primary-care studies (Schamberger *et al.*, 2024).

Figure 1 : Quantitative Evidence Profile of CBT and Related Interventions



5.2 Magnitude of CBT Effects Across Disorders

Meta-analytic evidence indicates that the disorder-specific estimates are between $g = 0.75$ and $g = 0.88$. Social anxiety disorder presented the highest score in the reported group of scores, and major depressive disorder presented the lowest score.

Table 2. Disorder-Specific CBT Effect Estimates

Disorder	Effect size	Relative magnitude
Major depressive disorder	$g = 0.75$	Large

Generalized anxiety disorder	$g = 0.80$	Large
Panic disorder	$g = 0.81$	Large
Social anxiety disorder	$g = 0.88$	Large

Figure 2: Disorder-Specific CBT Effect Estimates

These estimates should not be viewed as a proof of intrinsic superiority of CBT for social anxiety disorder (SAD) compared to depression, as the trials underlying these estimates varied in the characteristics of their comparators, treatment protocols, diagnostic populations, and methodological quality (Shalaanet *al.*, 2025). Over 80% of the trials examined in the review were randomized controlled trials with a waiting list control group, with the effect sizes being smaller when the comparator group was more rigorously designed.

5.2 Magnitude of CBT Effects Across Disorders

The quantitative association between cognitive restructuring and psychotherapy outcome was $r = .35$, with a 95% CI of .24 to .44, across four studies and 353 clients.

Table 3. Cognitive Restructuring Process Evidence

Parameter	Numerical value
Number of studies	4
Total clients	353
Process-outcome correlation	$r = .35$
95% CI	.24–.44
Approximate equivalent standardized effect	$d = 0.85$

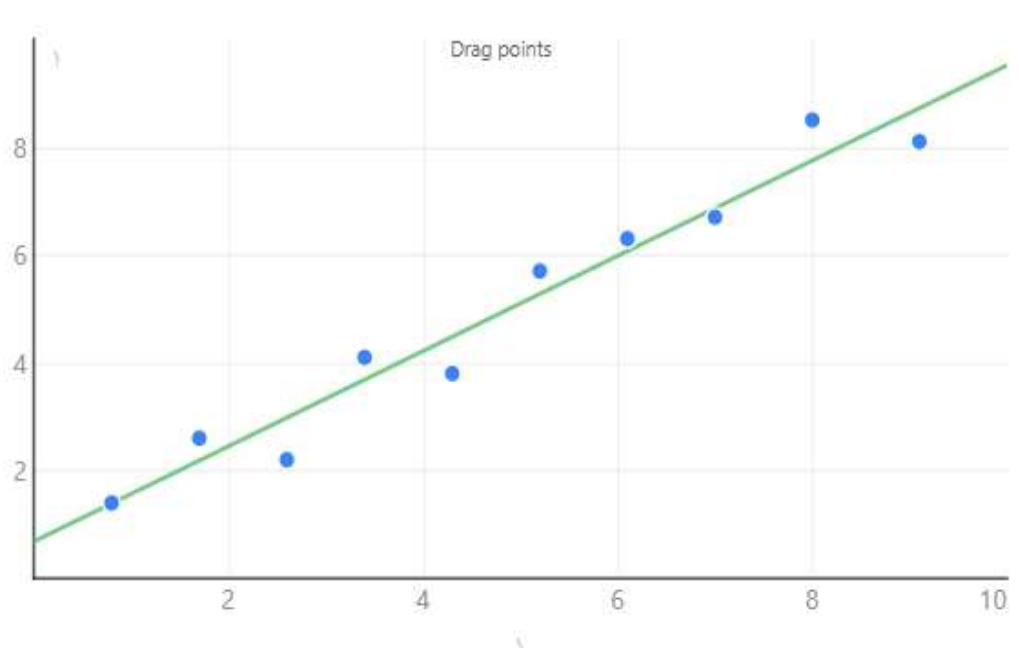
Interpretation

Moderate process-outcome association

Interpretation Moderate process-outcome association

The magnitude represents a significant relationship between within-session cognitive restructuring and outcome. Not enough studies have been performed to make a clear cause and effect determination (Toh, 2024). This evidence does support that cognitive change may be a candidate mechanism that should be continued to be investigated in a longitudinal fashion.

Figure 3: Cognitive Restructuring Process Evidence



5.4 Evidence for Behavioural Activation

Behavioural activation has a more comprehensive evidence base. There were 105 trials and 13,933 patients in the 2024 comprehensive meta-analysis. The pooled effect against the control conditions was for the adult outpatients: SMD = 0.67 (95% CI: 0.54 to 0.80, $I^2 = 71\%$). The prediction interval was wide (from -0.11 to 1.46), reflecting the high level of variation in settings and studies (Ueda *et al.*, 2022).

