

Review

Current theoretical models of generalized anxiety disorder (GAD): Conceptual review and treatment implications

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ABSTRACT

Theoretical conceptualizations of generalized anxiety disorder (GAD) continue to undergo scrutiny and refinement. The current paper critiques five contemporary models of GAD: the Avoidance Model of Worry and GAD [Borkovec, T. D. (1994). The nature, functions, and origins of worry. In: G. Davey & F. Tallis (Eds.), *Worrying: perspectives on theory assessment and treatment* (pp. 5–33). Sussex, England: Wiley & Sons; Borkovec, T. D., Alcaine, O. M., & Behar, E. (2004). Avoidance theory of worry and generalized anxiety disorder. In: R. Heimberg, C. Turk, & D. Mennin (Eds.), *Generalized anxiety disorder: advances in research and practice* (pp. 77–108). New York, NY, US: Guilford Press]; the Intolerance of Uncertainty Model [Dugas, M. J., Letarte, H., Rheume, J., Freeston, M. H., & Ladouceur, R. (1995). Worry and problem solving: evidence of a specific relationship. *Cognitive Therapy and Research*, 19, 109–120; Freeston, M. H., Rheume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences*, 17, 791–802]; the Metacognitive Model [Wells, A. (1995). Meta-cognition and worry: a cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy*, 23, 301–320]; the Emotion Dysregulation Model [Mennin, D. S., Heimberg, R. G., Turk, C. L., & Fresco, D. M. (2002). Applying an emotion regulation framework to integrative approaches to generalized anxiety disorder. *Clinical Psychology: Science and Practice*, 9, 85–90]; and the Acceptance-based Model of GAD [Roemer, L., & Orsillo, S. M. (2002). Expanding our conceptualization of and treatment for generalized anxiety disorder: integrating mindfulness/acceptance-based approaches with existing cognitive behavioral models. *Clinical Psychology: Science and Practice*, 9, 54–68]. Evidence in support of each model is critically reviewed, and each model's corresponding evidence-based therapeutic interventions are discussed. Generally speaking, the models share an emphasis on avoidance of internal affective experiences (i.e., thoughts, beliefs, and emotions). The models cluster into three types: cognitive models (i.e., IUM, MCM), emotional/experiential (i.e., EDM, ABM), and an integrated model (AMW). This clustering offers directions for future research and new treatment strategies.

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1. Introduction

Theoretical conceptualizations of generalized anxiety disorder (GAD) continue to undergo scrutiny and refinement, and it is an exciting time for research investigating causal and maintaining factors of this condition. Recent models offer unique and innovative perspectives on the theory and treatment of GAD. Starting with Borkovec's innovative avoidance theory of worry, each subsequent model has emphasized various pathogenic mechanisms (e.g., intolerance of uncertainty, positive beliefs about worry, emotion dysregulation) that have led to several novel strategies for treatment.

The current paper critically reviews five contemporary models of GAD with a primary focus on their conceptual similarities and differences, followed by a brief discussion of treatments based on each model. The models of interest are the Avoidance Model of Worry and GAD (AMW; Borkovec, 1994; Borkovec, Alcaine, & Behar, 2004), the Intolerance of Uncertainty Model (IUM; Dugas, Letarte, Rheaume, Freeston, & Ladouceur, 1995; Freeston, Rheaume, Letarte, Dugas, & Ladouceur, 1994), the Metacognitive Model (MCM; Wells, 1995), the Emotion Dysregulation Model (EDM; Mennin, Heimberg, Turk, & Fresco, 2002), and the Acceptance-Based Model of Generalized Anxiety Disorder (ABM; Roemer & Orsillo, 2002, 2005). The basic tenets of each model and supporting evidence are critically evaluated, followed by a discussion of treatment strategies derived from each model. The Mood-as-Input Model of Perseverative Worry (Davey, 2006) was not included in this review due to limited supporting evidence and the lack of a treatment specifically based on central tenets of the model.

Some of the basic assumptions of these five models are currently being tested *a priori* for the first time. Given that we are focusing specifically on clinical levels of worry, the current review only includes studies utilizing participants who either met diagnostic criteria for GAD using clinical interviews or analogue clinical samples based on empirically derived scores on continuous measures. We also attempted to focus on studies in which *a priori* hypotheses were tested, as opposed to *post hoc* analyses conducted.² The primary goal was to compare the models on a conceptual basis rather than provide an exhaustive review of the empirical support for each model.

1.1. The evolution of GAD and its treatment

GAD was first introduced as a unique diagnosis in the third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III; American Psychiatric Association [APA], 1980) but was most often used as a residual diagnosis for individuals who did not

meet diagnostic criteria for another anxiety disorder (Barlow, Rapee, & Brown, 1992). It was not until the publication of *DSM-III-R* (APA, 1987) that GAD was uniquely defined by chronic and pervasive worry (Barlow, Blanchard, Vermilyea, Vermilyea, & Di Nardo, 1986). According to the *DSM-IV-TR* (APA, 2000), GAD is characterized by excessive, uncontrollable worry about a variety of topics that occurs more days than not for a period of at least six months. The worry causes distress and/or functional impairment, and is associated with at least three of the following features: restlessness or feeling keyed up or on edge, being easily fatigued, difficulty concentrating or having one's mind go blank, irritability, muscle tension, and sleep disturbance (APA, 2000).

Psychotropic medications and cognitive behavior therapy (CBT) both appear to be effective for treating GAD (Anderson & Palm, 2006; Borkovec & Ruscio, 2001; Fisher, 2006). However, response rates are inconsistent across studies. Current evidence suggests that pharmacotherapy may be effective at reducing symptoms of anxiety but does not appear to have a significant impact on worry (Anderson & Palm, 2006), the defining characteristic of GAD. Clinical trials have indicated that CBT is an efficacious treatment relative to pill placebo, no treatment, wait-list, and nondirective supportive therapy, and that improvements from CBT are maintained 1 year post-therapy (Borkovec & Ruscio, 2001; Gould, Safren, Washington, & Otto, 2004). A recent meta-analysis conducted by Covin, Ouimet, Seeds, and Dozois (2008) that included only those studies that utilized the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) as an outcome measure (a valid and reliable indicator of pathological worry) found that CBT was effective in reducing worry, with a large average effect size of -1.15 . Despite the progress that has been made in creating efficacious therapies for GAD, a more comprehensive understanding of the mechanisms underlying this disorder is needed for additional enhancement of treatment effects.

2. Avoidance Model of Worry and GAD (AMW)

The Avoidance Model of Worry and GAD (AMW; Borkovec, 1994; Borkovec et al., 2004) is based on Mowrer's (1947) two-stage theory of fear, and also draws from Foa and Kozak's emotional processing model (Foa & Kozak, 1986; Foa, Huppert, & Cahill, 2006). The AMW asserts that worry is a verbal linguistic, thought-based activity (Behar, Zuellig, & Borkovec, 2005; Borkovec & Inz, 1990) that inhibits vivid mental imagery and associated somatic and emotional activation. This inhibition of somatic and emotional experience precludes the emotional processing of fear that is theoretically needed for successful habituation and extinction (Foa & Kozak, 1986; Foa et al., 2006).

On the other hand, enhancement of somatic and emotional experience can lead to effective processing of emotional cues. Habituation and extinction are made possible through exposure to

² For an exhaustive review of seminal literature including evidence from nonclinical samples and other preliminary work prior to the models' development, the reader is referred to Heimberg, Turk, & Mennin (2004).

