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Cognitive Restructuring and Psychotherapy Outcome: A Meta-Analytic Review

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Cognitive restructuring (CR) is one method that is hypothesized to play a role in the process of change across many psychotherapies and for a variety of clinical presentations. In this article, we define and illustrate CR. We then present a meta-analysis of four studies (including a total of 353 clients) examining the effect of CR measured within session on psychotherapy outcomes. The overall CR-outcome association was $r = .35$ (95% CI [.24, .44]; equivalent of $d = 0.85$). While more research on CR and immediate psychotherapy outcomes is needed, there is accumulating encouraging evidence regarding the therapeutic effect of CR. We conclude by advancing implications for clinical training and therapeutic practices.

Clinical Impact Statement
Questions: How robust is the relationship between cognitive restructuring (measured within session) and psychotherapy outcomes? ***Findings:*** Meta-analytic findings indicate there is a moderate positive relation between cognitive restructuring and psychotherapy outcomes. ***Meaning:*** The findings suggest cognitive restructuring (defined as the set of strategies used to teach clients how to identify, evaluate, and correct their inaccurate cognitions and underlying dysfunctional schemas) may be used to promote positive psychotherapy outcomes. ***Next Steps:*** Further research in more diverse samples is needed to better understand how different variables may moderate or mediate the effects of cognitive restructuring.

Keywords: cognitive restructuring, psychotherapy outcome, psychotherapy method, cognitive therapy, cognitive change

Cognitive Restructuring

One method that is hypothesized to play a role in the process of change across many psychotherapies is cognitive restructuring (CR), which refers to a set of techniques used to help clients identify, evaluate, and correct inaccurate beliefs (Beck et al., 1979). CR is a focal method for a variety of disorders, including major depressive disorder, panic disorder, social anxiety disorder, obsessive–compulsive disorder, and posttraumatic stress disorder.

In this article, we provide an overview of CR, including how it is defined, applied, and measured within individual psychotherapy. We provide a meta-analytic review of the extant research on CR, with a particular emphasis on therapist provision of CR within sessions and its effect on therapeutic outcomes. As a part of this review, we discuss previous reviews and limitations of the current research. Last, we discuss the implications of the research for psychotherapy training and practice.

Definitions and Clinical Description

Cognitive theory posits that cognitions are a key determinant of human behavior and emotion. These cognitions stem from *schemas*, which are the assumptions and attitudes derived from previous experience. It is hypothesized that when these schemas are maladaptive, the associated biased cognitions lead to the etiology and maintenance of psychopathology (Beck, 1996). In line with this theory, cognitive therapies aim to teach clients how to identify, evaluate, and correct their inaccurate beliefs and their underlying dysfunctional schemas (Beck et al., 1979). The collection of methods targeted at achieving these aims is referred to as CR (e.g., Beck et al., 1979; Clark & Beck,

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2010; Dobson & Dobson, 2009). We thus define CR as a collection of techniques aimed at teaching clients how to identify, evaluate, and correct their inaccurate beliefs and their underlying dysfunctional schemas.

CR may be applied differently across the cognitive behavior therapies. For instance, cognitive therapy (CT) tends to focus on clients' idiosyncratic belief systems and the kinds of evidence it would take to change those beliefs. This focus can result in a personalized application of CR that aims to produce meaningful change in those beliefs. On the other hand, cognitive behavioral therapy (CBT) integrates cognitive strategies with behavioral methods. The distinction in how CT and CBT therapists tend to employ CR is between what a given belief means to a client versus whether a client thinks a given thought. It is possible to believe something without actually thinking it at a given moment versus thinking something at a given moment without actually believing it. CT tends to emphasize the former and CBT tends to emphasize the latter (Hollon, 2021).

Given the broad assortment and utilization of CR, it has often been referred to under different labels such as cognitive methods, schema modification, or cognitive change procedures. CR is thought to be necessary for effective application of CT and CBT, leading to the proposed mechanism of cognitive change and subsequent symptom improvements. Rather than being defined as a single method, CR refers to the collection of therapeutic techniques aimed at helping clients identify, challenge, and correct biased and maladaptive automatic interpretations of events. In other words, if the intention of a method is to promote cognitive change or schema modification, and if it is presented to the client in that fashion, the technique can be considered CR. An overview of these techniques can be found in Table 1.

The generic process of CR—teaching clients how to identify, evaluate, and correct their inaccurate beliefs and their underlying dysfunctional schemas—is employed in multiple forms of individual psychotherapy. Virtually all mental health professionals address their clients' beliefs in some way. However, in this article, we focus on CR in the CBT tradition and research.

Commonly, CR is instantiated through use of a thought record, which describes the process of identifying, evaluating, and considering alternatives to automatic negative thoughts (i.e., thoughts that seem to occur instantaneously and on the fringe of awareness that affect mood and behavior). In completing the thought record, the therapist helps clients record specific thoughts and examine the relation between their feelings and behaviors. Once clients can elicit specific thoughts and record these thoughts, therapists can help clients to "distance" themselves affectively from the beliefs; that is, to recognize that their beliefs are efforts to represent reality not reality itself. That is facilitated by treating their thoughts as testable hypotheses rather than as established facts. The goal is not just to examine the accuracy of clients' beliefs for them, but also to teach them how to do so for themselves.

In CT, there is a basic distinction between thoughts and beliefs. Thoughts are seen as actual events that pass through the sensorium that may or may not be believed, whereas beliefs are perceptions of reality that do not actually have to be processed at any given moment to influence affect and behavior. CT emphasizes the idiosyncratic meaning of the belief whether it is present in the sensorium or not, whereas cognitive behavioral approaches tend to take a more concrete focus on whether a thought occurred whether it was believed or not.

