

Graduate thesis, PSYPRO 4100

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Change in meta-cognition is associated with  
reduced levels of worry after treatment in an adult  
population with generalized anxiety disorder: A  
preliminary analysis

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## **Abstract**

The Meta-cognitive model of generalized anxiety disorder (Wells, 1995) predicts that the most important factor in development and maintenance of GAD is negative meta-cognitive beliefs about the dangers and uncontrollability of worry. The present study aimed to examine the association between degree of change in negative meta-cognition and post-treatment levels of worry following treatment of generalized anxiety with Meta-cognitive therapy and Cognitive Behavioral Therapy. The main finding of the study was that change in negative meta-cognitions accounted for more than half the variance in post-treatment worry. These preliminary results provide further empirical evidence for the role of meta-cognitive change in GAD.

## **Introduction**

Generalized Anxiety Disorder (GAD) was first included in the third version of Diagnostic and Statistical Manual of Mental Disorders (DSM-III; American Psychiatric Association, 1980) when the diagnostic category "anxiety neurosis" was split into panic disorder and GAD. Until then GAD was considered a residual category for patients not fitting other anxiety diagnoses – often those who experienced considerable anxiety but without panic attacks or avoidance behavior typical of phobias (Heimberg, Turk & Mennin, 2004).

In the revised version of the DSM-III (DSM-III-R; APA, 1987) the central feature of GAD was changed from "free-floating anxiety" to worry.

The current diagnostic features of GAD (DSM-IV-TR; American Psychiatric Association, 2000) include "excessive and difficult-to-control worry" occurring more days than not for at least 6 months. The topics of worry must not be confined to one area and thus better be explained by other Axis-1 disorders (e.g. negative evaluation by others typical of social phobia or contamination typical of obsessive compulsive disorder). The patient must report at least three out of six somatic symptoms occurring more days than not in the last 6 months; 1) Restlessness, 2) Fatigue, 3) Difficulty concentrating, 4) Irritability, 5) Muscle tension and 6) Disturbance of sleep patterns. The symptoms must not be a result of the effects of substance abuse or medical condition, and must cause clinical levels of dysfunction in social, occupational and or other important areas of functioning.

GAD has been shown to be highly co morbid with other mental disorders. It has been shown that a diagnosis of GAD without any other co morbid disorder represented only one third of the total prevalence (Bruce, Machan, Dyck & Keller, 2001; Judd et al., 1998). Based on DSM-III-R criteria for GAD a study showed that up to 90 % of patients also manifest at least one other psychiatric illness, most commonly depression. Fifty percent of patients reported that the disorder caused significant impairment in their life (Wittchen, Zhao, Kessler & Eaton, 1994). In a recent study using 43.093 adults from USA found that 89.9 % of individuals with GAD had another co morbid disorder (Grant et al., 2005) With or without an additional co morbid diagnosis GAD was associated with significant personal distress and medication use (Wittchen et al., 1994; Brown, Barlow & Liebowitz, 1994; Grant et al., 2005; Turk & Mennin, 2011).

GAD remains understudied compared to other anxiety disorders not only because of its recent classification as a separate anxiety disorder but also because of frequent shifts in defining characteristics and issues pertaining to validity of involved constructs (Turk & Mennin, 2011; Mennin, Heimberg & Turk, 2004).

Developing effective means of treating the disorder is contingent on a thorough understanding of the etiology of the disorder and the underlying processes involved. Cognitive behavioral therapy (CBT) is the most commonly used psychological treatment for GAD; however results of randomized controlled trials have not consistently yielded results comparable for treatment of other anxiety disorders (e.g. Fisher, 2006). There is a need for innovation in the field of treating GAD. An in-depth review of the current theoretical models of GAD and their empirical support is beyond the scope of the paper; see Behar et al. (2009) for a review.

### **Worry**

One of the first attempts to define worry was provided by Borkovec, Robinson, Pruzinsky, and DuPree (1983, p. 10): “Worry is a chain of thoughts and images, negatively affect-laden and relatively uncontrollable; it 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; consequently, worry relates closely to the fear process.” Worry is not only the primary diagnostic feature in GAD – it has been suggested to be an important feature of 40 to 60 % of other anxiety disorders (Barlow, 2002).

