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A novel theory of experiential avoidance in generalized anxiety disorder: A review and synthesis of research supporting a contrast avoidance model of worry,^{☆,☆☆}

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Abstract

An important emphasis of the literature on generalized anxiety disorder (GAD) has been to achieve a greater understanding of the function of emotion (e.g., avoidance, dysregulation) in the etiology and maintenance of this disorder. The purpose of the following paper is to propose a new way of conceptualizing emotional sequelae in GAD by detailing the Contrast Avoidance Model of Worry. In presenting this model, we review theory and data that led to our current position, which is that individuals with GAD are more sensitive to feeling emotionally vulnerable to unexpected negative events, and that worry (the key pathological feature of GAD) is employed to *prolong and maintain a negative emotional state* thereby avoiding an unexpected negative emotional shift, or contrast experience. We also discuss implications for treatment given the presence of a new target for emotional exposure techniques. Finally, we establish the Contrast Avoidance Model within the framework of extant theories and models of pathogenic processes of GAD.

Keywords

Generalized anxiety disorder; Emotion; Emotional processing; Emotional avoidance; Emotion-regulation; Cognitive-behavioral therapy

Among those who study generalized anxiety disorder (GAD), there has been great interest in understanding its emotional sequelae, and how worry (the cardinal feature of GAD) is associated with the etiology and maintenance of emotion regulation problems. Within this context, Borkovec and colleagues' Cognitive Avoidance Theory of Worry (Borkovec, 1994; Borkovec, Alcaine, & Behar, 2004) has played a pivotal role in our understanding of the cyclical relationship between worry and emotional dysfunction, spurring much intriguing discussion and empirical study of these phenomena. Nonetheless, there is still room to improve upon our understanding of the pathogenic processes within GAD. Therefore, in pursuit of greater knowledge and insight into a complex clinical disorder, we endeavor to present a new perspective on the relationship between worry and emotional dysfunction in GAD.

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In the present paper, we will review and critique extant literature pertaining to the perspective that worry enables emotional avoidance in GAD, explore the direct physiological and subjective emotional impact of worry, and present a new theory pertaining to experiential avoidance in GAD. Specifically, we propose the Contrast Avoidance Model of Worry as an extension and modification of the perspective that worry serves an emotional avoidance function, and we present some preliminary findings in support of this model. We also discuss possible clinical implications for a disorder that has been considered historically to be the least successfully treated of all anxiety disorders (Borkovec & Ruscio, 2001; Newman & Erickson, 2010; Westen & Morrison, 2001). Finally, we provide a comparison between our new model and current leading models of worry and emotion in GAD.

1. Avoidance models of worry

Borkovec's model of GAD (Borkovec, 1994; Borkovec et al., 2004) suggests that worry functions as a cognitive avoidance response to perceived future threats. Among several types of avoidant functions posited for worry, two are most central to the theory. The first is that worry is a cognitive attempt to generate ways to prevent bad events from happening and/or to prepare oneself for their occurrence. The second is that worry just prior to fear-inducing images mutes aspects of somatic response to those images. In both types, this cognitive avoidance response is negatively reinforced and precludes the emotional processing of fear-related stimuli otherwise necessary for extinction of anxiety responses, thus leading to the maintenance of worry.

The second type of avoidant function in this theory is based on data showing that speech anxious participants who worry just prior to imaginal exposure to repeated public speaking images show reduced cardiovascular response to those images, whereas those who think relaxing or neutral thoughts before imaginal exposure show strong cardiac response with habituation across images (Borkovec & Hu, 1990; Borkovec & Sides, 1979; Peasley-Miklus & Vrana, 2000; Vrana, Cuthbert, & Lang, 1986; Vrana, Cuthbert, & Lang, 1989). Moreover, amount of time spent in worrisome thought (as opposed to imagery) during the worrying is negatively correlated with cardiac reactivity to subsequent fearful images, whereas the amount of time spent in relaxed thinking during relaxation was positively correlated with cardiac reactivity to the images (Borkovec, Lyonfields, Wiser, & Deihl, 1993). Taken together, these data suggest that it is the *worrisome* nature of thoughts that predicts the degree of inhibited reactivity. According to Foa and Kozak (1986) the absence of reactivity upon exposure to a feared stimulus is a demonstration of a failure to engage in emotional processing. Thus, Borkovec and colleagues suggest that worry precludes emotional processing that would otherwise allow for extinction. This theory also suggests that muted cardiovascular responses to subsequent feared imagery leads to the negative reinforcement of worry by a reduction in some somatic aspects of anxiety.

Later theories have suggested that in addition to precluding emotional processing, worrisome thinking may be associated with avoidance of emotional experience or avoidance of emotional arousal (Mennin, Heimberg, Turk, & Fresco, 2002; Newman, Castonguay, Borkovec, & Molnar, 2004; Roemer, Salters, Raffa, & Orsillo, 2005). Indeed, individuals with GAD do report greater fear of the negative consequences of a range of emotions than do non-anxious controls (Llera & Newman, 2010a; Mennin, Heimberg, Turk, & Fresco, 2005; Turk, Heimberg, Luterek, Mennin, & Fresco, 2005). Data also show that people with GAD report greater fear of and discomfort with anxiety and depression than do nonanxious control participants, as well as greater fear of depression than participants with social anxiety disorder (Llera & Newman, 2010a; Roemer et al., 2005; Turk et al., 2005). Moreover, when asked why they worry, GAD patients differed from nonworried anxious and control participants by indicating that "worry helps distract me from more emotional

topics,” (Borkovec & Roemer, 1995; Freeston, Rheaume, Letarte, Dugas, & Ladouceur, 1994), supporting theories that individuals with GAD use their worry to try to control emotional arousal.

Based on emotion theories, a number of new treatments have been developed to target avoidance of emotion in GAD. For example, Newman, Castonguay, Borkovec, and colleagues (Newman, Castonguay, Borkovec, Fisher, & Nordberg, 2008; Newman et al., in press) have developed and tested an interpersonal and emotional processing therapy for GAD; Roemer, Orsillo, and Salters-Pedneault (2008) have developed a mindfulness-based CBT for GAD; and Mennin (2006) has developed an emotion-regulation therapy for GAD. Each of these treatments is in various stages of testing with promising results from wait-list control and open trial pilot studies. To date, only one published study has directly compared an emotion-focused treatment to standard CBT (Newman et al., in press).

If people with GAD avoid emotions and if such emotional avoidance negatively reinforces the worry process, the treatment proposed by Newman and colleagues (Newman et al., 2004) might benefit such clients by using experiential techniques to expose individuals with GAD to avoided emotions. Further, this treatment should be effective in teaching people to attend to their emotions, that emotions are not dangerous, as well as in leading to habituation and decreasing worry. In addition, these effects should be more robust than those of standard CBT. However, in a recent randomized controlled trial of interpersonal and emotional processing therapy (I/EP) plus cognitive behavioral therapy (CBT) compared to CBT plus supportive listening (SL) (Newman et al., in press), we found no significant differences between CBT plus I/EP techniques and CBT plus SL on GAD symptoms. Our failure to demonstrate an added benefit of emotional processing therapy beyond standard CBT led us to revisit the basic research on GAD to determine whether the predominance of the data truly demonstrates that worry enables emotional avoidance.

2. The causal role of worry in creating negative emotionality

A tenet of many of the later theoretical models of emotion and GAD is that worry functions to enable avoidance of the experience of distressing negative emotions. However, experimental studies supporting this perspective have focused primarily on the impact of worry on *subsequent reactivity* to exposure to emotional stimuli. In the following section we review the data as they pertain to the experiential impact of the worry process itself.

Contrary to the idea that worry enables emotional avoidance, there is an abundance of data showing that individuals experience significant negative emotion caused by worry, and this has been demonstrated on both subjective and physiological levels (see Brosschot, Gerin, & Thayer, 2006 for a complete review). In terms of physiology, both trait and state worry are associated with increased physiological activation, particularly cardiovascular activation (Brosschot, van Dijk, & Thayer, 2002; Dua & King, 1987; Gerin, Davidson, Christenfeld, Goyal, & Schwartz, 2006; Glynn, Christenfeld, & Gerin, 2002; Llera & Newman, 2010a; Lyonfields, Borkovec, & Thayer, 1995; Pieper, Brosschot, van der Leeden, & Thayer, 2007; Roger & Jamieson, 1988; Scheier & Bridges, 1995; Segerstrom, Glover, Craske, & Fahey, 1999; Stapinski, Abbott, & Rapee, 2010; Suchday, Carter, Ewart, Larkin, & Desiderato, 2004; Thayer, Friedman, & Borkovec, 1996; Vickers & Vogelanz-Holm, 2003), which is contrary to an avoidance of activation hypothesis. Specifically, experimental inductions show that worry leads to accelerated heart rate and elevated skin conductance levels (Andor, Gerlach, & Rist, 2008; Dua & King, 1987; Hofmann et al., 2005; Lyonfields et al., 1995; Peasley-Miklus & Vrana, 2000; Stapinski et al., 2010; Thayer et al., 1996; Vrana & Lang, 1990; Vrana et al., 1989; York, Borkovec, Vasey, & Stern, 1987) when compared to neutral tasks, relaxation, or baseline levels. In addition, people with GAD may have chronically low

vagal tone (high stable heart rates and low heart rate variability), which has also been linked causally to worry (Brosschot, 2010; Brosschot & Thayer, 2003; Hoehn-Saric, McLeod, Funderburk, & Kowalski, 2004; Lyonfields et al., 1995; Thayer et al., 1996). Further, individuals with GAD have exhibited higher average heart-rate compared to control participants during ambulatory monitoring (Hoehn-Saric et al., 2004) and during laboratory studies (Knepp & Friedman, 2008).

Worry is also associated with increased activity in endocrinological and immunological systems (Schlotz, Hellhammer, Schulz, & Stone, 2004; Segerstrom, Solomon, Kemeny, & Fahey, 1998; Segerstrom et al., 1999), which although not directly related to emotional experiencing, nonetheless further underscores the argument that worry is a physiologically activating process. During worry, individuals exhibited significantly greater overall bilateral EEG beta than during the processing of difficult cognitive tasks (Carter, Johnson, & Borkovec, 1986). Further, EEG Beta has been associated with state and/or trait anxiety (Faure, 1949; Gastaut, Dongier, Broughton, & Tassinari, 1964). Moreover, as a result of a worry induction, people with GAD evidenced higher levels of gamma activity than did control participants in posterior electrode sites that have been associated previously with negative emotion (Oathes et al., 2008). In sum, extant data strongly suggest that worry causes physiological activation, which supports the concept of an emotionally activating model of worry more so than one of avoidance.

It is important to note that some studies have failed to find evidence that worry inductions lead to physiological activation relative to relaxation or neutral activities (Borkovec & Hu, 1990; Borkovec, Robinson, Pruzinsky, & DePree, 1983). Such inconsistent findings have been explained by Thayer et al. (1996) as possibly due to a failure of some studies to measure indices that reflect parasympathetic activity. According to Thayer, the relative increase in arousal observed during worry and anxiety is due to a deficit in the inhibitory activity of the parasympathetic nervous system. Thus, arousal during worry reflects a disinhibition of sympathoexcitatory mechanisms of cardiac control. Also, the tonically low vagal tone found in those with GAD reflects a physiological rigidity that may sometimes lead to failure to differentiate baseline from worrisome states in these individuals. As suggested by Hoehn-Saric et al. (2004), diminished physiological flexibility may represent a partial but insufficient effort of the body to adapt to the physiological changes induced by chronic anxiety.

