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Psychotherapeutic Treatments for Generalized Anxiety Disorder: Cognitive and Behavioral Therapies, Enhancement Strategies, and Emerging Efforts

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Abstract

Introduction: Generalized anxiety disorder (GAD) is common and disabling. Different versions of cognitive behavioral therapy (CBT) have been tested, but no treatment works for everyone. Therefore, researchers have attempted approaches to enhance CBT.

Areas covered: The current narrative review examines meta-analyses and individual trials of CBT-based treatments for GAD. We focus on CBT and its cognitive and behavioral components as well as efforts to enhance CBT and its dissemination and generalizability. Enhancement efforts included interpersonal and emotional processing therapy, mindfulness-based CBT, emotion regulation therapy, intolerance of uncertainty therapy, the unified protocol, metacognitive therapy, motivational interviewing, and contrast avoidance targeted treatment. Emerging strategies to enhance dissemination have focused on technologically based treatments. Attempts at generalizability have included examination of efficacy within diverse racial and ethnic groups.

Expert opinion: We conclude that CBT is efficacious, and a number of enhancement efforts have shown some promise in improving upon CBT in single trials. However, more research is needed, particularly efforts to determine which enhancements work best for which individuals

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and what are the mechanisms of change. Furthermore, few technological interventions have been compared to active treatments. Finally, much more attention needs to be paid to ethnic and racial diversity in randomized controlled trials.

Keywords

Psychotherapy; generalized anxiety disorder; GAD; cognitive behavioral therapy; CBT

1. Introduction

Generalized anxiety disorder (GAD) is defined by excessive anxiety and uncontrollable worry, with symptoms including restlessness, fatigue, difficulty concentrating, irritability, muscle tension, and sleep disturbance being present for more days than not for the past 6 months [1]. The anxiety, worry, and other symptoms associated with GAD make it difficult for individuals to carry out their daily activities, which leads to impairment in social, occupational, and other important areas of life [1]. GAD and its core symptom of worry are costly to society in terms of disability, role impairment, medical morbidity, coronary artery disease, immunity, workplace performance, and healthcare utilization [2–4]. Comorbid disorders are the rule rather than the exception with GAD. Individuals with GAD are likely to have met, or currently meet, criteria for other anxiety disorders [1]. Epidemiological studies of GAD suggest a high rate of comorbidity with major depression, panic disorder, social and specific phobia, and post-traumatic stress disorder [5,6]. Thus, interventions targeting GAD and worry are important and further justify treatment in a variety of clinical settings given the high rate of comorbidity.

Cognitive behavioral therapies (CBT) are considered first-line, gold-standard treatments for GAD [7]. However, CBT leads to substantial improvements in only about 50% of people [8,9]. Thus, in recent years efforts have been made to improve upon the efficacy of CBT for GAD. This suggests the need to take stock of not only traditional CBT interventions, but also mediators, moderators, and predictors of their effects (speaking to how they work and for whom), as well as relevant emerging treatments. Thus, the current narrative review provides an overview of psychotherapy and examines the evidence supporting not only cognitive behavioral therapy (CBT) and many of its traditional component treatments for GAD, but also more recent treatments targeting emotion regulation, interpersonal problems, meta-cognitions, contrast avoidance, intolerance of uncertainty, treatment motivation, comorbidity, and mindfulness in the treatment of GAD. Moreover, recent efforts have been made to increase CBT dissemination via technology and to consider the importance of client diversity factors shaping treatment response. The current paper thus examines both established treatments and emerging strategies for GAD, drawing upon meta-analyses as well as individual trials in areas where they constitute the available evidence.

2. Cognitive Behavioral Therapy and its Components

A standard package of CBT for GAD usually incorporates “psychoeducation” or information about the nature of anxiety and worry, a cognitive restructuring component to target worries and intrusive thoughts (i.e., cognitive therapy), and behavioral techniques

that emphasize behavior change, including self-monitoring of anxious responding, breathing retraining, and relaxation [8]. A meta-analysis found that CBT for GAD led to greater improvement than pill placebo ($g = 1.44$, 95% CI [0.94, 1.94]), psychological placebo ($g = 0.47$, 95% CI [0.25, 0.69]), and treatment as usual (TAU; $g = 0.38$, 95% CI [0.05, 0.71]) [10] (see Table 1 for an overview of studies discussed in this narrative review). CBT also had long-term effects up to 2 years [8]. Rates of remission (complete recovery) for GAD were 51.4% at posttreatment and 65% at follow-up [11]. CBT for GAD also has shown strong efficacy for comorbid anxiety and depressive disorders [10,12].

2.1 Relaxation Techniques

Relaxation techniques are theorized to be especially helpful for those with GAD, who are thought to have higher levels of autonomic rigidity. Such relaxation has been shown to enhance autonomic flexibility, which can be described as the capacity of the autonomic nervous system to adapt to changes in the environment by modifying arousal, breathing, and heart rate [13,14]. Relaxation responses can be attained through breathing retraining (BRT), Progressive Muscle Relaxation (PMR), and Applied Relaxation (AR). BRT entails slowed paced breathing from the diaphragm. PMR involves practicing systematic tensing and releasing of as many as 16 major muscle groups sequentially in a quiet space but gradually combining the muscle groups as the individual becomes proficient in the relaxation response [15]. Relatedly, applied relaxation (AR) begins with PMR and emphasizes making relaxation a portable skill to be deployed when anxiety is encountered in natural settings [16]. Individuals are instructed to regularly scan their body throughout the day, notice muscle tension, and immediately attempt to relax it away, thus maintaining a relaxed state.

Meta-analytic reviews of the efficacy of relaxation techniques have generally yielded large effects [17]. However, meta-analyses have often lumped together different approaches to relaxation training, leaving it unclear whether BRT, PMR, AR, or a combination were used [18]. In one exception to this, Monto-Marín et al. found that whereas PMR alone was inferior to CBT ($g = -0.47$, 95% CI: -0.63 to -0.30 , $I^2 = 37\%$), there was no significant difference between AR and CBT for GAD ($g = -0.05$, 95% CI: -0.19 to 0.09 , $I^2 = 12\%$) [19]. In sum, the current body of research suggests that CBT and AR may have comparable effects in the treatment of GAD, but PMR alone was inferior. This is likely because AR requires active efforts to generalize its effects to daily life to have an impact. We are not aware of any studies examining the efficacy of BRT alone for GAD.

2.2 Cognitive Therapy.

Cognitive therapy (CT) focuses only on cognitive restructuring techniques, a set of approaches aiming to modify maladaptive thoughts, beliefs, and images theorized to play a role in maintaining GAD [9]. Efficacy of CT alone was not significantly different than CBT at up to 2 years follow-up [20]. In meta-analyses, CT was more effective than no-treatment or placebo with a large between-group effect size ($d = 1.15$), and maintained gains at 6- and 12-month follow-up [21]. Hanrahan et al. examined worry treatments and found that CT was more efficacious than control groups ($d = 0.93$, 95% CI [0.59, 1.27]) [22]. Regarding types of control groups, effects of CT appeared stronger than waiting-list (large posttreatment effect sizes, $d = 1.8$, 95% CI [1.26, 2.37]) and non-CT active control groups ($d = 0.63$, CI

[0.21, 1.05]) [22]. Nonetheless, whereas CT appears to be well established for GAD, less than 50% recovered at the end of the treatment and long-term follow-up data are sparse [22].

2.3 Self-Control Desensitization

Another behavioral technique for GAD is self-control desensitization (SCD), a procedure to imaginably expose individuals to situations and stimuli that tend to trigger worry. The goal is to engage individuals in coping mechanisms that aim to reduce their worry, including mentally rehearsing potential confrontation and muscle relaxation. GAD has been traditionally viewed as less amenable than more circumscribed anxiety disorders (e.g., specific phobias) to exposure therapy, a form of therapy that involves helping the individual deliberately face feared stimuli or emotions until fear abates. As an alternative, SCD has been used as a form of counter-conditioning (changing the emotional response toward a stimulus by pairing it with an opposite state) suitable for diffuse anxiety such as GAD [9]. SCD entails first achieving relaxed states via progressive muscle relaxation and then imagining a situation that tends to trigger worry. Once anxiety increases, individuals focus on relaxing away the anxiety while continuing to imagine themselves in the worrisome situation but coping well with the situation. After anxiety has reduced individuals stop imagining the scenario but continue to focus on the relaxation sensations until fully relaxed. This progression is repeated multiple times. SCD's efficacy was not significantly different from combined CBT and CT alone for GAD, and improvements in anxiety symptoms were maintained at 2-year follow-up [20].

2.4 Worry Exposure

Worry exposure (WE) involves deliberately imagining or writing out worries as targets for habituation [23]. As originally conceived, it involves both imaginal exposure (exposure to feared ideas or images) and cognitive re-appraisal, although some models emphasize only the exposure component [24]. Originally, WE incorporated five steps [23] following rationale-provision. First, patients identified core worries. Second, they identified the most feared outcome(s) associated with the worry (e.g., “*What if I die in a car accident?*”). Third, they evoked imagery of the outcome for 25 minutes, without engaging in distraction or avoidance. Fourth, patients generated and considered alternative outcomes to the situation. Lastly, they evaluated whether WE reduced fear and increased realistic appraisals of future outcomes.

Several CBT packages for GAD have incorporated WE, but few studies have tested it as a stand-alone intervention. A review suggested some evidence of efficacy, despite methodological limitations [8]. Worry exposure (which also involved encouragement to reduce avoidance and reassurance seeking) was not significantly different from AR; both were superior to waitlist at posttreatment with maintenance of gains at 1-year follow-up [25]. However, in secondary analyses among remitters, worry exposure was associated with less reduction in reassurance seeking relative to AR [26].

Subsequent studies tested shorter-term variants of WE and modified its duration, delivery method, and format. Whereas Hoyer et al.'s intervention involved therapist contact [25], self-administered WE also reduced worry and associated outcomes [27]. Several studies

investigated written WE [i.e., writing out worries rather than pure imaginal exposure; 27,28,29], finding it superior to writing control conditions [29] at posttest but not at 3-month follow-up [27] (See Table 1 for studies discussed). In sum, available studies suggest some efficacy for stand-alone WE, although preliminary and beset by small samples.

