A cognitive model of generalized anxiety disorder (GAD) is described. The model asserts that generalized anxiety is an abnormal worry state. In this model, GAD results from the usage of worrying as a coping strategy and subsequent negative evaluation of worrying. The use of worry as a strategy is supported by positive metabeliefs concerning worry, whereas the negative appraisal of worrying (worry about worry) is linked to negative metabeliefs developed out of previous experience. These beliefs center on the themes of uncontrollability of worries and the dangerous consequences of worrying. Negative appraisal of worrying is associated with behavioral and cognitive responses that serve to maintain unwanted thoughts, and preserve dysfunctional beliefs. A review of the literature indicates that the model is consistent with existing data. Predictions and treatment implications of the model are discussed.

A Cognitive Model of Generalized Anxiety Disorder

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It is only in the last several years that generalized anxiety disorder (GAD) has been identified as a distinct disorder category. In this time, descriptions of the disorder have undergone repeated modification. In *DSM-III* (American Psychiatric Association [APA], 1980), GAD was a residual category that could only be diagnosed if no other anxiety disorder diagnosis was present. The criteria for GAD in *DSM-III* required anxious mood defined by presence of at least three symptoms. Revisions in *DSM III-R* (APA, 1987) emphasized presence of excessive and/or unrealistic worry in two or more life areas unconnected with another Axis I disorder. To meet criteria set out in *DSM-III-R*, presence of six symptoms (e.g., muscle tension, palpitations, and feeling keyed up or on edge) was also required. Duration of the disorder was extended to at least 6 months, thus facilitating differ-

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entiation between transient stress reactions and GAD. The refinement of worry as a central defining feature of GAD continued with introduction of *DSM-IV* (APA, 1994). In *DSM-IV,* the criterion that worry is experienced as difficult to control was introduced and the requirement of at least two different worry topics was dropped. To meet *DSM-IV* criteria for GAD, an individual must show: "Excessive anxiety and worry (apprehensive expectation), occurring more days than not for at least 6 months, about a number of events or activities" (APA, 1994, p. 435). There should be difficulty controlling worry, and the anxiety and worry should be associated with three (or more) out of six symptoms: (a) restlessness or feeling keyed up or on edge, (b) being easily fatigued, (c) difficulty concentrating or mind going blank, (d) irritability, (e) muscle tension, and (f) sleep disturbance. The focus of the worry should not be confined to another Axis I disorder.

GAD is a chronic disorder that can have a relatively early onset. Yonkers, Warshaw, Massion, and Keller (1996) assessed 164 patients with GAD and reported that age of onset varies between 2 and 61 years with a mean of 21 years. In retrospective accounts, the mean length of illness was 20 years. Similar reports of the longstanding nature of the problem were reported by Barlow, Blanchard, Vermilyea, Vermilyea, and DiNardo (1986). The degree of comorbidity between GAD and other psychiatric disorders is high. Sanderson and Barlow (1990) reported the comorbid characteristics of a sample of 22 patients meeting *DSM-III-R* criteria for GAD. About 59% met criteria for social phobia, and 27% met criteria for panic disorder. Dysthymia was reported by 27%, and depression by 14% of patients. Yonkers et al. (1996) reported that 52% of their GAD sample met criteria for panic disorder or panic with agoraphobia. Thirty-two percent were socially phobic, and 37% met criteria for major depression. These overlaps suggest that the *DSM-III-R* classification may have low integrity. However, a different possibility is that comorbidity reflects underlying mechanisms that are general vulnerability factors. GAD may reflect a relatively pure manifestation of mechanisms that are central to many emotional disorders. Consistent with this view, Rapee (1991) considered GAD as a basic anxiety disorder that is similar to the concept of trait-anxiety.

Because GAD is predominantly a worry disorder, a better understanding of the nature and functions of worry is likely to contribute to conceptualizng dysfunctional cognition in GAD. However, it is only relatively recently that worry has become the focus of clinical research interest. Empirical studies suggest that worry is multifaceted and distinctions between it and other types of thought in anxiety may prove useful in understanding mechanisms of anxiety maintenance (Borkovec & Inz, 1990; Wells, 1994a; Wells & Papageorgiou, 1995).

It is likely that GAD may be best conceptualized from a cognitive perspective that explains the maintenance of abnormal worry processes in that disorder. This article reviews the nature and function of worry, a cognitive model of worry in GAD is described, and a brief review of the experimental literature is presented to determine if existing information is consistent with the model.

THE NATURE OF WORRY

Worrying is an intrusive ideational process that can be differentiated from other types of intrusive thought such as obsessions (Turner, Beidel, & Stanley, 1992; Wells & Morrison, 1994). In early work, Borkovec, Robinson, Pruzinsky, and DePree (1983) defined worry as follows: "Worry is a chain of thoughts and images, negatively affect laden and relatively uncontrollable" (p. 10). They viewed worry as a problem-solving activity, closely related to fear processes. More recent theorizing by Borkovec and colleagues has emphasized the verbal conceptual nature of worrying. Evidence suggests that worrying in normals, and GAD patients in particular, is predominantly verbal rather than imaginal in content (Borkovec & Inz, 1990; Wells & Morrison, 1994). Summarizing results of a phenomenological study of normal worry, Tallis, Davey, and Bond (1994) described worry as a predominantly verbal thought process whose content is related to current concerns; however, the temporal focus of worry can also be on past or future issues. Worry is predominantly ego-syntonic and worry is in part perceived as serving an adaptive function. A little more than 83% of subjects in the study by Tallis et al. (1994) suggested that worry can produce reasonable solutions to problems. In a study of worry in a predominantly student sample, Borkovec et al. (1983)

showed that worry content was primarily concerned with future events (46.9%), followed by present situations (29.5%), and past events (20.9%). Self-labeled worriers did not differ from nonworriers in the temporal focus of worries. In a comparative study of the characteristics of normal worry and normal obsessions, Wells and Morrison (1994) demonstrated several qualitative differences. Worry was predominantly verbal, whereas obsessions were predominantly imaginal. Compared with obsessions, worry was rated as significantly more realistic, more voluntary, and associated with a greater compulsion to act. Worries also lasted significantly longer than obsessional thought intrusions.

