

Stian Solem

**Cognitive and Metacognitive
Changes in Exposure and
Response Prevention Treatment for
Obsessive–Compulsive Disorder:
Empirical Support for a
Metacognitive Model**

Thesis for the degree of Philosophiae Doctor

Trondheim, October 2010

Norwegian University of Science and Technology
Faculty of Social Sciences and Technology Management
Department of Psychology



NTNU – Trondheim
Norwegian University of
Science and Technology

NTNU

Norwegian University of Science and Technology

Thesis for the degree of Philosophiae Doctor

Faculty of Social Sciences and Technology Management
Department of Psychology

© Stian Solem

ISBN 978-82-471-2301-0 (printed ver.)
ISBN 978-82-471-2302-7 (electronic ver.)
ISSN 1503-8181

Doctoral theses at NTNU, 2010:165

Printed by NTNU-trykk

Contents

Summary	1
Acknowledgements	2
List of papers	3
1. Introduction	4
1.1. Prevalence, course, and comorbidity	6
2. Psychological models of OCD	9
2.1. Cognitive-behavioral models of OCD	10
2.1.1. Overinflated responsibility and overestimation of threat.	11
2.1.2. Perfectionism and tolerance for uncertainty.	12
2.1.3. Importance and control of thoughts.	13
2.1.4. Efficacy of cognitive-behavioral treatments for OCD.	15
2.1.5. Mediators and mechanisms of change in ERP and CBT for OCD.	18
2.2. The metacognitive model of psychopathology	21
2.2.1. The specific metacognitive model of OCD.	23
2.2.2. Empirical documentation for the metacognitive model of OCD.	25
2.2.3. Differences between the metacognitive model and the cognitive models.	28
3. Research questions	32
4. Method	35
4.1. Design and sample	35
4.2. Measures	36
4.2.1. Clinical interviews.	36
4.2.2. Self-report measures.	37
4.3. Treatments	41
4.4. Statistics	42
5. Results	44
6. Conclusions	45
7. Discussion	47
7.1. Strengths and limitations	47
7.2. Suggestions for further research	50
8. References	52
9. Papers I-IV	62

Summary

Exposure and response prevention (ERP) treatment for obsessive-compulsive disorder (OCD) has repeatedly been demonstrated as an efficient treatment for OCD and can be learned relatively easy by inexperienced student therapists (paper I). ERP was developed based on behavioral principles and the mechanisms of change have been suggested to involve reciprocal inhibition, counter-conditioning, habituation, extinction, or informal network-based emotional processing. More recent theories suggest cognitive and metacognitive beliefs as essential in the maintenance of OCD and that improvement following treatment could be mediated by changes in these beliefs. In paper II the validity of cognitive models of OCD and the metacognitive model of OCD was empirically tested. Support for the role of thought fusion beliefs, beliefs about rituals, and stop signals as predictors of obsessive-compulsive symptoms was documented. These metacognitive variables predicted more variance in obsessive compulsive symptoms than ordinary cognitions. Paper III documented further support for the metacognitive model by demonstrating empirically that change in metacognitions was a better predictor of treatment outcome than cognitive constructs such as perfectionism/certainty and responsibility/harm. The results suggested that modification of metacognitions could mediate reductions in symptoms when delivering ERP for OCD. However, the metacognitive model needs further investigation with more rigorous studies and analyses. Moreover, although the thesis suggests that changes in metacognition may be essential in ERP treatment of OCD it did not evaluate metacognitive therapy. In addition, the relationship between change in metacognition and change in specific obsessive-compulsive symptoms was not specified. This can now be tested using the Norwegian adaptation of the Obsessive Compulsive Inventory-Revised which seems to possess adequate psychometric properties allowing for dimensional assessment of obsessive-compulsive subtypes (Paper IV).

Acknowledgements

The present study was conducted at the Department of Psychology at the Norwegian University of Science and Technology (NTNU), and made possible with financial support from the project double competency in psychology.

I first of all want to thank my supervisor Patrick A. Vogel. This thesis would never have happened without his enthusiasm for research on OCD and the research network he has established. I would also like to thank my co-supervisor, Karin Erngrund, for her helping me keep up with neuropsychological research within the field of anxiety disorders. Unfortunately, our studies were not finished in time to be included in this thesis, but I look forward to continued collaboration. In addition, I wish to especially thank Bjarne Hansen who along Patrick introduced me to treatment and research on OCD. I would also like to express my gratitude to Leif E. O. Kennair who was a great help in establishing the OCD-school project. It has also been a great experience to collaborate and expand the OCD network in Norway by working together with Åshild Håland and Gunvor Launes and the anxiety disorders clinic at Gaustad.

I would especially like to mention and thank the students participating in the OCD-school: Øistein Eskeland, Kristen Hagen, Tarik Kapidzic, Ingrid L. Kildal, Rune Karlsen, Tony Marcelino, Tonje Mehus, Jarle Nordaas, Kari-Anne H. Sviggum, Cecilie Sarheim, Yngvill Ane Stokke Westad, and Danielle Wright. Their enthusiasm has been truly inspirational. I look forward to following you all further into your careers.

I would also want to thank the good colleagues at NTNU. Hans Nordahl has played a pivotal role in creating a good collaborative research network and has introduced me to many great researchers. I would especially like to mention clinical supervision on treating generalized anxiety disorder by distinguished professor Tom Borkovec and Professor Adrian Wells. The collaboration with dr. Wells has also allowed for me to meet fellow researchers with experience and clinical expertise on metacognition and OCD such as Samuel Myers and Peter Fisher. I would also like to thank my next-door colleagues at NTNU for making work enjoyable. In this regard, I would especially like to thank Roger Hagen, Odin Hjemdal, and Truls Ryum. I also want to thank Tore C. Stiles for excellent supervision. Thank you to Håvard Kallestad who generously shared data from his community control sample. In addition, I would like to thank Britt Buran for her help with practical matters.

A special thank to the Norwegian OCD foundation, Ananke, and especially Sidsel Myhr Nilsen for including our research group in their community and for collaboration on research projects.

Throughout the study I have learned a great deal by meeting many people with OCD. For that I am truly grateful. Also, I would like to mention the thousands of people participating in our control samples. I would like to thank my parents and my brother for their support. I want to thank my wife, Hilde for her patience. Last but not least, I would like to dedicate this thesis to our son, Mathias, our pride and joy.

List of papers

- I. Solem, S., Hansen, B., Vogel, P. A., & Kennair, L. E. O. (2009). The efficacy of teaching psychology students exposure and response prevention for obsessive-compulsive disorder. *Scandinavian journal of psychology*, 50, 245-250.
- II. Solem, S., Myers, S., Fisher, P., Wells, A., & Vogel, P. A. (2010). An empirical test of the metacognitive model of obsessive-compulsive symptoms: replication and extension. *Journal of Anxiety Disorders*, 24, 79-86.
- III. Solem, S., Håland, Å. T., Vogel, P. A., Hansen, B., & Wells, A. (2009). Change in metacognitions predicts outcome in obsessive-compulsive disorder patients undergoing treatment with exposure and response prevention. *Behaviour Research and Therapy*, 47, 301-307.
- IV. Solem, S., Hjemdal, O., Vogel, P. A., & Stiles, T. C. (in press). Norwegian version of the Obsessive-Compulsive Inventory-Revised: Psychometric properties. *Scandinavian Journal of Psychology*.

1. Introduction

According to the Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-IV; American Psychiatric Association, 1994) the primary feature of Obsessive-Compulsive Disorder (OCD) is the presence of recurrent obsessions or compulsions that are time consuming (take more than one hour a day) and cause marked distress or impairment. Additional diagnostic criteria are that individuals with OCD have at some time during the disorder recognized that their obsessions or compulsions are excessive and unreasonable. The disorder should not be caused by another mental disorder such as Tourette's disorder, schizophrenia, major depression, or organic mental disorder. Untreated OCD is associated with several adverse consequences for employment, work productivity, and social/family functioning (e.g., Calvocoressi et al., 1995; Koran, Thienemann, & Davenport, 1996; Leon, Portera, & Weissman, 1995; Magliano et al. 1996; Rasmussen, & Eisen, 1992; Torres, Prince, Begginton, P. et al. 2006). Also in Norway, substantial impairment has been documented for children and adolescents with OCD (Valderhaug & Ivarsson, 2005).

Obsessions are persistent thoughts, impulses, or images that are experienced as inappropriate and intrusive, while compulsions are repetitive excessive behaviors used to prevent or reduce anxiety or distress and to neutralize or prevent feared consequences. Compulsions are not realistically connected to what they intend to prevent. In diagnostic interviews such as the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown, DiNardo, & Barlow, 1994) the obsessions assessed cover topics relating to doubting, contamination, nonsensical impulses, aggressive impulses, sexual obsessions, religious/satanic obsessions, causing accidental harm to others, experiencing horrific images, and nonsensical thoughts/images. Compulsions assessed include neutralizing (counting), checking, washing, hoarding, internal repetition (obsessing), and adhering to certain rules or

sequences (ordering). These different expressions of OCD have been referred to as subtypes of OCD.

The OCD construct has yet to be explored in Norway, but there is little evidence for dramatic cultural differences in western cultures although some cultural impact could occur (e.g. Pallanti, 2008). The typical subtypes of OCD are usually labeled as: washing (excessive washing and cleaning often in relation to obsessions concerning contamination), obsessing (experiencing unwanted intrusive thoughts that are difficult to get rid of), checking (often related to thoughts about accidents such as fire, burglary etc.), ordering (arranging and aligning objects), neutralizing (such as repeated use of “magical” numbers), and hoarding (collecting and rarely discarding objects). However, the role of hoarding has been somewhat unclear.

It has been reported that obsessive-compulsive symptoms correlate with aspects of hoarding severity (Frost, Steketee, & Grisham, 2004; Frost, Steketee, Williams et al., 2000), and that doubting, checking, and reassurance seeking before discarding appear to be functionally similar to compulsive rituals (Rasmussen & Eisen, 1992). Still, it is controversial whether compulsive hoarding is a subtype of OCD or not (e.g., Tolin, Frost, & Steketee, 2007; Wu & Watson, 2005). Compared with other subtypes and patients with other anxiety disorders, individuals with compulsive hoarding typically report higher levels of depression and functional impairment, low marriage rates, social anxiety, and dependent personality traits (Frost, Steketee, Williams, & Warren, 2000; Kim, Steketee, & Frost, 2001). Individuals with hoarding symptoms also show poorer treatment outcome in pharmacological and cognitive behavior therapy compared to OCD patients without such symptoms (Abramowitz, Franklin, Schwartz, & Furr, 2003; Steketee & Frost, 2003). Other characteristics reported have been poor insight, treatment refusal, and lack of cooperation (Christensen & Greist, 2001; Damescours & Charron, 1998; Greenberg, 1987; Greenberg, Witztum, & Levy, 1990;

Tolin, Frost, & Steketee, 2007). In summary, it seems that hoarding has traits resembling OCD (as many other psychological disorders do), but also has certain differences.