2.5 Mediators and Moderators of CBT for GAD

Although CBT and its components have demonstrated efficacy on average, studies of predictors, moderators, and mediators of GAD treatment outcomes suggest *for whom* and *how* treatments may work. In terms of predictors of negative outcomes, older age [30,31], having received previous psychiatric treatment [32], being unmarried [32] and higher peaks in relaxation-induced anxiety [33] predicted worse outcomes. However, avoidance strategies did not predict treatment response to worry exposure, but higher cognitive and behavioral avoidance (e.g., safety behaviors) at posttest predicted poorer outcomes at follow-up [26]. Additionally, those with longer duration of GAD benefitted more from a component treatment, CT or SCD, than from combined CBT, whereas the opposite was true for those with shorter duration GAD [34,35]. This replicated finding implies that those with more chronic GAD may be overwhelmed by too many techniques and need a more intense dose of fewer treatment techniques, whereas having more technique options may be suitable to those with shorter-duration GAD. Also, those higher comorbid depression symptoms benefitted more from combined CBT than from AR or nondirective therapy [35], perhaps highlighting the importance of CT in treating comorbid depression. In another secondary analysis, domineering and intrusive interpersonal problems associated with the need for control led to more benefit from SCD than CBT or CT alone [36]. It is possible that clients with GAD high on dominance and intrusiveness may be less open to cognitive challenges to their way of perceiving the world. Lastly, mediators of CBT have included the establishment of flexible emotional responding [34] and change in expectancy/credibility [37]. In particular, one study found that CBT, CT, and SCD may also enhance flexibility during treatment (i.e., patients' level of responding to changes in their environment), which in turn resulted in more reliable change at posttreatment in the reduction of GAD symptoms [34].

3 Attempts to Improve Upon Basic CBT and Emerging strategies

Despite substantial empirical support for CBT in treating GAD, there is still room for improvement. Research suggests that CBT may be less efficacious for anxiety disorders with older people compared to adults of working age, because of the effect of cognitive decline due to aging and high rates of psychiatric comorbidity [38]. A meta-analysis found that the overall effect size of CBT for GAD was large for adults of working age ($g = 0.94$, 95% CI 0.52–1.36), but was moderate for older people ($g = 0.55$, 95% CI 0.22–0.88) [39], suggesting that there may be room for improvement in CBT methods. Relatedly, other studies suggest that about 60% of children and adolescents recover from their anxiety disorders and experience symptom reduction following CBT treatment [40]. Efforts to improve CBT have included targeting interpersonal problems, mindfulness, emotion regulation, meta-cognitions, intolerance of uncertainty, motivation, transdiagnostic features, and emotional contrasts. Additionally, approaches that capitalized on technology and that

attended more explicitly to client cultural diversity have been examined. We cover these approaches in the following sections.

3.1 Interpersonal and Emotional Processing Therapy

Traditional CBT does not attend explicitly to problematic interpersonal behaviors and avoidance of deeply processing emotions, many of which are linked to relational themes. However, studies attest to robust links between GAD or worry and interpersonal factors [e.g., 41]. For instance, individuals with GAD symptoms endorsed insecure attachment, a way of approaching relationships characterized by avoidance and anxiety [e.g., 42] and interpersonal problems [e.g., 43]. Such individuals may be particularly at risk for problematic affiliative or warm social behavior, given evidence of lower thresholds for perceiving emotions in faces [44], links of GAD symptoms to being “overly nurturant” [36], and worry facilitating detection of negative states in others [45]. However, worriers may overestimate affiliation toward others [46] and even come across as unaffiliative [47]. In addition, interpersonal difficulties predicted poorer response to therapy for GAD [48] and moderated response to relaxation versus interventions including cognitive therapy [36], therefore addressing them might improve GAD outcomes.

Interpersonal and Emotional Processing (I/EP) therapy was developed to supplement traditional CBT for GAD via experiential engagement with emotional and interpersonal themes [49]. I/EP emphasizes emotional vulnerability and learning from feedback about one’s impact on others, including the therapist. Such strategies, drawn from experiential and psychodynamic therapies, can be conceptualized within an integrative CBT framework: functional analysis of interpersonal strategies that avoid emotional processing, exposure to emotional states, therapist modeling of disclosure of emotional and interpersonal reactions, and interpersonal skills training. I/EP was developed as a separate module to accompany traditional CBT (55 minutes each), permitting dismantling treatment effects.

A few studies examined CBT plus I/EP for GAD. First, an open trial of 14 sessions [$n = 21$; 50] found clinically significant changes in anxiety (e.g., $d = 3.15$ for pre-post change and $d = 2.97$ for pretest to 1-year follow-up) as well as interpersonal problems. Specifically, 83.3% of participants exhibited clinically significant change at posttreatment, 58.8% at a 6-month follow-up, and 76.5% at a 1-year follow-up. Classification as interpersonally low-functioning dropped from 95% at pretest to 55.6% posttreatment.

Subsequently, a randomized controlled trial tested CBT+I/EP ($N = 43$) against CBT plus supportive listening [CBT + SL; $N = 40$; 51], controlling for therapist contact. The groups did not differ on treatment expectancy, credibility, or attrition. Both groups experienced large pre-post improvements for GAD symptom severity ($d = 1.86$), depression, and interpersonal problems, maintaining gains at two-year follow-up. At follow-up, CBT+I/EP was associated with more participants no longer diagnosable with GAD (75% vs. 63.6%) and higher responder status on interpersonal problems (83.9% vs. 66.7%), although these differences were not statistically significant. Moreover, clients reporting dismissive childhood attachment responded more strongly to CBT+I/EP versus CBT+SL [42]. In summary, CBT+I/EP constitutes a promising novel intervention for GAD, warranting further study.

3.2 Mindfulness Interventions

Rooted in Buddhist traditions and practices, mindfulness involves intentionally and non-judgmentally attending to present moment experience [52]. In practice, this involves techniques like paying attention to one's breath and approaching thoughts, emotions, and sensations with curiosity, openness, and acceptance. Present-mindedness and non-judgmental acceptance may be particularly useful for chronic worriers, who spend much of their mental life in the feared, potential future rather than in the valued present.

Mindfulness Based Stress Reduction (MBSR) and Mindfulness Based Cognitive Therapy (MBCT) are popular group and individual interventions for treating mood and anxiety disorders, including GAD. These programs include both substantial in-session practice and daily formal meditative practice between sessions [53,54]. MBSR emphasizes using mindfulness for a variety of everyday subjects (e.g., eating, relationships, work), utilizing gentle hatha yoga, body scans, and sitting meditation. MBCT participants learn to center their attention on the present moment by focusing on their breath whenever they notice that they are engaged in worries [54]. In addition to MBIs, numerous mindfulness-informed interventions (MIIs) such as Acceptance and Commitment Therapy (ACT), Dialectical Behavior Therapy (DBT), and Acceptance Based Behavior Therapy (ABBT) utilize mindfulness practices to support their core intervention modality but require less formal meditation practice.

In an analysis of 12 systematic reviews and meta-analyses of MBIs for anxiety, the authors concluded that MBIs had efficacy similar to traditional CBT, but with lower efficacy in clinical than non-clinical samples, and were most efficacious in well-established protocols like MBSR and MBCT [55]. Nine of the 12 papers identified greater reductions in pre-post anxiety scores for MBIs compared to control groups ($g = 0.57$; 95% CI [0.22, 0.89]). The remaining three studies found no significant differences between MBI and comparison groups ($g = 0.27$; 95% CI [-0.52, 0.02]). Other meta-analyses that compared mindfulness directly to CBT for anxiety disorders [56], found that CBT had significantly larger effect sizes for anxiety outcomes ($g = .88$, 95% CI [0.77, 1.0]), whereas elsewhere this comparison failed to reach statistical significance ($g = -.33$, 95% CI [-0.86, 0.19]; negative coefficient here is in the direction of CBT) [57]. Most reviews did not draw conclusions regarding GAD specifically. However, in one meta-analysis of six randomized controlled trials (RCTs) for GAD symptoms [57], compared with nonactive controls (including no treatment, open trials, education, TAU), MBIs had lower post-intervention symptoms in all studies except one ($g = -0.65$, 95% CI [-0.97, -0.32]) [58]. This analysis was limited by the small number of studies and methodological variability and does not speak to comparison with CBT.

Additionally, we note that ABBT for GAD, which features mindfulness practices to develop basic skills (e.g., mindfulness of breathing) followed by application to challenging contexts (e.g., observing painful thoughts and emotions during a conflict), was tested against an AR treatment; both groups showed improvement at post and 6-month follow-up, with no significant differences between groups [59].

Investigations into the mechanisms of MBIs showed that mindfulness (i.e., awareness and non-reactivity) and decentering (the capacity to observe thoughts from a distance) were

mediators in MBI treatment of GAD [60]. Other studies have found preliminary support linking mindfulness, interpersonal functioning, and anxiety [61], and mixed results for negative interpretation bias as a mediator in MBI treatment of GAD [62,63]. In summary, MBIs appear to be efficacious for treating GAD, but more research is needed to clarify the mechanisms of action and comparison against CBT.

3.3 Emotion regulation therapy (ERT)

ERT [64] is a variation of traditional CBT for GAD that centers on emotional functioning. This treatment comprises several foci: CBT techniques, emotion regulation skills, and contextual factors [i.e., applying strategies to real-world functioning; 65]. Treatment is broken into four phases. First, patients receive psychoeducation to promote awareness of emotional cues and reactive responses (e.g., worry), along with mindfulness and relaxation training to facilitate emotional experiencing. Second, maladaptive responses to emotion are replaced with acceptance/allowance, cognitive distancing (decentering), and cognitive reframing responses. Third, patients identify salient personal goals and explore internal conflicts that would block pursuit of these goals, then engage in exposure to goal-driven behavior. Finally, patients consolidate gains, process termination, and identify future goals.