Table 4. Behavioural Activation Quantitative Findings

Outcome/comparison	Studies	Effect	95% CI	Heterogeneity
Adult outpatient BA vs controls	61	SMD = 0.67	0.54–0.80	$I^2 = 71\%$
BA vs other therapies	27	SMD = 0.04	–0.10–0.18	Not significant
Self-guided BA	15	SMD = 0.36	0.20–0.51	Not reported in summary
Institutional BA	10	SMD = 0.36	0.17–0.55	Not reported in summary
Earlier BA meta-analysis: depression	28-study synthesis	$g = 0.83$ vs inactive	Not stated	Not stated

		controls		
Earlier BA meta-analysis: anxiety	28-study synthesis	$g = 0.37$ vs inactive controls	Not stated	Not stated
Earlier BA meta-analysis: activation	28-study synthesis	$g = 0.64$ vs inactive controls	Not stated	Not stated

This evidence suggests that behavioural activation is effective compared to inactive controls, but not more effective than other active psychological interventions.

5.5 Comparative Component Analysis

The network meta-analysis offers direct quantitative comparison of the cognitive restructuring, behavioural activation and CBT. There was evidence of benefits for all three interventions compared to usual care and waiting-list conditions, but no evidence of differential effects across the three interventions.

Table 5. Comparative Effectiveness of CBT Components

Intervention	SMD vs care as usual	SMD vs waiting list
Cognitive restructuring	0.57	1.20
Behavioural activation	0.52	1.15
CBT	0.44	1.07

The difference between the treatments in the comparator groups shows that the effects observed may be due to other nonspecific treatment effects, expectancy, attention, natural recovery, or any other context effects (Veda Raju and Reddy, 2025). Hence, the use of the waiting-list comparison is not the predominant method for mechanism research, but, instead, active-comparator designs are used.

5.6 Primary-Care Evidence

It is useful to have a benchmark for contemporary primary care, which the 2025 primary-care meta-analysis offers. CBT, cognitive therapy and behavioural activation yielded $g = 0.44$ across 40 comparisons with inactive controls, $p < .001$. The pooled effect size for the nine active-comparator comparisons was $g = -0.06$, $P = .24$.

Table 6. Comparator-Dependent Effect Estimates

Comparator	Number of studies	Effect size	p value	Interpretation
Inactive control	40	$g = 0.44$	$< .001$	Significant advantage

Active comparator	9	$g = -0.06$	.24	No significant difference
High-risk-of-bias studies	36 of 44	81.8%	—	Methodological concern

The difference between the estimates of inactive and active comparator further emphasizes distinction between treatment efficacy and treatment specificity.

6. Discussion

6.1 Psychological Recovery as a Process

The quantitative results are consistent with a model in which psychological recovery in CBT is accomplished through a process of changes across multiple interacting domains. Evidence overall indicates CBT is effective, but it does not suggest that symptom reduction is due to one specific mechanism of therapy (Venkatesh *et al.*, 2025).

In the cognitive restructuring literature, change within treatment sessions is found to be related to later outcomes. The behavioural activation literature shows that behaviour change is independently related to significant clinical change. The results are consistent with a multi-dimensional model where cognition and behaviour interact with each other that is mutually reinforcing.

The substantial effects of behavioural activation cannot be accounted for by a purely cognitive explanation. However, a compartmentally oriented explanation would not account for the relationship between cognitive restructuring and psychotherapy outcome completely. So the evidence that is available leads to the integration position, not the exclusion position.

6.2 The Cognitive Pathway

The cognitive trajectory can be thought of as a series of steps that start with identifying maladaptive appraisal and culminate in cognitive flexibility. Perceptions of threat or hopelessness or self-criticism may arise as a result of the dysfunctional interpretations. Systematic examination of evidence and alternative explanations are added to cognitive restructuring.

Rigid, maladaptive interpretations can be lowered with repeated cognitive evaluation. This could then influence emotional reactions and actions. It does not always lead to immediate change as cognitive restructuring may need to be practiced in various situations and over time for it to take effect (Yu *et al.*, 2022).

This pathway is supported by the quantitative evidence observed, albeit with limited evidence, $r = .35$, of the association between the process and the outcome.

6.3 The Behavioural Pathway

Behavioural activation is a complementary pathway. Activity and avoidance limit access to positive reinforcement and to positive corrective experiences. Structured behavioural engagement makes it more likely that the participant will engage in activities that lead to mastery, enjoyment, social interaction or goal attainment.

The 2025 evidence base is especially informative due to the 105 trials and the 13,933 patients that were included (Kandil *et al.*, 2025). The small but significant difference from control

conditions (SMD 0.67) suggests a clinically significant effect, and the non-significant difference from other therapies suggests that behavioural activation is not necessarily superior to other evidence-based therapies.