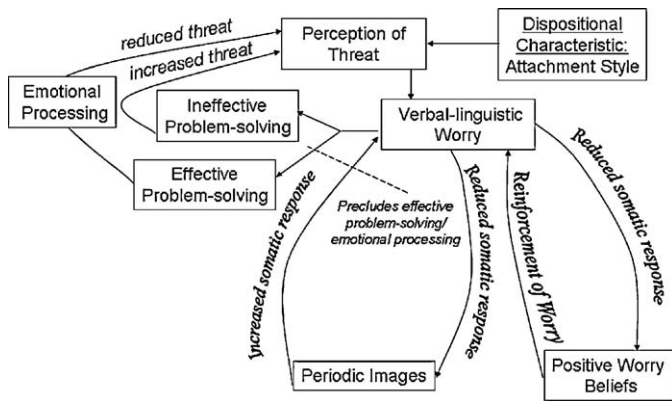


Fig. 1. The Avoidance Model of Worry and GAD. There is no published visual representation of the Avoidance Model of Worry and GAD. The visual model above was created by the current authors and approved by Dr. Borkovec.

the entire spectrum of fear cues, including the feared stimulus itself, the response to the stimulus, as well as the potential meaning behind the fear (Foa & Kozak, 1986). Therefore, worry can be seen as an ineffective cognitive attempt to problem solve and thus remove a perceived threat, while simultaneously avoiding the aversive somatic and emotional experiences that would naturally occur during the process of fear confrontation (Borkovec et al., 2004). Furthermore, the experience of worry becomes negatively reinforced. According to the AMW, catastrophic mental images that make their way into the worry process are replaced by less distressing, less somatically activating verbal linguistic activity. Thus, worry is negatively reinforced by the removal of aversive and fearful images (e.g., Borkovec, 1994; Borkovec et al., 2004). In addition, worry is further reinforced by positive beliefs, such as a belief that worry is helpful for problem-solving, motivating performance, and avoiding future negative outcomes. Positive beliefs are reinforced when negative future events do not occur or are effectively managed, thus further reinforcing the worry (see Fig. 1 for a visual depiction of the AMW).

In addition to outlining the basic process of worry, Borkovec and colleagues have explored possible etiological factors of worry (Borkovec et al., 2004; Sibrava & Borkovec, 2006). Borkovec and colleagues have suggested the possible impact of poor interpersonal skills on the maintenance of GAD (Sibrava & Borkovec, 2006). In addition, they have hypothesized that early lifetime events such as past trauma and insecure attachment styles may lead to subsequent development of GAD (Borkovec et al., 2004). Some researchers have suggested that an insecure attachment style (Bowlby, 1982) may result in diffuse anxiety problems in childhood that persist into adult relationships (Cassidy, Lichtenstein-Phelps, Sibrava, Thomas, & Borkovec, 2009; Sibrava & Borkovec, 2006). It is hypothesized that insecure attachment causes individuals to perceive the world as a dangerous place, and that individuals with GAD do not have adequate resources to cope with uncertain events. Further empirical work employing longitudinal methods is required to test the potential etiological roles of insecure attachment and past trauma in GAD.

2.1. Empirical support

Evidence supporting the AMW has already been extensively reviewed (e.g., Borkovec et al., 2004) and will only be briefly summarized here. There is evidence supporting the notion that worry is primarily a verbal-linguistic as opposed to an imagery-based process (Behar & Borkovec, 2005; Borkovec & Inz, 1990). In addition, worrying does appear to dampen somatic arousal at rest (Hoehn-Saric & McLeod, 1988; Hoehn-Saric, McLeod, & Zimmerli,

1989; Lyonfields, Borkovec, & Thayer, 1995; Thayer, Friedman, & Borkovec, 1996) and upon subsequent exposure to threat-related material (Behar & Borkovec, submitted for publication; Borkovec & Hu, 1990; Peasley-Miklus & Vrana, 2000). Individuals with GAD may also require a longer period of time to return to baseline levels of arousal following a stressor relative to individuals without GAD (e.g., Hoehn-Saric et al., 1989), suggesting prolonged hypo-responsiveness. There is also descriptive research suggesting that worry is reinforced among individuals with GAD via increased positive beliefs about worry (Borkovec & Roemer, 1995). In particular, individuals with GAD believe that worry serves as a distraction from more emotional topics, providing further evidence that it is used as a strategy to avoid emotional processing.

More recent work suggests that an insecure attachment style is more prevalent among individuals with GAD compared to healthy controls (Eng & Heimberg, 2006), although this might be true for other forms of psychopathology as well and not necessarily specific to GAD. Similarly, increased symptoms of worry and GAD have been associated with perceived alienation from parental figures and peers in a college undergraduate sample (Viana & Rabian, 2008) as well as in adolescents (Hale, Engels, & Meeus, 2006). Prospective studies are needed to more strongly support the notion that an insecure attachment style is an important predispositional characteristic that increases a person's risk for developing GAD. Finally, there is evidence suggesting that individuals with GAD focus much of their worry on interpersonal difficulties (Roemer, Molina, & Borkovec, 1997) and a large portion report being overly nurturing and exploitable within their relationships (Salzer et al., 2008), factors believed to be related to an insecure attachment style. In addition, interpersonal problems (as measured by the Inventory of Interpersonal Problems Circumplex Scales; Alden, Wiggins, & Pincus, 1990) that remain following therapy have been shown to predict poor outcome following CBT (Borkovec, Newman, Pincus, & Lytle, 2002). However, another study utilizing the structural analysis of social behavior (SASB; Benjamin, Giat, & Estroff, 1981) failed to replicate the finding that interpersonal behavior processes predict CBT treatment outcome for clients with GAD (Critchfield, Henry, Castonguay, & Borkovec, 2007).

2.2. Treatment

Specific treatment components for GAD have been developed based on the central tenets of the AMW. These cognitive-behavioral techniques include: (a) self-monitoring of external situations, thoughts, feelings, physiological reactions, and behaviors; (b) relaxation techniques such as progressive muscle relaxation, diaphragmatic breathing, and pleasant relaxing imagery; (c) self-control desensitization, which entails the use of methods (e.g., imaginal rehearsal) to facilitate the acquisition of habitual coping responses; (d) gradual stimulus control achieved by establishing a specific time and place for worrying; (e) cognitive restructuring aimed at increasing clients' flexibility in thinking and access to multiple, flexible perspectives; (f) worry outcome monitoring in which clients keep regular diary entries in order to monitor specific worries, their feared outcomes, and the actual outcomes of those worries; (g) the promotion of present-moment focus of attention, and (h) expectancy-free living (Behar & Borkovec, 2005; Behar & Borkovec, in press). A summary of the key components of treatment based on the AMW can be found in Table 1.

Evidence indicating that clients with GAD focus much of their worry on interpersonal relationships (Roemer et al., 1997; Salzer et al., 2008) and that the presence of interpersonal problems subsequent to CBT predicts poor short-term and long-term outcome (Borkovec et al., 2002), as well as evidence pointing to emotional processing deficits in GAD, prompted Borkovec and

Table 1
Summary of Treatment Components.

Theoretical model	Theoretical components	Key intervention components
Avoidance Model of Worry and GAD	Cognitive avoidance Positive worry beliefs Ineffective problem-solving/emotional processing Interpersonal issues Attachment style Previous trauma	Self-monitoring Relaxation techniques Self-control desensitization Gradual stimulus control Cognitive restructuring Worry outcome monitoring Present-moment focus Expectancy-free living
Intolerance of Uncertainty Model	Intolerance of uncertainty Negative problem orientation Cognitive avoidance Beliefs about worry	Self-monitoring Intolerance of uncertainty education Evaluating worry beliefs Improving problem-orientation Processing core fears
Metacognitive therapy	Positive beliefs about worry Type 1 Worry Negative beliefs about worry Type 2 Worry Ineffective coping	Case formulation Socialization Discuss uncontrollability of worry Discuss danger of worry Discuss positive worry beliefs
Emotion Dysregulation Model	Emotional hyperarousal Poor understanding of emotions Negative cognitive reactions to emotions Maladaptive emotion management and regulation	Relaxation exercises Belief reframing Emotion Education Emotional Skills Training Experiential exposure exercises
Acceptance-Based Model of GAD	Internal experiences Problematic relationship with internal experiences Experiential avoidance Behavioral restriction	Psychoeducation about ABM Mindfulness and Acceptance exercises Behavioral change and valued actions