Several studies have supported the efficacy of ERT in treating GAD. In a recent RCT ERT was superior to a modified attention control on a number of hypothesized mechanisms of improvement (e.g., mindfulness, reappraisal, emotion regulation) [66]. Notably, a sizeable percentage (80%) of patients receiving ERT reached high end-state functioning on GAD measures. Patients undergoing ERT also demonstrated improvements in attention regulation tasks [67] and metacognitive abilities (i.e., decentering and reappraisal), which temporally preceded symptom reduction [68]. Furthermore, ERT was associated with functional connectivity changes in brain regions associated with emotion/motivation (salience network) and self-referentiality (default mode network), which correlated moderately with symptom improvement [69]. However, few associations were statistically significant, perhaps due to the relatively small sample size. Nonetheless, findings overall reflect promise for ERT but require comparison to a more active comparison group and further examination in diverse samples.

3.4 Intolerance of Uncertainty Therapy

The intolerance of uncertainty model [70] theorizes that individuals with GAD fear uncertainty, leading to worrying to cope with or prevent feared events. They also experience cognitive avoidance and problem-solving deficits. Intolerance of uncertainty therapy (IUT) includes (a) worry awareness training to help individuals with GAD recognize which worries are related to solvable problems and which are not, (b) exposure to uncertainty and worries, (c) challenging and modifying beliefs about worry, and (d) problem-solving training. Two RCTs compared IUT to a waiting list control (WL) in adults with GAD, examining individual [71] and group IUT [72]. When administered in individual sessions, IUT led to reductions in anxiety, depression, worry, and GAD severity (d s ranging 0.87 to 3.19) and intolerance of uncertainty from pre- to post-therapy (with gains maintained over 6- and 12-month follow ups) [71]. Similarly, group IUT led to reductions in anxiety, depression, worry, GAD severity, and intolerance of uncertainty from pre-to post-therapy (d s ranged = 0.59 to

1.76), with gains maintained over a 2-year follow-up [72]. The no-treatment conditions in these studies led to no changes in any of these outcome measures. Similar results were found in a study of Chinese older adults with medium to large effect sizes for GAD symptoms, anxiety, depression, and intolerance of uncertainty ($\eta_p^2 = 0.13$ to 0.51) [73].

Two studies compared IUT to active comparison conditions [74,75]. IUT was compared to metacognitive therapy (MCT) or delayed treatment in one study of adults with GAD [76]. At posttreatment both MCT and IUT were superior to delayed treatment, with MCT superior to IUT on worry ($d = 0.96$) and general psychopathology ($d = 0.55$). MCT and IUT both led to reductions in worry, trait anxiety, general psychopathology, and depression (d s ranged 1.53 to 2.39 for MCT and 0.98 to 1.43 for IUT).

MCT also led to more reduction in worry at 6-month follow-up than IUT ($d = 0.78$). Both treatments led to GAD remission (MCT: 91%, IUT: 80%) at posttreatment with these gains maintained at 6-month follow-up. Another study [75], compared 12 weekly 1-hour sessions of IUT to SSRIs (Celexa, Zoloft, or Prozac) in Iranian women with GAD. Although both treatments led to improvements, IUT was superior to SSRIs at posttreatment on levels of worry ($\eta_p^2 = 0.36$), intolerance of uncertainty ($\eta_p^2 = 0.65$), and negative problem orientation ($\eta_p^2 = 0.30$). Unfortunately, there was no follow-up assessment and the study did not examine whether treatment gains were maintained if SSRIs were discontinued in the pharmacotherapy group.

In summary studies consistently support the efficacy of IUT for individuals across the lifespan with GAD, with results maintained at follow-up points. However, IUT was only compared to one other form of psychotherapy (meta-cognitive therapy) and to SSRIs. Thus, comparisons with traditional therapies are necessary.

3.5 Metacognitive Therapy

The metacognitive model of GAD suggests that beliefs about uncontrollability or the danger involved in worrying lead to worry about worry, which is followed by attempts to suppress the worries or reassurance seeking [77]. Individuals with GAD may also have positive beliefs about worrying. Metacognitive therapy (MCT) addresses negative and positive beliefs about worrying and suppression of worry via cognitive restructuring to examine the accuracy of the beliefs about worry. It also employs behavioral experiments to examine whether worrying is controllable (e.g. scheduling worry for a later time, etc.).

MCT was efficacious when compared to other types of therapy for GAD. For example, MCT was superior to AR in reducing worry, trait anxiety, depression, positive meta-cognitions, and negative meta-cognitions (d s ranged 0.92 to 3.41 for MCT; 0.27 to 1.63 for AR), with gains maintained over 6- and 12- month follow-ups [78]. At posttreatment, 80% of those in MCT recovered based on their worry and trait anxiety scores, compared to 10% on those measures in AR. Similar rates were found at 6-month follow-up (70% recovery for worry and trait anxiety in MCT versus 10–20% for AR) and 12-month follow-up (60–80% in MCT versus 10%–20% in AR). Additionally, at posttreatment 100% of the MCT group no longer met criteria for GAD compared to 50% of the AR group, with results maintained over 12-month follow-up (90% of MCT versus 50% of AR). When compared

to standard CBT and a waiting list, MCT led to higher recovery rates than CBT (65% recovery versus 38%) and greater reductions in worry at posttreatment and 2-year follow-up [79]. At 9-year follow-up on a subsample of 65%, 57% of the MCT condition and 38% of the CBT group were recovered from GAD, demonstrating long-term maintenance of gains [80]. Finally, as described above, MCT was superior to IUT in reducing worry and general psychopathology [75]. Thus, MCT shows strong promise in treating GAD and in single studies has outperformed IUT, CBT, and AR.

3.6 Motivational Interviewing

Motivational interviewing (MI) is a client-centered, directive counseling approach focused on evoking clients' intrinsic motivation to change. Originally developed to support treatment of substance abuse, MI is now frequently used to enhance intervention outcomes across psychological disorders and health conditions [81]. It can be flexibly applied in brief (e.g., 15-minute) or extended (e.g., 60-minute) encounters and within single sessions or across repeated encounters, although longer, repeated encounters appear to foster greater efficacy [82]. MI is most often used during intake or as a module prior to change-focused interventions. MI facilitates goal setting by *engaging* clients through empathic listening, *focusing* them on their goals and establishing permission to provide directive input, *evoking* change motivation, and *planning* specific change implementation strategies. Therapists rely heavily on four skills: (a) *open questions* that draw out clients' thoughts; (b) *affirmations* that build clients' confidence; (c) *reflections* that communicate empathy and prompt clients' reflection; and (d) *summaries* that clarify understanding. Core MI principles for therapists include (a) expressing empathy, (b) developing discrepancy between clients' behavior and values, (c) rolling with resistance (avoiding argumentation), and (d) supporting client self-efficacy. As applied to GAD, MI helps clients clarify the reasons they fear giving up worry, articulate the costs of worry, and foster "change talk" to motivate new strategies (e.g., relaxation, cognitive restructuring, and exposure therapy).

MI has been investigated as a pretreatment or integrated adjunct to CBT for GAD. A meta-analysis of 11 studies found moderate effects of MI as an adjunct to CBT on symptom reduction, compared to CBT alone, for anxiety disorders ($g = 0.59$, 95% CI [0.41, 0.78]) [83]. A somewhat smaller estimate was obtained for two studies investigating GAD specifically ($g = 0.39$, 95% CI [0.08, 0.70]).

RCTs targeting GAD identified benefits including lower resistance to treatment, higher therapist-rated homework compliance, and greater worry reduction for CBT with MI as a pretreatment versus CBT alone [84,85]. A study investigating 43 adults receiving either CBT with MI or standard CBT detected no group differences in pre-post change at 15 weeks, but found greater worry decline and general stress reduction at 6- and 12-month follow-ups, and five-fold lower likelihood of meeting GAD diagnosis at 12-month follow-up [86].

Investigations into the mechanisms of MI plus CBT for GAD have implicated lower resistance to treatment [85,87,88] and increased affiliative therapist behavior during disagreement [89], but not higher homework compliance or client-therapist alliance [87], suggesting that MI may improve outcomes primarily through clients' greater receptivity to change. Relative to participants receiving CBT alone, those receiving MI plus CBT reported

increased motivation for treatment and change [90] and greater agency in the treatment process [91,92]. In conclusion, there exists preliminary support for MI as an adjunct to CBT to improve motivation, engagement, and outcomes in clients with GAD, but further research must replicate its efficacy with larger samples and clarify optimal conditions and change mechanisms.

3.7 Unified Protocol

The unified protocol for transdiagnostic treatment of emotional disorders (UP) is an emotion-focused cognitive-behavioral intervention with five “core” modules based on CBT elements of proven effectiveness that target negative emotionality (e.g., neuroticism) and aversive reactions to emotions when they occur (e.g., restructuring maladaptive cognitive appraisals, preventing emotion avoidance, and changing maladaptive action tendencies) [93].

Compared to an inactive control condition, the UP demonstrated moderate to large effect size reductions across measures of anxiety ($g = -.81$, 95% CI [-1.29, -.34]) [93]. A large clinical trial comparing the UP to gold-standard, single disorder protocols (SDPs) for GAD and other anxiety disorders found that the UP led to similar symptom reduction and evidenced lower rates of attrition compared to the SDP [94].

In an RCT of the UP in a sample with primary diagnoses of GAD, social phobia, panic disorder or obsessive-compulsive disorder, there were greater reductions in primary and comorbid disorder symptom severity relative to waitlist at posttreatment [95]. Improvements in clinical severity and general symptoms of anxiety and depression were maintained at 3-month follow-up, with a slight increase in residual symptoms at 6-month follow-up [95]. In another study comparing the UP to SDPs for comorbid disorders, participants in the UP condition evidenced significant decreases in mean number of clinical diagnoses from baseline to post treatment and baseline to 12-month follow-up [96]. However, results showed no significant between-group differences in mean number of diagnoses and decline in symptoms of co-occurring conditions on GAD specific measures ($g = -0.29$, 95% CI [-1.12, 0.54]), suggesting that the UP and SDPs may be similarly efficacious for both GAD and co-occurring emotional disorders [96]. Thus, the UP is a promising treatment but more studies are needed that examine efficacy for GAD specifically.