In addition to physiological arousal, self-report measures of worry are highly correlated with measures of trait anxiety (Davey, Hampton, Farrell, & Davidson, 1992; Meyer, Miller, Metzger, & Borkovec, 1990; Tallis, Eysenck, & Mathews, 1991), state anxiety (Metzger, Miller, Cohen, Sofka, & Borkovec, 1990; Meyer et al., 1990), and depression (Metzger et al., 1990; Meyer et al., 1990). Trait worrying also predicted emotional distress 6–8 weeks later (Calmes & Roberts, 2007). Moreover, in exploring a direct causal role of worry, laboratory worry inductions have been found to lead to elevated subjective ratings of negative emotion (Borkovec & Inz, 1990; Borkovec et al., 1983; Borkovec et al., 1993; Hofmann et al., 2005; Llera & Newman, 2010a; Stapinski et al., 2010), including both anxious and depressive responses (Andrews & Borkovec, 1988). Taken together, these data suggest that worry does not lead to avoidance of a negative emotional state, but rather creates or sustains a negative state.

Given the multitude of data pointing to a negative activation model of worry, it is important to revisit extant studies demonstrating that worry leads to a muted response to a negative stimulus. Notably, in studies examining the experimental impact of worry on emotional reactivity to fear stimuli, although further reactivity was muted via preceding worry, this may be largely because worry has been used as the baseline to which response to emotional

stimuli is compared (e.g., Borkovec & Hu, 1990; Llera & Newman, 2010a). As indicated earlier, worry itself creates subjective and physiological indicators of anxiety. Therefore, if people are already experiencing negative arousal during worry and worry is used as the comparison baseline, this simply means that prior worry only prevents a *further increase* in arousal (Llera & Newman, 2010a). When a pre-worry resting baseline is used as the comparison point, there is no muting effect of worry on reactivity to fear stimuli (Peasley-Miklus & Vrana, 2000; Stapinski et al., 2010; Vrana et al., 1986, 1989). Moreover, Fisher, Granger and Newman (2010) showed that only GAD participants who exhibited sympathetic arousal at baseline (as measured by salivary alpha-amylase) showed muted reactivity to a stressor. Those GAD participants without sympathetic arousal at baseline (perhaps individuals who were not in the midst of worrying about something) showed reactivity comparable to nonanxious control participants. Also, Hazlett-Stevens and Borkovec (2001) found that in the context of in vivo exposure, worry did not preclude reactivity to a public speaking task in participants with public speaking anxiety. Together, these findings support our position that the only avoidance facilitated by worry may be that of a further increase in negative arousal.

3. A new way of understanding the avoidance phenomenon

A recent study by Llera and Newman (2010a) further illustrates the proposition that worry may not enable avoidance of emotion. We extended previous experimental studies of the impact of worry on fear imagery by using film clips that evoked a range of emotions. Thirty-eight participants with GAD and 35 nonanxious participants were assigned randomly to engage in worry, brief relaxation, or neutral inductions prior to sequential exposure to 4 emotion-inducing film clips. During worry, participants with GAD had higher physiological activation than they did during relaxation, with a neutral induction falling nonsignificantly in between. Those in the worry induction also reported higher negative affect than both relaxation and neutral inductions, which were statistically similar.

Consistent with prior studies using worry as the comparison baseline, in response to the fear clip, prior worry led to significantly less initial physiological (Cohen's d effect size = 1.0) and subjective responding than prior relaxation ($d = 1.35$), and to less subjective responding than did the neutral induction ($d = 1.2$). Prior worry also led to less subjective reactivity than either relaxation ($d = 1.19$) or neutral inductions ($d = .92$) in response to the sad clip. The finding that both relaxation and neutral inductions led to similarly greater subjective reactivity than worry suggests that these effects were driven by worry precluding further reactivity (as opposed to relaxation facilitating further reactivity) to both fearful and sad emotions but not positive emotions. These findings also suggest that worry heightens negative emotionality such that no further increases in negative affect or physiological responding are observed in response to fear exposure.

Importantly, there was no evidence of avoidance of fearful emotions during the fear induction. Specifically, there were no differences between prior worry, relaxation, or neutral activity in absolute levels of negative emotionality (either subjective or physiological) *during* the fear clip. On the other hand, whereas prior relaxation and neutral inductions led to *increased* sad affect, prior worry led to a decrease in reported sadness during the sad clip from previously heightened levels experienced during worry. Nonetheless, as with the fearful film, absolute levels of negative affect during exposure to the sad clip were not actually lower in participants who had worried previously than in participants in the neutral or relaxation inductions. Therefore, these individuals did not avoid negative affect associated with sadness. There were also no differential effects of worry, neutral, or relaxation inductions on reactivity to a happy film clip, suggesting that worry does not preclude positive affect associated with happy emotions. Taken together, these data show

that the only benefit of worry insofar as emotional avoidance is concerned appears to be an avoidance of the experience of a further increase or negative contrast with fearful and sad emotions.

The finding with respect to the impact of worry on reactivity to sad stimuli provides an additional link between GAD and depression. Depression and GAD are commonly comorbid disorders (Kessler et al., 2002). In addition, worry may play a role in depression. Several studies have shown that depressive rumination, which may be similar in process and emotional content to the worrisome thinking in GAD, is a factor that can maintain the depressive state (for a review, see Kuehner, Huffziger, & Liebsch, 2009). Moreover, laboratory inductions of worry show that it elicits both anxiety and depression in nearly equal amounts (Andrews & Borkovec, 1988). Ruminative self-focus in depressed and dysphoric participants is positively associated with both negative affect and negative mood reactivity to daily stressful events (Moberly & Watkins, 2008a, 2008b). Thus, rumination may serve to prolong negative emotions in much the same way that worry does.

Although these data provide an alternative to the perspective that worry enables avoidance of emotion, they do show that worry precludes *processing* of negative emotion, as suggested by Borkovec, Alcaine and Behar (2004). Thus, it is important to distinguish between emotional avoidance and emotional processing avoidance. By emotional avoidance, we are referring to the absence or reduction of a negative emotional state despite the presence of a stressor. However, data from Llera and Newman (2010a) show equivalence in *absolute levels* of negative affect following negative film clips regardless of prior induction, suggesting that worry does not facilitate avoidance of negative emotion. According to Foa and Kozak (1986), however, a demonstration of emotional processing requires *reactivity* upon exposure at both subjective and physiological levels. If one or both of these domains do not demonstrate reactivity to an emotional stimulus, the full fear structure has not been accessed and habituation is unlikely. Evidence that prior worry precludes further reactivity to fearful and sadness-inducing stimuli (Borkovec & Hu, 1990; Llera & Newman, 2010a; Peasley-Miklus & Vrana, 2000; Vrana et al., 1986, 1989) suggests that a central aspect of emotional processing of negative affect is eliminated by chronic worry. Additional evidence is exhibited with respect to a failure of those with GAD to demonstrate inhibitory learning (Craske et al., 2008) despite chronic exposure to negative emotional states. Taken together, these findings suggest that people with GAD neither avoid nor process negative emotions.

4. Worry leads to sustained emotionality

Also contrary to the idea that worry enables emotional avoidance is evidence for the relationship between worry and sustained negative emotionality. Based on extant data, Brosschot and colleagues (Brosschot, Pieper, & Thayer, 2005; Brosschot, Van Dijk, & Thayer, 2007; Brosschot et al., 2006; Pieper & Brosschot, 2005) have proposed that worry may be a mechanism by which cognitive representation of a stressor and associated negative emotionality are prolonged. Worry or rumination leads to slow recovery of blood pressure and heart rate in laboratory studies (Brosschot et al., 2006; Gerin et al., 2006; Glynn et al., 2002; Verkuil, Brosschot, de Beurs, & Thayer, 2009). Daily worry also predicts high heart rate and low heart rate variability during waking hours as well as during sleep (Brosschot et al., 2007). In addition, worry during a stressful period predicted higher anxiety and depression after the stress had ended (Segerstrom, Tsao, Alden, & Craske, 2000). Moreover, those with GAD report heightened emotional intensity and greater difficulty recovering from a negative mood state than nonanxious control participants (Mennin et al., 2005; Turk et al., 2005). Further, in a recent ambulatory physiology study combined with momentary assessment of worry, stress, and mood, whereas stressful events were not associated with heart rate or heart rate variability, worry episodes heightened both concurrent and

succeeding cardiac activity for 2 h following each worry episode (Pieper, Brosschot, van der Leeden, & Thayer, 2010). The impact of worry on cardiac activity in this study was independent of emotions, physical activity, posture, gender, age, body mass index, smoking, alcohol, coffee consumption, and time of day.

Borkovec (1985) has also theorized that the functional effect of worry may be the maintenance of anxiety. Worrying involves repeated rehearsal of catastrophic outcomes (Borkovec, 1985; Davey & Matchett, 1994). Such repetitious catastrophizing can worsen anxiety (Grayson & Borkovec, 1978). Worriers generate significantly more catastrophizing steps than do nonworriers during worry, and as catastrophizing unfolds they demonstrate a significant increase in subjective discomfort compared to nonworriers (Davey & Levy, 1998; Vasey & Borkovec, 1992). Similarly, worrying causes an incubation of negative thought intrusions (Borkovec et al., 1983; Butler, Wells, & Dewick, 1995; Wells & Papageorgiou, 1995; York et al., 1987). Moreover, in a series of studies, Jones, Davey, and colleagues have shown that cognitive rehearsal of an aversive unconditioned stimulus (which is similar to repetitive negative thought found in worry) maintains a conditioned fear response over successive nonreinforced presentations of a neutral conditioned stimulus (Davey & Matchett, 1994; Jones & Davey, 1990). Also consistent with this idea is a series of investigations conducted by Davey and colleagues (Davey, 2006; Startup & Davey, 2001) which support their “mood as input” hypothesis. This hypothesis states that negative mood, when experienced during worry, prevents individuals from discontinuing the worry process as they interpret the negative mood as evidence that the worry topic has not yet been properly resolved.

GAD and worry also impact information processing in ways that interfere with learning from experience and that contribute to the maintenance of anxious meanings attributed to various stimuli. For example, those with GAD have been found to have a hyper-responsive threat detection system and a biased tendency to interpret ambiguous threat cues as negative (Albu, 2008; Bradley, Mogg, Millar, & White, 1995; Bradley, Mogg, White, Groom, & de Bono, 1999; Mathews & MacLeod, 2005; Mogg, Millar, & Bradley, 2000; Waters, Mogg, Bradley, & Pine, 2008; Wilson, MacLeod, Mathews, & Rutherford, 2006). GAD patients also have an intentional memory inhibition bias for forgetting emotional material (Albu, 2008). Together, this suggests a failed vigilance-inhibition pattern in response to threatening material. Such cognitive biases are likely to prolong negative emotionality by reducing the capacity for emotional learning. Thus, rather than via avoidance of emotionality, another mechanism by which worry may prevent emotional processing may be via sustained negative emotionality, and a dampening of emotional learning.