colleagues to integrate a focus on interpersonal functioning and emotional processing into traditional CBT for chronic worry. A randomized clinical trial in which the effects of adding interpersonal and emotional processing therapy to CBT (CBT + IEP) was compared to CBT plus supportive listening (CBT + SL, where SL was used to control for common factors related to psychotherapy) was recently completed. Analyses indicate that, contrary to expectations, the addition of IEP to CBT did not enhance treatment efficacy as indicated by the majority of primary outcome measures at the post-treatment assessment. However, 24 months following the termination of treatment, the CBT + IEP condition evidenced a significantly higher rate of high end-state functioning. Interestingly, secondary analyses indicated that clients who had highly dismissive attachment styles (a variant of insecure attachment in which an adult appears to be minimizing the importance of attachment relationships and attachment related experiences) and who received CBT + IEP had significantly better post-therapy and follow-up outcome than all other clients, whereas those who did *not* have enmeshed relationships with their primary care-giver in childhood (a situation in which a parent relies on a child to aide in managing distress, which is a task that is developmentally beyond the capability of the child and is therefore very distressing) also did particularly well when IEP was part of their treatment (Newman, Castonguay, Borkovec, Fisher, & Nordberg, 2008; Newman, Castonguay, Fisher, & Borkovec, 2008). Thus, although the routine administration of interpersonal and emotional processing components is not appropriate for clients with GAD, these techniques may be useful with individual clients with particular interpersonal histories. Future research will hopefully further delineate the individual differences that predict enhanced treatment responsiveness following IEP components.

Subsequent to the development of the AMW, a number of alternative models of GAD and worry have been developed in an attempt to expand the scope of earlier formulations. Four such

models have been developed and systematically evaluated in controlled research studies, as reviewed below.

3. The Intolerance of Uncertainty Model (IUM)

The first of these new models highlights the role of intolerance of uncertainty (IU) in the development and maintenance of GAD (e.g., Dugas et al., 1995; Dugas, Buhr, & Ladouceur, 2004; Dugas, Gagnon, Ladouceur, & Freeston, 1998; Freeston et al., 1994). According to the Intolerance of Uncertainty Model (IUM), individuals with GAD find uncertain or ambiguous situations to be “stressful and upsetting” (Dugas & Koerner, 2005, p. 62), and experience chronic worry in response to such situations. These individuals believe that worry will serve to either help them cope with feared events more effectively or to prevent those events from occurring at all (Borkovec & Roemer, 1995; Davey, Tallis, & Capuzzo, 1996; Tallis, Davey, & Capuzzo, 1994). This worry, along with its accompanying feelings of anxiety, leads to negative problem orientation and cognitive avoidance, both of which serve to maintain the worry. Specifically, individuals who experience negative problem orientation (1) lack confidence in their problem solving ability, (2) perceive problems as threats, (3) become easily frustrated when dealing with a problem, and (4) are pessimistic about the outcome of problem-solving efforts (Koerner & Dugas, 2006). These feelings serve to exacerbate their worry and anxiety. As in Borkovec’s original conceptualization of GAD (Borkovec, 1994), cognitive avoidance refers to the use of cognitive strategies (e.g., thought replacement, distraction, thought suppression) that facilitate avoidance of the cognitive arousal and threatening images associated with worry (Dugas & Koerner, 2005). Dugas et al. (1998) note that IU serves to set off the chain of worrying, negative problem orientation, and cognitive avoidance, and argue that intolerance of uncertainty also directly affects one’s problem orientation and degree of cognitive avoidance. In this way, individuals with increased IU will be more prone to engaging in

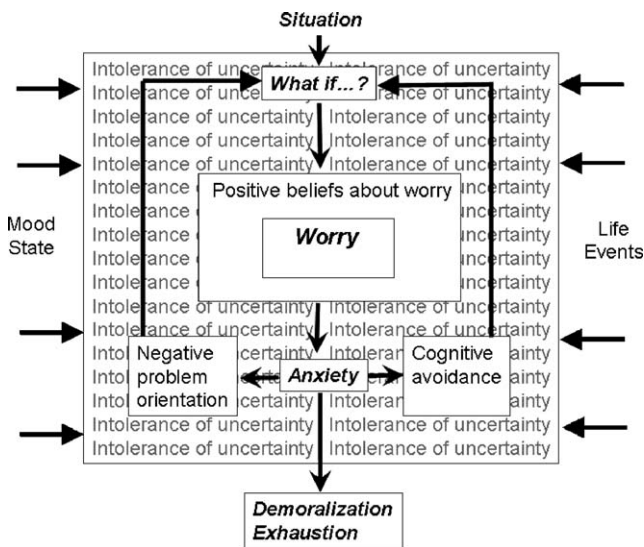


Fig. 2. The Intolerance of Uncertainty Model of GAD. Adapted with permission from Dugas and Robichaud (2007).

the worry process. Fig. 2 presents a visual depiction of the IUM (Dugas & Robichaud, 2007).

3.1. Empirical support

The IUM posits the importance of four factors in distinguishing individuals with GAD from healthy controls and other clinical samples: IU, positive beliefs about worry, cognitive avoidance, and negative problem orientation. Two studies (Dugas, Marchand, & Ladouceur, 2005; Ladouceur et al., 1999) explored the specificity of the four central features of the model to GAD by testing whether these four constructs reliably distinguish individuals diagnosed with GAD from those diagnosed with other anxiety disorders. Both studies (Dugas et al., 2005; Ladouceur et al., 1999) found that of these four facets, IU was the one aspect that was specific to GAD, as opposed to other anxiety disorders. Further, Dugas et al. (2007) found that IU and negative problem orientation predicted GAD symptom severity among a clinical sample of individuals with GAD. Holaway, Heimberg, and Coles (2006) found that individuals with analogue GAD and OCD experienced a greater degree of IU than did non-anxious controls; however, there was no significant difference in IU between the GAD and OCD groups. These results are consistent with other studies of IU in individuals with OCD (Steketee, Frost, & Cohen, 1998; Tolin, Abramowitz, Brigidi, & Foa, 2003), and suggest that IU might not be a phenomenon specific to GAD, but may also characterize those with OCD.

Ladouceur, Blais, Freeston, and Dugas (1998) compared undergraduate students identified as an analogue GAD sample (scored above the 80th percentile on the PSWQ and met cognitive and somatic criteria on the Generalized Anxiety Disorder Questionnaire (GADQ; Roemer, Borkovec, Posa, & Borkovec, 1995) to treatment-seeking individuals diagnosed with GAD. Consistent with the IU model, results indicated that these two groups reported significantly greater difficulties with negative problem orientation (but not actual problem solving), problem solving confidence, IU, and positive beliefs about worry than did nonclinical, moderate worriers. Likewise, Dugas et al. (1998) found that IU, beliefs about worry, thought suppression (cognitive avoidance), and negative problem orientation discriminated individuals diagnosed with GAD from nonclinical participants in a discriminant function analysis; however, IU was the variable that most strongly distinguished between the two groups.

Buhr and Dugas (2002) found that analogue GAD participants (identified as GAD based on scores on the Worry and Anxiety Questionnaire [WAQ; Dugas et al., 2001]) scored significantly higher on the Intolerance of Uncertainty Scale (IUS; Freeston et al., 1994) than did control participants or individuals meeting only the somatic criteria for GAD; furthermore, those meeting somatic criteria scored significantly higher on the IUS than did control participants. However, when considering results from the study sample as a whole (16% of whom met GAD criteria), the IUS was not found to be more highly correlated with worry than with depression (as measured by the Beck Depression Inventory [BDI]; Beck & Steer, 1987) or with anxiety (as measured by the Beck Anxiety Inventory [BAI]; Beck & Steer, 1990). In addition, evidence suggests that individuals with GAD experience elevated levels of positive beliefs about worry, cognitive avoidance, and negative problem orientation (Buhr & Dugas, 2002; Dugas et al., 1998), but evidence is mixed regarding the specificity of these elements to GAD with some studies suggesting good specificity for negative problem orientation (Robichaud & Dugas, 2005) whereas others indicate only IU as being specifically linked to GAD (Dugas et al., 2005; Ladouceur et al., 1999).