The process of evaluating thoughts often includes three questions pertaining to evidence, alternatives, and implications of automatic thoughts. Specifically, therapists may pose the first question listed at the bottom of the thought record, "What is the evidence that the automatic thought is true or not true?" to help clients examine available evidence to test the validity of their automatic thoughts. The second question, "Are there alternative explanations for that event?" is used to help clients generate explanations for an event other than the original explanation. The third question, "What are the implications if the thought is true?" is used to help the client determine what the implications or realistic consequences would be if their automatic thoughts proved to be true. These three questions help clients evaluate the accuracy of their automatic thoughts. Additional helpful CR techniques include recognizing cognitive errors in their thinking

Table 1
Examples of Cognitive Restructuring

Technique	Description
Report thoughts	Asking the client to report specific thoughts (verbatim if possible) that the client experienced in the session OR in a situation that occurred prior to the session.
Relate thoughts and mood	Encouraging the client to relate affective states that the client has experienced (OR will experience in the future) to the client's ongoing thoughts.
Distancing from beliefs	Encouraging the client to view their thoughts as beliefs which may or may not be true (representations of reality) rather than as established fact (reality itself).
Examine available evidence	Helping the client to use available evidence (including the client's prior experiences) to test the validity of their beliefs.
Search for alternative explanations	Helping the client to consider alternative explanations for events besides their initial explanation.
Think about implications of beliefs	Helping the client to determine the realistic consequences if the client's belief proved to be true.
Consider different perspectives	Encouraging the client to see their thoughts or problems from a different perspective.
Recognize cognitive errors	Helping the client to identify specific types of cognitive distortions or errors (e.g., all-or-none thinking, overgeneralization) present in the client's thinking.
Explore personal meaning	Probing for underlying beliefs related to a thought the client reported to explore the idiosyncratic personal meaning associated with the client's initial thought.
Test beliefs prospectively	Encouraging the client to engage in specific behaviors for the purpose of testing the validity of their beliefs OR make explicit predictions about external events and test those predictions to evaluate their accuracy.

Note. Descriptions were previously outlined in Hollon et al. (1988).

(e.g., all-or-none thinking), encouraging clients to see their thoughts from a different perspective (e.g., "What would you say to a friend who was in the same situation?"), and considering the personal meaning of such thoughts (e.g., "What does that thought mean about you?").

While many CR methods are logical and conversational in nature, CR may also include behavioral techniques that are intended to promote cognitive change. Most notably, therapists can collaborate with clients to design behavioral experiments to test their beliefs prospectively. Crafting behavioral experiments can be personalized to examine each client's idiosyncratic beliefs, focusing on the kinds of evidence needed to effectively test each client's beliefs, and being conducted in real-world settings. It is important to make a distinction between behavioral experiments intended to test a belief, and pure behavioral exposure techniques intended to reduce affective distress. Behavioral exposure involves subjecting a client to a conditioned stimulus that extinguishes (or habituates) the conditioned fear or anxiety response, with a consequential reduction in avoidance behavior. Strictly speaking, this would not be considered CR given that it does not have an explicit aim to identify and disconfirm erroneous negative beliefs. However, if exposure is suggested to the client to test the accuracy of that belief, then it is considered CR. For instance, in the treatment of specific phobia, if exposure is presented as a behavioral experiment to test the accuracy of the client's belief that he would jump off the bridge to his death (something that the second author once believed), then his forcing himself to run across the Golden Gate bridge would serve as a behavioral experiment that also was an instance of CR. Exposure may influence what we believe, but unless it is undertaken to test those beliefs, then it does not meet our definition as a CR method.

In the treatment of social phobia, social exposures are used to test whether safety behaviors (behaviors that are used to minimize or prevent a feared interpersonal outcome) help or hinder the clients in social situations (Clark & Wells, 1995). Clients with social phobia typically fear that they will behave in ways in social interactions that will expose them to ridicule or censor and thus engage in a variety of safety behaviors intended to forestall the dreaded consequences. For example, someone who is concerned that they will come across as boring may scan the newspapers in the morning to find interesting things to say or someone who fears sweating through their shirt will wear jackets even in warm weather to cover up the stains. Therapists can determine what is most concerning to the client and have them interact with others both with and without the "safety behaviors," often videotaping the interactions. What clients typically learn is that they come across in a more competent fashion when they drop the safety behaviors and focus instead on the other person in the interaction. Such behavioral experiments (exposures) are designed to test their idiosyncratic beliefs but involve little effort to logically dispute those notions in advance.

In the treatment of panic disorder, the therapist first asks the client what it is that they most fear happening (such as a heart attack, psychotic decompensation, or extreme social embarrassment), then encourages them to drop whatever safety behaviors they typically use to prevent the feared catastrophe from occurring (Clark, 1997). Clients who are afraid of having a heart attack are encouraged to drop their typical safety behaviors (laying down and controlling their breathing) and to do whatever they think it takes to bring on one (e.g., engage in rapid shallow breathing or run up and down a flight of stairs or spin around in an office chair). When the catastrophic event does not occur, they have powerful evidence that they were never at risk in the first place. This exercise is a clear instance of CR via use of a behavioral experiment. Simple interoceptive exposure in the absence of a rationale connecting the nonoccurrence of the catastrophic event as evidence that the individual was not at risk is exposure only and not CR.

