STOP YOUR WORRIES ABOUT WORRYING!

ISBN 905677266x

Printed by Optima Grafische Communicatie, Rotterdam
Cover design based on Fractal art by Ben Keller

STOP YOUR WORRIES ABOUT WORRYING!

An investigation into the cognitive correlates of worry

STOP JE GEPIEKER OVER PIEKEREN!

Een onderzoek naar de cognitieve correlaten van piekeren

Proefschrift
ter verkrijging van de graad van doctor aan de
Erasmus Universiteit Rotterdam
op gezag van de
rector magnificus
Prof. Dr. S.W.J. Lamberts
en volgens het besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op

donderdag 2 november 2006
om 16.00 uur

door

Gwendolijn Olivia de Bruin
Geboren te Wijk bij Duurstede

Promotiecommissie

Promotoren:	Prof.dr. P.E.H.M. Muris Prof.dr. H.T. van de Molen
Overige leden:	Prof.dr A.R. Arntz Prof.dr J.E.J.M. Hovens Dr. I.F.A Franken
Copromotor:	Mr.dr. E. Rassin

CONTENTS

1 INTRODUCTION

Worrying is such a commonplace experience for most people, that specifying what worry actually is seems almost unnecessary. However, in this introduction it will be made clear that worry is a complex way of dealing with (future) threat. The awareness that in the future possible negative events may occur, enables us to consider possible solutions to prepare for the right action. Obviously, this reaction is not an ad hoc response like that of an animal that displays fight or flight behavior when confronted with a frightening stimulus. However, the perception of an excessive amount of possible harmful events seems to facilitate the need to prepare our mind and body for all possibilities, and in effect makes us live many lives. As theses "lives" are only lived in our minds, a real safety signal that indicates that we will be able to handle the future problem and thus satisfies our need for certainty and disclosure is never reached (Woody & Rachman, 1994).

Before Borkovec started with his seminal work on worry, the construct of worry was only known in studies concerned with test anxiety. In this research domain a distinction was made between the cognitive component of test anxiety, that is worry, and the more emotional, physiological reactions of anxiety (see Spielberger, 1980). At the end of the previous century, Borkovec and his research group shifted their attention from insomnia research to worry (Borkovec, Robinson, Pruzinsky, & DePree, 1983). This early work of Borkovec can be seen as the starting point of what is nowadays known about worry. Back in 1983, Borkovec posited a definition of worry that has been cited frequently. He defined worry as "a chain of thoughts and images, negatively affect-laden and relatively uncontrollable. The worry process represents an attempt to engage in mental problem-solving on an issue whose outcome is uncertain but contains the possibility of one or more negative outcomes" (Borkovec et al., 1983; p. 10). Furthermore, according to Borkovec worry should be regarded as an immediate cognitive avoidance response to aversive images (Borkovec & Inz, 1990). The aversive images of events in the future are perceived as possibly threatening, and enhance uncertainty. The avoidant reaction that is provided by worrying is thought to minimize cardiovascular responses to the threatening images. Further, worry would prepare people for the worst, help them to avoid feeling anxious, and distract individuals from even more emotional or negatively affect-laden topics (Borkovec, Ray, & Stöber, 1998). Thus, worry functions in a way that enables individuals to cope with anxiety.

However, worry may also have clear disadvantageous features. That is, worry can be experienced as intrusive and is repetitive in nature. This is because worry is frequently concerned with finding solutions for problems that might take place in the future. As it often remains unknown whether the right solutions are considered, confirmation to stop the worrying is lacking. Furthermore, as the future is full with possible negative events, reasons to stop worrying are indeed often lacking; hence worrying can become intrusive and repetitive.

Worry and other forms of intrusive thought patterns

Uncontrollable thought activity is not confined to worry. Repetitive and intrusive thought activity is present in various forms of psychopathology such as anxiety, depression and obsessions (see Borkovec et al., 1983). Clark and Rhyno (2005) define intrusive thoughts,

images or impulses as: “any distinct, identifiable cognitive event that is unwanted, unintended, and recurrent. It interrupts the flow of thought, interferes in task performance, is associated with negative affect, and is difficult to control” (p. 4). As the symptoms of anxiety, depression and obsession show similarities and are often related to worry, these constructs will be addressed briefly before discussing worry in more detail.

Anxiety

Öhman (1993) defines anxiety as a state of undirected arousal following the perception of threat. As worry can also be perceived as a reaction to the perception of threat, it is not surprising that high levels of anxiety are generally found to be linked to high levels of worry (e.g., Davey, 1993; Mennin, Heimberg, & Turk, 2004). However, worry and anxiety are distinct constructs and this has been supported by numerous studies. For instance, Meyer, Miller, Metzger, and Borkovec (1990) have shown that in a group of anxiety disordered patients, the correlation between worry and anxiety is rather low. Furthermore, anxiety and worry differed in their relation and their unique contribution to a number of variables that are implicated in the etiology of anxiety and worry, such as problem solving skills, coping styles, focus of thoughts, emotional control, and negative affect (respectively, Davey, Hampton, Farrell, & Davidson, 1992; Stöber, 1998; Zebb & Beck, 1998). Finally, a number of experimental studies obtained additional evidence for the notion that worry and anxiety are different constructs. York, Borkovec, Vasey, and Stern (1987) tested, among other issues, whether worry, anxiety and neutral inductions produced differences in levels of negative cognitive intrusions. Results showed that the worry induction produced higher levels of negative intrusions than did the anxiety induction and the neutral induction. Andrews and Borkovec (1988) also used inductions of worry and anxiety; the worry induction produced a stronger emotional state than the anxiety induction did. All in all, it seems safe to conclude that worry and anxiety are related but nevertheless distinct constructs.

Rumination

Nolen-Hoeksema (1991) defined rumination as repetitive thoughts focused on depressive feelings and the origins of such symptoms. In contrast, worry is concerned with repetitive and uncontrollable thoughts about possible future negative events (Borkovec et al., 1983), which means that worry and rumination differ with regard to the time-orientation and the content of the thoughts. In short, rumination is associated with depression and past loss, whereas worry is linked to anxiety and future threat (see Segerstrom, Tsao, Alden, & Craske, 2000). Furthermore, Segerstrom et al. (2000) pose that thought content, and not the thought process (i.e., repetitive thought), discriminates the two forms (see also Watkins, 2004). Fresco, Frankel, Mennin, Turk, and Heimberg (2002) draw a similar conclusion on the basis of a factor analysis. Worry and rumination items were found to load on separate but correlated factors and so the conclusion was justified that they represent closely allied but distinct constructs (see also Muris, Roelofs, Meesters, & Boomsma, 2004).

Obsessions

Obsessions constitute another category of intrusive thoughts. Obsessions can be defined as persistent and recurrent ideas, thoughts, impulses or images that are experienced as intrusive and inappropriate and that cause marked anxiety or distress (see DSM-IV-TR; American Psychiatric Association, 2000). In reaction to an obsession, a person can develop a compulsion; an act that functions to neutralize the anxiety caused by the obsession (Taylor, 2002). Although the compulsions reduce discomfort, they can become disruptive of daily life routines in a dysfunctional manner (see DSM-IV-TR; American Psychiatric Association, 2000). Obsessions and worry are the main symptoms of two closely allied anxiety disorders, namely obsessive-compulsive disorder (OCD) and generalized anxiety disorders (GAD). Both represent repetitive cognitive intrusions that are difficult to dismiss and to control, and can be found in both clinical and non-clinical populations, although the frequency of these intrusive thoughts distinguishes clinical from non-clinical manifestations (Brown, Dowdall, Côté, & Barlow, 1994; Langlois, Freeston, & Ladouceur, 2000a; Langlois, Freeston, & Ladouceur, 2000b). Wells and Morrison (1994) conducted research in a normal sample and found that worry was more verbally oriented, more distracting, and less involuntary than obsessions. In a review by Turner, Beidel, and Stanley (1992), the similarities and differences between worry and obsessions were carefully analyzed. These authors conclude that although there is some overlap, the two constructs clearly differ on various dimensions. In comparison to obsessions, worry is concerned with daily life experiences instead of themes of dirt and contamination, worry is more often regarded as ego-syntonic and although both forms are experienced as uncontrollable, worry is resisted less strongly. In conclusion, despite clear similarities, worry and obsessions can be differentiated on several dimensions.

From normal to pathological worry

In sum, worry refers to the anticipation and/or avoidance of a negative outcome of a situation through pondering about possible solutions. This primarily verbal/linguistic activity results in the suppression of physical symptoms of fear and as such may be regarded as useful in the short-term. Worry is also associated with and initiated by feelings of anxiety. These feelings of anxiety may prompt the person to avoid the feared, future event altogether, instantly delivering further relief. However, a person who worries frequently overestimates the possibility of the occurrence of negative events (see Aikins & Craske, 2001); the chance that the negative event will actually happen is often rather low. So besides the preoccupation with worry, a person continuously avoids presumed future threats, and thus does not learn to employ adequate coping strategies. As life is full of ambiguous and negative events, frequent worry activity may loose its adaptive function of providing solutions for possible future problems, consequently creating prolonged states of anxiety and resulting in a significant disturbance of normal functioning (Borkovec et al., 1998).

Excessive worry and anxiety are the main features of GAD. Since 1987, GAD is no longer considered as a residual category for anxiety disorders in the DSM but is officially

accepted as a disorder. People with GAD often find it hard to cope with life and the constant distress and anxiety caused by the uncontrollable worrying. GAD often has its onset during adolescence, and it is thought that approximately 5% of the population suffers from GAD at one point in their lives. The disorder is persistent in nature and spontaneous recovery is infrequent (see American Psychiatric Association, 2000). Although patients with GAD experience their worrying as uncontrollable and causing significant anxiety, they still feel that there are positive features about worry that outweigh the negative sides and that worry helps them to deal with life in general. Davey (1994) describes high levels of anxiety, negative cognitions and catastrophising as examples of dysfunctional features of pathological worrying. These features can aggravate the individual's problems and negative mood.

Ruscio (2002) set out to investigate the differences between worry in GAD patients and worry in a group of high-worriers that did not meet the criteria for GAD. Ruscio (2002; p. 393) drew a tentative conclusion: "the boundary between normal worry and GAD may be quantitative, [the results] also indicate that GAD is not synonymous with severe worry and that characteristics of one may not necessarily generalize to the other".

However, in other studies (e.g., Mennin et al., 2004), it has been suggested that non-pathological and pathological worry do not differ in content but do so in terms of prevalence and severity, which seems to imply that the two forms of worry are positioned on a continuum. Ruscio, Borkovec, and Ruscio (2001) also examined whether the difference between normal and pathological worry is one of "degree or kind". First of all, they noted that normal and pathological worriers worry about similar topics, but pathological worriers worry about more topics (including worry about minor things), spend more time on worrying, and experience the worrying as more uncontrollable. Via taxometric procedures, Ruscio and colleagues also found support for the dimensionality ("degree") of worry. This conception is echoed in numerous investigations on the construct of worry, which employed both clinical and non-clinical subjects and often obtained similar results (see also Sexton, Norton, Walker, & Norton, 2003 for a similar reasoning).

More importantly, Ruscio et al. (2001) argue that theories that set out to explain how and why worry becomes pathological "must move beyond factors associated with the presence or absence of pathological worry [and should] consider causal and maintenance factors associated with varying levels of worry severity within the full range of worry presentations" (p. 418). Accordingly, what makes a person worry and what makes the levels of worry move from normal to pathological?

Cognitive models

Mathews (1990) puts forward three possible mechanisms: (1) people may vary in their sensitivity to signals of threat, (2) individuals who worry excessively may select the more threatening interpretation of signals that are ambiguous, and therefore prepare more often for threatening events and, (3) intrusive thoughts about aversive outcomes reflect differences in the way in which information about danger is stored in long term memory. This last possibility emerged from the work of Eysenck (1985) and the network theory of mood and memory of Bower (1981). That is, highly anxious individuals might store (more) danger

information in tight clusters, quickly having more threatening information at hand when experiencing possible threat. As mentioned by Mathews (1990), these possibilities are far from exhaustive. Several newer models that focus on what causes worry and what makes normal worry become pathological will be discussed in short next.

For instance, the model of Krohne (1993) proposes that individuals can be differentiated by the way they cope with threatening information that contains aversive and/or ambiguous stimuli. Individuals can cope by intensified processing of threatening information, "vigilance", or they can turn away from threat related to stimuli, that is, cognitive avoidance. Krohne (1993) states that predominantly aversive stimuli elicit somatic arousal. The experience of somatic arousal is postulated to lead to cognitive avoidant behavior, as an attempt to control the fear. The ambiguous nature of the situation provokes (emotional) uncertainty. The experience of uncertainty could enhance coping behavior via vigilance, that is, worry and anxiety. This model seems a prelude of another model that is central to this thesis (i.e., "Intolerance of Uncertainty").

Furthermore, Beck and Clark (1997) discuss an elaborated schema-based information-processing model directed at explaining an individual's vulnerability to anxiety disorders. The model proposes (faulty) automatic and strategic processing in reaction to anticipated or actual negative life events. In short, the incoming information is distorted, resulting in an overestimation of threat (capturing most of the attentional resources), which in turn leads to an underestimation of one's own coping resources, and finally an overuse of protective strategies such as worry.

In continuation of these cognitive models, several cognitive biases pertaining to threat that are involved in anxiety and worry can be identified. The biases are in the domain of (1) attention: a person is sensitive to cues signaling possible future threats, subsequently occupying disproportionate amounts of attention, (2) interpretation: ambiguous events are primarily interpreted in an emotional and threatening manner, and (3) memory: a negative mood (arising from anxiety that is provoked by ambiguous signals) facilitates easy storage as well as easy retrieval of threat-related information, which in turn elevates anxious feelings even more (see for instance Aikins & Craske, 2001; Eysenck, 1992; and MacLeod & Rutherford, 2004 for a detailed description, and reviews).

Even more recently, out of a range of "second generation" cognitive behavioral accounts that extended Beck's model (see Riskind, 2005), two models for worry and GAD appear especially promising (see Heimberg, Turk, & Mennin, 2004). These two models that concentrate on (1) intolerance of uncertainty, and (2) meta-worry, are the main focus of this thesis.

Intolerance of Uncertainty

A research group originating from Canada developed a model to explain worry and GAD. In this model, intolerance of uncertainty (IU) has a central role. This construct was postulated earlier by Krohne (1993) but somewhat differed from the concept of intolerance of uncertainty that is put forward here (see Grenier, Barrette, & Ladouceur, 2005). Ladouceur, Talbot, and Dugas (1997) define IU as: "the way an individual perceives information in

ambiguous situations and responds to this information with a set of cognitive, emotional, and behavioural reactions" (p. 356). These reactions are negative and independent of the probability of the actual occurrence of the situation and the associated consequences (Ladouceur, Gosselin, & Dugas, 2000). Thus, people who are intolerant of uncertainty worry frequently about what could possibly happen because they are sensitive to ambiguous information and events (e.g., interpretation bias) and because they have strong reactions to these situations, frequently asking themselves "What if …?" questions, and engaging in catastrophising about what might happen.

The construct of intolerance of uncertainty is measured by the Intolerance of Uncertainty Scale (IUS; Freeston, Rheaume, Letarte, Dugas, & Ladouceur, 1994), which measures "emotional, cognitive and behavioural reactions to ambiguous situations, implications of being uncertain, and attempts to control the future" (p. 791; Freeston et al., 1994). The original French version and the translated English version both exhibit satisfactory psychometric properties (see Buhr & Dugas, 2002; Dugas, Freeston, & Ladouceur, 1997; Freeston et al., 1994). A recent study by Norton (2005) demonstrated that the cross-cultural psychometric properties of the IUS were also good and highly similar for four ethnic groups in the United States (i.e., African American, Caucasian, Hispanic/Latino, and Southeast Asian).

Research conducted on the relation between IU and worry has delivered promising results. For example, Freeston et al. (1994) and Dugas et al. (1997) have demonstrated that, independent of levels anxiety and depression, there is a link between IU and worry. Furthermore, IU discriminated non-clinical subjects who clearly show the symptoms of GAD from non-clinical subjects who do not display such symptoms (Freeston et al., 1994). The construct of IU was also able to distinguish between GAD patients and non-clinical worriers (Ladouceur, Blais, Freeston, & Dugas, 1998). Finally, it has been demonstrated that GAD patients display higher levels of IU than patients with other anxiety disorders (Ladouceur et al., 1999). However, there is some debate about the ability of IU to make a distinction between various anxiety disorders. For example, Holaway, Heimberg, and Coles (2006) found that individuals with analogue GAD and OCD (as measured by means of questionnaires) displayed similar levels of IU. Similarly, Deacon, Kalsy, Whiteside, Schwartz, Moore, and Abramowitz (2003) found that patients with GAD, OCD and social phobia patients portrayed similar levels of IU.

Next to IU, the model that was constructed by Dugas, Gagnon, Ladouceur, and Freeston (1998) contains three other main features (see Figure 1).

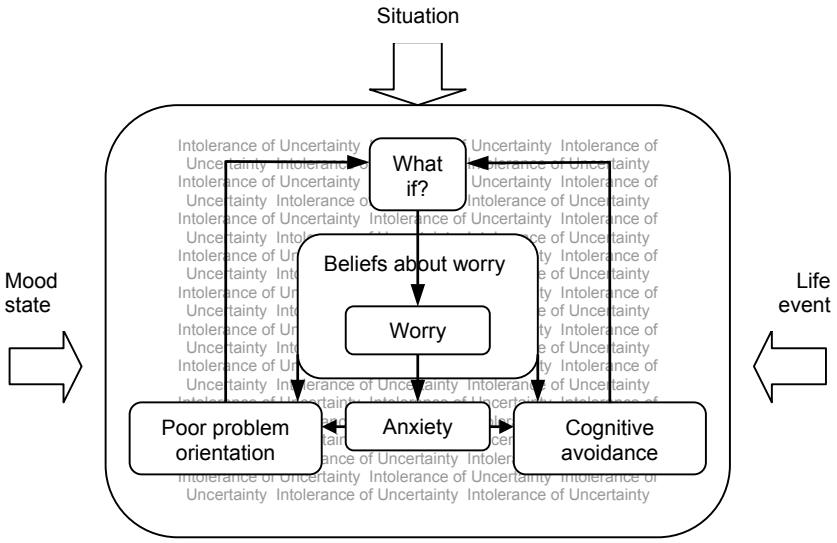

Figure 1. The conceptual model of GAD by Dugas and colleagues.
Based on: Dugas, M. J., Gagnon, F., Ladouceur, R., and Freeston, M. H. (1998). Generalized anxiety disorder: A preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*, 215-226.

First, the model is set against a background of high levels of IU. In short, if individuals exhibit high levels of IU, this can exacerbate the "What if …?" questions that initiate anxiety and worry. Second, according to the model, both negative and positive beliefs about the usefulness of worry contribute to levels of worry. In comparison to moderate worriers, GAD patients think that worrying is more useful in reaching solutions for problems and in preventing negative outcomes (Ladouceur et al., 1998). Furthermore, findings by Davey, Tallis, and Capuzzo (1996) are consistent with the idea that dysfunctional positive and negative beliefs about the consequences of worrying are related to pathological worrying. Wells (1995) also underscores the influence of rigid positive beliefs which motivate the (over)reliance on worry and negative beliefs (i.e., appraisal) about the usefulness and controllability of worry. The third feature of the model is poor problem orientation. Problem orientation refers to how people perceive their own problem solving ability, and meta-cognitive beliefs such as awareness, appraisal, emotional reactions and control strategies to problems encountered in everyday life (Dugas et al., 1998). Dugas et al. (1997) found that emotional problem solving and IU make unique contributions to worry. Both positive (focused information seeking) and negative (focusing on threat) orientation are related to worry, although no difference between non-clinical moderate worriers and GAD patients appeared on problem solving skills (Ladouceur et al., 1998). The fourth and final feature that is identified in this model is the process variable of cognitive avoidance. As mentioned

earlier, Borkovec posed that worry is a strategy to cope with mental images of threatening or disturbing future events (Borkovec & Inz, 1990). More specifically, Borkovec and Lyonfields (1993) found that somatic reactions on fearful imagery decrease as a result of worrying. Thus, this semantic cognitive activity can be viewed as a way of cognitive avoidance. Cognitive avoidance is also utilized as a dysfunctional manner of reducing distressing thoughts (Wegner, Schneider, Carter, & White, 1987), thus further aggravating the negative outcomes of worry. Finally, the study of Dugas et al. (1998) shows that all the process variables together (IU, beliefs about worry, poor problem orientation and cognitive avoidance) correctly discriminated as much as 82% of GAD patients from a non-clinical group. IU was the most important variable in explaining group differences.

Summarizing, the relation between IU and worry is well established. However, because of this close relation (see for instance Dugas et al. (1997) who reported a correlation of .70, and Freeston et al. (1994) who reported a correlation of .63) and the fact that both worry and IU refer to negative events, one might suggest that worry and IU are not distinct constructs. However, when keeping the definitions in mind, it is clear that worry refers to a mental reaction to a (possible) negative event in the future, whereas IU is the manifestation of a cognitive filter, in which an individual displays a low tolerance for the possibility that a negative event might happen. As such, “worry might best be seen as a product of IU” (Dugas, Buhr, & Ladouceur, 2004; p. 146). Furthermore, to disentangle the close relationship between worry and IU, a small number of experimental studies have been conducted. For instance, Ladouceur et al. (1997) investigated the relation between individual differences in IU and doubting behaviour, that is, participants’ performance during a task with varying levels (low, moderate and high) of ambiguity. Results showed that participants who scored high on the IUS, needed more information before coming to a decision in the moderately ambiguous task. This effect was not observed during the high and non-ambiguous tasks. This led Ladouceur et al. (1997) to conclude that individuals who are highly intolerant of uncertainty, under certain conditions, “have a lower threshold for the perception of ambiguity than other individuals” (p. 361) and that this lower threshold could lead to worry. Furthermore, results showed that although IU and the worry measure Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990) were related, the PSWQ nevertheless did not correlate to any of the task variables, which led the authors to conclude that “IU and trait worry are not only related but clearly distinct constructs” (Ladouceur et al., 1997; p. 362).

Next, Ladouceur et al. (2000) manipulated levels of IU to investigate the possible effects on worry. In this study, the level of IU was manipulated by providing participants instructions that contained information on the probability (low or high) of winning the (required) money in a computerized roulette game. Objective chances of winning were in fact determined by the computer and in actuality equal for all participants. Results indicated that participants in the increased IU group showed more worry as compared to participants who experienced a decreased level of IU. Thus, in this study, IU was successfully manipulated which resulted in changes of worry levels, thereby providing further evidence for the notion that IU is central to worry.

In sum, the research so far shows that levels of intolerance of uncertainty are positively related to levels of worry and GAD. However, the specificity of the concept of IU for GAD is not unequivocal and more experimental research is needed to explicate the relation between levels of intolerance of uncertainty and levels of state and trait worry (Dugas et al., 2004).

Meta-cognition

The second promising "second generation" cognitive account for worry is the model that pivots around meta-worry. Beck and Clark (1997) already mentioned a "meta-cognitive mode", or thinking about thinking, in their information-processing model. This elaborative strategic processing is initiated in the view of threat, in order to evaluate one's own coping resources (see "Cognitive models"). In response to this meta-cognitive reflection on threat, anxiety may decline (through better insight in the situation and one's coping resources or through initiated avoidance of threat) or increase (by continued preoccupation with the threat). Meta-cognition can be defined as "stable knowledge or beliefs about one's cognitive system and knowledge about factors that affect the functioning of the system; the regulation and awareness of the current state of cognition, and appraisal of the significance of thoughts and memories" (Wells, 1995; p. 302). Wells posited the Self-Regulatory Executive Function model (S-REF model; Wells & Matthews, 1996; Wells, 2002), in which newer understandings about meta-cognition are incorporated in the information-processing model of Beck. This multilevel model enables a better implementation and execution of cognitive therapy for a range of psychological disorders. The S-REF model states that meta-cognitive beliefs "concerning perseverative thinking processes should underlie both types (depressive and anxious) of mental act" (Wells, 2000; p. 156). Wells continued to emphasize the importance of meta-cognition, and in particular meta-worry, in relation to worry and GAD. In this cognitive account for worry and GAD, Wells (1994) distinguishes two worry dimensions, namely a content dimension and a process dimension. The first dimension of worry (type 1 worry) concerns worry about external events or internal, non-cognitive events such as concerns about one's health or social functioning. The second dimension (type 2 worry) comprehends "worrying about worry, appraising negative thoughts as uncontrollable, and reflecting a desire to control thoughts" (Wells, 1995; p. 304; Wells, 2004). Type 1 occurs when a stimulus is interpreted as possibly threatening (triggering the "What if..." question) and is initiated because the individual holds positive meta-beliefs about the function and effects of worry as a problem solving or coping strategy. However, extensive worrying can be interpreted as uncontrollable. Furthermore, external information about frequent worrying and social learning can lead to negative meta-beliefs about type 1 worry (Wells, 2005), and hence type 2 worry is initiated. This type 2 worry, the negative appraisal of the process and consequences of worry, is thought to be central to GAD (Wells, 2002).

The two types of worry can be measured by means of the Anxious Thoughts Inventory (AnTI; Wells, 1994). This self-report questionnaire possesses good psychometric properties. The research concerned with testing the validity of the meta-cognitive model of Wells was initially carried out with the AnTI. In later work, Wells (2005) developed the

measure Meta-Worry Questionnaire (MWQ), that specifically assesses the frequency and beliefs about meta-worry, and thus focuses on the perceived dangers accompanying worry, thereby incorporating the DSM-IV criteria for GAD. To date, no studies using this questionnaire have been published.

According to the meta-cognitive model, type 1 and type 2 worry may have several negative consequences for the person's functioning. These negative consequences are included in Wells' model. Firstly, there is a reciprocal relation between type 1 worry and emotion. Worry can diminish anxiety, when a felt sense of "I can handle the situation" is reached and worry maintains its functional role. But as has become clear from the earlier sections in this chapter, worry can also aggravate levels of anxiety, thereby having a negative impact on the emotional state of the individual, which in turn could increase the subjective need to worry even more (Wells, 2000). Secondly, when type 2 worry is activated, it has detrimental effects in three domains (see Figure 2). Type 2 worry can affect *behaviour* in such a way that individuals choose to avoid the threat, certain situations or information. This results in postponement of dealing with the anxious stimuli and alternative coping strategies are not initiated. The negative appraisal of frequent worrying also strengthens the feeling of loss of control, which can activate thought suppression as a coping strategy (*thought control*). However, (as mentioned earlier), thought suppression may be a counterproductive strategy, resulting in even higher levels of worry and as such contributing to the development of GAD (see Purdon, 1999; Salkovskis & Campbell, 1994; Wegner et al., 1987). The failure of this coping strategy reinforces the feeling of the uncontrollability of worry. In sum, Wells poses that meta-worry "could reflect a reciprocally incremental relationship between unwanted cognition and cognitive-behavioural attempts to suppress such cognition" (Wells, 1994; p. 297). The somatic and cognitive symptoms that result from worrying, can be interpreted as an indication that the person has no control over the worrying, and thus the negative beliefs about worry are strengthened and the emotional state further deteriorates (*emotion)* (Wells, 2000; Wells, 2004).