Support for IU as a cognitive vulnerability contributing to the development of GAD has also been examined in terms of four necessary specific qualities: manipulability, temporal antecedence, stability, and construct validity (Koerner & Dugas, 2008). Utilizing a gambling task to manipulate IU, Ladouceur, Dugas, et al. (2000) demonstrated that increasing IU subsequently increased worry over successful completion of the task compared to a condition in which levels of IU were decreased. In terms of temporal antecedence, a unidirectional relationship has been found between levels of IU and subsequent levels of worry within GAD clients being treated with CBT (Dugas & Ladouceur, 2000). Time-series analysis indicated that changes in IU scores preceded changes in the amount of reported worry, but the reverse relationship was not found. IU has also been found to be independent of mood state (e.g., symptoms of anxiety or depression), an important indication of stability (Buhr & Dugas, 2002, 2006; Dugas, Freeston, & Ladouceur, 1997). Finally, in a study examining the utility of a written exposure condition relative to a control writing condition, results suggested that improvements in worry were preceded by improvements in IU, suggesting that improvements in IU may be a key mediator for reducing worry (Goldman, Dugas, Sexton, & Gervais, 2007).

3.2. Treatment

Treatment of GAD based on the IUM revolves around the central theme of developing an increased tolerance for and acceptance of uncertainty (Robichaud & Dugas, 2006). Specific treatment components include self-monitoring, education regarding IU, the evaluation of worry beliefs, improving problem-orientation, and processing core fears (Robichaud & Dugas, 2006). Based on the understanding that clients with GAD are more likely to have negative and dysfunctional attitudes about problem solving, an important treatment component emerging from the IUM entails helping clients acquire a more positive orientation toward problems. This includes teaching clients how to properly discriminate between a problematic situation and emotions surrounding a situation, encouraging them to perceive problems as being a normal part of life, and suggesting that problems may be viewed as opportunities rather than threats (Robichaud & Dugas, 2006). Once the therapist educates the client about the framework of cognitions underlying their worry and specific maladaptive perceptions have been addressed, a final step involves processing core fears. Processing core fears, a component that addresses the influence of cognitive avoidance on maintenance of worry, entails

exposing clients to threatening mental imagery as a way to confront their fears and prevent avoidance (Robichaud & Dugas, 2006). The therapist probes for an underlying core fear within a client's recurring worry, and subsequently builds a descriptive exposure scenario that can be recorded and used for future exposure sessions (see Table 1 for a summary of the specific treatment components based on the IUM).

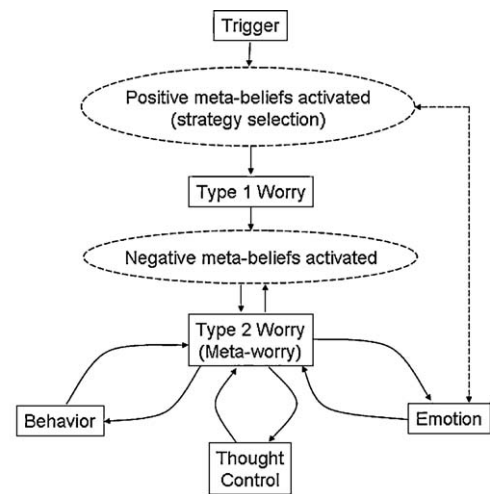
Several randomized controlled trials (RCTs) have evaluated the IUM-based treatment for GAD in individual (Dugas & Robichaud, 2007; Gosselin, Ladouceur, Morin, Dugas, & Baillargeon, 2006; Ladouceur, Dugas, et al., 2000; van der Heiden, 2008, September) and group formats (Dugas et al., 2003) with results generally supporting the clinical efficacy of the IUM-based treatments for GAD relative to wait-list control conditions (Dugas et al., 2003; Dugas & Robichaud, 2007; Ladouceur, Dugas, et al., 2000). Further, preliminary results from an ongoing RCT suggest that the IUM-based treatment for GAD resulted in clinically significant improvements in worry and anxiety relative to a wait-list control and applied relaxation (Dugas & Robichaud, 2007).

Gosselin et al. (2006) examined the utility of the IUM-based treatment for GAD for reducing benzodiazepine use among individuals with GAD who had taken benzodiazepines for at least 1 year and had the desire to stop the medication. Results suggested that benzodiazepine use decreased more among the IUM-based treatment group relative to an active listening control group. In contrast to these positive results, an IUM-based treatment for GAD was compared to metacognitive treatment and a wait-list control condition (van der Heiden, 2008, September). Results suggested no difference in treatment efficacy between IUM treatment and metacognitive treatment; likewise, there were no differences found in anxiety and worry reduction when IUM treatment was compared to a wait-list control condition.

4. The Metacognitive Model (MCM)

The Metacognitive model (MCM) of GAD proposed by Wells (1995, 1999, 2004, 2005) posits that individuals with GAD experience two types of worry. When individuals are initially faced with an anxiety-provoking situation, positive beliefs about worry are engendered (e.g., the belief that worry will help them cope with the situation). This process is known as *Type 1 worry*, which Wells defines as worry about non-cognitive events such as external situations or physical symptoms (Wells, 2005). Type 1 worry initially stimulates an anxiety response but later may increase or decrease anxiety, depending on whether the problem that has stimulated the worry has been resolved. During the course of Type 1 worry, negative beliefs about worry are activated (for Wells' theories on how negative beliefs about worry initially develop, see Wells, 1995). Individuals with GAD begin to worry about their Type 1 worry; they fear that the worry is uncontrollable or may even be inherently dangerous. This "worry about worry" (i.e., "meta-worry") is labeled by Wells as *Type 2 worry*.

According to the MCM, it is negative beliefs about worry and the resultant Type 2 worry that distinguishes individuals with GAD from nonclinical worriers (Wells, 2005). Type 2 worry is hypothesized to be associated with a host of ineffective strategies that are aimed at avoiding worry via attempts at controlling behaviors, thoughts, and/or emotions (e.g., reassurance-seeking, checking behavior, thought suppression, distraction, and avoidance of worrisome situations; Wells, 1999, 2004). Engagement in these ineffective coping strategies precludes the experience of events that might provide evidence to disconfirm the belief that worry is dangerous and uncontrollable. Furthermore, the very efforts used by those with GAD to control their thoughts (e.g., thought suppression, distraction) are often unsuccessful. As a result, they may lose confidence in their ability to control their



Adapted with permission from Wells (1997).

Fig. 3. The Metacognitive Model of GAD. Adapted with permission from Wells (1997).

worry, ultimately serving to reinforce the belief that worrying is uncontrollable and dangerous (Wells, 1999). Finally, Type 2 worry leads to an increase in anxiety symptoms, which may then serve a maintenance function if individuals interpret these anxiety symptoms as signs that their worrying is dangerous or uncontrollable (Wells, 2005). Fig. 3 presents a visual representation of this model (adapted from Wells, 1997).