1.1. Prevalence, course, and comorbidity

Obsessive-Compulsive Disorder was previously thought to be relatively rare (e.g. Woodruff & Pitts, 1964), although around 80% of the general population experience intrusive, unpleasant, unwanted thoughts similar to those seen in OCD (Rachman, & de Silva, 1978; Salkovskis, & Harrison, 1984) and more than half the population may engage in ritualized behavior (Muris, Merchelback, & Clavan, 1997). However, non-clinical samples report their obsessions and compulsion as less severe and distressing.

Rates for OCD vary slightly in different prevalence studies, but the disorder has been documented in different cultures (e.g. Weissman et al., 1994) with a lifetime prevalence rate ranging from 0.7% (in Taiwan) to 2.5% (in Puerto Rico). A recent study suggested lifetime prevalence rates around 2-3% with no consistent gender differences (Kessler, Berglund, Demler, Jin, & Walters, 2005). In USA lifetime prevalence rates have ranged from 1.9% to 3.3% (Karno, Golding, Sorenson, & Burnam, 1988). When using DSM-III-R criteria in Norway, a lifetime prevalence of 1.6% was found in the capitol (Oslo), while lower rates (.6%) were observed in a rural area (Kringlen, Torgersen, & Cramer, 2006). The 12 month prevalence rates were .7% and .3% respectively for the two sites. Reliability of results obtained in such epidemiological studies has in subsequent investigations been questioned (e.g. Nelson & Rice, 1997; Stein, Forde, Anderson, & Walker, 1997) and some of the differences found in such prevalence studies may also be caused by differences in diagnostic criteria used by DSM-III and DSM-IV (Crino, Slade, & Andrews, 2005).

Although several epidemiological studies have indicated that OCD is a relatively common condition, few studies have reported the prevalence of OCD in clinical settings. One study suggested that the disorder was rarely observed in the 19 clinics studied (Fireman, Koran, Leventhal, & Jacobson, 2001). This discrepancy with the prevalence data suggest that many individuals suffering from OCD are not seeking out treatment, or are not being recognized in clinics and given the benefits of empirically documented treatments. However, lifetime prevalence estimates in the range of 1% - 3% must be used with caution. If adjustments are made for misclassification and instability, it will still be a disorder which seems to be rarely recognized in clinics (Fireman et al., 2001). In addition, it often takes 7-10 years from onset until the diagnosis and treatment has taken place (Nestadt et al., 1994; Whitaker et al., 1990). These results are not satisfying when considering that treatment of OCD is among the psychological disorders where efficient treatment is thoroughly documented (Hofmann & Smits, 2008).

OCD usually develops in adolescence, but can also occur earlier in childhood. The majority of patients develop OCD before 35 years of age (Lo, 1967; Goodwin, 1969), and depression and/or anxiety may accompany initial symptoms often in connection with precipitating factors such as pregnancy/childbirth and difficult life events. Mean age of onset of symptoms is roughly 20 years (e.g. Heyman, Fombonne, Simmons, Ford, Meltzer, & Goodman, 2003). The course of the disorder could be quite chronic and fluctuate with levels of stress (e.g. Mataix-Cols, Ruach, Baer, et al., 2002; Stewart, Geller, Jenike et al., 2004). A longitudinal study lasting 40 years observed remission amongst 20% of the sample and partial remission amongst 28% (Skoog & Skoog, 1999). Improvement usually occurred after many years with the disorder and the majority of the sample continued to show clinical symptoms.

Early onset of OCD has been related to greater likelihood of obsessive-compulsive spectrum disorders such as tic/Tourette's disorders (Janowitz et al., 2009), somatoform, eating

and impulse-control disorders (de Mathis, do Rasario, Diniz, Torres, Shavitt, Ferrao, et al., 2008) and possibly obsessive-compulsive personality disorder (Maina, Albert, Salvi, Pessina, & Bogetto, 2008). Relationship to other anxiety and mood disorders is less clear. A related study (Grant, Mancebo, Pinto, Williams, Eisen, & Rasmussen, 2007), however, found that patients with late onset OCD showed less severe obsessions and a trend towards better outcome following CBT. However, such late age at onset (after age of 30) was quite rare (11.3% of the sample) and the study also found several non-significant differences between late and early onset regarding factors such as insight, quality of life, social functioning, and comorbidity.

Comorbidity is common among people with OCD and studies have indicated that around 50% have additional diagnoses (e.g. Steketee & Barlow, 2002; Torres, Prince, Bebbington et al., 2006). A Turkish study (Tükel, Polat, Ozdemir, Aksüt, Turksöy, 2002) found comorbid axis I conditions in 68.7% of their patients with OCD. Affective disorders were most prevalent, followed by anxiety disorders such as simple phobias (17.7%), social phobia (15.6%), generalized anxiety disorder (12.2%), and panic disorder (9.5%). Such comorbid conditions could affect treatment outcome and a Norwegian study (Hansen, Vogel, Stiles, & Gøtestam, 2007) found less improvement for patients with comorbid panic disorder or generalized anxiety disorder. Disorders such as body-dysmorphic disorder, hypochondriasis, eating disorders, nail-biting, skin-picking and trichotillomania are also prevalent in OCD (Bienvenu, Samuels, & Riddle, 2000). Among 113 children and adolescents with OCD in Sweden, comorbid conditions were observed in most cases and only one out of five patients had OCD as the only diagnosis (Ivarsson, Melin, & Wallin, 2008). The most common comorbidity was neuropsychiatric disorders (47%), as well as other anxiety disorders (39.8%) and affective disorders (24.8%). Personality disorders are also common especially cluster C (dependant, avoidant, and obsessive-compulsive). Around 50% of people

with OCD could have a comorbid personality disorder (Steketee & Barlow, 2002) compared to the prevalence of 2% in the general population (Torgersen, Kringlen & Cramer, 2001).

Causes of OCD and other psychological disorders are difficult to establish. Behavioral principles have been used to explain the development of OCD and cognitive and metacognitive models posit theories concerning the importance of different beliefs. In cognitive models early experiences could be understood as making a person vulnerable to OCD by developing obsessive beliefs which are then activated following a critical incident. Biological research has also found possible factors influencing obsessive-compulsive symptoms such as serotonin (e.g. Leckman et al., 2000) and genetic components (for review see van Grootheest, Cath, Beekman, & Boomsma, 2005). Certain regions of the brain have also been suggested as important in OCD as damage to certain areas correlate with obsessive-compulsive symptoms (e.g. Machlin, Harris, Pearlson, Hoehn, Saric, Jeffrey & Camargo, 1991; Whiteside, Port & Abramowitz, 2004) and studies have found increased metabolic activity in orbitofrontal cortex and basal ganglia which has been reduced following treatment (e.g. Nakatani, Nakgawa, Ohara, Goto, Uozumi, Iwakiri, et al., 2003). However, there is little evidence of a specific “OCD-centre” in the brain and there exists no lab test for OCD. Although there has been conducted a great deal of research within the medical field in regards to biological accounts for OCD a detailed review of this research is beyond the scope of this thesis.

2. Psychological models of OCD

2.1. Cognitive-behavioral models of OCD

Cognitive behavioral models have dominated the understanding and treatment of OCD. The model is a hybrid of a behavioral model and a cognitive model with its focus on obsessive beliefs. The cognitive models of OCD have their origins within Beck's schema theory of emotional disorders (Beck, 1976) and view dysfunctional schemas, beliefs, and appraisals as core constituents of the disorder. Several recent theories attempting to explain the pathogenesis and treatment of OCD emphasize the importance of cognitive factors and the debate continues as to which dysfunctional beliefs are most central in OCD. For instance, the model proposed by Salkovskis (1985) suggests that the fundamental dysfunctional beliefs concern inflated responsibility, while Rachman's (1997, 1998) cognitive model of obsessions places greater emphasis on the personal significance that people with OCD allocate to their intrusive thoughts. These cognitive theories have often been termed "appraisal theories", given the significance of the subjective interpretation of intrusions. These theories postulate that intrusions can be placed on a dimension of normal cognitive phenomenon and that the appraisal is partly derived from more enduring underlying beliefs and determine whether or not intrusions develop into clinical obsessions.

A coordinated effort to develop and evaluate cognitive assessment strategies for OCD resulted from a discussion following the World Congress of Behavioral and Cognitive Therapies in 1995 (OCCWG, 1997). Sixteen existing instruments assessing different domains of beliefs thought to contribute to the development and maintenance of OCD were ranked independently in order of importance for OCD. Through this process the Obsessive Compulsive Cognitions Working Group identified six belief domains; responsibility, perfectionism, tolerance for uncertainty, overestimation of threat, control of thoughts, and importance of thoughts. The working group developed two instruments to assess these beliefs and to guide future research on cognition in OCD. In accord with these empirically derived belief domains and the research direction taken on OCD subtypes, contemporary cognitive

therapy approaches have attempted to discover which cognitive beliefs are most relevant for a particular individual as well as modifying underlying core beliefs (e.g., Wilhelm & Steketee, 2006).

2.1.1. Overinflated responsibility and overestimation of threat.

One of the most influential and comprehensive cognitive analyses of OCD was presented by Salkovskis (1985, 1989, 1999, 2007). Central in this cognitive model is the faulty appraisal that promotes the notion of exaggerated personal responsibility for events that will bring harm. The concept of responsibility concerns believing that one has power to bring about or prevent negative outcomes. The interpretation of an intrusion based on the belief of responsibility (i.e. responsible for harm to oneself or others) will result in emotional discomfort and will motivate attempts at neutralization aimed at reducing or avoiding the perceived responsibility (Salkovskis, Richards, & Forrester, 1995).

In a review of the empirical findings regarding Salkovskis' theory, Clark (2004, p. 100) concludes that "appraisals/beliefs of responsibility and neutralization, are clearly core elements in the persistence of obsessions". However, Clark (2004) also pointed out that the significance of inflated responsibility may be overstated, and that it might be more applicable to certain subtypes of OCD.

Another central belief in OCD concerns the perceived likelihood and cost of aversive events (e.g. Foa & Kozak, 1986; Freeston et al., 1996; Salkovskis, 1985). Examples of such beliefs could be; "I believe that the world is a dangerous place"; and "bad things are more likely to happen to me than to other people". Related to overestimation of harm are beliefs about coping ability, low tolerance for uncertainty, and low tolerance for anxiety/discomfort. Overestimation of threat has, however, been linked with all anxiety disorders (Sookman & Pinard, 2002).

2.1.2. Perfectionism and tolerance for uncertainty.

Contemporary cognitive theorists have also suggested a role for perfectionism in the understanding of OCD. Several studies have found that perfectionism is related to obsessive-compulsive symptoms (e.g. Frost & Steketee, 1997; Hodgson & Rachman, 1977; Pleva & Wade, 2006; Rheaume, Freeston, Dugas, Letarte & Ladouceur, 1995), also when controlling for responsibility and depression (Wu & Cortesi, 2009). However, similarly to that of overestimation of threat, studies have failed at demonstrating that perfectionism is specific to OCD as compared to other psychiatric disorders (e.g. Frost & Steketee, 1997; Sassaroli et al., 2008). This observation has been discussed in terms of perfectionism being a necessary trait but not a sufficient trait for the development of obsessive-compulsive symptoms (Frost & Steketee, 1997).