5. A new theory of experiential avoidance in GAD: Avoidance of negative emotional contrast

Despite the causal role of worry in sustaining negative affect, high worriers view worry as a positive coping strategy and they report actively using it as such. Such positive functions include “preparation for the worst”, “motivation”, “distraction from more emotional topics”, actually preventing bad things from happening (superstitious beliefs) and/or helping the individual figure out how to prevent bad things from happening (Borkovec & Roemer, 1995; Davey, Tallis, & Capuzzo, 1996). In fact, endorsement of more positive consequences of worrying is significantly associated with higher trait worrying (Davey et al., 1996). In addition, positive beliefs about worry make a unique contribution to worry above and beyond general dysfunctional beliefs, as well as above and beyond symptoms of anxiety and depression (Francis & Dugas, 2004). Similar data indicate that positive beliefs about depressive rumination are associated with a tendency to engage in negative ruminative thinking (Brosschot, 2010).

So why would people with GAD have any positive attributions about the benefits of worry as a coping strategy if worry is a mechanism for chronic negative affect and prolonged stress, particularly given their reported discomfort with and desire to control negative emotion (Mennin et al., 2005; Roemer et al., 2005; Turk et al., 2005)? In an attempt to answer this question, our data led us to a new theory of experiential avoidance in GAD regarding the use of worry to avoid a negative emotional contrast. We believe that individuals with GAD use worry as a coping strategy because they prefer to feel chronically distressed in order to prepare for the worst outcome, rather than to experience a shift from a positive or euthymic state to a negative emotion. Thus, we believe that individuals with GAD use worry to avoid a negative contrast (but not a positive contrast). Consistent with our model, when asked why they worry, worriers report that it helps them to anticipate and prepare for negative events (e.g., "If I expect the worst, I won't be disappointed"; Borkovec & Roemer, 1995). Our model is also consistent with the viewpoint of Borkovec, Alcaine and Behar (2004) that people may create distress for themselves as a means to preclude even greater subsequent pain. Experiencing a decrease in negative emotions, such as relief when the feared outcome doesn't occur (which is the case 84% of the time; Borkovec, Hazlett-Stevens, & Diaz, 1999), serves to reinforce the worry.

Affective contrast theory has its roots in early and contemporary cognitive psychology. This theory states that the impact of an emotional experience is contingent on its degree of contrast with a preceding emotional state (Bacon, Rood, & Washburn, 1914). For example, an experience of unpleasantness can be heightened via contrast with a preceding pleasant stimulus. Similarly, the pleasure of an agreeable experience is heightened if it is preceded by a disagreeable experience, and an impression in itself unpleasant may be felt as pleasant if a *more* unpleasant state has been its antecedent. This theory has received empirical support (Harris, 1929; Williams, 1942), and has been expanded to show that the degree of affective discrepancy between stimuli is critical in the creation of a negative contrast experience (Dermer, Cohen, Jacobsen, & Anderson, 1979). This principle also applies to emotional stimuli. People judge others' emotional expressions as more negative when preceded with strongly contrasting expressions (i.e., sad faces preceded by happy faces; Thayer, 1980). In addition, people judge their own negative emotion as more negative when preceded by a positive emotion (Manstead, Wagner, & MacDonald, 1983).

Based on this cognitive psychology literature, as well as our own findings (Llera & Newman, 2010a), we theorized that individuals with GAD have developed a stronger aversive reaction and are even more sensitive to a negative emotional contrast than are nonanxious individuals, and that it is the avoidance of this contrast that motivates their worry. To test this theory, we replicated our previous study (Llera & Newman, 2010a) and included a questionnaire following the film clips asking participants to rate the extent to which the worry, relaxation, or neutral manipulations prior to the emotion-inducing film clips helped them cope with their emotions *during* the clips. In so doing, beyond merely assessing for increased or decreased emotionality following the clips, we were also attempting to ascertain a holistic appraisal of the overall effect of the worry, relaxation, or neutral induction on ability to cope with the impact of the various emotion-inducing film clips.

Our findings provide some meaningful insight into the Contrast Avoidance hypothesis. In this new investigation (Llera & Newman, 2010b), we found that whereas participants with GAD were more likely than nonanxious controls to indicate that prior worry had helped them feel *more* able to cope ($d = .88$) during the emotional film clips, the reverse pattern was demonstrated by nonanxious participants who rated worry as making them feel *less* able to cope as compared to those with GAD. Similarly, GAD participants rated relaxation ($d = 1.33$) and neutral inductions ($d = 1.54$) as having made them feel *less* able to cope during the

film clip than did nonanxious controls, whereas nonanxious controls were more likely to indicate that relaxation and neutral inductions helped them feel *more* able to cope compared to those with GAD. Within GAD participants, there was a significant difference between worry and neutral ($d = 1.2$) and worry and relaxation ($d = .84$) (with no difference between relaxation and neutral $d = .42$), showing worry to be more helpful than neutral or relaxation at helping them to cope with the impact of the films. Within nonanxious participants, relaxation and neutral were not significantly different from one another ($d = .21$), but relaxation ($d = 1.35$) and neutral activities ($d = 1.2$) were rated as more helpful than worry.

Ironically, despite reporting that worry helped them cope with negative emotion, participants with GAD also rated their absolute level of negative affect as being significantly higher than did controls across both worry and subsequent negative clips. However, nonanxious controls, despite experiencing less negative affect, found worry as a coping strategy to be less helpful than those with GAD. The finding that participants with GAD experience worry as both leading to greater sustained negative emotion *and* as helping them cope, while far from being a contradiction, in fact highlights that what they found so helpful was avoidance of the *contrast experience* itself, rather than negative emotion *per se*.

These findings may be the key to understanding why people with GAD neither avoid nor process negative emotions. Rather than feel relaxed or euthymic, people with GAD prefer to experience the chronically negative emotion associated with worry to avoid being vulnerable to a negative emotional contrast, which might entail a sharp increase in negative affect. This suggests that the experience of a negative contrast (i.e., as opposed to worry, feeling relaxed or neutral would create a contrast relative to fear or sadness) was more upsetting for the GAD participants than nonanxious controls, which differs from simply a fear of negative emotions. Also consistent with a fear of letting down their guard, people with GAD seem to be especially prone to experiencing relaxation induced anxiety (Heide & Borkovec, 1983, 1984). Perhaps this is due to the fact that relaxation leaves them vulnerable to experiencing a negative contrast in their emotions.

This new hypothesis is consistent with Gray's (1982) neurophysiological theory of anxiety, which states that one trigger for anxious responding is the detection of a mismatch between expected and encountered stimuli in the environment. As such, if individuals use worry to prepare for the worst on an emotional level, then they are reducing the likelihood of a negative emotional contrast experience (similar to a mismatch) if they do experience a negative event. Importantly, this argument suggests that the use of worry as a means of emotional contrast avoidance could interfere with the ability to terminate the worry process, as any reduction in worry (including parallel decreases in negative affect) may be an internal anxiety trigger. Because the worry cycle has been negatively reinforced via relief when the feared event does not occur and/or avoidance of an emotional contrast if it does occur, this anxiety signal will most likely lead to a reactivation of the worry state. This idea is also consistent with the stop rules research and theory of Davey and colleagues who suggest that a negative mood associated with worry motivates persistence and the use of "as many as you can" stop rules, which also interferes with worry termination (Davey, Startup, MacDonald, Jenkins, & Patterson, 2005).

Additionally, the likelihood of experiencing a positive contrast (going from a bad to a good state) becomes that much greater if one is always prepared for the worst outcome. Therefore, these individuals may greatly prefer to feel emotions associated with being pleasantly surprised (i.e., a positive emotional contrast) over unexpectedly disappointed and upset (i.e., a negative emotional contrast), thus also leading to positive reinforcement of the worry process.

6. Treatment implications

Despite evidence for the failure of GAD participants to engage in successful emotional processing, traditional methods of treating GAD have not included exposure techniques that will achieve emotional processing (Borkovec & Newman, 1998). Moreover, cognitive therapy and self-control desensitization (SCD), two major components of standard CBT for GAD, appear insufficient to address emotional processing. Borkovec and Costello (1993) found that a reflective listening condition was significantly superior to cognitive therapy and SCD treatments on objectively coded ratings of depth of emotional processing (using the Experiencing Scale (Klein, Mathieu Coughlan, & Kiesler, 1986; Klein, Mathieu, Gendlin, & Kiesler, 1969), one of the most reliable methods of assessing change process in experiential therapy). The fact that reflective listening produced greater levels of emotional processing but failed to achieve greater outcome suggests that the type of emotional processing that occurred was not relevant for therapeutic effects to occur. Specifically, the content of clients' emotions in the reflective listening condition was likely vocalizations of worrisome thinking, and not focused on aspects of emotionality that clients were avoiding. We hypothesize that the use of exposure techniques to help GAD participants confront aspects of avoided emotionality will help reduce their chronic worrying.

We now suspect that our efforts to address emotional processing with experiential techniques (Newman et al., in press) failed for two reasons: 1) exposure is not taking place unless clients confront a stimulus that is both feared and avoided, and we did not identify and target the essential components of the stimuli that were feared and avoided by people with GAD (e.g., a negative emotional contrast created by relaxation contiguous with negative emotional imagery), and 2) experiential techniques do not systematically and in a graduated manner expose clients to feared emotional stimuli in the same way as exposure techniques. We hypothesize that graduated exposure in a systematic manner is likely to be more tolerable to clients than were experiential exercises.

Although exposure is one of the most well tested and effective techniques for addressing emotional processing, (Foa & Kozak, 1986; Rachman, 1980), exposure is not taking place unless clients are exposed to a stimulus that is both feared and avoided. Prior efforts to implement exposure within GAD used techniques that induced worrisome fears via imagery (Hoyer et al., 2009; Zinbarg, Lee, & Yoon, 2007). However, our data show that rather than avoid negative emotionality, GAD clients already actively generate negative emotionality via worry. Therefore, engaging clients with GAD in these processes is comparable to asking participants who already experience chronic negative emotionality to keep doing what they are already doing.

People sometimes confuse SCD, which has been used in two studies (Borkovec & Costello, 1993; Borkovec, Newman, Pincus, & Lytle, 2002), with exposure. However, SCD is different from what we are proposing as contrast exposure in several ways. Whereas the goal of SCD is to pair cognitive and/or relaxation coping with worry *trigger* imagery concurrently to *reduce* strong emotion, contrast exposure would aim to *induce* strong emotion via exposure to worry *outcome* imagery following contiguous relaxation. A worry *trigger* is often an ambiguous stimulus that a worrier would typically interpret as negative (e.g., your boss tells you s/he needs to see you), whereas a worry *outcome* is the actual core fear (e.g., your boss fires you). Similarly, whereas the focus and rationale of exposure is on inducing strong emotion and in teaching clients to tolerate emotional shifts, SCD focuses on pairing cognitive or relaxation coping with imagery as a means to *reduce* aversive emotion. According to Craske et al. (2008), a focus on distress tolerance rather than distress diminishment is important in the creation of inhibitory learning. Also, as noted earlier, depth of emotional processing in response to SCD was objectively coded as inferior to reflective

listening (Borkovec & Costello, 1993), suggesting that SCD may not be optimal for emotional processing.