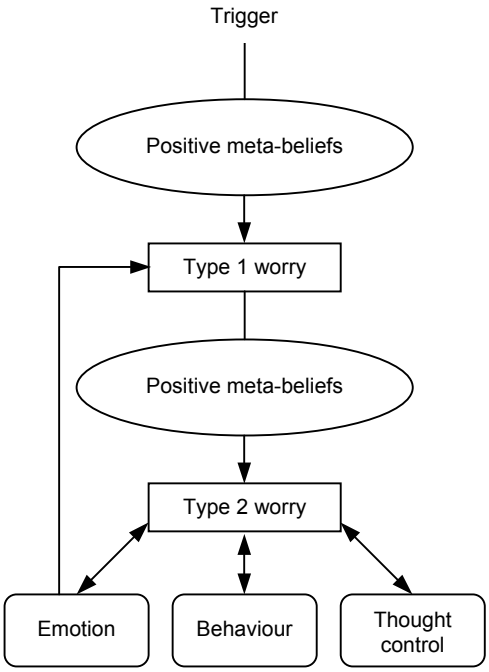

Figure 2. The cognitive model of GAD by Wells and Carter.
Based on: Wells, A., and Carter, K. (1999). Preliminary tests of a cognitive model of generalized anxiety disorder. *Behaviour Research and Therapy, 37*, 585-594.

So, when type 1 worry becomes too frequent, and this ongoing worrying is increasingly evaluated in a negative way, type 2 worry (meta-worry) is initiated. This cognitive construct is thought to transform normal worry into pathological worry. A study by Wells and Carter (1999) demonstrated that problematic worrying in non-clinical participants was indeed related to meta-worry, and that this link was independent of trait anxiety and content (type 1) worry. Davis and Valentiner (2000) found that participants who met the criteria for GAD, displayed significantly higher levels of meta-worry, in comparison to non-anxious and non-worried anxious participants. Further research has demonstrated that patients with GAD displayed significant higher levels of meta-worry than patients with panic disorder, social phobia and depression (Wells & Carter, 2001).

Additional support for the model was obtained in research on more general meta-cognitive beliefs and appraisals, which are also thought to be related to other forms of psychopathology, such as OCD (e.g., Gwilliam, Wells, & Cartwright-Hatton, 2004; Purdon & Clark, 1999; Wells, 1995). Cartwright-Hatton and Wells (1997) constructed a self-report measure to assess “individual differences in positive and negative beliefs about worry and intrusive thoughts, metacognitive monitoring and judgements of cognitive efficiency” (Wells,

2000; p. 111). This Meta-Cognitions Questionnaire (MCQ) consists of five dimensions, namely positive beliefs about worry, negative beliefs about the controllability of thoughts and corresponding danger, cognitive confidence, negative beliefs about thoughts in general including themes of superstition, punishment and responsibility, and cognitive self-consciousness. Research with the MCQ has yielded promising results. Cartwright-Hatton and Wells (1997) found that the MCQ dimensions correlated with anxiety, worry (both type 1 and type 2), and obsessional symptoms. Worry was predicted by positive beliefs about worry, negative beliefs about the controllability of thoughts and corresponding danger, and cognitive confidence. Wells and Papageorgiou (1998) replicated these findings, that is, the MCQ dimensions correlated with obsessional symptoms and worry. Regression analyses showed that positive beliefs about worry and beliefs concerning uncontrollability and danger predicted worry. Davis and Valentiner (2000) demonstrated that participants who fulfilled the criteria for GAD displayed significantly higher scores on all MCQ scales than a nonanxious group, and differed on four of the five dimensions in comparison to a nonworried anxious group. Wells and Carter (2001) also showed that GAD patients scored higher on the negative meta-cognition scales concerned with uncontrollability and danger in comparison to patients with panic disorder, social phobia, depression and non-patients, even when general levels of worry were controlled. Wells and Cartwright-Hatton (2004) developed a short form of the MCQ. The subscale “negative beliefs about thoughts in general including themes of superstition, punishment and responsibility” was replaced by “beliefs about need to control thoughts”. Wells and Cartwright-Hatton (2004) again found the expected correlations between the subscales and measures of worry, anxiety and obsessional symptoms.

In conclusion, there is evidence for the tenability of the cognitive model of Wells (1995) from two lines of research, one concentrating on meta-worry and the second concentrating on more general meta-cognitive beliefs and appraisal. However, the latter line of research is not specific for worry, but also pertains to meta-cognitive processes involved in OCD (see for instance Davis & Valentiner, 2000; Emmelkamp & Aardema, 1999; Gwilliam et al., 2004; Purdon & Clark, 1999). More specifically, the dimension “cognitive self-consciousness” (CSC), which refers to the excessive tendency to be aware of, and monitor one’s thinking (Cartwright-Hatton & Wells, 1997) has received additional attention in distinguishing OCD from GAD. In the study of Cartwright-Hatton and Wells (1997), only CSC differentiated OCD patients from GAD patients, with the former group showing significantly higher levels of cognitive self-consciousness. Janeck, Calamari, Riemann, and Heffelfinger (2003) replicated this finding, comparing an OCD group with a group of anxiety disordered patients. Cohen and Calamari (2004) found that CSC and intrusive thought appraisal are predictors of OCD symptoms and stated that CSC appears to be distinguishable from the (negative) appraisal of intrusive thoughts. Finally, CSC seems to be the starting point of thought salience and the negative appraisal of intrusive thoughts (Marker, Calamari, Woodard, & Riemann, in press).

Thesis outline

This thesis focuses on the cognitive concepts of intolerance of uncertainty and meta-worry, and sets out to gain further insight into the tenability of these two dysfunctional cognitions in their relation to symptoms of worry.

In Chapter 2, the Intolerance of Uncertainty Scale was translated into Dutch and the psychometric properties of this translation were reexamined. A factor analysis was performed to explore the possible underlying factor structure. Furthermore, the internal consistency, test-retest reliability, and convergent validity were assessed ("Psychometric properties of a Dutch version of the Intolerance of Uncertainty Scale").

In Chapter 3, a study is presented that investigated whether individual differences in IU have predictive value for state worry, in response to experimental situations that are either high or low in uncertainty. The two experimental situations that were devised to elicit the different levels of uncertainty consisted of completing a partly unsolvable intelligence task and an IQ task that actually varied in level of difficulty. The aforementioned outline showed that the grounding studies for the IU model of GAD have relied heavily on self-report questionnaires. Little experimental research has been conducted on the causal relation between IU and worry. Therefore, this study further examines the empirical tenability of the IU model of GAD via experimental research ("Worrying in the lab: Does intolerance of uncertainty have predictive value?")

In Chapter 4, two studies investigated the relations between being aware of one's own thoughts (CSC) and the negative appraisal of worry (meta-worry) on the one hand, and symptoms of worry and obsessional thought on the other. The literature is unclear on how these two concepts relate to each other, and subsequently to different types of intrusive thoughts, that is, worry and obsessional thoughts ("Cognitive Self-Consciousness and meta-worry and their relations to symptoms of worry and obsessional thoughts"). Although the study relied on a small sample, the results suggested that meta-worry might be more important for understanding excessive, intrusive thought patterns, more so than cognitive self-consciousness. This preliminary finding was further explored ("Are there specific meta-cognitions associated with vulnerability to symptoms of worry and obsessional thoughts?"). The meta-cognitive concept of suppression (the conscious attempts to avoid unwanted thoughts) was also included in this study, as heightened levels of monitoring one's own thoughts and the negative appraisal of thoughts could relate to frequent efforts of thought suppression, which in turn could influence levels of worry and obsessional thoughts.

In Chapter 5, the concluding study attempted to test the relative contributions of the main two cognitive constructs intolerance of uncertainty and meta-worry to symptoms of worry. In this study, the relation between intolerance of uncertainty, meta-worry, and neuroticism on the one hand, and worry on the other hand was investigated. Worry was operationalized in two different ways: as trait worry and as idiosyncratic worry. Neuroticism was included as a feasible general vulnerability factor of worry ("The prediction of worry in non-clinical individuals: The role of intolerance of uncertainty, meta-worry, and neuroticism").

Finally, in Chapter 6 the main findings, limitations, and future directions are summarized and discussed.

References

Aikins, D. E., & Craske, M. G. (2001). Cognitive theories of generalized anxiety disorder. *Psychiatric Clinics of North America, 24*, 57-74.

Andrews, V. H., & Borkovec, T. D. (1988). The differential effects of inductions of worry, somatic anxiety, and depression on emotional experience. *Journal of Behavior Therapy and Experimental Psychiatry, 19*, 21-26.

American Psychiatric Association (1987). *Diagnostic and statistical manual of mental disorders (3rd ed. rev)*: Washington, DC, US: American Psychiatric Publishing, Inc.

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders (4th ed., text rev)*: Washington, DC, US: American Psychiatric Publishing, Inc.

Beck, A. T., & Clark, D. A. (1997). An information processing model of anxiety: automatic and strategic processes. *Behaviour Research and Therapy, 35*, 49-58.

Borkovec, T. D., & Inz, J. (1990). The nature of worry in generalized anxiety disorder: A predominance of thought activity. *Behaviour Research and Therapy, 28*, 153-158.

Borkovec, T. D., & Lyonfields, J. D. (1993). Worry: Thought suppression of emotional processing. In H. W. Krohne (Ed.), *Attention and avoidance: Strategies in coping with aversiveness* (pp. 101-118). Kirkland, WA: Hogrefe & Huber Publishers.

Borkovec, T. D., Ray, W. J., & Stöber, J. (1998). Worry: A cognitive phenomenon intimately linked to affective, physiological, and interpersonal behavioral processes. *Cognitive Therapy and Research, 22*, 561-576.

Borkovec, T. D., Robinson, E., Pruzinsky, T., & DePree, J. A. (1983). Preliminary exploration of worry: Some characteristics and processes. *Behaviour Research and Therapy, 21*, 9-16.

Bower, G. H. (1981). Mood and memory. *American Psychologist, 36*, 129-148.

Brown, T. A., Dowdall, D. J., Côté, G., & Barlow, D. H. (1994). Worry and obsessions: the distinction between generalized anxiety disorder and obsessive-compulsive disorder. In G. C. L. Davey & F. Tallis (Eds.), *Worrying. Perspectives on theory, assessment and treatment* (pp. 229-246). Chichester: John Wiley & Sons Ltd.

Buhr, K., & Dugas, M. J. (2002). The Intolerance of Uncertainty Scale: Psychometric properties of the English version. *Behaviour Research and Therapy, 40*, 931-946.

Cartwright-Hatton, S. & Wells, A. (1997). Beliefs about Worry and Intrusions: The Meta-Cognitions Questionnaire and its Correlates. *Journal of Anxiety Disorders, 11*, 279-296.

Clark, D. A., & Rhyno, S. (2005). Unwanted intrusive thoughts in nonclinical individuals: implications for clinical disorders. In D. A. Clark (Ed.), *Intrusive thoughts in clinical disorders: theory, research, and treatment* (pp. 1-29). New York: The Guilford Press.

Cohen, R. J., & Calamari, J. E. (2004). Thought-focused attention and obsessive-compulsive symptoms: an evaluation of cognitive self-consciousness in a nonclinical sample. *Cognitive Therapy and Research, 28*, 457-471.

Davey, G. C. (1993). A comparison of three worry questionnaires. *Behaviour Research and Therapy, 31*, 51-56.

Davey, G. C. L. (1994). Pathological worrying as exacerbated problem solving. In Davey, G. C. L. & Tallis, F. (Ed.). *Worrying, perspectives on theory, assessment and treatment*, (pp. 35-59). Chichester: John Wiley & Sons Ltd.

Davey, G. C., Hampton, J., Farrell, J., & Davidson, S. (1992). Some characteristics of worrying: Evidence for worrying and anxiety as separate constructs. *Personality and Individual Differences, 13*, 133-147.

Davey, G. C. L., Tallis, F., & Capuzzo, N. (1996). Beliefs about the consequences of worrying. *Cognitive Therapy and Research, 20*, 499-520.

Davis, R. N., & Valentiner, D. P. (2000). Does meta-cognitive theory enhance our understanding of pathological worry and anxiety? *Personality and Individual Differences, 29*, 513-526.

Deacon, B. J., Kalsy, S. A., Whiteside, S. P., Schwartz, S. A., Moore, K. M., and Abramowitz, J. S. (2003, November). Intolerance of uncertainty across the anxiety disorders. Poster presented at the Annual convention of the Association for the Advancement of Behavior Therapy (AABT), Boston, USA.

Dugas, M. J., Buhr, K., & Ladouceur, R. (2004). The role of intolerance of uncertainty in etiology and maintenance. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized Anxiety Disorder. Advances in research and therapy* (pp. 143-163). New York: The Guilford Press.

Dugas, M. J., Freeston, M. H., & Ladouceur, R. (1997). Intolerance of uncertainty and problem orientation in worry. *Cognitive Therapy and Research, 21*, 593-606.

Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: A preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*, 215-226.

Emmelkamp, P. M. G., & Aardema, A. (1999). Metacognition, specific obsessive-compulsive beliefs and obsessive-compulsive behaviour. *Clinical Psychology and Psychotherapy, 6*, 139-145.

Eysenck, M. W. (1985). Anxiety and the worry process. *Bulletin of the Psychonomic Society, 22*, 545-548.

Eysenck, M. W. (1992). *Anxiety: The cognitive perspective*. Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc.

Freeston, M. H., Rheaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*, 791-802.

Fresco, D. M., Frankel, A. N., Mennin, D. S., Turk, C. L., & Heimberg, R. G. (2002). Distinct and overlapping features of rumination and worry: The relationship of cognitive production to negative affective states. *Cognitive Therapy and Research, 26*, 179-188.

Grenier, S., Barrette, A.-M., & Ladouceur, R. (2005). Intolerance of Uncertainty and Intolerance of Ambiguity: Similarities and differences. *Personality and Individual Differences, 39*, 593-600.

Gwilliam, P., Wells, A., & Cartwright-Hatton, S. (2004). Does meta-cognition or responsibility predict obsessive-compulsive symptoms: a test of the metacognitive model. *Clinical Psychology and Psychotherapy, 11*, 137-144.

Heimberg, R. G., Turk, C. L., & Mennin, D. S. (Eds.). (2004). *Generalized anxiety disorder: advances in research and practice*. New York: The Guilford Press.

Holaway, R. M., Heimberg, R. G., & Coles, M. E. (2006). A comparison of intolerance of uncertainty in analogue obsessive-compulsive disorder and generalized anxiety disorder. *Journal of Anxiety Disorders, 20*, 158-174.

Janeck, A. S., Calamari, J. E., Riemann, B. C., & Heffelfinger, S. K. (2003). Too much thinking about thinking?: metacognitive differences in obsessive-compulsive disorder. *Journal of Anxiety Disorders, 17*, 181-195.

Krohne, H. W. (1993). Vigilance and cognitive avoidance as concepts in coping research. In H. W. Krohne (Ed.), *Attention and avoidance: Strategies in coping with aversiveness* (pp. 19-50). Kirkland, WA: Hogrefe & Huber Publishers.

Ladouceur, R., Blais, F., Freeston, M. H., & Dugas, M. J. (1998). Problem solving and problem orientation in generalized anxiety disorder. *Journal of Anxiety Disorders, 12*, 139-152.

Ladouceur, R., Dugas, M. J., Freeston, M. H., Rheaume, J., Blais, F., Boisvert, J. M., et al. (1999). Specificity of generalized anxiety disorder symptoms and processes. *Behavior Therapy, 30*, 191-207.

Ladouceur, R., Gosselin, P., & Dugas, M. J. (2000). Experimental manipulation of intolerance of uncertainty: A study of a theoretical model of worry. *Behaviour Research and Therapy, 38*, 933-941.

Ladouceur, R., Talbot, F., & Dugas, M. J. (1997). Behavioral expressions of intolerance of uncertainty in worry. *Behavior Modification, 21*, 355-371.

Langlois, F., Freeston, M. H., & Ladouceur, R. (2000a). Differences and similarities between obsessive intrusive thoughts and worry in a non-clinical population: Study 1. *Behaviour Research and Therapy, 38*, 157-173.

Langlois, F., Freeston, M. H., & Ladouceur, R. (2000b). Differences and similarities between obsessive intrusive thoughts and worry in a non-clinical population: Study 2. *Behaviour Research and Therapy, 38*, 175-189.

MacLeod, C., & Rutherford, E. (2004). Information-processing approaches. Assessing the selective functioning of attention, interpretation, and retrieval. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder. Advances in research and practice*. New York: The Guilford Press.

Marker, C. D., Calamari, J. E., Woodard, J. L., & Riemann, B. C. (in press). Cognitive self-consciousness, implicit learning and obsessive-compulsive disorder. *Journal of Anxiety Disorders*.

Mathews, A. (1990). Why worry? The cognitive function of anxiety. *Behaviour Research and Therapy, 28*, 455-468.

Mennin, D. S., Heimberg, R. G., & Turk, C. L. (2004). Clinical presentation and diagnostic features. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder. Advances in research and practice*. New York: The Guilford Press.

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28*, 487-495.

Muris, P., Roelofs, L., Meesters, C., & Boomsma, P. (2004). Rumination and worry in nonclinical adolescents. *Cognitive Therapy and Research, 28*, 539-554.

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology, 100*, 36-52.

Norton, P. J. (2005). A psychometric analysis of the Intolerance of Uncertainty Scale among four racial groups. *Journal of Anxiety Disorders, 19*, 699-707.

Öhman, A. (1993). Fear and anxiety as emotional phenomena: clinical phenomenology, evolutionary perspectives, and information-processing mechanisms. In M. Lewis & J. M. Haviland (Eds.), *Handbooks of emotions* (pp. 511-536). New York: The Guilford Press.

Purdon, C. (1999). Thought suppression and psychopathology. *Behaviour Research and Therapy, 37*, 1029-1054.

Purdon, C., & Clark, D. A. (1999). Metacognition and obsessions. *Clinical Psychology and Psychotherapy, 6*, 102-110.

Riskind, J. H. (2005). Cognitive Mechanisms in Generalized Anxiety Disorder: A Second Generation of Theoretical Perspectives. *Cognitive Therapy and Research, 29*, 1-5.

Ruscio, A. M. (2002). Delimiting the boundaries of generalized anxiety disorder: differentiating high worriers with and without GAD. *Journal of Anxiety Disorders, 16*, 377-400.

Ruscio, A. M., Borkovec, T. D., & Ruscio, J. (2001). A taxometric investigation of the latent structure of worry. *Journal of Abnormal Psychology, 110*, 413-422.

Salkovskis, P. M., & Campbell, P. (1994). Thought suppression induces intrusion in naturally occurring negative intrusive thoughts. *Behaviour Research and Therapy, 32*, 1-8.

Segerstrom, S. C., Tsao, J., C. I., Alden, L. E., & Craske, M. G. (2000). Worry and rumination: Repetitive thought as a concomitant and predictor of negative mood. *Cognitive Therapy and Research, 24*, 671-688.

Sexton, K. A., Norton, P. J., Walker, J. R., & Norton, G. R. (2003). Hierarchical model of generalized and specific vulnerabilities in anxiety. *Cognitive Behaviour Therapy, 2*, 82-94.

Spielberger, C. D. (1980). *Test Anxiety Inventory. Preliminary professional manual*. Palo Alto, CA: Consulting Psychologist Press.

Stöber, J. (1998). Reliability and validity of two widely-used worry questionnaires: Self-report and self-peer convergence. *Personality and Individual Differences, 24*, 887-890.

Taylor, S. (2002). Cognition in obsessive compulsive disorder: an overview. In R. O. Frost & G. Steketee (Eds.), *Cognitive approaches to obsessions and compulsions: Theory,*

assessment, and treatment. Amsterdam, Netherlands: Pergamon/Elsevier Science Inc.

Turner, S. M., Beidel, D. C., & Stanley, M. A. (1992). Are obsessional thoughts and worry different cognitive phenomena? *Clinical Psychology Review, 12*, 257-270.

Watkins, E. (2004). Appraisals and strategies associated with rumination and worry. *Personality and Individual Differences, 37*, 679-694.

Wegner, D. M., Schneider, D. J., Carter, S. R., & White, T. L. (1987). Paradoxical effects of thought suppression. *Journal of Personality and Social Psychology, 53*, 5-13.

Wells, A. (1994). A multi-dimensional measure of worry: Development and preliminary validation of the Anxious Thoughts Inventory. *Anxiety, Stress and Coping: An International Journal, 6*, 289-299.

Wells, A. (1995). Meta-cognition and worry: A cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy, 23*, 301-320.

Wells, A. (2000). *Emotional disorders and metacognition. Innovative cognitive therapy*. Chichester: John Wiley & Sons Ltd.

Wells, A. (2002). Worry, metacognition, and GAD: Nature, consequences, and treatment. *Journal of Cognitive Psychotherapy, 16*, 179-192.

Wells, A. (2004). A cognitive model of GAD. Metacognitions and pathological worry. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder. Advances in research and practice* (pp. 164-186). New York: The Guilford Press.

Wells, A. (2005). The Metacognitive Model of GAD: Assessment of Meta-Worry and Relationship With DSM-IV Generalized Anxiety Disorder. *Cognitive Therapy and Research, 29*, 107-121.

Wells, A., & Carter, K. (1999). Preliminary tests of a cognitive model of generalized anxiety disorder. *Behaviour Research and Therapy, 37*, 585-594.

Wells, A., & Carter, K. (2001). Further tests of a cognitive model of generalized anxiety disorder: Metacognitions and worry in GAD, panic disorder, social phobia, depression, and nonpatients. *Behavior Therapy, 32*, 85-102.

Wells, A., & Cartwright-Hatton, S. (2004). A short form of the metacognitions questionnaire: properties of the MCQ-30. *Behaviour Research and Therapy, 42*, 385-396.

Wells, A., & Matthews, G. (1996). Modelling cognition in emotional disorder: the S-REF model. *Behaviour Research and Therapy, 34*, 881-888.

Wells, A., & Morrison, A. P. (1994). Qualitative dimensions of normal worry and normal obsessions: A comparative study. *Behaviour Research and Therapy, 32*, 867-870.

Wells, A., & Papageorgiou, C. (1998). Relationships between worry, obsessive-compulsive symptoms and meta-cognitive beliefs. *Behaviour Research and Therapy, 36*, 899-913.

Woody, S., & Rachman, S. (1994). Generalized anxiety disorder (GAD) as an unsuccessful search for safety. *Clinical Psychology Review, 14*, 743-753.

York, D., Borkovec, T. D., Vasey, M. W., & Stern, R. (1987). Effects of worry and somatic anxiety induction on thoughts, emotion and physiological activity. *Behaviour Research and Therapy, 25*, 523-526.

Zebb, B. J., & Beck, J. G. (1998). Worry versus anxiety: is there really a difference? *Behavior Modification, 22*, 45-61.

2

PSYCHOMETRIC PROPERTIES OF A DUTCH VERSION OF THE INTOLERANCE OF UNCERTAINTY SCALE

de Bruin, G. O., Rassin, E., van der Heiden, C., & Muris, P. (2006). *Psychometric properties of a Dutch version of the Intolerance of Uncertainty Scale*. Manuscript submitted for publication.

Abstract

Intolerance of uncertainty (IU) is thought to play a key role in the development and maintenance of worry and generalized anxiety disorder. The present study investigated the psychometric properties of the Dutch translation of the Intolerance of Uncertainty Scale (IUS), the most frequently employed scale for measuring IU. The factor analysis of the IUS pointed in the direction of a one-factor solution. Furthermore, the Dutch IUS portrayed excellent internal consistency and test re-test reliability. Tests of construct validity showed that the Dutch IUS correlated significantly stronger with worry than with depression. The regression analysis demonstrated that IU contributed significantly to worry, after controlling for demographic variables and levels of anxiety and depression. In addition, it was demonstrated that the IUS successfully discriminated between patients with GAD and other anxiety disorders, and non-clinical participants. Overall, it seems safe to conclude that the Dutch IUS is a reliable and valid scale for assessing IU.

Introduction

Since Generalized Anxiety Disorder (GAD) is no longer considered as a residual category in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association [APA], 1987), this disorder and its main feature of worry have been the focus of considerable research attention. One line of research aims at explaining the development and maintenance of worry and GAD by means of a concept known as intolerance of uncertainty (IU). In their frequently cited paper, Borkovec, Robinson, Pruzinsky, and DePree (1983) define worry as "a chain of thoughts and images, negatively affect-laden and relatively uncontrollable. The worry process represents an attempt to engage in mental problem-solving on an issue whose outcome is *uncertain* but contains the possibility of one or more negative outcomes" (p. 10; Borkovec et al., 1983). This definition makes clear that the aspect of uncertainty is one of the key elements of this anxiety phenomenon. Freeston, Rheaume, Letarte, Dugas, and Ladouceur (1994) introduced the construct of IU, which can be described as "the predisposition to react negatively to an uncertain event or situation, independent of its probability of occurrence and of its associated consequences" (p. 934; Ladouceur, Gosselin, & Dugas, 2000). Briefly, people who are characterized by high levels of IU experience many ambiguous situations of everyday life as stressful and fearful, which means that they are also "generating dysfunctional emotional states (i.e. worrying), inhibiting problem focused behaviour, and requiring high degrees of evidence before a decision can be made" (p. 792; Freeston et al., 1994). In this way, IU is thought to contribute to worry and GAD.

Research on the relation between IU and worry has yielded promising results. For example, Freeston et al. (1994) have demonstrated that there is a unique link between IU and worry, which is independent of levels of anxiety and depression. Furthermore, in the non-clinical population, IU discriminated subjects who clearly show the symptoms of GAD from those who do not display such symptoms (Freeston et al., 1994). Similar results have been obtained in studies involving clinical patients. That is, IU was found to distinguish between GAD patients and non-clinical worriers (Ladouceur, Blais, Freeston, & Dugas, 1998), and it has been demonstrated that GAD patients display higher levels of IU than patients with other anxiety disorders (Ladouceur et al., 1999). Although these findings seem to indicate that IU is specifically related to worry and GAD, it should be noted that research is still inconclusive on this point as there is little empirical research on this issue, and there are indications that this characteristic is also relevant for Obsessive-Compulsive Disorder (OCD; Holaway, Heimberg, & Coles, 2006).

Most studies on IU have employed the Intolerance of Uncertainty Scale (IUS; (Freeston et al., 1994), which intends to measure "emotional, cognitive and behavioural reactions to ambiguous situations, implications of being uncertain, and attempts to control the future" (Freeston et al., 1994). The psychometric properties of the original French version of the IUS were examined by Freeston et al. (1994) and Dugas, Freeston, and Ladouceur (1997). Their studies demonstrated that the IUS displays good internal consistency (α = .91) and test-retest reliability over a five-week period (r = .78). Furthermore, factor analysis revealed a five-factor structure with factors related to the following themes:

(1) uncertainty is unacceptable and should be avoided, (2) being uncertain reflects badly on a person, (3) frustration related to uncertainty, (4) uncertainty causes stress, and (5) uncertainty prevents action. Finally, correlations between the IUS and measures for symptoms of worry, depression and anxiety ranged between .52 and .63, which demonstrates that the questionnaire has satisfactory convergent validity (Dugas et al., 1997; Freeston et al., 1994).