Individual with OCD often exhibit pathological doubt concerning properties of stimulus, situations, and actions (e.g. Rasmussen & Eisen, 1988; Reed, 1985). Doubts are often seen in regards to whether hand washing has been performed and as to whether they have forgotten something important. Pathological doubt has been thought to be most evident among patients with checking compulsions (Rachman & Hodgson, 1980; Rasmussen & Eisen, 1992), but has also been postulated to play a central role in many other anxiety disorders as well as in obsessive-compulsive personality disorder and dependent personality disorder (American Psychiatric Association, 1994). Intolerance for uncertainty is often observed in people having difficulty making decisions. It seems as if they are more cautious and use longer time to categorize objects and wishes for information to be repeated. When a decision is made it often involves greater doubt about the correctness of this decision and uncertainty, and newness/change is interpreted as potentially dangerous. Difficulties with strong affect and the confidence in ability to cope with ambiguous situations may also be dimensions of this belief.

2.1.3. Importance and control of thoughts.

The belief that “mere presence of a thought indicates that it is important” (OCCWG, 1997, p. 678) is the foundation for the importance of thoughts theory, which is largely based on the misinterpretation of significance theory developed by Rachman (1997, 1998). The main proposition is that catastrophic misinterpretations of importance of one’s thoughts, images, and impulses both lead to and contributes to persistence of obsessions. The central premise is that normally occurring intrusions are catastrophically misinterpreted in terms of signifying to the person that they are “mad, bad, or dangerous” (Rachman, 1997, 1998). Factors such as high moral standards, depression, anxiety proneness, and cognitive biases contribute to vulnerability when experiencing obsessions and catastrophic misinterpretations. According to Rachman (1998), normal unwanted intrusive thoughts will develop into clinical obsessions if they are misinterpreted as personally important and threatening, given that the content of the intrusions is contrary to the individual’s value system. When this occurs, frequency of the obsessions will increase because both internal (i.e. anxiety sensations) and external cues (e.g. sharp objects) may be misinterpreted as threatening (i.e. “the terrible physical sensations indicate that I could lose my mind and end up hurting myself or others with that knife”) instead of neutral. This in turn leads to increased persistence of the obsessions, since avoidance and attempts at neutralization will prevent disconfirmation and instead reinforce the catastrophic misinterpretation.

Thought-action fusion (TAF; Rachman, 1997, 1998, 2003), which is conceptualized as a cognitive bias (Rachman, 1993; Shafran, Thordarson, & Rachman, 1996), contributes to misinterpretation of significance. This is defined as “a phenomenon in which people tend to regard their thoughts as being psychologically equivalent to the corresponding action, and/or believe that their thoughts of possible misfortunes actually increase the likelihood that the misfortune will occur” (Rachman, 2003, p. 12). Two forms of TAF are considered relevant to OCD. Likelihood TAF is the belief that having the thought increases the likelihood that a

negative event will happen to oneself or others. The second form is termed as a moral TAF, in which the thought is perceived as shameful and having the thought is as bad as committing the act. The relationship between TAF and responsibility has been conceptualized in different ways (e.g. Rachman, 1993; Shafran et al., 1996; Salkovskis & Forrester, 2002) and may require better operational definitions (Berle & Starcevic, 2005).

Clark (2004) has reviewed the empirical status for Rachman's hypothesis, and concluded that inflated misinterpretations of significance and the TAF bias are empirically supported in OCD. However, the extent to which these processes are specific to OCD is still uncertain, since there is evidence that they also occur in other forms of anxiety (Clark, 2004; Shafran & Rachman, 2004).

The tendency to overestimate the significance of controlling one's thoughts, and the belief that this is attainable and desirable has been given prominence with the theory regarding control of thoughts. This domain is largely based on the cognitive control theory developed by Clark and Purdon (1993), and Purdon and Clark (1994). In addition to the primary appraisal of intrusions based on importance, threat, and inflated responsibility, the model proposes that a faulty secondary appraisal of failed thought control plays an important role in OCD. Several features of this secondary misinterpretation contribute to escalation of obsessive-compulsive symptoms, including misinterpreting failed thought control as highly significant and/or as increasing the probability for future threat, believing that it is possible and desirable to achieve complete or perfect control, having an inflated sense of responsibility, and drawing faulty conclusions about uncontrollability (Clark, 2004).

Clark (2004) reported that there is only indirect support for some parts of the cognitive control theory. However, Tolin and colleagues (2006, 2007) concluded that there is increasing evidence indicating that individuals with OCD are characterized by the belief that thought control is both necessary and possible, and that these individuals use maladaptive thought

control strategies that have a high probability of being unsuccessful. Also, a literature review by Moulding and Kyrios (2006) suggested that the interaction or discrepancy between desire for control and sense of control over thoughts contribute to obsessive-compulsive symptoms.

2.1.4. Efficacy of cognitive-behavioral treatments for OCD.

The most effective psychotherapeutic approach for treating OCD is exposure and response prevention (ERP), cognitive behavior therapy, and pharmacotherapy with selective serotonin reuptake inhibitors (March, Frances, Kahn, & Carpenter, 1997). Evidence for ERP has been accumulating over 40 years after its first description by Meyer (1966) in a case series. ERP is derived from learning theory and consists of exposure to the anxiety provoking obsessions while preventing neutralizing or ritual responses that reduce anxiety. How ERP for OCD actually works is more difficult to establish. Different accounts such as reciprocal inhibition, counter-conditioning, habituations, extinction, the two-factor model, and network-based emotional processing have been suggested as possible mechanisms, but all have experienced difficulties when it comes to empirical tests (Tryon, 2005).

Even though ERP for OCD is thoroughly documented as an efficient treatment, it has been associated with a high level of discomfort and seems to require a high degree of treatment motivation. This might be one factor explaining the often replicated finding that 25–30% of the patients suitable for this treatment approach do not want to enter, drop out early, or do not comply with it (Salkovskis & Kirk, 1989; McDonald, Marks, & Blizard, 1988). Among those who comply with the treatment 20% or more do not respond or fail to maintain their gains (Foa & Kozak, 1996; Barlow, Allen & Choate, 2004). When using asymptomatic criterion as the index of outcome the recovery rate is approximately 25% (Fisher, & Wells, 2005a). One attempt to improve the overall efficacy of ERP has included adding motivational interviewing to increase willingness to commence and comply with ERP (Maltby & Tolin,

2005, Simpson, Zuckoff, Page, Franklin, & Foa, 2008). Other attempts have combined ERP with pharmacological treatment (e.g. Simpson, Foa, Liebowitz, et al., 2008) and a recent interest has been to investigate whether D-Cycloserine can potentiate the effects of ERP (e.g. Wilhelm et al., 2008) as it has been shown to facilitate learning and fear extinction (Norberg, Krystal, & Tolin, 2008). However, no dramatic improvements have been observed from these attempts.

There has been increasing interest in cognitive processes involved in the etiology of obsessive-compulsive symptoms. It has been argued that treatment can be improved by identifying and modifying maladaptive beliefs and cognitive processes underlying the disorder. Devaluation of the importance of within-session habituation has inspired several theoretical and empirical contributions to the field aimed at specifying maladaptive appraisals underlying the disorder. A number of cognitive theorists have proposed that OCD could be conceptualized and treated cognitively and studies on cognitive therapy for OCD started to be published in the 1980's.

Meta-analyses suggest that ERP and cognitive therapy for OCD are quite equivalent and unquestionably efficacious treatments for OCD (e.g. Franklin, & Foa, 2002; Abramowitz, 1997; van Balkom et al., 1994; Rosa-Alcázar, Sánchez-Meca, Gómez-Conesa, & Marin-Martinez, 2008). In a number of studies (Abramowitz, Foa, & Franklin, 2003; Marks et al., 1988; Rachman, & Hodgson, 1980; Foa & Kozak, 1996) approximately 60–80% of the adult cases are classified as treatment responders and they often experience around 50% symptom reduction (Abramowitz, Franklin, & Foa, 2003). There seems to be small differences between ERP and cognitive therapy (Fisher & Wells, 2005a; Freeston et al., 1997) although some evidence does exist that attrition rates are lower in cognitive therapy (e.g. Abramowitz, Taylor, & McKay, 2005). When using asymptomatic criterion as index of outcome, ERP and cognitive therapy have low and equivalent recovery rates of approximately 25% (Fisher, &

Wells, 2005a). In Norway, research studies have also documented efficacy of CBT treatment both in adults (Vogel, Stiles, & Gøtestam, 2004) and children/adolescents (Valderhaug, Larsson, Gøtestam, & Piacentini, 2007). A Norwegian survey also suggested that cognitive/behavioral, family and medication approaches were preferred over psychodynamic and humanistic approaches in the management of OCD in children/adolescents (Valderhaug, Gøtestam, & Larsson, 2004).

Various methodological issues are problematic in treatment studies of OCD. Many studies have used small sample sizes and did not include control conditions to compare the efficacy of different treatment approaches. None of the studies have specified the amount of cognitive techniques applied, or when to use them for specified intrusions or subtypes. Also, different selection methods and control groups have been used throughout the studies. Many studies also lack intent to treat analyses. Taken together, these methodological differences may limit the generalizability of the results. As these studies employ a wide range of cognitive techniques for different obsessive beliefs, it is difficult to assess what interventions are important for which problem when using between-group designs. The possibility of holding everything constant except for one variable in order to assess its effect is difficult with the designs used in the studies reviewed above.

In cognitive therapy, recent research efforts aimed at increasing treatment efficacy have often centered on the content specificity hypothesis. This premise argues that specific dysfunctional beliefs underlie and maintain dysfunctional appraisals of intrusions and, in turn are associated with particular symptom presentations or subtypes (e.g., Sookman, Abramowitz, Calamari, Wilhelm, & McKay, 2005). Matching OCD subtypes with specific cognitive strategies could enhance treatment outcome as previous treatment trials have typically treated OCD as a homogenous group, thereby ignoring symptom subtypes and possible necessary differences in therapeutic focus. Accordingly, attempts to reliably identify

particular subtypes of OCD using factor analytic and clustering methods have been conducted, but empirical support for a more subtype specific cognitive treatment has yet to be adequately demonstrated.

2.1.5. Mediators and mechanisms of change in ERP and CBT for OCD.

Statistical methods for testing mediator effects have been developed and dramatic progress has been made within the neuroscience field which could facilitate further documentation for the mechanism of change in successful treatment of OCD. However, research on mediators and the mechanism of change in empirically supported treatments for OCD is still in its infancy. Within the field of OCD only a few correlational studies exist that investigate the relationship between changes in cognitions and changes in symptoms. The studies that have been conducted on ERP and CBT for OCD have found significant correlations between improvement on cognitive beliefs and obsessive-compulsive symptoms. In a study by Emmelkamp, van Oppen, and van Balkom (2002), obsessive-compulsive symptoms and obsessive beliefs changed significantly following ERP treatment for a group of OCD patients ($N = 28$). Significant differences in obsessive beliefs were found between treatment responders and non-responders. Whittal, Thordarson, and McLean (2005) reported similar results for CBT and ERP treatment ($N = 54$), with a significant correlation between residual change scores for obsessive beliefs and OCD symptoms. Whittal and colleagues found that cognitive change was associated with symptom improvement, but there were no significant differences between the conditions (CBT or ERP) on any of the specific cognitive beliefs and appraisals at treatment termination or follow-up.

