Emotion Regulation Therapy and Its Potential Role in the Treatment of Chronic Stress-Related Pathology Across Disorders

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Abstract

Although stress is an inevitable part of everyday life, its chronicity, severity, and perceived burden can result in enduring distress, which may manifest as heightened emotionality, contributing to a number of self-regulatory failures. Specifically, distress disorders are characterized, in part, by heightened sensitivity to underlying motivational systems related to threat/safety, reward/loss, or both. Further, individuals suffering from these conditions typically engage in perseverative negative thinking (e.g., worry, rumination, self-criticism) in an effort to manage motivationally relevant distress and often utilize these processes at the detriment of engaging in new contextual learning. Distress disorders are often brought on by enduring chronic stress, coupled with these maladaptive emotional, cognitive, and behavioral responses and ensuing impairment which contribute to and in turn worsen the deficits from these purported mechanisms. Emotion regulation therapy is a theoretically derived treatment that is based upon affective science to offer a blueprint for improving intervention by focusing on targeting the motivational responses and corresponding regulatory failures of individuals with distress disorders. Open and randomized controlled trials have demonstrated considerable preliminary evidence for the utility of emotion regulation therapy and its proposed mechanisms in treating the distress conditions.

Keywords

chronic stress, emotion regulation, distress disorders, treatment, allostasis

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Conceptualizing Mood and Anxiety Difficulties in the Context of Chronic Stress

Stress brought about by physical, environmental, and/or interpersonal challenges is an inevitable part of life and many organisms have developed means to adapt to these stressors when they arise. McEwen¹ refers to this active and dynamic process of confronting and adapting to stressors as allostasis and quantifies the cumulative physiological cost or burden caused by this adaptation to the stress as allostatic load. A primary goal of organisms is to maintain homeostasis, which refers to an attempt to maintain an internal state within the body in service of optimizing survival. Although stressors are taxing to the organism, ideally the burden is temporary or cyclical and the organism can reestablish homeostasis.² However, stress can lead to dysfunction and pathophysiological states (i.e., allostatic overload) when adversities arise unexpectedly, are extreme, and protracted—thereby causing an imbalance as the available energy or resources are insufficient to address the burden brought on by the stressor. McEwen’s¹ allostasis model provides an important heuristic for understanding the normative and adaptive aspects associated with managing stress. In essence, this model is predicated on self-regulation, which commonly refers to the behavioral, cognitive, and emotional control responses emitted by an organism to optimally address circumstances that arise in daily life.² This model also helps to account for when and how severe and persistent stress can lead to dysfunction and disease as regulatory systems can no longer

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withstand the burden caused by the intensity of one or more stressors.

Consistent with McEwen’s\textsuperscript{3} allostasis model, contemporary emotion regulation theories\textsuperscript{4} also view an organism’s responses to an emotionally evocative situation from a self-regulation perspective. Gross adopts a functional emotion perspective in positing that optimal regulation represents the coordination of attentional, cognitive, and behavioral responses to the arising of emotionally evocative situations so that an individual is constantly adjusting and/or course correcting his or her appraisals of a situation and corresponding behavioral responses to fit one’s personal goals or objectives.\textsuperscript{5} Beyond achieving a personally relevant outcome, optimal emotion regulation results in an economy of resource involvement that tries to match the amount of effort exerted (e.g., attentional, cognitive, behavioral) to the situation and emit the least taxing response necessary to achieve the desired goal.

Drawing upon these models of allostasis and emotion regulation, we have sought to characterize and empirically investigate distress, which is commonly regarded as a maladaptive internal response to stressors that arise in one’s life. Our program of research is predicated on a neurobehavioral model that conceptualizes distress as an imbalance of neural circuitry subserving cognition, emotion, and decision-making.\textsuperscript{6} For instance, distress often manifests as intense emotionality\textsuperscript{7–9} that affects the experience of negative and positive emotions as well as cognitive and behavioral factors that actually cause, worsen, and prolong the stressful situations that patients struggle to tolerate. One such factor that commonly accompanies this intense emotionality in distress is perseverative negative thinking (PNT; e.g., worry, rumination)\textsuperscript{10,11} self-criticism,\textsuperscript{12} loneliness,\textsuperscript{13,14} and perceived discrimination\textsuperscript{15–19}). PNT complicates treatment responsiveness, increases unhealthy habits,\textsuperscript{20} and interferes with life-style and treatment engagement. Importantly, distress is also a transdiagnostic experience in that it is not specific to a particular disorder but rather characterizes several prevalent psychiatric disorders that are often comorbid with one another and have led to the moniker of distress disorders.\textsuperscript{21}

