

## GAD, Metacognition, and Mindfulness: An Information Processing Analysis

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**In this commentary I discuss the integration of mindful procedures in cognitive therapy of generalized anxiety disorder (GAD) and attempt to answer questions concerning the effects of mindfulness on information processing and on mechanisms purported to maintain GAD in the metacognitive model of this disorder. Different techniques that promote mindfulness can be identified, including mindfulness meditation and attention training. These techniques are intended to disrupt repetitive styles of dysfunctional thinking. I argue that the effect of mindfulness strategies on information processing in emotional disorder can be conceptualized in metacognitive terms as (a) activating a metacognitive mode of processing; (b) disconnecting the influence of maladaptive beliefs on processing; (c) strengthening flexible responding to threat; and (d) strengthening metacognitive plans for controlling cognition. Although mindfulness meditation may have general treatment applications, the metacognitive model of GAD suggests caution in using this treatment in GAD. It is unclear which dimension of worry should be targeted, and mindfulness meditation does not contain information that can lead to unambiguous disconfirmation of erroneous beliefs about worry.**

**Key words:** generalized anxiety disorder, metacognition, worry, mindfulness, information processing.  
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Cognitive-behavioral treatments of generalized anxiety disorder (GAD) have produced modest and disappointing outcomes (e.g., Fisher & Durham, 2000). One of the weaknesses has been the use of a range of different treatment techniques, often presented in combination, with a limited sense of how each of the techniques may impact on different components of cognition within a dynamic model of disorder maintenance. To improve treatment

effectiveness, the development and/or application of new techniques should be based on an understanding of the mechanisms that maintain excessive and difficult-to-control worry, the hallmark of GAD. This endeavor of understanding is all the more engaging in light of models of anxiety that suggest that the core processes in GAD are fundamental processes in all anxiety disorders (Barlow, 1988, 1991).

Recently, there has been a growing interest in the use of mindfulness meditation and similar procedures in the treatment of psychological disorder. Such approaches vary in the extent to which they are linked to underlying theoretical mechanisms purported to maintain disorder. Roemer and Orsillo (this issue) have suggested that it may be useful to integrate mindfulness/acceptance-based approaches with cognitive-behavioral models to improve the treatment of GAD. Their assertion is notable since it is based on the theoretical premise that patients with GAD habitually worry in order to reduce internal distress. Therefore mindfulness/acceptance techniques may be used to promote an alternative to habitual patterns of responding in GAD with “intentional, flexible ways of responding that are chosen rather than automatic” (Roemer & Orsillo, this issue, p. 62). It appears from their conceptual analysis that worrying is seen largely as a reflexive process. However, the question of the usefulness of mindfulness in treating GAD can be addressed by taking a broader model of cognition in this disorder that considers the strategic nature of worry and its link with higher level beliefs. One model of GAD, the metacognitive model, provides a detailed account of the factors that contribute to and maintain pathological worry in this disorder. This model raises a number of issues concerning the utility of mindfulness as a treatment technique in this disorder.

The purpose of this commentary is to describe the metacognitive model of GAD and raise several important implications of this model for applying mindfulness techniques in treatment. Before embarking on this, in the next section the nature of mindfulness will be briefly outlined, and I will attempt to answer an important question: what impact might mindfulness have on human information processing?

### THE NATURE OF MINDFULNESS

Mindfulness meditation stems from Buddhist practices. It has been defined as “paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally. This kind of attention nurtures greater awareness,

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clarity and acceptance of present-moment reality” (Kabat-Zinn, 1994, p. 4). Mindfulness meditation consists of focusing on one’s breathing and accepting present-moment experiences. The breath is used as an anchor to bring thoughts back to present-moment experience. Mindfulness meditation has been applied as a procedure to reduce depressive relapse after cognitive-behavioral therapy (Teasdale et al., 2000). The objective of this application is disengagement of appraisals of stimuli or cognition in order to block ruminative thinking about one’s situation. Despite this innovative use, mindfulness meditation was not originally derived from a cognitive-behavioral model of the factors that contribute to vulnerability to or the maintenance of psychological disorder. It is not clear how merely being aware in the present moment in a nonjudgmental way can provide experiences that unambiguously modify dysfunctional beliefs or other cognitive mechanisms that drive unhelpful thinking patterns of worry or rumination.

A theory-based technique that has been developed to increase flexible metacognitive control of attention and unlock problematic inflexible self-focused thinking styles is attention training (Wells, 1990). This technique differs from the mindfulness strategies reviewed above in that it does not require self-focused attention, and it emphasizes intensive and flexible attention to external auditory stimuli, in which patients implicitly resist capture of attention by internal, nontarget distracters during practice. The technique is practiced on a daily basis during specific practice periods, and it is not used as a stress-management strategy. Like mindfulness meditation, attention training does not provide unambiguous information that can modify dysfunctional beliefs. However, the technique is based on a cognitive model of emotional disorder (Wells & Matthews, 1994) and on the principle that by flexibly controlling attention, the individual can develop metacognitive control skills and thereby strengthen plans stored in long-term memory that can be called to regulate cognition. Although intended to be used as a component of cognitive therapy, the technique alone appears to be effective in treating panic, social phobia, hypochondriasis, and recurrent major depression (Wells, 1990; Wells, White & Carter, 1997; Papageorgiou & Wells, 1998, 2001).