There are several limitations to these studies and it is a leap to move from these correlational studies to making inferences about the mediating role of cognitions or mechanisms of change. Theories have postulated potential mediators (e.g. change in

cognitions) for how the therapy should work, but how it actually works has not been addressed. Finding mediators is an important first step for establishing mechanisms of change in therapy and several criteria should ideally be met. The treatment should be demonstrated to bring about outcomes that are better than no treatment or placebo and should have a plausible theory attempting to explain how this happens. Then the timeline criteria should be met by demonstrating that the mediator (e.g. cognitions or metacognition) actually change before symptom change occurs. A further indication of a possible mediator could come from higher dosage of treatment leading to better outcome. The studies mentioned above do not meet these criteria. Inferences about causes cannot be made due to the correlational nature of the studies, the timeline criterion is not addressed appropriately and there is no control for possible confounding variables and bidirectional relations. However, these studies are a starting point for further research on the mechanism of change in ERP and CBT for OCD.

Research on the relationship between smoking and lung cancer also started out with correlational studies. These were later followed by longitudinal studies suggesting a possible causal mechanism. Experimental studies documented further a dosage effect and finally the mechanism between smoking and lung cancer was demonstrated to occur through cell mutation due to a chemical found in cigarettes. Despite the many flaws of correlational research it provides a starting point and raises awareness regarding the need to better understand how ERP actually works. For a review on the role of mediators and mechanism of change in psychotherapy confer Kazdin (2007). Although no studies on mediators in treatment of OCD meet the criteria suggested by Kazdin, there have been such studies based on cognitive therapy for other anxiety disorders. For instance, Smits, Rosenfield, McDonald, and Telch (2006) found that modifying cognitions concerning high probability of harm (similar to overestimation of harm in OCD) led to reductions in fear as observed in patients with social anxiety disorder. However, there are very few studies on this topic and Tryon

(2005) have highlighted difficulties experienced by behavioral, cognitive, and affective accounts and suggested that change could occur simultaneously in these systems.

Dismantling and finding the critical components of an efficacious treatment would be an important step towards discovering mediators and possibly later the mechanism of change. The non-significant differences between changes in cognitions for ERP and CBT make it difficult to draw strong conclusions about the importance of targeting OCD-specific beliefs with cognitive therapy. In addition, it has been a problem that it has not been specified how much time was spent on modifying beliefs from the different belief domains or specified what the criteria for such selection were. As most CBT studies target several different belief domains, without specifying how much time is spent on each, or offer a rationale or model for how this selection of priority is done, the possibility of replicating these studies or generalizing their findings is limited. Since different beliefs domains and cognitive processes could be differentially important, it is also possible that such a spread of focus might result in suboptimal cognitive therapy according to the content specificity hypothesis.

Development of disorder specific cognitive models has resulted in effective treatments for many anxiety disorders (e.g., Butler, Chapman, Forman, & Beck, 2006). For instance, cognitive therapy for panic disorder has improved efficacy rates beyond those achieved by purely behavioral interventions (Siev & Chambless, 2007). However, OCD has not witnessed comparable improvements (Steketee, Frost, & Wilson, 2002; Abramowitz, Taylor, & McKay, 2005) and the efficacy rates of both cognitive and behavioral approaches for OCD may have reached a plateau where a fresh perspective could be needed (Whittal, Robichaud, Thordarson, & McLean, 2008).

2.2. The metacognitive model of psychopathology

In the cognitive models that explain obsessive-compulsive symptoms with constructs such as perfectionism/overestimation of harm and responsibility/tolerance of uncertainty it is the content of the cognitions which predominate as the core mechanisms. The metacognitive model holds a different perspective where cognitive beliefs are understood as by-products of metacognitive beliefs. According to the metacognitive model it is the individual's cognitions about their own cognitive processes which is the key to understanding the development and maintenance of the disorder. Automatic intrusive thoughts, feelings, or doubts activate meta-beliefs about the danger and meaning of such events and encompass beliefs about the harmful effects of thoughts, the need to control them, and beliefs about the importance of monitoring for them and engaging in perseverative coping strategies such as worry and rumination. These beliefs influence appraisals of intrusions and responses to them which affect emotional reactions. Metacognitive theory implies that treatment should not focus on challenging the validity of particular worries and negative thoughts, beliefs about inflated responsibility, intolerance of uncertainty or perfectionism as is the case in cognitive therapy.

The metacognitive model of psychopathology is based on the Self-Regulatory Executive Function (S-REF) model (Wells, & Matthews, 1994; 1996). This model described the relationship between beliefs that guide regulation of behavior and mental processes, controlled processes and automatic processing of internal and external information. Metacognition refer to beliefs and knowledge about thinking as well as strategies used to regulate and control thinking processes. The origins of metacognition come from developmental and educational psychology (Flavell, 1979), where it has long been recognized that metacognitions plays a critical role in how people learn and that training in metacognitive control can result in more effective learning. This parallels with the goal of facilitating new learning in psychological therapy. In metacognitive therapy focus is on modifying inflexible self-focused attention, perseverative thinking styles in the form of worry/rumination,

attentional strategies of threat monitoring, maladaptive coping behaviors, and the metacognitive beliefs that regulate these processes.

There are three main facets of metacognition; metacognitive knowledge, metacognitive experiences, and metacognitive skills/strategies (Flavell, 1979; Wells, 2000). Metacognitive knowledge is stored in memory in a declarative form and refers to knowledge about cognitive processes. It encompasses beliefs about thoughts and the function of memory, perception, and attention. Metacognitive knowledge is modified through a wide range of learning experiences and through monitoring of cognition. A person with OCD could develop false declarative beliefs about their inability to control their responses to obsessions if he or she repeatedly and unsuccessfully uses thought control strategies in an attempt to remove obsessions.

The second facet, metacognitive experiences, includes experiences such as feelings of confidence or feelings of knowing (e.g. the tip of the tongue phenomenon). These feeling states can be used by the person with OCD as a guide for selecting coping responses and assessing the nature of a threat (Wells, 2000). Other aspects of metacognitive experiences include the appraisal of thoughts and the nature and degree of awareness a person has over their current cognitive processing routines.

Metacognitive strategies are the final facet concerned with the techniques used to regulate and control cognition, and are conceptualized as proceduralized knowledge or plans for processing. In OCD, the control strategies used are directed at modifying online conceptual processing. This may involve attempting to remove intrusive thoughts from consciousness for instance by thought suppression or constructing and focusing on positive images. Unfortunately, these metacognitive control strategies tend to intensify and exacerbate unwanted metacognitive experiences. The consequence is that it prevents metacognitive knowledge from being adaptively modified.

The central tenet of the S-REF model is a style of thinking called the cognitive attentional syndrome (CAS) which is considered the main causal factor in prolonging emotional disorders. The CAS consists of three interacting components. Firstly, perseverative thinking is used in the form of worry and rumination and maladaptive attentional strategies that focus attention on signs of threat (e.g., intrusive thoughts) and emotional/physiological arousal. Secondly, the attention strategy represents another aspect of the individuals plan for coping with intrusive thoughts. Monitoring for signs of threat in OCD is metacognitive in nature as it is a volitional and effortful strategy designed to regulate cognition. In addition to perseverative thinking and attentional strategies, a third component involves counterproductive coping (i.e. compulsions), which consists of strategies which disrupt regulation of cognition and prevent maladaptive metacognitive knowledge from being corrected. The CAS is driven by metacognitive knowledge such as “worry will help me cope” and “paying attention to signs of threat keeps me safe” which prevent metacognitive knowledge from being modified because they continually refresh the belief that obsessions are powerful and significant, rather than being benign cognitive events.

2.2.1. The specific metacognitive model of OCD.

The metacognitive model of psychopathology could be used as a generic model to treat psychological disorders. However, disorder specific models have been developed in order to target the metacognitive beliefs which could be more prominent in certain disorders. The metacognitive model of OCD proposes that intrusive thoughts activate metacognitive knowledge which in turn guides maladaptive processing (the CAS). The metacognitive beliefs concern the dangerousness and significance of intrusive thoughts/feelings and are termed thought-fusion beliefs. Wells (1997; 2009) proposed three different types of thought-fusion beliefs to be important for OCD. Thought-Action Fusion (TAF) involves believing that a

thought alone can cause a person to carry out an action, or that a thought is equivalent to an action. Thought-Event Fusions (TEF) involves thinking that having a thought can cause events. Thought-Object Fusions (TOF) involves the belief that thoughts and feelings can be transferred into objects.

The thought-fusion beliefs can be measured with the Thought Fusion Instrument (TFI, Wells, Gwilliam, & Cartwright-Hatton, 2001). Depending upon the strength of these fusion beliefs, the intrusions could be appraised as significant and possibly dangerous. According to the metacognitive model these fusion beliefs are activated following a trigger (usually an automatic thought) and will further give rise to beliefs about rituals.

Beliefs about rituals are assumptions an individual holds about the need to carry out rituals and neutralising behaviour in response to intrusions. These are expressed in a declarative form and could either be positive, e.g. “if I keep knives locked in the cupboard I will not hurt my children”, or negative, e.g. “my rituals could make me go crazy”. Modulation of the level of distress is partially attributable to the person’s metacognitive beliefs about rituals and their metacognitive knowledge (typically erroneous), reflecting their ability to remove intrusions from consciousness. These beliefs about rituals activate a metacognitive plan for reducing the perceived threat, which includes a wide range of overt and covert neutralizing strategies as well as perseverative thinking and monitoring for unwanted thoughts in an attempt to neutralize threat. The Beliefs About Rituals Inventory (BARI; Wells & McNicol, 2004) assesses the strength of such beliefs.

Rituals and neutralising behaviour are performed until an internal subjective criteria, or stop signal, is met (Gwilliam, Wells & Cartwright-Hatton, 2004; Wells, 2000). The metacognitive plan consists of specific internal rules, in conjunction with stop signals that determine how the ritual is conducted and when it finishes. The stop signal is often a metacognitive experience such as a feeling of knowing or a feeling of satisfaction used by the

individual to determine whether it is safe to terminate their neutralizing behavior. Examples of such subjective criteria are “having a perfect memory of the action” and “having performed the rituals in the correct order”. These stop signals and others have been proposed and assessed with the Stop Signals Questionnaire (SSQ; Myers, Fisher & Wells, 2009a).

2.2.2. Empirical documentation for the metacognitive model of OCD.

Considerable evidence exists that dimensions of metacognition are associated with obsessive-compulsive symptoms in both analogue and clinical populations. A number of correlational studies have demonstrated that metacognitive beliefs are positively correlated with obsessive-compulsive symptoms (Cartwright-Hatton & Wells, 1997) after controlling for worry (Wells & Papageorgiou, 1998; Sica, Steketee, Ghisi, Chiri, & Francheschini, 2007) and depressive symptoms (Emmelkamp & Aardema, 1999).