Worry is considered a normal occurring phenomenon in the general population (e.g. Wells & Morrison, 1994) and it has been shown that outside clinical populations 38 % of individuals worry at least once a day (Tallis, Davey, & Capuzzo, 1994).

The anxiety in GAD can be described as “apprehensive expectation”, and in contrast to other anxiety disorders lack a clear focal point or narrow range of feared stimuli as for instance the fear of scrutiny by others typical of social phobia or the fear of contamination typical of obsessive-compulsive disorder. The feared stimuli in GAD are abstract and might never occur which precludes effective exposure and subsequent in therapy (Garfinkle & Behar, 2012).

Worry is primarily a verbal-linguistic form of processing information, and involves little imaginal activity – it involves “talking to oneself” (Borkovec & Inz, 2000). The worry process can be differentiated from both obsessional thoughts typical of OCD and rumination typical of depression (Wells & Morrison, 1994; Papageorgiou & Wells, 2001). Worry can be used as a strategy to generate a sense of being prepared, and also to distract from other, more emotionally distressing topics (Borkovec & Roemer, 1995). It follows that the perceived gains of worrying negatively reinforces the view of worry as an effective means to reduce negative outcomes. Indeed, such positive beliefs about the need to worry are common across all contemporary cognitive models of GAD (Fisher & Wells, 2011). What people worry about, hereby referred to as worry content, appears to be the same independent of GAD diagnosis. Some evidence point to an overweight of themes related to interpersonal and miscellaneous, everyday issues (e.g. Borkovec, Robinson, Pruzinsky & DePree, 1983, Sanderson & Barlow, 1990; Craske, Rapee, Jackel & Barlow, 1989; Roemer, Molina & Borkovec, 1997). Self reported high degrees of worry alone do not differentiate non-GAD worriers from those who meet criteria for a GAD-diagnosis (Ruscio, 2002). Further, when matched on levels of trait worry the degree to which participants endorse beliefs about the uncontrollability of worry has been found to differentiate GAD from non-GAD worriers (Ruscio & Borkovec, 2004). GAD worriers have also been shown to spend more time worrying (Craske et al., 1989).

### **Meta-cognitive model of GAD**

”Meta-cognition is cognition applied to cognition” (Wells, 2009: ppt 1). MCT has some similarities with traditional cognitive therapy since it focuses on dysfunctional beliefs. However, the focus is not beliefs about the self or the world as in traditional CBT, but the subjective appraisal of the thinking process.

The goal of traditional CBT is to challenge the patient’s belief in the validity of negative thoughts, feelings and beliefs. The central focus of treatment is to examine and challenge the meaning the patients prescribe to their experience. MCT deals with a pattern of thinking which prohibits the negative thoughts, feelings and beliefs from being transitory and simply passing (Wells, 2009). It is based on the idea that negative thoughts are normal, but certain response patterns are thought to ”lock the individual into prolonged and recurrent states of negative self-relevant processing” (Wells, 2009: ppt. 3). The beliefs about the self and the world are seen as products of maladaptive styles of thinking. A focus on the content of worry does not change the underlying style of thinking.

General worry about external events, physical symptoms described as "mild, transient, generally limited in scope and experienced by the majority of individuals" (Ruscio, 2002, pp. 378) are in meta-cognitive theory labeled Type 1 Worry (Wells, 2009). The content of worry experienced by the normal population in response to a trigger falls into this category. This category of worry is the target of treatment with CBT. In the meta-cognitive model GAD develops when the individual starts to perceive the process of worrying as uncontrollable and psychologically or physiologically harmful. Such beliefs, or "worry about worry" are labeled Type 2 Worry or meta-worry.