The Distress Disorders
The experience of chronic and enduring distress over time typifies the phenomenological experience of psychiatric disorders that structural emotion scholars (e.g., Krueger, 1999, Watson, 2009)\textsuperscript{22,23} have termed the “distress disorders” comprised of generalized anxiety disorder (GAD), major depressive disorder (MDD), persistent depressive disorder (DYS), and posttraumatic stress disorder (PTSD). In contrast to the rationally derived categories found in the Diagnostic and Statistical Manuals (DSM; e.g., anxiety disorders, mood disorders, etc.), structural emotion scholars adopt an atheoretical and actuarial approach to vertically organize diagnostic entities into superordinate categories of broad emotional features that align with constructs of negative emotionality. Findings from these various studies revealed that many of the DSM anxiety disorders coalesce into a grouping that is typically referred to as fear disorders (consisting of specific phobia, social anxiety disorder, and panic disorder) and the aforementioned distress disorders. Collectively, distress disorders are impactful psychiatric conditions which pose a significant public health burden. For instance, distress disorders are among the most commonly occurring and impairing psychiatric disorders.\textsuperscript{24,25} Lifetime and 12-month prevalence of these conditions are considerable: GAD (5.7%/3.1%), PTSD (6.8%/3.5%), MDD (16.6%/6.7%), and DYS (2.5%/1.5%). Distress disorders demonstrate a chronic and persistent course and are not likely to spontaneously remit without intervention.\textsuperscript{26} They also complicate the presentation and treatment of medical conditions throughout the lifespan, contributing to both an increased risk of cardiovascular disease\textsuperscript{27,28} and metabolic syndrome.\textsuperscript{28} The burden of distress disorders is particularly prevalent among older adults.\textsuperscript{30} A recent study examining the world disease burden from all medical conditions in 2010 estimated that mood disorders including MDD and DYS were the second leading cause of years lived with disability (YLD) throughout the world.\textsuperscript{31} Further, a 2010 study estimated that anxiety disorders (which included GAD and, at the time, PTSD) were named as the fifth leading cause of YLD.\textsuperscript{31} Individuals diagnosed with distress disorders also are likely to engage in numerous health risk behaviors.\textsuperscript{20} Individuals experiencing depression and anxiety are more likely to smoke tobacco, consume greater quantities of alcohol, be more sedentary, and consume an unhealthy diet.\textsuperscript{32} Findings have indicated that both veterans and nonveterans diagnosed with PTSD are more likely to smoke tobacco, consume alcohol, be sedentary, and be medication nonadherent compared to individuals without PTSD.\textsuperscript{33,34}

Applying an Affective Science Approach to the Nature and Treatment of Distress Disorders
The burgeoning field of affective science seeks to elucidate the emotional processes that underlie adaptive and maladaptive responses to stressors\textsuperscript{35} and consequently provides a strong empirical basis for how to best target distress and distress disorders. Normative emotional processing and regulation models\textsuperscript{4,36} are a core
component of affective science and when applied to understanding psychopathology align with the growing multidisciplinary field of intervention science and with National Institute of Mental Health priorities, which seeks to elucidate biobehavioral markers that are reliably dissociable in patient subgroups as compared to healthy controls so as to hone interventions to better target central determinants of distress and dysfunction.