A central prediction of the metacognitive model is that the metacognitive beliefs about the significance and danger of intrusions is most relevant to understanding the disorder and that non-metacognitive beliefs such as responsibility is the result of conceptual processing guided by metacognitions. Some empirical studies have supported this prediction. Two cross-sectional studies (Gwilliam, Wells, & Cartwright-Hatton, 2004; Myers & Wells, 2005) examined the relative contribution of metacognition and inflated responsibility to obsessive-compulsive symptoms. Both inflated responsibility beliefs and metacognition were associated with obsessive compulsive symptoms, but when the interrelations between the two constructs and worry were controlled, only metacognition, and not inflated responsibility predicted obsessive-compulsive symptoms. These two studies suggest that inflated responsibility is an epiphenomenon of metacognitive beliefs. People with OCD make inflated responsibility appraisals, but this could occur as part of the ruminative chain of thoughts activated by metacognitive beliefs about the meaning and significance of intrusive thoughts. These studies challenged the content specificity hypothesis of cognitive therapy and the view that it is

necessary to match OCD subtypes with specific cognitive belief domains. Metacognitive beliefs on the other hand could be the same across subtypes (Irak & Tosun, 2008) which could suggest that metacognitive therapy could be delivered in a group format despite the patients' considerable heterogeneity.

Further evidence in support of the importance of metacognitions in OCD came from an exploratory factor analysis of the Obsessive Beliefs Questionnaire-44 which obtained four factors: (1) perfectionism/uncertainty, (2) importance and control of thoughts, (3) inflated responsibility, and (4) overestimation of threat (Myers, Fisher, & Wells, 2008). In a series of regression analyses the relative contribution of the cognitive beliefs and the metacognitive domain of importance and control of thoughts were tested. The analyses controlled for worry and overestimation of threat. The major finding was that the metacognitive factor was the unique and consistent predictor of obsessive-compulsive symptoms. However, in Wells' model, the metacognitive factors involved in OCD are broader than those defined in the importance and control of thoughts subscale of the OBQ-44. Based on the metacognitive model it would be more interesting to explore the role of thought-fusions, beliefs about rituals, stop signals, and the role of general metacognitive factors such as positive beliefs about worry and cognitive confidence. Myers, Fisher, & Wells (2009b) demonstrated for instance that a specifically designed metacognitive measure of beliefs about intrusions (the thought-fusion instrument) was an independent prospective predictor of obsessive-compulsive symptoms, whereas the cognitive and metacognitive beliefs indexed by the OBQ were not significant.

Other aspects of the metacognitive model involve low confidence in memory and cognitive self-consciousness (CSC) which is the tendency to monitor one's own cognitive processing. CSC is a volitional strategy guided by positive metacognitive beliefs about the advantages of examining cognitive activity in relation to intrusive thoughts. Studies have

illustrated the relationship between CSC and obsessive-compulsive symptoms (e.g., Cartwright-Hatton & Wells, 1997; Janeck, Calamari, Riemann, & Heffelfinger, 2003) and found that CSC differentiated OCD patients from a mixed-anxiety group after controlling for general anxiety, depression, and cognitive belief domains. A follow-up study in a large non-clinical population replicated the above result in that CSC predicted obsessive-compulsive symptoms over and above negative interpretations of intrusions and trait anxiety (Cohen & Calamari, 2004). Studies have also shown that people with OCD, mainly with the checking subtype, have low confidence in their memory abilities (e.g., Hermans, Martens, DeCort, Pieters, & Eelen, 2003; Tolin et al., 2001) and that this may be related to heightened CSC. For example, Exner et al. (2009) found high CSC mediated episodic memory difficulties in OCD.

The metacognitive model of OCD specifies that metacognitive beliefs about intrusions, beliefs about rituals, and stop signals are central to the maintenance of the disorder. Myers, Fisher, and Wells (2009a) found that each of these three metacognitive domains were positively related to obsessive-compulsive symptoms and that, as predicted by the model, each domain contributed incremental explanatory power. Moreover, this relationship remained when non-metacognitive beliefs (perfectionism/certainty and inflated responsibility) were controlled. These findings need to be replicated as these constructs have been submitted to relatively few empirical tests.

Although several studies lend support to the predictions of the metacognitive model, few treatment studies have tested the efficacy of metacognitive therapy. Fisher & Wells, (2005b) compared a metacognitive rationale with a habituation rationale when giving brief exposure and response prevention. The metacognitive condition showed significantly greater reduction in anxiety associated with obsessive thoughts and reduction in metacognitive beliefs and in the urge to engage in neutralizing behaviors. Based on these findings they concluded that prolonged exposure does not appear to be necessary for belief change. A case series has

demonstrated (Fisher, & Wells, 2008) that patients with OCD effectively can be treated with MCT, but so far no large open trial or randomized controlled trial have been conducted. In summary there is empirical support for the metacognitive model based on cross-sectional studies but there is a lack of studies investigating the role of metacognitions in OCD samples and there is a lack of treatment studies supporting metacognitive therapy for OCD.

2.2.3. Differences between the metacognitive model and the cognitive models.

It has been argued that cognitive therapy resemble metacognitive therapy since both aim to enable patients not to respond to the intrusion, just to let them come and go without interference or special attention (e.g., Wilhelm & Steketee, 2006). However, this is at odds with the vast majority of treatment strategies and the theoretical basis of cognitive therapy. This is deduced from the fact that almost all of the treatment components involve further conceptual analysis with the goal of reality testing a range of cognitive beliefs. Also, the current interest in developing subtype specific treatments is in line with the content specificity hypothesis in cognitive models. The diversity of obsessional content and compulsive behavior show much heterogeneity (Feinstein, Fallon, Petkova, & Liebowitz, 2003), but its content or choice of compulsive behavior is considered as less important by the metacognitive model since the metacognitive beliefs attached should be quite similar irrespective of subtype. According to the metacognitive model, therapy should explicitly focus on modifying higher order metacognitive processes such as beliefs about the importance and power of thoughts, and to enable the patient to develop an adaptive plan for processing obsessional stimuli and for guiding subsequent behavior (Wells, 2000).

The metacognitive perspective focuses on how the cognitive attentional syndrome operates in OCD and views the multiple cognitive beliefs as part of the patients' perseverative thinking. The aim of this thinking is understood as an attempt to try and make sense of and to cope with their intrusions and emotions. There are similarities between MCT and CBT and

these deal with common aspects of therapy such as; assessment followed by an idiosyncratic formulation, psycho-education, self-monitoring, socializing to the model, verbal and behavioral reattribution strategies used to change beliefs and behaviors, exposure to feared stimuli, and relapse prevention interventions are conducted towards the end of treatment. However, there are also important differences. MCT does not focus on content of cognitive beliefs. Each appraisal is considered to occur as a result of maladaptive processing and occur in the context of perseveration as a coping response to the initial intrusion. Therefore, from the metacognitive perspective, cognitive therapy is understood as attempting to modify content of perseverative thinking rather than the metacognitive processes which perpetuate continued maladaptive processing.

Metacognition is involved with both the control and monitoring of cognition. When patients enter treatment, they are typically operating in an object mode which means that they respond to their intrusive thoughts as if they were facts. A primary goal of metacognitive therapy is to enable patients to shift to a metacognitive mode of processing and enable the person to be aware and recognize their thoughts as events in the mind that do not necessarily have any power or significance. OCD patients often make distorted appraisals, but that these occur in a stream of rumination/ worry. For an individual with checking compulsions the cognitive beliefs associated could be: "I'm unsure as to whether I actually closed the door and I must be certain of my decisions" (intolerance of uncertainty), "For me, making a mistake is as bad as failing completely" (perfectionism), "Harmful events will happen unless I am very careful" (overestimation of threat), and "If my actions could have even a small effect on a potential misfortune, I am responsible for the outcome (inflated responsibility). In MCT, none of these beliefs are targeted. The main metacognitive belief could be: "thinking I forgot to lock the door means it's the case." Metacognitive belief about rituals could be: "I need to perform my rituals otherwise or I'll never get rid of the intrusion", and the stop signal could

be “I have to check the door a specific number of times”. The use of rituals is understood as an attempt to regulate cognition, not to prevent harm or potential danger.

In cognitive therapy the therapist has a range of intervention techniques to challenge the obsessive beliefs. Cognitions could be labeled as to which cognitive distortion is inherent in the appraisal (e.g. black and white thinking) and pie charts can be used to illustrate the patient’s estimated probability with more logical estimates. Other methods include double standard technique, where the therapist asks the patient if they would judge others in the same way, and use downward arrow technique to elicit core beliefs which could be challenged. MCT does not include any of these strategies in treatment of OCD. Such strategies are viewed as promoting further conceptual processing, similar to worry and rumination, and therefore would be contraindicated. MCT employs a range of distinct therapeutic strategies in treatment of OCD designed to enable patients to update their metacognitive knowledge and metacognitive control strategies to distance patients from their intrusive thoughts and thus relate to and experience their thoughts in a more benign manner (Wells, 2000). In practical terms, the type of technique used is less important than what belief it intends to challenge and according to MCT it should be aimed at modifying metacognitive beliefs.

As previously mentioned, a challenge in MCT is to enable patients to shift to a “metacognitive mode” of experiencing thoughts rather than remaining stuck in “object mode,” where thoughts are evaluated as subjective realities that must be controlled. The “antidote” is that of detached mindfulness (DM), a central strategy in MCT originally conceptualized by Wells & Mathews (1994) and refers to how an individual relates to, and experiences cognitive events. It also involves the development of greater executive control over attentional strategies and types of thinking. DM is concerned with helping the patient to gain greater awareness of metacognitive processing thereby enabling the person to suspend conceptual processing. Detachment also consists of the individual experiencing himself/herself as an

observer, separate from the intrusive thought. A multitude of methods can be used to facilitate detached mindfulness (see Wells, 2005). However, the main goal is for patients to do nothing in response to intrusive thoughts or feelings, thereby modifying the cognitive attentional syndrome, resulting in minimal perseverative thinking, modification of threat monitoring and removal of maladaptive coping responses. For further comparison of CBT and the metacognitive approach confer Fisher (2009).

3. Research questions

As reviewed in the introduction, ERP and CBT are the most documented psychosocial treatments for OCD. Despite their efficacy there exists confusion as to how the treatment actually works. ERP was originally developed based upon behavioral principles, but has evolved to incorporate a focus on cognition. Cognitive therapies without exposure exercises for OCD and one experimental study (Fisher & Wells, 2005b) have raised doubts as to whether habituation is really necessary for reduction in symptoms. The experimental study showed that reduction in anxiety could be greater when delivering a brief exposure and response prevention exercise when accompanied with a metacognitive rationale compared to a traditional habituation rationale. Likewise, the cognitive models have suggested that it is necessary for patients with OCD to modify their obsessive beliefs during ERP in order for symptom relief to take place.