3.8 Pharmacotherapy

Although our review is focused on psychotherapeutic treatments for GAD, it is worthwhile to briefly mention the efficacy of medications in the treatment of GAD. More than half of patients (57%) with anxiety disorders are being treated using pharmacological treatment [97]. In addition to CBT, antidepressants are considered a first line of treatment for anxiety disorders, given that they are generally well-tolerated and effective [98]. Whereas medications are effective in treating GAD, research suggests that psychotherapy shows larger treatment outcomes than do medications. For example, a meta-analysis of RCTs found that psychotherapy showed a medium to large effect size ($g = 0.76$) whereas medication showed a small effect size on GAD outcomes ($g = 0.38$) [10]. In addition, research suggests that lasting symptom remission is likely after CBT termination, whereas medication termination may lead to relapse [98]. Also, studies generally suggest that combining CBT

with medication for anxiety disorders does not lead to long-lasting benefits over CBT alone [98]. It is important to note, however, that there is a dearth of studies on long-term outcomes of pharmacotherapy for GAD. In fact, a recent meta-analysis could not find any rigorous studies that assessed outcome following termination of pharmacotherapy for GAD [10].

4. Emerging Strategies in Treatment of GAD

4.1 Treating GAD with Technology

An emerging strategy used to treat GAD harnesses technological advances including virtual reality (VR), internet delivery, and ecological momentary interventions (EMIs). One RCT found that 10 minutes of VR dialectical behavior therapy plus mindfulness was better at increasing treatment adherence compared to mindfulness alone [99]. Both groups led to reductions in GAD symptoms, anxiety, and depression (d s ranging -1.27 to -1.36 for Mindfulness; -0.54 to -1.33 for Mindfulness + VR). Finally, virtual exercise therapy consisting of cycling while looking at a virtual natural environment reduced stress in adults with GAD more than cycling while looking at virtual abstract paintings [100].

The efficacy of internet-delivered interventions for GAD was demonstrated in two reviews [101,102]. A meta-analysis evaluated internet-delivered interventions of 20 RCTs that had various types of control groups (i.e., wait-list, attention, and placebo) [102]. Interventions ranged from five modules over 8 weeks to 12 modules over 12 weeks and most included support from a therapist by phone, email, or instant messaging. Internet CBT (ICBT) led to significant improvements in GAD symptoms, pathological worry, comorbid anxiety, depression, distress, disability, and quality of life, with Cohen's d ranging between -0.91 to -0.38 [102]. In the other non-meta-analytic systematic review [101] of 9 RCTs of ICBT for GAD, all studies demonstrated large treatment effects, with results maintained up to 3 years after treatment.

Several newer studies of ICBT that were not included in these reviews also show promising results [101,102]. One of the most recent studies of ICBT examined 12 PowerPoint modules emailed to participants [103]. ICBT led to a reduction in anxiety relative to no therapy (no effect sizes provided), with gains maintained at 6-month and 1-year follow-ups. Additionally, these reviews [101,102] only examined ICBT and some ecological momentary interventions may be conducted without the use of the internet.

Ecological momentary interventions (EMIs) are therapies provided via hand-held technology, such as palmtop computers, ambulatory biofeedback devices, and apps. The use of a palmtop computer in addition to six sessions of group therapy led to a high number of participants achieving change on at least two out of three measures of GAD at posttreatment, with no difference when compared to a longer (12-session) group therapy for GAD that did not use the computer ($d = .60$) [104]. The 6-session palmtop assisted intervention was superior to a 6-session no-computer group in the percent of individuals who achieved change on at least two out of three GAD measures at posttreatment ($d = 1.00$). At follow-up there were no differences between groups (6-month follow up: d s ranging from $.16$ to $.58$; 12-month follow-up d s ranging from $.42$ -. $.69$). However, a higher percent of participants achieved reliable change on at least two of the three measures of GAD in

the computer-assisted six-session group at all time points than the six-session no-computer group and a higher percent at 12-month follow up than the 12-session no-computer group.

Another EMI study compared the efficacy of a worry outcome journal to a thought log. Those in the worry outcome condition recorded worries as predictions about the future, the probability of feared versus actual outcomes, worry distress, and worry duration on paper four times per day for 10 days when prompted by text message [105]. Thought log participants recorded their thoughts and associated distress. Information was entered online each night. The worry outcome condition led to greater pre-post reduction in worry ($d = -0.59$) and was marginally superior to the thought log on pre- to 20-day follow-up ($d = -0.52$), with gains maintained over the follow-up period.

Smartphone-based brief self-help apps consisting of 40 10-minute sessions and contact with trained coaches led to greater reductions in stress and a greater probability of remission from GAD at posttreatment relative to a no treatment condition in college students with GAD in the United States (Cohen's d ranging between -0.45 to -0.40) [106]. Gains were maintained at 6-month follow-up; however, there were no longer differences between the two conditions in the rates of remission ($d = -0.23$). Similar results were found in college students in India, with those in the guided self-help having greater reductions in GAD symptoms, worry, and depression (d ranging -0.40 to -0.53) [107]. Overall, studies suggest that technology may be a way to increase accessibility of interventions; however, more large-scale RCTs with strong methodology including follow-up assessments are necessary. Further, no studies examined whether technology-based interventions were as efficacious as face-to-face interventions.

4.2 Contrast Avoidance Treatment

The Contrast Avoidance model (CAM) suggests that individuals with GAD actively use worry to create and maintain a stable negative emotional state [108,109]. Specifically, CAM posits that people with GAD fear sharp increases in their negative emotions. Individuals with GAD report feeling more distraught than non-anxious controls when experiencing a sharp shift from a relaxed state to one that is negative [109,110]. The sudden rush of negative affect that accompanies a stressful event preceded by a neutral or positive mood is referred to as *negative emotional contrast* (NEC).

CAM also suggests that people with GAD use worry to maintain a negative emotional state to avoid such shifts in emotions, attenuating the experience of NEC in response to stressful events. For example, low negative arousal during relaxation and neutral periods facilitated a sharp increase in NEC in response to subsequent fear exposures [111,112]. In contrast, relative to baseline, worry increased subjective and physiological arousal, thereby avoiding an NEC. Using an ecological momentary assessment paradigm, another study showed that worry at a given moment predicted sustained arousal and reduced NEC one hour later [113]. People with GAD have reported preferring to worry rather than relaxation prior to threats [109]. Therefore, worrying keeps individuals with GAD in a state of vigilance and anxiety, and if something bad happens, they will not experience a sharp increase in their negative emotion, because they are already in a negative emotional state. The theory also suggests that although those with GAD also worry to increase the probability of a *positive emotional contrast* (i.e., greater relief when situations one worried about do not occur),

they are uncomfortable with sustained positive or euthymic states because it leaves them vulnerable to a negative emotional contrast.

Within the CBT framework, worry reduction is the key treatment target; however, CAM would suggest that extant treatments aimed at challenging worry patterns may attempt to remove the cognitive defense of worry without treating the underlying core fear. CAM treatment would need to specifically target contrast avoidance to address maladaptive patterns of worry. Targeting contrast avoidance in treatment could be achieved via exposure to relaxation or other positive states followed by negative emotional stimuli. The treatment of negative contrast sensitivity could also incorporate cognitive and behavioral interventions. Cognitive intervention could modify the belief that negative emotional contrasts are dangerous, fostering the counter-narrative that allowing oneself to experience a broad range of emotions and emotional shifts constitutes a fuller, braver, more authentic life than remaining perpetually in a painfully negative mood to brace oneself against future negative mood shifts. Behaviorally, repeated exposure to a relaxed state followed by a negative emotional contrast may help patients habituate and reduce aversion to sudden negative contrasts [108].

Interestingly, however, some recent studies took a different approach to reducing contrast avoidance [114]: targeting “kill-joy” thinking, the tendency toward cognitions that prevent lingering in positive mood states. CAM would suggest that kill-joy thinking may arise when people are uncomfortable with euthymic moods and attempt to downregulate their emotion. In this study, a series of techniques emphasizing savoring and maintaining positive emotions were used to treat GAD using an ecological momentary intervention (EMI) called Skilljoy. The treatment was compared to an active control treatment. Whereas Skilljoy led to significant decreases in both contrast avoidance and worry symptoms, the active control treatment did not. Moreover, within the Skilljoy condition, change in contrast avoidance during the first half of the treatment predicted subsequent change in worry [114,115]. Thus, exposure to and savoring of positive emotions appears to be another promising treatment for GAD that may actively target contrast avoidance. In another study, 4 sessions of well-being therapy (focused on maintaining and extending euthymic states) compared to 4 sessions of CBT led to an enhanced outcome over 8 sessions of CBT alone [116]. These findings suggest that GAD treatment might first include learning to savor and maintain positive and euthymic states, followed by exposure to negative contrasts once clients are able to tolerate sustained relaxation or positive moods without worry. Future research must examine these possibilities directly.

4.3 Diversity in Treatment of GAD

It is critical to focus on diversity-related aspects of GAD in a review of treatment literature, as we cannot assume that extant treatments apply uniformly across all populations with equal success. In this section, we note studies considering diversity in terms of age, race/ethnicity, and gender identity, though other domains are relevant for further exploration (e.g., ability, immigration status, religion, sexual identity), as well as the intersection of identities.

Though treatments are often tested on young and middle-aged adult samples, some studies have focused on older and child/adolescent samples. A systematic review was conducted

on 27 trials of psychotherapy (e.g., CBT, Acceptance and Commitment Therapy) and pharmacotherapy (e.g., antidepressants, sedatives) for older adults with GAD (age ≥ 55 ; $n = 2,373$) [117]. Both treatments demonstrated efficacy for GAD, based on pooled effects for psychotherapy (OR = 0.33, 95% CI [0.17, 0.66]) and pharmacotherapy (OR = 0.32, 95% CI [0.18, 0.54]). However, age moderated outcome in a recent meta-analysis [10] of 79 RCTs for various evidence-based psychological (e.g., CBT, acceptance-based behavior therapy, applied relaxation) and pharmacological (e.g., SSRIs, benzodiazepines) treatments for GAD, such that older mean age predicted *lower* treatment efficacy for psychotherapy, but not pharmacotherapy. In terms of youth, a meta-analysis of 81 RCTs tested various modalities of CBT (individual, group, family-based, and remote) against waitlist, attention, TAU, and medication controls in children and adolescents ($M_{age} = 10.9$ [1.6]) with mixed anxiety disorders [118]. Overall, CBT in various modalities was superior to waitlist, showed mixed beneficial effects compared to attention controls, and did not outperform TAU. Individual CBT was not significantly different from SSRIs, but the combined treatment was superior to either treatment alone at post-test.