The reliability and validity of the English translation of the IUS were investigated by Buhr and Dugas (2002). Again, internal consistency (α = .94) and test-retest reliability (r = .74) were good. However, this time the factor analysis yielded a four-factor structure. The four factors were labeled as follows: (1) uncertainty leads to the inability to act, (2) uncertainty is stressful and upsetting, (3) unexpected events are negative and should be avoided, and (4) being uncertain about the future is unfair. According to Buhr and Dugas (2002) this factor structure captures the essence of the IUS better than the five-factor structure as reported by Freeston et al. (1994), although the authors also noted that it may be preferable to use the total score of the scale. Buhr and Dugas (2002) also provided further support for the validity of the IUS as they demonstrated that the IUS was more convincingly linked to worry as compared to depression and anxiety. Furthermore, the relation between IUS and worry remained significant when controlling for gender, age, and the influence of anxiety and depression.

A final study by Norton (2005) examined the psychometric properties of the IUS in four ethnic groups in the United States (i.e., African American, Caucasian, Hispanic/Latino, and Southeast Asian) to assess the cross-cultural validity of the questionnaire. Results showed that the reliability and validity were good and highly similar for all groups. However, exploratory factor analysis of the IUS across the various groups did not yield a consistent solution. That is, for each of the groups a somewhat different factor structure emerged, many items did not load uniquely on a single factor, and the factors were difficult to interpret. Furthermore, as in the Buhr and Dugas study (2002), the factors were found to correlate substantially, which points in the direction of a one-factor solution and seems to indicate that IU can best be seen as an unidimensional construct. Thus, the results justify Buhr and Dugas' as well as Norton's recommendation to employ the total score when using the IUS.

Altogether, research so far has yielded considerable evidence for the psychometric qualities of the IUS. As IU is increasingly acknowledged as an important cognitive factor playing a role in the pathogenesis of anxiety disorders such as GAD, researchers from all over the world are interested in using the IUS. The current study offers information concerning the psychometric properties of the Dutch version of the IUS in a non-clinical sample and provides evidence to show that the translation of the instrument was successful. The study also examined some basic theoretical assumptions concerning the links between IU, on the one hand, and worry, anxiety, and depression, on the other hand. More specifically, we not only tested the factor structure, internal consistency and test re-test reliability of the Dutch IUS, but also used the scale to examine whether IU is more substantially related to worry than to general (i.e., trait) anxiety and depression. In addition, it

was investigated whether the IUS discriminates between patients with GAD and other anxiety disorders, and non-clinical participants.

Method

Sample

Parts of the data were collected in different studies among psychology students of Erasmus University Rotterdam, the Netherlands. Students received course credits for participation. In total, 209 students (168 women and 41 men; mean age = 20.50 years, *SD* = 2.51, range 18-34) completed the IUS. One-hundred-and-two of these students (89 women and 13 men; mean age = 20.03 years, *SD* = 2.15, range 18-34) also completed the PSWQ, BDI, and STAI. To assess the test-retest reliability of the IUS, a sub-sample of 43 students (41 women and 2 men; mean age = 20.04 years, *SD* = 2.76, range 18-34) completed the scale for a second time, four weeks after the initial assessment.

Furthermore, the study included a group of twenty-three patients (16 women and 7 men; mean age = 37.34 years, *SD* = 11.54, range 20-65) from Ensis, an outpatient treatment centre in Rotterdam and Spijkenisse, The Netherlands. Certified psychologists diagnosed the patients via semi-structured diagnostic interviews, based on DSM-IV-TR criteria (American Psychiatric Association [APA], 2000). Fourteen patients met the criteria for Generalized Anxiety Disorder, the remainder (*n* = 9) suffered from other anxiety disorders such as OCD, social phobia, and post-traumatic stress disorder. Patients completed the IUS (and PSWQ, BDI, and STAI) during the initial assessment at the treatment center. Written consent for participation was given.

Measures

The IUS consists of 27 items (see Table 1). Each item is answered on a five-point scale (ranging from 1 = *not at all characteristic of me* to 5 = *entirely characteristic of me*). For the purpose of this study, the English version of the IUS was translated into Dutch. Next, Dutch IUS-items were translated back to English in order to check whether the original meaning of the IUS-items was retained. Problem items were scrutinized until agreement on their phrasing was reached.

The Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) taps trait-like worry. The PSWQ consists of 16 items obtaining information about the frequency and intensity of worrying (e.g., “Many situations make me worry”). Items are answered on a five-point scale (1 = *not at all typical of me*; 5 = *very typical of me*). A PSWQ total score is calculated by summing the scores on all items after recoding reversed items.

The Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) is a 21-item self-report scale for measuring the presence and severity of the main symptoms of depression. The items reflect the degree to which respondents experience symptoms of depression in the past week (0 = *not present*; 3 = *very much present*). Higher scores (range: 0-63) indicate higher levels of depression.

The trait anxiety scale of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970) is generally regarded as an index of dispositional anxiety, and

consists of 20 items (e.g., “I feel nervous and restless”) that are rated on a four-point scale (1 = *almost never*; 4 = *almost always*). A total score (range 20-80) can be derived of which higher scores are indicative of higher levels of trait anxiety.

Results

Factor Analysis

An exploratory principal components factor analysis with Oblimin rotation was performed on the 27 items of the IUS (*N* = 209). Seven factors were found with an eigenvalue > 1 (i.e., 7.00, 1.96, 1.75, 1.46, 1.28, 1.16, and 1.05). Following previous factor analytic studies of the IUS (Buhr & Dugas, 2002; Freeston et al., 1994; Norton, 2005), the four- and five-factor structure solutions were inspected in detail. However, these solutions were not satisfactory (i.e., many secondary loadings, weak factors, and difficult to interpret). Therefore, and on the basis of the screeplot, the one-factor solution seemed most justified. Table 1 shows the item-total correlations for the 27 items of the IUS.

Table 1. IUS-item total correlations (*N* = 209).

No.	Item	
1	Uncertainty stops me from having a strong opinion.	.33
2	Being uncertain means that a person is disorganized.	.15
3	Uncertainty makes life intolerable.	.32
4	It’s unfair having no guarantees in life.	.45
5	My mind can’t be relaxed if I don’t know what will happen tomorrow.	.65
6	Uncertainty makes me uneasy, anxious, or stressed.	.50
7	Unforeseen events upset me greatly.	.69
8	It frustrates me not having all the information I need.	.53
9	Uncertainty keeps me from living a full life.	.55
10	One should always look ahead so as to avoid surprises.	.39
11	A small unforeseen event can spoil everything, even with the best planning.	.51
12	When it’s time to act, uncertainty paralyses me.	.54
13	Being uncertain means that I am not first rate.	.74
14	When I am uncertain, I can’t go forward.	.43
15	When I am uncertain, I can’t function very well.	.47
16	Unlike me, others seem to know where they are going with their lives.	.61
17	Uncertainty makes me vulnerable, unhappy, or sad.	.53
18	I always want to know what the future has in store for me.	.58
19	I can’t stand being taken by surprise.	.52
20	The smallest doubt can stop me from acting.	.57
21	I should be able to organize everything in advance.	.54
22	Being uncertain means that I lack confidence.	.40
23	I think it’s unfair that other people seem to be sure about their future.	.62
24	Uncertainty keeps me from sleeping soundly.	.42
25	I must get away from all uncertain situations.	.64
26	The ambiguities in life stress me.	.54
27	I can’t stand being undecided about my future.	.52

As can be seen, with the exception of item 2, all items were found to make a clear contribution to the total score of the scale. In passing, it should be mentioned that the employment of other extraction methods (i.e., maximum likelihood) and/or rotations (i.e., varimax) yielded highly similar results. That is, the one-factor structure appeared to provide the most clear-cut and parsimonious solution for the IUS.

Internal consistency

In Table 2 mean scores, standard deviations, and Cronbach's alphas for the IUS, as well as for the other measures (i.e., PSWQ, BDI, and STAI-trait) are displayed for the students group, as well as for the patients group. The internal consistency for the Dutch IUS was .88 in the student sample, and .94 in the sample of anxiety-disordered patients. All the other scales also displayed good internal consistency (*α*'s between .81 and .94).

Table 2. Mean scores (standard deviations), and Cronbach's *α*'s for the IUS and other questionnaires.

	Students			Patients		
	Mean (*SD*)	*α*	*N*	Mean (*SD*)	*α*	*N*
IUS	65.89 (12.95)	.88	209	89.87 (18.51)	.94	23
PSWQ	43.51 (6.43)	.92	102	66.96 (8.92)	.89	23
BDI	6.21 (5.32)	.81	102	19.75 (7.75)	.82	23
STAI- trait	38.64 (7.65)	.88	102	57.74 (7.99)	.87	23

Note. IUS: Intolerance of Uncertainty Scale, PSWQ: Penn State Worry Questionnaire, BDI: Beck Depression Inventory, STAI-trait: State-Trait Anxiety Inventory-trait.

Test-retest reliability

The test-retest reliability for the IUS over the four-week period appeared satisfactory: $r = .79$ ($p < .001$), although mean IUS scores slightly decreased from 67.67 (*SD* = 12.78) on occasion 1 to 64.37 (*SD* = 12.83) on occasion 2 [$t(42) = 2.60$, $p < .05$].

Construct validity

All questionnaires (i.e., PSWQ, BDI, and STAI-trait) correlated significantly with the IUS (see Table 3). The correlation between the IUS and PSWQ was significantly higher than the correlation between the IUS and BDI ($Z = 1.87$, $p < .05$). The other correlations did not differ significantly.

Table 3. Correlation coefficients between the IUS and the other questionnaires (in non-clinical sample).

	PSWQ	BDI	STAI-trait
IUS	.61	.46	.50
PSWQ		.50	.65
BDI			.68

Note. IUS: Intolerance of Uncertainty Scale, PSWQ: Penn State Worry Questionnaire, BDI: Beck Depression Inventory, STAI-trait: State-Trait Anxiety Inventory-trait. All correlations were significant at $p < .001$

A hierarchical regression analysis was performed to determine which variables contributed to the prediction of worry (PSWQ). Gender and age were entered on the first step, BDI and STAI-trait on the second step, whereas the IUS was entered on the third and last step. The results are presented in Table 4 and show that after controlling for demographic variables, depression and anxiety, the IUS still accounted for a significant additional 4% of variance in PSWQ scores.

Table 4. Hierarchical regression analysis to test the predictive value of the IUS for worry as indexed by the PSWQ ($N = 102$).

Variables	R^2	ΔR^2	*B*	*SE B*	*β*
Step 1	.05	.05			
Gender			2.81	3.18	.09
Age			-.97	.48	-.20*
Step 2	.46**	.41**			
BDI			.11	.21	.06
STAI			.82	.14	.61**
Step 3	.49**	.04**			
IUS			.19	.07	.23*

Note. PSWQ: Penn State Worry Questionnaire, BDI: Beck Depression Inventory, STAI-trait: State-Trait Anxiety Inventory-trait, IUS: Intolerance of Uncertainty Scale. * $p < .05$, ** $p < .01$.

On the PSWQ, BDI, and STAI-trait, scores of the clinical group differed significantly from those of the non-clinical group (respectively: $t(123) = 5.64$, $t(123) = 9.57$, $t(123) = 11.92$; all p's $< .001$). As expected, patients displayed higher levels of worry, depression, and trait-anxiety as compared to the non-clinical subjects. A *t*-test was performed to check whether the scores on the IUS discriminated between non-clinical participants ($N = 209$) and the group of mixed anxiety patients ($N = 23$). The results revealed that the latter group scored significantly higher on the IUS with a mean score of 89.87 ($SD = 18.51$), $t(230) = 8.04$, $p < .001$. A further *t*-test revealed that this difference was not exclusively caused by the GAD patients; these patients had a mean IUS score of 90.36 ($SD = 16.92$) versus 89.11 ($SD = 21.83$) for the other anxiety disorder patients [$t(21)<1$]. Since the aforementioned regression analysis demonstrated that age was a significant predictor of PSWQ scores, an

analysis of variance with age entered as a covariate was also conducted. The results showed that the effect of group remained significant [$F(1,122) = 8.80$, $p < .01$].

Discussion

Several research groups are examining IU as a possible key factor in the development and maintenance of worry and GAD. The present study was set up to investigate the psychometric properties of the Dutch translation of the IUS, which is the most frequently employed scale for measuring individual differences in IU. The results confirm that the psychometric properties of the Dutch IUS are similar to those of the French and English versions and seem to demonstrate that the translation was successful. Firstly, factor analysis of the IUS pointed in the direction of a one-factor solution, and hence justifies the conclusion that IU can best be regarded as a unidimensional construct (e.g., Norton, 2005). Therefore, we concur with the recommendation of Buhr and Dugas (2002) to employ the total score of the IUS in future research. Secondly, the Dutch version of the IUS was found to possess excellent internal consistency and test re-test reliability, which is in keeping with results obtained in the previous IUS validation studies (Buhr & Dugas, 2002; Dugas et al., 1997; Freeston et al., 1994; Norton, 2005). Thirdly, tests of the construct validity showed that the Dutch IUS correlated significantly stronger with worry than with depression. The correlation between IUS and trait anxiety and that between IUS and worry were equally strong. Furthermore, a regression analysis demonstrated that IU contributed significantly to worry, even after controlling for demographic variables and levels of anxiety and depression. Again, these results are comparable to previous findings on the convergent and divergent validity of the IUS (Buhr & Dugas, 2002; Dugas et al., 1997; Freeston et al., 1994; Norton, 2005) and seem to provide further evidence for the notion that the concept of IU is most relevant for the study of worry. Finally, the IUS adequately differentiated between a group of non-clinical participants and a group of patients with GAD and other anxiety disorders. As expected, the clinical group scored significantly higher on the IUS than the group of non-clinical participants. However, no difference was found between IUS scores of GAD patients and patients with other anxiety disorders, and as such the results from Ladouceur et al. (1999) were not replicated. However, in our analysis, the patient groups were rather small. Future research including larger groups of patients with different anxiety disorders is needed to further examine the specificity of IU.

Besides the small sample size of our clinical group, two further limitations of the present study should be mentioned. The first limitation pertains to the unequal gender distribution of the non-clinical group, with a female to male ration of almost 5:1. However, the correlation between gender and the IUS was non-significant and gender did not contribute significantly to worry. These results are consistent with research of Robichaud, Dugas, and Conway (2003) who have demonstrated that IU does not differ between males and females, and that there seems to be no differential association between IUS scores and worry for both genders. Therefore, there is no reason to assume that reliability and validity estimates were affected by the unequal gender distribution of our sample. A second limitation of our study is that our non-clinical sample consisted of undergraduate students

and therefore the results may not generalize to other populations. Further research with other types of community samples should be carried out to replicate the present findings. In spite of these shortcomings, it seems safe to conclude that the Dutch version of the IUS is a reliable and valid scale for assessing IU, and therefore can be regarded as a useful instrument for future research on the role of this cognitive factor in the etiology and maintenance of worry and GAD.

References

American Psychiatric Association (1987). *Diagnostic and statistical manual of mental disorders (3rd ed. rev)*: Washington, DC, US: American Psychiatric Publishing, Inc.

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders (4th ed., text rev)*: Washington, DC, US: American Psychiatric Publishing, Inc.

Borkovec, T. D., Robinson, E., Pruzinsky, T., & DePree, J. A. (1983). Preliminary exploration of worry: Some characteristics and processes. *Behaviour Research and Therapy, 21*, 9-16.

Buhr, K., & Dugas, M. J. (2002). The Intolerance of Uncertainty Scale: Psychometric properties of the English version. *Behaviour Research and Therapy, 40*, 931-946.

Dugas, M. J., Freeston, M. H., & Ladouceur, R. (1997). Intolerance of uncertainty and problem orientation in worry. *Cognitive Therapy and Research, 21*, 593-606.

Dugas, M. J., Hedayati, M., Karavidas, A., Buhr, K., Francis, K., & Phillips, N. A. (2005). Intolerance of Uncertainty and Information Processing: Evidence of Biased Recall and Interpretations. *Cognitive Therapy and Research, 29*, 57-70.

Freeston, M. H., Rheaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*, 791-802.

Holaway, R. M., Heimberg, R. G., & Coles, M. E. (2006). A comparison of intolerance of uncertainty in analogue obsessive-compulsive disorder and generalized anxiety disorder. *Journal of Anxiety Disorders, 20,* 158-174.

Ladouceur, R., Blais, F., Freeston, M. H., & Dugas, M. J. (1998). Problem solving and problem orientation in generalized anxiety disorder. *Journal of Anxiety Disorders, 12*, 139-152.

Ladouceur, R., Dugas, M. J., Freeston, M. H., Rheaume, J., Blais, F., Boisvert, J. M., et al. (1999). Specificity of generalized anxiety disorder symptoms and processes. *Behavior Therapy, 30*, 191-207.

Ladouceur, R., Gosselin, P., & Dugas, M. J. (2000). Experimental manipulation of intolerance of uncertainty: A study of a theoretical model of worry. *Behaviour Research and Therapy, 38*, 933-941.

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28*, 487-495.

Norton, P. J. (2005). A psychometric analysis of the Intolerance of Uncertainty Scale among four racial groups. *Journal of Anxiety Disorders, 19,* 699-707.

Robichaud, M., Dugas, M. J., & Conway, M. (2003). Gender differences in worry and associated cognitive-behavioral variables. *Journal of Anxiety Disorders, 17*, 501-516.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the State-Trait Anxiety Inventory*. Palo Alto: Consulting Psychologists Press.

3

WORRYING IN THE LAB: DOES INTOLERANCE OF UNCERTAINTY HAVE PREDICTIVE VALUE?

de Bruin, G. O., Rassin, E., & Muris, P. (in press). Worrying in the lab: Does intolerance of uncertainty have predictive value? *Behaviour Change*.

ABSTRACT

The present article describes two experimental studies investigating whether individual differences in intolerance of uncertainty (IU) predict worry in response to uncertain situations. In both studies, undergraduate students completed the Intolerance of Uncertainty Scale (IUS; Freeston, Rheaume, Letarte, Dugas, & Ladouceur, 1994; *Personality and Individual Differences*, *17*, 791-802) and then completed an intelligence task, which was thought to elicit feelings of uncertainty. After completing the task, state worry was measured. Results of both studies showed that there were positive correlations between IUS-scores and task-related state worry. Furthermore, Study 2 showed that individual differences in IU only were predictive of worry in a situation that elicits low to medium levels of uncertainty, and not in a situation high in uncertainty. Thus, only under certain conditions IU-related personality characteristics seem to be predictive of worrisome thoughts.

INTRODUCTION

A growing body of research concerning worry and generalized anxiety disorder (GAD; American Psychiatric Association, 1994) has been published in the past years. Worry, which is the key feature of GAD, can be defined as "a chain of thoughts and images, negatively affect-laden and relatively uncontrollable" (p. 10; Borkovec, Robinson, Pruzinsky, & DePree, 1983). Different approaches concerning the nature, function, and theoretical underpinnings of worry and GAD have been proposed. For instance, in some theories, worry is viewed as a way to cope with threatening images (Aikins & Craske, 2001) or as a way to reduce the somatic responses of anxiety, thereby lessening the experience of painful emotions (Borkovec & Lyonfields, 1993). However, because accurate problem solving is not applied and anxious situations are not adequately tackled, the long-term effects of worry are counterproductive and states of anxiety perpetuate. Another theory on worry was provided by Wells (1994). His cognitive model of GAD proposes that meta-worrying, the negative appraisal of worrying itself, is essential to the development of pathological worrying (see also Wells & Carter, 1999). A final theoretical account associates worry with information processing biases (Borkovec, Ray, & Stöber, 1998). For example, GAD patients exhibit a bias towards negative interpretations of ambiguous situations and react more rapidly to threatening cues. Thus, worriers' thoughts are negatively laden and focused on threats, and as a result, anxiety is constantly present.

Interestingly, Dugas, Gagnon, Ladouceur, and Freeston (1998) developed a model in which intolerance of uncertainty (IU) is regarded as the crucial process variable in the acquisition and maintenance of severe worry. IU can be described as "the predisposition to react negatively to an uncertain event or situation, independent of its probability of occurrence and associated consequences" (p. 934; Ladouceur, Gosselin, & Dugas, 2000). In short, people with high levels of IU experience many ambiguous situations of everyday life as stressful and fearful, and as a result "generate dysfunctional emotional states, inhibit problem-focused behaviour, and require high degrees of evidence before a decision can be made" (p. 792; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994). In this way, IU is thought to contribute to worry and GAD. Freeston et al. (1994) developed the Intolerance of Uncertainty Scale (IUS), a self-report questionnaire for assessing emotional, cognitive, and behavioural reactions to ambiguous situations, attempts to control the future, and implications of being uncertain. Thereafter, a series of studies has been conducted with this measure to investigate IU and its specificity in relation to worry. For example, Dugas, Freeston, and Ladouceur (1997) reported that IU (as measured by the IUS) is strongly related to trait worry, irrespective of age, sex and mood state. Ladouceur, Blais, Freeston, and Dugas (1998) demonstrated that the level of IU even discriminates between non-clinical subjects who worry regularly and clinically referred patients with GAD, with the latter displaying significantly higher scores on the IUS.

The grounding studies for the IU model of GAD have relied on self-report questionnaires. However, it is also important to assess the link between IU and worrying using experimental paradigms. So far, only a few studies have examined the premises of the proposed IU model of GAD experimentally. For example, a study of Ladouceur, Talbot, and

Dugas (1997) investigated the relation between individual differences in IU and subject's performance during a task with varying levels of ambiguity. More specifically, participants were given various bags containing black and white marbles and asked to determine the ratio of black and white marbles in the bags, by drawing as much marbles from each bag as they needed to make that decision. The ambiguity level of the task was manipulated by changing the actual black/white ratio of the marbles and by mentioning different possible ratios to the participants. The dependent variable was the number of marbles that were drawn from the bags. Results showed that participants, who scored high on the IUS, drew a higher number of marbles before reaching a decision in the moderately ambiguous task. This effect was not observed during the high and non-ambiguous tasks. It was concluded that individuals who are highly intolerant of uncertainty, under certain conditions, "have a lower threshold for the perception of ambiguity than other individuals" (p. 361). In conclusion, the study of Ladouceur et al. (1997) examined the relationship between IU and GAD-related "doubting" behaviour. The behavioural reactions to the moderately ambiguous task at least provided some support for the validity of self-reported IU.

A second study by Ladouceur et al. (2000) focused on the presumed effects of the experience of IU on worrying. During a computerized roulette game, participants were instructed to win a certain amount of money to enable a standard donation to a (fictitious) foundation. The level of IU was manipulated by providing participants with instructions that contained information on the probability of actually winning the required money. The instructions that intended to increase the level of IU stated that the chance of winning enough money was exceptionally low. The instructions to decrease the level of IU told participants that the chance of winning enough money was relatively high. Objective chances of winning were in fact determined by the computer and in actuality equal for all participants. Results indicated that participants in the increased IU group showed more worry as compared to participants who experienced a decreased level of IU. In other words, Ladouceur and colleagues (2000) experimentally manipulated participants' level of IU, and thereby enhanced the level of worry, which is of course a result that seems to fit with the IU model of GAD.

A third study by Grenier and Ladouceur (2004) also examined the relationship between experimentally induced IU and worry. In this study, the level of IU was manipulated by asking participants to imagine they had ingested a medicine and to repeat aloud statements reflecting increased (e.g., "It's unfair to have no guarantees in life") or decreased IU (e.g., "I am able to live with the uncertainties in life"). Results demonstrated that participants in the increased IU condition showed higher levels of worry than participants in the decreased IU condition.

In sum, experimental studies on the link between IU and worry have shown that (1) individual differences in IU to some extent predict GAD-related "doubting" behaviour during an ambiguous task (Ladouceur et al., 1997), and (2) that experimentally manipulated IU enhances the level of worrisome thoughts or, if one likes, state worry (Ladouceur et al., 2000; Grenier & Ladouceur, 2004). The current studies extend on this previous research and further explored the link between IU and worry using a somewhat different experimental

approach. More specifically, these studies investigated whether individual differences in IU (as indexed by the IUS) are able to predict levels of state worry in response to experimental situations that are either high or low in uncertainty.

STUDY 1

In the first experiment, it was investigated whether individual differences in IU (as indexed by the IUS) are able to predict state worry in response to an uncertain situation, that is, the completion of a partly unsolvable intelligence task. An attempt was made to induce high and low levels of uncertainty during the task, by providing subjects with differential instructions concerning the probable outcome of the task. It was anticipated that high levels of self-reported IU would be accompanied by higher levels of task-related "state" worry, and that this would be particularly true under high levels of experimentally induced uncertainty.

Method

Participants

Forty undergraduate students of Erasmus University Rotterdam, the Netherlands, participated in this study. Students were given course credits and a monetary fee for their participation. The sample included 31 women and 9 men, who had a mean age of 20.88 years (*SD* = 2.11).

Measures and procedure

Firstly, the Intolerance of Uncertainty Scale (IUS; Freeston et al., 1994) was administered. The IUS consists of 27 items assessing implications of being uncertain, attempts to control the future, and emotional, cognitive and behavioural reactions to ambiguous situations. Examples of items are "The ambiguities in life stress me", "I always want to know what the future has in store for me", and "One should always look ahead so as to avoid surprises". Items are answered on a five-point scale (1 = *strongly disagree*; 5 = *strongly agree*). The IUS has excellent internal consistency (α = .94), satisfactory test-retest stability (*r* = .74), as well as good convergent and discriminant validity (Buhr & Dugas, 2002; Freeston et al., 1994).

Next, participants were instructed to complete ten written word-association assignments derived from a Dutch intelligence test (Kooreman & Luteijn, 1987). These ten assignments had to be completed within five minutes. What the participants did not know was that half of the assignments were manipulated in such a way that they were unsolvable. The other five assignments were solvable and increased in difficulty. The Appendix shows an example of a solvable and an unsolvable assignment.

Given that some assignments were unsolvable, all participants were hypothesised to feel uncertain. To increase motivation as well as disappointment, discomfort, uncertainty and possibly worrying, all participants were told that they would receive an extra, small, monetary fee for each assignment that was completed correctly. In addition, an attempt was made to vary the level of uncertainty by instructing some of the participants that the assignments were designed for measuring the IQ of young teenagers, and therefore they

would probably do very well on the task, while others received the instruction that the task was developed to measure the IQ of highly gifted people, and therefore it would be perfectly normal if they didn't answer all items correctly. It was hypothesised that subjects who were given the former instruction would feel more uncertain and hence display higher levels of worry more those who received the latter instruction. The participants were randomly assigned to one of the two instruction conditions. There were 20 participants in each condition. No age [$t(38)= 1.28$, *ns*] or sex differences [$\chi^2(1,40) < 1.0$] between the two conditions were found.