#### **EFFECTS OF MINDFULNESS ON INFORMATION PROCESSING**

What is the effect of mindfulness on information processing in psychological disorder? This question can be

readily answered within the context of the self-regulatory executive function (S-REF) model of emotional disorder (Wells & Matthews, 1994, 1996). The S-REF offers a multilevel cognitive architecture for locating mindfulness effects. In this model, information processing is supported by interactions between three levels of cognition: a level of stored knowledge or beliefs in long-term memory, a level of on-line processing supporting appraisal and execution of coping strategies reliant on attention, and a lower level of reflexive processing that predominantly operates outside of conscious awareness. In the model beliefs are conceptualized not only as declarative, non-metacognitive information as in schema theory (e.g., “I’m worthless, I’m inadequate”), but include a metacognitive belief component or plan that guides the activities of the on-line processing system. For instance, two people with the same negative declarative belief (e.g. “I’m a failure”) can show different responses when exposed to the same threat. One may worry; the other may engage in task-focused problem solving. The presence of the declarative belief alone cannot explain these different styles of on-line processing. Individuals persist in repetitive negative styles of thinking—namely, active worry/rumination in response to stress—because they hold metacognitive beliefs about the advantages of engaging in such strategies and/or beliefs that lead to unhelpful strategies of mental regulation.

In addition to levels of cognition, the S-REF model identifies two different processing modes: an *object mode* and a *metacognitive mode* (Wells, 2000). Features of these two modes in relation to self-regulation and cognitive change processes are depicted in Table 1. Effective cognitive therapy relies on the establishment of a metacognitive processing mode which strengthens alternative beliefs for guiding cognition and action that break the constraints imposed by maladaptive processing (e.g., threat monitoring, self-focus, worry) on cognitive modification.

In the context of the distinction made in the S-REF model between metacognitive beliefs, on-line processing, and modes, mindfulness techniques have several potential effects on information processing: (a) They offer a means of activating and strengthening the metacognitive mode of processing; a general-purpose resource that facilitates cognitive restructuring. (b) They decouple the influence of maladaptive metacognitive beliefs on on-line processing; that is, they enable patients to be aware of internal/external threats without activating counterproductive worry/ruminatory styles of thinking. (c) They introduce

**Table 1.** Characteristics of two modes of processing: the object mode and metacognitive mode

Metacognitions	Object Mode	Metacognitive Mode
Knowledge	Thoughts depict reality (threat is objective) Thoughts must be acted on (to reduce threat)	Thoughts are events, not realities (threat is subjective) Thoughts can be evaluated (for accuracy)
Goals	Eliminate threat	Modify thinking
Strategies	Evaluate threat Execute threat-reducing behaviors (e.g., worry, threat monitoring)	Evaluate thoughts Execute metacognitive control behaviors (e.g., suspend worry, redirect attention)
Probable outcome	Maladaptive knowledge strengthened	Knowledge restructured New plans developed

*Note.* After Wells (2000).

flexible ways of responding to threat. (d) They strengthen metacognitive plans for controlling and guiding cognition. However, mindfulness may be counterproductive if it is used in object mode processing as a means of controlling or escaping from nonexistent threat. In this context the nonoccurrence of catastrophe could be attributed to use of mindfulness and not the fact that catastrophe would not occur. The mode of processing activated will depend on the rationale given for practicing mindfulness and the patient's goals in using the technique. The mindful state does not inherently contain information that is capable of unambiguously disconfirming the content of patients beliefs and negative appraisals, despite the fact that it may free-up locked in perseverative processing and its attendant problems.

Finally, the effectiveness of mindfulness states may depend on how characteristics of the technique interface with characteristics of specific disorders. For example, self-focused mindful procedures (meditation) consisting of focusing on breathing may run the risk of strengthening self-consciousness, which may contribute to stress vulnerability. Elevated self-awareness has been linked to psychological vulnerability (Barlow, 1988; Ingram, 1990) and may contribute to dysfunctional beliefs in some circumstances. Procedures that do not require self-focus but achieve greater metacognitive control over processing, such as attention training (Wells, 1990), offer cognitive theory-based alternatives that reduce self-focus, disrupt ruminative styles of thinking, and increase flexible metacognitive control.