Exposure has demonstrated efficacy for many disorders, including panic disorder, post-traumatic stress disorder (Bouchard et al., 1996; Foa et al., 1999; Marks, Lovell, Noshirvani, Livanou, & Thrasher, 1998; Mavissakalian & Michelson, 1986), obsessive-compulsive disorder (Foa, Steketee, & Grayson, 1985; McKay, 2009), social phobia (Mersch, 1995; Newman, Hofmann, Trabert, Roth, & Taylor, 1994), and specific phobias (Öst, Alm, Brandberg, & Breitholtz, 2001; Öst, Salkovskis, & Hällstrom, 1991). If one or more core fears could be identified in GAD, then the powerful exposure methods so effective with other anxiety disorders could be applied. New evidence combined with prior studies suggests that fear and avoidance of negative emotional contrast may be one of these core fears, perhaps the most important one. Therefore, graduated exposure to a negative emotional contrast could be especially effective.

7. Comparison between contrast theory and extant theories of GAD

As noted earlier, a number of models of the development and maintenance of GAD have incorporated the perspective that worry enables emotional avoidance. Below we summarize these models to highlight similarities and differences with our contrast theory. It is neither our goal to summarize all of the data supporting these models nor is it our goal to critique them (see Behar, DiMarco, Hekler, Mohlman, & Staples, 2009 for a full review of the research underlying these models). Importantly, although there are some areas in which our model would disagree with each of these models, we view our new perspective as an extension rather than a refutation of the essence of these models.

7.1. Intolerance of Uncertainty (IU) Model of GAD

The IU Model (Dugas, Buhr, & Ladouceur, 2004; Dugas, Gagnon, Ladouceur, & Freeston, 1998; Dugas, Letarte, Rheume, Freeston, & Ladouceur, 1995; Freeston et al., 1994) suggests that IU is a central pathogenic mechanism in the development and maintenance of GAD. IU is defined as “the tendency to react negatively on an emotional, cognitive, and behavioral level to uncertain situations and events” (Dugas et al., 2004; p. 143). According to this model, those experiencing IU consider any level of ambiguity in situations with potential negative outcomes to be stressful and upsetting, thus motivating avoidance of such experiences. Given that it is nearly impossible to behaviorally avoid uncertain situations in life, a person may therefore resort to cognitive strategies (i.e., worry) to avoid discomfort.

Dugas, Buhr, and Ladouceur (2004) and Dugas, Gagnon, Ladouceur, and Freeston (1998) posit both a direct and indirect pathway in which the experience of IU might lead to the development and maintenance of GAD. First, IU is defined as representing a schema about the danger of ambiguity, whereas worry is considered to be a reaction to that schema. As such, an IU schema could lead a person to over-focus on potential negative outcomes in uncertain situations, causing these outcomes to seem more likely to occur and to bring more catastrophic consequences. This, in addition to poor beliefs regarding problem-solving abilities (Freeston et al., 1994), suggests a pathway in which IU could lead directly to an increase in worry.

As for the indirect pathway to GAD, the IU Model posits several process variables leading to worry maintenance (Dugas et al., 2004, 1998) in addition to IU. First are positive beliefs about worry, including protection from negative emotions (e.g., surprise, sadness). Next is a negative problem orientation, or lack of confidence in problem-solving abilities and pessimism regarding problem-solving efforts. Lastly, the model proposes that cognitive avoidance strategies comprise a main component of worry maintenance, in that the verbal/

linguistic properties of worry serve to avoid aversive imagery and associated negative arousal. They add that IU serves to further fuel cognitive avoidance in that it renders images of potential negative events as even less tolerable.

7.1.1. Areas of convergence with the Contrast Avoidance Model—This theory can be considered an important foundation for (and parallel of) the conceptualization of the Contrast Avoidance Model. Specifically, if individuals with GAD experience greater discomfort in uncertain situations (especially if the anticipated outcome is negative and/or they have poor confidence in their problem-solving skills), this could be in part because they fear the emotional ramifications of this negative experience. The Contrast Avoidance Model purports that as a result of these factors, these individuals would rather feel badly all the time than be taken by surprise, which is consistent with, but provides further elaboration on the IU Model.

7.1.2. Areas of divergence—The final step in the IU theory is that cognitive avoidance (i.e., the verbal/linguistic properties of worry) is employed to avoid the negative arousal and threatening images evoked by feared outcomes. Our theory does not support the idea that such arousal and images are avoided. Rather, we argue that an alternative coping strategy is achieved via worry, such that reactions to feared negative outcomes are in fact rehearsed.

For instance, in support of the IU Model, Dugas, Buhr, and Ladouceur (2004) describe clinical interactions in which GAD patients state that they would prefer to have a negative outcome than an uncertain one (e.g., that their husband leave them now rather than having to wait to see if marital problems ameliorate). We would suggest that a great deal of the IU principle is driven by the fact that these individuals fear, in addition to the external ramifications of a negative event, their own internal reaction of a negative emotional contrast in response to that event. As such, if a client is overwhelmed by the fear that their spouse will leave them (or they'll lose their job, or be diagnosed with an illness) and they experience difficulty tolerating the uncertainty of these outcomes, they cope with this by generating the internal reaction that they would have had to the event. In other words, they would rather experience the negative emotional state now, rather than anticipate that it might happen at some unknowable time in the future. This suggests preference for a negative emotional state rather than allowing oneself to feel good and then be taken by surprise. Therefore, our theory adds that by engaging in the worry process, these individuals are in effect rehearsing the negative internal state in order to be emotionally prepared in the event that the bad outcome does happen. By feeling prepared in this way, these individuals avoid the noxious experience of a negative emotional contrast, and thus the cycle is reinforced. This then is the pathogenic mechanism by which worry is maintained, according to the Contrast Avoidance Model.

7.2. Metacognitive (MC) Model of GAD

The MC Model (Wells, 1995, 1999), suggests that beliefs about worry (experienced in separate, successive stages) lead to a maladaptive cycle of coping attempts in the face of a stressor. This cycle interferes with emotional processing, which in turn fuels more ineffectual attempts at coping through worry. The crucial element of the MC Model is that it is the negative attributions about worry that are pathogenic and lead to the development and maintenance of GAD.

The MC Model proposes two specific types of worry based on different metacognitive appraisals. The first type of worry (Type I), occurs in response to external and/or internal (non-cognitive) events that are perceived as threatening (e.g., job status, physical wellbeing, etc.) (Wells, 2004; p. 166). In the MC Model, individuals with GAD hold positive

attributions about worry as helpful in coping with such threats. Examples include beliefs that worry leads to reduced chances of being overwhelmed by unexpected negative events, protection from surprise, and increased cautiousness (Wells, 1995). (Though clearly, holding positive beliefs about worry in general is not unique to GAD, see: Borkovec & Roemer, 1995; Cartwright-Hatton & Wells, 1997; Davis & Valentiner, 2000; Ruscio & Borkovec, 2004). However, through a certain chain of events (detailed below), an individual may begin to develop Type II worries, or *worry about worry*. These are based on negative appraisals of their worry experience, such as feeling that worries are out of control and can be harmful. According to the MC Model, the development of Type II worry is part of the pathogenic process, which can lead to and maintain GAD.

The MC Model delineates this process as follows. First, an internal or external event triggers Type I worry (e.g., “what if I develop cancer?”), which may be associated with ANS activation. For an individual who finds this uncomfortable, such activation may lead them to shift to verbal cognitive processes based on the idea that such processes help to avoid negative arousal. Typically, the worry process would terminate when the individual feels that they have a better handle on the problem; however, if the internal experience of worry is itself perceived as threatening, the process of termination would be disrupted, thus leading to the perpetuation of worry and the exacerbation of negative beliefs.

According to the MC Model, such beliefs are increased through the use of worry to avoid somatic activation, which interferes with successful emotional processing of distressing material and thus maintains anxious associations. This may then lead to vigilance toward worrisome thoughts and their triggers followed by attempts at suppression, which themselves have been shown to increase cognitive intrusions (Butler et al., 1995; Clark, Ball, & Pape, 1991; Wegner, Schneider, Carter, & White, 1987; Wells & Papageorgiou, 1995). Such unsuccessful attempts at avoidance/suppression will fuel the belief that worry is uncontrollable, increasing the likelihood of Type II worries. In sum, a cycle of negative metacognitions, hypervigilance toward threat cues, followed by (mostly unsuccessful) attempts at avoidance leads to interrupted processing of anxious material and increased cognitive intrusions, which in turn interferes with mental regulation and leads to more worries.

7.2.1. Areas of convergence with the Contrast Avoidance Model—Similar to the MC Model, our model purports that beliefs about worry fuel maladaptive coping using worry and that this ultimately leads to a failure to process emotions appropriately. The theories are also similar with respect to the idea that the process of worrying engages individuals in a cycle that is ultimately negatively reinforcing. In addition, the two theories converge on the idea that persons with GAD hold both positive and negative views of worry and that these individuals use their worry as a means to cope with threats as well as to regulate emotion.

A main tenet of the MC Model is that emotion regulation difficulties caused by Type I worries may begin to fuel Type II worries, which further exacerbates emotional dysfunction. Although our model does not include theories regarding Type II worry, we do believe that in the presence of contrast avoidance behaviors, worry leads to deficits in emotional processing of stressors and maintains anxious associations. We also agree that worry has more than one stage. According to our model, what leads people to begin the process of worrying and/or not cut it off early is the view that worry will protect them from experiencing a negative emotional contrast. At the same time, it is clear that intensive worrying takes on a life of its own and once individuals with GAD have been worrying for an extended period they would likely try to intervene to control their worry and the associated distress. However, once worry reaches this stage it is less possible to stop worrying and/or control distress.

Nonetheless, when a negative contrast is avoided and/or the worrisome outcome does not happen, the person experiences relief, which ultimately reinforces their view that worry helped them to cope.

7.2.2. Areas of divergence—The two models differ with respect to which beliefs about worry fuel the maintenance of GAD. Whereas the MC Model focuses on the role of negative beliefs, our results (as well as results of two other studies) show that persons with GAD and nonanxious controls demonstrate significant differences in their beliefs toward the utility of worry to control their emotional responses to external events (Type I worry) (Borkovec & Roemer, 1995; Llera & Newman, 2010b). Another aspect in which the two theories diverge is with respect to the concept that Type I worry reduces somatic activation. As we note, substantial data suggest that worry is associated with sustained tonic somatic activation (and as a result it mutes acute reactivity to brief images).

In sum, the MC Model of GAD, with its emphasis on the role of Type II metacognitions and worries, is in many ways consistent with the Contrast Avoidance Model. However, we argue that fear of contrast and the patterns of contrast avoidance provide a crucial link in the emergence and maintenance of worry.