After having spent five minutes in the lab, allegedly waiting for the experimenter to return with their task performance ratings, participants completed a self-constructed 7-item questionnaire. This questionnaire addressed worrisome thoughts regarding their performance on the test as experienced during the five minutes waiting period, i.e., task-related state worry. The questions were: (1) "While waiting for the results on the task, I thought about the assignments for a long time", (2) "I am concerned about my results on the verbal intelligence task", (3) "I worried about (my performance on) the task", (4) "I thought about (my performance on) the task", (5) "After the task was over, I didn't think of the results" (reversed item), (6) "While I was waiting for the results, I thought about the assignments regularly", and (7) "Even though I felt I did well on the task, I kept thinking about it". Questions were answered on a five-point scale (1 = *strongly disagree*, 5 = *strongly agree*). A total score was computed by summing the ratings on all items (after recoding the reversed item), with a higher score meaning that the participant displayed higher levels of state worry (range: 7-35). Two extra open-ended questions inquired about the estimated number of correctly answered assignments and the number of thoughts about the task. The actual number of correctly answered assignments was also obtained.

Results and discussion

Before addressing the main research questions of Study 1, a number of general findings should be discussed. First, inspection of the mean scores on various measures indicated that the experiment induced low to moderate levels of state worry (see Table 1).

Table 1. Mean scores (standard deviations) on various indices, and correlations between the IUS and state worry and other variables (Study 1)

	M (SD)	*r* with IUS
IUS (27-135)	65.21 (11.38)	
State worry (7-35)	17.51 (4.11)	.42*
Number of thoughts about the task	2.98 (2.15)	.36*
Estimated number of items answered correctly	5.30 (1.22)	-.09
Actual number of items answered correctly	4.08 (.80)	.19

Note. $N = 40$. IUS: Intolerance of Uncertainty Scale. * $p < .01$

Second, it should be mentioned that participants answered on average four items correctly, but slightly overestimated their performance [paired $t(39) = 5.83$; $p < .01$]. Third, the internal consistency of the IUS was good ($\alpha = .85$), and the reliability of the task-related state worry

scale was also satisfactory (α = .74). Fourth and finally, no gender differences were found for the IUS, the state worry scale, or any of the other variables.

As hypothesised, scores on the IUS correlated positively with the state worry scale. Thus, higher levels of individual differences in IU were accompanied by higher levels of worry about the task. Scores on the IUS also correlated positively with the number of thoughts about the task, which indicates that participants who scored high on the IUS more frequently thought about the task during the five-minute waiting period. No meaningful correlations were found between the IUS and the estimated or actual number of correctly answered items. In contrast with our expectations, the differential instructions (i.e., high versus low uncertainty) did not produce differences on the worry variable, means being 17.79 (*SD* = 3.92) and 17.35 (*SD* = 4.36), respectively [$t(38) < 1$], or on the number of thoughts about the task, means 3.20 (*SD* = 2.65) and 2.75 (*SD* = 1.55), respectively [$t(38) < 1$]. Neither did the two groups score differently on the actual and estimated number of correctly answered items [$t(38) < 1$ and $t(38) = 1.30$, $p > .05$, respectively]. Not surprisingly, then, the correlation between IUS and the worry scale was highly similar in the high and low uncertainty groups ($r = .41$, $p < .05$ and $r = .42$, $p < .05$, one-tailed, respectively).

Although the link between IUS scores and state worry was as expected and appeared quite robust, the results were less informative on the issue of under what circumstances increased levels of IU result in enhanced worry. The additional instructions that were given to manipulate participants' level of uncertainty were probably not powerful enough to yield differential effects on worry and thought frequency. In Study 2, an attempt was made to improve this aspect of the study.

STUDY 2

The second study was set up to induce high and low uncertainty levels by administering two versions of an IQ-test that actually varied in difficulty. Measures were added to check for anxiety levels of the participants before and after the experimental manipulation. Further, levels of uncertainty and worry about performance on the IQ-test were assessed as the main outcome variables.

Method

Measures and procedure

At the beginning of the experiment, participants were informed that they would have to complete an IQ-test. First, participants filled in the IUS (see Study 1). Then, participants completed a brief measure of state anxiety that consisted of 4 items from the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970; e.g., "I feel anxious"), and two additional items measuring participants' level of uncertainty (i.e., " I am uncertain") and test anxiety (i.e., "I am scared about taking the test"). These items were answered on a 100-mm visual analogue scale (VAS) with 0 = not at all applicable, and 100 = highly applicable. Next, a short IQ-test was administered. The IQ-test consisted of 10 assignments that were selected from the "Test voor Niet-Verbale Abstractie" ("Test of Non-Verbal Abstraction"), which is a Dutch instrument for measuring non-verbal, non-numerical

intelligence (Drenth, 1965). Briefly, each assignment was composed of four geometric figures with a specific communality. Participants were then presented with six new geometric figures, and instructed to choose the two figures that had the same communality as the initial four figures. Participants were randomly assigned to one of two conditions. In the condition intending to produce high levels of uncertainty, participants had to solve 10 assignments that were difficult. In the low uncertainty condition, participants were presented with 10 simple assignments. All participants were informed that they would receive feedback on their performance at the end of the experiment. After completing the IQ-test, all participants filled out two specific questions concerning their level of uncertainty and worry thoughts about performance on the IQ-test (respectively "I feel uncertain about my performance on the IQ-test" and "I am worried about my performance on the IQ-test"). Next, the brief measure of state anxiety, uncertainty, and test anxiety was completed for a second time. Finally, participants were debriefed.

Study 2 hypothesized that higher scores on the IUS would be related to worry about the test performance, and also to feelings of uncertainty about performance on the IQ-test, state anxiety, uncertainty, and test anxiety, and that this would be especially true for the high uncertainty condition.

Participants

Sixty-three undergraduate students of Erasmus University Rotterdam, the Netherlands, participated in this study. Students were given course credits for their participation. The participants were randomly assigned to one of the conditions (see measures and procedures). Next, the two groups were matched with regard to scores on the IUS (which showed satisfactory internal consistency: α = .83), to ensure that the two groups were equal in their level of intolerance of uncertainty. As a result of the matching procedure, 50 participants were retained. The final sample consisted of 25 students per condition and included 44 women and 6 men, who had a mean age of 20.96 years (*SD* = 3.84).

Results and discussion

Mean scores (and standard deviations) of the IUS and the various experimental variables are presented in Table 2. As can be seen, IUS scores were somewhat higher than those obtained in Study 1 but still within the normal range of this measure. Further, mean pre-test scores indicated that subjects reported low to moderate levels of state anxiety, uncertainty, and test anxiety. In passing, it should be mentioned that the internal consistency of the pre- and post-test state anxiety questions was satisfactory (respectively α = .81 and .87). No age [$t(48) < 1$] or sex differences [$\chi^2(1,50) = 3.03$, *ns*] between the two conditions were found. In addition, prior to the IQ-test, participants in both conditions did not differ on levels of state anxiety, uncertainty, test anxiety, or IUS scores, all ts$(48) < 1.45$, *ns*.

Table 2. Means (standard deviations) for the IUS and various experimental variables, and correlations between the IUS and other variables, computed separately for the high and low uncertainty conditions (Study 2)

Variables	High uncertainty		Low uncertainty	
	M (*SD*)	*r* with IUS	*M* (*SD*)	*r* with IUS
IUS	67.00 (7.34)$_a$		68.20 (6.75)$_a$	
Pre-test state anxiety	110.12 (82.90)$_a$	.56**	101.24 (73.69)$_a$	.28
Pre-test uncertainty	31.20 (25.74)$_a$	.46*	25.64 (22.41)$_a$	.41*
Pre-test test anxiety	27.32 (30.96)$_a$	.40*	16.84 (18.64)$_a$	.46*
Uncertainty about performance	52.12 (28.84)$_a$	.10	29.64 (28.38)$_b$	.36
Worry thoughts about performance	32.56 (25.85)$_a$	-.11	18.00 (18.40)$_b$	.41*
Post-test state anxiety	114.36 (56.85)$_a$	.30	94.76 (65.20)$_a$	.27
Post-test uncertainty	34.72 (21.23)$_a$	.26	22.24 (18.50)$_b$	.48*
Post-test test anxiety	23.72 (21.35)$_a$	.21	16.76 (19.87)$_a$	.44*

Note. *N* = 25 in each condition, IUS: Intolerance of Uncertainty Scale, * $p < .05$, ** $p < .01$. Means within the same row with different subscripts indicate significant difference at $p < .05$.

A *t*-test demonstrated that the experimental manipulation was successful, that is, participants in the high uncertainty condition displayed higher levels of uncertainty about their performance on the IQ test than the participants in the low uncertainty condition, means being 52.12 (*SD* = 28.84) versus 29.64 (*SD* = 28.38)[$t(48) = 2.78$, $p < .01$]. Participants in the high uncertainty condition also showed significantly higher levels of worry about their performance on the test, means being 32.56 (*SD* = 25.85) versus 18.00 (*SD* = 18.17)[$t(48) = 2.30$, $p < .05$]. No differences were observed for post-test state and test anxiety scores [both *t*s(48)s < 1.20, *ns*. However, participants in the high uncertainty condition displayed higher levels of post-test uncertainty than participants in the low uncertainty condition, means being respectively 34.72 (*SD* = 21.23) versus 22.24 (*SD* = 18.50)[$t(48)= 2.22$, $p < .05$].

Correlations between the IUS and the experimental variables were computed for each of the conditions. As shown in Table 2, in both conditions, most correlations between the IUS and pre-test state anxiety, pre-test uncertainty, and pre-test test anxiety were positive and significant (all *r*s between .40 and .56, *p*s < .05), with the exception of the correlation between IUS and pre-test state anxiety in the low uncertainty condition ($r = .28$, $p > .05$), which was nevertheless in the expected direction.

To investigate whether individual differences in IU would predict levels of worry, and in particular under high uncertain circumstances, correlations between IUS and worry about performance on the IQ test were examined. Surprisingly, only in the low uncertainty condition, the predicted correlation between IUS and worry was found ($r = .41$, $p< .05$), as well as positive associations between IUS and post-test uncertainty, and post-test test anxiety (*r*s between .44 and .48, all *p*s < .05). In the high uncertainty condition, these correlations were weaker. In particular, it is important to note that precisely in this condition the correlation between IUS and worry was totally absent ($r = -.11$).

To summarize, in Study 2, the experimental manipulation appeared successful, as both conditions differed in levels of uncertainty following the IQ-test. Further, the hypothesized relation between individual differences in IU (as indexed by the IUS) and worry about test performance was found, but surprisingly only in the low uncertainty condition. In the high uncertainty condition, the predicted link between IUS scores and worry about test performance did not emerge. Further, in the low uncertainty condition, IUS scores were also positively correlated to post-test uncertainty and test anxiety scores which further demonstrates that within this condition, subjects with higher levels of IU were more distressed than subjects with lower levels of IU.

GENERAL DISCUSSION

These experimental studies were conducted to further examine the empirical tenability of the IU model of GAD (Dugas et al., 1998). Previous experimental studies on the link between IU and worry showed (1) that individual differences in IU to some extent predict GAD-related "doubting" behaviour during an ambiguous task (Ladouceur et al., 1997), and (2) that experimentally manipulated IU enhances the level of worrisome thoughts or, if one likes, state worry (Ladouceur et al., 2000; Grenier & Ladouceur, 2004). The current studies made an attempt to investigate whether individual differences in IU are predictive of (state) worry in response to experimental situations that are either high or low in uncertainty. Although in Study 1 the link between IUS scores and state worry was demonstrated, it could not be explicated under what circumstances individual differences in IU result in higher levels of worry. The results of Study 2 were more conclusive in this respect, as they indicated that in particular under low uncertain circumstances, individual differences in IU were predictive of worry. Interestingly, in a high uncertainty situation, this relation between IU and worry was not found. Note that this finding is similar to that reported by Ladouceur et al. (1997), who demonstrated that individual differences in IU predicted GAD-related doubting behaviour, but only in response to a moderately ambiguous situation, and not in a non- or high ambiguous situation. Ladouceur et al. (1997) therefore concluded that "individuals who are intolerant of uncertainty have a lower threshold of perception of ambiguity than other individuals" (p. 361). All in all, the results seem to indicate that the relation between IU and worry is not linear. That is, IU levels only seem to hold predictive value for worry-related behaviour when persons are in a situation that makes them really doubtful or uncertain. Situations that are experienced as either clearly high or very low in uncertainty, seem to elicit normal, adaptive reactions, and under such conditions, IU is not predictive of worry.

A few shortcomings of the present study need to be mentioned. One obvious methodological limitation of the two experiments is the generalisability of nonclinical participants. Experimental research with clinical subjects is certainly needed to further validate the IU model of GAD (Dugas et al., 1998). A second limitation pertains to the fact that the present samples predominantly consisted of women. However, there is no reason to assume that there are gender differences in the relation between IU and worry. For example, a recent study of Robichaud, Dugas, and Conway (2003) demonstrated that gender differences in worrying could not be explained by sex-related variations in

intolerance of uncertainty, which indicates that the relation between IU and worry is not dependent on gender.

All in all, the studies reported in this article touched on important issues. On the one hand, the relation between IU and worry was confirmed. On the other hand, the relation between individual differences in IU and worry only seems to emerge under certain circumstances. That is, when a person is in a situation that elicits a certain amount of uncertainty and doubt, this personality characteristic will have predictive value for the level of worry.

REFERENCES

Aikins, D. E., & Craske, M. G. (2001). Cognitive theories of generalized anxiety disorder. *Psychiatric Clinics of North America, 24*, 57-74.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders (4th ed.)*: Washington, DC: American Psychiatric Association: American Psychiatric Publishing, Inc.

Borkovec, T. D., & Lyonfields, J. D. (1993). Worry: Thought suppression of emotional processing. In H. W. Krohne (Ed.), *Attention and avoidance: Strategies in coping with aversiveness* (pp. 101-118). Kirkland, WA: Hogrefe & Huber Publishers.

Borkovec, T. D., Ray, W. J., & Stöber, J. (1998). Worry: A cognitive phenomenon intimately linked to affective, physiological, and interpersonal behavioral processes. *Cognitive Therapy and Research, 22*, 561-576.

Borkovec, T. D., Robinson, E., Pruzinsky, T., & DePree, J. A. (1983). Preliminary exploration of worry: Some characteristics and processes. *Behaviour Research and Therapy, 21*, 9-16.

Buhr, K., & Dugas, M. J. (2002). The Intolerance of Uncertainty Scale: Psychometric properties of the English version. *Behaviour Research and Therapy, 40*, 931-946.

Drenth, P. J. D., 1965. *Test voor Niet Verbale Abstractie handleiding*. Lisse: Swets & Zeitlinger.

Dugas, M. J., Freeston, M. H., & Ladouceur, R. (1997). Intolerance of uncertainty and problem orientation in worry. *Cognitive Therapy and Research, 21*, 593-606.

Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: A preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*, 215-226.

Freeston, M. H., Rheaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*, 791-802.

Grenier, S., & Ladouceur, R. (2004). Manipulation de l'intolerance a l'incertitude et inquietudes. *Canadian Journal of Behavioural Science, 36*, 56-65.

Kooreman, A. & Luteijn, F. (1987). *Groninger Intelligentie Test GIT: Schriftelijke verkorte vorm.* Lisse: Swets & Zeitlinger.

Ladouceur, R., Blais, F., Freeston, M. H., & Dugas, M. J. (1998). Problem solving and problem orientation in generalized anxiety disorder. *Journal of Anxiety Disorders, 12*, 139-152.

Ladouceur, R., Gosselin, P., & Dugas, M. J. (2000). Experimental manipulation of intolerance of uncertainty: A study of a theoretical model of worry. *Behaviour Research and Therapy, 38*, 933-941.

Ladouceur, R., Talbot, F., & Dugas, M. J. (1997). Behavioral expressions of intolerance of uncertainty in worry. *Behavior Modification, 21*, 355-371.

Robichaud, M., Dugas, M. J., & Conway, M. (2003). Gender differences in worry and associated cognitive-behavioral variables. *Journal of Anxiety Disorders, 17*, 501-516.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the State-Trait Anxiety Inventory*. Palo Alto: Consulting Psychologists Press.

Wells, A. (1994). A multi-dimensional measure of worry: Development and preliminary validation of the Anxious Thoughts Inventory. *Anxiety, Stress and Coping: An International Journal, 6*, 289-299.

Wells, A., & Carter, K. (1999). Preliminary tests of a cognitive model of generalized anxiety disorder. *Behaviour Research and Therapy, 37*, 585-594.

Appendix. Two examples of the written word-association assignments

	Assignment	Answers options
Solvable	Boy - Girl	Lad
	Father - Mother	Big
	Man - ?	Strong
		Woman (correct answer)
		Wife
Unsolvable	Flower - Vase	Pollen
	Bush - Garden	Grass haulm
	Tree - ?	Fence
		Flower bulb
		Rake

4

META-COGNITIONS IN RELATION TO WORRY AND OBSESSIONS

4.1

COGNITIVE SELF-CONSCIOUSNESS AND META-WORRY AND THEIR RELATIONS TO SYMPTOMS OF WORRY AND OBSESSIONAL THOUGHTS

de Bruin, G. O., Rassin, E., & Muris, P. Cognitive self-consciousness and meta-worry and their relations to symptoms of worry and obsessional thoughts. *Psychological Reports,* 2005, 96, 222-224. © Psychological Reports 2005

Abstract

The relation between cognitive self-consciousness and meta-worry, and their connections to symptoms of worry and obsessional thoughts were examined. Fifty-three undergraduate students completed the expanded version of the Cognitive Self-consciousness Scale, the Meta-worry subscale of the Anxious Thought Inventory, the Penn State Worry Questionnaire and the Padua Inventory-Revised. Results showed that cognitive self-consciousness and meta-worry were moderately correlated (r = .57). Further, both constructs were positively associated with symptoms of worry and obsessional thoughts. When controlling for cognitive self-consciousness, meta-worry remained significantly correlated to both types of symptoms. Yet, when controlling for meta-worry, correlations between cognitive self-consciousness and symptoms of worry and obsessional thoughts clearly attuned and were no longer significant. These findings suggest that meta-worry is more important for understanding excessive, intrusive thought patterns than the mere tendency to monitor one's thoughts.

Introduction

Several research lines have focused on explaining excessive, intrusive thought patterns such as obsessions and worry. For example, Janeck, Calamari, Riemann, and Heffelfinger (2003) found evidence to suggest that cognitive self-consciousness, which refers to the tendency to monitor one's thoughts (see also Cartwright-Hatton & Wells, 1997), plays a role in the pathogenesis of obsessive-compulsive disorder. Briefly, their study showed that cognitive self-consciousness differentiated patients with obsessive-compulsive disorder from other anxious patients. Wells (1995) described the seemingly related concept of meta-worry, which can be defined as negative appraisals of worry activity, and linked this concept to generalized anxiety disorder. Indeed, evidence was obtained showing that patients with generalized anxiety disorder display higher levels of this cognitive factor than patients with social phobia or panic disorder (Wells & Carter, 2001). Although cognitive self-consciousness and meta-worry have been treated as separate constructs, it can be argued that there are similarities between both phenomena. For example, it seems plausible that meta-worry is initiated after a person has monitored his/her thoughts. Further, it is also likely that meta-worry leads to an increase of the awareness of thoughts. Thus, it may well be that cognitive self-consciousness and meta-worry are closely allied constructs. Furthermore, it is unclear whether cognitive self-consciousness is exclusively related to obsessional symptomatology, and whether meta-worry is uniquely linked to worrying.

The present study was undertaken to assess the association between cognitive self-consciousness and meta-worry, and to examine the specificity of both constructs for explaining obsessional thoughts and worry symptoms. It was hypothesized that cognitive self-consciousness and meta-worry are at least to some extent related. Further, in keeping with the literature, it was predicted that cognitive self-consciousness would be more clearly linked to obsessions, whereas meta-worry would be more convincingly associated with worrying.

Method

A group of 53 undergraduates (10 males, 43 females; *M* = 20.0 years, *SD* = 1.56) completed the expanded version of Cognitive Self-consciousness Scale (Janeck et al., 2003) which measures the tendency to monitor one's thoughts, a subscale of the Anxious Thoughts Inventory to index meta-worry (Wells, 1994), and the Penn State Worry Questionnaire (Meyer, Miller, Metzger, & Borkovec, 1990) and the Padua Inventory-Revised (van Oppen, Hoekstra, & Emmelkamp, 1995), respectively measuring symptoms of worry and obsessional thoughts. The psychometric properties of these measures have proven to be highly satisfactory, and this was supported by good internal consistencies of various scales in the present study (i.e., all Cronbach's alphas were between .81 and .93).

Results and Discussion

Mean scores were 34.19 (*SD* = 9.27) on the Cognitive Self-consciousness Scale, 10.54 (*SD* = 3.21) on the Meta-worry subscale of the Anxious Thought Inventory, 47.43 (*SD* = 9.79) on the Penn State Worry Questionnaire, and 33.75 (*SD* = 19.22) on the Padua Inventory-

Revised. Table 1 displays correlations between the scales for measuring cognitive self-consciousness and meta-worry, on the one hand, and symptoms of worry and obsessional thoughts, on the other. As can be seen, all correlations were positive and significant, which essentially means that the constructs of cognitive self-consciousness and meta-worry were both related to symptoms of worry as well as obsessional thoughts. Scores on the Cognitive Self-consciousness Scale and the Meta-worry subscale of the Anxious Thought Inventory were also significantly correlated (r = .57, p < .001, two-tailed).

Table 1. Correlations between scales measuring cognitive self-consciousness and meta-worry on the one hand, and scales assessing symptoms of worry and obsessional thoughts, on the other (N = 53).

	Penn State Worry Questionnaire	Padua Inventory-Revised
Cognitive Self-consciousness Scale	.53**	.33*
Anxious Thought Inventory-Meta-worry	.59**	.40**

* p < .05, ** p < .01 (two-tailed)

To assess the specificity of cognitive self-consciousness and meta-worry for symptoms of worry and obsessional thoughts, partial correlations were computed. Results showed that when controlling for levels of meta-worry, scores on the Cognitive Self-consciousness Scale were no longer substantially correlated with scores on the Penn State Worry Questionnaire and the Padua Inventory-Revised (partial r's being .26 and .10, p's > .05, two-tailed). However, scores on the Meta-worry subscale remained significantly correlated to Penn State Worry Questionnaire and Padua Inventory-Revised scores, even after the influence of cognitive self-consciousness was partialled out (partial r's being .42 and .30, respectively, p's < .05, two-tailed).

Altogether, these findings indicate that cognitive self-consciousness and meta-worry are moderately correlated. Furthermore, examination of the specificity of cognitive self-consciousness and meta-worry for explaining psychopathological thought processes suggested that meta-worry appears to play a more prominent role. As such, the results suggest that meta-worry might be a harmful, that is, "toxic" element of being aware of one's thoughts, and at least warrant the hypothesis that meta-worry might be more important for understanding excessive, intrusive thought patterns than cognitive self-consciousness. However, it should be borne in mind that the current study was correlational in nature and relied on a small, non-clinical sample that predominantly contained females. Thus, it remains to be seen to what extent these findings generalize to clinical samples and actually have repercussions for current models on the pathogenesis of excessive, intrusive thought processes.

References

Cartwright-Hatton, S., & Wells, A. (1997) Beliefs about worry and intrusions: the Meta-Cognitions Questionnaire and its correlates. *Journal of Anxiety Disorders, 11*, 279-296.

Janeck, A. S., Calamari, J. E., Riemann, B. C., & Heffelfinger, S. K. (2003) Too much thinking about thinking? Metacognitive differences in obsessive-compulsive disorder. *Journal of Anxiety Disorders, 17*, 181-195.

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990) Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28*, 487-495.

van Oppen, P., Hoekstra, R. J., & Emmelkamp, P. M. G. (1995) The structure of obsessive-compulsive symptoms. *Behaviour Research and Therapy, 33*, 15-23.

Wells, A. (1994) A multi-dimensional measure of worry: development and preliminary validation of the Anxious Thoughts Inventory. *Anxiety, Stress and Coping: An International Journal, 6*, 289-299.

Wells, A. (1995) Meta-cognition and worry: cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy, 23*, 301-320.

Wells, A., & Carter, K. (2001) Further tests of a cognitive model of generalized anxiety disorder: Metacognitions and worry in GAD, panic disorder, social phobia, depression, and nonpatients. *Behavior Therapy, 32*, 85-102.

4.2

ARE THERE SPECIFIC META-COGNITIONS ASSOCIATED WITH VULNERABILITY TO SYMPTOMS OF WORRY AND OBSESSIONAL THOUGHTS?

de Bruin, G. O., Rassin, E., & Muris, P. (in press*).* Are there specific meta-cognitions associated with vulnerability to symptoms of worry and obsessional thoughts? *Personality and Individual Differences*.

Abstract

This study focuses on a variety of meta-cognitions in a sample of non-clinical subjects. More specifically, the relations between cognitive self-consciousness (i.e., the awareness of one's own thoughts), meta-worry (i.e., the negative appraisal of intrusive thoughts), and thought suppression (i.e., conscious attempts to avoid unwanted thoughts) were examined. In addition, associations between these three meta-cognitive constructs and symptoms of worry and obsessional thoughts were investigated. Results showed that meta-cognitive variables were positively related. Nevertheless, evidence was found to indicate that the strongly resembling concepts of cognitive self-consciousness and meta-worry should be viewed as distinct factors. Further, meta-worry correlated (significantly) stronger with symptoms of worry and obsessional thoughts than did the other two cognitive constructs. Finally, meta-worry and thought suppression were unique predictors of symptoms of worry, whereas cognitive self-consciousness and meta-worry were unique predictors of obsessional thoughts. The implications of these findings are briefly discussed.

Introduction

Recent research has focused on meta-cognition as a possible explanation for two forms of excessive intrusive thoughts, namely worry and obsessions. Meta-cognition can be defined as "stable knowledge or beliefs about one's cognitive system and knowledge about factors that affect the functioning of the system; the regulation and awareness of the current state of cognition, and appraisal of the significance of thoughts and memories" (p. 302; Wells, 1995).

Wells (1995) developed a cognitive model that is applicable to worry and generalized anxiety disorder (GAD). He argues that not the content of worry but in particular meta-cognitive dimensions and the process of worry are involved in the development of problematic worrying. Wells (1994) constructed the Anxious Thoughts Inventory (AnTI) to distinguish two types of worry. Type 1 worry refers to the content of worry (e.g., worry about one's health or social functioning), and is initiated because of positive beliefs about the function and effects of worry as a problem solving or coping strategy. Type 2 worry covers "worrying about worry, appraising negative thoughts as uncontrollable, and reflecting a desire to control thoughts" (p. 304; Wells, 1995). According to Wells' (1995) model, worry becomes problematic when Type 1 worry becomes "overactive" and negative thoughts about ongoing worrying, that is, Type 2 worry (meta-worry), occur. A study of non-clinical participants has indeed demonstrated that problematic worrying is related to meta-worry, and that this link was independent of trait anxiety and content (type 1) worry (Wells & Carter, 1999). Furthermore, research with clinically referred patients has demonstrated that meta-worry differentiates patients with panic disorder, social phobia and depression from patients with GAD, with the latter showing significantly higher levels of meta-worry (Wells & Carter, 2001).