4.1. Empirical support

A subset of tenets of the MCM have been supported in studies of nonclinical worry (for a review, see Wells, 2004). However, relatively few studies have specifically aimed to test the MCM in clinical samples. Results from these studies indicate that individuals with GAD do not substantially differ in their reported positive beliefs about worry relative to other groups, such as non-worried, anxious individuals (Davis & Valentiner, 2000) and high worriers without GAD (Ruscio & Borkovec, 2004). Extant literature evaluating the MCM suggests that individuals with GAD endorse negative beliefs about worry and report engaging in meta-worry (Cartwright-Hatton & Wells, 1997; Davis & Valentiner, 2000; Ruscio & Borkovec, 2004; Wells & Carter, 2001). Although metacognitions (i.e., self-awareness of cognitive processes) have been used to describe and treat other forms of psychopathology (e.g., OCD; Fisher & Wells, 2008), the MCM for GAD specifies the importance of metacognitive beliefs specifically about worry as a central component of GAD. However, evidence pointing to the specificity of negative beliefs about worry and meta-worry to GAD is mixed. Individuals with GAD experience more negative beliefs about worry and Type 2 worry relative to individuals without a diagnosis of an anxiety disorder (Cartwright-Hatton & Wells, 1997; Davis & Valentiner, 2000; Ruscio & Borkovec, 2004; Wells, 2005; Wells & Carter, 2001), or who have subclinical anxiety or worry (Davis & Valentiner, 2000; Ruscio & Borkovec, 2004; Wells, 2005), panic disorder (Davis & Valentiner, 2000), social anxiety disorder (Davis & Valentiner, 2000; Wells & Carter, 2001), and mood disorders (Cartwright-Hatton & Wells, 1997). Still, other studies suggest that individuals with GAD experience similar levels of negative beliefs about worry and Type 2 worry as do those with OCD (Cartwright-Hatton & Wells, 1997) and panic disorder (Wells & Carter, 2001). Further, Ruscio and Borkovec (2004) found that although non-GAD high worriers evidenced lower scores on negative beliefs about the uncontrollability and danger of worrying

than did those with GAD, the non-GAD high worriers evidenced higher scores on these beliefs than did an unselected group of university students, suggesting that such beliefs may be relevant for all high worriers and not merely those with GAD.

Aside from investigations examining the role of negative beliefs about worry and Type 2 worry in GAD, the temporal relationship between constructs suggested by the MCM along with the role of ineffective coping strategies in the perpetuation of GAD await *a priori* evaluation. There has been no longitudinal work examining any of the components of the model despite the fact that the model was created as a way of conceptualizing the development and maintenance of GAD. Furthermore, some of the core features of Wells' model remain less thoroughly defined. The model specifies that "the activation of negative beliefs [about worry] leads to a negative appraisal of worrying, or Type 2 worry" (Wells, 2004, p. 169). Thus, negative beliefs about worry and Type 2 worry are distinguished as two separate entities, with the former temporally preceding the latter. However, studies and measures associated with the model such as the Anxious Thoughts Inventory (AnTI; Wells, 1994), the Metacognitions Questionnaire (MCQ; Cartwright-Hatton & Wells, 1997), or the Meta-Worry Questionnaire (MWQ; Wells, 2005) do not reliably distinguish between negative beliefs about worry and Type 2 worry.

Additionally, the majority of studies investigating negative beliefs about worry/meta-worry utilize the MCQ (Cartwright-Hatton & Wells, 1997; Wells, 1994) and AnTI (Wells, 1994), which, as Wells notes, is potentially problematic given that these two measures focus on perceived lack of control over worry, which are defining *DSM-IV* criteria of GAD (Wells, 2005). Thus, studies employing these measures assert that an established diagnostic criterion for GAD discriminates individuals with GAD from those without GAD. It is important that the constructs of Type 2 worry and negative beliefs about worry be refined, or that different methodological approaches be employed, in order to resolve this circularity. Finally, although Wells asserts a causal relationship between Type 1 and Type 2 worry, and between negative beliefs about worry and Type 2 worry, no investigations to date have tested these hypothesized causal relationships.

4.2. Treatment

The initial aim of Metacognitive Therapy (MCT) for GAD is not to reduce the amount of worry, but to *alter* Type 2 worry (i.e., the negative beliefs that the client holds about worry; Wells, 2006). In addition, the client is introduced to alternative coping strategies for dealing with worry (see Table 1). Overall, there is an emphasis on altering cognitions related to the client's reliance on worry as a positive force in his/her life as well as negative perceptions of worry as uncontrollable and dangerous. Specific treatment components include case formulation, socialization, discussion regarding the uncontrollability of worry, the danger of worry, and positive worry beliefs (Wells, 2006). Case formulation involves a series of probing questions regarding the thoughts that triggered the client's worry episode, their reaction to the episode, and any attempts to control or stifle the worry. Answers to these questions allow the therapist to understand the situations that trigger worry, as well as the client's positive and negative beliefs about worry. Socialization can be understood as the education component of MCT as clients are introduced to the goals of MCT and the therapist emphasizes the importance of altering beliefs about worry as opposed to reducing the worry itself. Given that the MCM focuses on the clients' dysfunctional beliefs about worry in their everyday lives, MCT uses several homework strategies for reducing worry such as the mismatch strategy (in which clients are asked to compare worry concerning a situation with the actual outcome of the situation) or worry modulation experiments (where clients are

instructed to increase or decrease worry on different occasions in order to dispel positive beliefs about worry; Wells, 2006).

The efficacy of MCT for GAD has been evaluated in one open trial (Wells & King, 2006) and one RCT (van der Heiden, 2008). Results from the open trial suggest significant reductions in anxiety, mood, and worry with 75% of treated individuals meeting criteria for a successful recovery at 12-months post-treatment (Wells & King, 2006). As mentioned earlier, preliminary evidence was presented of an RCT comparing MCT, IUM treatment, and a wait-list control condition. Results suggested that MCT but not IUM yielded significant improvements on worry and anxiety relative to the wait-list control condition. Further, there were no significant differences in symptom-reduction between MCT and IUM treatments (van der Heiden, 2008). An RCT comparing MCT to applied relaxation has been completed and the manuscript is in preparation (Wells, personal communication, January 2009).

5. The Emotion Dysregulation Model (EDM)

The Emotion Dysregulation Model (EDM) draws from the literature on emotion theory and the regulation of emotional states in general (e.g., Ekman & Davidson, 1994; Gross, 1998; Mayer, Salovey, Caruso, & Sitarenios, 2001; Mayer, Salovey, Caruso, & Sitarenios, 2003). The EDM also shares features with Linehan's conceptualization of emotional deficits in borderline personality disorder (Linehan, 1993a, 1993b). The EDM consists of four central components (Mennin, Turk, Heimberg, & Carmin, 2004). The first component asserts that individuals with GAD experience emotional hyperarousal, or emotions that are more intense than those of most other people. This applies to both positive and negative, but particularly to negative, emotional states (Turk, Heimberg, Luterek, Mennin, & Fresco, 2005). Second, individuals with GAD have a poorer understanding of their emotions than do most individuals. Third, they have more negative attitudes about emotions (e.g., the perception that emotions are threatening) than do others.³ Finally, they evidence maladaptive emotion regulation and management strategies that potentially leave them in emotional states that are even worse than those they initially set out to regulate (Mennin et al., 2004).

Each of the four EDM components has several tenets. For instance, subsumed under the first component of the model (intensity of emotions) are the assumptions that individuals with GAD have a lower threshold for the experience of emotion than do others, and that emotions occur more easily and quickly, rather than just more strongly, among individuals with GAD (Mennin, Heimberg, Turk, & Fresco, 2005). Moreover, perhaps due to the hypothesized greater intensity of and lower threshold for emotions, individuals with GAD are also expected to express emotions more frequently than others, and this is particularly the case for negative emotions.

The second component (poor understanding of emotions) subsumes deficits in describing and labeling emotions, as well as in accessing and applying the useful information that emotions convey (Mennin et al., 2005). The combination of components 1 and 2 is hypothesized to lead to the third component, which stipulates that individuals with GAD become overwhelmed, anxious, or uncomfortable when strong emotions occur, thereby creating a feedback loop. Individuals with GAD are also hypothesized to show extreme hypervigilance for threatening information and increased attention either toward or away from emotions and pertinent negative beliefs (McDonald, Hahn, Barefield, Smith, & Williams, 2005). Finally, this sequence culminates in the fourth

³ Mennin originally identified this component as negative reactivity to emotions but more recently has named this component negative cognitive reactions to emotions (Mennin, personal communication, April 2008).