When it comes to testing treatment efficacy in historically underrepresented or oppressed groups, there is a dearth of research. This is troubling considering that experiencing racism can increase rates of GAD in people of color, and LGBTQ+ populations receive GAD diagnoses at higher rates than the general public, possibly due in part to experiences with harassment and rejection [see 119 for a review]. A few pilot studies have reported treatment efficacy in African American, Latino or mixed racially or ethnically diverse groups with GAD [e.g., 120,121,122], though these require replication with more rigorous methodologies. However, racial and ethnic minorities have demonstrated significantly higher dropout rates and lack of access to high quality and culturally competent care compared to the general population, and also report experiencing more harm in treatment [see 119].

Therefore, it is imperative not only to determine the effectiveness of traditional therapies for GAD in diverse samples, but also to modify these therapies and/or generate new treatment modalities that might be better suited to working with clients from minority backgrounds. Graham-LoPresti and colleagues provided suggestions for modifying a number of traditional approaches (e.g., CBT, mindfulness, and acceptance-based approaches) in ways that are more culturally responsive [119]. This includes incorporating an emphasis on how discrimination experiences may be fueling symptoms, and being sensitive to how the nature of this stressor may impact traditional techniques (e.g., exposure) [119]. This is a critical direction for future research on the treatment of GAD, but more effort and resources are sorely needed to address this concerning imbalance in the availability of high-quality care for diverse clients with GAD.

5. Conclusion

The current paper reviewed evidence on both traditional CBT and efforts to enhance CBT, its dissemination, and generalizability. One of the limitations of our narrative review is that we included meta-analytic findings that often group together heterogeneous studies of mixed methodological rigor, which in some cases may obscure important effects of particular interventions for particular populations.

Overall CBT has demonstrated greater efficacy than no treatment, pill placebo, and psychological placebo with large effect sizes and gains maintained at follow-up. Targeted CBT also reduced comorbid disorders at a comparable rate as the unified protocol. Furthermore, component analyses have shown that AR was superior to PMR alone, but AR, cognitive therapy, and SCD were not significantly different in outcome to CBT. Also, worry exposure was not significantly different from AR.

In terms of efforts to improve upon CBT, emotion regulation therapy, mindfulness interventions, intolerance of uncertainty therapy, technological interventions, and the unified protocol have demonstrated greater efficacy compared to nonactive controls. In addition, some meta-analytic studies showed that CBT was superior to MBIs on anxiety measures. Furthermore, intolerance of uncertainty therapy was superior to SSRIs, whereas metacognitive therapy was superior to intolerance of uncertainty therapy and CBT. Motivational interviewing plus CBT was also better than CBT alone. Moreover, interpersonal and emotional processing therapy was superior to CBT alone in individuals with dismissive childhood attachment. Finally, momentary interventions targeting the worry outcome journal and a positive emotion focused treatment were superior to active control conditions. Nonetheless, most studies have found nonsignificant differences between enhanced treatments compared to other active treatments and/or have yet to be tested in comparison to active treatments. Thus, efforts to improve upon CBT though promising, require more research. In particular, greater attention needs to be paid to well-powered RCTs to detect small effect sizes, as comparisons between active therapy conditions usually yield much smaller effects than comparison to no-treatment or nonactive comparison control groups. Regarding efforts at dissemination, although technological interventions have shown some promise, few have been compared to active comparison conditions. Finally, interventions for GAD in individuals with ethnic and racial diversity are limited to a few smaller pilot studies and thus, much more research is needed.

6. Expert Opinion

Whereas the foregoing review summarized extant GAD treatment research, here we move beyond the existing data to provide an integrated opinion about the state of the science and promising future directions for clinical research.

First, we note several critiques of the existing literature. One major concern pertains to *specificity*. Namely, most psychotherapy research suffers from the assumption that primary and secondary diagnoses represent distinct conditions rather than different expressions of shared underlying vulnerabilities. In addition, extant measures take for granted that worry is a future-oriented, verbal-linguistic thought process, despite the fact that worries overlap markedly or can be confused by clients with perseverative thinking about past failures, obsessions, or trauma-related intrusive thoughts [123]. Furthermore, psychological mechanisms hypothesized to cause and maintain GAD symptoms have rarely exhibited strong specificity to GAD. For instance, difficulty labeling and understanding emotions, intolerance of uncertainty, metacognitions about worry, and negative contrast sensitivity (each featured by particular models of GAD) are not exclusively associated with GAD.

Ongoing research must therefore address these concerns. For instance, assessment must encompass dimensional measurement of other diagnostic categories. Additionally, measurement of worry must move toward enhanced precision. One case in point is a new measure that derived factors for the distinct dimensions underlying worry and other forms of repetitive negative thought including lack of controllability, preparing for the future, expecting the worst, searching for causes/meaning, dwelling on the past, and thinking discordant with the ideal self [123]. Alternatively, measuring perseverative thinking more broadly would facilitate studying a higher-order transdiagnostic process characterizing affective disturbance in and beyond GAD. With regard to specificity of hypothesized mechanisms or mediators for GAD, we are particularly interested in studies that test multiple competing mediator variables—in addition to accounting for multiple symptom dimensions—to explain unique variance in GAD symptoms. For instance, several recent studies have demonstrated unique links to GAD symptoms by constructs related to negative emotional contrast avoidance even when accounting for intolerance of uncertainty, problem-solving, or meta-cognitions [e.g., 124,125]

Additionally, therapy research must continue to grapple with the finding that not everyone responds to gold-standard CBT and its variants [11]. Historically, one approach to achieving higher remission rates has been to develop more complex multi-component treatment packages providing a full suite of tools, premised on the notion that “more is better.” However, only rarely have studies compared multicomponent CBT packages to active controls. Moreover, packages often do not typically outperform standalone interventions—such as CBT faring no better than applied relaxation [19]. One possible explanation is that extant trials have not been sufficiently powered to detect small differences between active treatments or between packages and standalone interventions, suggesting that future studies aiming to demonstrate superiority of particular interventions will require much larger samples. On the other hand, more research testing parsimonious approaches (e.g., worry exposure) is warranted.

Alternatively, developing or further refining therapies that “surgically” target theorized maintenance factors for GAD remains a promising avenue. Some of these treatments noted above (e.g., [74]) resulted in a higher proportion of individuals achieving high end-state functioning, although future replication across multiple sites to control for allegiance effects is merited. We look forward to studies of therapies informed by the Contrast Avoidance Model, given that the core tenets of the model have found support in experimental lab studies and in studies of daily life. If GAD involves a psychological “allergy” to negative emotional contrasts, treatments must endeavor to decrease sensitivity to it by increasing individuals’ capacity to tolerate sustained positive affective states without dampening them, as well as upward shifts into negative states. Future studies must yield greater precision about whether such exposure merely requires relaxation prior to fear exposure, alternating positive and negative states repeatedly, or a critical ratio of positive and negative states. Relevant to the CAM versus the intolerance of uncertainty model, it will be important to learn whether the most successful fear exposures must be *sudden*. Moreover, studies have yet to systematically investigate extended exposure to *positive* states, which may be aversive to individuals with GAD when they allow themselves to savor such states without worrying to diminish subsequent negative contrasts.

Positive mood enhancement strategies such as behavioral activation, lovingkindness, savoring, mindfulness of pleasure, gratitude, and moral elevation may be of interest, in line with preliminary but promising findings of interventions focused on extending and enhancing positive states [114,126]. Lastly, further *personalizing* interventions for GAD represents a promising direction. Most importantly, beyond testing gold standard CBT interventions across a broader range of cultural, sexual, gender, and spiritual/religious groups, further strides must be made in terms of how to idiographically tailor treatment to the individual. Studies of moderation of treatment response by interpersonal style or personality (e.g., [36]) provide one basis for this tailoring, although moderation effects are notoriously small and hard to replicate, warranting much larger samples (or combining many samples) in future research. Modular treatments may facilitate selective provision of only the components that particular individuals need, rather than the full suite of treatments. Alternatively, the advent of wearable technology and passive sensors, coupled with machine learning approaches, holds the promise of capturing ongoing streams of patients' behavioral data that might be used to customize treatments or facilitate "just-in-time adaptive interventions" in which technology identifies vulnerable moments and alerts individuals in real time in order to cue coping responses. Alongside such high-tech approaches, researchers and clinicians must also engage in the low-tech work of building relationships with diverse communities and facilitating opportunities to learn first-hand from marginalized communities about ways that extant treatments fail to meet their needs.

In summary, an honest appraisal of the state of the art and science suggests both that CBT provides substantial symptom relief for many people with GAD and that more work remains to further meet the needs of people who suffer from chronic worry and anxiety. We hope that further identifying and treating key mechanisms of GAD, "right-sizing" and personalizing interventions, and culturally adapting our approaches will ultimately enhance the human capacity for living in the valued present without undue worry and fear.

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Table 1.