#### **THE METACOGNITIVE MODEL OF GAD**

In the metacognitive model of GAD (Wells, 1995, 1997), worry is viewed not merely as a symptomatic consequence of anxiety but as an active and motivated style of

appraisal and coping with threat that is driven by metacognitive beliefs. It is proposed that individuals with GAD use worry to cope with anticipated danger and threat. Worrying of this kind is often triggered by an intrusive thought or an image. Once a trigger is encountered, positive metacognitive beliefs (e.g., "worrying helps me cope"; "worrying keeps me safe"; "if I worry I'll be prepared") lead individuals with GAD to continue the execution of worry sequences in which a range of "what if" danger-related questions are contemplated and potential strategies for dealing with threat scenarios are generated. This process of worry, called type 1 worrying, continues until it meets its goals of generating personally acceptable coping responses. It follows from this that the duration of anxiety responses is linked partially to the length of time taken to meet goals for coping. The person with GAD continues to worry until he or she assesses that he or she will be able to effectively cope with threat. This assessment is often based on an internal cue such as felt-sense that one will be able to cope or the belief that all-important outcomes have been contemplated. However, pathological worrying characteristic of GAD emerges when negative metacognitive beliefs about worry are activated. Individuals with GAD negatively appraise their worrying and believe that their worrying is uncontrollable and potentially harmful or dangerous. Such negative beliefs can emerge from personal learning experiences, common folklore about the dangers of stress and worry, and from the effects of repeated type 1 worrying. For instance, worrying may interfere with emotional processing and incubate intrusive thoughts contributing to negative appraisals of cognitive control. The two domains of negative belief that are important are beliefs about uncontrollability of worry and beliefs about the dangers of worrying (e.g., "I could go crazy with worry"; "wor-

rying can damage my body”). In GAD, negative beliefs are activated during worry episodes, and this leads to negative appraisal of the worry process. Such negative appraisals are known as type 2 worry or meta-worry. Meta-worry leads to an escalation of anxiety so that individuals experience a refreshed need to continue worrying in order to feel that they are able to cope.

Two further mechanisms contribute to the problem in the form of the person’s behavioral responses and thought-control strategies. Because positive and negative beliefs about worry coexist, the person is motivated to worry in response to initial triggers and rarely attempts to actively interrupt the worry sequence once it is initiated. Limited evidence is therefore available that worry is controllable. The dissonance between positive and negative beliefs can be avoided if the individual avoids triggers for worrying in the first place. This may consist of behavioral avoidance, reassurance seeking, and attempts not to think about worry triggers. The problem with these responses is that they deprive individuals of an opportunity to discover that worrying is subject to voluntary control and/or even if it isn’t controlled that worrying is harmless. Other behaviors such as reassurance seeking and checking are problematic because they support appraisals of threat and can provide conflicting information that acts as a continued source of worrying. This model is supported by data from a range of sources as summarized below:

1. Both positive and negative beliefs about worry are positively associated with proneness to pathological worrying (Cartwright-Hatton & Wells, 1997; Wells & Papageorgiou, 1998).

2. Individuals meeting criteria for GAD give higher ratings for positive reasons for worrying involving superstition and problem-solving than nonanxious subjects (Borkovec & Roemer, 1995).

3. Patients with GAD report significantly greater negative beliefs about worrying than patients with panic disorder or social phobia or nonpatient controls (Wells & Carter, 2001).

4. Type 2 worry is a better predictor than type 1 worry of pathological, GAD-like worry in nonpatients (Wells & Carter, 1999).

5. Compared to patients with panic disorder or social phobia or nonpatients, patients with GAD have significantly higher meta-worry scores (Wells & Carter, 2001).

6. In a prospective study of predictors of GAD status and of pathological worry, meta-worry and negative meta-

cognitive beliefs emerged as significant causal predictors of GAD 12–14 weeks later (Nassif, 1999).

7. Worrying after exposure to stress is associated with an incubation of intrusive images (Butler, Wells, & Dewick; 1995; Wells & Papageorgiou, 1995), and individual differences in the use of worry to control thoughts is associated with the development of post-traumatic stress disorder after trauma (Holeva, Tarrier, & Wells, 2001). These data suggest that worrying can contribute to intrusions and are consistent with the idea that it may stimulate negative metacognitive beliefs about thinking.

#### **LOCATING MINDFULNESS WITHIN THE METACOGNITIVE TREATMENT OF GAD**

The metacognitive model raises some important and potentially problematic issues concerning the effective integration of mindfulness techniques in the treatment of GAD. We may ask, at which thoughts should mindfulness be targeted during worry sequences: the initial trigger, the ensuing type 1 worry sequence, or the meta-worry? The precise target for the procedure is likely to have an impact on its effectiveness. More specifically, the model predicts that if the procedure is only targeted at suspending type 1 worry, this may be a form of avoidance that prevents patients from discovering that worry is harmless. In contrast, if it is used to suspend meta-worry and unhelpful thought-control responses, and type 1 worry is allowed to continue or encouraged, then it may be used as a behavioral experiment to challenge negative beliefs about the consequences of worrying. We have found that worry postponement experiments, in which patients are encouraged to be mindful of initial thoughts that trigger worry and then choose not to engage in type 1 worry, can be used to challenge uncontrollability beliefs; however, this should be followed by strategies in which the patient deliberately enhances type 1 worry as a means of discovering that worry is not dangerous. This treatment is described in detail elsewhere (Wells, 1997, 2000).