Worrying is associated with affective reactions of anxiety and depression (Borkovec, Robinson, et al., 1983). When asked to characterize the feeling states typically experienced when worrying, anxiety, tension, and apprehension were the most highly rated among a range of emotion scales (Borkovec, Robinson, et al., 1983, study 2). Awareness of somatic activity during worrying was not extensive in a student sample. However, worriers reported significantly greater difficulty shutting off worrisome thoughts once they had started compared with nonworriers. Amongst somatic responses, muscle tension was the most highly rated when worrying.

A COGNITIVE MODEL OF GAD

At the center of GAD appears to be the experience of uncontrollable and distressing worry. A cognitive model of GAD has recently been advanced by the author (Wells, 1995) describing the processes involved in the development and maintenance of the problem. An outline of the model is depicted in Figure 1. This is a metacognitive model accounting for development and maintenance of subjectively uncontrollable and aversive worry states in GAD. Metacognition concerns beliefs and appraisals about cognition and the ability to monitor and regulate cognition (e.g., Flavell, 1979). The model is based on a differentiation between two types of worry: Type 1 worry, which is worry about external events and noncognitive internal events; and Type 2 worry (metaworry), which is worry about one's own thinking (Wells, 1994b, 1995).

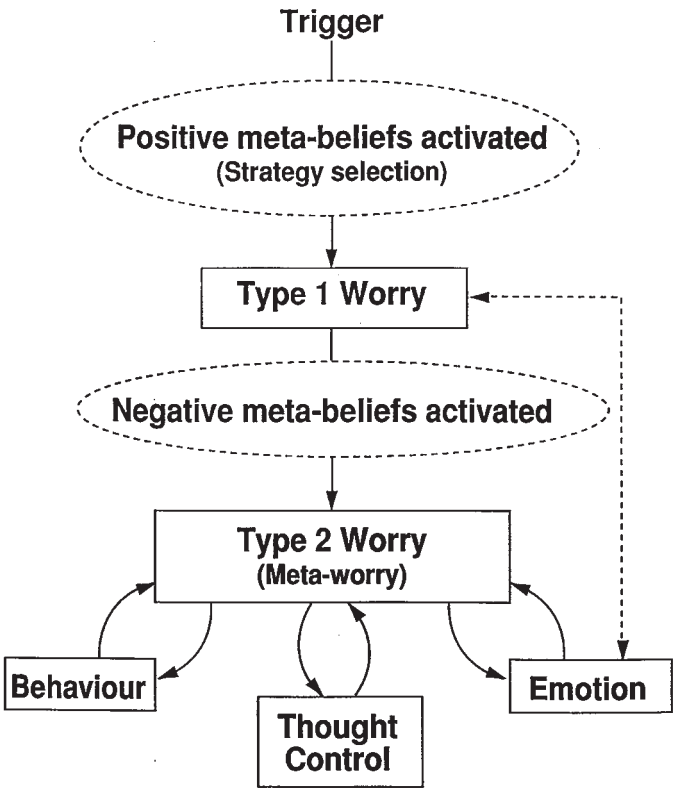

Figure 1. A metacognitive model of the processes involved in the maintenance of generalized anxiety disorder.

As a result of previous experience, individuals with GAD develop a series of assumptions and beliefs about worry or the use of ruminatory modes of thinking. Two types of belief are relevant to the problem: (a) positive beliefs about worry in which the individual believes that worrying serves a protective or coping function and (b) negative beliefs about worry, typically concerning the uncontrollability of worry and the dangerous consequences of worrying. Once a GAD patient appraises a situation or event as threatening, positive beliefs about

worry are activated and worry-based processing is selected as a means of continued appraisal and coping. This is Type 1 worry generally concerned with external events and noncognitive internal events. However, the catastrophizing process of worrying creates its own problems and becomes the source of negative appraisal. For example, worrying increases sensitivity to worry-related information such that an increasing range of negative worry triggers is encountered. GAD patients report that in the long term, worrying breeds further worry. Thus, worrying thoughts become more invasive and negative beliefs about worry are reinforced. This contributes to worry about worry (Type 2 worry or metaworry). Type 2 worry contributes to the patient's anxiety responses, which is taken as further evidence of danger associated with worry (and evidence of an inability to cope). Some of the ways in which the GAD patient behaves in response to Type 2 worry contribute further to the maintenance of belief in Type 2 worry and negative beliefs. In particular, attempts to control or suppress worrying thoughts produce further intrusions and greater perceived difficulties with mental control. Moreover, the nonoccurrence of catastrophe associated with worrying is attributed to thought control and avoidance behaviors, thereby restricting the likelihood of negative belief change.

Behavioral strategies such as avoidance of situations that trigger worry, reassurance seeking, and checking are intended to prevent the activation of worrying. Such strategies maintain preoccupation with worry and prevent exposure to situations that can prove that worry is harmless and controllable. Moreover, attempts to avoid worry reduce the opportunities for practicing the execution of nonworry-based processing routines in response to negative thoughts. The GAD patient is in a state in which positive and negative beliefs about worry coexist. Avoidance should be conceptualized not only as avoidance of appraised external dangers thought to be inherent in situations but also avoidance of the need to worry and hence the potential dangers of worrying.

Having outlined the basic features of the model, the role of key processes in maintaining problematic worry in GAD are now considered in more detail.