Using an affective science framework of emotion processing and regulation, we have delineated a model that targets motivational, regulatory, and resultant behavioral components of adaptive and maladaptive stress responding. We have argued that effective responding to stress involves (1) activation of motivational systems that mobilize the pursuit of safety/reducing perceived threat, reward/minimizing loss, or both; regulatory mechanisms comprised of (2) attentional capacities including the ability for broadening, shifting, and sustaining attention to interoceptive and exteroceptive emotional stimuli and (3) metacognitive capacities including decentering (e.g., the ability to observe items that arise in the mind with healthy psychological distance, greater self-awareness, and perspective-taking) and cognitive reappraisal (e.g., the ability to change one’s evaluation of an event so as to alter its emotional significance); and (4) resultant broad and flexible behavioral repertoires, which are comprised of maximal emotional clarity and subsequent effectively implemented and goal-relevant responses that produce optimal behavioral outcomes (see part a of Figure 1).

Conversely, as we have argued, individuals with distress disorders often experience motivational conflicts for which they are unable to resolve and effectively act on impetuses for risk and reward, fail to flexibly place and maintain their attention on percepts that are personally relevant to one’s goals, and resort to more cognitively elaborative and resource intensive perseverative strategies (e.g., worry, rumination, self-criticism) as a way of managing distressing emotions and motivations. This pattern of motivational and regulatory deficits results in short-term maladaptive behavioral consequences (i.e., reassurance seeking, compulsive behaviors, drinking, smoking, maladaptive eating behavior) and long-term impact on threat and reward learning (lack of approach behavior in favor of greater perceived safety, withdrawing pursuit of potentially rewarding outcomes).

Emotion regulation therapy (ERT) is a brief psychotherapy that was focally developed to help ameliorate the impact of distress disorders using the functional affective science model delineated above as a framework for targeting interventions. Although ERT’s approach to treating distress disorders is uniquely packaged within an affect science framework, it integrates principles from traditional and contemporary cognitive-behavioral therapies and regulatory mechanisms (particularly self-referential; e.g., worry, rumination, self-criticism) that lead to short-term behavioral (e.g., avoidance, reassurance-seeking, compulsive behaviors; maladaptive coping) responses and long-term contextual learning consequences (i.e., generalized threat, diminished reward sensitivity) that are hypothesized to comprise the distress disorders. ERT has been delivered in 20-, 16-, and 8-session formats as part of manualized open label and randomized controlled trials. In each of these formats, the treatment is divided into two different phases, with the first phase of treatment focusing on increasing momentary clarity of motivational responses during emotional episodes and the cultivation of mindful emotion regulation skills with the goal of promoting counteractive responding to intense emotional experiences. Skills are presented in a specific order focusing on less cognitively elaborative skills (e.g., attention regulation skills) followed by more cognitively elaborative skills (e.g., metacognitive regulation skills). Metacognitive regulation skills focus specifically on decentering and reappraisal. Collectively, these attention and metacognitive skills are introduced to promote more adaptive responding to one’s internal (e.g., emotional) and external (e.g., contextual) environments. Each skill is meant to target a different point along the temporal emotional cascade that occurs during a distress episode, particularly in the presence of PNT. Clients are taught to utilize these skills in the moment when they first notice the arising of emotional and motivational cues. Further, the cultivation of these skills aid individuals in increasing their ability to identify pulls towards both security (e.g., safety-seeking, avoidance) and reward (e.g., moving towards potentially satisfying and values-consistent stimuli and experiences in one’s environment) motivations and created more balanced responding to their motivational impetuses.

Once clients have developed some competency with identification of motivations and applying mindful emotion regulation skills in maladaptive momentary responding in the first half of treatment, the focus of the second phase of ERT seeks to proactively engage motivational states through the promotion of behavioral approach informed by clients’ identification of what is meaningful and intrinsically rewarding in their lives and how they would like to be living if distress associated with negative emotions and PNT were not holding them back. Motivation is targeted through the utilization of imaginal risk/reward exposures and conflict dialogue tasks, during which clients commit to taking actions between sessions that, rather than relying on seeking security and avoiding, promote approaching intrinsically rewarding situations threat in service of...
gaining a wider behavioral repertoire congruent with personal values. ERT concludes with the therapist and patient reviewing the progress made during the course of treatment and encouraging the patient to continue utilizing mindful emotion regulation skills to address distressing situations when they arise (i.e., “being counteractive”) as well as when planning important but potentially stressful future endeavors (i.e., “being proactive”). See part b of Figure 1 for a summary of this emotion regulation model and how ERT targets each of the model’s components.