Clients who suffer from posttraumatic stress disorder usually do everything they can not to think about the trauma, but that paradoxically appears to be what brings the symptoms (e.g., flashbacks, night terrors) about. Any of the trauma-focused cognitive or behavioral approaches encourage clients to relive the traumatic experience, but whereas a more purely behavioral approach like prolonged exposure requires dozens of repeated (and excruciating) instances to extinguish (or habituate) the distress, a purely cognitive approach requires only reliving the experience a time or two for the purpose of finding the meaning the client has ascribed. A variety of cognitive and behavioral strategies are then applied to examine the accuracy of that belief. For example, one of the authors worked with a client who had been raped as a teen who concluded that no decent man that she was interested in would reciprocate her interest if he knew what had happened to her. Both CR and behavioral experiments (disclosing the secret to a girlfriend in preparation for disclosure to her new boyfriend) were used to help her disconfirm the belief.

CR is emphasized as a core element in many treatments for several disorders, including in cognitive treatments of depressive disorders, anxiety disorders, obsessive–compulsive disorder, posttraumatic stress disorder, and psychosis. Given the broad assortment of CR methods, therapists can select the individual CR techniques that best fit each client's case conceptualization and treatment goals. These methods can be introduced as early as the first session and continued to be practiced throughout and beyond a course of therapy.

Assessment

CR Measures

We review three measures that assess CR within session. Two of these measures are observer-rated measures, which involve intensively trained raters concurrently watching recordings of therapy sessions and coding CR usage within that session. The third measure is a client-report assessment of CR used within session. While each assesses CR within session, these measures only provide estimates of the amount of CR that occurred in a session and have not been used to determine exactly where in the session the CR occurred.

Collaborative Study Psychotherapy Rating Scale

The Cognitive Methods subscale of the Collaborative Study Psychotherapy Rating Scale (CSPRS; Hollon et al., 1988) is an observer-rated measure of therapist's adherence to CR during a session. The CSPRS was originally developed to distinguish therapist behaviors among CBT, interpersonal psychotherapy, and clinical management of medication in the National Institute of Mental Health's Treatment of Depression Collaborative Research Program (Elkin, 1994). A factor analysis conducted on a sample of 176 adults with depression receiving CBT identified a 10-item Cognitive Methods subscale (see Strunk et al., 2012 for details). The CSPRS Cognitive Methods subscale has demonstrated acceptable interrater reliability and good internal consistency (e.g., Sasso et al., 2016; Schmidt et al., 2019; Strunk et al., 2010).

Performance of CT Strategies

The performance of CT strategies (PCTS) is also an observer-rated measure of client's cognitive behavioral skills used within a session (Strunk et al., 2007). The PCTS contains three subscales: a three-item Behavioral Activation subscale, a 10-item Automatic Thought Work subscale, and a two-item Schema or Core Belief Work subscale. The latter two subscales represent CR. All items are rated on 7-point Likert scales. The PCTS has demonstrated good interrater reliability, internal consistency, and validity with respect to predicting relapse independent from a measure of CT skill competency (Strunk et al., 2007).

Bern Postsession Report

The Bern Postsession Report (BPSR; Flückiger et al., 2010) includes three self-report items that clients complete after a session to assess the extent to which they used CR in the session that was just finished. The CR portion of the BPSR has demonstrated adequate internal consistency (Gómez Penedo et al., 2020). A comparison between therapist and observer ratings on this measure has demonstrated acceptable discriminant and convergent validity (Flückiger et al., 2009, 2010).

Measures of CR Effectiveness

The effectiveness of therapeutic methods can be evaluated with immediate outcomes (measured in-session), intermediate outcomes (measured post- or between-session), or distal outcomes (measured posttreatment). We review four specific outcomes (including three intermediate and two distal outcomes) that have been used to evaluate the effectiveness of CR in the research literature.

Intermediate Outcomes

Cognitive Change-Immediate Scale. The Cognitive Change-Immediate Scale is a five-item self-report measure administered at postsession that assesses clients' experience of cognitive change within the session that just occurred (Schmidt et al., 2019). This measure asks clients to indicate the extent to which they agreed with items on 7-point Likert scales, with higher scores indicating greater agreement. This measure has demonstrated excellent internal consistency and convergent validity with a measure of CBT skills (Schmidt et al., 2019).

Beck Depression Inventory–II. The Beck Depression Inventory–II (BDI-II) is a 21-item self-report measure that assesses a client's depressive symptoms (Beck et al., 1996). This measure is completed at the start of sessions on 0- to 3-point scales. The BDI-II has demonstrated excellent reliability and validity (Beck et al., 1996).

World Health Organization Well-Being Index. The World Health Organization Well-Being Index is a five-item self-report measure that was designed to assess subjective psychological well-being. The items on the measure are rated on 0- to 5-point Likert scales. The measure has been validated as screening tool for depression (Topp et al., 2015).

Distal Outcomes

Relapse Risk. One study has assessed relapse risk during a posttreatment follow-up period in relation to CR (Strunk et al., 2007) in a sample of clients who responded to treatment. In this sample of treatment responders, clients met relapse criteria if they scored a 14 or greater on the Hamilton Rating Scale for Depression (Hamilton, 1960) for two consecutive weeks at any point during a 1-year follow-up period.

Dropout. One study examined dropout in relation to CR (Ezawa & Strunk, 2022). In this study, dropout was defined as a patient prematurely discontinuing treatment.

Clinical Example

Below, we provide a hypothetical vignette in which the therapist (T) helps the client (C) complete a thought record. Please see Figure 1, for the corresponding thought record.