There is a great need to better understand how improvement following ERP and CBT for OCD occurs as this would enable researchers to better understand the nature of OCD and allow for designing more effective treatments. Although ERP and CBT for OCD seems to work rather well, it is still important to investigate whether these results could be replicated in other countries and cultures as well as how much training is needed in order to become competent in delivering this treatment. So far there has been one treatment study completed in Norway on ERP for adults with OCD. The treatment results from that study were promising, but it was also a highly controlled trial using experienced therapists. How the results would be when using more inexperienced therapist remains uncertain. Addressing this issue would enable the research community to explore translational aspects of ERP for OCD and is

important for future projects aimed at evaluating the role of supervision and the cost-efficiency of ERP.

If cross-cultural studies continue to indicate that ERP is an effective treatment for OCD and that it is relatively easy to learn, it would be important to proceed with investigating what mediates this effect. The cognitive revolution has introduced the importance of cognitions and hybrid models grouped together under the umbrella term CBT have proliferated. Pure cognitive therapy or integrated with traditional behavioral therapy have resulted in improved outcomes for some psychological disorders (e.g. panic disorder and social phobia). However, for OCD, the introduction of cognitive therapy has not resulted in improved outcomes leading to the question of whether we are challenging the right beliefs?

The metacognitive model suggests that that the cognitive constructs proposed as important in OCD are less relevant and that focus should be shifted to the metacognitive factors maintaining the disorder. It is therefore important to explore the validity of the metacognitive model compared to the cognitive models. If studies suggest that metacognitions are more important than ordinary cognitions in explaining obsessive-compulsive symptoms it could be an indication that the reason for the shortcomings of cognitive therapy for OCD are due to the model focusing on the wrong beliefs. Furthermore, if cross-sectional studies support the validity of the metacognitive model, then the role of metacognitions in OCD should be put to further tests in treatment studies for OCD. Change in metacognition should be accompanied by change in obsessive-compulsive symptoms. If mediators of ERP for OCD could be more accurately identified it could be easier to develop a more effective treatment. In addition, if change in metacognition mediates change in obsessive-compulsive symptoms, it would be important to investigate whether this finding is replicated across the different subtypes of OCD and to find the interventions best suited to modify metacognitive beliefs.

In an attempt to clarify these issues, the thesis set fourth four research projects:

1. The aim of the first study was to investigate the efficacy of teaching inexperienced psychology students ERP for OCD.
2. The aim of the second study was to conduct an empirical test of the cognitive and metacognitive models for obsessive-compulsive symptoms.
3. The aim of the third study was to test the relative importance of changing cognitions (responsibility/harm and perfectionism/certainty) and metacognition in ERP treatment for OCD.
4. The aim of the fourth study was to explore the OCD construct in Norwegian samples and to investigate whether the Norwegian translation of the OCI-R is an adequate measure of obsessive-compulsive symptoms and subtypes.

4. Method

4.1. Design and sample

Study I was an open trial with no control group. The study investigated whether inexperienced student therapist could efficiently learn ERP for OCD. The therapists consisted of five women and five men with a mean age of 22.4 ($SD = 1.4$) when starting supervision. The students had been studying psychology for three semesters and none of them had previous clinical experience. They were enrolled in a 5-year long educational program in order to become clinical psychologists. Their four supervisors were all male and had some background from treatment and research on OCD. The OCD sample consisted of 21 outpatients with a primary OCD diagnosis. All but one patient had previously attended professional psychological treatment and four had previous inpatient stays. The OCD sample had a mean age of 33.0 ($SD = 15.2$). Thirteen were of female gender. Nine were married or cohabitants. Thirteen were currently working or studying. Ten of the patients used medication (SSRI/SNRI).

Study II consisted of two studies in which both used cross-sectional design to investigate the relationship between cognitions, metacognitions and obsessive-compulsive symptoms. In the first part of the study a community control sample was recruited through e-mail lists for introductory psychology students and local government employees. The sample consisted of 269 participants of which 70.1% were women. In addition to the community control sample, a sample of people suffering from OCD was recruited. The OCD sample consisted of participants at a university clinic for adults specializing in OCD treatment. The OCD sample consisted of 57 participants with a mean age of 31 ($SD = 11.7$). The majority of the sample was of female gender (59.6%). In the second part of study II, a total of 304 community controls were recruited. The participants were recruited through e-mail lists from the most popular classes at the university (philosophy, psychology, medicine, and physics).

66.4% of the sample were of female gender. In the sample, 54.4% were single, and the remaining were cohabitant/married. The majority of the sample were students (75.7%), while 20.4% were in full-time jobs, and the remaining participants had either part-time work, disability, or were retired.

In study III changes in cognitions and metacognitions were investigated as predictors of treatment outcome for 83 outpatients with OCD who had completed ERP. The sample had a mean age of 34.2 ($SD = 11.9$), and the majority were female (71.1%). About half of the sample used SSRIs and the sample had suffered from OCD for a mean of 14.4 ($SD = 11.5$) years. Comorbid conditions were present; 37.3% had depressive disorders, 21.7% had social anxiety disorder, 18.1% had generalized anxiety disorder, and 18.1% suffered from panic/agoraphobia.

In study IV a cross-sectional design was employed in order to investigate the psychometric properties of the OCI-R. Two samples, one clinical OCD sample and one student/community control sample, were recruited. The control sample consisted of 1167 participants (436 were high school students) with a mean age of 22.5 ($SD = 7.9$). The majority of the sample was of female gender (62.4%). The OCD sample consisted of 72 participants with a mean age of 32.2 ($SD = 12.5$, range 16-66) and the majority of the sample was of female gender ($N = 44$).

4.2. Measures

4.2.1. Clinical interviews.

The Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV, Brown, DiNardo, & Barlow, 1994) was used as a diagnostic interview in all four studies. The structured Clinical Interview for the DSM-IV on axis I (First, Spitzer, Gibbon, & Williams, 1995) was used as a

diagnostic interview for some patients in study I, III and IV. The SCID has different modules covering mood episodes, psychotic symptoms, psychotic disorders; mood disorders, substance use disorders; and anxiety, adjustment, and other disorders. In addition, study IV used the Clinical interview for DSM-IV axis II Personality_(Spitzer, Williams, Gibbon, & First, 1990) as a measure of personality disorders.

The Yale-Brown Obsessive-Compulsive Scale (Y-BOCS; Goodman et al., 1989a; 1989b) was used in all studies. The interview has been used as a measure of obsessive-compulsive severity. Five obsession and five compulsion items are assessed on 0 - 4 point ratings in regards to frequency, distress, interference, resistance, and control. Studies have indicated adequate psychometric properties (Goodman et al., 1989a; Woody, Steketee, & Chambless, 1995).

4.2.2. Self-report measures.

Beck Anxiety Inventory (BAI; Beck & Steer, 1990) was used as a measure of anxiety symptoms in study IV. BAI is a 21-item self-report questionnaire measuring common symptoms of clinical anxiety. Each symptom is rated on a four-point scale, with higher scores indicating higher levels of anxiety symptoms. BAI has shown good psychometric properties (Beck & Steer, 1990).

Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979) was used as a measured of depressive symptoms in study I, III, and IV. BDI is a 21-item self-report inventory, which has been shown to be a reliable and valid measure of syndrome depression severity in both clinical and non-clinical populations (Beck, Steer, & Garbin, 1988). Each symptom is rated on a four-point scale where higher scores indicate higher levels of depressive symptoms.

Beliefs about rituals inventory (BARI; Wells & McNicol, 2004) was used as a metacognitive measure in study II. Beliefs about rituals inventory assesses beliefs about compulsions and consists of 14 items. Each item is rated on a 1 (disagree) to 4 (agree very much) scale. One example of an item is “I need to do my rituals or else I will be punished”. 12 of the items in the questionnaire assess positive beliefs about rituals and two items reflect negative beliefs about rituals.

Metacognition Questionnaire-30 (MCQ-30; Wells & Cartwright-Hatton, 2004) was used as a measure of metacognitive beliefs in study III. MCQ-30 is a 30-item self-report scale measuring beliefs about thinking. Responses are required on a four-point scale ranging from 1 (do not agree) to 4 (agree very much). A five-factor structure exists: (1) positive beliefs about worry; (2) negative beliefs about the controllability of thoughts and corresponding danger; (3) cognitive confidence; (4) negative beliefs about thoughts in general/need to control thoughts; and (5) cognitive self-consciousness. High scores reflect more reported problems with the item in question (e.g. a high cognitive confidence score indicates less trust in one’s memory). Appropriate psychometric properties have been reported (Wells & Cartwright-Hatton, 2004).

Obsessive Beliefs Questionnaire-44 (OBQ-44; Obsessive Compulsive Cognitions Working Group, OCCWG, 2005) has been used as a measure of cognitive beliefs relevant in OCD in study I, II, and III. OBQ-44 assesses belief domains that have been proposed to be important in the etiology of OCD. There are 44 items, all rated on a 7 point scale from 1 (strongly disagree) to 7 (strongly agree). OBQ-44 has been found to show good internal consistency and criterion-related validity in both clinical and non-clinical samples (OCCWG, 2005). OBQ-44 is a measure which is designed specifically to measure cognitions in OCD. The three subscales are: (1) responsibility/threat, referring to the belief that one is obligated to prevent negative events due to exaggerated beliefs in the likelihood of harm occurring; (2) perfectionism/certainty, referring to intolerance of imperfection and mistakes; and (3)

importance/control of thoughts, referring to the belief that the mere occurrence of thoughts implies that they are meaningful and dangerous and that these thoughts should be controlled. The importance/control of thoughts subscale has been labelled as a “metacognitive” construct in the original paper on the OBQ (Obsessive Compulsive Cognition Working Group, 1997) with reference to the work of Clark & Purdon (1993).

Obsessive Compulsive Inventory Revised (OCI-R; Foa et al., 2002) was used as a measure of obsessive-compulsive symptoms in study I and II. The scale consists of six subscales with three items on each subscale. The six dimensions are obsessing, washing, checking, neutralizing, ordering, and hoarding. Eighteen items are rated on a 0 (not at all distressing/bothering) to 4 (extremely distressing/bothering) scale. Examples of items include "I feel I have to repeat certain numbers" (neutralizing) and "I frequently get nasty thoughts and have difficulty in getting rid of them" (obsessing). Several studies have indicated the OCI-R to be a good measure of obsessive-compulsive symptoms (e.g. Abramowitz & Deacon, 2006; Foa et al. 2002; Hajcak, Huppert, Simons, & Foa, 2004; Huppert et al. 2007).

Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger & Borkovec, 1990) was used as a measure of worry in study II and IV. PSWQ includes 16 items that are rated from 1 (not at all typical of me/not descriptive) to 5 (very typical of me/very descriptive) as to how typical the statement (e.g. “My worries overwhelm me” and “I am always worrying about something”) is for them. PSWQ assesses the intensity, frequency, and uncontrollability of worry in general without referring to specific topics. Appropriate psychometric properties have been described (Meyer et al., 1990; Molina & Borkovec, 1994).