TABLE 1

Basic Themes in Metaworry and Beliefs Reported by Five Generalized Anxiety Disorder Patients

Gender	*Age*	*Type 2 Worry*	*Negative Metabeliefs*	*Positive Metabeliefs*
F	28	Oh God I'm doing it again (worry). It will get worse and I'll go crazy.	Worrying could make me go crazy. If I don't control my worries people will reject me.	Worrying makes things turn out O.K. Worrying saves face.
M	42	I can't stop. This could escalate and I'll cease to function. I'll be paralyzed.	I'm unable to control my worry. Worrying is harmful.	Worrying concentrates the mind. Worrying makes me a caring person.
M	24	I mustn't think this, I'm not normal. What if people notice I'm worried: I'll end up alone. What if I'm schizophrenic.	Worrying could make me crazy. It's abnormal to worry. Worrying prevents me getting on in life.	Worrying helps me cope. If I work through my worries I'll be prepared.
M	27	I have no control. What if I can't stop.	Worry will ruin my life. Worrying will stop me getting what I really want. If I don't control worry it will control me. My worry is uncontrollable.	If I imagine all the worst things I won't be taken by surprise. Worrying keeps me safe.
F	35	I must stop it (worry) or I'll lose control. My mind can't take this.	I must stop worrying or I'll get depressed and be unable to cope/function. Worry could make me lose my mind (have a nervous breakdown). Worrying means I'm not in control. My worries are uncontrollable.	Worrying helps me cope. Worrying helps me sort out problems.

USE OF WORRY AS A PROCESSING STRATEGY

When a situation is appraised as threatening, GAD patients execute worry as a means of anticipating threat and of coping. Worrying of this kind is normally triggered by an initial negative automatic thought (e.g., "What if my partner is involved in an accident") that may be a response to external or internal stimuli. Use of worry as an appraisal and coping strategy involves ruminative sequences in which the patient contemplates a series of worst consequences and examines different coping outcomes. Worry is normally executed until some internal goal is met or until the process is interrupted by distraction or other incompatible event (e.g., sleep or alcohol intoxication). Examples of internal goals include generating a range of possible coping plans or more often a feeling that the individual will be able to cope. Type 1 worry is also suspended by information that eliminates uncertainty about events (e.g., information that a partner is safe).

Use of worry as a strategy is problematic in several respects. First, an infinite variety of negative scenarios can be generated. Therefore, the need to worry to cope proliferates. More specifically, the repeated generation of negative possibilities leads to a greater sense of vulnerability and danger. Second, worry routines increase the detection of threat-related information that intrudes as new triggers for worrying. Third, use of worry appears to maintain or exaggerate unwanted intrusive thoughts. Fourth, when catastrophes do not occur, the individual may attribute such nonoccurrence to the fact that they used worry and hypervigilance to anticipate and avoid danger, thus strengthening positive beliefs about worrying (e.g., "If I worry about being attacked and I'm alert for all the dangers then I'll be safe. I've never been attacked so the strategy must be working.").

Some GAD patients report that their worry sequence involves reviewing a range of negative possibilities and focusing attention on evidence for and against the content of worry. Increased vigilance for information consistent with worries is an attempt to augment worry routines in a way that facilitates the believed coping function of worrying (e.g., "If I focus on all the negative things I'll be prepared."). However, a search for evidence contributes to perceptions of threat and fuels the worry process.

In summary, the effect of worry-based processing is to maintain positive beliefs about worry and to increase intrusive thoughts in a way that leads to appraisals of decreased control over worrying. The repeated practice of worry routines, which can be longstanding over many years, contributes to automatization of the initiation of worrying, which supports the sense of subjective uncontrollability. However, the demanding and flexible nature of worrying means that the execution of worrying remains subject to voluntary control. The negative consequences of worry-based processing routines increase the likelihood that negative beliefs and metaworries concerning controllability develop.

TYPE 2 WORRY AND NEGATIVE BELIEFS

Type 2 worry refers to negative appraisal of the worry process. GAD patients appraise worries as uncontrollable and potentially dangerous. The metacognitive model assumes that such appraisals stem from negative beliefs about worry. These beliefs result from the deleterious effects of the use of worry strategies as outlined earlier. However, other sources of information such as social feedback and life events play a role in the development of negative beliefs. For example, a GAD patient recently reported that she had been a worrier since early childhood, and when her father had a "nervous breakdown" that was attributed to his tendency to worry, her own worry became the source of concern. Type 2 worry has emotional and behavioral consequences, which in turn maintain the problem of recurrent subjectively uncontrollable worry. The content of Type 2 worries and negative beliefs in five consecutive GAD cases is presented in Table 1 for illustrative purposes.

EMOTIONAL RESPONSES

When engaged in Type 1 worrying, GAD patients often experience apprehension characterized by muscle tension, uneasiness, restlessness, and anticipatory anxiety. These responses may be promptly suppressed if a satisfactory conclusion to the worry sequence is rapidly achieved. However, when Type 2 worry is activated, anxiety escalates

and becomes more acute. In some cases in which worrying is appraised as an indication of immediate catastrophe, such as loss of mental control, panic attacks occur. Cognitive and somatic symptoms of anxiety are interpreted as a sign of loss of control or as a sign of an inability to cope. Such interpretations of symptoms support negative beliefs about worry and about personal vulnerability.

THE ROLE OF BEHAVIOR IN MAINTAINING METAWORRY

Behavioral responses in GAD are associated with worry at the Type 1 and Type 2 level. At the Type 1 level, behaviors include avoidance of feared situations. For example, social evaluative worries in GAD are often accompanied by avoidance of social situations. Similarly, patients who worry about being physically attacked in situations tend to avoid walking alone or adopt hypervigilance strategies to increase safety.

The metacognitive model is unique in emphasizing the role of behaviors linked to Type 2 worry. Many of the behavioral responses in GAD can be conceptualized as strategies intended to avert the negative consequences of worrying. Common behaviors include avoidance of situations or stimuli that trigger worry, reassurance seeking, checking, and behavioral self-control. For example, one patient deliberately timed his arrival home from work so that he arrived after his partner. In this way, he could avoid worrying about her should she be late home. In another case, a patient asked her husband to telephone her twice a day so that she could be certain that he was safe and thereby avoid worrying "unnecessarily."

The problem with these behaviors is that they maintain worry. Type 1 worry is maintained because avoidance of situations reduces opportunities for evaluating the accuracy of worry. Thus, beliefs about usefulness of worry as a coping strategy remain unchanged. Behaviors aimed at averting negative consequences of worrying are a problem because they preserve negative beliefs and worry about worry. Of particular importance is the fact that the nonoccurrence of catastrophe due to worry (e.g., loss of mental control and insanity) is attributed to use of behavioral strategies, thus preserving negative worry beliefs and metaworry.