**ERT Clinical Outcomes**

**Efficacy Findings**

ERT has established efficacy through an initial open trial (OT; \(N = 20\); \(M_{\text{age}} = 32, SD = 10.96; 75\% \text{ women}\)) of patients diagnosed with GAD with and without co-occurring major depression and in a randomized controlled trial (RCT; \(N = 53\); \(M_{\text{age}} = 38, SD = 14.46; 81\% \text{ women}\)) examining symptom changes throughout ERT in comparison to a minimal attentional control condition. Patients in this initial OT demonstrated reductions in GAD severity, worry, trait anxiety, and corresponding improvements in quality of life, with within-subject effect sizes well exceeding conventions for large effects (Hedges’ \(g = 0.5\) to 4.0). These gains were maintained for nine months following the end of treatment. The Time \(\times\) Group interaction findings from the RCT evidenced significant reductions in GAD severity, worry, trait anxiety, and depression symptoms, and corresponding improvements in social disability and quality of life for patients who received immediate ERT compared to a modified attention control condition, with between-subject effect sizes in the medium to large range (\(g = 0.5\) to 1.5). Similar to the OT findings, these gains were maintained for nine months following the end of treatment. Furthermore, depression-related outcomes such as rumination and anhedonia were reduced considerably.

More recently, ERT has been tested in an OT of ethnically diverse and disadvantaged young adults (\(N = 31\); \(M_{\text{age}} = 22, SD = 2.48; 71\% \text{ women}\)) diagnosed with a primary diagnosis of any anxiety or mood disorder. Results demonstrated a comparably severe sample to the previous trials and similarly strong ameliorative changes from pre- to posttreatment in worry, rumination, generalized anxiety, anhedonic depression, clinician-rated severity of GAD and MDD, social disability, and quality of life with within-subjects

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**Figure 1.** Functional emotion regulation model of distress disorders and corresponding ERT targets.
Hedges’ g’s ranging from 1.5 to 4.0. These gains were maintained at a 3-month and 9-month follow-up. Most recently, we have examined the efficacy of the 8-session format of ERT compared to the 16-session version. Preliminary analyses have revealed no significant differences in completer status between the two groups ($\chi^2 = 1.29$, $p = .27$), highlighting that both versions were tolerable for participants. Across all outcomes, although both treatment versions produced significant main effect improvements from pre- to posttreatment (all Cohen’s $f^2$s > .52), the magnitude of gains was comparatively larger for the 16-session version. Commensurately, findings revealed significant group by time interactions for the majority of outcomes from pre- to posttreatment. Beyond these indices of clinical response, all of these ERT trials resulted in an impressive percent of patients achieving high endstate functioning, which corresponds to whether patients’ scores on clinician-assessed and self-reported symptom measures are restored to within one standard deviation of healthy norms. High end state functioning is a rigorous standard of clinical improvement than simply examining change over time given that it necessitates normalization of self-reported symptoms rather than reductions alone. Achieving high endstate functioning essentially means that ERT was associated with restoration of normative symptom and functioning levels on a combination of GAD (range = 55% to 85%) and MDD (range = 56% to 80%) indicators that were maintained or increased into the posttreatment follow-up.\(^56,57,59\)