Following this line of research, Cartwright-Hatton and Wells (1997) constructed a self-report measure tapping several meta-cognitive beliefs and processes that are implicated in obsessive thinking. This Meta-Cognitions Questionnaire (MCQ) consists of five dimensions, namely positive beliefs about worry, negative beliefs about the controllability of thoughts and corresponding danger, cognitive confidence, negative beliefs about thoughts in general including themes of superstition, punishment and responsibility, and cognitive self-consciousness. Interestingly, only the Cognitive Self-Consciousness (CSC) scale, referring to the excessive tendency to be aware of, and monitor one's thinking, differentiated patients with obsessive-compulsive disorder (OCD) from other anxiety disorder patients with the former group showing significantly higher levels of cognitive self-consciousness (Cartwright-Hatton & Wells, 1997). Janeck, Calamari, Riemann, and Heffelfinger (2003) replicated this finding, using an expanded CSC scale. Again, cognitive self-consciousness was elevated in OCD patients as compared to other anxiety disorder patients. These researchers concluded that "the excessive tendency to reflect upon one's cognitive processes may increase opportunities for negative appraisals of intrusive thoughts, foster over-importance of thought beliefs, and increases the likelihood of developing OCD" (p. 180). Likewise, Cohen and Calamari (2004) have postulated that cognitive self-consciousness appears to be distinguishable from the (negative) appraisal of intrusive thoughts, and can be linked to the process of turning normal intrusions into abnormal obsessions.

A third important concept that is closely associated with meta-cognition is thought suppression, which can be defined as conscious attempts to avoid (unwanted) thoughts (Wegner, Schneider, Carter, & White, 1987). The definition of meta-cognition implies that meta-cognition refers to awareness and regulation of current cognition states (Wells, 1995), and as such it can be argued that thought suppression also is a variant of meta-cognition. Furthermore, the concept of meta-cognition has been repeatedly associated with the loss of cognitive control (see Wells, 1995). Meta-worry in particular "could reflect a reciprocally incremental relationship between unwanted cognition and cognitive-behavioural attempts to suppress such cognition" (p. 297; Wells, 1994). Moreover, it is conceivable that heightened levels of cognitive self-consciousness and negative appraisal of one's own thoughts (i.e., meta-worry) are associated with frequent efforts of thought suppression. Purdon (2004) already stated that suppression is driven by negative thought appraisal. Additionally, the counterproductive effect of thought suppression has been perceived as a possible factor in the etiology and maintenance of both GAD and OCD (Purdon, 1999; Wegner, 1989).

In conclusion, current theoretical accounts suggest that meta-cognitive variables such as meta-worry and cognitive self-consciousness are involved in OCD and GAD. In a previous study by De Bruin, Rassin, and Muris (2005), the relation between meta-worry and cognitive self-consciousness as well as their link to symptoms of worry and obsessional thoughts was examined in a small sample of 54 non-clinical subjects. A correlation of .57 was found between meta-worry and cognitive self-consciousness providing tentative evidence that these meta-cognitive variables are closely allied constructs. Furthermore, the results indicated that cognitive self-consciousness and meta-worry were both positively related to pathological worry and obsessional thoughts. However, when controlling for meta-worry, cognitive self-consciousness was no longer significantly associated with symptoms of worry or obsessional thoughts. In contrast, meta-worry remained substantially linked to worry symptoms and obsessional thoughts after the influence of cognitive self-consciousness was partialled out. These results seem to indicate that meta-worry is more important for the understanding of excessive intrusive thought patterns than cognitive self-consciousness.

The present study was an extension of the previous study by de Bruin et al. (2005) and examined three meta-cognitive factors that are thought to be relevant for the development of worry and obsessional thoughts, namely cognitive self-consciousness, meta-worry, and thought suppression. The relationships among these three meta-cognitive constructs and their specific links to symptoms of obsessive thoughts and worry were examined in a large sample of non-clinical subjects. More precisely, the following issues were addressed. To begin with, correlations among meta-worry, cognitive self-consciousness, and thought suppression were computed. In addition, to gain more insight in the degree of overlap between cognitive self-consciousness and meta-worry, a joint factor analysis was conducted on a data set including both constructs. Further, in replication of De Bruin et al. (2005), it was examined whether the three meta-cognitive constructs show differential relationships to intrusive thought patterns. Finally, it was explored to what extent cognitive self-consciousness, meta-worry and thought suppression each make a unique

contribution to symptoms of intrusive thoughts. It was hypothesized that the meta-cognitive constructs would all be positively correlated. Furthermore, in spite of the expected positive link between meta-worry and cognitive self-consciousness, it was predicted that the joint factor analysis would identify them as two separate constructs. Lastly, it was hypothesized that all meta-cognitive constructs would be positively linked to symptoms of worry and obsessional thoughts. However, based on earlier work (de Bruin et al. 2005), it was expected that meta-worry would be most substantially linked to symptoms of both worry and obsessional thoughts, and would make the largest unique contribution to both patterns of intrusive thought.

Method

Participants and procedure

All participants were recruited via the Internet. On several Dutch sites, advertisements were placed inviting people to participate in a brief online study. Participants either had the opportunity to fill out a small set of measures that only contained the CSC scale and the meta-worry questionnaire, or an extended set which also included scales for measuring thought suppression and symptoms of excessive intrusive thoughts. Two-hundred-and-eleven participants (52 men and 159 women; mean age = 37.33 years, *SD* = 12.05, range 15-72) completed the small set of measures; these data were used for the factor analysis. One-hundred-and-thirty-six participants (30 men, 106 women; mean age = 36.35 years, *SD* = 12.09, range 17-71) filled out the extended set and these data could be employed for studying the relations among the three cognitive constructs (i.e., meta-worry, cognitive self-consciousness, and thought suppression), and their links to symptoms of excessive intrusive thoughts. No exact information on the background of the participants was available, although it should be mentioned that none of them indicated that they (had) received psychological treatment for mental disorders.

Measures

The Cognitive Self-Consciousness Scale (CSC; Janeck et al., 2003) measures the tendency to be aware of and monitor one's thinking. The CSC that was employed in the present study consisted of 11 items (e.g., "I monitor my thoughts") that had to be answered on a 4-point scale (1 = *disagree*, 4 = *strongly agree*). Originally, the CSC was a 7-item subscale of the Meta Cognitions Questionnaire (see Cartwright-Hatton & Wells, 1997). Janeck et al. (2003) expanded the subscale by adding 7 items derived from the Pain Vigilance and Awareness Questionnaire (McCracken, 1997). They found high internal consistency (α = .94) and good incremental validity for their expanded version. However, the results of a recent psychometric analysis by Cohen and Calamari (2004) have indicated that it is preferable to exclude the three reversed items as these clearly have a negative impact on the reliability of the scale. We followed this suggestion and thus employed a shortened version of the CSC (CSC-S).

The Anxious Thought Inventory (AnTI; Wells, 1994) measures three types of worry: two content-related worry dimensions (i.e., worry about social affairs and worry about

physical health) and one process worry dimension (i.e., meta-worry). Only this latter subscale was included in the present study. As mentioned earlier, meta-worry can be defined as the negative appraisal of worrying itself. The meta-worry subscale of the AnTI consists of 7 items (e.g., "I worry that I cannot control my thoughts as well as I would like"), which are answered on a 4-point scale (1 = *almost never*, 4 = *almost always*). Previous research has shown that the meta-worry subscale is reliable in terms of internal consistency (α = .75) and test-retest stability (the correlation over a 6-week period was .77; Wells, 1994).

The White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994) consists of 15 items that have to be answered on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). The Dutch translation of the WBSI was demonstrated to possess good reliability and validity (Muris, Merckelbach, & Horselenberg, 1996). However, it has been noted that the WBSI does not only measure thought suppression, but also addresses the experience of intrusive thoughts (see Rassin, 2003). Several authors suggested a two-factor structure for the WBSI, with one factor representing "real" thought suppression and the other referring to the experience of intrusive thoughts (see Höping & de Jong-Meyer, 2003; Rassin, 2003). As the factor solutions found in these two studies were not completely identical, we decided to construe a "pure" thought suppression index that only contained items that consistently loaded on the suppression factor in both studies (i.e., original WBSI-items 1, 10, 11, 13 and 14).

The Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) measures trait-like worry. The PSWQ consists of 16 items obtaining information about the frequency and intensity of worrying (e.g., "My worries overwhelm me"). Items are answered on a 5-point scale (1 = *not at all typical for me*; 5 = *very typical of me*). Item ratings are summed to yield a total worry score, with a higher score indicating a higher level of worry. The PSWQ has good internal consistency (with α's between .86 and .94; see Davey, 1993), test-retest reliability (the correlation over a 8-10 week period was .92), and satisfactory convergent and discriminant validity (Meyer et al., 1990).

The Padua Inventory-Revised (PI-R; van Oppen, Hoekstra, & Emmelkamp, 1995) is an abbreviated version of the Padua Inventory (Sanavio, 1988) and consists of 41 items (e.g., "I tend to keep on checking things more often than necessary", "Before I go to sleep I have to do certain things in a certain order", and "I feel my hands are dirty when I touch money") that are all indicative of obsessive-compulsive symptoms. Items are rated on a 5-point scale (0 = *not at all*, 4 = *very much*). A total PI-R score can be obtained, with a higher score indicating higher levels of obsessive-compulsive symptoms. The reliability and validity of the PI-R is satisfactory (van Oppen et al., 1995).

Results

General findings

Mean scores (standard deviations) and Cronbach *α* values for the questionnaires that were used in this study are shown in Table 1. It should be mentioned that scores on the PI-R, PSWQ, CSC-S, AnTI Meta-worry, and WBSI suppression were well in line with those obtained in previous studies of non-clinical subjects (see respectively van Oppen et al., 1995; Robichaud, Dugas, & Conway, 2003; Cohen & Calamari, 2004; Wells, 1994; McKay & Greisberg, 2002). Further, inspection of the data revealed that the kurtosis and skewness of all scales was within acceptable limits. The reliability of the various scales was satisfactory, with internal consistency coefficients ranging between .86 and .95.

Furthermore, a gender difference emerged on the PSWQ, with women reporting significantly higher levels of worry than men (M = 52.14, SD = 11.80 versus M = 44.07, SD = 14.34, respectively; $t(134) = 9.92$, $p < .01$), a finding which is in keeping with earlier research (see Robichaud et al., 2003). No effects of age were found. Thus, age and gender effects were rather small, and as it can be assumed that the relations between the three meta-cognitive constructs and intrusive thought patterns are highly similar for both genders and across various ages, these demographic variables were controlled for in further analyses rather than focusing on them.

Table 1. Mean scores (and standard deviations) and Cronbach's *α*'s for the various questionnaires.

	M (*SD*)	*α*
PI-R	30.04 (18.08)	.93
PSWQ	50.36 (12.80)	.95
CSC-S	25.70 (7.35)	.92
AnTI Meta-worry	11.84 (4.17)	.86
WBSI Suppression	16.92 (4.08)	.87

Note. N = 136. PI-R: Padua Inventory-Revised, PSWQ: Penn State Worry Questionnaire, CSC-S: Cognitive Self-Consciousness-Shortened version, AnTI: Anxious Thought Inventory, WBSI: White Bear Suppression Inventory.

Correlations among the three meta-cognitive constructs

As expected, the correlation between CSC-S and AnTI Meta-worry scores was substantial and significant: r = .57 ($p < .001$). The correlations between WBSI-suppression and AnTI Meta-worry (r = .60, $p < .001$) and between WBSI-suppression and CSC-S scores (r = .52, p < .001) were of a similar magnitude.

Factor analysis of cognitive self-consciousness and meta-worry items

A principal components factor analysis with an Oblimin rotation (as correlated factors were hypothesized) was carried out on the 11 items of the CSC-S and the 7 items of the AnTI Meta-worry scale. Four factors were found with eigenvalues > 1.00 (i.e., 7.32, 2.16, 1.06, 1.01). However, the scree test indicated that inspection of the two-factor solution was justified. This solution accounted for 52.68% of the variance. The factor loadings are presented in Table 2. In general, AnTI Meta-worry items loaded most convincingly on the

first factor, whereas most CSC-S items loaded more clearly on the second factor. An exception to this rule was CSC-S item 11 ("I become preoccupied with my thoughts"), which loaded more convincingly on the "meta-worry" than on the "cognitive self-consciousness" factor. Note also that a number of other CSC-items (i.e., items 1, 7, 8, 9, 10) had substantial secondary loadings.

Table 2. Factor loadings, obtained with an exploratory factor analysis (Oblimin rotation) of the CSC-S and AnTI Meta-worry items.

		Factor 1	Factor 2
AnTI 22	I worry that I cannot control my thoughts as well as I would like.	.86	.37
AnTI 21	I think that I am missing out on things in life because I worry too much.	.85	.38
AnTI 20	I have difficulty clearing my mind of repetitive thoughts.	.78	.35
AnTI 19	Unpleasant thoughts enter my mind against my will.	.70	.26
AnTI 17	I take disappointments so keenly that I can't put them out of my mind.	.69	.24
CSC-S 11	I become preoccupied with my thoughts.	.67	.64
AnTI 16	When looking to my future I give more thought to the negative things than the positive things that might happen to me.	.62	.31
AnTI 18	I have repetitive thoughts such as counting or repeating phrases.	.54	.15
CSC-S 6	I constantly examine my thoughts.	.39	.82
CSC-S 5	I pay close attention to the way my mind works.	.25	.80
CSC-S 7	I am very sensitive to the way my mind works.	.61	.71
CSC-S 3	I monitor my thoughts.	.18	.69
CSC-S 8	I focus on my thoughts.	.43	.68
CSC-S 4	I am constantly aware of my thinking.	.23	.66
CSC-S 9	I notice my thoughts even if I am busy with another activity.	.56	.66
CSC-S 1	I think a lot about my thoughts.	.53	.63
CSC-S 2	I am aware of the way my mind works, when I am working on a problem.	.14	.63
CSC-S 10	I seem to be more conscious of thinking than others.	.47	.54

Note. N = 211. CSC-S: Cognitive Self-Consciousness-Shortened version, AnTI: Anxious Thought Inventory.

Correlations between meta-cognitive constructs and symptoms of intrusive thoughts

To examine the links between the three meta-cognitive constructs and symptoms of worry and obsessional thoughts, correlations were computed (see Table 3). As can be seen, measures of cognitive self-consciousness, meta-worry and thought suppression were all positively and significantly correlated to measures of worry and obsessional thoughts.

Tests for comparing correlation coefficients (Meng, Rosenthal, & Rubin, 1992) showed that the correlation between WBSI-suppression and worry was significantly greater than the correlation between WBSI-suppression and obsessional thoughts (Z = 2.27, p < .05). For cognitive self-consciousness and meta-worry, such a differential pattern did not emerge: these cognitive constructs were equally related to both types of intrusive thoughts.

Because PI-R and PSWQ were significantly correlated (r = .43; p < .001), partial correlations were also computed (see right columns of Table 3). These partial correlations yielded highly similar results. That is, all meta-cognitive factors were significantly correlated with worry symptoms and obsessional thoughts. Further, after controlling for the overlap between PI-R and PSWQ, again the correlation between WBSI-suppression and worry was significantly greater than the correlation between WBSI-suppression and obsessional thoughts (Z = 2.58, p < .01).

Next, it was examined whether obsessional thoughts and symptoms of worry showed differential relationships to the three meta-cognitive constructs. Results demonstrated that the link between obsessional thoughts and meta-worry was significantly stronger than the relation between obsessional thoughts and thought suppression (Z = 4.96, p < .01). Furthermore, worry symptoms and meta-worry were significantly stronger associated with each other than worry symptoms and cognitive self-consciousness (Z = 3.43, p < .01). Other correlations did not differ significantly.

Table 3. Correlations between CSC-S, AnTI Meta-worry, and WBSI-suppression on the one hand, and obsessive thoughts and symptoms of worry on the other hand.

	PI-R	PSWQ	PI-R while holding PSWQ constant	PSWQ while holding PI-R constant
CSC-S	$.48_{a,b}$	$.50_{a,d}$	.33	.37
AnTI Meta-worry	$.60_{b}$	$.70_{b,c}$	.46	.61
WBSI Suppression	$.43_{a}$	$.60_{c,d}$	.23	.51

Note. N = 136. Correlations within the same row or column that do not share similar subscripts differ significantly at p < .05. PI-R: Padua Inventory-Revised, PSWQ: Penn State Worry Questionnaire, CSC-S: Cognitive Self-Consciousness-Shortened version, AnTI: Anxious Thought Inventory, WBSI: White Bear Suppression Inventory. All correlations were significant at p < .001.

Unique contributions of meta-cognitive constructs to worry and obsessional thoughts

To examine to what extent cognitive self-consciousness, meta-worry, and thought suppression make a unique contribution to symptoms of worry and obsessional thoughts, a series of regression analyses were carried out (see Table 4). As mentioned earlier, gender and age were entered on the first step of the analyses in order to control for these demographic variables. On the second step, either symptoms of worry or obsessional thoughts were entered to control for their mutual influence. On the third and final step, cognitive self-consciousness, meta-worry and thought suppression were entered to examine their unique contribution to both types of intrusive thoughts (i.e., worry and obsessional thoughts). In the regression analysis predicting symptoms of worry, gender made a significant contribution on step 1 (R^2 = .07, p < .05). On step 2, obsessional thoughts also made a significant contribution to worry (ΔR^2 = .17, p < .001). Finally, of the meta-cognitive variables that were entered on step 3, meta-worry and thought suppression were found to make a significant contribution to symptoms of worry (ΔR^2 = .35, p < .001). In the final regression equation, all variables together explained 58% of the variance. When predicting obsessional thoughts, gender and age (step 1) did not account for a significant proportion of

the variance. However, symptoms of worry (step 2; ΔR^2 = .18, p < .001), cognitive self-consciousness and meta-worry (step 3; ΔR^2 = .20, p < .001) did explain significant proportions of the variance. In total, variables explained 39% of the variance in obsessional thoughts.

Table 4. Regression analyses predicting obsessional thoughts and symptoms of worry.

Dependent	Step	Predictors	*β*	*t*	*p*
PSWQ	1	Gender	.26**	3.12	.00
		Age	.01	.11	.92
	2	PIR	.41**	5.35	.00
	3	CSC-S	.11	1.50	.14
		AnTI Meta-worry	.50**	5.92	.00
		WBSI Suppression	.23**	3.10	.00
PIR	1	Gender	.10	1.11	.27
		Age	-.03	-.30	.76
	2	PSWQ	.44**	5.35	.00
	3	CSC-S	.20*	2.15	.03
		AnTI Meta-worry	.48**	4.42	.00
		WBSI Suppression	.06	.67	.50

Note. N = 136. PI-R: Padua Inventory-Revised, PSWQ: Penn State Worry Questionnaire, CSC-S: Cognitive Self-Consciousness-Shortened version, AnTI: Anxious Thought Inventory, WBSI: White Bear Suppression Inventory. * p < .05, ** p < .005

Discussion

The present study investigated the relations between three meta-cognitive factors (i.e., cognitive self-consciousness, meta-worry, and thought suppression) and symptoms of worry and obsessional thoughts in a sample of non-clinical individuals. The main results of the study can be catalogued as follows. Firstly, the meta-cognitive constructs were all positively related with each other, with *r*'s ranging between .52 and .60. To gain further insight in the degree of overlap between cognitive self-consciousness and meta-worry, a joint factor analysis was performed on the items of the CSC-S and AnTI Meta-worry scales. Results showed that the items of both constructs generally loaded on separate factors, in spite of the fact that some items had substantial secondary loadings. This seems to warrant the conclusion that cognitive self-consciousness and meta-worry are related but nevertheless distinct meta-cognitive constructs. Thirdly, cognitive self-consciousness, meta-worry, and thought suppression were all significantly related to symptoms of worry and obsessional thoughts. Nevertheless, a differential pattern emerged in the correlations between the three meta-cognitive constructs and indices of intrusive thought patterns. That is, the correlation between thought suppression and worry was significantly greater than the correlation between thought suppression and obsessional thoughts. Further and most importantly, meta-worry correlated (significantly) stronger with symptoms of worry and obsessional thoughts than did the other two meta-cognitive constructs (see also de Bruin et al., 2005). Finally, the results of the regression analyses indicated that the three meta-cognitive

constructs each had their own influence on intrusive thought patterns. That is, meta-worry and thought suppression were unique predictors of symptoms of worry, whereas cognitive self-consciousness and meta-worry were unique predictors of obsessional thoughts. In sum, in this non-clinical sample, meta-worry appeared to be consistently linked to various types of intrusive thought patterns, whereas thought suppression and cognitive self-consciousness only seem relevant when explaining a specific type of intrusive thoughts (respectively worry and obsessional thought).

Three comments are in order with respect to these findings. The first comment is concerned with the results of the regression analyses that cognitive self-consciousness was relevant in explaining obsessional thoughts. It is not clear to what extent this variable is capable of predicting a broad range of obsessional thoughts. A study of Wells and Papageorgiou (1998) showed that cognitive self-consciousness only predicted dressing and grooming compulsions but no other obsessional symptoms after controlling for the other subscales of the MCQ. Thus, the exact influence of cognitive self-consciousness on obsessional phenomena in non-clinical subjects remains largely unknown and should be investigated in further research. The second comment is concerned with the fact that meta-worry was related to symptoms of both worry and obsessional thoughts. As Wells (2005) stated, the meta-worry subscale of the AnTI concentrates on the appraisal of thoughts as being uncontrollable. The current data seem to suggest that this sense of uncontrollability represents the more toxic element of meta-cognition, and as such seems most relevant for understanding various types of intrusive thought patterns. Lastly, unexpectedly, thought suppression did not contribute to obsessional thoughts. This is in contrast with previous correlational research, which has demonstrated that thought suppression was significantly related to OCD symptoms (Purdon, 2004). However, it should be mentioned that there is one important methodological difference between the present study and the research described by Purdon (2004). That is, whereas the current study employed a pure thought suppression index, previous research used the total WBSI score that, as mentioned earlier, also includes intrusive thoughts, and as such may have inflated the relationship to obsessional thoughts.

It should be acknowledged that the present study suffers from various limitations. A first shortcoming is the correlational design of this study. Such an approach does not make it possible to draw conclusions about cause-effect relations. Thus, it may well be that meta-cognitive constructs such as cognitive self-consciousness, meta-worry, and thought suppression result in intrusive thought patterns, but it is also possible that these meta-cognitive factors are just a by-product of worry and obsessional thoughts. The second limitation is concerned with the fact that the study relied on non-clinical subjects. It remains to be seen whether these findings can be generalized to clinical populations including patients with OCD and GAD. Nevertheless, understanding the relations between meta-cognitions and worry and obsessional thoughts in a normal population can also be considered as highly valuable because various authors assume that pathological manifestations of intrusive thought patterns lie on one and the same continuum (Mennin, Heimberg, & Turk, 2004; Ruscio, Borkovec, & Ruscio, 2001). The third drawback pertains to

the use of only one instrument for assessing the main constructs that were studied. Further, only self-report instruments were employed. It is clear that a multi-trait, multi-method approach is preferable for this type of research. Nevertheless, the current data provided some interesting information on the links between cognitive constructs such as cognitive self-consciousness, meta-worry, and thought suppression, and intrusive thought patterns. The results suggest that in particular meta-worry plays an important role. In this regard, it is of interest to note that Wells (2005) recently developed a new measure for assessing this cognitive construct, namely the Meta-Worry Questionnaire (MWQ). This questionnaire specifically focuses on the perceived dangers accompanying worry and would be a more valid index of meta-worry than the subscale of the AnTI, which was employed in the current research. Clearly, future studies examining the role of meta-worry on intrusive thought patterns should also include the MWQ.

References

Cartwright-Hatton, S., & Wells, A. (1997). Beliefs about Worry and Intrusions: The Meta-Cognitions Questionnaire and its Correlates. *Journal of Anxiety Disorders, 11*, 279-296.

Cohen, R. J., & Calamari, J. E. (2004). Thought-focused attention and obsessive-compulsive symptoms: an evaluation of cognitive self-consciousness in a nonclinical sample. *Cognitive Therapy and Research, 28*, 457-471.

Davey, G. C. (1993). A comparison of three worry questionnaires. *Behaviour Research and Therapy, 31*, 51-56.

de Bruin, G. O., Rassin, E., & Muris, P. (2005). Cognitive self-consciousness and meta-worry and their relations to symptoms of worry and obsessional thoughts. *Psychological Reports, 96*, 222-224.

Höping, W., & de Jong-Meyer, R. (2003). Differentiating unwanted intrusive thoughts from thought suppression: what does the White Bear Suppression Inventory measure? *Personality and Individual Differences, 34*, 1049-1055.

Janeck, A. S., Calamari, J. E., Riemann, B. C., & Heffelfinger, S. K. (2003). Too much thinking about thinking?: metacognitive differences in obsessive-compulsive disorder. *Journal of Anxiety Disorders, 17*, 181-195.

McCracken, L. M. (1997). Attention to pain in persons with chronic pain: a behavioral approach. *Behavior Therapy, 28*, 100-114.

McKay, D., & Greisberg, S. (2002). Specificity of measures of thought control. *Journal of Psychology, 136*, 149-160.

Meng, X. l., Rosenthal, R., & Rubin, D. B. (1992). Comparing correlated correlation coefficients. *Psychological Bulletin, 111*, 172-175.

Mennin, D. S., Heimberg, R. G., & Turk, C. L. (2004). Clinical presentation and diagnostic features. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder. Advances in research and practice*. New York: The Guilford Press.

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28*, 487-495.

Muris, P., Merckelbach, H., & Horselenberg, R. (1996). Individual differences in thought suppression. The White Bear Suppression Inventory: Factor structure, reliability, validity and correlates. *Behaviour Research and Therapy, 34*, 501-513.

Purdon, C. (1999). Thought suppression and psychopathology. *Behaviour Research and Therapy, 37*, 1029-1054.

Purdon, C. (2004). Empirical investigations of thought suppression in OCD. *Journal of Behavior Therapy and Experimental Psychiatry, 35*, 121-136.

Rassin, E. (2003). The White Bear Suppression Inventory (WBSI) Focuses on Failing Suppression Attempts. *European Journal of Personality, 17*, 285-298.

Robichaud, M., Dugas, M. J., & Conway, M. (2003). Gender differences in worry and associated cognitive-behavioral variables. *Journal of Anxiety Disorders, 17*, 501-516.

Ruscio, A. M., Borkovec, T. D., & Ruscio, J. (2001). A taxometric investigation of the latent structure of worry. *Journal of Abnormal Psychology, 110*, 413-422.

Sanavio, E. (1988). Obsessions and compulsions: The Padua Inventory. *Behaviour Research and Therapy, 26*, 169-177.

van Oppen, P., Hoekstra, R. J., & Emmelkamp, P. M. G. (1995). The structure of obsessive-compulsive symptoms. *Behaviour Research and Therapy, 33*, 15-23.