Stop Signals Questionnaire (SSQ, Myers et al., 2009a) was used as a metacognitive construct in study II. SSQ is developed to capture the importance of certain stop criteria in deciding to stop carrying out rituals. The items are constructed based on a list of unhelpful stop signals prevalent in OCD patients as found in case-material (Myers et al., 2009). The

questionnaire consists of 12 items and respondents are asked to rate how important each of these signals are for stopping their rituals on a 5 point scale from 0 (not at all important) to 5 (extremely important). All items begin with “An important signal of when I can stop my rituals is when...” and one example of an item is “... I have replaced the intrusive thought with a positive image”.

Thought-Fusion Instrument (TFI; Wells, Gwilliam, & Cartwright-Hatton, 2001) was used as a measure of the metacognitive construct of thought-fusion in study II. TFI assess metacognitive beliefs about the meaning, significance, and danger of intrusive thoughts. It was designed to measure the three types of thought fusions implicated in the metacognitive model: Thought-Action Fusion (e.g., “If I have thoughts about harming someone I will act on them”), Thought-Event Fusion (e.g., “My thoughts alone have the power to change the course of events”) and Thought-Object Fusion (e.g., “My feelings can be transferred into objects”). TFI consist of 14 items rated on a 0 to 100 scale. Gwilliam et al. (2004) obtained acceptable reliability and preliminary evidence supports its convergent and discriminant validity.

Yale-Brown Obsessive Compulsive Scale Self-Report (Y-BOCSSR; Baer, Brown-Beasley, Score & Henriques, 1993) was used in study II. The self-report version of the Y-BOCS rates the severity of symptoms in patients with OCD. Y-BOCSSR contains a total of 10 items where the first five items measures severity of obsessions and the last five quantify the severity of compulsions. Each item is scored on a 5 point scale from 0 (no distress) to 4 (extreme distress). Five items are assessed for both obsessions and compulsions: frequency, control, resistance, interference and distress. Studies have documented adequate psychometric properties (Grabill et al. 2008; Steketee, Frost and Bogart, 1996).

4.3. Treatments

Participants included in this thesis who underwent psychotherapy were recruited from a group therapy project for OCD and from individual ERP treatments conducted at outpatient clinics. The therapists included graduate psychology students (study I), psychologists, and psychiatrists.

The group therapy used groups led by a psychologist and a psychiatrist with six participants. The groups met once a week for a total of twelve 2.5 hour long sessions. The group treatment was adapted from a manual developed by Krone, Himle, & Nesse (1991). In addition to ERP, every group therapy session included the presentation of a topic that was relevant to the treatment of OCD (e.g. the nature of OCD, principles of behaviour therapy, family life, and lifestyle). Other interventions included the use of workbooks (with information about OCD, space for taking notes and forms to document daily compliance and progress), attempts at externalizing the OCD (e.g. “OCD is a bully, let’s fight back”), and the use of coping statements (e.g. “it’s not me it’s my OCD”). There was no adherence measure for the group therapy, but supervision by one of the developers of the manual was given and the detailed protocol was not deviated from.

The individual treatments used in this thesis were based on a commonly used treatment manual for obsessive-compulsive disorder (Kozak & Foa, 1997). The majority of the individual treatments used ERP with no extra cognitive techniques. However, some of the individual treatments included cognitive techniques such as Socratic questioning, pie-charts, and cognitive restructuring. The individual treatments used 90-min sessions which were delivered twice a week. The main ingredients of the therapy were for the first session to formulate a case-conceptualization, presenting a habituation rationale, and self-registration of rituals for homework. Session 2 involved creating the exposure hierarchy and introducing

rules for ritual prevention. The following sessions were similar in structure and consisted mainly of checking homework assignments, 60 minutes with in vivo and imaginary exposure delivered in a sequence specified by the hierarchy (reaching the top of the hierarchy after six sessions with exposure), and agreeing on homework assignments. Focus turned to relapse prevention when treatment was approaching termination.

4.4. Statistics

In study IV, effect sizes were calculated for ADIS-IV ratings, OCI-R, and BDI and clinical significant change analyses were estimated for the treatment completers. In study II, effect sizes were used in order to explore the differences among the two samples in regards to metacognitive beliefs and obsessive-compulsive symptoms. Pearson correlations were calculated in order to investigate the relationship between obsessive-compulsive symptoms and the two metacognitive constructs of thought-fusion beliefs and beliefs about rituals. In the second part of the study, correlations were computed for the metacognitive beliefs (including the third construct of stop signals), non-metacognitive beliefs, obsessive-compulsive symptoms and worry. Two hierarchical regressions were computed with either the OCI-R or the Y-BOCSSR as the dependent variable. PSWQ was entered on Step 1 to control for worry, followed by threat (from the OBQ-44), non-metacognitive beliefs (responsibility and perfectionism from the OBQ-44), and then the metacognitive measures were entered on separate steps with the order of entry based on their theorised causal sequence of activation, with thought fusion (TFI) on Step 4, belief about rituals (BARI) on Step 5, and stop signals (SSQ) on Step 6.

In study III, effect sizes of treatment effect were calculated for comparisons with other studies. Furthermore, the proportion of patients achieving clinically significant change, improving, and showing no change according to the criteria of Fisher & Wells (2005a) was

estimated. Comparisons of treatment responders' and non-responders' change scores on obsessive beliefs and metacognitions were calculated using independent t-tests. These analyses were followed by correlational analyses to investigate the relationship between changes in symptoms and changes in beliefs. Regression analyses were then used to predict outcome using pre-treatment levels of obsessive-compulsive symptoms on step 1, changes in depressed mood on the second step, before entering change scores in the non-metacognitive beliefs measured by the OBQ-44 on step 3. For the last step we investigated the influence of the metacognitive variables. In the fourth and final step the change score for the MCQ-30 was entered along with changes in the importance/control of thoughts subscale of the OBQ-44 since it was originally described as a metacognitive construct. Finally, correlation coefficients for post-treatment and follow-up results were calculated for the obsessive-compulsive symptoms, cognitive beliefs, and metacognitive beliefs in order to assess the stability of the results.

In study IV, the proposed factor structure of the OCI-R was tested using confirmatory factor analysis on the control sample. Reliability of the OCI-R was tested with Cronbach's alpha and intercorrelations. Validity of the OCI-R was then further explored from different perspectives. Firstly, comparisons of the OCD sample and the student control sample were analyzed using t-tests and effect sizes. In addition, further exploration of the six factors as predictors of obsessive-compulsive severity was investigated using regression analysis that controlled for worry. Relationship between subtypes of OCD (as assessed with the structured clinical interview) and their corresponding subscale on the OCI-R were then investigated using effect-size calculations. The relationship between the OCI-R and obsessive-compulsive severity, worry, anxiety, and depression were finally explored using correlational analyses combining participants from the control sample and the OCD sample.

5. Results

In study I, entitled “The efficacy of teaching psychology students exposure and response prevention for obsessive-compulsive disorder”, the effect sizes following treatment were large as measured with a diagnostic interview and the OCI-R. The results indicated that 65% of the treatment completers achieved clinical significant change at post-treatment and the results at follow-up were encouraging. The treatment was conceived of as credible and strong working alliances were achieved.

The theoretical basis of cognitive and metacognitive accounts of OCD was empirically explored in study II, entitled “An empirical test of the metacognitive model of obsessive-compulsive symptoms: replication and extension”. The study found that metacognitive beliefs of thought fusion and beliefs about rituals correlated significantly with obsessive-compulsive symptoms. Also, the OCD sample scored higher on these metacognitive measures compared with the control sample adding to the validity of metacognitions in OCD. Thought-fusion and belief about rituals were found to be predictors of obsessive-compulsive symptoms. Stop signals correlated significantly with obsessive-compulsive symptoms, but they were not a predictor. The cognitive factor of responsibility/harm was not a significant predictor when controlling for metacognitions, while the results for perfectionism/certainty were more ambiguous.

According to the metacognitive model psychological treatment should function through changing maladaptive metacognitions. Whether or not changes in metacognition could mediate symptom change in ERP for OCD was explored in study III, entitled “Change in metacognitions predicts outcome in obsessive-compulsive disorder patients undergoing treatment with exposure and response prevention”. The ERP treatment delivered was effective and commensurate with other trials of ERP for OCD. Metacognitive beliefs and beliefs

concerning perfectionism/certainty and responsibility/harm decreased significantly during the course of treatment. The correlations between changes in the OBQ-44 and changes in obsessive–compulsive symptoms were similar to that of previous research (e.g., Whittal et al., 2005). Patients who made clinically significant change, but not those that were simply improved or made no change, had significantly lower post-treatment scores on metacognition. Change on the MCQ-30 explained a large proportion of the variance in obsessive–compulsive symptoms. Change in metacognition was a better predictor of outcome symptom levels than change in beliefs about responsibility/harm and perfectionism/certainty. When the overlap between predictors was controlled for, only metacognition was significant. Further analyses showed that during treatment, change in two dimensions of metacognition independently predicted posttreatment symptom severity. These were beliefs about the need to control thoughts and positive beliefs about the need to worry.

Further investigation of the relationship between metacognitions and subtypes of OCD is now possible since study IV, entitled “Norwegian version of the Obsessive-Compulsive Inventory-Revised: Psychometric properties”, confirmed a six-factor structure of the OCI-R. Cronbach’s alpha values and the intercorrelations of the subscales were similar to that of previous studies and suggested acceptable reliability. OCI-R scores could significantly differentiate the OCD sample from the control sample. All OCI-R subscales except for hoarding were significant predictors of obsessive-compulsive severity. Strongest relationship was found with another measure of obsessive-compulsive severity (the Y-BOCS), and as expected, significant and positive correlations were observed for measures of worry, anxiety, and depression.

6. Conclusions

ERP has been the treatment of choice for OCD for several decades. Despite this fact, little is known about the teachability of ERP to inexperienced therapists and there is a debate concerning whether patients in Norway actually are offered this treatment. The first aim of this thesis was therefore to investigate whether inexperienced psychology students in Norway could become competent ERP therapists when given appropriate supervision. The results indicated that ERP is an empirically supported treatment of OCD that can be relatively easily learned by inexperienced therapist.

Despite the efficacy of ERP and CBT for OCD there is still confusion as to how the treatment works. The second aim of the thesis was therefore to investigate to different theoretical accounts of obsessive-compulsive symptoms. The relative contribution of cognitions and metacognitions was investigated. The results indicated that metacognitions could be more important than ordinary cognitions in explaining obsessive-compulsive symptoms. The results supported the validity of the metacognitive model of OCD.

Given the empirical evidence suggesting the importance of metacognitions in OCD the third aim of the thesis was to further investigate the validity of the cognitive models and the metacognitive model in a treatment study for patients with OCD. The results indicated that ERP for OCD could be mediated by change in metacognition and provides further indication for the validity of the metacognitive model.

In summary the thesis has provided further documentation for the efficacy of ERP and suggested that it could be mediated by change in metacognition. The thesis provides further support for the validity of the metacognitive model of OCD. However, a future challenge includes investigating whether this finding would be replicated independent of subtype of OCD. This could now be analyzed using the OCI-R as a measure of obsessive-compulsive symptoms and subtypes.