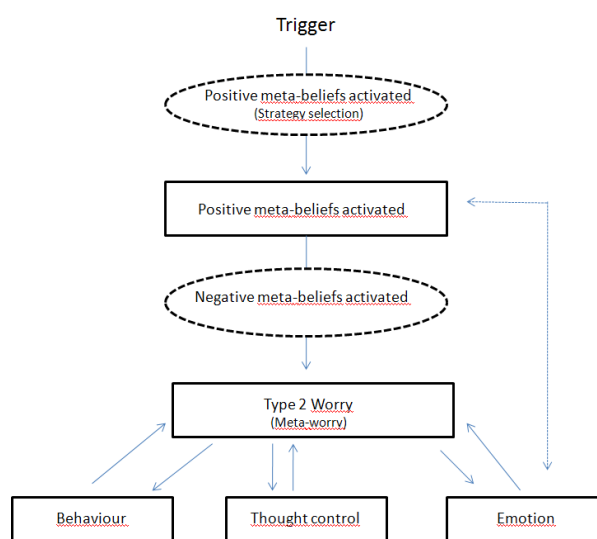


Figure 1: The Meta-cognitive model of GAD (Wells, 2009).

Worry triggers may vary, but usually occur as a "what-if?-thought". In response to a trigger certain positive meta-cognitive beliefs about the usefulness of worry as a strategy is activated (i.e. "worrying helps me cope").

The perception of uncontrollability stems in part from the maladaptive pattern of responding to intrusive negative thought content. The individual responds with attempts to control thoughts through distraction, avoidance or suppression which ultimately increase preoccupation with negative thoughts, increase sensitivity to threat and diminish sense of control over worry. These behaviours preclude both effective problem solving and to allow the transient, negative thought to pass on its own. This may lead to an immediate reduction in somatic response and thereby further negatively reinforce the beliefs about the usefulness of worry (Wells, 2009).

### **Treatment of worry and the need for innovation**

CBT is the treatment of choice for GAD, but due to the disorder's brief history it has been argued that a clear conclusion as to what treatment is most effective cannot yet be reached in

part because of the small amount of research (Hunot, Churchill, Silva de Lima & Teixeira, 2007).

A recent meta-analytical review found CBT to be effective in reducing worry specific symptoms in GAD (Covin et al., 2008). The argument for innovation in the field of psychotherapy for GAD is based on the fact that CBT does not produce significant change in outcome on measures beyond effect size and statistical significant change in symptoms.

Efficacy of treatment measured by i.e. Jacobson methodology (Jacobson & Truax, 1991) or proportion of participants no longer meeting diagnostic criteria for GAD is argued to be a better indicator of overall effectiveness of therapy than effect sizes alone (Fisher, 2006; Hunot, Churchill, Silva de Lima & Teixeira, 2007; Van der Heiden, Muris, & Van der Molen, 2012).

Fisher (2006) conducted a meta-analysis of CBT for GAD which utilized Jacobson methodology (e.g. Jacobson & Truax, 1991) to measure clinical significant change on both the trait version of State Trait Anxiety Index (STAI-T; Spielberger, Gorusch, Lushene, Vagg & Jacobs, 1983) and Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger & Borkovec, 1990). His analysis showed that only approximately 50 % of participants met criteria for recovery as measured by PSWQ and 60 % on the STAI-T. Further research into theory driven treatments of GAD and examinations of the specific cognitive processes involved in maintenance and change of the disorder and change seems warranted.

Research on Wells meta-cognitive model of GAD has shown promising results. Large post-treatment effect sizes and high levels of recovery have been shown in an uncontrolled trial (Wells & King, 2006), compared with AR (Wells, Welford, King, Papageorgiou, Wisely, & Mendel (2010) and compared with CBT in a preliminary analysis (Kvistedal, 2011). All studies employed the stringent Jacobson criteria for measuring clinically significant improvement as well as measuring statistical significant change in symptoms, and post treatment outcome showed large effect sizes in the range of 1.04 – 3.41 and high degrees of clinically significant change ranging from 60 – 100 %.

Common limitations of these studies are the small sample size, and further replication comparing MCT to other active treatment in large samples is needed. Van der Heiden, Muren & van der Molen (2012) recently compared the efficacy of MCT to Intolerance of Uncertainty Therapy (UIT; Dugas, Gagnon, Ladouceur & Freeston, 1998) in a randomized clinical trial of 126 participants with GAD. At post treatment 91 % of the participants who received MCT no longer met criteria for the GAD diagnosis compared to 80 % for the participants receiving IUT.

Research is still uncovering the degree to which change in a specific cognitive process is related to outcome in GAD. For the validity of CBT to hold true future studies must investigate to what extent therapeutic change in specific cognitive processes can predict outcome. One such study conducted by Butler (1993) found preliminary evidence that degree of pre-treatment tendency to interpret ambiguous situations as threatening predicted outcome.