Overview of controlled trials of psychotherapeutic treatments for GAD

Study (year)	Comment	Condition	Results	Conclusion
Carpenter et al. (2018) [7]	Meta-analysis of CBT studies.	1.CBT 2.Placebo condition	1 > 2: $g = 0.56$, 95% CI = 0.44, 0.69	CBT is a moderately efficacious treatment when compared to placebo.
Carl et al. (2019) [10]	Meta-analysis of CBT studies.	1.CBT 2. Pill placebo 3.Psychological placebo 4.TAU	1 > 2: $g = 1.44$, 95% CI: 0.94, 1.94 1 > 3: $g = 0.47$, 95% CI: 0.25, 0.69 1 > 4: $g = 0.38$, 95% CI: 0.05, 0.71	CBT led to greater improvement compared to pill placebo, psychological placebo, and TAU.
Springer et al. (2018) [11]	Meta-analysis of remission rates of CBT.	1.CBT	Post-treatment: 51.4% 35.5%–66.9% Follow-up: 65.0% 43.6%–81.7%	Rates of remission (complete recovery) for GAD were 51.4% at posttreatment and 65% at follow-up for CBT.
Newman et al. (2010) [12]	Investigation of comorbidity on CBT.	1.14 session of CBT	Pre to post treatment: $\beta = -.58$, SE = .07, $t = -8.32$, $p < .001$	Significant decline in the number of comorbid anxiety and depressive disorders from pretreatment to posttreatment.
Hayes-Skelton et al. (2012) [13]	Mechanisms of change in AR.	1.16 weeks of AR	--	AR may lead to changes in mindfulness, decentering, and acceptance.
Cuijpers et al. (2016) [17]	Meta-analysis of cognitive and behavioral therapies.	1.CBT 2.Control	1 > 2: $g = 0.73$, 95% CI: 0.56, 0.90	Cognitive and behavioral therapies reduce anxiety symptoms relative to control condition.
Montero-Marín et al. (2018) [19]	Meta analysis of relaxation studies.	1.CBT 2.Relaxation training 3. Applied relaxation	1 > 2: $g = -0.25$, 95% CI: -0.38 , -0.13 2 = 3: AR vs CBT: $g = -0.05$, 95% CI: -0.19 to 0.09	CBT, compared with relaxation, had a small but statistically significant effect in the treatment of anxiety. However applied relaxation was comparable to CBT.
Borkovec et al. (2002) [20]	Component analysis of CBT.	1.CT 2. SCD 3. CBT	1 = 2 = 3 at all timepoints: Posttherapy d : 1=2.95; 2=2.38; 3=2.80 6-month d : 1=2.81; 2=2.35; 3=2.86 12-month d : 1=2.48; 2=2.43; 3=2.45 24-month d : 1=2.67; 2=2.34; 3=2.31	Efficacy of CT alone and SCD alone were not significantly different than CBT at up to 2 years follow-up.
Covin et al. (2008) [21]	Meta-analysis of CT studies.	1.CT 2. Control groups	1 > 2; $d = 1.15$	CT was more effective than no-treatment or placebo with a large between-group effect size for GAD.
Hanrahan et al. (2013) [22]	Meta-analysis of CT studies.	1.CBT 2. Nontherapy	1 > 2; $d = 1.81$ (CI: 1.26, 2.37)	CBT more efficacious than nontherapy for GAD.
Hoyer et al. (2009) [25]	Worry exposure versus applied relaxation.	1.Worry exposure 2.AR 3. Waitlist	1 = 2: No significant effects. 1, 2 > 3: WE and AR superior to waitlist	Worry exposure was not significantly different from AR; both were superior

Study (year)	Comment	Condition	Results	Conclusion
				to waitlist at posttreatment with maintenance of gains at 1-year follow-up.
Beesdo-Baum et al. (2012) [26]	RCT examining AR and worry exposure in GAD.	1.AR 2.Worry exposure	1 > 2: Mean difference = -1.42, 95% CI: -2.76, -0.08	Worry exposure was associated with less reduction in reassurance seeking relative to AR.
Wolitzky-Taylor & Telch (2010) [27]	RCT of worry exposure.	1.WE 2.Writing control	1 > 2: $\beta = 1.39$, $t(419) = 6.37$, $p < .001$	WE superior to writing control condition at posttest but not at 3-month follow-up.
Fracalanza et al. (2014) [28]	Testing written imaginal worry exposure for GAD.	1.Consistent exposure (CE) 2.Varied exposure (VE) 3.Neutral condition (NC)	1 > 2, 3 $d = .91$	Participants in the CE condition displayed a significant reduction in PSWQ scores from baseline to follow-up, whereas VE and NC did not.
Goldman et al. (2007) [29]	Impact of written worry exposure.	1.WE 2.Writing control	1 > 2: PSWQ coefficient = -1.77, $t(-1.24)$, $p > .05$	Groups did not significantly differ in their PSWQ score.
Gould et al. (2012) [30]	Meta analysis of CBT for anxiety disorders in older people.	1.CBT 2.Nonactive control	1 > 2: $g = 0.20$, 95% CI: -0.42, -0.01	Small effect size in favor of CBT for older people compared to control condition.
Wetherell et al. (2013)[31]	Age differences in treatment response to CBT.	1.CBT/ Pharmacotherapy 2.TAU	1 > 2: Younger group: $F(3,648) = 6.93$, $P < 0.000$ Older group: $F(3,93) = 2.26$, $P = 0.09$	Intervention was significantly better than TAU for GAD symptoms in the younger group, but not in the older group.
Durham et al. (1997)[32]	Examining outcome predictors of GAD.	1.Cognitive therapy 2. Analytic psychotherapy 3.Anxiety management	1 > 2, 3: Married: $B = -2.81$, $p = 0.02$ Cognitive therapy: $B = -2.94$, $p = 0.01$ Comorbidity axis 1 (none): $B = -4.16$, $p = 0.00$ Comorbidity axis 1 (one additional): $B = -1.62$, $p = 0.05$	Being single, widowed or divorced increased the likelihood of relapse, as did not receiving CT and having more than one additional axis 1 diagnosis.
Newman et al. (2018) [33]	Peak relaxation-induced anxiety as a moderator of CBT for GAD.	1.Low RIA 2.Moderate RIA 3.High RIA	1 > 2 ($d = 1.162$) 1 > 3 ($d = -0.813$)	Those with lower peak RIA improved more than moderate or high peak RIA.
Newman & Fisher (2013) [34]	Duration of GAD as a moderator of CBT versus component treatments in GAD. Also examined flexibility of symptoms as a mediator of this moderation	1.CBT 2.CT 3.SCD	Those with longer duration GAD 2 > 1 ($d = .93$) 3 > 1 ($d = .67$) Those with shorter duration GAD: 1 > 2 ($d = .93$) 1 > 3 ($d = .67$)	Longer duration of GAD may benefit more from CT or SCD than from combined CBT. Shorter duration GAD benefitted more from CBT than CT and SCD. Flexible responding mediated this moderation
Newman et al. (2019) [35]	Time varying moderation of GAD duration and comorbid depression on therapy outcomes.	1.CBT 2. AR 3. ND	Those with longer duration GAD: 2 > 1 ($d = .64$) Those with higher depression: 1 > 3 ($d = .52$)	Longer duration predicted better response to AR than CBT. Higher depression predicted greater symptom

Study (year)	Comment	Condition	Results	Conclusion
				reduction in response to CBT relative to nondirective therapy.
Newman et al., (2017)[36]	Interpersonal difficulties predict differential response to CT versus BT.	1.BT 2.CT 3.CBT	Those with greater intrusiveness: 1 > 3 ($d = 1.16$) 1 > 2 ($d = 0.805$) 2 = 3 ($d = 0.132$) Those higher in domineering 1 > 3 ($d = 1.104$) 1 > 2 ($d = 0.835$). 2 = 3 ($d = 0.131$).	Compared to participants with less intrusiveness, those with dimensionally more intrusiveness responded with greater change to BT than to CT or CBT across all follow-up points. Those with more dominance responded better to BT compared to CT and CBT at all follow-up points.
Newman & Fisher (2010) [37]	Examining the mediating effect of changes in expectancy/credibility from sessions 4–7 of 14-session CBT for GAD.	1.CBT	GAD severity predicted rate of change in expectancy/credibility ($d = .50$). Change in expectancy/credibility were significantly predicted by both the latent intercept ($d = .45$), and slope factors, ($d = .38$) for the expectancy/credibility growth model.	Relationship between RCI and GAD was partially mediated by the rate of change in expectancy/credibility.
Kishita & Laidlaw (2017) [39]	Meta-analysis comparing the efficacy of CBT for GAD between adults of working age and older adults.	1.CBT for working age adults 2.CBT for older adults	1 > 2: Working age adults: $g = 0.94$, 95% CI:0.52, 1.36 Older adults: $g = 0.55$, 95% CI: 0.22, 0.88	Overall effect size of CBT for GAD was moderate for older people and large for adults of working age.
Warwick et al. (2017)[40]	Meta-analysis of CBT in children and adolescents.	1.CBT 2.Wait-list control	1 > 2: CBT: 66.4%, 95% CI: 56.6, 6.1 Wait-list: 20.6%, 95% CI: 11.8, 29.5	66.4% of CBT participants free from anxiety disorders compared to 20.6% of wait-list controls.
Newman et al. (2015)[42]	Dismissive childhood attachment as moderator of treatment outcomes for GAD.	1.CBT+I/EP 2. CBT+SL	Higher dismissive attachment: 1 > 2: ($d = 0.54$)	Clients reporting dismissive childhood attachment responded more strongly to CBT+I/EP versus CBT+SL.
Zainal & Newman (2018) [45]	Theory of mind in GAD.	1.GAD 2.Controls	1 > 2 ($d = .56$).	Theory of mind reasoning was significantly more accurate among the GAD group relative to controls.
Malivoire et al. (2020)[48]	Systematic review of interpersonal dysfunction and treatment outcome in GAD.	--	--	Interpersonal difficulties predicted poorer response to therapy for GAD.
Newman et al. (2008) [50]	Open trial of integrative therapy for GAD.	1.CBT+I/EP	$d = 3.15$ for pre-post change and $d = 2.97$ for pretest to 1-year follow-up.	Integrative therapy significantly decreased GAD symptomatology, with maintenance of gains up to 1 year following treatment relative to CBT and supportive listening.