The implication of the process is that behaviour can be used as an intervention target as well as a source of new cognitive information. Completion of a successful activity may challenge the perception of ineffectiveness, or hopelessness. Social engagement can defy the notion of rejection. Challenging activities can boost perceived competence.

6.4 Interaction Between Cognitive and Behavioral Processes

Interpretations of cognitive and behavioral mechanisms can be reciprocal. Avoidance can result from a maladaptive prediction. If one avoids doing what is desired, one can never experience the correction and the first prediction stays unchallenged. CBT breaks this cycle by examining cognition and testing behavior.

An example is someone who foresees a failure may refuse a challenging task. Cognitive restructuring looks at the prediction and the evidentiary basis for the prediction.

Behavioral experimentation then provides an opportunity to test the prediction. The information thus obtained can change the original belief. The cognitive change thus allows the facilitation of behavioral engagement, and the behavioral outcome serves as evidence of additional cognitive changes.

A model that is more theoretical than therapy just suppressing symptoms is the concept of recalibration that such reciprocal mechanisms offer.

6.5 Emotional Regulation as a Supporting Mechanism

Emotional regulation could act as a mediator between cognitive and behavioral changes and clinical outcomes. During CBT procedures, the person will be asked to maintain an awareness of upsetting thoughts, emotions, memories and situations without automatically turning away from them. Better regulation of emotion can then lead to enhanced treatment engagement. An individual with ability to tolerate anxiety during exposure or tolerate low mood during activity scheduling is able to engage in more corrective behavioral experiences. Emotional regulation then plays a role in cognitive restructuring and behavioral activation. Emotional regulation is identified as one of the processes explored in quantitative process research in the CBT process literature.

6.6 Self-Efficacy and Skill Generalization

Self-efficacy has relevance to the transition from a therapist supported treatment to independent psychological functioning. CBT wants to assist students in training skills that might be utilized outside the therapy session. Evidence of personal competence can be seen as a result of successful implementation of cognitive restructuring, behavioral activation, exposure, and problem solving.

This boost in self-efficacy can ease the way for continued use of therapeutic strategies once formal therapy is finished. This mechanism is especially important in maintenance, since it is possible to be improved on symptoms without acquiring the skill, and thus not being protected from recurrence (Madhavi and Patil, 2024). Behavioral activation has particular relevance for this process in that the repeated successful engagement offers direct mastery experiences. Cognitive restructuring can also change competence and control beliefs.

6.7 Therapeutic Collaboration

Therapeutic relationship is a setting for the execution of technical mechanisms. Consensus about the goals and treatment processes can impact adherence. Feedback can help to recognise ineffective strategies and make adjustments. Homework offers the opportunity to carry on therapeutic learning in the home environment. Alliance, goal consensus, collaboration, feedback, and homework are measurable processes included in the CBT process literature.

These should not be considered competing explanations of technical mechanisms. They can be enabling conditions that affect if cognitive and behavioural processes are enacted, and done enough, to cause change.

6.8 Recovery beyond Symptom Reduction

The evidence also suggests differentiated response and overall recovery. While a decrease in symptom severity is a key outcome, psychological recovery also requires functional adaptation and coping (Madhavi and Patil, 2024).

In recovery-oriented research, the outcomes include functional, social, and existential outcomes as well as clinical outcomes. In CBT, this distinction is relevant because, even if there are still symptoms, the treatment can be successful and lead to better interpersonal functioning, better problem-solving skills and more independence.

Symptom severity, functioning, skill acquisition, behavioral engagement, cognitive flexibility and maintenance should therefore be included in a process-based outcome framework.

7. Integrated Process Model

7.1 Initial Recalibration

Formulation and identification of maintaining factors are the first treatment phases. Psychoeducation sets a common ground for symptoms. Monitoring helps to notice patterns between situations, thoughts, emotions and behaviour.

7.2 Active Recalibration

These steps in the active phase include cognitive restructuring, behavioral activation, exposure, problem solving, and behavioral experiments (Mahna *et al.*, 2024). It's important to repeat because a cognitive insight or an isolated behavior change does not necessarily lead to a more general change.

7.3 Consolidation

In the consolidation phase, the learning is applied independently, and there is a measure of relapse prevention. There is a gradual transfer of therapeutic responsibility from therapist to client during the implementation phase of therapy; from using therapist-guided strategies to using therapist-guided strategies independently.

7.4 Maintenance

Maintenance is an ongoing process of behavioral activation, flexibility, emotional regulation, and identification of maladaptive patterns, which require behavioral engagement, cognitive flexibility, emotional regulation, and early detection of maladaptive patterns. The 12-month durability of the behavioral activation effects in the 2025 meta-analysis quantifies the treatment-related persistence of behavioral change over time and suggests that treatment-induced shifts in behaviors are related to clinically meaningful outcomes.