In her study she compared CBT to behavior therapy and this cognitive predictor was only related to outcome in the CBT-group. However, she used a broad measure of anxiety and the results thereby showed that tendency to interpret ambiguous situations predict post treatment level of anxiety more than worry specifically.

A recent study by Van der Heiden et al. (2010) examined a hierarchical model for the relationship between higher order vulnerability factors, specifically the personality traits of neuroticism and extraversion, and second order mediators that determine the specific manifestations of symptomatology in GAD. The mediators in their analysis were positive and negative meta-cognitions and also Intolerance of Uncertainty (IU; Dugas et al., 1998). Van der Heiden and colleagues found that individual differences in worry was mainly a result of differences in measured neuroticism, and that this link was mediated by negative meta-cognitions as well as IU, but IU to a lesser degree. In the analysis the personality traits and mediators of meta-cognitions and IU accounted for 39.8 % of the variation in worry thereby lending some support to the appropriateness of therapy targeting both these dimensions. As research is uncovering the different aspects of worry further investigations is needed to evaluate predictive power of the different theoretical models. The area of focus in MCT is separate from CBT in that the former focuses on the patient's particular style of relating to his/her thoughts more than challenging and reality-testing the content of thoughts. CBT has



been shown to be effective in reducing symptoms of GAD, but the results of clinical trials are still not on par with the effectiveness of CBT for other anxiety disorders. One possible reason for the discrepancy in the efficacy in outcome research between CBT and MCT is that treatment that focuses change in response to worry-triggers indirectly challenges negative meta-cognitive beliefs about the uncontrollability of worry.

### **Study aims and hypotheses**

This study aimed to: 1) test the meta-cognitive model of GAD by investigating the relationship between negative meta-cognitions and levels of worry at post-treatment, and 2) investigate to which degree changes in cognitions and meta-cognitions relate to post treatment levels of worry. Variables of interest were change in worry content as measured by the social- and health-worry subscales of the AnTI, and change in negative meta-cognitions as measured by the negative meta-cognitions subscale of the MCQ-30. The outcome measures used for measuring worry were the PSWQ.

In accordance with the meta-cognitive model we hypothesized that pre treatment levels of meta-worry would correlate with post-treatment levels of worry. Given the efficacy of CBT we also suspected that content of worry would account for some variance, albeit less than meta-worry. We also expected that change in meta-cognitions following treatment would account for more variance in post treatment levels of worry than change in worry content (cognitions).

## **Method**

### **Design**

The study is only preliminary, and is based on a dataset collected at the outpatient-clinic at the Department of Psychology at the Norwegian University of Science and Technology in Trondheim, Norway. The goal of the original study was to treat at least 60 participants suffering from GAD and they were individually treated with either CBT or MCT. Contrast measures of symptoms pre- and post treatment and in addition a pre to post waitlist control group was included (N = 20).

## Participants

Participants were recruited to the study by a combination of advertising in newspapers and referrals from general practitioners and other mental health specialists in the Trondheim area. Out of 298 people considered for the study 251 responded to newspaper ads and 47 were referred. 185 of the 251 who responded to ads were excluded by telephone screening consisting of a brief 30-minute semi-structured interview. The remaining 66 were offered a further brief diagnostic interview in person which further excluded 26. The remaining 40 participants plus all those referred by general practitioners (N=47) were given the full structured diagnostic interview using ADIS-IV, SCID-I, SCID-II to determine whether the participants met the criteria described above and also any additional diagnoses. Videotapes of the interviews of participants determined eligible for the study by the assessors were then sent to supervisors Hans M. Nordahl, Ph.D., Professor NTNU and Roger Hagen, Ph.D., Associate Professor, NTNU. Participants deemed suitable for the study by both supervisors were then offered inclusion (N=58). Reassessment of the participants at post treatment were given by the same assessor who were all kept blind to treatment group and progress.