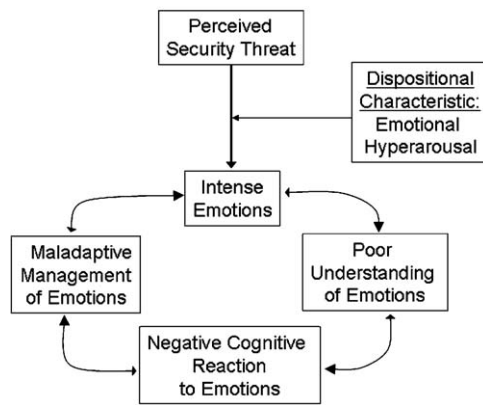


Fig. 4. Emotion Dysregulation Model. There is no published visual representation of the Emotion Dysregulation model. As such, the above was created by the current authors and approved by Dr. Mennin.

component, which specifies that individuals with GAD make unsuccessful or maladaptive attempts to either minimize emotions or over-control emotions, or inappropriately express emotional arousal (e.g., excessive worry, suppression of emotions, emotional outbursts). As such, worry plays a fundamental role in this model as an ineffective strategy to cope with emotions. According to Mennin and colleagues (e.g., Mennin et al., 2005), however, this succession of events can also proceed in the opposite direction (i.e., maladaptive emotion regulation strategies leading to increased negative emotion), thereby giving rise to a bidirectional cycle of emotion dysregulation and negative affect. Fig. 4 presents a visual depiction of this model.

5.1. Empirical support

Current evidence supports the notion that individuals with GAD experience negative but not positive emotions more intensely than do healthy controls (Mennin et al., 2005; Salters-Pedneault, Roemer, Tull, Rucker, & Mennin, 2006; Turk et al., 2005) and those with other psychopathology including depression (Mennin, Holaway, Fresco, Moore, & Heimberg, 2007) and social anxiety disorder (Mennin et al., 2007; Turk et al., 2005). In addition, prior research suggests that individuals with GAD have increased difficulty identifying, describing, and understanding their emotions compared to healthy undergraduates (Mennin et al., 2005, 2007). Current evidence supports the notion that individuals with GAD exhibit increased fear of intense emotions compared to healthy controls (Mennin et al., 2005; Salters-Pedneault et al., 2006; Turk et al., 2005). Finally, results suggest that individuals with GAD engage in more emotional coping strategies (i.e., excessive worry, emotional outbursts, emotional suppression) compared to healthy controls (Mennin et al., 2007) and individuals with other psychopathology including depression and social anxiety (Mennin et al., 2007).

Other studies have failed to support the hypothesized components of the EDM. Significant differences were not found between GAD and control groups on the ability to identify and describe emotions in a study (Novick-Kline, Turk, Mennin, Hoyt, & Gallagher, 2005) that used an observer-rated measure (Levels of Emotional Awareness Scale; Lane, Quinlan, Schwartz, Walker, & Zeitlin, 1990), or a study (Decker, Turk, Hess, & Murray, 2008) that used a diary technique to assess emotional awareness. These results suggest that self-report measures may be problematic in the assessment of the ability of individuals with GAD to identify and/or describe their emotional experiences. This may be due to GAD individuals' tendency to underestimate their emotion regulation skills. In addition, there does not appear to be a

difference in identifying, describing, or understanding emotions between individuals with GAD and individuals with other forms of psychopathology including depression (Mennin et al., 2007) and social anxiety disorder (Mennin et al., 2007; Turk et al., 2005). Finally, empirical evidence suggests no significant differences between fear of intense emotions among individuals with GAD compared to individuals with depression (Mennin et al., 2007) or social anxiety (Mennin et al., 2007; Turk et al., 2005).

Future studies of the EDM should evaluate other aspects of the model that have not yet been subjected to empirical scrutiny (e.g., that GAD is characterized by a lower emotional threshold, or that individuals with GAD fail to utilize the adaptive information carried by emotional states). Furthermore, the research on this model has focused almost exclusively on data from analogue participants whose degree of GAD severity may be below clinical thresholds. Additionally, a desirable quality of a model is that it makes only one prediction given a specific set of circumstances (Keppel, Saufley, & Tokunaga, 1992). The EDM posits that individuals with GAD may demonstrate undercontrol (e.g., inappropriate expression) of negative affective states, overcontrol (e.g., avoidance or suppression) of those states, or a combination thereof; however, the distinct precursors of these different response patterns have not been hypothesized or empirically examined. Also, there have not been any investigations of the manner in which the four components may interact temporally. Despite these limitations, preliminary data supporting several of the key components of the model (as cited herein) suggest that further testing of the EDM is warranted, and that this model has the potential to enhance our conceptual understanding of GAD.

5.2. Treatment

A therapeutic intervention based on the EDM (emotion regulation therapy for GAD [ERT]), which is built on the assumption that improvements in emotion regulation lead to improvements in GAD symptoms, is currently in development (Mennin, 2004). The intervention combines elements of CBT (e.g., self-monitoring, relaxation) with techniques designed to address problems with emotion regulation (e.g., increasing emotional awareness) and emotional avoidance (e.g., exposure). Specific treatment components of ERT (as listed in Table 1) include relaxation exercises, belief reframing, psychoeducation about emotions, emotional skills training, and experiential exposure exercises (Mennin, 2004). Emotion education focuses on teaching individuals with GAD about the importance of emotions in decision-making and interpersonal relationships. Emotional skills training equips clients with various techniques designed to enhance understanding and regulation of their emotions. Such skills include enhancing one's somatic awareness of emotions, learning how to identify and differentiate emotions, and learning the motivation behind one's emotions. Becoming familiar with these personally relevant emotional characteristics prepares clients for emotion regulation skills, through which they learn to recognize emotionally overwhelming situations and how to manage them (Mennin, 2004). Experiential exposure exercises are completed during the therapy session and aim to reveal and explore feared core emotional themes (Mennin, 2004).

A program of research investigating the efficacy of this treatment is currently in the early stages, and preliminary results have thus far been presented during a professional conference (Mennin, Fresco, Ritter, Heimberg, & Moore, 2008, November). Results from 8 of the anticipated 14 initial participants in this open trial are promising, indicating significant reductions in worry and GAD symptoms among those treated clients. Besides this open trial, an RCT is in the beginning stages of data collection (Mennin, personal communication, January 2009).

6. Acceptance-Based Model of Generalized Anxiety Disorder (ABM)

Roemer and Orsillo (2002, 2005) have drawn upon Hayes and colleagues' Model of Experiential Avoidance (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996) and Borkovec's AMW (Borkovec et al., 2004) in proposing a preliminary Acceptance-Based Model of GAD (ABM). According to Roemer and Orsillo (Roemer & Orsillo, 2002, 2005; Roemer & Orsillo, personal communication, January 2009; Roemer, Salters, Raffa, & Orsillo, 2005), the ABM involves four components: (a) internal experiences, (b) a problematic relationship with internal experiences, (c) experiential avoidance, and (d) behavioral restriction (see Fig. 5).

According to this model, a problematic relationship with internal experiences (thoughts, feelings, or bodily sensations) consists of two specific aspects, namely (1) negatively reacting to internal experiences, and (2) fusion with internal experiences. The first aspect, negatively reacting to internal experiences, involves any negative thoughts (e.g., judgment of emotional responses as extreme or undesirable) or meta-emotions (e.g., fear of fear) that may arise when an individual has an internal experience. When this occurs, individuals experience difficulties monitoring, accepting, and interpreting emotions. It is noteworthy that this first problem is conceptually similar to the EDM's emphasis on negative attitudes about emotions (e.g., a perception that emotions are threatening; Mennin et al., 2002). The second problem, fusion with internal experiences, entails becoming entangled or "fused" with the negative reaction to internal experiences. In other words, fusion with internal experiences is a belief that these transient negative reactions to internal experiences are permanent and thus a defining characteristic of the individual.

The third component of this model, experiential avoidance, is defined as actively and/or automatically avoiding internal experiences perceived to be threatening or otherwise negative. Examples include worrying about possible future events or worrying about minor matters to avoid more serious concerns. The final component of the model, behavioral restriction, is the reduced engagement in valued actions or activities that the individual finds meaningful (e.g., spending time with family). Behavioral restriction develops as individuals with GAD become

more experientially avoidant of their internal experiences. They often generalize that avoidance to other activities in their lives that are valuable, such as spending time with their families. One consequence of behavioral restriction may be reduced awareness of the present moment, which can limit the awareness individuals with GAD experience when they do engage in valued actions.