Completing a Thought Record

C: *My partner does not like talking or spending time with me anymore. He must be starting to lose interest in me.*

T: *How do you know your partner does not like talking or spending time with you anymore?*

C: *Because I am boring and depressed all the time.*

T: *Well, let's check that thought out. Let's see what evidence you have that your partner doesn't like you anymore. What evidence do you have to support that thought?*

C: *He doesn't talk with me as often after work. We also haven't gone on a date night in a long while.*

T: *What happens after work?*

C: *Well, he comes home late. Then, we usually just eat a late dinner, watch TV, and go to bed.*

T: *And why does he come home late?*

C: *He was recently promoted, and he said he has been given more responsibilities than before, which has been stressful for him.*

T: *So, your partner is working longer hours after the recent promotion. When did you start feeling like he doesn't like you anymore?*

C: *I guess it started around the time of that promotion.*

T: *Hmm … It sounds like there might be other possible explanations for why your partner has been talking or spending less time with you lately besides your initial thought that he is losing interest in you. What evidence do you have against that thought your partner doesn't like you anymore?*

C: *Well, I have asked him directly if he has lost interest, and he denies it.*

T: *So, he has directly told you he has not lost interest. Interesting …*

C: *Yes, but he might be lying or trying to protect my feelings.*

T: *What are the implications if he was lying, and it is true that he has lost interest?*

Figure 1
Example Thought Record

THOUGHT RECORD

Directions: When you notice your mood getting worse, ask yourself, "What's going through my mind right now?" and as soon as possible jot down the thought or mental image in the Automatic Thoughts column. Then consider how realistic those thoughts are.

Date	Situation Where were you – and what was going on – when you got upset?	Emotions What emotions did you feel (sad, anxious, angry, etc.)? Rate intensity (0-100%).	Automatic Thoughts What thoughts and/or images went through your mind? Rate your belief in each (0-100%).	Alternative Responses Use the questions at the bottom to compose responses to the automatic thoughts. Rate your belief in each (0-100%). Also, consult the list of possible distortions.	Outcome Rerate belief in your automatic thoughts (0-100%) and in the intensity of your emotions (0-100%).
11/1	*Partner came home from work and did not spend time with me before going to bed.*	*Sad – 90% Frustrated – 50%*	*My partner does not like talking or spending time with me anymore. (90%) {mind-reading} He must be starting to lose interest in me. (100%) {jumping to conclusions}*	*I have asked my partner if he has lost interest, and he denies it. (80%) {evidence} Partner was recently promoted, and he has been given more responsibilities than before, which has been stressful for him. (95%) {alternative explanations} If my partner has lost interest in me, there are things that I can do to rekindle that interest or move beyond the relationship. (90%) {implications}*	*Sad – 20% Frustrated – 10%*

(1) What is the **evidence** that the automatic thought is true? What is the evidence that it is not true?
(2) Are there **alternative explanations** for that event, or alternative ways to view the situation?
(3) What are the **implications** if the thought is true? What's most upsetting about it? What's most realistic? What can I do about it?
(4) What would I tell a good friend in the same situation?

Possible Distortions: All-or-none Thinking; Overgeneralizing; Discounting the Positives; Jumping to Conclusions; Mind-reading; Fortune-telling; Magnifying/Minimizing; Emotional Reasoning; Making "Should" Statements; Labelling; Inappropriate Blaming

C: *Well, I guess I would be sad, and that I would have to move on.*

T: *Okay, so that is one possibility. Is there anything you could do that might help rekindle that interest?*

C: *Yes, I suppose so. When we were first dating, we spent a lot of time together and went on fun dates. That seemed to make our relationship stronger.*

T: *Great, well let's make sure to jot this down on your thought record.*

Previous Reviews

Little literature has focused on examining the direct impact of CR applied within session. This is likely in part due to the intensive training and resources needed to repeatedly measure CR within and outcomes after each session. Instead, most research efforts have examined the effect of CR across sessions using component analysis or mediation analysis. *Component analysis* examines the impact of CR on outcome experimentally by dismantling treatment packages and then comparing interventions containing a CR component with interventions that do not contain a CR component. The rationale behind these studies is that dismantling permits examination of the additive effect of CR. *Mediation analysis*, on the other hand, relies on correlational analyses across time to determine whether the implementation of CR leads to subsequent cognitive change. While these studies do measure CR within sessions, they do not necessarily relate it to cognitive or symptom change within that same session. Nonetheless, these methods elucidate the role of CR in the overall therapeutic process and are worthy of review.

Component Analysis

Within the depression treatment literature, purely behavioral interventions and combined cognitive behavioral interventions have been compared in component analyses. General findings from these component analyses have been interpreted to suggest CR is effective but not necessary for achieving acute symptom change (Clark, 2014). This interpretation, however, depends upon the quality of the CR provided, and there were indications in some of the original component studies that the cognitive therapists essentially "gave up" and provided largely supportive therapy with interpersonally difficult patients who were more severely depressed

(Coffman et al., 2007). Additionally, findings from more recent studies suggest that the addition of CR may be important for sustained therapeutic outcomes (Clark, 2014).