7.3. Acceptance-based (AB) Model of GAD

With its basis in certain extant theories of worry, for example, the Cognitive Avoidance Model of Borkovec and colleagues, the MC Model, and the IU Model, and drawing also from the Experiential Avoidance Model (e.g., Hayes, Wilson, Gifford, Follette, & Strosahl, 1996), Roemer and Orsillo (2002; Roemer et al., 2005) developed the AB Model of GAD. Linking these theories together, the AB Model posits a new way to understand the development and maintenance of GAD, with the main tenet being a focus on acceptance and mindfulness patterns underlying this disorder.

According to the AB Model, individuals with GAD believe that worry serves to prevent negative outcomes (via problem-solving or superstitious thinking), and also assists in avoidance of noxious internal experiences (i.e., distraction from distressing emotional topics, avoidance of somatic activation). Given a fear of uncertainty, individuals with GAD may maintain a sense of control (in the short-term) via predicting, and even superstitiously avoiding, potential negative outcomes and distressing internal experiences. However, given that avoided internal material paradoxically becomes more prevalent (e.g., Wegner et al., 1987), and unprocessed negative emotional material endures (Foa & Kozak, 1986), these individuals are thus thrust into an unproductive cycle of increased worry and avoidance.

Central to the AB Model is an emphasis on the discomfort with and avoidance of internal experiences that is characteristic of individuals with GAD. This model also suggests that worry itself becomes an unwanted internal experience that is difficult to stop based on a cycle of negative reinforcement. Moreover, the model states that although there is a lack of specific behavioral avoidance in GAD, there is an overall avoidance regarding problem-solving behaviors. In sum, the model proposes that a tendency to focus on future events and attempts at distraction from internal experiences underscore a lack of acceptance and mindfulness as maintaining pathological factors in individuals with GAD.

7.3.1. Areas of convergence—For the most part, the AB Model is based on a similar foundation as our model, and has many overlapping and synchronous features. For example, similar to the AB Model, the Contrast Avoidance Model arises from research showing that people with GAD believe that worry may serve a positive function. The two theories also converge on the idea that worry serves an avoidant function and that such worry is maintained via reinforcement. We would further agree that worry does provide the illusion

of control. Moreover, we would agree that worry enables avoidance of emotional processing.

7.3.2. Areas of divergence—Whereas the AB Model suggests that worry is used to avoid negative internal experiences, we would specify that the internal experience most dreaded for these individuals is that of a negative emotional contrast, rather than negative emotion *per se* as a specific target of avoidance. Further, we believe that instead of worry being reinforced by emotional avoidance, it is the relief (when the feared outcome does not happen) as well as the successful avoidance of a negative emotional contrast (when the feared event occurs) that leads to a reinforcement of worry. Also, whereas the AB Model suggests that worry becomes an avoided internal experience, we suggest that worry and its associated negative emotionality retain its positive functional value as a means to avoid a negative emotional contrast.

7.4. Emotion Dysregulation (ED) Model of GAD

The ED Model (Mennin, Heimberg, Turk, & Fresco, 2002; Mennin et al., 2005), with a foundation in the Cognitive Avoidance Model of Borkovec and colleagues, proposes that a more detailed emotion regulation perspective could shed light on the pathogenic processes of GAD. Mennin and colleagues indicate that worry can lead to emotional avoidance, but also stress a comprehensive understanding of the nature of emotional experiencing in GAD that might precede the adoption of such an avoidance strategy.

The ED Model states that emotional dysfunction in GAD may be categorized by 4 main dysregulation processes: 1) heightened emotional intensity, 2) poor emotional understanding, 3) negative reactivity to emotions (e.g., fear of emotions), and 4) maladaptive management attempts. Regarding the first process, the model proposes that individuals with GAD experience their emotions more easily, quickly, and intensely than those without GAD, and that this can also lead to inappropriate emotional expression (such as over-expression of negative affect). Secondly, these individuals may experience difficulty differentiating between primary emotions, and therefore cannot use important affective information due to its overwhelming nature. According to the functionalist perspective within the emotion literature (e.g., Davison, 1965; Frijda, 1986), this can interfere with the adaptive information provided by emotional experiences, including goals and action tendencies. The model then proposes that difficulties associated with the first 2 processes can result in emotions being perceived as more threatening. Finally, maladaptive coping is associated with poor modulation skills, such as attempts to control, avoid, or blunt emotional experiences. This is when worry enters the model as an attempt to avoid such aversive emotional experiences.

7.4.1. Areas of convergence—There are many conceptual similarities between our model and the ED Model. For example, we also suggest that individuals with GAD fail to regulate their emotions appropriately and that such dysregulation interferes with emotional processing. The two theories also converge on the idea that persons with GAD use worry as a dysfunctional means to cope with threats as well as to regulate emotion. Further, we agree that people with GAD do experience heightened emotional intensity.

7.4.2. Areas of divergence—Where the models differ may be regarding the specific threat posed by emotion and a differential perspective on the role and function of worry in maintaining the problems highlighted in the ED Model. Specifically, we propose a more targeted emphasis of the negative appraisal of emotions, in that feeling vulnerable and not braced for a negative emotional contrast is the main focus of threat, and it is through attempts to avoid this contrast that worry becomes functionally involved in the model. In

terms of extending the ED Model, we suggest that these individuals may describe their emotions as more intense because of the aversion to the experience of a negative emotional contrast. In addition, engaging in worry as avoidance of emotional contrast could lead to alexithymic problems, such as identifying specific emotional experiences. In sum, we propose that it is the specific negative appraisal of a negative emotional contrast that leads to difficulties of emotion regulation, and such difficulties can interfere with emotional experience on many levels, including subjective intensity as well as understanding.

7.5. Areas of divergence with all prior theories

As noted, all of the above theories have interpreted the extant literature to suggest that worry enables avoidance of emotional experiencing. This has led to divergence with the Contrast Avoidance Model, especially as it pertains to treatment implications. Because none of the prior theories address the idea of negative emotional contrast, none discuss the importance of helping individuals learn to cope with such contrasts, and as such none of the new treatments based on these theories have incorporated an emotional contrast exposure component. For example, although the IU treatment attempts to address core fears via exposure, it does not expose clients to a negative contrast experience. Specifically, if a client were already in a negative emotional state prior to fear exposure (which is likely given the chronic nature of worry in GAD), this would obviate the capacity to facilitate processing of the emotional contrast experience. Similarly, although the ED Model also includes emotional exposure techniques as part of treatment (as was the case with the Newman et al. (in press) treatment), unless clients are first induced into a relaxed or euthymic mood state then clients are not exposed to a negative emotional contrast and thus may fail to reduce their fear of emotional contrasts. Furthermore, neither the MC nor AB treatment models propose a specific emotional contrast exposure component in their treatment recommendations.

In sum, although the theories described above suggest vital and important foci for treatment, including psychoeducation regarding the negative effects of worry as a coping mechanism and mindfulness/acceptance exercises, they all differ from the Contrast Avoidance Model in that none recommend specifically including exposure to a negative emotional contrast experience. Moreover, a crucial component of the Contrast Avoidance Model, as noted throughout the paper and based on Foa and Kozak (1986), states that the absence of emotional contrast during exposure may itself fail to produce the emotional processing necessary to reduce fear associations.

8. Concluding remarks

The goal of this paper was to review the current literature on the relationship between worry and emotion dysfunction in the development and maintenance of GAD. Using the tenets of emotional contrast theory as our foundation, we presented a new model that may explain many inconsistencies in the literature on emotion in GAD. Specifically, we suggest that in interpreting the extant literature, recent theories of emotion in GAD have failed to discriminate: a) somatic response to worry from somatic response to stress following worry, b) use of a resting baseline from use of a worry baseline, c) initial reactivity to a feared stimulus from absolute levels of emotionality during a feared stimulus, and d) emotional avoidance from emotional processing avoidance. By discriminating these constructs and revisiting the extant literature, we have shown that the overwhelming evidence suggests that although worry precludes emotional processing, worry does not enable avoidance of emotional experiencing. Instead, worry facilitates and maintains a sustained negative emotional state, and may simply inhibit additional increases in activation in response to stressors. We propose the Contrast Avoidance Model of Worry, which suggests that individuals with GAD fear negative emotional contrast experiences and use worry in order

to avoid feeling vulnerable to having such an experience. We presented emerging data from our laboratory that support this conclusion. Further, we established the Contrast Avoidance Model within the framework of extant theories and models of pathogenic processes of GAD. We also discussed important implications of this new theory for the treatment of emotion dysregulation, including a potential specific focus for systematic exposure techniques. We propose that the incorporation of such techniques in treatments for GAD will help to target and reduce the avoidance central to the emotional pathology of GAD. This perspective may be the key to developing more effective treatments for GAD.

References

- Albu M. Automatic and intentional inhibition in patients with generalized anxiety disorder. *Cognitive Creier Comportament*. 2008; 12(2):233–249.
- Andor T, Gerlach AL, Rist F. Superior perception of phasic physiological arousal and the detrimental consequences of the conviction to be aroused on worrying and metacognitions in GAD. *Journal of Abnormal Psychology*. 2008; 117(1):193–205. doi:10.1037/0021-843X.117.1.193. [PubMed: 18266497]
- Andrews VH, Borkovec TD. The differential effects of inductions of worry, somatic anxiety, and depression on emotional experience. *Journal of Behavior Therapy and Experimental Psychiatry*. 1988; 19(1):21–26. doi:10.1016/0005-7916(88)90006-7. [PubMed: 3392220]
- Bacon MM, Rood EA, Washburn MF. A study of affective contrast. (*Minor Stud. fr. Psychol. Lab. of Vassar Col., XXV.*). *American Journal of Psychology*. 1914; 25(2):290–293. doi:10.2307/1413417.
- Behar E, DiMarco ID, Hekler EB, Mohlman J, Staples AM. Current theoretical models of generalized anxiety disorder (GAD): Conceptual review and treatment implications. *Journal of Anxiety Disorders*. 2009; 23(8):1011–1023. doi:10.1016/j.janxdis.2009.07.006. [PubMed: 19700258]
- Borkovec TD. Worry: A potentially valuable concept. *Behaviour Research and Therapy*. 1985; 23(4): 481–482. doi:10.1016/0005-7967(85)90178-0. [PubMed: 4026778]
- Borkovec, TD. The nature, functions, and origins of worry.. In: Davey, GCL.; Tallis, F., editors. *Worrying: Perspectives on theory, assessment and treatment*. Wiley; Oxford, England: 1994. p. 5-33.
- Borkovec, TD.; Alcaine, O.; Behar, ES. Avoidance theory of worry and generalized anxiety disorder.. In: Heimberg, R.; Mennin, D.; Turk, C., editors. *Generalized anxiety disorder: Advances in research and practice*. Guilford; New York: 2004. p. 77-108.
- Borkovec TD, Costello E. Efficacy of applied relaxation and cognitive-behavioral therapy in the treatment of generalized anxiety disorder. *Journal of Consulting and Clinical Psychology*. 1993; 61(4):611–619. doi:10.1037/0022-006X.61.4.611. [PubMed: 8370856]
- Borkovec TD, Hazlett-Stevens H, Diaz ML. The role of positive beliefs about worry in generalized anxiety disorder and its treatment. *Clinical Psychology and Psychotherapy*. 1999; 6(2):126–138. doi:10.1002/(SICI)1099-0879(199905)6:2<126::AID-CPP193>3.0.CO;2-M.
- Borkovec TD, Hu S. The effect of worry on cardiovascular response to phobic imagery. *Behaviour Research and Therapy*. 1990; 28(1):69–73. [PubMed: 2302151]
- Borkovec TD, Inz J. The nature of worry in generalized anxiety disorder: A predominance of thought activity. *Behaviour Research and Therapy*. 1990; 28(2):153–158. doi: 10.1016/0005-7967(90)90027-G. [PubMed: 2183759]
- Borkovec TD, Lyonfields JD, Wiser SL, Deihl L. The role of worrisome thinking in the suppression of cardiovascular response to phobic imagery. *Behaviour Research and Therapy*. 1993; 31(3):321–324. doi:10.1016/0005-7967(93)90031-O. [PubMed: 8476407]
- Borkovec, TD.; Newman, MG. Worry and generalized anxiety disorder.. In: Bellack, AS.; Hersen, M., editors. *Comprehensive clinical psychology: Vol. 6. Adults: Clinical formulation and treatment*. Pergamon Press; Oxford, England: 1998. p. 439-459.
- Borkovec TD, Newman MG, Pincus AL, Lytle R. A component analysis of cognitive-behavioral therapy for generalized anxiety disorder and the role of interpersonal problems. *Journal of Consulting and Clinical Psychology*. 2002; 70(2):288–298. doi:10.1037/0022-006X.70.2.288. [PubMed: 11952187]