THE ROLE OF THOUGHT CONTROL IN MAINTAINING METAWORRY

It has been seen how overt behaviors perpetuate beliefs and Type 2 worry. Thought control strategies are a subtype of behavior that present the same problems. However, it is useful to conceptualize the effects separately because additional mechanisms are involved.

Patients with GAD use a range of strategies to avoid worrying and avert the appraised dangers of worrying. Strategies include distraction, suppression, self-talk, and attempts to regulate the content of thought in safe ways. Many of these strategies are unsuccessful and contribute to a diminished sense of mental control. When attempts are made to avoid worrying, this usually consists of trying to exclude the content of worry from consciousness. Patients report mixed success in their ability to exclude the content of thought, and such efforts fail over an extended time course. Individuals with GAD rarely direct control efforts at suspending the process of worrying (i.e., continuous rumination on a topic). Most GAD patients appear unaware of the fact that they can suspend ruminative processing (Type 1 worry). It is likely that positive worry beliefs act against practicing suspension of Type 1 worry once it has been triggered. The inevitable failure to indefinitely abolish worry-related thought content from consciousness and the failure to practice disengagement of Type 1 worry processes (rumination) perpetuates Type 2 worry and negative beliefs concerning the uncontrollability and consequences of worrying. Some patients report that they attempt to reason with their worries and challenge its content. Unfortunately, this extends continuous ruminative processing and acts against the suspension of the perseverative worry process.

A BRIEF REVIEW OF RESEARCH

In this section, the literature on worry and generalized anxiety is briefly reviewed to determine if the research is consistent with the model. Existing published research is considered together with new findings from the author's own research program.

EVIDENCE FOR THE ROLE OF TYPE 2 WORRY

Because the cognitive model presented here specifies that worry about worry (Type 2 worry) is a central feature of problematic worry such as that found in GAD, one would expect that Type 2 worry is closely associated with measures of problematic or pathological worry. Thus, differences in worry content should be more pronounced at the Type 2 than the Type 1 level. There is little published research directly on this issue. Craske, Rapee, Jackel, and Barlow (1989) compared worries of 26 nonanxious controls with worries of 19 *DSM-III-R* (APA, 1987) GAD patients in a self-monitoring study. Worries were classified by independent judges into five predetermined categories: (a) family/home/interpersonal relationships, (b) finances, (c) work/school, (d) illness/injury/health, and (e) miscellaneous. GAD patients reported a significantly greater proportion of worries about illness/health/injury than control subjects. However, controls reported a significantly higher proportion of financial worries than GAD subjects. Worries in GADs and controls did not differ in terms of the maximum anxiety or maximum aversiveness associated with them, the degree to which the content was likely, or the level of anxiety aroused by attempting to resist worrying. In a forward regression with grouping (GAD vs. control) as the dependent variable, only perceived control was a significant predictor. Therefore, a Type 2 appraisal (controllability) emerged as a central differentiating feature of GAD and normal worries. Similar findings of few differences in worry content (at the Type 1 level) between high and low worriers have been found by others. For example, Vasey and Borkovec (1992) examined the content of a catastrophizing sequence in chronic worriers and nonworriers and found that only 4 out of 34 comparisons showed a difference.

Wells (1994b) developed the Anxious Thoughts Inventory (AnTI) to measure multiple dimensions of worry proneness. Factor analyses of the scale yielded a replicable three-factor instrument measuring separable Type 1 and Type 2 worry dimensions. The first two factors measure social and health concerns, whereas the third factor measures Type 2 worry or metaworry (e.g., "I worry that I cannot control

my thoughts as well as I would like to."). In a recent study, Wells and Carter (1999) administered the AnTI to groups of age- and gender-matched nonpatient controls, patients with major depression, GAD patients, and a group of patients with various other anxiety disorders (e.g., panic, agoraphobia, and social phobia) as defined by *DSM-III-R* (APA, 1987). Patients with GAD had significantly higher metaworry scores than other anxious patients or normal controls. GAD patients did not differ in social or health worries from the mixed anxiety group. GAD patients were more worried about their health than nonpatients but there were no differences in social worry. Differences between GADs and other anxious patients and between GADs and normals were highest for the metaworry subscale.

In a follow-up study, Cartwright (1996) administered the AnTI and the GAD-Q to 108 graduate students. The GAD-Q (Borkovec & Roemer, 1995) is an instrument designed to identify GAD cases according to *DSM-III-R* (APA, 1987) criteria. Fourteen subjects met criteria for GAD and the scores of this subsample on AnTI scales was compared with the remaining subjects who did not meet criteria. GAD subjects had significantly higher scores on the social and metaworry subscales but not the health-worry subscale. The greatest difference was in metaworry score.

The metacognitive model predicts that type 2 worries should be associated with the problem level attached to worrying irrespective of the frequency of Type 1 concerns. To test this hypothesis, Wells and Carter (1999) asked 140 nonpatient subjects to rate on a visual analogue scale the extent to which worry was a problem for them. Metaworry measured by the AnTI subscale was a significant predictor of problem level when Type 1 worries were partialed out. In a further analysis partialling out worry frequency in addition to Type 1 worries, metaworry remained a significant predictor.

RELATIONSHIPS BETWEEN METABELIEFS AND WORRYING

The cognitive model proposes that problematic worrying is linked to both positive and negative beliefs about worry. Moreover, it is the strengthening of negative beliefs that determine the transition from chronic worry/rumination to problematic worry in GAD. Negative

beliefs should therefore be particularly strong in GAD compared with normal subjects and compared with disorders in which problematic intrusions are not central.

Borkovec and Roemer (1995) conducted two studies investigating the reasons given for worrying by students. It is likely that such reasons correspond with positive worry beliefs. Subjects who met criteria for *DSM-III-R* (APA, 1987) GAD based on the GAD-Q were asked to complete a 6-item Reasons To Worry Questionnaire. The questionnaire was based on reasons suggested by former GAD patients and included: motivation, problem solving, preparation for threat, avoidance, distraction from more upsetting topics, and superstitious reasons. The subjects taken together in the first study rated motivation, preparation, and avoidance as the most characteristic reasons for their worry. GAD subjects ($n = 10$) rated using worry for distraction from more upsetting things significantly more than nonanxious subjects. In a second larger study, GAD subjects ($n = 64$) gave significantly higher ratings than nonworried anxious or nonanxious subjects for distraction from more emotional topics. GAD subjects also gave significantly higher ratings for superstitions and problem solving than nonanxious subjects, with nonworried anxious subjects nonsignificantly different.