Component analysis has also examined the role of CR in the treatment of anxiety disorders, particularly in relation to exposure. Like component analyses in the treatment of depression, purely behavioral interventions and combined cognitive behavioral interventions have been shown to be equally effective in the treatment of anxiety symptoms (for a more comprehensive review, see Deacon & Abramowitz, 2004). Also like the depression treatment literature, few studies have examined purely cognitive interventions. Regarding panic disorder specifically, CR alone and exposure alone have both been shown to lead to symptom improvement; however, combined exposure and CR do not lead to significantly stronger effects than exposure alone (for a review, see Gould et al., 1995). Regarding social anxiety disorder, past studies have failed to find significant differences in posttreatment outcomes between cognitive behavioral and exposure only treatments (for a review, see Feske & Chambless, 1995).

Regarding obsessive–compulsive disorder, component analyses have most often been used to test exposure and response prevention (ERP; a behavioral therapy that exposes clients to situations that provoke their obsessions) against ERP plus CR. Overall, it appears CR is less effective than ERP, and that adding CR to ERP does not improve outcome (Abramowitz et al., 2005). Once again, questions can be raised as to how adequately CR was provided by essentially behavioral investigators at the time these trials were conducted. Incidentally, early proponents of exposure therapy for obsessive–compulsive disorder have come to focus on the disconfirmation of idiosyncratic beliefs regarding personal responsibility in recent years (Salkovskis, 1999).

In posttraumatic stress disorder research, component analysis has been used extensively to examine the role of CR in relation to trauma exposure. CBT (with exposure) has been found to be as efficacious as trauma exposure alone, leading some researchers to conclude that CR is not effective since it adds little to no additional benefit to treatment (Longmore & Worrell, 2007). However, more recent reviews have concluded that exposure, CR, and CBT (including both exposure and CR) are equally effective in the treatment of posttraumatic stress disorder (Hassija & Gray, 2010; Ponniah & Hollon, 2009), and CR may have a more enduring effect than exposure alone (Tarrier & Sommerfield, 2004). Component analyses of cognitive processing therapy have shown that CR may be the most effective component of the larger treatment package (Resick et al., 2008; Stein et al., 2012; Walter et al., 2014).

A meta-analysis of 20 randomized controlled trials that compared CT alone (without exposure) and exposure alone in the treatment of anxiety disorders revealed similar effect sizes for the treatment of posttraumatic stress disorder, obsessive–compulsive disorder, and panic disorder (Ougrin, 2011). On the other hand, the effect size for the treatment of social anxiety disorder was significantly greater for CT when looking at both acute and long-term outcomes. Taken together, these component analyses suggest that CR is an effective method for depression and anxiety, at least as effective as behavioral components. CR may be especially important in some cases, such as in the treatment of social anxiety disorder, albeit in the indirect form of behavioral experiments.

Mediation Analysis

The cognitive mediation hypothesis states that cognitive change is what accounts for symptom change (Clark & Beck, 2010). Given that the aim of CR is to produce cognitive change, many researchers measure cognitive change as a proxy for the quality or success of CR (instead of measuring the implementation of CR directly).

Reviews of the literature on cognitive mediation have yielded mixed conclusions. Longmore and Worrell (2007) conducted a review on studies examining cognitive mediation in CBT and concluded that there was limited evidence for the cognitive mediation hypothesis. Hofmann (2008) critiqued this review for the selective scope of studies included. In a separate review focused on examining cognitive mediation in the treatment of depression specifically, Garratt et al. (2007) concluded that cognitive change predicted change in depressive symptoms, but this relation was not specific to cognitive treatments. More recent comprehensive reviews have suggested that the available evidence is consistent with cognitive mediation for a variety of disorders (Clark, 2014; Hofmann et al., 2018; Lorenzo-Luaces et al., 2015). While reviewing the literature according to criteria for statistical mediation (i.e., evidence of a statistical mediational relation of cognitions on symptoms, an effect of CBT on cognitive change, and cognitive change temporally preceding symptom change), Hofmann et al. (2018) found considerable support for the cognitive mediation hypothesis in the treatment of panic disorder, social anxiety disorder, and posttraumatic stress disorder and preliminary support for generalized anxiety disorder and major depressive disorder.

Limitations of Component and Mediation Analyses

Component analysis can lend further understanding on whether CR provides additional therapeutic effect above and beyond the components to which it is being compared; however, a significant limitation is that this type of analysis cannot speak to the direct effect of CR. Similarly, mediation analyses based on the cognitive mediation hypothesis do not allow researchers to draw conclusions about CR in session because it relies on the untested assumption that the cognitive changes measured are indeed the result of CR alone. It is conceivable that cognitive changes can be the product (or byproduct) of methods other than CR (e.g., exposure might lead to symptom improvement by both behavioral and cognitive change). Relatedly, CR may not always or exclusively lead to cognitive changes. Therefore, it is critical to examine CR applied within session and its relation to intermediate and distal therapeutic outcomes.

Research Review

In this section, we present a systematic review of studies examining the effect of CR *within* session on psychotherapy outcomes.

Search Strategy

Our inclusion criteria for studies in this review were: (a) written in English, (b) appearing in peer-reviewed journals, (c) measured CR as a specific *within session* method, (d) assessed some measure of outcome, (e) conducted as individual therapy, (f) in a face-to-face setting, and (g) contained sufficient information to examine the relation between CR and that outcome.

We used several search strategies to identify studies for inclusion in this review. First, we conducted a search of the PsycINFO database. We examined studies that included at least one of the terms listed in each of these three following categories: (a) CR, cognitive methods, cognitive change procedures, cognitive intervention, schema modification, automatic thought modification, modify automatic thoughts; (b) outcome, symptom; and (c) therapy, psychotherapy. The final PsycINFO database search resulted in 629 results. After removing duplicates, 419 unique articles remained. We also searched the reference section of previous reviews (Clark, 2014; Hofmann et al., 2018; Lorenzo-Luaces et al., 2015). We then inspected each of the individual study abstracts for the inclusion criteria. We identified eight articles for in-depth examination that appeared to meet the inclusion criteria based on their abstracts.