**Table 1: Inclusion criteria**

Participants meeting all of the listed criteria were included in the study:
1) Signed written consent obtained prior to entry in the study
2) Diagnosed with generalized anxiety disorder (DSM-IV, APA, 1994)
3) 18 years or older

**Table 2: Exclusion criteria**

Participants presenting and of the following were not included in the study:
1) Known somatic diseases
2) Psychosis
3) Past suicidal attempts and/or current intent
4) PTSD
5) Cluster A or B Personality disorder
6) Substance dependence
7) Not willing to accept random allocation
8) Not willing to withdraw psychotropic medication for a period of 4 weeks prior to entry in the trial

All participants were randomly allocated to either one of the two treatment groups or the waitlist control group. Two factors were controlled for in the randomization; gender and presence of major depressive disorder. All participants filled out a battery of self report measures before and after completing treatment. Once the treatment groups completed treatment, participants in the wait list group were re-randomized to be treated either with CBT or MCT. Follow up measures are scheduled to be conducted at 1 and 2 years after completion of the trial.

### **Therapists and treatment**

A total of six therapists conducted both the CBT and the MCT treatments. During the treatment phase they were supervised by Professor Thomas Borkovec, Penn State University and Professor Adrian Wells, Ph.D., University of Manchester/Norwegian University of Science and Technology to assure quality of treatment. All treatment were recorded on video and subjected to review by external experts to assure treatment true to the protocols of Professors Borkovec and Wells.

The treatments differ on theoretical assumptions regarding GAD and steps were taken to assure the least amount of overlap of focus and techniques across treatment groups. In the CBT-condition there were given no focus to the patients meta-beliefs regarding worry, perceived controllability of worry. In the MCT-condition no focus was given to training the patient in awareness of worry-cues, and no instruction was given regarding relaxation techniques or breathing practice.

### **Outcome measures**

All participants filled out a battery of self-report measures before and after treatment. Among these measurements were the PSWQ (Meyer et al., 1990). The PSWQ has become the most utilized measure of trait worry (e.g. Covin, 2007) and consists of 16-items designed to measure the qualities of worry and its subjective experience related to excessiveness, uncontrollability and elaborateness of worry topics. The items are rated on a 5-point scale ranging from “not at all” to “very typical”. The psychometric properties of the PSWQ have been investigated in both non-clinical and clinical samples (Meyer et al., 1990; Brown, Antony & Barlow, 1992). It has been shown to possess excellent internal consistency (Cronbach alphas ranging from 0.86 - 0.95) and test-retest reliability ( $r_s$  ranging from 0.74 - 0.93; Molina & Borkovec, 1994). Brown et al. (1992) investigated the validity of the PSWQ in a sample of 436 patients suffering from anxiety disorders (panic disorder, GAD, social phobia, simple phobia, obsessive-compulsive disorder) and 32 controls. They reported high internal consistency in line with the results of Meyer et al. (1990). Further it was found that scores on the PSWQ differentiated between the different anxiety disorders and also the controls from the patients with a diagnosis. Also as reported by Meyer et al (1990) scores on the PSWQ did not correlate with other measures of anxiety and depression in the GAD sample providing further evidence of worry as an independent construct.

The Anxious Thoughts inventory (AnTI; Wells, 1994) is a self-report measure consisting of 22 items empirically derived to measure different aspects of worry proneness on three distinct subscales; social worry, health worry and meta-worry. The first two scales focus on worry content (type 1 worry) while the third measures meta-worry or type 2 worry specifically. Wells & Carter (2001) have reported high internal consistency (social worry: 0.84, health worry: 0.81, meta-worry: 0.75) and high test-retest correlations over a 6-week period (social worry: 0.76, health worry: 0.84, meta-worry: 0.77). Positive correlations with other

measurements of worry (e.g. PSWQ: .58 for social worry and .40 for health worry) has also been shown (Wells, 2009).

Scores on the individual subscales of the AnTI have also been found to discriminate between different diagnostic groups. Patients suffering from panic disorder score higher on health worry, patients with social phobia score higher on social worry, and finally, patients with GAD score higher on meta-worry (Wells & Carter, 2001). The latter result is in accordance with Wells meta-cognitive model of GAD where subjective experience of uncontrollability and dangerousness of the worry process more so than the domains of worry is the noxious aspect. A limitation of the AnTI is that it measures perceived sense of worry uncontrollability and to lesser degree subjective appraisals of danger associated with the process of worrying (Wells, 2005), which makes it a non-optimal measure of meta-worry in GAD.