Study (year)	Comment	Condition	Results	Conclusion
Newman et al. (2011) [51]	RCT of CBT for GAD with integrated techniques.	1.CBT+I/EP 2.CBT+SL	1 = 2; $d = 1.86$ for within group effect sizes	Both groups experienced large pre-post improvements for GAD symptom severity.
Fumero et al. (2020)[55]	Meta analysis of MBIs.	1.MBIs 2.Control	1 > 2: $n=9, g = 0.57$; 95% CI: 0.22, 0.89 1=2: $n=3, g = 0.27$; 95% CI: -0.52,0.02	Reviews confirmed a moderate effect size of MBIs in improving anxiety symptoms for 75% of the studies.
Newby et al. (2015)[56]	Meta-analysis comparing mindfulness and CBT.	1.CBT 2.MBIs	1 > 2: $g = .88$, 95% 95% CI: 0.77, 1.0	CBT had significantly larger effect sizes for anxiety outcomes compared to MBIs.
Hedman-Lagerlöf et al. (2018) [57]	Meta-analysis of CBT versus MBIs.	1.MBI 2.CBT	$g = -.33$, 95% CI: -0.86, 0.19	No significant difference between CBT and MBI on posttest assessment.
Ghahari et al. (2020) [58]	Meta-analysis of MBIs for GAD.	1.MBIs 2.Nonactive controls	$g = -0.65$, 95% CI: -0.97, -0.32	MBIs had lower post-intervention symptoms relative to nonactive controls.
Hayes-Skelton et al. (2019) [59]	RCT of ABBT versus AR for GAD.	1.ABBT 2.AR	d 's: 0.002, 0.24	Both groups showed improvement at post and 6-month follow-up, with no significant differences between groups.
Hoge et al. (2015)[60]	Investigating mediational analysis of mindfulness and decentering.	1.MBIs 2.Attention control	1 > 2	Change in decentering and change in mindfulness significantly mediated the effect of MBIs on anxiety.
Millstein et al. (2015)[61]	Investigating the links between interpersonal problems, mindfulness, and therapy outcome in acceptance-based behavior therapy.	1.ABBT 2.AR	1 = 2: $F(1,62) = .003, p = .96, d = 0.01$	No significant differences between treatments; however, there was preliminary support linking mindfulness, interpersonal functioning, and anxiety.
Hoge et al. (2020)[62]	Investigating the role of interpretation bias in mindfulness.	1.MBSR	Indirect effect 95% CI: -0.025, 0.083	No evidence of an indirect relationship between baseline levels of mindfulness and anxiety via negative interpretation bias.
Mayer et al. (2019) [63]	Mediation of interpretation bias in the relation between dispositional mindfulness and trait anxiety levels.	--	$a*b$: $B = -0.22, SE = 0.05, 95\% CI: -0.32, -0.13$	Significant indirect effect (i.e., mediation) of dispositional mindfulness on trait anxiety through interpretation bias.
Mennin et al. (2018)[66]	RCT of emotion regulation therapy	1.ERT 2.Attention control	1 > 2: g range: .72, .83	ERT was superior to a modified attention control on

Study (year)	Comment	Condition	Results	Conclusion
				several hypothesized mechanisms of improvement (e.g., mindfulness, reappraisal, emotion regulation).
Renna et al. (2018)[67]	Examining attention regulation in response to ERT.	1.GAD 2.Controls	1 > 2: $r = -.64, p = .025$	Patients undergoing ERT demonstrated improvements in attention regulation tasks.
O'Toole et al. (2017) [68]	Investigating changes in decentering and reappraisal during ERT.	1.16 sessions of ERT	Changes in decentering temporally preceded changes in: PSWQ, $z = -2.56, p = .010, r = .46$ STAI-7, $z = -2.01, p = .044, r = .36$ Changes in cognitive reappraisal temporally preceded changes in: PSWQ, $z = -2.37, p = .018, r = .42$ STAI-7, $z = -2.43, p = .016, r = .43$ GAD-7, $z = -2.19, p = .029, r = .39$.	Patients undergoing ERT demonstrated improvements in metacognitive abilities (i.e., decentering and reappraisal).
Scult et al. (2019)[69]	Examining functional connectivity following treatment from ERT.	1.16 sessions of ERT	GAD: pre=5.8 (0.7), post=3.4 (0.9), $t(df)=10(20), p < 0.001, g = 2.73$.	Participants demonstrated a significant decrease in GAD symptoms in response to ERT.
Ladouceur et al. (2000) [71]	RCT of individual IUT.	1.IUT 2.Waitlist control	1 > 2: d 's ranged= 0.87, 3.19	IUT led to reductions in anxiety, depression, worry, GAD severity, and IUT relative to waitlist control.
Dugas et al. (2003) [72]	RCT of group IUT.	1.Group IUT 2.Waitlist control	1 > 2: d s ranged = 0.59, 1.76	Group IUT led to reductions in anxiety, depression, worry, GAD severity, and IUT relative to waitlist control.
Hui & Zhihui (2017) [73]	RCT of CBT targeting IUT.	1.CBT targeting IUT 2.Control	1 > 2: $\eta_p^2 = 0.13, 0.51$	Group CBT led to reductions in anxiety, depression, and IUT compared to control.
Van der Heiden et al. (2012) [74]	RCT of MCT and IUT.	1.MCT 2.IUT 3.Delayed treatment	1, 2 > 3: $F_s > 16.99, p < .05$ 1>2: PSWQ: $F(1,74) = 18.71, p < .05$ MCT= 91% and IUT=80% no longer fulfilled the diagnostic criteria for GAD.	MCT and IUT were significantly better than DT on all anxiety outcome measures. High proportion of individuals achieving high end-state functioning after MCT and IUT.
Zemestani et al. (2020) [75]	RCT of IUT.	1.IUT 2.SSRIs	1 > 2: η_p^2 range= 0.30, 0.65	IUT was superior to SSRIs at posttreatment on levels of worry, IUT, and negative problem orientation.
Van der Heiden et al. (2013) [76]	RCT of IUT.	1.IUT 2.MCT	1 > 2: Worry: $d = 0.96$ General psychopathology: $d = 0.55$	MCT superior to IUT on worry and general psychopathology.
Wells et al. (2010) [78]	RCT of MCT.	1. MCT 2.AR	1 > 2: d s range: 0.92, 3.41	MCT superior to AR in reducing worry, trait anxiety, depression, positive

Study (year)	Comment	Condition	Results	Conclusion
				meta-cognitions, and negative meta-cognitions.
Nordahl et al. (2018) [79]	RCT comparing MCT to CBT.	1.MCT 2.CBT	1 > 2: Recovery rates: MCT=65% v. CBT=38%	MCT seems to produce recovery rates that exceed those of CBT.
Solem et al. (2021)[80]	RCT comparing MCT to CBT.	1.MCT 2.CBT	1 > 2: Recovery rates were 57% for MCT and 38% for CBT.	At 9-year follow up MCT showed greater recovery rates compared to CBT.
Rubak et al. (2005)[82]	Systematic review and meta-analysis of MI.	1.MI 2.Traditional advice	1 > 2: 95 % CI ranging between: 0.23, 99.04	Significant effects of MI for combined effect estimates for body mass index, total blood cholesterol, systolic blood pressure, blood alcohol concentration and standard ethanol content relative to traditional advice.
Marker & Norton (2018) [83]	Meta-analysis of MI.	1.MI/CBT 2.CBT	1 > 2: $g = 0.39$, 95% CI: 0.08, 0.70	MI as an adjunct to CBT on symptom reduction, compared to CBT alone, for GAD was superior.
Aviram et al. (2011)[84]	Impact of MI on resistance in CBT.	1. MI pretreatment then CBT (MI-CBT) 2.No pretreatment prior to CBT (NPT-CBT)	1 > 2: Treatment resistance: $d = 1.00$, 95% CI: .027, 1.68 1 > 2: Higher therapist-rated homework compliance.	Lower resistance to treatment and higher therapist-rated homework compliance for CBT with MI as a pretreatment versus CBT alone.
Westra et al. (2009)[85]	RCT adding a MI as pretreatment to CBT for GAD.	1. MI pretreatment then CBT (MI-CBT) 2.No pretreatment prior to CBT (NPT-CBT)	1 > 2: $d = .53$	Greater worry reduction for CBT with MI as a pretreatment versus CBT alone.
Westra et al. (2016)[86]	RCT of CBT/MI versus CBT.	1.CBT 2.MI/CBT	1 = 2: No group differences in pre-post change at 15 weeks 1 < 2: MI/CBT clients had a significantly steeper rate of distress reduction over the follow-up period than the CBT only clients.	No between-groups differences in outcomes from pre- to posttreatment; however, greater worry decline at 6- and 12-month follow-ups in the MI/CBT group relative to CBT alone.
Constantino et al. (2019)[87]	Specific and common mediators of CBT integrated with MI.	1.MI/CBT 2.CBT	Alliance: indirect effect = 0.20, SE = 1.09, 95% CI [bias corrected] = -1.67, 2.85. Homework completion: indirect effect = 0.94, SE = 1.62, 95% CI [bias corrected] = -1.83, 4.87	No indirect effects through alliance and homework completion emerged.
Muir et al. (2021)[88]	Examining mediators of CBT integrated with MI.	1.MI/CBT 2.CBT	1 > 2: $B = 11.88$, SE = 2.38, 95% CI: 9.77, 14.21	Lower treatment resistance in MI plus CBT compared to CBT alone.
Hara et al. (2021)[89]	Therapist affiliation and hostility in CBT with and without MI.	1.MI/CBT 2.CBT	1 > 2: $\beta = 2.82$, SE = 1.05, $p = .007$	Increased affiliative therapist behavior during disagreement in MI/CBT relative to CBT.