After reviewing these studies, we identified five studies that met our inclusion criteria. The reasons the other three articles did not meet inclusion criteria were that they did not contain a measure of CR as a specific within session method ($k = 1$; Teasdale & Fennell, 1982), did not contain sufficient information to examine the relation between CR and outcome ($k = 1$; Mohlman, 2013), and was a reanalysis of a data set that already examined the relation between CR and an outcome (Sasso et al., 2016). See Table 2 for a list of the included studies.

Review of the Studies

Strunk et al. (2007) examined CR within session in a sample of 35 patients with moderate to severe depression who responded to a course of CT. In this study, the PCTS was used to assess automatic thought and schema/core belief work at sessions recorded during the 12th week, 14th week, and last week of acute treatment. Due to missing data, the analyses in this study concerning the PCTS were limited to 32 patients. While controlling for study site and pretreatment CBT skill use, the overall PCTS was significantly related to reduced risk of relapse during the year-long follow-up period, $\chi^2(1, N = 32) = 5.46$, hazard = 3.37, CI [1.22, 9.32], $p = .02$. However, the PCTS is a composite measure that includes a measure of behavioral activation along with the two CR indices. When looking at the individual CR-related subscales, neither was significantly associated with risk of relapse although each was in the expected direction: PCTS-AT, $\chi^2(1, N = 32) = 1.11$, hazard = 1.68, CI [0.64, 4.41], $p = .29$; PCTS-SC, $\chi^2(1, N = 32) = 3.80$, hazard = 1.82, CI [1.00, 3.34], $p = .05$.

Strunk et al. (2010) measured CR using the CSPRS for the first four therapy sessions of 60 clients who participated in a course of CBT for depression. Symptoms were assessed before each session using the BDI-II (Beck et al., 1996). The authors found CR significantly predicted lower symptom scores in the next session while controlling for current symptoms ($r = .44$, $t = 3.67$, $p < .001$). CR remained a significant predictor of next session symptom change even when controlling for the alliance ($r = .42$, $t = 3.49$, $p = .0009$).

In a reanalysis of the same data set, Sasso et al. (2016) disaggregated the within- and between-person variation of CR. The authors then examined the within- and between-person components of CR as predictors of next session symptom improvements and found that both components significantly predicted next session improvements, between: $b = 1.58$, $SE = .51$, $t(54) = 3.14$, $p = .003$; within: $b = 3.58$, $SE = 1.14$, $t(156) = 3.15$, $p = .002$. Relations focused on the within-person variability of predictor variables can ensure stable patient characteristics are not accountable for the relation.

Schmidt et al. (2019) also used the CSPRS to measure CR for the first five sessions of 126 clients who participated in a course of CT. CR was then disaggregated into within- and between-person components and examined as predictors of same session cognitive change, which was assessed using the Cognitive Change–Immediate scale (Schmidt et al., 2019). Higher values of within- and between-person CR predicted greater immediate cognitive change, within: $b = .97$, $SE = 0.57$, $t(351) = 3.43$, $p = .001$; between: $b = 3.10$, $SE = 1.32$, $t(119) = 2.34$, $p = .02$.

Gómez Penedo et al. (2020) measured CR using the BPSR in a sample of clients randomized to exposure-based CT (EBCT; $n = 71$) or CT for depression ($n = 70$). CR was assessed after each session. After treatment completion, 3-month, 6-month, and 12-month follow-up, clients also completed measures of avoidance (measured with the Cognitive-Behavioral Avoidance Scale; Ottenbreit & Dobson, 2004), self-efficacy (measured with the General Self-Efficacy Scale; Schwarzer & Jerusalem, 1995), and depressive symptoms (measured with the BDI-II). Across both treatments, greater increases in CR were related to lower avoidance and greater self-efficacy, and both lower avoidance and greater self-efficacy were associated with lower levels of depressive symptoms at the 12-month follow-up. In addition, CR was directly related to decreased

Table 2
Studies in the Research Review

Source	*N*	CR measure	Outcome	Treatment	Results	*r*	*d*
Strunk et al. (2007)	32	PCTS-AT	Relapse risk	CBT	+	.19	0.39
	32	PCTS-SC	Relapse risk	CBT	+	.35	0.75
Strunk et al. (2010)	60	CSPRS-CM	Symptoms	CBT	+	.44	0.98
Schmidt et al. (2019)	120	CSPRS-CM	Cognitive change	CBT	+	.20	0.41
Gómez Penedo et al. (2020)	71	BPSR-CR	Symptoms	CBT	+	.41	0.90
	70	BSPR-CR	Symptoms	EBCT	+	.42	0.93
Ezawa and Strunk (2022)	229	CSPRS-CM	Symptoms	CBT	+	.39	0.85
	229	CSPRS-CM	Dropout	CBT	+	.47	1.07

Note. CR = cognitive restructuring; PCTS-AT = Performance of Cognitive Therapy Strategies–Automatic Thought Work subscale; PCTS-SC = Performance of Cognitive Therapy Strategies–Schema or Core Belief Work Subscale; CSPRS-CM = Collaborative Study Psychotherapy Rating Scale–Cognitive Methods subscale; BPSR-CR = Bern Postsession Report–Cognitive Restructuring questionnaire; CBT = cognitive behavioral therapy; EBCT = exposure-based cognitive therapy; "+" = relation between CR and therapeutic outcome in the expected direction.

depressive symptom scores at the 12-month follow-up. While the original publication did not report the direct relation between CR and outcomes, Gómez Penedo reported in a personal communication that CR (modeled as a Level 1 predictor in a three-level multilevel model) predicted next session symptoms (measured with the WHO-5, coded with greater scores indicating lower depression severity) in both the EBCT and CBT samples (EBCT sample: $b_{standardized} = 0.37$, CBT sample: $b_{standardized} = 0.36$).