The Meta-Cognitive Questionnaire (MCQ; Cartwright-Hatton & Wells, 1997) measures trait meta-cognitions on five different subscales: 1) Positive beliefs about worry; 2) Negative beliefs about worry concerning uncontrollability and danger; 3) Low cognitive confidence; 4) Need to control thoughts; 5) Cognitive self-consciousness. The original instrument consisted of 65 items and had sound psychometric properties. Recently Wells & Cartwright-Hatton (2004) have introduced a shorter, refined version with only 30 items entitled MCQ-30 which has been shown to be similar to the original both with respects to high internal consistency (alphas ranging from .72 to .93) and high test-retest correlations ( $r = .75$  for total score,  $r_s$  ranging from .59 to .79 for the five subscales) over a period of four months (Wells & Cartwright-Hatton, 2004). Thus it measures broader aspects of meta-cognitions and thus more suitable in assessing worry in GAD, than AnTI. Thus in measuring meta-worry, the MCQ-30 is the recommended instrument (Well, 2009).

### **Overview of data analyses**

First, in order to do a crude test of the associations between pre-treatment levels of cognitions and meta-cognitions and worry, a correlation matrix was calculated. Further, a hierarchical multiple regression was then used with pre treatment levels of overall worry entered in the first step. In the second step the two worry content subscales and meta-worry were entered. Second, we were interested in whether changes in the respective dimensions of worry would be associated with the variance in post-treatment overall worry. The difference in pre- and

post-treatment worry content, meta- and overall worry was calculated. Then, a correlation matrix was calculated to examine the degree to which change in specific worry dimensions correlate with change in overall worry. Finally, a multiple hierarchical regression was used with pre treatment levels of worry measured by the PSWQ entered in the first step and the difference scores on the three subscales in the second.

## **Results**

The correlations between the subscales and pre-treatment levels of worry are presented in Table 1. Analysis showed that both the social worry content dimension and the negative meta-cognitions were highly correlated with pre-treatment levels of overall worry. Further, health worry was only found to be correlated with negative meta-cognitions.

In the first regression analysis a hierarchical multiple regression analysis was used to attempt a prediction of post treatment levels of worry using pre treatment levels of social, health and negative meta-worry. Results indicated that none of the worry dimension subscales reached significance - when adjusting for the pre-levels scores on worry.

In the second regression analysis we were interested in examining whether change in the specific dimensions of content and meta-worry would be associated with post-treatment levels of worry. First, a correlation matrix was calculated between the difference scores of the subscales and overall worry. The results are shown in table 4.

**Table 3**

Bivariate correlations of the specific subscales of the AnTI and MCQ-30 and PSWQ. All measures are pre-treatment. (N=71-80).

		AnTISocial	AnTIHealth	PSWQ	MCQNeg
AnTISocial	Pearson Correlation				
	Sig. (2-tailed)				
AnTIHealth	Pearson Correlation	.012			
	Sig. (2-tailed)	.919			
PSWQ	Pearson Correlation	.590**	.152		
	Sig. (2-tailed)	.000	.202		
MCQNeg	Pearson Correlation	.309**	.296*	.543**	
	Sig. (2-tailed)	.008	.012	.000	

\*  $p < 0.05$ , \*\*  $p < 0.01$  Note. AnTISocial = Social worry subscale of the Anxious Thoughts Inventory.

AnTIHealth = Health worry subscale of the Anxious Thoughts Inventory. MCQNeg = Negative meta-cognitions subscale of the MCQ-30. PSWQ = Penn State Worry Questionnaire.

In the regression analysis pre-treatment levels of worry were entered in the first step, and explained 11 % of the variance. In the second step differences in negative meta-worry made the most significant contribution to the variance with 52.9 % of the variance explained. Change in social worry explained an additional 13.1 % of the variance. The overall model explained 78 % ( $\Delta R^2 = .78$ ,  $F(3, 59) = 72.32$ ,  $p < .0001$ ) of the variance in post-treatment worry. The results are presented in table 4.