The aim of metacognitive-focused treatment is to modify patients’ negative beliefs about worry concerning uncontrollability and the danger of worry and to challenge positive beliefs that lead to an inflexible execution of worrying as a means of coping with anticipated threats. Later in treatment patients are asked to adopt alternative strategies in response to initial worry triggers, such as deciding not to worry, and imagining positive outcomes in response to intrusions. However, this is presented in such a way that it does not become avoidance of the dan-

gers believed to be associated with worrying, which would prevent disconfirmation of negative beliefs about worry.

To what extent can mindfulness achieve these aims? It is possible that mindfulness can lead patients to question their beliefs about the uncontrollability of worry. However, this depends on the cognitive set (rationale) in which mindfulness exercises are practiced, and it depends on the cognitions that are targeted for mindful responding. If mindfulness is presented as an experiment to show how patients can be aware of intrusions that trigger worry without activating type 1 worry sequences as a means of coping/avoidance, then this may challenge beliefs about the uncontrollability of worry. In this instance, patients are using mindful experiencing instead of worry responses to intrusions. From a metacognitive perspective they are having experiences that can facilitate the acquisition of the belief that worrying is controllable, and they are practicing the skill of mindful experiencing, which may be used as a general resource for disengaging ruminative/worry responses from negative thought intrusions. However, the control of worry does not provide unambiguous disconfirmation of negative beliefs concerning the dangers of worrying. Moreover, if practiced successfully, worry disengagement by mindfulness may support an attributional bias in which the nonoccurrence of catastrophe (e.g., “mental breakdown”) is attributed to use of control and not to the fact that the belief in catastrophe is erroneous. Thus, a potential danger with mindfulness as a strategy is that it may not directly modify some of the core metacognitive belief domains that contribute most centrally to the problem of uncontrollable and distressing worry. Strategies such as mindfulness and relaxation therapies are likely to be effective only to the extent that they modify metacognitive beliefs and meta-worry. One of the dangers is that mindfulness meditation could be used as an anxiety-management technique, which could interfere with patients discovering that anxiety itself does not lead to catastrophe.

Finally, to what extent might mindfulness modify positive beliefs about the usefulness of worry as a coping strategy? In using mindfulness to disengage Type 1 worry, patients potentially open themselves up to discover that they can cope effectively without the use of worrying. If mindfulness is presented as a behavioral experiment, then it may be effectively used for this purpose.

In summary, it seems that mindfulness presented in unmodified form as a meditative exercise probably lacks

the specificity to unambiguously modify erroneous metacognitive beliefs that are hypothesized as central to the maintenance of GAD. This need not consign mindfulness to the scrap-heap, because as we have seen, there are potential consequences of mindfulness that are more generally important for cognitive modification. Indeed, mindful procedures may be presented as initial techniques for disrupting perseverative processing and configured as behavioral experiments to test patients’ metacognitive beliefs about worrying. However, we have not used mindfulness meditation in our metacognitive-focused treatment of GAD, and we have found that it is highly effective to focus directly on formulating and challenging negative and positive beliefs about worrying.

#### CONCLUSION

The contribution of mindfulness in treating GAD remains to be evaluated, and, as we have seen, its integration in cognitive therapy when viewed in the context of the metacognitive model raises several conceptual and procedural issues concerning its effective usage. The mindfulness construct, particularly if operationalized in metacognitive terms of promoting a metacognitive mode of processing and enabling patients to disengage from perseverative self-focused processing, has been posited as a general initial strategy for recovering attentional resources for subsequent cognitive restructuring (Wells & Matthews, 1994, 1996). Moreover, practicing the skill of disengaging from negative thoughts and attention training have been viewed as providing the basic setting conditions for developing and strengthening metacognitive plans stored in long-term memory that can be used to guide attention and thinking in a flexible rather than in a threat-bound manner in emotional disorder. Thus, mindfulness as a goal may have a more general application in the treatment of emotional disorders, but the techniques used to accomplish such a goal should be conceptually grounded in cognitive theory. The hypothesized utility of mindfulness for specifically treating GAD is dependent on the model of GAD adopted. If, as predicted by the metacognitive model, effective treatment depends on modifying erroneous beliefs about worry, then mindfulness techniques may not unambiguously accomplish this unless they are specifically modified to do so.

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