Ezawa and Strunk (2022) examined within-person components of CR, behavioral methods, and the therapeutic alliance as predictors of next session symptom change across the early sessions of 229 clients who participated in a course of CBT (while controlling for within-client current symptoms and including therapist as a random effect). CR was assessed using the CSPRS and symptoms were assessed using the BDI-II. In that study, higher values of within-client CR predicted lower next session symptoms, $b_{standardized} = -0.39$, $b = -0.78$, $SE = 0.29$, $t(212) = -2.72$, $p = .01$, and lower risk of dropout ($b_{standardized} = 1.93$, $b = 1.93$, $SE = 0.49$, $OR = 6.85$, 95% CI [2.59, 18.11], $p < .001$). Neither the within-person component of behavioral methods nor the therapeutic alliance predicted next session symptoms. This study incorporated data from three prior studies of CBT for depression, two of which were Strunk et al. (2010) and Schmidt et al. (2019). Moreover, the sample used in Ezawa and Strunk (2022; composed of only White therapists) was restricted to Black and White patients because the primary test included examining differences in CBT delivery between the races. Thus, there was partial but not complete overlap in samples with the studies already reported. Interestingly, CR use differed markedly between groups such that therapists utilized significantly less CR with Black patients than White patients. However, the effect of CR use on next session symptoms did not differ based on the race of the patient.

In sum, this systematic review identified five studies that examined the effect of CR as a within session method on intermediate or distal psychotherapy outcomes. Each of these studies was conducted in the context of providing a cognitive treatment for depression. Measurement of CR varied markedly across studies, as did the therapeutic outcome of interest. Yet, in all identified studies (Table 2), therapist use of CR was positively related to therapeutic outcome (i.e., lower risk of relapse, lower next-session depressive symptoms, greater cognitive change, and lower attrition).

Meta-Analysis

We then conducted a meta-analysis of studies included in the research review that contained sufficient information to estimate r and Cohen's d effect sizes of the relation between CR and a therapeutic outcome. To keep observations independent, we chose not to include Ezawa and Strunk (2022) given the overlap of this study's participants with Strunk et al. (2007) and Schmidt et al. (2019), although the effect size for the relation between CR and next-session symptoms from Ezawa and Strunk is presented in the forest plot for purposes of comparison. Relatedly, we included only one of the relations between CR and relapse risk for Strunk et al. (2007; instead of the two CR measures). Due to the small number of studies, we conducted a single meta-analysis with data sets examining both intermediate and distal outcomes in relation to CR. Peterson and Brown's (2005) formula was used to impute the associated r values for studies that only reported standardized βs. To calculate the pooled mean effect size, we employed a random effects model and calculated effect size intervals using comprehensive meta-analysis Version 3 software. We calculated the I^2 statistic to assess the heterogeneity of effect sizes. We also calculated Egger's and Begg's tests for indication of publication bias. Tests for publication bias assume symmetry in the distribution of studies around the observed mean with smaller studies contributing more extreme scores in either direction. When publication bias occurs, it is usually smaller studies with weaker findings that fail to make it into the literature. This pattern is reflected in a deficit of studies in the lower left quadrant of the normal curve and can be detected by either of the two tests of symmetry that we conducted and is usually depicted visually with a funnel plot.

The overall r effect size of the studies examining the relation between CR and therapeutic outcomes was .35 (95% CI [.24, .44]; Cohen's $d = 0.85$) with low heterogeneity ($I^2 = 11.40$). A list of the studies included in the meta-analysis is found in Table 3. A forest plot of study r effect sizes is found in Figure 2. There was no significant evidence of publication bias according to Egger's ($p = .14$) and Begg's tests ($p = .16$). The total number of clients was 353.

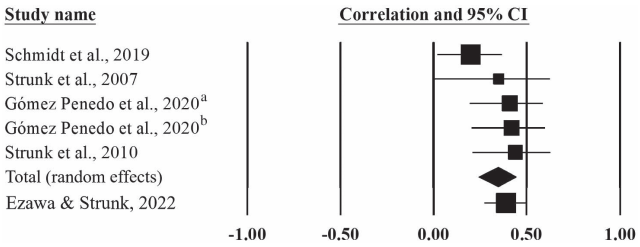
The outcomes among studies included in the meta-analysis varied considerably, but the findings were robust across these different intermediate (i.e., depressive symptoms, cognitive change) and distal outcomes (i.e., relapse risk). In addition, the smallest effect sizes listed in Table 3 (Schmidt et al., 2019; Ezawa & Strunk, 2022)