Tallis, Davey, and Capuzzo (1994) administered a battery of questionnaires to 128 subjects ages 18 to 59; one of the measures was a 56-item questionnaire designed to elicit information on the phenomenology of worry. Two areas assessed in this study that are likely to reflect beliefs were the perceived negative and positive consequences of worrying. A little more than 71% of respondents thought that worrying made situations worse in general. Specific responses were used to generate a questionnaire that was administered to 127 undergraduate students and the data condensed with factor analysis. Four factors were obtained (although the criteria for numbers of factors extracted and the method of rotation if any is not reported). These factors were: Pessimism and Negative Outlook (e.g., “Continued worry makes me lose track of all good things that happen.”); Problem Exaggeration (e.g., “Worrying blows situations out of proportion.”); Performance Disruption (e.g., “Worrying stalls decisive action.”); and Emotional Discomfort (e.g., “Worry makes me focus on the wrong things.”). To

the extent that these appraisals reflect individual's beliefs about worry, several belief domains are evident. Subjects were also asked to indicate the extent to which they believed that when worrying they were problem solving. Forty-six percent of respondents suggested that worrying was an attempt at problem solving between the ranges *definitely* and *always* on the respective rating scale. Subjects were asked to explain how they thought worry was a helpful process. Two factors emerged: Worry Activated as a Motivator and Worry Facilitates Preparation and Analysis of Situations.

More direct evidence of the relationship between metabeliefs and worry comes from work in the author's own laboratory. Cartwright-Hatton and Wells (1997) developed the MetaCognitions Questionnaire (MCQ) to assess dimensions of positive and negative beliefs about worry and individual differences in metacognitive processes. The questionnaire has five subscales and shows good psychometric properties. The subscales are: (a) positive beliefs (e.g., "Worrying helps me cope."); (b) beliefs about uncontrollability (e.g., "When I start worrying I cannot stop."); (c) cognitive confidence (e.g., "I have a poor memory."); (d) general negative beliefs about thoughts including themes of punishment and responsibility (e.g., "Not being able to control my thoughts is a sign of weakness."); and (e) cognitive self-consciousness (e.g., "I pay close attention to the way my mind works."). As predicted by the metacognitive model, positive and negative beliefs are significantly associated with worry proneness as measured by the AnTI. In a longitudinal study of students beginning university (n = 66), positive beliefs about worry were positively correlated with state-anxiety measured 8 weeks later when state-anxiety at time one was controlled (Cartwright, 1996).

Cartwright-Hatton and Wells (1997) compared MCQ scores of 32 *DSM-IV* (APA, 1994) GAD patients with 17 patients with obsessive-compulsive disorder (OCD), a group of 14 patients with various other diagnoses (e.g., social phobia, depression, and agoraphobia), and 30 nonpatient controls. No significant differences emerged in the endorsement of positive worry beliefs; however, GAD and obsessive-compulsive patients reported significantly greater negative beliefs concerning uncontrollability than all other groups. This is not surprising because *DSM-IV* GAD criteria include an uncontrollability crite-

rion. However, GAD and OCD subjects also showed significantly higher scores than normal controls on negative beliefs in general. Both sets of patients also scored more highly on lack of cognitive confidence compared with the nonclinical control group. The anxious patient control group scored intermediately between nonpatients and the GAD and OCD patients.

PROBLEMATIC CONSEQUENCES OF WORRY-BASED PROCESSING

The model suggests that use of worrying as a processing strategy may create its own problems that contribute to intrusive mental experience. The literature on worry and task performance has convincingly established that worry has the general effect of using up attention required for other activities, so that the worrier is cognitively impaired (Eysenck, 1992; Sarason, Sarason, & Pierce, 1990). It is likely that use of worrying as a coping strategy is not without its price. The deleterious effects of worrying could contribute to the development of intrusive mental experience and worry about worry. Two lines of research are relevant to evaluating this issue. The first has examined the effect of worrying on subsequent thinking; the second has explored the effects of worrying on intrusive images following exposure to stressful stimuli.

Following the assumption that worry is similar to fear processes in which brief exposure can increase fear and longer exposure leads to fear extinction, Borkovec, Robinson, et al. (1983) assigned high and low worry subjects to worry periods of 30, 15, or 0 minutes; they then asked subjects to focus on their breathing for 5 minutes, during which thought content reports were obtained every minute. During the worry periods, subjects were asked to worry about current concerns in their typical worry fashion. In general, compared to nonworriers, worriers reported more anxiety and depression, less task-focused attention, and more negative distracting thoughts during the breathing focusing task. Combining worrier and nonworrier samples revealed that for the 15-minute worry period, negative thought distractions increased, whereas for the zero- and 30-minute worry groups, distractions decreased. In a subsequent study, York, Borkovec, Vasey, and Stern (1987) showed that subjects had more negative thought intrusions

after the induction of worry than after a neutral condition. These results suggest that brief periods of worrying may increase subsequent negative thinking.

Two studies have investigated the effects of worrying styles of thinking on intrusive images following exposure to stressful stimuli. The hypothesis behind such studies is that verbal worry could block emotional processing of images. In a preliminary investigation, Butler, Wells, and Dewick (1995) asked three groups of subjects to watch a gruesome film about a workshop accident and then introduced different poststressor manipulations of thinking. Subjects were asked to do one of the following for a period of 5 minutes after the film: settle down (control group), image about the events in the film, or worry in verbal form about the events in the film. Subjects who were asked to worry about the film reported significantly more intrusive images during the following 3 days than either imagery or control groups. Wells and Papageorgiou (1995) conducted a full-scale study replicating this effect and testing for mechanisms underlying the incubation effects of worry on intrusive images following exposure to stress. They used four poststress manipulations that theoretically varied in the proportional extent to which they blocked emotional processing and produced tagging. Tagging refers to the accessing of information concerning the stressor and engaging in elaborative processing such that a wider range of material serves as a retrieval cue for stress-related intrusions. Worry about the film resulted in the highest frequency of intrusions during a subsequent 3-day period. The pattern of results showed an incremental frequency of intrusive images across conditions, consistent with the cojoint tagging and blocked emotional processing mechanism.