**Table 4**

Model 2: Statistics for the different steps of regressions with post treatment PSWQ regressed on calculated difference scores of the social and health worry subscales of the AnTI, and negative meta-cognition subscale of the MCQ-30 (N=66-80)

<b>Model 2</b>	<b>F</b>	<b><math>\Delta R^2</math></b>	<b>B</b>	<b>SE B</b>	<b><math>\beta</math></b>
<i>Step 1</i>	8.82**	.11**			
PSWQ pre			0.69	0.23	.35**
<i>Step 2</i>	56.93***	.64***			
PSWQ pre			0.74	0.14	.39***
DiffMCQNeg			-1.9	0.20	-.73***
<i>Step 3</i>	72.32***	.78***			
PSWQ pre			0.89	0.12	.46***
DiffMCQNeg			-1.23	0.20	-.47***
DiffAnTISocial			-1.03	0.17	-.46***

\*  $p < 0.05$ , \*\*  $p < 0.01$  and \*\*\*  $p < 0.001$ . Note. DiffMCQNeg = Difference between score pre and post treatment for the negative meta-cognitions scale of Meta-cognitions Questionnaire pre post treatment; PSWQ = Penn State Worry Questionnaire; DiffAnTISocial = Difference between score pre and post treatment for the social worry subscale of the Anxious Thoughts Inventory.

## **Discussion**

This study was designed to investigate the proposition by the meta-cognitive model that negative meta-cognitions are the driving structures of the development and maintenance of GAD. The population used consisted of adults with generalized anxiety disorder who had received treatment with CBT and MCT.

The two aims of the study were to 1) examine the relationship between levels of content and negative meta-worry at pre-treatment to overall worry at outcome, and 2) to examine the relationship between change in measures of content and negative meta-worry to overall worry at outcome.

Results indicated that the first hypothesis was not confirmed. We expected that pre-treatment levels of worry dimensions, specifically negative meta-worry to a higher degree than worry



content, would be related to post-treatment overall worry. None of the subscales of AnTI or MCQ-30 entered in the first regression made significant contributions to the variance in the outcome measure in this analysis.

A possible explanation for this is that both CBT and MCT produced such large decreases in their respective dimensions of worry that the variance in overall worry at post-treatment did not allow for any clear effect to be seen.

The efficacy of both meta-cognitive therapy and CBT in producing clinically significant change in the same sample used in this study has been recently described elsewhere in a preliminary analysis by Kvistedal (2011). He found that 71 % of participants in the MCT-group met criteria for recovery as measured by the PSWQ post-treatment, and 87.5 % were considered to be in remission. The CBT group fared less well with 39 % meeting criteria for recovery as measured by the PSWQ and 68.8 % considered to be in remission. In Kvistedal's preliminary analysis CBT was found to be highly effective in treating GAD symptoms, albeit not as effective as MCT. An implication of this is both therapies are effective regardless of degree of symptoms measured at pre-treatment.

However, a relationship between measures of both overall and specific dimensions of worry at pre-treatment was found in the original correlation analysis. Specifically, measures of negative meta-cognitions and social worry showed high correlations to overall worry. This is to be expected since a diagnosis of GAD requires individuals to report excessive and uncontrollable worry, and both the AnTI and MCQ-30 have been shown to have sound psychometric properties. Another interpretation of this is that there exists a degree of overlap in the underlying construct that the measurements tap.

The therapists were given specific instructions to not focus on meta-cognitions in the CBT treatment and not to challenge worry content in the MCT treatment. However, our results could be interpreted that the focus on reality testing and disproving worry content in CBT also leads to decrease in negative meta-cognitions as patients realize that worry can, in fact, be controlled. One of the areas of focus in CBT is removing the more or less automatic worry response to internal and external triggers, and focus on this in therapy will affect indirectly meta-beliefs about uncontrollability as the patient gain insight into the other, more adaptive responses that are available. Further research should address whether the degree to which the

relative effectiveness of CBT can be attributed to indirect change of meta-cognitive dimensions by for instance measuring symptoms and meta-cognitive change multiple times over the course of treatment.

The second aim of the study was to investigate whether change in negative meta-worry would account for a higher proportion of overall variance in post-treatment worry than change in dimensions of worry content.