The developers of the ABM suggest that "individuals with GAD have negative reactions to their own internal experiences, and are motivated to try to avoid these experiences, which they do both behaviorally and cognitively (through repeated engagement in the worry process)" (Roemer & Orsillo, 2005, p. 216). Specifically, an individual may perceive an external threat or may have an unpleasant internal experience that leads him/her to engage in experiential avoidance. This avoidance reduces the distress caused by the internal experience in the short-term. In the long-term, however, this avoidance serves to reinforce behavioral restriction as the individual becomes less engaged in activities (either by engaging in the activities less often or by being less experientially aware during the activities) that he/she finds valuable. This results in increased distress that can trigger more negative internal experiences, thereby perpetuating the cycle.

6.1. Empirical support

Recent studies have explicitly examined components of the ABM in predicting GAD symptoms (Lee, Orsillo, Roemer, & Allen, *in press*; Michelson, Lee, Orsillo, & Roemer, 2008, November; Roemer et al., 2005, 2009). Roemer et al. (2005) conducted two studies to examine the relationship between experiential avoidance, negative reactions to emotions (i.e., fear of anger, depression, anxiety, and positive emotions), and GAD symptom severity in a nonclinical sample of women (Study 1) and a small clinical sample of individuals with GAD (Study 2). Results suggest that experiential avoidance and negative reactions to emotions were both positively associated with GAD symptom severity in the nonclinical sample (Study 1), but not in the clinical sample (Study 2), although this lack of a significant association in the clinical sample may be partially attributable to the small sample size ($N = 19$; Roemer et al., 2005).

Roemer et al. (2009) conducted two studies to examine the relationship between emotion regulation, mindfulness, and GAD symptom severity in a nonclinical sample (Study 1) and among individuals with GAD and a nonclinical control group (Study 2). Results from Study 1 of Roemer et al. (2009) suggest that difficulties in emotional regulation were positively associated with GAD symptom severity and that mindfulness was inversely associated with GAD symptom severity within a nonclinical sample drawn from an urban university. Results from Study 2 (Roemer et al., 2009) suggest that individuals with GAD reported higher levels of difficulties with emotion regulation and significantly lower levels of mindfulness compared to a nonclinical control group. Lee et al. (*in press*) found that individuals with GAD reported greater levels of experiential avoidance and distress about emotions compared to a nonclinical control group. Finally, Michelson et al. (2008, November) found that individuals with GAD engaged less in valued actions compared to a nonclinical control group.

There are several limitations to the existing research on the ABM. First, the model is still in its developmental stages and thus many of the components and labels identified in this paper are based on personal communications with the authors and papers under review, rather than on published work (Lee et al., *in press*; Roemer & Orsillo, personal communication, January, 2009). In addition, there have been no tests of the temporal relationship between the constructs specifically identified in this model. The majority of the tenets of ABM await *a priori* evaluation using more

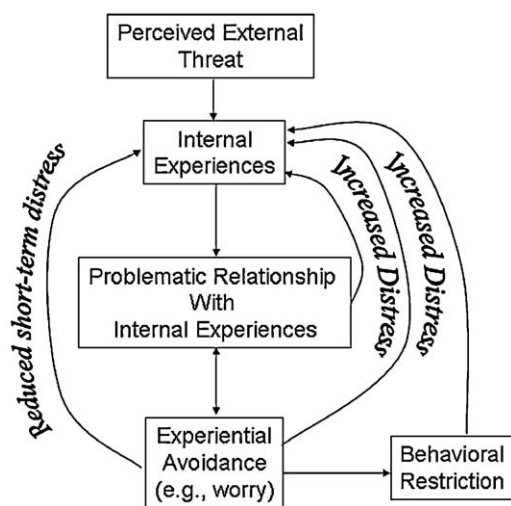


Fig. 5. An Acceptance-Based Model of GAD. There is no published visual representation of the Acceptance-Based Model of GAD. As such, the above was created by the current authors and approved by Drs. Roemer and Orsillo. Note that although the above cycle may begin with a perceived external threat it might also be set-off by internal experiences alone. Further, once the cycle begins internal experiences rather than perceived external threats play a more important role in perpetuating the cycle.

stringent designs including longitudinal analyses and experiments in which the key constructs are manipulated. Finally, to the best of the authors' knowledge, there is little research on GAD that examines fusion of internal experiences; thus, this construct requires further validation.

6.2. Treatment

Roemer and Orsillo have developed an acceptance-based behavioral therapy for GAD (ABBT; Orsillo, Roemer, & Barlow, 2003; Roemer & Orsillo, 2005, 2007; Roemer, Orsillo, & Salters-Pedneault, 2008). ABBT is comprised of three broad treatment components, specifically (a) psychoeducation about the ABM, (b) mindfulness and acceptance exercises, and (c) behavior change and valued actions (Roemer & Orsillo, 2005). Psychoeducation involves teaching the client about the ABM, with particular emphasis on teaching the client about the use of worry as a tactic for avoiding more distressing internal experiences that lead to reduced engagement in valued actions. In addition, psychoeducation also focuses on the function of emotions in preparing for action, communicating with others, and enhancing life experiences. Finally, psychoeducation focuses on defining the goal of treatment as promoting valued actions rather than reducing distressing internal experiences such as anxiety (Roemer & Orsillo, 2005).

Mindfulness and acceptance exercises focus on promoting active, compassionate, nonjudgmental, and expansive awareness of one's internal and external sensations as a way to fully experience the present moment. This is accomplished through techniques used in other GAD treatments (e.g., AMW treatment) such as self-monitoring and relaxation. In addition, the client is asked to label internal experiences (e.g., "I am having the feeling of sadness;" "I am having the thought that I am useless"). This is meant to help the client separate or "defuse" the client's perception of self from internal experiences. The final component of treatment is behavior change and valued actions. For this, the client is asked to identify values (i.e., aspects of life that he/she finds meaningful) and to assess how consistent his/her current actions are to these values. Following this, the client is asked to engage in a series of writing assignments to further increase awareness of the relationship between current behaviors and values. Through these exercises, the client and therapist work to identify specific valued actions in which the client can engage and that can be self-monitored, with the goal of increasing the frequency of these valued actions over time (Roemer & Orsillo, 2005).

Results from an open trial conducted with clients diagnosed with GAD indicated that ABBT resulted in significant improvements in worry, anxiety, and depression at post-treatment, and that the majority of benefits were still apparent at 3-month follow-up (Roemer & Orsillo, 2007). In addition, a recent RCT examining ABBT compared to a wait-list control condition in a clinical sample yielded similar results, with large effect sizes and significantly reduced clinician-rated and self-reported GAD symptoms (Roemer et al., 2008). An RCT is currently underway comparing ABBT to applied relaxation (Roemer & Orsillo, personal communication, January 2009).

7. Limitations of extant research

Although the models discussed herein hold promise for deepening our understanding of GAD, studies examining the models share several methodological limitations. Most of the studies rely heavily on self-report measures that require individuals to remember previous emotional states. As is evident from previous research, individuals' short-term recall of emotions

appears to involve qualitatively different processes compared to long-term past recall of emotions (e.g., Robinson & Clore, 2002). As such, methodological approaches in which participants are asked to engage in short-term recall or present-moment reporting of emotional states would likely provide discrepant results from those relying on long-term past emotional recall. In addition, individuals with GAD respond differentially on physiological and self-report measures (e.g., Borkovec & Hu, 1990; Behar & Borkovec, submitted for publication), which further underscores the need for greater utilization of objective measures of functioning in this population.

Although self-report measures provide an effective tool for testing preliminary hypotheses, a movement towards the use of more objective measures of internal experiences is warranted. These methods could include collateral and historical data, observational measures, physiological monitoring, and extended naturalistic monitoring for continuous time periods. For example, two studies employed either an observer-rated measure or a diary technique to assess for emotional awareness, a key construct of the EDM (Decker et al., 2008; Lane et al., 1990). As reviewed above, these studies yielded different results compared to self-report, thus further highlighting the potential limitation of self-report measures. These types of techniques should be used with greater frequency to better assess key constructs from each model.