Wegner, D. M. (1989). *White bears and other unwanted thoughts : suppression, obsession, and the psychology of mental control*. New York: The Guilford press.

Wegner, D. M., Schneider, D. J., Carter, S. R., & White, T. L. (1987). Paradoxical effects of thought suppression. *Journal of Personality and Social Psychology, 53*, 5-13.

Wegner, D. M., & Zanakos, S. (1994). Chronic thought suppression. *Journal of Personality, 62*, 615-640.

Wells, A. (1994). A multi-dimensional measure of worry: Development and preliminary validation of the Anxious Thoughts Inventory. *Anxiety, Stress and Coping: An International Journal, 6*, 289-299.

Wells, A. (1995). Meta-cognition and worry: A cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy, 23*, 301-320.

Wells, A. (2005). The Metacognitive Model of GAD: Assessment of Meta-Worry and Relationship With DSM-IV Generalized Anxiety Disorder. *Cognitive Therapy and Research, 29*, 107-121.

Wells, A., & Carter, K. (1999). Preliminary tests of a cognitive model of generalized anxiety disorder. *Behaviour Research and Therapy, 37*, 585-594.

Wells, A., & Carter, K. (2001). Further tests of a cognitive model of generalized anxiety disorder: Metacognitions and worry in GAD, panic disorder, social phobia, depression, and nonpatients. *Behavior Therapy, 32*, 85-102.

Wells, A., & Papageorgiou, C. (1998). Relationships between worry, obsessive-compulsive symptoms and meta-cognitive beliefs. *Behaviour Research and Therapy, 36*, 899-913.

5 THE PREDICTION OF WORRY IN NON-CLINICAL INDIVIDUALS: THE ROLE OF INTOLERANCE OF UNCERTAINTY, META-WORRY, AND NEUROTICISM

de Bruin, G. O., Rassin, E., & Muris, P. (in press). The prediction of worry in non-clinical individuals: The role of intolerance of uncertainty, meta-worry, and neuroticism. *Journal of Psychopathology and Behavioral Assessment*.

Abstract

The present study investigated the relation between intolerance of uncertainty (IU), meta-worry, and neuroticism on the one hand, and worry on the other hand, in a sample of 105 university students. Two different operationalizations of worry were used: trait worry and idiosyncratic worry. Results showed that IU, meta-worry, and neuroticism correlated significantly with trait worry. Further, IU and meta-worry were strongly related but made a unique and independent contribution to trait worry. Finally, IU and meta-worry could be considered as partial mediators of the relation between neuroticism and trait-like worry. Relations of IU, meta-worry, and neuroticism with idiosyncratic worry were weak or even absent, although neuroticism was associated with idiosyncratic worry when the stressful event was more imminent. In conclusion, not IU and meta-worry, but the general vulnerability factor of neuroticism appeared to possess the most declarative value in relation to both trait and idiosyncratic worry.

Introduction

Worry can be defined as anxious apprehension, which refers to “a future oriented mood state in which one becomes ready or prepared to attempt to cope with upcoming negative events” (p. 158; Brown, O'Leary, & Barlow, 2001; see also Borkovec, Robinson, Pruzinsky, & DePree, 1983). As a result, worrying may help the individual to effectively deal with future problems. However, preoccupation and over-reliance on worry can result in the perpetuation of anxious feelings, instead of reducing them (Davey, Hampton, Farrell, & Davidson, 1992). Furthermore, excessive worrying is the cardinal symptom of generalized anxiety disorder (GAD; see DSM-IV, American Psychiatric Association, 2000), which is a commonly occurring and debilitating mental disorder (Wells, 2004).

Since the influential work of Beck (1976; see also Beck & Clark, 1997) and Ellis (1962) on the role of cognitive processes in anxiety and worry, various researchers have investigated the etiology and development of excessive worry and GAD within the context of cognitive-behavioural theory. One promising and relatively recent research line was initiated by Dugas, Gagnon, Ladouceur, and Freeston (1998) who introduced the cognitive construct of intolerance of uncertainty (IU). IU refers to “a cognitive bias that affects how a person perceives, interprets, and responds to uncertain situations on a cognitive, emotional, and behavioural level” (Dugas, Schwartz, & Francis, 2004; p. 835). A person who is characterized by high levels of IU will more easily perceive a future event as negative and potentially threatening than a person who is low on IU. Consequently, high IU individuals are more likely to display maladaptive cognitive, emotional, and behavioural reactions. Dugas, Buhr, and Ladouceur (2004) assume that IU plays a role in the etiology of worry in both clinical and non-clinical samples. Previous research, which employed the Intolerance of Uncertainty Scale (IUS; Freeston, Rheaume, Letarte, Dugas, & Ladouceur, 1994), has demonstrated that (1) there is a unique link between IU and worry, which is independent of concurrent levels of anxiety and depression (Freeston et al., 1994), (2) IU can distinguish between GAD patients and non-clinical worriers (Ladouceur, Blais, Freeston, & Dugas, 1998), (3) IU discriminates non-clinical subjects displaying GAD symptoms from those who do not display such symptoms (Freeston et al., 1994), and (4) GAD patients display higher levels of IU than patients with other anxiety disorders (Ladouceur et al., 1999).

Another line of research that makes a feasible attempt to explain worry and GAD in terms of cognitive-behavioural theory is the meta-cognitive model of Wells (1995). According to this account, faulty meta-cognitions and meta-cognitive beliefs contribute to emotional problems. Wells (2004) postulates that it is important to distinguish between “type 1” worry, which pertains to worry about external events and internal though non-cognitive events such as physical symptoms, and “type 2” worry, which refers to the conscious appraisal of worry-related processes. More precisely, “Type 2” worry is concerned with dysfunctional beliefs about worry, meta-cognitive appraisal of worry (i.e., worrying about worry or “meta-worry”), and the desire to control these thoughts. In other words, “type 1” worry applies to the content of worrisome thoughts, whereas “type 2” worry is responsible for uncontrollable and problematic worry levels (as seen in GAD). Support for this theory has been obtained in several studies. In a group of non-clinical participants, Wells and Carter (1999) not only

found that problematic worrying was associated with meta-worry, but also demonstrated that this link was independent of trait anxiety and content (type 1) worry. In addition, Wells and Carter (2001) showed that meta-worry can differentiate patients with panic disorder, social phobia and depression from patients with GAD, with the latter showing significantly higher levels of meta-worry.

Two important issues can be raised when considering these cognitive-behavioral accounts of pathological worry. To begin with, the two research lines discussed above can both be considered as promising models for explaining excessive and uncontrollable worry in terms of cognitive constructs. In spite of similarities, so far no study can be found that has examined the connection between IU and meta-worry, and their relative contribution to symptoms of worry and GAD. Further, it may well be the case that IU and meta-worry are both components of one and the same vulnerability factor, namely neuroticism. Neuroticism, also known as negative affectivity, can be described as a stable and general trait dimension, which predisposes to "a broad range of negative moods, cognitions and self-appraisal" (Robichaud & Dugas, 2005; p. 2; see also Clark, Watson, & Mineka, 1994). Craske has postulated that neuroticism refers to the disposition to perceive threat easily and to become quickly aroused (Craske, 1999). As such, it is not surprising that neuroticism is thought to be closely related to worry and GAD (Brown, Chorpita, & Barlow, 1998; Hettema, Prescott, & Kendler, 2004; Keogh, French, & Reidy, 1998; Steptoe & Kearsley, 1990). Although some researchers argue that neuroticism is not an explanatory concept (Ormel, Rosmalen, & Farmer, 2004), Claridge and Davis (2001) conclude that neuroticism can be informative when used in combination with disorder-specific constructs. Furthermore, Taylor (1998) argues that models that attempt to explain the etiology of fear and anxiety, should take general factors (e.g., neuroticism) as well as specific factors (e.g., IU or meta-worry) into consideration.

It may well be the case that IU and meta-worry are cognitive concomitants of neuroticism, and play a mediating role in the link between this general vulnerability factor and symptoms of worry and GAD. Some support for this notion has already been provided by Sexton and colleagues (Sexton, Norton, Walker, & Norton, 2003) who investigated the hierarchical vulnerability structure of fear and anxiety. These researchers found evidence for a model in which neuroticism was associated with more specific vulnerability factors such as IU, which in turn were related to psychopathological symptoms like worry. Results indicated a (partial) mediation model with neuroticism as the predictor variable, IU as mediator, and worry as the criterion variable. Replication of a similar model in a clinical sample yielded comparable results (Norton, Sexton, Walker, & Norton, 2005). In general, the results seemed to be in keeping with a theoretical model in which a common vulnerability factor (i.e., neuroticism) predisposes to a broad range of anxiety problems, while more specific vulnerabilities determine specific anxiety symptoms and hence shape the type of anxiety disorder from which the individual comes to suffer (Taylor, 1998). However, more research examining the role and (relative) contributions of general and specific vulnerability factors to symptoms of worry and GAD is clearly warranted.

With these issues in mind, the present study examined the relations between IU, meta-worry, and neuroticism on the one hand, and worry on the other hand in a sample of non-clinical individuals (i.e., university students). Further, the relative contributions of the cognitive variables IU and meta-worry to worry were investigated. Finally, following the work by Sexton et al. (2003) and Norton et al. (2005), a mediational model was hypothesized in which the link between neuroticism and worry was mediated by the cognitive variables of IU and meta-worry. Two different operationalizations of worry were used to enable a thorough examination of the construct of worry in relation to these variables. First, general trait-like worry symptoms were measured using the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990), and second, a specific scale was developed to investigate whether neuroticism and the cognitive constructs of IU and meta-worry also hold declarative value for idiosyncratic, situation-specific worry (i.e., worry about an important, upcoming examination). The idiosyncratic worry scale was administered on two separate occasions; five weeks before the examination and approximately 2 days prior to this event, which provided an experimental investigation of the cognitive correlates of situation-specific worry when the stressful event was less and more imminent.

Method

Measures

The Intolerance of Uncertainty Scale (IUS; Freeston et al., 1994) consists of 27 items assessing implications of being uncertain, attempts to control the future, and emotional, cognitive, and behavioural reactions to ambiguous situations. Items (e.g., "I always want to know what the future has in store for me") are answered on a five-point scale (1 = *strongly disagree*; 5 = *strongly agree*). The IUS has excellent internal consistency (α = .94), satisfactory test-retest reliability (r = .74), as well as good convergent and discriminant validity (Buhr & Dugas, 2002; Freeston et al., 1994).

The Anxious Thought Inventory (AnTI) was developed by Wells (1994) and measures three types of worry; two content-related worry dimensions (i.e., worry about social affairs and worry about physical health) and one process worry dimension (i.e., meta-worry or the negative appraisal of worry itself). As the present study examined meta-worry, only this latter subscale was included. The meta-worry subscale of the AnTI (AnTI-MW) consists of 7 items (e.g., "I worry that I cannot control my thoughts as well as I would like"), which are answered on a 4-point scale (1 = *almost never*, 4 = *almost always*). Previous research has demonstrated that the meta-worry subscale of the AnTI is reliable in terms of internal consistency (α = .75) and test-retest stability (the correlation over a 6-week period was .77; Wells, 1994).

The general vulnerability factor of neuroticism was measured by means of a subscale of the Eysenck Personality Questionnaire (EPQ; Eysenck, Eysenck, & Barrett, 1985). Twelve items (e.g., "Does your mood often go up and down?") are answered on a dichotomous (*yes* or *no*) scale. Yes-responses are summed to produce a total score, with higher scores indicating higher levels of neuroticism. The EPQ-N scale has good internal consistency (α = .84 for men, α = .80 for women) (Eysenck et al., 1985).

The Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990) was used to measure trait-like worry. The PSWQ consists of 16 items for measuring the frequency and intensity of worrying (e.g., "My worries overwhelm me"). Items are answered on a 5-point scale (1 = *not at all typical for me*; 5 = *very typical of me*). Item ratings are summed to yield a total worry score, with higher scores indicating higher levels of worry. The PSWQ has good internal consistency (with α's between .86 and .94; see Davey, 1993), test-retest reliability (the correlation over a 8-10 week period was .92), and satisfactory convergent and discriminant validity (Meyer et al., 1990).

The Worry about the Test Questionnaire (WTQ) was developed for the purpose of the present study in order to measure idiosyncratic worry thoughts about an upcoming graded exam. The WTQ items were derived from the PSWQ, but were modified in such a way that they were applicable to this specific situation. Six items of the original PSWQ were eliminated because they were formulated too strongly to apply to the situation at hand (e.g., "My worries overwhelm me"), displayed considerable overlap with another item (e.g., "I am always worrying about something" and "I never worry about anything"), or were items that explicitly measured trait worry ("I worry all the time"). The 10 WTQ items were answered on a 5-point scale (1 = *not at all typical for me*; 5 = *very typical of me*; see Appendix), and a total score was obtained by summing the ratings on all items. Some evidence for the psychometric qualities of the WTQ has been obtained. To begin with, WTQ scores are convincingly related to ratings on the Test Anxiety Inventory (TAI; see Spielberger, 1980), a scale that measures anxiety proneness in test situations (r = .68, p < .01). Further, the Cronbach's alphas of the WTQ were also satisfactory (.86 and .88 on occasion 1 and 2, respectively). All in all, the WTQ appeared to measure the students' idiosyncratic worry thoughts about an examination.

All instruments were administered in Dutch. If available, official, copyrighted translations were used (i.e., EPQ) with permission. For the other non-Dutch scales, the English instruments as fully described in the original articles, were translated following a back-translation approach. It is important to note that the Dutch versions of the IUS, AnTI, EPQ-N and PSWQ all have been reported to possess satisfactory psychometric properties (see respectively deBruin, Rassin, van der Heiden, & Muris, submitted; deBruin, Rassin, & Muris, 2005; deBruin, Muris, & Rassin, 2006; Sanderman, Arrindell, Ranchor, Eysenck, & Eysenck, 1995; Van Rijsoort, Emmelkamp, & Vervaeke, 1999).

Participants and Procedure

One-hundred-and-five students of Erasmus University Rotterdam, the Netherlands, participated in this study. Students participated voluntary and received course credits for participation. The students gave informed consent and the Ethical Committee of Psychology approved the study. The 6 self-report measures, including the WTQ (i.e., WTQ1), were filled in five weeks before a final examination of the year. This examination tested students' study progress of the past year, and partly determined whether students could proceed to the next academic year. The majority of the students (76.2%) reported that they felt clear pressure to pass the exam. Of the 105 students, 98 students (17 men and 81 women; mean age = 20.55

years, *SD* = 2.11, range = 18-29) completed the WTQ for a second time (i.e., WTQ2), on average 1.43 days before the examination.

Results

General findings

Before addressing the main research issues of the present study, a number of general findings are discussed. First, mean scores on the IUS, the meta-worry scale of the AnTI, the EPQ-N, and PSWQ were all well in keeping with previous data obtained in non-clinical participants and hence underline the normative character of the present sample (e.g., Sexton et al., 2003; Wells, 1994; Muris, Roelofs, Rassin, Franken, & Mayer, 2005; Dugas et al., 2004). Second, the reliability of all questionnaires was satisfactory, with internal consistency coefficients ranging between .80 and .92 (see Table 1). Third, gender differences were evaluated by means of independent sample *t*-tests. Results only revealed a significant difference for the EPQ-N: women displayed significantly higher levels of neuroticism than men [*M* = 5.01, *SD* = 3.10 versus *M* = 3.35, *SD* = 2.26, respectively; $t(96) = 2.09$, $p < .05$]. Fourth and finally, a paired-samples *t*-test indicated that worry about the examination showed a small but significant increase from the first to the second measurement of the WTQ [$t(97) = 2.06$, $p < .05$]. Meanwhile, the correlation between WTQ1 and WTQ2 was fairly high ($r = .79$, $p < .001$). Thus, in spite of a slight increase as the test came closer, worrying about the test remained relatively stable during the five weeks before the examination.

Correlations between cognitive factors and worry

Correlation coefficients between all questionnaires are displayed in Table 1. The correlations between IU, meta-worry, and neuroticism were all strong and significant (*r*s between .60 and .66, *p*s < .001). IU, meta-worry, and neuroticism also correlated substantially with the measure of trait worry (*r*s ranging from .63 to .76, *p*s < .001). Furthermore, the correlations between IU, meta-worry, and neuroticism, on the one hand and idiosyncratic worry (measured by WTQ1 and WTQ2) on the other, were also significant (*r*s between .21 and .35), with the exception of the correlation between meta-worry and WTQ2, which approached significance ($r = .18$, $p = .08$).

The relative contribution of IU and meta-worry to symptoms of worry

The correlation between IU and meta-worry was .60 (see Table 1). Therefore, partial correlations were calculated to reveal the relative influences of IU and meta-worry on the PSWQ, WTQ1, and WTQ2. Results showed that, while controlling for meta-worry, the correlation between IUS and trait worry (PSWQ) remained significant ($r = .41$, $p < .01$), whereas the link between IUS and idiosyncratic worry was no longer significant (*r*s being .13 on occasion 1 and .19, $p = .07$ on occasion 2). The partial correlations between meta-worry and worry symptoms (while controlling for IUS) showed a highly similar pattern. That is, the correlation between meta-worry and trait worry remained significant ($r = .40$, $p < .01$),

whereas the association between meta-worry and idiosyncratic worry was small and non-significant (*r*s being .10 on occasion 1 and .03 on occasion 2).

Table 1. Mean scores (standard deviations) and Cronbach's *α*'s for the questionnaires that were used in the study, and correlations among the various measures

	M (*SD*)	*α*	(1)	(2)	(3)	(4)	(5)
(1) IUS	61.19 (15.94)	.92					
(2) AnTI-MW	10.00 (3.15)	.80	.60**				
(3) EPQ-N	4.72 (3.03)	.81	.66**	.62**			
(4) PSWQ	45.80 (11.38)	.92	.63**	.63**	.76**		
(5) WTQ1	29.68 (7.69)	.86	.22*	.21*	.30*	.43**	
(6) WTQ2	30.73 (7.90)	.88	.25*	.18	.35**	.47**	.79**

Note. *N* = 98, IUS: Intolerance of Uncertainty, AnTI-MW: Anxious Thought Inventory- Meta-Worry, EPQ-N: Eysenck Personality Questionnaire-Neuroticism, PSWQ: Penn State Worry Questionnaire, WTQ1: Worry about the Test Questionnaire, first measurement, WTQ2: Worry about the Test Questionnaire, second measurement. * $p < .05$, ** $p < .01$.

Test of mediational models

As indicated by Baron and Kenny (1986), a variable can be seen as a mediator if the following conditions are met: (a) variation in levels of the independent variables (i.e., neuroticism) significantly account for variation in the presumed mediators (i.e., IU and meta-worry), (b) variation in the mediators significantly account for variation in the dependent variable (e.g., trait worry), and (c) the previous significant relation between the independent and the dependent variable shows a significant decrease when controlling for the influence of the mediators. To test these conditions, partial correlations were computed that were also corrected for gender.

The results of the first hypothesized mediational model (neuroticism → IU and meta-worry → trait worry) are shown in Figure 1.

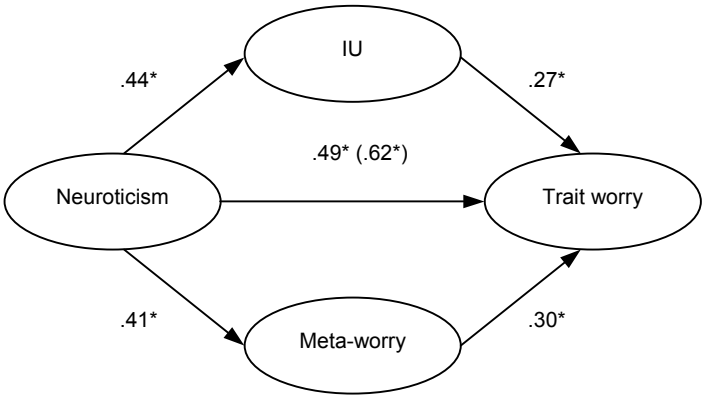

Figure 1. The partial mediational effects of Intolerance of Uncertainty and meta-worry on the relation between neuroticism and trait-like worry (* $p < .01$). Coefficient in brackets is uncorrected coefficient.

The first condition was met as the independent variable neuroticism was significantly linked to the mediators IU and meta-worry, even after controlling for the mutual effects of the mediators (*r*'s being .41 and .44, $p < .01$). The second condition was also fulfilled, as IU and meta-worry both significantly contributed to the criterion variable trait worry, even when controlling for the influence of neuroticism (*r*'s .27 and .30 respectively). The third condition, which implies that the relation between neuroticism and trait worry should decrease when controlling for the influence of the two mediators, was also met; the correlation dropped from .62 to .49. Preacher and Hayes (2004) argue that next to fulfilling the criteria mentioned by Baron and Kenny (1986), simple mediation models should also be tested via the more direct and statistically sound Sobel test (Preacher & Hayes, 2004). This Sobel test assesses whether the indirect effect of the independent variable (i.e., neuroticism) on the dependent variable (i.e., trait worry) via the mediator (i.e., IU and meta-worry) is greater than zero. This proved to be the case; Z values were 2.67 ($p < .01$) for the mediator IU and 2.85 ($p < .01$) for the mediator meta-worry (see Preacher & Leonardelli, 2001 for calculations).

Mediation effects of IU and meta-worry on the relation between neuroticism and idiosyncratic worry on occasion 1 (WTQ1) and on occasion 2 (WTQ2) were also tested. For both the models, the second condition stated by Baron and Kenny (1986) was not fulfilled; IUS and meta-worry made no significant contributions to idiosyncratic worry when controlling for their mutual influence and the effect of neuroticism. Thus, IUS and meta-worry cannot be considered as mediators of the relation between neuroticism and idiosyncratic worry on occasion 1 and occasion 2. Subsequently, regression analyses were run in order to clarify the relative contribution of the variables IU, meta-worry, and neuroticism on the dependent variables WTQ1 and WTQ2. Table 2 summarizes the results. When predicting idiosyncratic worry on the occasion 1, none of the variables appeared to have a unique and significant influence. Note that neuroticism was the only variable that explained a significant, albeit minimal, proportion of the variation in idiosyncratic worry on occasion 2.

Table 2. Summary of hierarchical regression analyses for variables predicting idiosyncratic worry (WTQ1 and WTQ2) ($N = 98$).

Dependent variable	Predictor variable	*B*	*SE B*	*β*	*Δ* R^2
$WTQ1_a$	EPQ-N	.57	.37	.23	.02
	IUS	.02	.07	.05	.00
	AnTI-MW	.11	.33	.04	.00
$WTQ2_b$	EPQ-N	.88	.38	.34*	.06*
	IUS	.03	.07	.08	.00
	AnTI-MW	-.20	.33	-.08	.00

Note. $_a$: $R^2 = .10$, $_b$: $R^2 = .13$. EPQ-N: Eysenck Personality Questionnaire subscale neuroticism, IUS: Intolerance of Uncertainty Scale, AnTI-MW: Anxious Thought Inventory subscale meta-worry, WTQ1: Worry about Test Questionnaire, first measurement, WTQ2: Worry about Test Questionnaire, second measurement. * $p < .05$

Discussion

The present study investigated the relation between IU, meta-worry, and neuroticism on the one hand, and worry on the other hand in a sample of non-clinical university students. Various worry operationalizations were used: that is, not only levels of trait worry were measured, but also idiosyncratic worry about an upcoming examination. First, zero-order correlations between all variables were investigated. In keeping with previous research, the results showed that IU, meta-worry, and neuroticism all correlated substantially with trait worry as measured by the PSWQ. Interestingly, the relations between IU, meta-worry, neuroticism, and idiosyncratic worry, measured on two occasions (WTQ1 and WTQ2), were considerably smaller but still significant, except for the relation between meta-worry and WTQ2. Secondly, the relative contributions of the two cognitive factors (i.e., IU and meta-worry) on the worry variables were evaluated via partial correlations. IU and meta-worry correlated highly, but each factor made a unique and independent contribution to trait worry as indexed by the PSWQ, but not to idiosyncratic worry. Finally, tests of mediation revealed that IU and meta-worry can indeed be considered as partial mediators of the relation between neuroticism and trait-like worry. This result is in accordance with the results of Sexton, Norton, and colleagues (Sexton et al., 2003; Norton et al., 2005). Mediational effects of IU and meta-worry on the relation between neuroticism and idiosyncratic worry were not found. However, regression analysis indicated that neuroticism was involved in idiosyncratic worry on occasion 2.

Although the cognitive factors of IU and meta-worry overlapped considerably, both variables seemed to have a unique influence on trait worry, independent of levels of neuroticism. However, IU and meta-worry were barely related to idiosyncratic worry. This result was in contrast with the assumption that specific, situation-related worry would also be linked to these cognitive factors. One explanation for the absence of an influence of the IU and meta-worry on idiosyncratic worry might be that the test evoked highly similar worry levels for all participants and as a result of this lack of variation, differential relations to the cognitive variables did not emerge. In a similar vein, it can be argued that the examination provoked only mild levels of stress and thus moderate levels of worry. That is, the average score on most WTQ-items was 3 (on a scale 5-point scale). Furthermore, when the examination was more imminent (occasion 2), somewhat stronger links among the study variables were found. On that occasion, the general vulnerability factor of neuroticism did explain a small but significant proportion of the variance in idiosyncratic worry.

In sum, the current data seem to indicate that not the specific cognitive factors of IU and meta-worry, but the general vulnerability factor of neuroticism appeared to possess most declarative value in relation to both trait and idiosyncratic worry. This is somewhat at odds with the current notion in the literature, suggesting that neuroticism is not an explanatory concept (Ormel et al., 2004). Similarly, Claridge and Davis (2001) conclude that neuroticism can be informative, but only when used in combination with other disorder-specific constructs that explain additional variance and hence have extra explanatory power. Taking these ideas into consideration and noting that after including the worry-specific factors of IU and meta-worry, neuroticism still explained a considerable proportion of the

variance in worry scores, it is most likely that there are still other cognitive constructs that come into play, possibly originating from or in combination with neuroticism (e.g., interpretation bias, memory bias; Dugas, Hedayati, Karavidas, Buhr, Francis, & Phillips, 2005).

The present investigation suffered from some limitations. Firstly, the sample primarily consisted of women. The inclusion of more men could have provided the opportunity to explore gender differences in the links among IU, meta-worry, neuroticism and worry. Secondly, the study examined the relations between neuroticism, IU, meta-worry and various worry operationalizations in a normal sample. Of course, similar research should encompass clinical samples before generalizations of the present results to pathological manifestations of worry (e.g., GAD) can be made. And finally, in the current study students probably experienced only mild levels of idiosyncratic worry. As such, subsequent research should target more stressful events that elicit more severe and pervasive idiosyncratic worry. Only when such research has been conducted, a more definite conclusion can be drawn about whether the cognitive factors of IU and meta-worry not only play a role in trait worry, but also contribute to the understanding of specific, situation-related worry.

References

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders (4th ed., text revision)*: Washington, DC, US: American Psychiatric Publishing, Inc.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 6*, 1173-1182.