ERT has subsequently also been evaluated in the context of cancer caregivers.\(^68,69\) The contextual demands of caregiving for a loved one with a chronic illness has been found to lead to heightened emotional distress.\(^70,71\) At times, the distress experienced by these caregivers may surpass that of the actual cancer patient.\(^72–74\) Psychosocial interventions containing efficacious treatment principles (e.g., CBT) show disappointing results in reducing anxiety and depression in informal caregivers.\(^75\) In an initial open trial, 32 informal caregivers (87% women; mean age = 55; 61% partner, 19% children, and 16% parent of patient with cancer) who endorsed significant distress and either elevated worry or rumination received the 8 session version of ERT, which was adapted to the caregiver context (ERT-C). Caregivers receiving ERT-C evidenced reductions in worry,\(^60\) rumination,\(^65\) and anxiety and depression symptoms\(^76\) (within-subject effect sizes $g$’s = 0.4–0.9).\(^68\) A follow-up RCT in 81 informal caregivers (75% women; mean age = 48; 75% were female caring for male patients) comparing the 8-session ERT-C protocol versus a waitlist control condition further found strong between-subject effects for these indices as well as a measure of caregiver burden ($g$’s = 0.5–1.0). Further, patients whose informal caregivers attended ERT-C experienced a large increase in quality of life posttreatment compared to those whose informal caregiver were in the waitlist condition ($g$ = 0.9).\(^69\)

**Model-Related Changes**

In addition to establishing strong effects for clinical outcomes, the above trials also demonstrated significant treatment-related change from pretreatment to posttreatment and through the follow up in self-reported measures of target mechanisms with moderate to large within ($g$’s = 0.6–2.6)\(^55,57,68\) and between-subjects effect sizes ($g$’s = 0.5–1.0).\(^57,69\) Further, we tested mediational models and found that measures of overall and specific attentional and metacognitive regulatory ability demonstrated indirect effects on primary outcomes of diagnostic anxiety severity,\(^59\) worry,\(^60\) depression,\(^62\) social disability,\(^64\) and quality of life\(^63\) when comparing ERT to the modified attention control comparator.\(^57\)

To examine the relationship of these changes to outcomes, we have utilized multiple indices of emotion functions including subjective report, behavioral tasks, and biological indices that have established reliability and validity in lab and analogue studies. Below, we describe a set of pilot studies that examined the relationship between ERT implementation, changes in the proposed target mechanisms, and clinical outcomes using multi-method assessment. These studies provide important preliminary multi-method evidence that ERT achieves clinical response via changes in motivational and regulatory mechanisms as theorized.

To test changes in attention regulation in response to treatment and its relation to treatment outcome, participants completed a modified emotional Stroop (1935) task consisting of happy or fearful facial expressions with emotion words (e.g., “fear” or “happy”) overlaid on the image to test emotional conflict adaptation.\(^77,78\) Participants were instructed to respond as quickly and accurately as possible to whether the person in the image displayed a fearful or happy expression. Overall, participants evidenced pre- to mid-treatment improvements in their ability to shift their attention in the face of emotional conflict (pre to mid Cohen’s $d$ = 0.74) to levels comparable to healthy controls.\(^77\) Further, these pre-to mid-treatment changes were associated with gains in patients’ ability for greater mindful observing which in turn was associated with reductions in social disability.\(^79\) In a subsequent study, we have also examined changes in neural correlates of this conflict adaptation and found that dorsal medial prefrontal cortex activation at pretreatment (potentially reflecting elaborative self-referential processing) significantly disengaged at posttreatment and this change was associated with decreases in clinician-rated anxiety severity and increases in self-reported attentional shifting and focusing abilities. The
Emotional Interference Task was also completed by a subset of trial patients to assess ERT-linked gains in attentional flexibility. This task requires participants to differentiate between low- and high-pitched tones and press the corresponding keys quickly and accurately as possible while viewing images (e.g., neutral, negative arousing, positive arousing) from the International Affective Picture System. Findings indicated that patients receiving ERT increased their ability to sustain attention despite emotional distraction from pre- to mid-treatment, when attention skills are specifically cultivated. Further, this attention regulation change from pre- to mid-treatment significantly predicted reductions in anxiety and worry in addition to increases in mindful nonreactivity and social disability at posttreatment.

With respect to metacognitive regulation, in the 16-session open trial self-reported reappraisal and decentering were examined as causally preceding symptom change throughout treatment. Findings indicated that improvements in decentering temporally preceded changes in worry and trait anxiety while improvements in reappraisal preceded reductions in worry, trait anxiety, and generalized anxiety symptoms were associated with increases in decentering and commensurate reductions in worry. Further, in another study, we examined a commonly used explicit emotion regulation task and found increased activation in neural areas associated with regulative ability and corresponding increases in metacognitive abilities and decreased clinician-rated severity of MDD.