Another limitation shared by many of the studies reviewed herein concerns their excessive reliance on identifying GAD samples based on continuous measures such as the GAD-Q-IV (Newman, Zuellig, Kachin, Constantino, & Cashman-McGrath, 2002) as opposed to diagnostic interviews. Because analogue samples may be less severely impaired by worry and other GAD symptoms, diagnostic interviews such as the Anxiety Disorder Interview Schedule-4th Edition (ADIS-IV; Brown, DiNardo, & Barlow, 1994) and the Structured Clinical Interview for the DSM-IV-TR (SCID-IV; First, Spitzer, Gibbon, & Williams, 2007) should be used whenever possible for proper classification of individuals with GAD.

Perhaps most importantly, the vast majority of investigations examining the five models have employed non-experimental designs in tests of hypotheses. This fact stands in stark contrast to the various specific causal hypotheses presented by the models.⁴ Experimental studies with clear *a priori* hypotheses are needed in future tests of the newer models of GAD. For example (Ladouceur, Dugas, et al., 2000; Ladouceur, Gosselin, & Dugas, 2000) employed an experimental manipulation in which they utilized a gambling task to manipulate intolerance of uncertainty. This type of innovative methodological design approach should be used more widely to provide rigorous assessments of the causal predictions made by each model. In addition, the use of RCTs with active control conditions and appropriate examination of moderation and mediation (e.g., Kraemer, Wilson, Fairburn, & Agras, 2002), as discussed in the future directions section below, is required to delineate both the theoretical and practical utility of each theory.

8. The models in comparison

Despite these limitations, the models collectively offer valuable insights into the basic nature of GAD and the necessary steps to its successful treatment. Indeed, the veritable explosion in research on GAD over the past 15 years has resulted in many complementary theoretical models and vast improvements in our ability to treat the condition (Covin et al., 2008). The five theoretical models share a common emphasis on the central importance of avoidance of internal experiences. For example, the AMW asserts that worry

⁴ Although the AMW does cite many experimental investigations as evidence for its central tenets, no direct *a priori* experimental tests of the model exist.

is a strategy for avoiding emotion-laden stimuli such as vivid images and somatic activation, whereas the IUM identifies worry as a strategy for avoiding uncertainty. The MCM focuses on individuals engaging in strategies to avoid worrying about worry, and the EDM identifies worry as one of several ineffective coping strategies to manage and likely avoid emotions. Finally, the ABM suggests that worry is one type of experiential avoidance of internal experiences. Further, there are several common treatment components across the models including psychoeducation about GAD, self-monitoring, and an emphasis on training clients to cope with internal experiences. In addition to these similarities, there are also important conceptual differences that impact the treatments designed from each model. These conceptual differences can be highlighted by classifying the theories into three realms: cognitive models (i.e., MCM, IUM), emotional/behavioral models (i.e., EDM, ABM), and an integrated model (i.e., AMW).

Although the cognitive models certainly contain secondary foci on emotional and behavioral components, specific thoughts/cognitions are identified as the primary pathogenic mechanism of GAD. For example, the IUM highlights intolerance of uncertainty as the primary construct of interest, which the authors identify as a cognitive vulnerability for worry, cognitive avoidance, and negative problem orientation. Furthermore, negative problem orientation is defined as negative thoughts and core beliefs that individuals with GAD have about their problem-solving ability (Dugas et al., 1995). Similarly, the MCM highlights the importance of negative meta-beliefs about worry and subsequent Type 2 worry (i.e., worry about worry; Wells, 1995). As such, these two models' primary foci are on cognitions as the key components that drive the development and maintenance of GAD. This focus on cognitions directly impacts the types of treatment techniques used. For example, treatments based on these models primarily focus on understanding and evaluating core cognitions (i.e., beliefs and thoughts) about internal experiences such as the veracity of negative problem-solving beliefs (IUM), negative meta-beliefs about worry (MCM), and positive beliefs about worry (IUM and MCM).

In contrast, the emotional/behavioral models focus primarily on the impact of emotions and behaviors in the development and maintenance of GAD. For example, in the EDM, poor understanding and regulation of emotions is identified as the key construct in the conceptualization of GAD etiology and maintenance (Mennin et al., 2002). The ABM highlights the importance of experiential avoidance, or engaging in behaviors to avoid unpleasant internal experiences, which leads to behavioral restriction or a reduced engagement in behaviors that otherwise bring valued meaning into an individual's life (Roemer & Orsillo, 2002). Although cognitions play an important role in treatments based on these theoretical conceptualizations of GAD, emotions and behaviors are the primary focus of treatment, as is evidenced in these treatment packages' predominant focus on emotion education (i.e., emotional skills training, the function of emotions in life, and the role of emotions in decision-making; EDM and to a lesser degree ABM), experiential exposure exercises (EDM and ABM), mindfulness/acceptance (ABM), and values-based actions (ABM).

The AMW places equal importance on cognitive elements (e.g., positive worry beliefs) and emotional/behavioral elements (e.g., avoidance of emotionally laden stimuli) as key components in the development and maintenance of GAD (Borkovec et al., 2004). In addition, the AMW has evolved to include new components that emphasize other factors such as interpersonal relationships, attachment style, and past trauma (Borkovec et al., 2004). Treatment based on the AMW incorporates cognitive restructuring (cognitive), self-control desensitization (behavioral), relaxation skills (behavioral), and interpersonal and emotional processing (affective) as central components of treatment.

9. Future directions and conclusion

Although significant advances have been made in the theoretical understanding of GAD, there remains a need for a greater amount of basic research examining the predictive components of the five models. Moreover, additional randomized clinical trials are warranted to further test the practical utility of each model and its impact on individuals suffering from GAD. Specifically, we recommend the increased use of additive (also called constructive) designs as a means of evaluating specific treatment components that may enhance the efficacy of existing therapies for GAD. Additive designs start with a basic treatment that is known to be efficacious (e.g., traditional CBT) and then add to it a new treatment component that for theoretical and/or empirical reasons is hypothesized to potentially enhance the efficacy of the basic treatment component (for a detailed discussion of the additive design, see Behar & Borkovec, 2003). Such an approach to evaluating treatment efficacy allows for clear conclusions regarding the impact of each treatment component on outcomes and thus can further advance our understanding of underlying theoretical constructs that impact GAD.

Additionally, future RCTs should continue to examine moderation analyses in order to identify individual differences in differential treatment response to particular therapies for GAD (Kraemer et al., 2002). For example, some individuals with GAD may score particularly highly on measures of intolerance of uncertainty and thus may respond better to treatment components with an emphasis on cognitions, whereas other individuals with GAD may score highly on measures of poor emotion regulation and thus respond better to emotional/behavioral treatment components. Examination of these moderation hypotheses could then be used to tailor specific individuals to specific treatments for GAD. Based on current models, important moderators to evaluate include intolerance of uncertainty, attachment style, negative meta-beliefs about worry, and experiential avoidance, among others.

The effectiveness of CBT for the treatment of GAD has yielded promising results (Covin et al., 2008; Mitte, 2005), yet there is a need to further enhance the efficacy of evidence-based interventions. All of the current models highlight the importance of worry as an avoidance strategy of internal experiences. Furthermore, the models can be conceptualized into three types: cognitive models (i.e., IUM, MCM), emotional/behavioral models (i.e., EDM, ABM), and an integrated model (i.e., AMW). Future work examining the components of each of these models is warranted using a greater reliance on experimental designs that examine the predictive elements of each model. In addition, testing the treatment components that are based on these theories should rely more heavily on the additive design as a way of seeking to enhance current therapies with additional components that may increase the efficacy of those therapies. Finally, these RCTs should also include moderation analyses to determine the types of individuals who respond best to each type of treatment. These steps will aid in our enhanced understanding of the etiological and maintaining factors in GAD, as well as our improved ability to treat individuals suffering from this condition.

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