Beck, A. T (1976). Cognitive theory and the emotional disorders. New York: International Universities Press.

Beck, A. T., & Clark, D. A. (1997). An information processing model of anxiety: automatic and strategic process. *Behaviour Research and Therapy, 35*, 49-58.

Borkovec, T. D., Robinson, E., Pruzinsky, T., & DePree, J. A. (1983). Preliminary exploration of worry: Some characteristics and processes. *Behaviour Research and Therapy, 21*, 9-16.

Brown, T. A., Chorpita, B. F., & Barlow, D. H. (1998). Structural relationships among dimensions of the DSM-IV anxiety and mood disorders and dimensions of negative affect, positive affect, and autonomic arousal. *Journal of Abnormal Psychology, 2*, 179-192.

Brown, T. A., O'Leary, T. A., & Barlow, D. H. (2001). Generalized anxiety disorder. In D. H. Barlow (Ed.), *(2001). Clinical handbook of psychological disorders: A step by step treatment manual (3rd ed.)* (p. 154-208). New York, NY: Guilford Press.

Buhr, K., & Dugas, M. J. (2002). The Intolerance of Uncertainty Scale: Psychometric properties of the English version. *Behaviour Research and Therapy, 40*, 931-946.

Claridge, G., & Davis, C. (2001). What's the use of neuroticism? *Personality and Individual Differences, 31*, 383-400.

Clark, L. A., Watson, D., & Mineka, S. (1994). Temperament, personality, and the mood and anxiety disorders. *Journal of Abnormal Psychology, 103*, 103-116.

Craske, M. G. (1999). *Anxiety disorders: Psychological approaches to theory and treatment*. Boulder, Colorado: Westview.

Davey, G. C., Hampton, J., Farrell, J., & Davidson, S. (1992). Some characteristics of worrying: Evidence for worrying and anxiety as separate constructs. *Personality and Individual Differences, 13*, 133-147.

deBruin, G. O., Rassin, E., & Muris, P. (2005). Cognitive self-consciousness and meta-worry and their relations to symptoms of worry and obsessional thoughts. *Psychological Reports, 96*, 222-224.

deBruin, G.O., Muris, P, & Rassin, E. (2006). *Are there specific meta-cognitions associated with vulnerability to symptoms of worry and obsessional thoughts?* Manuscript submitted for publication.

deBruin, G.O., Rassin, E., van der Heiden, C., & Muris, P. (2006). *Psychometric properties of a Dutch version of the Intolerance of Uncertainty Scale.* Manuscript submitted for publication.

Dugas, M. J., Buhr, K., & Ladouceur, R. (2004). The role of intolerance of uncertainty in etiology and maintenance. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized Anxiety Disorder. Advances in reserach and therapy* (p. 143-163). New York: Guilford Press.

Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: A preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*, 215-226.

Dugas, M. J., Hedayati, M., Karavidas, A., Buhr, K., Francis, K., & Phillips, N. A. (2005). Intolerance of Uncertainty and Information Processing: Evidence of Biased Recall and Interpretations. *Cognitive Therapy and Research, 29*, 57-70.

Dugas, M. J., Schwartz, A., & Francis, K. (2004). Intolerance of uncertainty, worry, and depression. *Cognitive Therapy and Research, 28*, 835-842.

Ellis, A. (1962). *Reason and emotion in psychotherapy*. Secaucus, N.J.: Citadel Press.

Eysenck, H. J., Eysenck, M. W., & Barrett, P. (1985). A revised version of the psychoticism scale. *Personality and Individual Differences, 6*, 21-29.

Freeston, M. H., Rheaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*, 791-802.

Hettema, J. M., Prescott, C. A., & Kendler, K. S. (2004). Genetic and environmental sources of covariation between generalized anxiety disorder and neuroticism. *American Journal of Psychiatry, 161*, 1581-1587.

Keogh, E., French, C. C., & Reidy, J. (1998). Predictors of worry. *Anxiety, Stress and Coping: An International Journal, 11*, 67-80.

Ladouceur, R., Blais, F., Freeston, M. H., & Dugas, M. J. (1998). Problem solving and problem orientation in generalized anxiety disorder. *Journal of Anxiety Disorders, 12*, 139-152.

Ladouceur, R., Dugas, M. J., Freeston, M. H., Rheaume, J., Blais, F., Boisvert, J. M., et al. (1999). Specificity of generalized anxiety disorder symptoms and processes. *Behavior Therapy, 30*, 191-207.

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28*, 487-495.

Muris, P., Roelofs, J., Rassin, E., Franken, I., & Mayer, B (2005). Mediating effects of rumination and worry on the links between neuroticism, anxiety and depression. *Personality and Individual Differences, 36*, 1105-1111.

Norton, P. J., Sexton, K. A., Walker, J. R., & Norton, G. R. (2005). Hierarchical vulnerability factors for anxiety : replication and extension with a clinical sample. *Cognitive Behaviour Therapy, 34*, 50-63.

Ormel, J., Rosmalen, J., & Farmer, A. (2004). Neuroticism: a non-informative marker of vulnerability to psychopathology. *Social Psychiatry and Psychiatric Epidemiology, 39*, 906-912.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36*, 717-731.

Preacher, K.J., & Leonardelli, G.J. (2001, March). Calculations for the Sobel test: An interactive calculation tool for mediation tests [Computer software]. Available from http://www.unc.edu/~preacher/sobel/sobel.htm.

Robichaud, M., & Dugas, M. J. (2005). Negative problem orientation (Part II): construct validity and specificity to worry. *Behaviour Research and Therapy, 43*, 403-412.

Sanderman, R., Arrindell, W.A., Ranchor, A.V., Eysenck, H.J., and Eysenck, S.B.G. (1995). *Het meten van persoonlijkheidskenmerken met de Eysenck Personality Questionnaire (EPQ), een handleiding*. NCvG, Rijksuniversiteit Groningen.

Sexton, K. A., Norton, P. J., Walker, J. R., & Norton, G. R. (2003). Hierarchical model of generalized and specific vulnerabilities in anxiety. *Cognitive Behaviour Therapy, 2*, 82-94.

Spielberger, C. D. (1980). *Test Anxiety Inventory. Preliminary professional manual*. Palo Alto, CA: Consulting Psychologist Press.

Steptoe, A., & Kearsley, N. (1990). Cognitive and somatic anxiety. *Behaviour Research and Therapy, 28*, 75-81.

Taylor, S. (1998). The hierarchic structures of fears. *Behaviour Research and Therapy, 36*, 205-214.

Van Rijsoort, S., Emmelkamp, P., & Vervaeke, G. (1999). The Penn State Worry Questionnaire and the Worry Domains Questionnaire: Structure, reliability and validity. *Clinical Psychology and Psychotherapy, 6*, 297-307.

Wells, A. (1994). A multi-dimensional measure of worry: Development and preliminary validation of the Anxious Thoughts Inventory. *Anxiety, Stress and Coping: An International Journal, 6*, 289-299.

Wells, A. (1995). Meta-cognition and worry: A cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy, 23*, 301-320.

Wells, A. (2004). A cognitive model of GAD. Metacognitions and pathological worry. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder. Advances in research and practice* (p. 164-186). New York: Guilford Press.

Wells, A., & Carter, K. (1999). Preliminary tests of a cognitive model of generalized anxiety disorder. *Behaviour Research and Therapy, 37*, 585-594.

Wells, A., & Carter, K. (2001). Further tests of a cognitive model of generalized anxiety disorder: Metacognitions and worry in GAD, panic disorder, social phobia, depression, and nonpatients. *Behavior Therapy, 32*, 85-102.

Appendix. The 10 WTQ items, and the original PSWQ item numbers (from which the WTQ items were derived)

Item	Original PSWQ item number	WTQ Question
1)	1	Luckily, I have enough time to finish the exam, otherwise, I would worry about it.
2)	3	I do not ten d to worry about the grade of the exam.
3)	4	The exam makes me worry.
4)	5	I know I should not worry about he exam, but I just cannot help it.
5)	8	I find it easy to dismiss thoughts about the exam.
6)	9	As soon as I finish the exam, I start to worry about the result.
7)	10	I have not worried about the exam.
8)	11	When I finish the exam, I am not concerned about it any more.
9)	14	Once I start worrying about the exam, I cannot stop.
10)	16	I worry about the exam until it is finished.

WTQ: Worry about Test Questionnaire, PSWQ: Penn State Worry Questionnaire.

6 GENERAL DISCUSSION

This thesis focused on explicating two cognitive constructs, intolerance of uncertainty and meta-worry, which are both considered to be relevant concepts in theories explaining the etiology and maintenance of worry and GAD. In this section, the results of previous chapters will be summarized, theoretical and methodological issues will be discussed, and an attempt will be made to relate the current findings to the existing literature. Finally, recommendations for future research will be made.

Summary and discussion of the main results

In Chapter 2, it was demonstrated that the Dutch version of the IUS displayed similar psychometric properties as the French and English versions of this scale. The internal consistency, test-retest reliability, and convergent validity were all satisfactory and comparable to previous versions of the IUS (Buhr & Dugas, 2002; Dugas, Freeston, & Ladouceur, 1997; Freeston, Rheaume, Letarte, Dugas, & Ladouceur, 1994; Norton, 2005). Further, a factor analysis of the Dutch IUS indicated a one-factor solution, confirming the idea of Norton (2005) that IU reflects a unidimensional construct, and the proposition of Buhr and Dugas (2002) to employ the total score of the IUS in research. In conclusion, the Dutch version of the IUS appeared to be a psychometrically sound questionnaire for measuring individual differences in intolerance of uncertainty.

However, in a recent study by Carleton, Norton, and Asmundson (in press), the authors argue that none of these structures was optimal, and therefore decided to revise the IUS, which resulted in a shortened scale with a clear two-factor structure. These two factors appear reliable and stable and nicely represent two important components of intolerance of uncertainty, namely anxiety (prospective anxiety) and avoidance (inhibitory anxiety). Clearly, more studies are warranted to further examine the underlying structure of the IUS. Furthermore, examination of the psychometric properties of the Dutch IUS in clinical populations is required.

In Chapter 3, two experimental studies are described in which it was investigated whether individual differences in intolerance of uncertainty predict levels of worry in response to uncertain situations. Both experiments confirmed that there seems to be a clear-cut relationship between IU and worry. The findings that emerged from these experiments may be helpful to understand under what circumstances levels of IU lead to heightened levels of worry. More precisely, the second experiment demonstrated that individual differences in IU gave rise to a higher frequency of worrisome thoughts in the experimental condition that was low in uncertainty. Moreover, in this low uncertainty condition, IUS scores were also associated with higher levels of post-test uncertainty and test anxiety. Thus, individuals who display higher levels of IU were more distressed than individuals with lower levels of IU, and this was particularly true in the low uncertainty condition. These results are partly in agreement with those of Ladouceur, Talbot, and Dugas (1997), who demonstrated that individual differences in IU predicted GAD-related doubting behaviour, but merely in a moderately ambiguous situation and not in a non- or highly ambiguous situation. Altogether, the findings seem to justify the conclusion that intolerance of uncertainty is predictive of worry levels, but only when a person truly feels doubtful or

uncertain. These feelings of doubtfulness and uncertainty can be determined by several factors, such as the individuals' interpretation of the event, the level of intolerance of uncertainty, and the adopted coping strategy (see Greco & Roger, 2001). Worry is not instigated in high IU individuals when uncertainty is high or absent; these situations elicit normal and adaptive behavior, irrespective of individual levels of IU. Further experimental research should address this notion on the relation between intolerance of uncertainty and worry, in ambiguous and uncertain events.

In Chapter 4, the relation between cognitive self-consciousness and meta-worry on the one hand, and symptoms of worry and obsessional thoughts on the other hand was examined. In recent literature, the first concept has been typically linked to OCD, whereas the second concept has been predominantly related to GAD. Although meta-worry and cognitive self-consciousness are consistently treated as separate constructs, it seems clear that these concepts share various features. For instance, it seems plausible that only after extensively monitoring one's thoughts, a person will interpret his/her own thoughts negatively. In other words, when a person is barely conscious of his thoughts, it is not very likely that he will engage in negative thought evaluation. Further, it seems self-evident that the negative appraisal of one's thoughts leads to increased awareness of these thoughts. Thus, cognitive self-consciousness and meta-worry seem to be constructs that are akin. So far, it has been unclear whether cognitive self-consciousness is exclusively related to obsessional symptomatology, and whether meta-worry is uniquely linked to worrying, especially in non-clinical populations. The results of Chapter 4 indicated that cognitive self-consciousness and meta-worry indeed seem to be related. In addition, it was found that meta-worry was significantly related to symptoms of worry and obsessional thoughts, even when controlling for the influence of cognitive self-consciousness. When the correlations between cognitive self-consciousness and symptoms of worry and obsessional thoughts were controlled for the influence of meta-worry, these relations clearly attenuated and were no longer significant. These findings suggest that the negative appraisal of thoughts (i.e., meta-worry) is more relevant when studying pathological thought processes than cognitive self-consciousness (at least in non-clinical individuals).

A further study described in Chapter 4 examined the influence of thought suppression. Results showed that the meta-cognitive constructs were all positively related with each other. Cognitive self-consciousness, meta-worry, and thought suppression were all significantly related to symptoms of worry and obsessional thoughts. Thought suppression was more convincingly related to worry symptoms than to obsessional thoughts, while meta-worry was more strongly associated with obsessional thoughts and worry symptoms than the other two cognitive constructs. Furthermore, the results of regression analyses indicated that cognitive self-consciousness and meta-worry were unique predictors of obsessional thoughts, whereas meta-worry and thought suppression were unique predictors of symptoms of worry. Meanwhile, meta-worry appears to play a consistent role in various types of intrusive thoughts, whereas cognitive self-consciousness and thought suppression only seem relevant when explaining a specific type of intrusive thoughts (respectively obsessional thought and worry).

Thus, in non-clinical populations, it seems to be the case that meta-worry is (equally) relevant for various types of intrusive, anxiety-related thoughts. This conclusion is not in keeping with research conducted in clinical samples which consistently demonstrated that GAD patients portray significantly higher levels of meta-worry than other anxiety disorder patients (Wells & Carter, 2001). Furthermore, the results of the presented study suggest that thought suppression is predominantly linked to worry symptoms, and less relevant for symptoms of obsessional thought, which is also in disaccord with previous literature (Purdon, 1999). Perhaps then, cognitive processes such as meta-worry, cognitive self-consciousness, and thought suppression operate differentially in clinical and non-clinical populations.

Furthermore, when looking more closely at the correlations between cognitive variables, and worry and obsessional thoughts as obtained in the two studies in Chapter 4, one has to conclude that the correlations with worry were consistently stronger. This could be due to the fact that in the non-clinical participants of these studies worry symptoms were more common than symptoms of OCD, which are more egodystonic and therefore probably less frequent in comparison to worry thoughts. Further research on the specificity of cognitive self-consciousness, meta-worry, and thought suppression for predicting various types of intrusive thoughts in non-clinical subjects is obviously needed.

Chapter 5 addressed the relative contribution to worry of intolerance of uncertainty and meta-worry. In this study, worry was operationalized in two ways. First, levels of trait worry were measured by means of the PSWQ. Second, levels of idiosyncratic worry about an upcoming event were measured on two separate occasions (when the stressful event was less and more imminent). In addition to the two central constructs, a general vulnerability factor for anxiety symptoms, neuroticism, was also included. Results demonstrated that IU, meta-worry, and neuroticism all correlated substantially with trait worry. Considerably smaller yet mostly significant correlations were found with idiosyncratic worry. Tests of mediation models revealed that IU and meta-worry can best be considered as partial mediators of the relation between neuroticism and trait-like worry. However, these mediational effects of IU and meta-worry on the relation between neuroticism were not found for idiosyncratic worry. Here, the regression analysis indicated that only neuroticism was involved in idiosyncratic worry on occasion 2, that is, when the examination was more imminent. In sum, the data seemed to indicate that not the specific cognitive factors of IU and meta-worry, but the general vulnerability factor of neuroticism appeared to possess most declarative value in relation to both trait and idiosyncratic worry. However, some authors have argued that neuroticism is too general and non-informative to possess explanatory value (Ormel, Rosmalen, & Farmer, 2004). Claridge and Davis (2001) also adhere to this view but underline that neuroticism may still be informative if it is used in combination with disorder-specific variables. It seems most likely that there are still other cognitive constructs (e.g., cognitive biases in attention and interpretation) involved in the radicalization of worry, possibly originating from or in combination with neuroticism.

Integrative model for intrusive thoughts

The main results of this thesis can be summarized in a model that is displayed in Figure 1. This model consists of a personality variable (i.e., negative affectivity or neuroticism) and several cognitive variables, which all contribute to symptoms of intrusive thoughts, such as worry and obsessions. The continuous lines in the model indicate a relation; the bold lines reflect a stronger relation, whereas the dotted lines represent a relation that is not studied in this thesis, but is known from the literature, or is feasible and needs to be investigated.

The results of Chapter 5 have shown that the general vulnerability factor of neuroticism makes a direct contribution to worry, as this personality variable explained a significant portion of variance of worry, independent of IU and meta-worry. Alongside these two cognitive variables, thought suppression and cognitive self-consciousness are also related to worry. However, of these four cognitive variables, meta-worry consistently portrayed the strongest relation to worry.

In addition, the studies in Chapter 4 make it possible to make some statements about the relations between various cognitive variables and symptoms of OCD. Again, meta-worry displayed the strongest relation to symptoms of OCD. As such it can be concluded that meta-worry appears to play a consistent role in various types of intrusive thoughts. Note further that the four cognitive variables that are included in the model seemed related to both worry (GAD) as well as obsessional thoughts (OCD). In other words, at least in non-clinical populations these cognitive variables are not unique for one type of intrusive thought.

Finally, it should be acknowledged that this model is not exhaustive. It is likely that other cognitive variables such as positive and negative beliefs about the use of worry and the employment of dysfunctional coping strategies other then suppression also play a role in the development of intrusive thought patterns such as GAD and OCD.

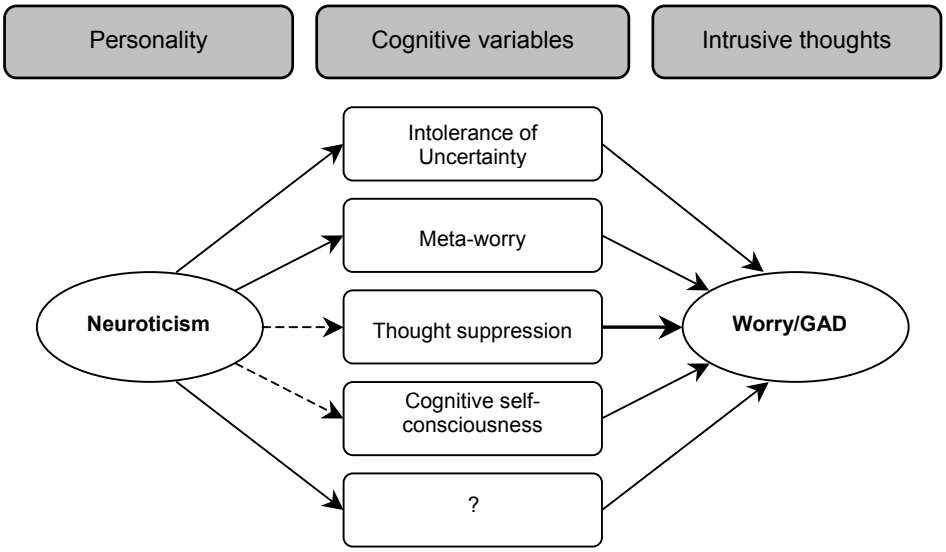

Figure 1. A model of cognitive variables that contribute to worry thoughts in non-clinical populations.

Limitations

In this section, three decisions about the way in which the studies in the present thesis were conducted, are explicated and discussed.

Choice of measures

The choice for the main research measures, namely the Intolerance of Uncertainty Scale (IUS; Freeston et al., 1994) and the Anxious Thoughts Inventory (AnTI; Wells, 1994), and not other questionnaires, was a carefully considered and deliberate one. To explain this choice, a non-exhaustive number of questionnaires that measure the same, or similar, concepts will be discussed hereafter.

Some 60 years ago, Frenkel-Brunswik (1948) introduced a concept known as intolerance of ambiguity (IA), which was described as the tendency of an individual to perceive present (not future) ambiguity as threat or discomfort. Although there is little agreement on the precise definition of ambiguity (Greco & Roger, 2001), it is clear that IA shows considerable overlap with IU. IA can best be conceptualized as a perceptual and cognitive concept that has been employed in industrial and organisational psychology, whereas IU has been predominantly used in clinical psychology. Various subtests of intelligence tests have been used to measure IA, but the psychometric properties of these IA indices were not satisfactory. It is clear that new and more elaborated measures for IA are

needed (see also Greco & Roger, 2001) and that the currently available indices are certainly not suitable for measuring the concept of IU.

Davey, Hampton, Farrell, and Davidson (1992) have constructed the Ambiguous/Unambiguous Situations Diary, a self-report questionnaire that assesses the individuals' interpretations of "diary sections". These diary sections are worded ambiguously (e.g., "I got a piece of coursework back and was surprised at the mark it was received), unambiguously positive or negative (e.g., "I went to Amanda's party last night, it was brilliant!" and "We invited some friends round to join us for a barbecue, but no one turned up"). The participants have to fill in whether they are concerned or unconcerned by the events described in the diary. This questionnaire does not cover the whole concept of IU, but rather taps a person's interpretation of ambiguousness.

More direct measures of intolerance of uncertainty can be found in studies conducted on OCD-related phenomena, such as doubting behavior, estimation of threat, and uncertainty (Sookman & Pinard, 2002). In this type of research, intolerance of uncertainty refers to "beliefs about the necessity of being certain, beliefs that one has a poor capacity to cope with unpredictable change, and (..) the difficulty of adequate functioning in inherently ambiguous situations" (OCCWG, 1997; p. 678). Importantly, in the context of OCD, intolerance of uncertainty is viewed as one of the contributing factors, not as a primary factor. A number of scales have been developed that include the IU-like aspect of OCD. For instance, Freeston, Ladouceur, Gagnon, and Thibodeau (1993) developed the Inventory of Beliefs Related to Obsessions (IBRO), which not only yields information about (irrational) beliefs about the meaning of intrusive thoughts and their consequences, but also intolerance of uncertainty. In addition, the OCCWG (2001) developed the Obsessive Beliefs Questionnaire (OBQ-87), in which tolerance of uncertainty is also included as a subscale.

Obviously, researchers from various theoretical backgrounds have been interested in the phenomenon of IU. As IU as defined in the model of Dugas and colleagues (Dugas, Gagnon, Ladouceur, & Freeston, 1998) was the main focus, the employment of the IUS seemed to be the most optimal choice. Recently, Carleton et al. (in press) reported on a short version of the IUS that consisted of only 12 items (instead of 27 items in the original version). The shortened scale appeared to be psychometrically sound and highly correlated with the original IUS. Further research employing this new and more economic measure of IU is recommendable.

For measuring the concept of meta-worry, the AnTI was used, which at the time that this Ph.D. thesis started was the only scale for assessing this cognitive constructs. More recently, the Meta-Worry Questionnaire (MWQ; Wells, 2005), has been developed to specifically assess the frequency of meta-worry and the participants' beliefs about the tenability of this meta-worrying thought. The MWQ thus focuses more on the perceived dangers that accompany this type of worry. An advantage of the new scale is that it clearly refers to the DSM-IV criteria for GAD (see American Psychiatric Association, 2000). However, up till now no study has been conducted with this questionnaire, and so, little is known about the psychometric properties of the scale. As such, the employment of the

meta-worry subscale of the AnTI still seems justified, in particular as the studies employed non-clinical participants as opposed to GAD patients.

In sum, excellent psychometric properties have been reported (see Buhr & Dugas, 2002; Dugas et al., 1997; Norton, 2005; Wells & Carter, 1999) for both the IUS (Freeston et al., 1994) and the AnTI (Wells, 1994), and together with the fact that there were no better questionnaires available when the studies in this theses were conducted, the choice for these two specific questionnaires seems justified.

Use of self-report measures

The majority of the data presented in this thesis were obtained by means of self-report questionnaires. Although the use of self-report measures is applied in numerous studies on psychopathology, one might argue that reliance on this type of assessment only provides partial information and may be susceptible to various biases (e.g., response bias, see for instance de Jonge & Slaets, 2005). However, as McNally pointed out "many aspects of psychopathology do not have overt behavioral manifestations other than self-reports of phenomenal states" (2001; p. 519), and this seems especially true for the cognitive constructs that were the subject of this thesis. In other words, concepts such as IU and meta-worry are best measured by self-report scales. Self-report measures and behavioral measures are a particular strong way to conduct research of cognitive constructs (McNally, 2001). As such, the employment of self-report scales as well as experimental manipulations in several studies in this thesis simply seemed the best way to go.

Use of non-clinical samples

Another potential shortcoming of the present thesis is the fact that the main studies were conducted with non-clinical participants. Although some might even consider this as a major weakness of this thesis, several arguments can be made to tackle this conception. Firstly, according to Sexton, Norton, Walker, and Norton (2003), there is ample research evidence to support the notion that anxiety can best be viewed as a continuum with mild, normal manifestations of this negative emotion on one end and more severe, pathological anxiety as seen in phobias and anxious disorders on the other end (see also Chapter 1). In keeping with this idea, the use of normal participants as "analogue of individuals with anxiety disorders" (p. 92) is widely accepted. Furthermore, the general population includes healthy individuals as well as some individuals with more extreme levels of worry, so the general range of severity in anxiety manifestations is captured. Thirdly, Ruscio, Borkovec, and Ruscio (2001) already argue that "theories attempting to explain how and why worry becomes problematic must move beyond factors associated with the presence or absence of pathological worry. Instead, (one should) consider causal and maintenance factors associated with varying levels of worry severity within the full range of worry presentations" (p. 418). As such, research that employs normal participants certainly contributes to the understanding of worry, and may elucidate processes and mechanisms that are present before pathological levels occur. Moreover, the experimental psychopathology approach as advocated by Jansen, Merckelbach, and Van de Hout (1992) and many others encourage

experimental research with normal controls. More specifically, advocates of this approach plead for an extended practice of experimental research, in which psychopathological phenomena are investigated and replicated in the laboratory, where explanations can be tested unambiguously. Thus, there are plenty of good reasons for examining anxiety phenomenon such as worry with normal and healthy participants. Nevertheless, additional studies also including persons with clinical levels of worry and anxiety disordered patients certainly are a fruitful future endeavor.

Future directions

In the previous sections, some suggestions for further research have already been made. Additionally, future studies into the psychometric properties of the abbreviated form of the IUS and the MWQ to assess the cognitive constructs of IU and meta-worry are worthwhile. More generally, the relation between these cognitive constructs and worry should be investigated in specific groups, such as children, adolescents, and older people. So far, only a handful of studies have examined worry in these populations, and most of this research reports on the effectiveness of therapy, not on fundamental underlying processes (see for instance Cartwright-Hatton et al., 2004; Laugesen, Dugas, & Bukowski, 2003; Leger, Ladouceur, & Freeston, 2003 for research concerned with children and adolescents, and for instance Ladouceur, Leger, Dugas, & Freeston, 2004; Nuevo, Montorio, & Borkovec, 2004 for research conducted with older people; for reviews of research with regard to these populations, see Albano & Hack, 2004, and Beck & Averill, 2004).