The main finding of this study was that change in negative meta-cognitive beliefs accounted for a substantial 52.9 % of the variance in outcome. The overall model accounted for 77 % when change in social worry was entered into the analysis and we controlled for pre-treatment worry. Cartwright-Hatton & Wells (1997) found that when controlling for trait anxiety positive beliefs about the need to worry, low cognitive confidence and in particular beliefs about the uncontrollability and dangers of worry as measured by three of the subscales in the MCQ accounted for 10 % of the variance in proneness to worry as they measured by the sum of the AnTI. Our results extrapolate this finding by indicating the strong relationship between change in a specific domain of meta-cognitions and a more frequently used measure of overall worry; the PSWQ (e.g. Covin et al., 2007). Recently, Khawaja and McMahon (2011) compared the relative relationship of meta-worry as measured by the meta-subscale of the AnTI and found that it accounted for roughly 10 % of the variance in GAD-symptoms. Our study, in comparison, found that negative meta-worry accounted for five times the variance in post-treatment worry.

Our results are also in concordance with the proposed hierarchical vulnerability model of Van der Heiden et al. (2010) where negative meta-cognitions along with Intolerance of Uncertainty was found mediate the relationship between the higher order vulnerability factors of neuroticism and symptoms of GAD. Our results far surpass those of Van der Heiden and colleagues as they found that neuroticism, negative meta-cognitions and Intolerance of Uncertainty together explained 39,8 % of the variance in worry. The results in are in line with efficacy studies of MCT for GAD where MCT has been shown to highly effective in an open clinical trial (Wells & King, 2006), compared to AR (Wells et al., 2010), compared to CBT in a preliminary analysis (Kvistedal, 2011) and compared to Intolerance of Uncertainty therapy (Van der Heiden et al., 2012).

Other researchers have investigated the relationship between meta-cognitions and other psychiatric illnesses. Khawaja and MacMahon (2011) found that although meta-worry showed the strongest relationship to symptoms of GAD, it was also associated with symptoms of OCD, social phobia and depression. In a recent study Solem et al. (2009) showed that change in meta-cognitive dimensions of the need to control thoughts and the need to worry accounted for 22 % of the variance in symptoms at post-treatment following exposure and response prevention treatment for OCD. These results offer further evidence to the importance of the meta-cognitive model in other psychiatric illnesses.

A limitation of this study is the use of subscales of AnTI as a single measure of worry content. Although the worry content clearly involves themes pertaining to health and social factors, further studies should examine the need for measures that capture other worry themes.

A second limitation was the low sample size (N=59) which indicates low statistical strength and low external validity. This is due to the preliminary nature of this investigation. Later analysis of meta-cognitions will include a larger sample (Nordahl et al., in prep.).

We chose to control for pre-treatment levels of worry whereas other researchers have controlled for trait anxiety. The sample size precluded the addition of other predictors as this would further impair the statistical strength of the analysis. The amount of variance in outcome explained by change in negative meta-cognitions strongly suggests the importance of this cognitive process as a further focus in the innovation of psychotherapy for GAD. It could be that symptom improvement in itself causes reductions in meta-cognitions, rather than the opposite.

In conclusion, this preliminary study further adds to the empirical support of importance of negative meta-beliefs about worry in the Meta-cognitive model of GAD by showing that the theoretical construct of negative appraisals of the perceived dangers and uncontrollability of worry is highly associated with measures of worry after treatment. GAD is considered to be the “basic anxiety disorder” and maladaptive worry is proposed to be involved in 40 – 60 % of other psychiatric disorders (Barlow, 2002). Traditional CBT have not been able to effectively treat this disorder with the same degree of clinically significant change of other

anxiety disorders, and innovation in the field of treatment of pathological worry is needed. MCT has several lines of promising research indicating the importance of meta-worry in both GAD and other psychiatric illnesses. Evidence has shown that MCT is highly effective in reducing both hypothesized constructs of meta-worry, and also fostering clinically significant change. The relative efficacy of CBT compared to MCT could potentially be explained by the importance of meta-worry in GAD which is only indirectly addressed in CBT, however caution about causal inferences are important at this stage in the study .

The results of the current study in association with studies of the efficacy of MCT offers promising results for the ability of MCT to alleviate symptoms of the anxiety disorder that is currently considered to be most resistant to therapy.

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