In summary, there is direct support for the concept that using worry as a processing strategy is associated with intrusive thoughts, both during a worry period and as a result of brief worry following a stressor. Individuals who worry as a predominant means of coping appear to be engaged in an activity that contributes to intrusive thoughts. It is likely that such effects reinforce appraisals of diminished control and, over a longer time period, strengthen negative metabeliefs about the consequences of worrying.

THE EFFECT OF THOUGHT CONTROL ON INTRUSIONS

The present model predicts that the use of worry as a processing strategy and the attempted control or suppression of worry contributes to metaworry. These strategies prevent disconfirmation of belief in the harmful effects of worrying and exacerbate intrusions. There are no data on the effect of thought control on the maintenance of metabeliefs. However, Wells and Davies (1994) demonstrated that metaworry correlated positively with a tendency to use particular types of strategy to control unwanted thoughts. More specifically, metaworry and social worry were associated with a greater tendency to use punishment and worry about more minor matters to control unwanted thoughts. However, health worry was not associated with the use of any thought control strategy assessed by the Thought Control Questionnaire.

Several studies have explored the effects of thought suppression. In the earliest studies, Wegner and colleagues showed that asking subjects not to think of a target thought (e.g., a white bear) was associated with a delayed rebound of the target thought (Wegner, Schneider, Carter, & White, 1987). Other investigators have failed to find such a rebound effect but have observed an immediate enhancement (during suppression) of target thoughts (Lavy & van den Hout, 1990; Merckelbach, Muris, van den Hout, & de Jong, 1991). The contradictory pattern of results means that drawing conclusions about suppression effects is risky. Differences in methodology could account for differences in outcome. Use of emotionally neutral and nonself-relevant stimuli to be suppressed means that extrapolation of the findings of early studies to the types of thought that individuals with GAD experience is hazardous. However, a few studies have examined suppression of emotional and self-relevant material but these have not tested GAD subjects. Salkovskis and Cambell (1994) identified personally relevant and naturally occurring intrusive thoughts that subjects reported they normally attempt to suppress to some degree. Subjects asked to suppress these thoughts showed significantly more intrusions both during and after suppression than a control group. Cartwright (1996) examined the suppression of personal worries in nonpatients using one of three natural suppression techniques: distraction by a pleasant

thought, distraction by another worry, and self-criticism for having the thought. These strategies were based on strategies assessed by the Thought Control Questionnaire (TCQ) (Wells & Davies, 1994). Subjects were asked to record on a hand-held counter each time a worrying thought occurred during the suppression and subsequent monitoring condition. The study showed no evidence of an immediate enhancement effect or a rebound effect. However, there was evidence that distraction by a pleasant thought resulted in significantly fewer immediate intrusions than distraction by another worry. Borkovec and Inz (1990) suggested that GAD patients may use worry as a means of distracting from more unpleasant thoughts. If this is so, it is likely to be an unhelpful or counterproductive strategy.

Using a different recording paradigm, Mathews and Milroy (1994) asked subjects to make a written note of thought content at 1-minute intervals during a 15-minute monitoring period. The monitoring period followed 5 minutes of either thinking about an idiosyncratic worry topic, suppression (think about anything except the worry topic), or think about a nonworry topic. No group differences were found in frequency of worry-related or other thoughts. Chronic worry subjects reported more unpleasant thoughts, and control subjects more neutral or pleasant thoughts across all conditions. However, the measure of thought frequency consisted of specific timed samples, which is probably less sensitive than continuous monitoring.

The suppression studies reviewed earlier have relied on brief suppression periods, which are unlikely to resemble the types of repeated and extended suppression practiced by worry patients. Trinder and Salkovskis (1994) examined the effects of longer suppression periods. Subjects were asked to record intrusions only, to suppress, or to think through during a period of 4 days. Suppression was found to enhance intrusions over this time period.

COGNITIVE BIAS IN GAD

In the present model, worry is problematic in part because it leads to biased detection of threat-related information. Biases in information processing are a reliable finding across anxiety disorders (Wells & Matthews, 1994, for review). Patients with anxiety show sensitivity to

stimuli associated with their concerns. For example, Mogg, Mathews, and Weinman (1989) investigated the extent to which content of GAD patients' worries was associated with particular attentional biases. Patients meeting International Classification of Disease (ICD) 9 criteria for anxiety state (which includes general anxious symptoms and panic attacks) were significantly slower to name the colors of threat than nonthreat words in comparison with normal controls. In addition, subjects who worried about physical concerns were significantly slower on the physical threat Stroop than the neutral Stroop but showed similar times on the social threat Stroop. Anxious patients with social concerns showed a trend toward greater interference on the social Stroop compared with the neutral Stroop but this was nonsignificant.

Although attentional bias effects in anxiety states are well established, four studies have examined such effects in clearly defined GAD samples. Three studies have investigated GAD samples. Martin, Williams, and Clark (1991) showed that patients meeting *DSM-III* (APA, 1980) criteria for GAD compared with normal controls showed greater interference for positive emotional and threat words in a modified Stroop task.