- Borkovec TD, Robinson E, Pruzinsky T, DePree JA. Preliminary exploration of worry: Some characteristics and processes. *Behaviour Research and Therapy*. 1983; 21(1):9–16. doi: 10.1016/0005-7967(83)90121-3. [PubMed: 6830571]
- Borkovec TD, Roemer L. Perceived functions of worry among generalized anxiety disorder subjects: Distraction from more emotionally distressing topics? *Journal of Behavior Therapy and Experimental Psychiatry*. 1995; 26(1):25–30. [PubMed: 7642757]
- Borkovec TD, Ruscio AM. Psychotherapy for generalized anxiety disorder. *Journal of Clinical Psychiatry*. 2001; 62(Supplement 11):37–45. [PubMed: 11414549]
- Borkovec TD, Sides JK. The contribution of relaxation and expectancy to fear reduction via graded, imaginal exposure to feared stimuli. *Behaviour Research and Therapy*. 1979; 17(6):529–540. doi: 10.1016/0005-7967(79)90096-2. [PubMed: 43126]
- Bouchard S, Gauthier J, Laberge B, French D, Pelletier MH, Godbout C. Exposure versus cognitive restructuring in the treatment of panic disorder with agoraphobia. *Behaviour Research and Therapy*. 1996; 34(3):213–224. doi:10.1016/0005-7967(95)00077-1. [PubMed: 8881091]
- Bradley BP, Mogg K, Millar N, White J. Selective processing of negative information: Effects of clinical anxiety, concurrent depression, and awareness. *Journal of Abnormal Psychology*. 1995; 104(3):532–536. doi:10.1037/0021-843X.104.3.532. [PubMed: 7673577]
- Bradley BP, Mogg K, White J, Groom C, de Bono J. Attentional bias for emotional faces in generalized anxiety disorder. *British Journal of Clinical Psychology*. 1999; 38(3):267–278. doi: 10.1348/014466599162845. [PubMed: 10532148]
- Brosschot JF. Markers of chronic stress: Prolonged physiological activation and (un)conscious perseverative cognition. *Neuroscience & Biobehavioral Reviews*. 2010; 35(1):46–50. doi:10.1016/j.neubiorev.2010.01.004. [PubMed: 20096302]
- Brosschot JF, Gerin W, Thayer JF. The perseverative cognition hypothesis: A review of worry, prolonged stress-related physiological activation, and health. *Journal of Psychosomatic Research*. 2006; 60(2):113–124. doi:10.1016/j.jpsychores.2005.06.074. [PubMed: 16439263]
- Brosschot JF, Pieper S, Thayer JF. Expanding stress theory: prolonged activation and perseverative cognition. *Psychoneuroendocrinology*. 2005; 30(10):1043–1049. doi:10.1016/j.psyneuen.2005.04.008. [PubMed: 15939546]
- Brosschot JF, Thayer JF. Heart rate response is longer after negative emotions than after positive emotions. *International Journal of Psychophysiology*. 2003; 50(3):181–187. doi:10.1016/s0167-8760(03)00146-6. [PubMed: 14585487]
- Brosschot JF, van Dijk E, Thayer JF. Prolonged autonomic activation, perseverative negative cognition, and daily stressors. *International Congress Series*. 2002; 1241:329–336. doi:10.1016/S0531-5131(02)00615-5.
- Brosschot JF, Van Dijk E, Thayer JF. Daily worry is related to low heart rate variability during waking and the subsequent nocturnal sleep period. *International Journal of Psychophysiology*. 2007; 63(1):39–47. doi:10.1016/j.ijpsycho.2006.07.016. [PubMed: 17020787]
- Butler G, Wells A, Dewick H. Differential effects of worry and imagery after exposure to a stressful stimulus: A pilot study. *Behavioural and Cognitive Psychotherapy*. 1995; 23(1):45–56. doi: 10.1017/S1352465800017628.
- Calmes C, Roberts J. Repetitive thought and emotional distress: Rumination and worry as prospective predictors of depressive and anxious symptomatology. *Cognitive Therapy and Research*. 2007; 31(3):343–356. doi:10.1007/s10608-006-9026-9.
- Carter WR, Johnson MC, Borkovec TD. Worry: An electrocortical analysis. *Advances in Behaviour Research and Therapy*. 1986; 8(4):193–204. doi:10.1016/0146-6402(86)90004-4.
- Cartwright-Hatton S, Wells A. Beliefs about worry and intrusions: The Meta-Cognitions Questionnaire and its correlates. *Journal of Anxiety Disorders*. 1997; 11(3):279–296. doi:10.1016/S0887-6185(97)00011-X. [PubMed: 9220301]
- Clark DM, Ball S, Pape D. An experimental investigation of thought suppression. *Behaviour Research and Therapy*. 1991; 29(3):253–257. doi:10.1016/0005-7967(91)90115-J. [PubMed: 1883305]
- Craske MG, Kircanski K, Zelikowsky M, Mystkowski J, Chowdhury N, Baker A. Optimizing inhibitory learning during exposure therapy. *Behaviour Research and Therapy*. 2008; 46(1):5–27. doi:10.1016/j.brat.2007.10.003. [PubMed: 18005936]

- Davey, GCL. A mood-as-input account of perseverative worrying.. In: Davey, GCL.; Wells, A., editors. *Worry and its psychological disorders: Theory, assessment and treatment*. Wiley; Hoboken, NJ: 2006. p. 217-237.
- Davey GC, Hampton J, Farrell J, Davidson S. Some characteristics of worrying: Evidence for worrying and anxiety as separate constructs. *Personality and Individual Differences*. 1992; 13(2): 133-147. doi:10.1016/0191-8869(92)90036-O.
- Davey GCL, Levy S. Catastrophic worrying: Personal inadequacy and a perseverative iterative style as features of the catastrophizing process. *Journal of Abnormal Psychology*. 1998; 107(4):576-586. doi:10.1037/0021-843X.107.4.576. [PubMed: 9830245]
- Davey GCL, Matchett G. Unconditioned stimulus rehearsal and the retention and enhancement of differential "fear" conditioning: Effects of trait and state anxiety. *Journal of Abnormal Psychology*. 1994; 103(4):708-718. doi:10.1037/0021-843X.103.4.708. [PubMed: 7822572]
- Davey G, Startup H, MacDonald C, Jenkins D, Patterson K. The use of "as many as can" versus "feel like continuing" stop rules during worrying. *Cognitive Therapy and Research*. 2005; 29(2):155-169. doi:10.1007/s10608-005-3162-5.
- Davey GCL, Tallis F, Capuzzo N. Beliefs about the consequences of worrying. *Cognitive Therapy and Research*. 1996; 20(5):499-520. doi:10.1007/BF02227910.
- Davis RN, Valentiner DP. Does meta-cognitive theory enhance our understanding of pathological worry and anxiety? *Personality and Individual Differences*. 2000; 29(3):513-526. doi:10.1016/s0191-8869(99)00211-1.
- Davison GC. Relative contributions of differential relaxation and graded exposure to desensitization of a neurotic fear. *Proceedings of the Annual Convention of the American Psychological Association*. 1965:209-210.
- Dermer M, Cohen SJ, Jacobsen E, Anderson EA. Evaluative judgments of aspects of life as a function of vicarious exposure to hedonic extremes. *Journal of Personality and Social Psychology*. 1979; 37(2):247-260. doi:10.1037/0022-3514.37.2.247.
- Dua JK, King DA. Heart rate and skin conductance as measures of worrying. *Behaviour Change*. 1987; 4(3):26-32.
- Dugas, M.; Buhr, K.; Ladouceur, R. The role of intolerance of uncertainty in etiology and maintenance.. In: Heimberg, R.; Mennin, D.; Turk, C., editors. *Generalized anxiety disorder: Advances in research and practice*. Guilford Press; New York: 2004. p. 143-163.
- Dugas MJ, Gagnon F, Ladouceur R, Freeston MH. Generalized anxiety disorder: A preliminary test of a conceptual model. *Behaviour Research and Therapy*. 1998; 36(2):215-226. doi:10.1016/S0005-7967(97)00070-3. [PubMed: 9613027]
- Dugas MJ, Letarte H, Rheume J, Freeston MH, Ladouceur R. Worry and problem solving: Evidence of a specific relationship. *Cognitive Therapy and Research*. 1995; 19(1):109-120. doi:10.1007/BF02229679.
- Faure J. Contribution à l'EEG de l'anxiété./Contribution to the EEG in anxiety. *Electroencephalography and Clinical Neurophysiology*. 1949; 1:124-125.
- Fisher AJ, Granger DA, Newman MG. Sympathetic arousal moderates self-reported physiological arousal symptoms at baseline and physiological flexibility in response to a stressor in generalized anxiety disorder. *Biological Psychology*. 2010; 83(3):191-200. doi:10.1016/j.biopsycho.2009.12.007. [PubMed: 20036309]
- Foa EB, Dancu CV, Hembree EA, Jaycox LH, Meadows EA, Street GP. A comparison of exposure therapy, stress inoculation training, and their combination for reducing posttraumatic stress disorder in female assault victims. *Journal of Consulting and Clinical Psychology*. 1999; 67(2): 194-200. doi:10.1037/0022-006X.67.2.194. [PubMed: 10224729]
- Foa EB, Kozak MJ. Emotional processing of fear: Exposure to corrective information. *Psychological Bulletin*. 1986; 99(1):20-35. doi:10.1037/0033-2909.99.1.20. [PubMed: 2871574]
- Foa EB, Steketee G, Grayson JB. Imaginal and in vivo exposure: A comparison with obsessive-compulsive checkers. *Behavior Therapy*. 1985; 16(3):292-302. doi:10.1016/s0005-7894(85)80017-4.
- Francis K, Dugas MJ. Assessing positive beliefs about worry: Validation of a structured interview. *Personality & Individual Differences*. 2004; 37(2):405-415. doi:10.1016/j.paid.2003.09.012.