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Marcus et al. (2011)[90]	Qualitative analysis of client experiences of MI with GAD.	1.MI 2. CBT	1 > 2	Relative to participants receiving CBT alone, those receiving MI plus CBT reported increased motivation for treatment and change.
Button et al. (2019)[91]	Qualitative analysis examining client expectations of CBT with and without MI.	1.MI/CBT 2.CBT	1 > 2	Compared to CBT clients, MI-CBT clients reported experiencing greater agency in the treatment process.
Kertes et al. (2011) [92]	MI and CBT versus CBT alone on GAD symptoms.	1.MI/CBT 2.CBT alone	1 > 2: <i>M</i> PSWQ reduction MI-CBT = 42.8, <i>SD</i> = 10.2 <i>M</i> PSWQ-reduction CBT = 17.6, <i>SD</i> = 12.6; <i>t</i> (8) = 3.48, <i>p</i> =.008	MI-CBT group showed significantly greater worry reduction than the NPT-CBT group as measured by the PSWQ from baseline to post-CBT.
Sakiris & Berle (2019)[93]	Meta-analysis of the UP	1.UP 2.Inactive control	1 > 2: <i>g</i> = -.81, 95% <i>CI</i> : -1.29, -.34	Compared to an inactive control condition, the UP demonstrated moderate to large effect size reductions across measures of anxiety.
Barlow et al. (2017) [94]	RCT of the UP.	1.UP 2.SDPs 3.Waitlist control	1 > 2: Treatment completion: odds ratio, 3.11; 95% <i>CI</i> : 1.44, 6.74 1, 2>3: UP: <i>d</i> = -0.93; 95% <i>CI</i> , -1.29, -0.57; SDPs: <i>d</i> = -1.08; 95% <i>CI</i> , -1.43, -0.73 1=2: <i>β</i> , 0.25; 95% <i>CI</i> : -0.26, 0.75	Patients were more likely to complete treatment with the UP than with SDPs. Both the UP and SDPs were superior to the waitlist control condition at acute outcome. Reductions in clinical severity rating from baseline to the end of treatment indicated statistical equivalence between the UP and SDPs.
Farchione et al. (2012)[95]	RCT of UP.	1.UP 2.Waitlist control	1 > 2: <i>B</i> = -.58, <i>p</i> < .001, <i>g</i> = 1.39	Greater reductions in primary and comorbid disorder symptom severity in UP relative to waitlist at posttreatment.
Steele et al. (2018) [96]	RCT of UP.	1.UP 2.SDPs	1 > 2: <i>g</i> = - 0.29, 95% <i>CI</i> : - 1.12, 0.54	No significant between-group differences in mean number of diagnoses and decline in symptoms of co-occurring conditions on GAD specific measures.
Bandelow et al. (2007)[97]	Study examining percentage of people with anxiety disorders using	1.Pharmacotherapy	--	57% of people with anxiety disorders are being treated using pharmacological treatment.

Study (year)	Comment	Condition	Results	Conclusion
	pharmacological treatment.			
Tolin (2017) [98]	Meta-analysis examining concurrent CBT with antidepressant medication.	1. CBT/medication 2.CBT	1 > 2: Posttreatment: $g = 0.33$; 95% CI: 0.22, 0.44; NNT: 7.7 Follow-up: $g = -0.18$; 95% CI: -0.365, 0.00; NNT:-	Addition of antidepressants confers a small advantage over CBT at posttreatment, although this advantage is lost when medications are discontinued.
Navarro-Haro et al. (2019) [99]	RCT of VR dialectical behavior therapy.	1.VR dialectical behavior therapy/MI 2.MI	1 = 2: Mindfulness: $d = -1.27$, -1.36 Mindfulness + VR: $d = -0.54$, -1.33	Both groups led to reductions in GAD symptoms, anxiety, and depression.
Wang et al. (2019)[100]	Examining cycling through a projection-based virtual environment System on GAD.	1.Cycling while looking at virtual natural environment 2.Cycling while looking at virtual abstract paintings	1 > 2: Cycling while looking at virtual natural environment: alpha: 6.53; 95%CI: 1.72, 11.35 Cycling while looking at virtual abstract paintings: alpha: 4.05; 95%CI: 2.62, 5.48	Virtual exercise therapy consisting of cycling while looking at a virtual natural environment reduced stress in adults with GAD more than cycling while looking at virtual abstract paintings.
Eilert et al. (2021) [102]	Meta-analysis of internet delivered interventions.	1.Internet CBT 2.Wait list control	1 > 2: $d = -0.91$; 95% CI: 1.25, 0.56	Internet CBT led to significant improvements in GAD symptoms, pathological worry, comorbid anxiety, depression, distress, disability, and quality of life.
Alavi & Hirji (2020)[103]	Examining PowerPoint-based CBT delivered through email.	1.Email-CBT 2.Control group	1 > 2: Scores at 12 weeks=25.3, 6-month follow-up=25, and 1-year follow-up=23.9; $t_{35}=16.4$, $P<0.001$, $t_{34}=16.9$, $P<0.001$, and $t_{30}=16.5$, $P<0.001$.	ICBT led to a reduction in anxiety relative to no therapy, with gains maintained at 6-month and 1-year follow-ups.
Newman et al. (2014) [104]	EMA of hand-held technology.	1.Computer assisted group CBT 2. 6 session group CBT 3. 12 session group CBT	1 > 2: Posttreatment: $\chi^2(1, 25) = 4.975$, $p = .026$, $d = .997$ 1 = 3: $\chi^2(1, 20) = 1.664$, $p = .197$, $d = .602$	Palmtop computer in addition to six sessions of group therapy compared to six sessions of therapy without the computer led to a higher number of participants achieving change on at least two out of three measures of GAD at posttreatment, with no difference when compared to a longer (12-session) group therapy for GAD that did not use the computer.
LaFreniere & Newman (2016) [105]	Worry outcome journal.	1.Worry outcome journal 2.Thought log	1 > 2: Pre-post worry reduction: $d = -0.59$ 1 > 2: Pre- to 20-day follow-up: $d = -0.52$	The worry outcome condition led to greater pre-post reduction in worry and was marginally superior to the

Study (year)	Comment	Condition	Results	Conclusion
				thought log on pre- to 20-day follow-up.
Newman et al. (2021) [106]	RCT of smartphone treatment for GAD.	1.Smartpphone self-help app 2.No treatment	1 > 2: Posttreatment: $d = -.45, -0.40$ Rates of remission: $d = -0.23$	Smartphone self-help app led to greater reductions in stress and a greater probability of remission from GAD at posttreatment relative to a no treatment condition. Gains were maintained at 6-month follow-up; however, there were no longer differences between the two conditions in the rates of remission.
Newman et al. (2021)[107]	RCT examining internet-delivered guided self-help for GAD.	1.Guided self-help CBT 2.Waitlist control	1 > 2: d 's ranging from $-0.40 - 0.53$	Guided self-help had greater reductions in GAD symptoms, worry, and depression compared to waitlist control condition.
LaFreniere & Newman (in preparation) [115]	Ecological momentary assessment examining techniques to reduce contrast avoidance.	1.Techniques maintaining positive emotions. 2.Active control	1 > 2	Compared to active control, the treatment condition led to significant decreases in contrast avoidance and worry symptoms.
Fava et al. (2005)[116]	Examining well-being therapy for GAD.	1.4 sessions CBT followed by 4 sessions of well-being therapy 2.CBT	1 > 2: CBT before: 15.3 ± 1.7 CBT after therapy: 10.4 ± 1.7 CBT follow-up: 10.3 ± 1.8 Well-being therapy before: 16.4 ± 1.5 Well-being therapy after therapy: 7.6 ± 1.2 Well-being therapy follow-up: 6.5 ± 1.9 P value after therapy: 0.007 P value follow-up: 0.298	4 sessions of well-being therapy followed by 4 sessions of CBT led to an enhanced outcome over 8 sessions of CBT alone.
Gonçalves & Byrne (2012) [117]	Meta-analysis of psychotherapy and pharmacotherapy.	1.Active intervention 2.Control condition	1 > 2: Psychotherapy: OR = 0.33, 95% CI: 0.17, 0.66 Pharmacotherapy: OR = 0.32, 95% CI: 0.18, 0.54.	Both treatments demonstrated efficacy for GAD.
Sigurvinsdóttir et al. (2020) [118]	Examining the effectiveness of CBT for child and adolescent anxiety disorders across different CBT modalities and comparisons.	1.Individual CBT 2.Group CBT 3.Remote CBT 4.Waitlist 5.TAU 6.Attention controls	1 > 4: OR = 9.53; 95% CI: 5.48, 16.58. 2 > 4: OR=8.96, 95% CI: 4.03, 19.90. 3 > 4: OR=6.14, 95% CI, 2.97 to 12.71 1 = 5: OR= 3.70; 95% CI: 0.84, 16.40. 2 = 5: OR=0.16, 95% CI: 0.29, 0.60. 1 > 6: OR=2.55, 95% CI: 1.35, 4.93. 2 = 6: OR=0.42,95% CI: 0.14, 1.23.	CBT in various modalities was superior to waitlist, showed mixed beneficial effects compared to attention controls, and did not outperform TAU.
Vera et al. (2021)[120]	CBT and ABBT treatment in Spanish-speaking Latino with GAD.	1.ABBT 2.CBT 3.TAU	1, 2 > 3: 57% of the ABBT group, 60% of the CBT group, and 43% of the TAU group achieved a reliable change in PSWQ scores	CBT and ABBT reduced worry level to a greater degree than usual care by follow-up.
Markell et al. (2014)[121]	Examining combined medication and CBT for GAD in African American participants.	1.African American receiving combined treatment 2.European American receiving combined treatment	1 = 2: HAM-A: $f = 1.51, df = (1, 199), p = .22$ PSWQ: $F = .17, df = (1, 64), p = .69$	The outcomes for African Americans receiving combined treatment (medication and CBT) were not significantly different from European Americans receiving

Study (year)	Comment	Condition	Results	Conclusion
				combined treatment on anxiety outcomes.
Renna et al. (2018)[122]	Pilot study of emotion regulation therapy for GAD.	1.16 sessions of ERT.	Pre to mid: $t= 4.45, g= 1.62$ Pre to post: $t=11.27, g= 4.05$ Pre to 3-mo. follow-up: $t= 12.04, g= 4.32$ Pre to 9-mo. follow-up: $t= 11.24, g= 4.04$	GAD symptom reductions from ERT.

CBT: Cognitive behavioral therapy; TAU: Treatment as usual; AR: Applied relaxation; PSWQ: Penn State Worry Questionnaire; IU: Intolerance of uncertainty; CT: Cognitive therapy; SCD: Self-control desensitization; ND: Nondirective therapy; AR: Applied relaxation; I/EP: Interpersonal and emotional processing; SL: Supportive listening; RCT: Randomized controlled trial; BT: Behavioral therapy; RIA: Relaxation-induced anxiety; ND: Nondirective therapy; MBIs: Mindfulness-based interventions; MBSR: Mindfulness-based stress reduction; ABBT: Acceptance-based behavior therapy; IUT: Intolerance of uncertainty; ABBT: Acceptance-based behavior therapy; ERT: Emotion regulation therapy; CBT-IU: Cognitive behavioral therapy targeting intolerance of uncertainty; MCT: Metacognitive therapy; MI: Motivational interviewing; MI/CBT: Motivational interviewing and cognitive behavioral therapy; UP: Unified protocol; SDPs: Single disorder protocols; VR: Virtual reality; OR: Odds ratio; HAMA-A: Hamilton anxiety rating scale.