Furthermore, Taylor (1998) concludes that in order to develop a more detailed understanding of pathological fear and anxiety, various etiological variables ranging from general to more specific factors need to be included in theoretical models. He urges other researchers to study more of such variables, and in some studies of the thesis, this suggestion was (partially) followed. An increased understanding of the unique contributions of these variables, and the mediator and moderator effects among them could also be useful for the development of better forms of therapy. The results of the current thesis suggest that in particular interventions that aim at correcting meta-cognitive beliefs might be a valuable addition to cognitive-behavior therapy (van der Heiden, Muris, & van de Molen, 2005). Furthermore, it should be mentioned that this type of therapy partially derives its effectiveness (Barlow, Levitt, & Bufka, 1999) because various cognitive factors are successfully targeted. For example, Roemer and Orsillo (2002) sum up several elements of cognitive-behavioral therapy that seem to be effective. These elements include psycho-education, careful monitoring of anxious responding, coping skills, and cognitive restructuring. It may well be the case that psycho-education and cognitive restructuring are helpful for reducing maladaptive beliefs (meta-worry), the monitoring of anxiety cues and increasing coping skills may diminish ambiguity and feelings of uncertainty. Various authors have noted that it is important to determine the (cognitive) factors that mediate successful interventions such as cognitive-behavior therapy (Brewin, 2006).

All in all, the present thesis aims at providing information that further contributes to our knowledge on the etiology of (pathological forms of) worry. The possibilities of research

on worry, a phenomenon that is so common to many of us, appears almost inexhaustible. This research field steadily accumulates valuable insights that can be translated into more successful therapeutic interventions, thereby providing better chances for more people to live their life without the paralyzing power of fear and uncertainty.

References

Albano, A. M., & Hack, S. (2004). Children and Adolescents. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder. Advances in research and practice* (pp. 383-408). New York: The Guilford Press.

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders (4th ed., text rev)*: Washington, DC, US: American Psychiatric Publishing, Inc.

Barlow, D. H., Levitt, J. T., & Bufka, L. F. (1999). The dissemination of empirically supported treatments: A view to the future. *Behaviour Research and Therapy, 37*, S147-S162.

Beck, J. G., & Averill, P. M. (2004). Older Adults. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder. Advances in research and practice* (pp. 409-433). New York: The Guilford Press.

Brewin, C. R. (2006). Understanding cognitive behaviour therapy: A retrieval competition account. *Behaviour Research and Therapy, 44*, 764-784.

Buhr, K., & Dugas, M. J. (2002). The Intolerance of Uncertainty Scale: Psychometric properties of the English version. *Behaviour Research and Therapy, 40*, 931-946.

Carleton, R. N., Norton, P. J., & Asmundson, G. J. G. (in press). Fearing the unknown: A short version of the Intolerance of Uncertainty Scale. *Journal of Anxiety Disorders*.

Cartwright-Hatton, S., Mather, A., Illingworth, V., Brocki, J., Harrington, R., & Wells, A. (2004). Development and preliminary validation of the meta-cognitions questionnaire -- adolescent version. *Journal of Anxiety Disorders, 18*, 411-422.

Claridge, G., & Davis, C. (2001). What's the use of neuroticism? *Personality and Individual Differences, 31*, 383-400.

Davey, G. C., Hampton, J., Farrell, J., & Davidson, S. (1992). Some characteristics of worrying: Evidence for worrying and anxiety as separate constructs. *Personality and Individual Differences, 13*, 133-147.

De Jonge, P., & Slaets, J., P.J. (2005). Response sets in self-report data and their associations with personality traits. *European Journal of Psychiatry, 19*, 209-214.

Dugas, M. J., Freeston, M. H., & Ladouceur, R. (1997). Intolerance of uncertainty and problem orientation in worry. *Cognitive Therapy and Research, 21*, 593-606.

Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: A preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*, 215-226.

Freeston, M. H., Ladouceur, R., Gagnon, F., & Thibodeau, N. (1993). Beliefs about obsessional thoughts. *Journal of Psychopathology and Behavioral Assessment, 15*, 1-21.

Freeston, M. H., Rheaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*, 791-802.

Frenkel-Brunswik, E. (1948). Intolerance of ambiguity as an emotional and perceptual personality variable. *Journal of Personality, 18*, 108-143.

Greco, V., & Roger, D. (2001). Coping with uncertainty: the construction and validation of a new measure. *Personality and Individual Differences, 31*, 519-534.

Jansen, A., Merckelbach, H., & Van de Hout, M. A. (1992). *Experimentele psychopathologie: een inleiding*. Assen/Maastricht: Van Gorcum.

Ladouceur, R., Leger, E., Dugas, M., & Freeston, M. H. (2004). Cognitive-behavioral treatment of generalized anxiety disorder (GAD) for older adults. *International Psychogeriatrics, 16*, 195-207.

Ladouceur, R., Talbot, F., & Dugas, M. J. (1997). Behavioral expressions of intolerance of uncertainty in worry. *Behavior Modification, 21*, 355-371.

Laugesen, N., Dugas, M. J., & Bukowski, W. M. (2003). Understanding Adolescent Worry: The Application of a Cognitive Model. *Journal of Abnormal Child Psychology, 31*, 55-64.

Leger, E., Ladouceur, R., & Freeston, M. H. (2003). Cognitive-behavioral treatment of generalized anxiety disorder among adolescent: A case series. *Journal of the American Academy of Child and Adolescent Psychiatry, 42*, 327-330.

McNally, R. J. (2001). On the scientific status of cognitive appraisal models of anxiety disorder. *Behaviour Research and Therapy, 39*, 513-521.

Norton, P. J. (2005). A psychometric analysis of the Intolerance of Uncertainty Scale among four racial groups. *Journal of Anxiety Disorders, 19*, 699-707.

Nuevo, R. R., Montorio, I., & Borkovec, T. D. (2004). A test of the role of metaworry in the prediction of worry severity in an elderly sample. *Journal of Behavior Therapy and Experimental Psychiatry, 35*, 209-218.

Obsessive Compulsive Cognitions Workings Group. (1997). Cognitive assessment of obsessive–compulsive disorder. *Behaviour Research and Therapy*, *35*, 667-681.

Obsessive Compulsive Cognitions Workings Group. (2001). Development and initial validation of the Obsessive Beliefs Questionnaire (OBQ) and the Interpretation of Intrusions Inventory (III). *Behaviour Research and Therapy*, *39,* 987-1006.

Ormel, J., Rosmalen, J., & Farmer, A. (2004). Neuroticism: a non-informative marker of vulnerability to psychopathology. *Social Psychiatry and Psychiatric Epidemiology, 39*, 906-912.

Purdon, C. (1999). Thought suppression and psychopathology. *Behaviour Research and Therapy, 37*, 1029-1054.

Purdon, C. (2004). Empirical investigations of thought suppression in OCD. *Journal of Behavior Therapy and Experimental Psychiatry, 35*, 121-136.

Rassin, E. (2005). *Thought Suppression*. Oxford, UK: Elsevier Ltd.

Roemer, L., & Orsillo, S. M. (2002). Expanding our conceptualization of and treatment for Generalized Anxiety Disorder: Integrating mindfulness/acceptance-based approaches with existing cognitive-behavioral models. *Clinical Psychology: Science and Practice, 9*, 54-68.

Ruscio, A. M., Borkovec, T. D., & Ruscio, J. (2001). A taxometric investigation of the latent structure of worry. *Journal of Abnormal Psychology, 110*, 413-422.

Sexton, K. A., Norton, P. J., Walker, J. R., & Norton, G. R. (2003). Hierarchical model of generalized and specific vulnerabilities in anxiety. *Cognitive Behaviour Therapy, 2*, 82-94.

Sookman, D. & Pinard, G. (2002). Overestimation of threat and intolerance of uncertainty in obsessive compulsive disorder. In R. O. Frost & G. Steketee (Eds.), *Cognitive approaches to obsessions and compulsions: Theory, assessment, and treatment*. Amsterdam, Netherlands: Pergamon/Elsevier Science Inc.

Taylor, S. (1998). The hierarchic structures of fears. *Behaviour Research and Therapy, 36*, 205-214.

van der Heiden, C., Muris, P., & van de Molen, H. (2005). De gegeneraliseerde angststoornis: recente ontwikkelingen in therapie en behandeling. *Directieve Therapie, 25*, 316-348.

Wells, A. (1994). A multi-dimensional measure of worry: Development and preliminary validation of the Anxious Thoughts Inventory. *Anxiety, Stress and Coping: An International Journal, 6*, 289-299.

Wells, A. (2005). The Metacognitive Model of GAD: Assessment of Meta-Worry and Relationship With DSM-IV Generalized Anxiety Disorder. *Cognitive Therapy and Research, 29*, 107-121.

Wells, A., & Carter, K. (1999). Preliminary tests of a cognitive model of generalized anxiety disorder. *Behaviour Research and Therapy, 37*, 585-594.

Wells, A., & Carter, K. (2001). Further tests of a cognitive model of generalized anxiety disorder: Metacognitions and worry in GAD, panic disorder, social phobia, depression, and nonpatients. *Behavior Therapy, 32*, 85-102.

SAMENVATTING

Dit proefschrift bevat onderzoek naar twee verschillende constructen die verondersteld worden bij te dragen aan een hoge mate van piekeren, en belangrijk zijn bij het ontstaan en de instandhouding van de gegeneraliseerde angststoornis (GAS; een stoornis waarbij overmatig piekeren het kernsymptoom is). Deze twee constructen zijn intolerantie voor onzekerheden en meta-piekeren.

Intolerantie voor onzekerheden

De twee Canadese onderzoekers Dugas en Ladouceur hebben het construct “intolerantie voor onzekerheden” (IO) aangevoerd als mogelijke belangrijke oorzaak van piekeren. Deze onderzoekers veronderstellen dat mensen die slecht tegen onzekerheden kunnen (c.q. hiervoor intolerant zijn) situaties sneller als ambigu waarnemen dan mensen die niet intolerant zijn voor onzekerheden. Vervolgens reageren zij op deze ambigue situaties door te gaan piekeren, om zo met die waargenomen onzekerheden om te gaan. Onderzoek heeft reeds aangetoond dat IO en piekeren inderdaad hoog gecorreleerd zijn. Verder zijn patiënten met een gegeneraliseerde angststoornis meer intolerant voor onzekerheden dan gezonde mensen die piekeren, en de verschillende angststoornis patiënten kunnen van elkaar worden onderscheiden aan de hand van IO, waarbij GAS patiënten de hoogste mate van IO vertonen.

Hoofdstuk 2 bevat een validatie studie naar de Nederlandse versie van de “Intolerance of Uncertainty Scale” (IUS). De IUS is de meest gebruikte vragenlijst om IO te meten. Uit dit onderzoek bleek dat IO kan worden gezien als een eendimensionaal construct. Verder bleek dat de interne consistentie en de test-hertest betrouwbaarheid hoog waren. Daarnaast bleek dat een hoge score op de “Intolerantie voor Onzekerheden Schaal” sterker samenhing met een hoge mate van piekeren dan met een hoge mate van depressie. Een regressie analyse liet verder zien dat IO significant bijdroeg aan de mate van piekeren als er gecorrigeerd werd voor leeftijd, geslacht, mate van angst en depressie. Ook bleek dat GAS patiënten en andere angststoornis patiënten significant hoger scoorden op de IO dan gezonde mensen. Samengevat komen de psychometrische eigenschappen van de Nederlandse versie van de IUS overeen met die van de Franse en Engelse versie.

In het derde hoofdstuk van dit proefschrift worden twee experimentele studies beschreven waarbij onderzocht werd of individuele verschillen op IU de mate van piekeren konden voorspellen, en wat deze verschillen voor eventuele gevolgen op gedrag had. De deelnemers moesten hiertoe de IUS invullen en vervolgens een al dan niet moeilijke IQ-taak uitvoeren. Uit het onderzoek bleek dat mensen die hoog op de IUS scoren over het algemeen meer piekeren over hun prestatie op de IQ-taak. Bij de groep deelnemers die de gemakkelijke IQ-taak moesten maken, voorspelde individuele verschillen op de IUS de mate van piekeren. Kennelijk heeft IO met name voorspellende waarde als er ook daadwerkelijk gepiekerd kan worden. Als de situatie duidelijk is, dat wil zeggen, als de taak te moeilijk is of te makkelijk, dan voorspelt IO de mate van piekeren niet.

Meta-piekeren

De tweede lijn in de proefschrift betreft onderzoek naar het concept meta-piekeren. De nadruk van het meta-pieker-model dat wordt voorgesteld door Wells ligt niet op de inhoud van alledaags piekeren maar op de negatieve beoordeling van piekergedachten en het willen controleren c.q. onderdrukken van piekergedachten. De meta-cognitieve aanname dat piekeren “gevaarlijk” is wordt verondersteld dagelijks piekeren te veranderen in pathologisch piekeren. Om je eigen gedachten te kunnen beoordelen moet je natuurlijk wel eerst in een bepaalde mate bewust zijn van je eigen gedachten. Dit noemt men “cognitive self-consiousness” (CSC). Uit de literatuur is gebleken dat met name patiënten met obsessief compulsieve stoornis (OCS) een verhoogd niveau van CSC laten zien, en niet zozeer patiënten met een gegeneraliseerde angststoornis (GAS). Toch is het zo dat GAS patiënten meer meta-piekeren dan mensen met een andere angststoornis, of dan mensen zonder een angststoornis.

In hoofdstuk 4 is onderzocht wat de relatie is tussen CSC en meta-piekeren, en wat hun relatie is tot symptomen van GAS (piekeren) en OCS (obsessies en compulsies). De resultaten van dit onderzoek tonen aan dat CSC en meta-piekeren inderdaad met elkaar correleren. Verder bleek dat meta-piekeren samenhangt met zowel piekeren als obsessies en compulsies (ook als deze relatie gecorrigeerd werd voor CSC). CSC was eveneens gerelateerd aan piekeren, maar minder aan OCS symptomen; deze relaties verdwenen echter wanneer er gecorreleerd werd voor meta-piekeren. In de vervolgstudie (zie Hoofdstuk 4.2) werd verder onderzocht in hoeverre CSC en meta-piekeren als aparte constructen gezien kunnen worden. Aan de hand van factoranalyse kan gesteld worden dat CSC en meta-piekeren inderdaad twee aparte constructen zijn. Verder werd in deze vervolgstudie onderzocht wat de invloed van gedachtesuppressie was in relatie tot piekeren en obsessieve gedachten. Men kan namelijk veronderstellen dat als je je continu bewust bent van je eigen gedachten (CSC) en je daarbij deze gedachten negatief beoordeelt (meta-worry), de noodzaak om je gedachten te onderdrukken (suppressie) wordt vergroot. Echter, de mate van gedachtesuppressie is ook gerelateerd is aan een grotere mate van piekeren en OCS symptomen. De resultaten lieten zien dat alle drie deze meta-cognitieve constructen, CSC, meta-piekeren en suppressie, allen positief met elkaar correleerden. Verder werd aan de hand regressie analyses onderzocht wat de precieze bijdrage was van de drie meta-cognitieve constructen aan de mate van piekeren en OCS symptomen. De resultaten lieten zien dat piekeren het beste werd voorspeld door de constructen meta-piekeren en suppressie. OCS symptomen werden het beste voorspeld door de constructen meta-piekeren en CSC. Gesteld lijkt dan te kunnen worden dat (bij gezonde mensen) de negatieve waardering van je eigen gedachten (meta-piekeren) het meest “vergiftigend” werkt en dat je het beste niet kan piekeren over je gepieker.

In Hoofdstuk 5 wordt een onderzoek beschreven dat de twee bovenstaande onderzoekslijnen combineert. In het bijzonder werd onderzocht wat de relatieve bijdrage is van IO en meta-piekeren aan piekeren. Piekeren werd op twee manieren geoperationaliseerd. De mate waarin de deelnemers in het algemeen geneigd zijn om te

piekeren (c.q. de karaktertrek piekeren) werd vastgesteld, alsmede de mate van piekeren naar aanleiding van een aankomend examen (ook wel idiosyncratisch piekeren genoemd). Naast IO en meta-piekeren werd ook de mate van neuroticisme gemeten, omdat bekend is dat deze persoonlijkheidsfactor in belangrijke mate bijdraagt aan angst in zijn algemeenheid. De resultaten lieten zien dat alle drie de variabelen IO, meta-piekeren en neuroticisme correleren met de karaktertrek piekeren. De correlaties van de drie variabelen met idiosyncratisch piekeren waren aanzienlijk kleiner. Door middel van het testen van mediatie modellen kon worden vastgesteld dat zowel IU als meta-piekeren gezien kunnen worden als partiële mediatoren van de relatie tussen neuroticisme en de karaktertrek piekeren. Deze twee variabelen waren geen mediatoren in de relatie tussen neuroticisme en idiosyncratisch piekeren. Echter, een regressie analyse liet zien dat de mate neuroticisme wel van invloed was op idiosyncratisch piekeren naarmate het examen dichtbij kwam. In het kort kan gesteld worden dat de algemene factor neuroticisme, en niet de specifieke variabelen IO en meta-piekeren, de meeste verklarende kracht heeft voor zowel de karaktertrek piekeren als piekeren over een stressvolle gebeurtenis.

Dit proefschrift heeft een bijdrage geleverd aan het onderzoek dat gedaan wordt ter verduidelijking van welke factoren een invloed hebben op een hoge mate van piekeren. Als duidelijk wordt hoe piekeren ontstaat en welke factoren dit proces beïnvloeden, dan kunnen er nog betere therapeutische interventies ontwikkeld worden zodat de kans bestaat dat minder mensen hun leven hoeven te leven in angst voor het dagelijkse bestaan en de toekomst.

D ANKWOORD

Woorden van dank allereerst voor mijn begeleiders.
Eric, aan je aparte stijl van, laten we het maar gewoon “zijn” noemen, was ik snel gewend. Door je typische Ericiaanse tics, je spitsvondige opmerkingen en door je humor voelde ik me snel op mijn gemak. Je had altijd tijd, stond open om te helpen, verduidelijkte zaken, en zette alle opties op een rijtje. Ik benijd je wetenschappelijk inventiviteit en nieuwsgierigheid. Ik hoop dat je je eerste AIO niet snel zal vergeten ;-).
Peter, ik was al halverwege mijn AIO tijd toen je hier als hoogleraar kwam werken. Mijn oude stukken werden opgeknapt en nieuwe onderzoekslijnen werden uitgezet. Ik had het nodig dat je me aanstuurde, dat je op details hamerde en me inzicht en overzicht gaf in het doen van onderzoek. Mijn dank hiervoor is groot.
En Henk M, zeer bedankt voor het mogelijk maken van mijn AIO plek. Zoals uit mijn dankwoord zal blijken was deze tijd voor mij zeer waardevol.

Door, met en tussen de collega’s van psychologie en dankzij de ongedwongen gezellige sfeer, ben ik 4 jaar met plezier naar mijn werk gegaan. Ik zeg expres ook “tussen” want een groot deel van het voltooien van een proefschrift gebeurt in ‘t hoofd en achter de computer. Maar promoveren doe je toch echt niet alleen!
Marleen, zo goed als 4 jaar op een kamer. Verwonderd hebben we wel eens geconcludeerd dat we elkaar vaker zagen dan wie dan ook. Wat hebben we veel met elkaar bepraat; over onderzoek, werk, maar vooral ook over vele (zo niet alle) privé zaken, liefdesperikelen en onszelf. Bedankt voor de gezelligheid!
En dan de andere meidenkamers: Manon en Marleen S.. Manon, bedankt dat ik altijd bij je kon binnen lopen, met een praatje over niks, of juist over belangrijke zaken (altijd die mannen)! En ook al begaf mijn computer het in de final hours van mijn AIO tijd, gelukkig kon ik bij jou terecht voor tips en hulp bij het opmaken van mijn proefschrift. Marleen S., door mijn regelmatige gebinnenloop bij jullie kon je haast niet om me heen, ook al probeerde je altijd gedisciplineerd door te werken ;-)! Ik vond jullie luisterende oren en meningen fijn, altijd verliet ik jullie kamer vrolijk.
Birgit en Marije: Ik vond het gezellig om na, voor en tijdens het checken van de post even een praatje te maken met jullie over alle leuke (en minder leuke dingen) van het leven. Ik wens jullie nog lang veel plezier op die kamer! Dames, ik hoop jullie te blijven zien!
Ingmar, bedankt voor de gezelligheid en de praatjes over het weekend en uitgaan, maar ook onze gesprekken over de serieuzere zaken van het leven heb ik zeer gewaardeerd.
En dan een aantal mensen die ik ook moet noemen: Lidia (met twee i’s), ik sprak je niet vaak, maar als ik je sprak was het goed. Ik hoop dat je heel gelukkig bent en blijft met je gezin! Ook de “derde wielen aan de wagen” ;-), de tijdelijke (extra) kamergenootjes Saskia en Lydia deden mij weer anders naar mijn werk en mezelf kijken, dank daarvoor. Bedankt ook Eveline voor de hulp bij het gereedmaken van de omslag van dit boekje. Alle andere fijne collega’s die hier niet met naam en toenaam worden genoemd, bedankt voor de gezelligheid en inspirerende gesprekken. Misschien dat de volgende zaken nog wat leuke herinneringen oproepen, voor mij in ieder geval wel: de Efteling, (kotsen op) wintersport,

lunchen op de Euromast, de vele gezellige etentjes en borrels (cliniclowns!), praatjes in de keuken en bij het kopieerapparaat, squashen, zaalvoetbal en ga zo maar door!

Dank ook aan de achterkant van de cijfertje, de data... de studenten. Ik weet dat piekeren voor velen een gebezigde activiteit is en gelukkig voor mij waren de psychologie studenten daar in geen uitzondering!

Cynthia, al jaren luister je naar mijn perikelen, maar hebben we ook veel lol samen. Ik vind het erg fijn dat je als paranimf naast me zal staan, waar zou ik zijn zonder jou?! En Lonneke, bedankt voor de gezelligheid, versperkingen en luisterend oor al die jaren, je bent een waardevolle vriendin!!!!!
Alle bezoekers van de laan, bedankt voor de nodige afleiding, gezelligheid en ontspanning tijdens mijn AIO tijd!

Bedankt ouders, voor alles! Ik verbaas me er wel eens over dat ik nu welgeteld 26 jaar opleiding heb genoten, dat lijkt me wel even genoeg! Ik hoop dat jullie trots zijn. Niet zo zeer op mij maar op jullie zelf. Wout, de vanzelfsprekendheid van jouw enorme bron van kennis (waar je het overigens wel niet mee eens zijn zal zijn;-)) is iets waar ik altijd op terug kan vallen. En ik zal het verder ontkennen maar flauwe grapjes kunnen best leuk zijn. Floor, wat anders kan ik zeggen dan dat je mijn lieve mama bent. Ik weet dat ik altijd op jullie kan rekenen. Ik hoop, heel erg, dat jullie nog lang van een mooi leven mogen en kunnen genieten! Dave, lieve broer, het is altijd gezellig als we de tijd hebben voor elkaar. We kunnen uren praten en ik leer altijd weer over mezelf, jou, het leven en ons gezin, dat waardeer ik zeer.

En dan Tom, mijn allerliefste lieverd. Ik denk (natuurlijk) altijd dat ik het beter weet ;-), maar je hebt me heel veel duidelijk gemaakt en geleerd; simpel en gewoon door jezelf te zijn. Het leven hoeft niet ingewikkeld te zijn. Het leven is mooi en is er om te leven, niet om te (o)verdenken. We zijn gelukkig saampjes.

In de afgelopen 4 jaar heb ik op allerlei vlakken veel geleerd. Ik kijk uit naar het begin en de rest van mijn carrière, en met al deze goudstaafjes in mijn rugzak kan ik haast niet meer verkeerd terecht komen.

Bedankt voor de fijne tijd iedereen!

Gwen

CURRICULUM VITAE

Gwen de Bruin werd geboren op 18 juli 1976 in Wijk bij Duurstede. Van 1988 tot 1995 volgde zij middelbaar onderwijs (VWO) op de Openbare Dalton Scholengemeenschap in Voorburg. In 1995 begon ze aan haar studie psychologie aan de Universiteit Utrecht. Ze volgde het tracé cognitieve functiestoornissen. Haar stage liep ze in Verpleeghuis Nieuw Berkendael te Den Haag, op de afdeling Intensieve Zorg voor patiënten met niet-aangeboren hersenletsel. Ze schreef haar scriptie naar aanleiding van onderzoek bij kinderen met antisociale en agressieve gedragsstoornissen, wat zij deed in Buitenkliniek Vossenveld, van het Universitair Medisch Centrum te Utrecht. In 2002 behaalde zij haar diploma. Vanaf 2002 tot 2006 werkte ze als AIO aan het Instituut voor Psychologie aan de Erasmus Universiteit Rotterdam.

Publicaties:

de Bruin, G. O., Rassin, E., & Muris, P. (in press). The prediction of worry in non-clinical individuals: The role of intolerance of uncertainty, meta-worry, and neuroticism. *Journal of Psychopathology and Behavioral Assessment*.

de Bruin, G. O., Rassin, E., & Muris, P. (in press*).* Are there specific meta-cognitions associated with vulnerability to symptoms of worry and obsessional thoughts? *Personality and Individual Differences*.

de Bruin, G. O., Rassin, E., & Muris, P. (in press). Worrying in the lab: Does intolerance of uncertainty have predictive value? *Behaviour Change*.

de Bruin, G. O., Rassin, E., van der Heiden, C., & Muris, P. (2006). *Psychometric properties of a Dutch version of the Intolerance of Uncertainty Scale*. Manuscript submitted for publication.

de Bruin, G. O., Rassin, E., & Muris, P. (2005). Cognitive self-consciousness and meta-worry and their relations to symptoms of worry and obsessional thoughts. *Psychological Reports, 96,* 222-224.

Rassin, E., Muris, P., Jong, J., & de Bruin, G. (2005). Summoning white bears or letting them free: the influence of the content of control instructions on target thought frequency. *Journal of Psychopathology and Behavioral Assessment, 27*, 253-258.

de Bruin, G. O., & Nagtegaal, M. H. (2003). De psychologie achter de rechtsgang [Recensie van het boek *Het recht van binnen. Psychologie van het recht*]. *De Psycholoog, 38*, 21-22.

Poster presentaties:

de Bruin, G. O., & Rassin, E. (2003, July). *Efficacy of thought control strategies*. Poster session presented at the international, interdisciplinary conference for Psychology and Law, Edinburgh.

de Bruin, G.O. (2005, September). *Meta-cognition and suppression: their relations to obsessional thoughts and worry in a non-clinical sample.* Poster session presented at the European Association of Behavioural and Cognitive Therapies conference, Thessaloniki.