- Freeston MH, Rheaume J, Letarte H, Dugas MJ, Ladouceur R. Why do people worry? *Personality and Individual Differences*. 1994; 17(6):791–802. doi:10.1016/0191-8869(94)90048-5.
- Frijda, NH. *The emotions*. Cambridge University Press; Paris, France: 1986.
- Gastaut H, Dongier M, Broughton R, Tassinari C. Electroencephalographic and clinical study of diurnal and nocturnal anxiety in attacks. *Electroencephalography and Clinical Neurophysiology*. 1964; 17:475.
- Gerin W, Davidson KW, Christenfeld NJS, Goyal T, Schwartz JE. The role of angry rumination and distraction in blood pressure recovery from emotional arousal. *Psychosomatic Medicine*. 2006; 68(1):64–72. doi:10.1097/01.psy.0000195747.12404.aa. [PubMed: 16449413]
- Glynn LM, Christenfeld N, Gerin W. The role of rumination in recovery from reactivity: Cardiovascular consequences of emotional states. *Psychosomatic Medicine*. 2002; 64(5):714–726. doi:10.1097/01.PSY.0000031574.42041.23. [PubMed: 12271102]
- Gray JA. *Precis of the neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system*. Behavioral and Brain Sciences. 1982; 5(3):469–534. doi:10.1017/S0140525X00012851.
- Grayson JB, Borkovec TD. The effects of expectancy and imagined response to phobic stimuli on fear reduction. *Cognitive Therapy and Research*. 1978; 2(1):11–24. doi:10.1007/BF01172509.
- Harris AJ. An experiment on affective contrast. *American Journal of Psychology*. 1929; 41(4):617–624. doi:10.2307/1414718.
- Hayes SC, Wilson KG, Gifford EV, Follette VM, Strosahl K. Experiential avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology*. 1996; 64(6):1152–1168. doi:10.1037/0022-006x.64.6.1152. [PubMed: 8991302]
- Hazlett-Stevens H, Borkovec TD. Effects of worry and progressive relaxation on the reduction of fear in speech phobia: An investigation of situational exposure. *Behavior Therapy*. 2001; 32(3):503–517. doi:10.1016/S0005-7894(01)80033-2.
- Heide FJ, Borkovec TD. Relaxation-induced anxiety: Paradoxical anxiety enhancement due to relaxation training. *Journal of Consulting and Clinical Psychology*. 1983; 51(2):171–182. doi:10.1037/0022-006X.51.2.171. [PubMed: 6341426]
- Heide FJ, Borkovec TD. Relaxation-induced anxiety: Mechanisms and theoretical implications. *Behaviour Research and Therapy*. 1984; 22(1):1–12. doi:10.1016/0005-7967(84)90027-5. [PubMed: 6365071]
- Hoehn-Saric R, McLeod DR, Funderburk F, Kowalski P. Somatic symptoms and physiologic responses in generalized anxiety disorder and panic disorder: An ambulatory monitor study. *Archives of General Psychiatry*. 2004; 61(9):913–921. doi:10.1001/archpsyc.61.9.913. [PubMed: 15351770]
- Hofmann SG, Moscovitch DA, Litz BT, Kim H-J, Davis LL, Pizzagalli DA. The worried mind: Autonomic and prefrontal activation during worrying. *Emotion*. 2005; 5(4):464–475. doi:10.1037/1528-3542.5.4.464. [PubMed: 16366750]
- Hoyer J, Beesdo K, Gloster AT, Runge J, Hofler M, Becker ES. Worry exposure versus applied relaxation in the treatment of generalized anxiety disorder. *Psychotherapy and Psychosomatics*. 2009; 78(2):106–115. doi:10.1159/000201936. [PubMed: 19218829]
- Jones T, Davey GC. The effects of cued UCS rehearsal on the retention of differential “fear” conditioning: An experimental analogue of the “worry” process. *Behaviour Research and Therapy*. 1990; 28(2):159–164. doi:10.1016/0005-7967(90)90028-H. [PubMed: 2327933]
- Kessler RC, Berglund PA, Dewit DJ, Ustun TB, Wang PS, Wittchen HU. Distinguishing generalized anxiety disorder from major depression: prevalence and impairment from current pure and comorbid disorders in the US and Ontario. *International Journal of Methods in Psychiatric Research*. 2002; 11(3):99–111. doi:10.1002/mpr.128. [PubMed: 12459823]
- Klein, MH.; Mathieu Coughlan, P.; Kiesler, DJ. The experiencing scales.. In: Pinsof, WM.; Greenberg, LS., editors. *The psychotherapeutic process: A research handbook*. Guilford Press; New York, NY: 1986. p. 21-71.

- Klein, MH.; Mathieu, PC.; Gendlin, ET.; Kiesler, DJ. The Experiencing Scale: A research and training manual (Vol.1). University of Wisconsin Extension Bureau of Audiovisual Instruction; Madison, WI: 1969.
- Knepp MM, Friedman BH. Cardiovascular activity during laboratory tasks in women with high and low worry. *Biological Psychology*. 2008; 79(3):287–293. doi:10.1016/j.biopsycho.2008.07.002. [PubMed: 18706472]
- Kuehner C, Huffziger S, Liebsch K. Rumination, distraction and mindful self-focus: Effects on mood, dysfunctional attitudes and cortisol stress response. *Psychological Medicine*. 2009; 39(02):219–228. doi:10.1017/S0033291708003553. [PubMed: 18485265]
- Llera SJ, Newman MG. Effects of worry on physiological and subjective reactivity to emotional stimuli in generalized anxiety disorder and nonanxious control participants. *Emotion*. 2010a; 10(5):640–650. doi:10.1037/a0019351. [PubMed: 21038947]
- Llera SJ, Newman MG. Revisiting emotional avoidance in GAD. Paper presented at the Association of Behavioral and Cognitive Therapies. November.2010b
- Lyonfields JD, Borkovec TD, Thayer JF. Vagal tone in generalized anxiety disorder and the effects of aversive imagery and worrisome thinking. *Behavior Therapy*. 1995; 26(3):457–466. doi:10.1016/S0005-7894(05)80094-2.
- Manstead AS, Wagner HL, MacDonald CJ. A contrast effect in judgments of own emotional state. *Motivation and Emotion*. 1983; 7(3):279–290. doi:10.1007/bf00991678.
- Marks I, Lovell K, Noshirvani H, Livanou M, Thrasher S. Treatment of posttraumatic stress disorder by exposure and/or cognitive restructuring: A controlled study. *Archives of General Psychiatry*. 1998; 55(4):317–325. doi:10.1001/archpsyc.55.4.317. [PubMed: 9554427]
- Mathews A, MacLeod C. Cognitive vulnerability to emotional disorders. *Annual Review of Clinical Psychology*. 2005; 1(1):167–195. doi:10.1146/annurev.clinpsy.1.102803.143916.
- Mavissakalian M, Michelson L. Agoraphobia: Relative and combined effectiveness of therapist-assisted in vivo exposure and imipramine. *Journal of Clinical Psychiatry*. 1986; 47(3):117–122. [PubMed: 3512534]
- McKay D. Exposure and ritual prevention reduces symptoms more than stress management training in OCD treated with SSRIs. *Evidence-Based Mental Health*. 2009; 12(1):17. doi:10.1136/ebmh.12.1.17. [PubMed: 19176776]
- Mennin DS. Emotion regulation therapy: An integrative approach to treatment-resistant anxiety disorders. *Journal of Contemporary Psychotherapy*. 2006; 36(2):95–105. doi:10.1007/s10879-006-9012-2.
- Mennin DS, Heimberg RG, Turk CL, Fresco DM. Applying an emotion regulation framework to integrative approaches to generalized anxiety disorder. *Clinical Psychology: Science and Practice*. 2002; 9(1):85–90. doi:10.1093/clipsy/9.1.85.
- Mennin DS, Heimberg RG, Turk CL, Fresco DM. Preliminary evidence for an emotion dysregulation model of generalized anxiety disorder. *Behaviour Research and Therapy*. 2005; 43(10):1281–1310. doi:10.1016/j.brat.2004.08.008. [PubMed: 16086981]
- Mersch PPA. The treatment of social phobia: The differential effectiveness of exposure in vivo and an integration of exposure in vivo, rational emotive therapy and social skills training. *Behaviour Research and Therapy*. 1995; 33(3):259–269. doi: 10.1016/0005-7967(94)00038-L. [PubMed: 7726802]
- Metzger RL, Miller ML, Cohen M, Sofka M, Borkovec TD. Worry changes decision making: The effect of negative thoughts on cognitive processing. *Journal of Clinical Psychology*. 1990; 46(1): 78–88. doi:10.1002/1097-4679(199001)46:1<78::AID-JCLP2270460113>3.0.CO;2-R. [PubMed: 2303569]
- Meyer TJ, Miller ML, Metzger RL, Borkovec TD. Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy*. 1990; 28(6):487–495. doi: 10.1016/0005-7967(90)90135-6. [PubMed: 2076086]
- Moberly NJ, Watkins ER. Ruminative self-focus, negative life events, and negative affect. *Behaviour Research and Therapy*. 2008a; 46(9):1034–1039. doi:10.1016/j.brat.2008.06.004. [PubMed: 18684437]