Finally, two recent publications derived from the 16-session ERT open trial revealed ERT-linked patterns of resting state functional connectivity (rsFC) associated with areas of the salience network (SN; involved in orienting attention to external and internal stimuli and facilitating the integration of sensory, emotional, and cognitive information in service of optimal communication, social behavior, and self-awareness) and areas of the default mode network (DMN; involved in autobiographical, self-monitoring, and social cognition functions). Using seed-based rsFC with seeds placed in the SN (i.e., insular cortex) and DMN (i.e., posterior cingulate cortex [PCC]), pretreatment patterns of neural activation predicted clinical response to ERT with respect to gains in decentering and reductions in worry. A recent follow-up once again using seed-based rsFC with seeds in the insula and PCC revealed ERT-linked changes in resting state connectivity which were associated with decreases in GAD and MDD diagnostic severity and increases in both attention and metacognitive regulation. Taken together, these preliminary findings provide initial support for our hypotheses that the salutatory effects of ERT result in part through normalization of emotion regulatory mechanisms.

Limitations
This review presents a contemporary conceptualization of distress disorders using an affective science framework. Our conceptualization is consistent with nosological models that group disorders based on similarities in observable surface level characteristics (e.g., anxiety vs. depression symptoms) but find conceptual utility in grouping disorders on the basis of fear versus distress symptoms. Given the more conceptual classification of distress disorders within the context of ERT, continued work is needed to test whether each of these disorders respond favorably to the treatments that focally target hypothesized underlying and shared characteristics. Although GAD and MDD have been extensively tested in previous trials of ERT with favorable outcomes, these trials have not examined PTSD specifically (although it was often comorbid). The mechanism studies described above are preliminary and do not fully test the mediating role of target mechanisms in producing ERT’s ameliorative effects given limits in the number of assessment points, small sample size, and the absence of a comparison condition to control for maturation effects. Although ERT findings to date are promising, larger, more definitive trials with rich mechanism assessments across the entire range of distress disorders are an important next step.

Conclusions and Future Directions
Distress disorders are prevalent, result in considerable suffering and public health burden, and are highly comorbid with one another, and are challenging to treat even when patients receive demonstrated medication and psychosocial interventions. Distress disorders are particularly difficult to treat given the presence of salient emotional responses and subsequent negative self-referential processes that exacerbate and maintain the symptoms associated with these conditions. We have emphasized the public health significance of distress disorders such as GAD, DYS, MDD, and PTSD given their prevalence and impact on functioning, economic burden, and health outcomes. Individuals who experience these conditions are more vulnerable to engaging in emotional and behavioral processes that may exacerbate the presence and experience of chronic stress in their lives. This process, in turn, reinforces the symptomology present in distress disorders, particularly the processes of worry, rumination, and self-criticism. ERT offers a blueprint based on affective science for improving intervention for these individuals by focusing on the motivational responses and corresponding regulatory characteristics common to their symptomology. This emphasis on affective science permits identification of mechanisms of treatment in terms of core disruptions of normative
motivational, regulatory, and resultant behavioral/learning factors, which in turn helps generate more targeted solutions to help clients utilize adaptive ways to cope or compensate for these core deficits. Although future research is needed to further identify the specific ways that it may ameliorate the psychological, physiological, and contextual aspects of chronic stress, previous trials of ERT have demonstrated considerable preliminary evidence for its ability to treat distress disorders and potential mechanisms that may underlie this efficacy. We also plan to use a dismantling approach to identify the way that specific skills in ERT may contribute to improvements in the purported mechanisms by examining whether briefer tailored intervention components can more precisely and specifically target the purported mechanisms of action. This work will allow us to better hone the treatment in identifying the way in which specific ERT skills, in isolation, promote changes in each purported mechanism of the intervention and thus independently contribute to reduction of symptom burden, distress, and impairment in distress disorders.

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