Two other studies have used masked and unmasked presentations of stimuli to locate Stroop effects as strategic or preattentive in nature. Bradley, Mogg, Millar, and White (1995) showed that patients with GAD without concurrent depression showed more Stroop interference for anxiety words (e.g., disgrace and cancer) than neutral words in comparison with patients with a combined diagnosis of GAD and depression or control subjects. In a follow-up study, Mogg, Bradley, Millar, and White (1995), retested the GAD nondepressed patients 2 months later. GAD patients received cognitive-behavior therapy in the test-retest interval. Nine subjects were tested again after a follow-up period of about 20 months after initial testing. Although GAD patients showed significantly greater interference for negative words in comparison with normal controls at pretreatment (this difference was not influenced by masked or unmasked presentations of the words), following treatment, there was no significant difference. In a comparison of pretreatment interference scores with those at follow-up in the subsample of nine patients, no significant difference emerged, sug-

gesting that the change in cognitive bias during treatment was not maintained. Correlations between self-report measures and changes in Stroop interference between testing sessions showed that a greater reduction in anxious thought ratings was associated with greater reduction in interference compared to treatment for masked anxiety words. The same relationship was significant between time 1 and time 3. In addition, decreased trait anxiety was associated with reduced interference for unmasked anxiety words. State and trait anxiety and depression scores were not associated with any changes in interference.

These findings support the concept that patients with GAD show increased sensitivity to emotional material. The extent to which such bias is associated with worrying remains to be clearly established. Biased processing could contribute to continued perception of threat and therefore repeatedly prime the need to worry to cope.

EFFECTS OF PSYCHOLOGICAL TREATMENT

Early treatments for GAD tended to be multicomponent, cognitive-behavioral interventions combining anxiety control strategies (e.g., relaxation and distraction) with cognitive procedures such as identifying and challenging negative thoughts. Cognitive strategies have generally been based on Beck's generic model of anxiety and have only indirectly focused on mechanisms responsible for problematic worry. Typically, cognitive behavioral approaches show that about 50% of patients show improvement with this type of treatment, but the degree of improvement is highly variable (Borkovec & Matthews, 1988; Borkovec, et al., 1987; Butler, Cullingham, Hibbert, Klimes, & Gelder, 1987; Butler, Fennell, Robson, & Gelder, 1991; Durham & Turvey, 1987). Durham and Allan (1993) reviewed the results of GAD treatment outcome studies conducted since 1980. Their analysis was restricted to two measures that have been most frequently used across studies: the Trait-Anxiety Inventory (Spielberger, Gorsuch, Lushne, Vagg, & Jacobs, 1983) and the Hamilton Anxiety Scale (Hamilton, 1959). Eleven studies were reviewed that employed treatment categorized as relaxation, biofeedback, nondirective psychotherapy, behavior therapy, and cognitive therapy based on Beck's

theory. Percentage improvement across studies was reported as ranging from 6% to 50% in trait-anxiety and 20% to 76% in Hamilton scores at posttreatment. There was limited evidence of a superiority of cognitive therapy compared to other treatment approaches in the studies reviewed.

Application of cognitive procedures in the treatment of GAD continues to grow. Butler et al. (1991), using a more cognitively oriented approach, showed that it was superior to behavior therapy. Group differences were greater 6 months after treatment ended than they were initially, at which time 42% of cognitive-behavior therapy (CBT) patients met operationally defined criteria for good outcome compared with 5% of behavior therapy patients. Unfortunately, the behavior therapy condition produced a low degree of change compared with other behaviorally based interventions (e.g., Borkovec & Costello, 1993), thus obscuring clear assessment of any real superiority of the cognitive-behavioral treatment. Borkovec and Costello (1993) compared applied relaxation with CBT. Both treatments were more effective than a nondirective control. Although long-term follow-up suggested an advantage of CBT compared to relaxation, with 57.9% versus 37.5% of patients reaching high end-state functioning, this difference was not statistically significant.

Durham et al. (1994) compared cognitive therapy, analytic psychotherapy, and anxiety management treatments (AMT). Patients received either low (8 to 10 sessions) or high (16 to 20 sessions) therapist contact. There were no significant effects for level of contact. Cognitive therapy and anxiety management were roughly equivalent posttreatment but cognitive therapy was superior to analytic psychotherapy. For example, in trait-anxiety scores, CBT and AMT showed a 25.9% and 25.5% improvement, whereas the improvement in analytic psychotherapy was 11.1%. Cognitive therapy patients continued to show improvement during the follow-up period in trait-anxiety but this was not the case in the other treatment conditions.

In summary, previous treatments of GAD have not been based on a specific cognitive model of the disorder. They have tended to employ strategies that have been shown to be effective in the treatment of other anxiety disorders and have not directly targeted the problem of worry. However, Borkovec, Wilkinson, Folensbee, and Lerman (1983)

developed a stimulus-control treatment specifically for worry. They conducted two studies evaluating the effects of the procedure in self-labeled worriers. The treatment consisted of: (a) learning to identify worrying or unpleasant thoughts and distinguishing these from pleasant thoughts; (b) establishing a 30-minute worry period to take place at the same place and time each day; (c) postponement of worries when they occur and replacement of worries with attending to present moment experience; and (d) use of the 30-minute worry period to worry about concerns and engage in problem solving to eliminate concerns. In the first study, subjects received either the treatment or no treatment during a 4-week period. The treated group was asked to worry and engage in problem solving during the worry period. This group showed significantly greater improvement in percentage of the day spent worrying compared with nontreated subjects. In a second study, two treatment groups were used and subjects were instructed to only worry (not problem solve) during the worry period. One group was asked to worry mentally, the other group was asked to write down its worries. No differences in effectiveness emerged for the two treatment conditions. However, a comparison of combined treatment data with no treatment showed greater reductions in percentage of day spent worrying and feeling tense following treatment relative to no treatment. Effectiveness of the procedure without a problem-solving component shows that problem solving of specific worries is not the mechanism of treatment effects. Borkovec, Wilkinson, et al. (1983) conceded that it is not clear which component of the procedure plays a role. It could be monitoring of worries, the act of postponing worries, the substitution of alternative thoughts, or the practice of a daily worry period.

Effectiveness of worry control may initially appear to contradict the idea that thought control is counterproductive. However, effectiveness of the procedure is consistent with the present model, which distinguishes between the content and the process of worrying and emphasizes the role of underlying beliefs. In particular, the procedure requires that individuals interrupt the ruminative worry process and maintain awareness of the content of worry so that worry can be initiated later. Therefore, subjects are not encouraged to suppress the content of worry. The model accounts for effectiveness of worry control in

terms of reversing subjects' failure to attempt control of the worry process. It is also likely that the procedure facilitates experiences that challenge dysfunctional beliefs about uncontrollability and the dangerous consequences of worrying. More specifically, postponement offers a direct means of challenging beliefs about uncontrollability, and the implementation of a 30-minute worry period offers a means of disconfirming negative beliefs about the dangers of worrying. However, because the treatment does not have a rationale emphasizing its disconfirmatory qualities in a cognitive framework, it must be assumed that these effects are largely incidental. Treatment effects could be potentially enhanced by modifications of the technique that maximize unambiguous disconfirmation of negative beliefs.