- Moberly NJ, Watkins ER. Ruminative self-focus and negative affect: An experience sampling study. *Journal of Abnormal Psychology*. 2008b; 117(2):314–323. doi:10.1037/0021-843X.117.2.314. [PubMed: 18489207]
- Mogg K, Millar N, Bradley BP. Biases in eye movements to threatening facial expressions in generalized anxiety disorder and depressive disorder. *Journal of Abnormal Psychology*. 2000; 109(4):695–704. doi:10.1037//0021-843X.109.4.695. [PubMed: 11195993]
- Newman MG, Castonguay LG, Borkovec TD, Fisher AJ, Nordberg SS. An open trial of integrative therapy for generalized anxiety disorder. *Psychotherapy: Theory, Research, Practice, Training*. 2008; 45(2):135–147. doi:10.1037/0033-3204.45.2.135.
- Newman, MG.; Castonguay, LG.; Borkovec, TD.; Molnar, C. Integrative psychotherapy.. In: Heimberg, RG.; Turk, CL.; Mennin, DS., editors. *Generalized anxiety disorder: Advances in research and practice*. Guilford Press; New York, NY: 2004. p. 320-350.
- Newman, MG.; Erickson, TM. Generalized anxiety disorder.. In: Beck, JG., editor. *Interpersonal processes in the anxiety disorders: Implications for understanding psychopathology and treatment*. American Psychological Association; Washington, DC: 2010. p. 235-259.
- Newman MG, Hofmann SG, Trabert W, Roth WT, Taylor CB. Does behavioral treatment of social phobia lead to cognitive changes? *Behavior Therapy*. 1994; 25(3):503–517. doi:10.1016/S0005-7894(05)80160-1.
- Newman MG, Castonguay LG, Borkovec TD, Fisher AJ, Boswell J, Szkodny L, et al. A randomized controlled trial of cognitive-behavioral therapy with integrated techniques from emotion-focused and interpersonal therapies. *Journal of Consulting and Clinical Psychology*. in press.
- Oathes DJ, Ray WJ, Yamasaki AS, Borkovec TD, Castonguay LG, Newman MG, et al. Worry, generalized anxiety disorder, and emotion: Evidence from the EEG gamma band. *Biological Psychology*. 2008; 79(2):165–170. doi:10.1016/j.biopsycho.2008.04.005. [PubMed: 18499328]
- Öst LG, Alm T, Brandberg M, Breitholtz E. One vs five sessions of exposure and five sessions of cognitive therapy in the treatment of claustrophobia. *Behaviour Research and Therapy*. 2001; 39(2):167–183. doi:10.1016/S0005-7967(99)00176-X. [PubMed: 11153971]
- Öst LG, Salkovskis PM, Hällstrom K. One session therapist-directed exposure vs. self-exposure in the treatment of spider phobia. *Behavior Therapy*. 1991; 22(3):407–422. doi:10.1016/S0005-7894(05)80374-0.
- Peasley-Miklus C, Vrana SR. Effect of worrisome and relaxing thinking on fearful emotional processing. *Behaviour Research and Therapy*. 2000; 38(2):129–144. doi:10.1016/S0005-7967(99)00025-X. [PubMed: 10660999]
- Pieper S, Brosschot JF. Prolonged stress-related cardiovascular activation: Is there any? *Annals of Behavioral Medicine*. 2005; 30(2):91–103. doi:10.1207/s15324796abm3002_1. [PubMed: 16173905]
- Pieper S, Brosschot JF, van der Leeden R, Thayer JF. Cardiac effects of momentary assessed worry episodes and stressful events. *Psychosomatic Medicine*. 2007; 69(9):901–909. doi:10.1097/PSY.0b013e31815a9230. [PubMed: 17991822]
- Pieper S, Brosschot JF, van der Leeden R, Thayer JF. Prolonged cardiac effects of momentary assessed stressful events and worry episodes. *Psychosomatic Medicine*. 2010; 72(6):570–577. doi: 10.1097/PSY.0b013e3181dbc0e9. [PubMed: 20410249]
- Rachman S. Emotional processing. *Behaviour Research and Therapy*. 1980; 18(1):51–60. doi: 10.1016/0005-7967(80)90069-8. [PubMed: 7369988]
- Roemer L, Orsillo SM. 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*. 2002; 9(1):54–68. doi:10.1093/clipsy/9.1.54.
- Roemer L, Orsillo SM, Salters-Pedneault K. Efficacy of an acceptance-based behavior therapy for generalized anxiety disorder: Evaluation in a randomized controlled trial. *Journal of Consulting and Clinical Psychology*. 2008; 76(6):1083–1089. doi:10.1037/a0012720. [PubMed: 19045976]
- Roemer L, Salters K, Raffa SD, Orsillo SM. Fear and avoidance of internal experiences in GAD: Preliminary tests of a conceptual model. *Cognitive Therapy and Research*. 2005; 29(1):71–88. doi:10.1007/s10608-005-1650-2.

- Roger D, Jamieson J. Individual differences in delayed heart-rate recovery following stress: The role of extraversion, neuroticism and emotional control. *Personality and Individual Differences*. 1988; 9(4):721–726. doi:10.1016/0191-8869(88)90061-x.
- Ruscio AM, Borkovec TD. Experience and appraisal of worry among high worriers with and without generalized anxiety disorder. *Behaviour Research and Therapy*. 2004; 42(12):1469–1482. doi:10.1016/j.brat.2003.10.007. [PubMed: 15500816]
- Scheier MF, Bridges MW. Person variables and health: Personality predispositions and acute psychological states as shared determinants for disease. *Psychosomatic Medicine*. 1995; 57(3): 255–268. [PubMed: 7652126]
- Schlottz W, Hellhammer J, Schulz P, Stone AA. Perceived work overload and chronic worrying predict weekend–weekday differences in the cortisol awakening response. *Psychosomatic Medicine*. 2004; 66(2):207–214. doi:10.1097/01.psy.0000116715.78238.56. [PubMed: 15039505]
- Segerstrom SC, Glover DA, Craske MG, Fahey JL. Worry affects the immune response to phobic fear. *Brain, Behavior, and Immunity*. 1999; 13(2):80–92. doi:10.1006/brbi.1998.0544.
- Segerstrom SC, Solomon GF, Kemeny ME, Fahey JL. Relationship of worry to immune sequelae of the Northridge earthquake. *Journal of Behavioral Medicine*. 1998; 21(5):433–450. doi:10.1023/A:1018732309353. [PubMed: 9836130]
- Segerstrom SC, Tsao JCI, Alden LE, Craske MG. Worry and rumination: Repetitive thought as a concomitant and predictor of negative mood. *Cognitive Therapy and Research*. 2000; 24(6):671–688. doi:10.1023/A:1005587311498.
- Stapinski LA, Abbott MJ, Rapee RM. Evaluating the cognitive avoidance model of generalised anxiety disorder: Impact of worry on threat appraisal, perceived control and anxious arousal. *Behaviour Research and Therapy*. 2010; 48(10):1032–1040. doi:10.1016/j.brat.2010.07.005. [PubMed: 20688319]
- Startup HM, Davey GCL. Mood as input and catastrophic worrying. *Journal of Abnormal Psychology*. 2001; 110(1):83–96. doi:10.1037//0021-843X.110.1.83. [PubMed: 11261404]
- Suchday S, Carter MM, Ewart CK, Larkin KT, Desiderato O. Anger cognitions and cardiovascular recovery following provocation. *Journal of Behavioral Medicine*. 2004; 27(4):319–341. doi:10.1023/B:JOBM.0000042408.80551.e1. [PubMed: 15559731]
- Tallis F, Eysenck M, Mathews A. Elevated evidence requirements and worry. *Personality and Individual Differences*. 1991; 12(1):21–27. doi:10.1016/0191-8869(91)90128-X.
- Thayer S. The effect of expression sequence and expressor identity on judgments of the intensity of facial expression. *Journal of Nonverbal Behavior*. 1980; 5(2):71–79. doi:10.1007/bf00986510.
- Thayer JF, Friedman BH, Borkovec TD. Autonomic characteristics of generalized anxiety disorder and worry. *Biological Psychiatry*. 1996; 39(4):255–266. doi:10.1016/0006-3223(95)00136-0. [PubMed: 8645772]
- Turk CL, Heimberg RG, Luterek JA, Mennin DS, Fresco DM. Emotion dysregulation in generalized anxiety disorder: A comparison with social anxiety disorder. *Cognitive Therapy and Research*. 2005; 5(1):89–106. doi:10.1007/s10608-005-1651-1.
- Vasey MW, Borkovec TD. A catastrophizing assessment of worrisome thoughts. *Cognitive Therapy and Research*. 1992; 16(5):505–520. doi:10.1007/BF01175138.
- Verkuil B, Brosschot JF, de Beurs DP, Thayer JF. Effects of explicit and implicit perseverative cognition on cardiac recovery after cognitive stress. *International Journal of Psychophysiology*. 2009; 74(3):220–228. doi:10.1016/j.ijpsycho.2009.09.003. [PubMed: 19770006]
- Vickers KS, Vogeltanz-Holm ND. The Effects of Rumination and Distraction Tasks on Psychophysiological Responses and Mood in Dysphoric and Nondysphoric Individuals. *Cognitive Therapy and Research*. 2003; 27(3):331–348. doi:10.1023/a:1023970501448.
- Vrana SR, Cuthbert BN, Lang PJ. Fear imagery and text processing. *Psychophysiology*. 1986; 23(3): 247–253. doi:10.1111/j.1469-8986.1986.tb00626.x. [PubMed: 3749404]
- Vrana SR, Cuthbert BN, Lang PJ. Processing fearful and neutral sentences: Memory and heart rate change. *Cognition and Emotion*. 1989; 3(3):179–195.
- Vrana SR, Lang PJ. Fear imagery and the startle-probe reflex. *Journal of Abnormal Psychology*. 1990; 99(2):189–197. doi:10.1037/0021-843X.99.2.189. [PubMed: 2348014]

- Waters AM, Mogg K, Bradley BP, Pine DS. Attentional bias for emotional faces in children with generalized anxiety disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2008; 47(4):435–442. doi:10.1097/CHI.0b013e3181642992. [PubMed: 18388762]
- Wegner DM, Schneider DJ, Carter SR, White TL. Paradoxical effects of thought suppression. *Journal of Personality and Social Psychology*. 1987; 53(1):5–13. doi:10.1037/0022-3514.53.1.5. [PubMed: 3612492]
- Wells A. Meta-cognition and worry: A cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy*. 1995; 23(3):301–320. doi:10.1017/S1352465800015836.
- Wells A. A metacognitive model and therapy for generalized anxiety disorder. *Clinical Psychology and Psychotherapy*. 1999; 6(2):86–95. doi:10.1002/(SICI)1099-0879(199905)6:2<71::AID-CPP186>3.0.CO;2-G.
- Wells, A. A Cognitive Model of GAD: Metacognitions and Pathological Worry.. In: Heimberg, Richard G.; Turk, Cynthia L.; Mennin, Douglas S., editors. *Generalized anxiety disorder: Advances in research and practice*. Guilford Press; New York, NY, US: 2004. p. 2164-2186.p. xvip. 2446
- Wells A, Papageorgiou C. Worry and the incubation of intrusive images following stress. *Behaviour Research and Therapy*. 1995; 33(5):579–583. doi:10.1016/0005-7967(94)00087-Z. [PubMed: 7598681]
- Westen D, Morrison K. A multidimensional meta-analysis of treatments for depression, panic, and generalized anxiety disorder: An empirical examination of the status of empirically supported therapies. *Journal of Consulting and Clinical Psychology*. 2001; 69(6):875–899. doi: 10.1037//0022-006X.69.6.875. [PubMed: 11777114]
- Williams GD. The effect of order of appearance on the appreciation of musical selections. *Journal of General Psychology*. 1942; 27:295–310.
- Wilson EJ, MacLeod C, Mathews A, Rutherford EM. The causal role of interpretive bias in anxiety reactivity. *Journal of Abnormal Psychology*. 2006; 115(1):103–111. doi:10.1037/0021-843X.115.1.103. [PubMed: 16492101]
- York D, Borkovec TD, Vasey M, Stern R. Effects of worry and somatic anxiety induction on thoughts, emotion and physiological activity. *Behaviour Research and Therapy*. 1987; 25(6):523–526. doi: 10.1016/0005-7967(87)90060-X. [PubMed: 3426513]
- Zinbarg RE, Lee JE, Yoon KL. Dyadic predictors of outcome in a cognitive-behavioral program for patients with generalized anxiety disorder in committed relationships: A “spoonful of sugar” and a dose of non-hostile criticism may help. *Behaviour Research and Therapy*. 2007; 45(4):699–713. doi:10.1016/j.brat.2006.06.005. [PubMed: 16904063]