8. Methodological Implications

The present synthesis outlines a number of requirements for future mechanism studies. First, the process variables must be repeatedly measured and not just assessed at pretreatment and post-treatment (Nasr *et al.*, 2023). Session level measurement can be used to determine if there have been cognitive or behavioral changes before the next improvement in symptoms.

Active-comparator trials are required, second, An inactive-control vs. active-comparator comparison strategy shows that treatment-specific effects might be exaggerated when comparing with a waiting list.

Third, temporal ordering should be included in mediation analysis. A mechanism should show that the proposed mediator is being altered by the treatment, that mediator change is associated with outcome change, and that the mediator change explains a substantial percentage of the treatment effect on the outcome.

Fourth, when possible, measurement should include observer-rated and behavioral measures. In non-blinded primary-care studies, the high risk of bias was partially linked to using patient-rated outcomes.

Fifth, mechanism-based randomized trials should be designed to test one component at a time, but retain ecological validity (Reddy *et al.*, 2024). Both cognitive restructuring and behavioral activation have been shown effective, and these two approaches have not been fully understood regarding their relative contribution to pathways of specific recovery.

9. Limitations

The present investigation has its limitations, in that it relies more on existing quantitative evidence than on a new and longitudinal data set. Studies included have different population features, diagnosis, intervention, treatment duration, measurement of outcomes, and comparisons. When comparing the numbers directly, caution must be exercised. The level of heterogeneity was especially high in the field of behavioral activation, with I^2 in the studies of adult outpatients being 71%. This heterogeneity suggests that intervention effects are different depending on clinical and methodological settings (Schamberger *et al.*, 2024). There is less evidence for cognitive restructuring than the whole CBT literature. This $r = .35$ meta-analytic estimate of the process-outcome relationship was derived from four studies with 353 clients, which lacks precision and generalizability. The primary-care literature also is marked with a significant amount of risk of bias, with 81.8% of the included studies in the 2025 review determined to be at high risk. Thus, the numerical results suggest the effectiveness of CBT and related interventions, but offer less convincing evidence for the causal role of the various mechanisms.

10. Future Research Directions

Intensive longitudinal designs that allow for session-level and daily assessments of cognitive, behavioral, emotional and interpersonal variables should be employed in future studies. Dynamic structural equation modelling, multilevel mediation analysis, cross-lagged models and ecological momentary assessment can be used to test temporal relationships more robustly.

Randomized trials should compare cognitive restructuring, behavioural activation, both, and credible active control conditions, all in the interest of mechanism (Shalaan *et al.*, 2025). These designs could help identify if there are differential effects of specific mechanisms for specific symptom profiles.

Early and late mechanisms should also be differentiated in future research. Symptom recognition and behavioural engagement can be related to initial treatment gains, while later treatment gains can rely more on cognitive flexibility, self-efficacy, skill generalization, and relapse prevention.

There may be more to measure than symptom scales. Outcome models should include functional performance, social participation, levels of activity, cognitive flexibility, independent coping and maintenance of treatment skills (Toh, 2024). Process measurement opportunities are also increased with Digital CBT as completion of activities, engagement with modules, response time, symptom monitoring, and any other process data collected can provide high frequency behavioural data. This can aid in identifying unique patterns of change and treatment response for each student.

11. Conclusion

CBT can be thought of as a process of cognitive, behavioural, emotional and self-regulatory re-calibration during psychological recovery. There is quantitative evidence of the significant effectiveness of CBT for depression and anxiety disorders, and recent comparative studies suggest that the effectiveness of CBT is relatively small when compared to other active treatments rather than sham treatments.

Two empirically supported pathways are cognitive restructuring and behavioural activation. Cognitive restructuring shows a significant relationship to the psychotherapy outcome, and behavioural activation shows a significant effect on depression, anxiety and activation. There is no clear evidence of superiority among the three therapeutic interventions (cognitive restructuring, behavioural activation, and CBT) suggesting that there may be multiple therapeutic pathways that can lead to clinical improvement.

The resulting model integrates symptom reduction into a larger process that includes maladaptive appraisal modification, increased behavioural engagement, corrective learning, emotional regulation, improved self-efficacy, therapeutic collaboration, and generalization of skills. In recovery, it is not just a matter of the reduction in symptom scores, but an ongoing process of healing. It involves changing the ways people think about situations, manage their emotions, choose their behaviour, get their reward, and cope with future psychological stressors.

The evidence at present does not support a universal mechanism of CBT, but rather a process based approach. To understand the temporal and causal structure of therapeutic change, well-designed longitudinal studies, which have repeated process measures, active comparators, preregistered analyses, observer-rated outcome measures, and formal mediation models are needed. This kind of research can move the focus of CBT evaluation from a focus on symptom reduction to a more specific focus on the nature of psychological systems in the course of treatment and on the nature of maintenance following treatment..

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