Table 3
Studies Included in Meta-Analysis

Source	*N*	CR measure	Outcome	*R*	*d*	95% CI for *r*
Schmidt et al. (2019)	120	CSPRS-CM	Cognitive change	.20	0.41	[.02, .37]
Strunk et al. (2007)	32	PCTS-SC	Relapse risk	.35	0.75	[.00, .62]
Gómez Penedo et al. (2020)[a]	71	BPSR-CR	Symptoms	.41	0.90	[.20, .59]
Gómez Penedo et al. (2020)[b]	70	BSPR-CR	Symptoms	.42	0.93	[.21, .60]
Strunk et al. (2010)	60	CSPRS-CM	Symptoms	.44	0.98	[.21, .62]
Total (random effects)	353	CR	Positive outcome	.35	0.75	[.24, .44]
Ezawa and Strunk (2022)	229	CSPRS-CM	Symptoms	.39	0.85	[.27, .50]

Note. Positive effect sizes reflect relations between CR and the respective therapeutic outcome in the expected positive direction. CI = confidence interval; CSPRS-CM = Collaborative Study Psychotherapy Rating Scale—Cognitive Methods subscale; PCTS-SC = Performance of Cognitive Therapy Strategies–Schema or Core Belief Work Subscale; BPSR-CR = Bern Postsession Report–Cognitive Restructuring questionnaire; CR = cognitive restructuring; CBT = cognitive behavioral therapy; EBCT = exposure-based cognitive therapy.
[a] Gómez Penedo et al. (2020) = CBT sample. [b] Gómez Penedo et al. (2020) = EBCT sample.

Figure 2
Forest Plot



Note. Positive effect sizes reflect relations between CR and treatment outcomes in the expected direction. CR = cognitive restructuring; CI = confidence interval; CBT = cognitive behavioral therapy; EBCT = exposure-based cognitive therapy.
[a] Gómez Penedo et al. (2020) = CBT sample. [b] Gómez Penedo et al. (2020) = EBCT sample.

were those belonging to the two studies that disaggregated the within- and between-patient components of the CR variable. By doing so, these studies ruled out any relations involving the within-patient components of CR as being accounted for by stable patient characteristics (Curran & Bauer, 2011; Wang & Maxwell, 2015).

Limitations of the Research

There are several methodological difficulties in examining the therapeutic effect of CR within sessions, which likely relates to the small number of studies (Lorenzo-Luaces et al., 2015). First, measuring CR within a session is resource intensive. Besides the number of hours needed to rate therapy sessions, training a single rater can take upwards of 70 hr (Strunk et al., 2007), and often multiple raters are needed to reach acceptable reliability (Ezawa et al., 2021). Researchers might consider automating training procedures to increase the reliability of and reduce the resources needed to utilize current observer-rated CR measures (e.g., Ezawa et al., 2021). Recent breakthroughs in machine learning and artificial intelligence may also pave the way for computerized coding of CR and therapy outcomes.

Second, many of the studies examining the effect of CR have relied on naturalistic studies that cannot establish causality. While manipulating single variables (such as therapist use of CR) can be difficult, it is essential that researchers consider the timing of assessments to ensure CR and outcomes are not measured concurrently and are aligned with a causal relation.

Third, there is a need to investigate mediators of the relation between therapist methods and treatment outcomes. It would be more consistent with the cognitive theory to measure CR as a predictor of cognitive changes, as opposed to direct predictors of symptom outcomes. There might also be other mediational pathways, and moderators of such pathways, that researchers ought to consider when designing future studies to investigate the impact of CR within session.

Training Implications

Training in CR often involves didactic instruction, active modeling, role playing with feedback, and supervision, usually but not necessarily as part of formal training in CT or CBT. While we are unaware of any training protocols for CR specifically (as opposed to CT generally), we recommend that psychotherapists first attain a comprehensive understanding of the cognitive model (Beck, 1976; Beck et al., 1979). When providing CR, clients are most likely to receive a therapeutic benefit when they too understand the cognitive model, specifically that the way in which they interpret events drives their mood and behaviors. Furthermore, CR is first used to identify and challenge negative automatic thoughts in specific situations, but over time, therapists may amplify the impact of CR by using these methods to help identify and challenge client's underlying core beliefs. For therapeutic manuals describing how to implement CR in session, please see Beck et al. (1979) and Beck (2020).

Therapeutic Practices

There is initial evidence that CR promotes positive outcomes in individual psychotherapy. In the current review, therapist use of CR was positively related to intermediate (i.e., lower next-session depressive symptoms and greater cognitive change) and distal treatment outcomes (i.e., lower risk of relapse and lower attrition). The studies examining the therapeutic impact of CR within session have been limited to the treatment of depression. However, component analyses that have examined the additive effect of CR in relation to behavioral components have found CR to be at least as equally effective as behavioral components in the treatment of anxiety disorders and obsessive–compulsive disorder. In addition, evidence from component analyses suggests that CR may be more therapeutic than behavioral components in the treatment of social anxiety disorder and posttraumatic stress disorder (Clark, 2014). In a complementary body of work, mediation analyses have found cognitive change (i.e., the expected product of CR) to lead to symptom improvement across a variety of disorders (Hofmann et al., 2018; Lorenzo-Luaces et al., 2015). Thus, we offer the following practices based on this body of research evidence:

- Utilize CR by helping clients identify, challenge, and correct negative inaccuracies in their thinking.
- Promote CR in the treatment of several disorders, including depression, anxiety, social anxiety, obsessive–compulsive disorder, and posttraumatic stress disorder.
- Consider the use of CR in any clinical circumstances when working with clients to foster cognitive change and subsequent symptom improvement.
- Beware of possible biases in underutilizing CR with marginalized populations.
- Recall that the goal of CR is not to minimize existing threats but rather to get an accurate sense of what they might be.

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Asterisk indicates that the study was included in the meta-analysis.

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