In conclusion, treatments for GAD produce only modest effects at best. There is limited support for a superiority of interventions involving cognitive therapy elements compared with behavioral packages. Studies show a clearer advantage for cognitive therapy compared with psychotherapy and nondirective approaches. However, there is much scope for improvement of treatment outcomes. One limitation is that treatments have not been based on a cognitive model of GAD and they have not directly targeted mechanisms underlying problematic worry. It is likely that the overall effectiveness of treatment can be improved if interventions are based on a specific model of the disorder such as the one presented here.

PREDICTIONS AND TREATMENT IMPLICATIONS

Usefulness of a clinical model is determined by its ability to account for existing research, generate innovations in treatment, and provide testable predictions. The present model is consistent with the research reviewed here and it offers new specifications for treatment of GAD. These treatment strategies have yet to be evaluated in a controlled study, although results of a single case series recently completed by the author shows highly favorable results. There are four central predictions arising from the present model that may be further evaluated in future research:

1. In comparison with anxious patients whose primary problem is not one of intrusive thoughts, and compared to normal controls, GAD patients should show a higher incidence of metaworry.
2. Independent of the frequency of Type 1 worries, metaworry should contribute to the distress and anxiety associated with worrying in GAD.
3. GAD patients should show evidence of positive and negative beliefs about worrying or rumination.
4. Treatments that fail to modify metaworry and negative and positive metabeliefs should have higher rates of relapse than treatments that succeed in changing these dimensions.

The model outlined here has several implications for treatment. Detailed accounts of the treatment can be found in Wells (1997). First, it explains the modest effects of existing cognitive-behavioral approaches. In particular, it suggests that anxiety management strategies that teach control of affect (e.g., relaxation and distraction) do not lead to substantial metacognitive change because they do not directly address the causes of worry. Moreover, such procedures may be unhelpful if they become additional safety behaviors that are believed to prevent feared catastrophes. Second, the model suggests that cognitive-behavioral interventions could be improved if the focus of treatment shifts from challenging the content of Type 1 worries and focuses on reducing belief in metaworry and in the negative and positive beliefs that drive worry. More specifically, previous cognitive approaches have worked on challenging validity of individual worries and appraisals of the likelihood of negative events. However, this approach produces modest results because it fails to optimally change underlying metacognitions concerning uncontrollability of worry, dangers of worry, and advantages of worrying. Moreover, individuals with a longstanding history of worry will need to practice using alternative nonworry-based appraisal strategies when the access to such skill is lacking.

The model suggests a general sequence to treatment. Patients are first socialized to the model. They are helped to become aware of the role of metaworry and counterproductive control strategies in maintaining the problem. Initial metaworries chosen for modification concern the uncontrollability of worry. Belief in control is restored by reviewing episodes in which worry was interrupted by conflicting demands. Behavioral experiments involving the postponement of

worry should be used for this purpose. Subsequent steps should challenge metaworry concerning the dangers of worrying. This can be achieved by reviewing the evidence and counter-evidence in support of such appraisals. Behavioral experiments involving increased worrying should be used to demonstrate that worrying is harmless. For example, the patient who believes that worrying will lead to loss of mental control is asked to deliberately worry more and try to lose control the next time worry is activated. To maximize disconfirmation, the patient should be instructed not to engage in thought control strategies or other behaviors that reduce the risk of loss of control. To produce the setting conditions under which disconfirmation can occur, it is useful to expose the patient to avoided stimuli (thoughts or situations) that normally activate the worry process. Negative appraisals and negative beliefs about worry can be challenged by strengthening cognitive dissonance in patients. The model posits the existence of two types of metabelief: positive and negative. Both types of belief should be elicited early in treatment and the contradiction between them should be highlighted. For example, if a patient concedes that worrying serves a protective function and facilitates coping, this belief should be contrasted with the idea that it can lead to mental breakdown. This strategy usually leads to a loosening of particular beliefs.

Once negative beliefs and metaworries have been effectively modified, positive beliefs about worry should be the focus of intervention. The disadvantages of worrying should be reviewed and the validity of worries should be questioned as an explicit means of demonstrating that worry holds few advantages. In particular, it is helpful to demonstrate that worries are unrealistic representations of situations and, thus, they offer few real advantages. One technique, the mismatch strategy (Wells, 1997), consists of asking patients to write a detailed account of the content of worry, such as worries concerning exposure to a particular situation that is normally avoided. The patient is asked to worry about what could happen in the situation. This is followed by entering the situation and observing what really happens while taking care to check out the validity of the worry scenario.

Finally, patients are instructed in practicing alternative endings for worry sequences. Rather than rehearsing catastrophic outcomes, they are required to practice suspension of ruminative worry-based pro-

cessing and also practice contemplating positive scenarios in response to worry triggers. This is intended to increase the range and use of appraisal strategies available to the individual. Remaining problems associated with Type 1 worrying, for example, concurrent social anxiety, are conceptualized and treated using appropriate models.

CONCLUSION

A cognitive model of GAD was reviewed in this article. A central tenet of the model is that GAD results from an interaction between the use of worry as a processing strategy and negative appraisal of the worry process. When worry is appraised as uncontrollable and dangerous, this leads to behavioral and cognitive responses that have counterproductive effects of enhancing intrusive thoughts, maintaining preoccupation, and preventing disconfirmation of negative and positive beliefs about worry. A review of the literature indicates that the model is consistent with data on the nature of worries in GAD, with the results of studies exploring the consequences of worrying, and with existing experiments that have tested specific aspects of the model. The model explains the modest effects obtained with existing treatments and suggests principles for developing more effective cognitive treatments of GAD.

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