7. Discussion

7.1. Strengths and limitations

In general this thesis' main strength is that it tests theoretical predictions from two different theoretical models of OCD that are empirically supported. Further strengths include good treatment results which were obtained when using ERP for OCD making the findings clinically relevant, issues of supervision and dissemination of ERP for OCD were addressed, and psychometrically adequate measures were employed. However, the thesis also has several limitations such as limited description of treatment fidelity, issues concerning small sample size, lack of control groups and randomization, there is no empirical test of metacognitive therapy, group- and individual treatment are collapsed together, and several measures have yet to be validated in Norway. More specific strengths and limitations of the four individual papers included are described below.

The major strength of study I is that it demonstrates that it is relatively easy to acquire competency in delivering ERP for OCD. The positive treatment results achieved justifies investigating whether these results are replicable in other university clinics as well as other professional clinics. We consider it a positive finding for patients, practitioners, and clinical researchers that relatively inexperienced students can learn efficient treatment quickly. The main conclusion from this trial is that students are able to apply ERP treatment successfully to OCD when given appropriate supervision.

Due to different limitations of this study several questions remain unanswered. The study had a small sample size, lacked a control group, as well as the fact that our two diagnostic assessors also supervised the students. However, use of self-report measures supplemented the results. Finally, five patients did not meet for follow-up assessment, leaving the results from follow-up analysis difficult to interpret. One of the unanswered questions is

whether ongoing group supervision is essential due to lack of a control group. Little is known concerning how much training and supervision is needed to achieve certain levels of efficiency. The students used in our study could also be an unrepresentative group. However, they represented half of their class, indicating that they are probably not that different from other students enrolled in the same program. Our study is unable to answer whether these students will be better therapists in the future compared to their classmates who did not receive this training. In general these positive treatment results introduce a challenge to metacognitive therapy for OCD. ERP for OCD seems relatively easily translated into different setting while the effort needed to become an efficient metacognitive therapist is uncharted territory.

The major strength of study II is that it replicated results of a previous study (Myers et al., 2009) thereby further strengthening the empirical support for the metacognitive model of OCD. In doing so the results indicated a potential clinical use of these results may be reflected in metacognitive therapy for OCD (Wells 1997, 2000). Study II had several limitations. It had a cross-sectional design which means conclusions about causation cannot be made. In addition the questionnaires were not randomly ordered due to the software program used, which could subject the results to be affected by potential order effects.

The major strength of study III is that it is the first of its kind to indicate that ERP for OCD could be mediated by change in metacognition. In study III, it was found that good response to exposure and response prevention treatment is associated with reduction in metacognition which is a new original finding. Findings are consistent with the metacognitive model of OCD and the emphasis it gives on focusing on modification of metacognition in treatment. The design did not allow issues concerning the causal relationship between metacognitive belief change and symptom improvement during treatment to be addressed. Taken together with related research on metacognition and OCD, it seems reasonable to

assume on the basis of these data that metacognition could probably contribute to OCD and that changing them may be instrumental in recovery. Study III suffers from the same problems as the studies reviewed in the introduction regarding the relationship between changes in cognition and treatment outcome. The design of the study does not allow for inferences concerning mediators and mechanism of change to be drawn. However, the study represents an important first step towards revealing this mechanism. Its strength lies in its use of plausible theories and the use of multiple measures of possible mediators set in a treatment study. Despite this, the study suffers from the timeline problem, the need for multiple assessments (preferably from session to session or within session measures). In addition, more studies are needed to investigate whether the finding will be replicated and studies attempting to manipulate these possible mediators are needed. The study might also be improved by including multiple measures of obsessive–compulsive symptoms. Inclusion of other self-report measures of obsessiveness or distress could possibly lead to different results. However, Y-BOCS is the gold-standard for measuring obsessive–compulsive symptoms and it covers all different subtypes of OCD. Also, Y-BOCS showed meaningful correlations with the cognitive and metacognitive measures suggesting that it is a reasonable measure for the purposes of our study.

Among the strengths of study IV are the sample size and the fact that the study is the first of its kind in Norway to adequately assess psychometric properties of a measure designed to assess obsessive–compulsive symptoms. The Norwegian OCI-R has shown initial evidence of sound psychometric properties making it a suitable measure of obsessive–compulsive severity and different subtypes of OCD. It seems to be an appropriate measure for use in both clinical settings and in research projects for OCD related problems with Norwegian samples. In general the OCI-R seems to capture the obsessive–compulsive construct in meaningful ways. Its validity was further strengthened with study IV replicating previous results of the

factor structure and correlates with obsessive-compulsive related measures. There were some limitations to the psychometric study. The factor analysis was conducted using only the control sample. Whether or not the six factor structure is replicated in an OCD sample remains unanswered. A larger OCD sample (also including hoarding patients) could also have allowed for cut-off scores to be calculated. Also no other clinical group for comparison was included. In regards to the subscale-subtype relationships sample size is again a potential problem making it questionable to conclude in regards to the OCI-R's ability to capture specific dimensions of OCD. A final limitation could be that it was difficult to assess how the OCI-R subscales predict obsessive-compulsive severity using a clinical sample, due to the sample size and missing data on measures of worry/anxiety.

7.2. Suggestions for further research

A comparison of cognitive-behavioral therapy and metacognitive therapy for OCD would provide useful information and a randomized controlled trial or at least a large open trial should be conducted. Despite this thesis yielding empirical support for the metacognitive model, it has not tested metacognitive therapy. Another important aspect of evaluating the model involves dissemination research in order to address whether metacognitive therapy is applicable when used in clinics and how much training is needed in order to become a skillful metacognitive therapist.

It is also recommended that the temporal relationship between cognitive/metacognitive change and symptom change is repeatedly assessed to investigate if symptom change is mediated by beliefs and cognitive/metacognitive processes using multilevel analyses, and that multiple baseline studies are applied to study the relative importance of the cognitive, metacognitive, and the behavioral elements of CBT. In order to further test the metacognitive

model of OCD, more and larger prospective studies are encouraged to further investigating the causal mechanism involved in the development of obsessive-compulsive symptoms.

Preliminary results have indicated that metacognitions are important in OCD. However the metacognitive profile shouldn't necessarily be different depending on subtypes of OCD. The cognitive model on the other hand has exerted a great deal of effort towards findings specific beliefs for subtypes. With the Norwegian OCI-R it is now possible to address the issues of subtypes. Further research is also needed as to how the metacognitive model applies to other groups with OCD (e.g. children, adolescents, geriatric, and people with different cultural backgrounds).

8. References

- Abramowitz, J. S. (1997). Effectiveness of psychological and pharmacological treatments for obsessive-compulsive disorder: a quantitative review. *Journal of Consulting and Clinical Psychology, 65*, 44–52.
- Abramowitz, J. S., & Deacon, B. J. (2006). Psychometric properties and construct validity of the Obsessive-Compulsive Inventory-Revised: Replication and extension with a clinical sample. *Journal of Anxiety Disorders, 20*, 1016-1035.
- Abramowitz, J. S., Foa, E. B., & Franklin, M. E. (2003). Exposure and Ritual Prevention for Obsessive-Compulsive Disorder: Effects of Intensive Versus Twice-Weekly Sessions. *Journal of Consulting and Clinical Psychology, 71*, 394–398.
- Abramowitz, J. S., Franklin, M. E., Schwartz, S. A., & Furr, J. M. (2003). Symptom presentation and outcome of cognitive-behavioral therapy for obsessive-compulsive disorder. *Journal of Consulting and Clinical Psychology, 71*, 1049–1057.
- Abramowitz, J. S., Taylor, S., & McKay, D. (2005). Potentials and limitations of cognitive treatments for obsessive-compulsive disorder. *Cognitive Behavior Therapy, 34*, 140-147.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders (4th ed.)*. Washington DC: Author.
- van Balkom, A. J. L. M., van Oppen, P., Vermeulen, A. W. A., van Dyck, R., Nauta, M. C. E., & Vorst, H. C. M. (1994). A meta-analysis on the treatment of obsessive compulsive disorder: a comparison of antidepressants, behavior, and cognitive therapy. *Clinical Psychology Review, 14*, 359–381.
- Baer, L., Brown-Beasley, M. W., Sorce, J., & Henriques, A. (1993). Computer-assisted telephone administration of a structured interview for obsessive-compulsive disorder. *American Journal of Psychiatry, 150*, 1737–1738.
- Barlow, D. H., Allen, L. B., & Choate, M. L. (2004). Toward a unified Treatment for Emotional Disorders. *Behavior Therapy, 35*, 205-230.
- Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. New York: International Universities Press.
- Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression*. New York: Guilford Press.
- Beck, A. T., & Steer, R. A. (1990). *Manual for the Beck Anxiety Inventory*. The Psychological Corporation, San Antonio, Tex.
- Beck, A. T., Steer, R. A., & Garbin, M. C. (1988). Psychometric properties of the Beck Depression Inventory: twenty-five years of evaluation. *Clinical Psychology Review, 8*, 77-100.
- Berle, D., & Starcevic, V. (2005). Thought-action fusion: Review of the literature and future directions. *Clinical Psychology Review, 25*, 263-284.
- Bienvenu, O.J., Samuels, J.F., Riddle, M.A., Hoehn-Saric, R., Liang, K. Y., Cullen, B. A., et al. (2000). The relationship of obsessive-compulsive disorder to possible spectrum disorders. *Biological Psychiatry, 48*, 287-293.
- Brown, T. A., DiNardo P. A. & Barlow D. (1994). *Anxiety Disorders Interview Schedule (4th ed.)*. Boulder, CO: Graywind Publications.
- Butler, A. C., Chapman, J. E., Forman, E. M., & Beck, A. T. (2006). The empirical status of cognitive-behavioral therapy: A review of meta-analyses. *Clinical Psychology Review, 26*, 17-31.

- Calvocoressi, L., Lewis, B., Harris, M., Trufan, S. J., Goodman, W. K., McDougle, C. J., & Price, L. H. (1995). Family accommodation in obsessive-compulsive disorder. *American Journal of Psychiatry*, *152*, 441–443.
- 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.
- Christensen, D. D., & Greist, J. H. (2001). The challenge of obsessive-compulsive disorder hoarding. *Primary Psychiatry*, *8*, 79–86.
- Clark, D. A. (2004). *Cognitive-behavioral therapy for OCD*. New York: The Guilford Press.
- Clark, D. A., & Purdon, C. (1993). New perspectives for a cognitive theory of obsessions. *Australian Psychologist*, *28*, 161–167.
- 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.
- Crino, R., Slade, T., & Andrews, G. (2005). The Changing Prevalence and Severity of Obsessive-Compulsive Disorder Criteria From DSM-III to DSM-IV. *American Journal of Psychiatry*, *162*, 876–882.
- Damecour, C. L., & Charron, M. (1998). Hoarding: A symptom, not a syndrome. *Journal of Clinical Psychiatry*, *59*, 267–272.
- DiNardo, P. A., & Barlow, D. H. (1988). *Instructions for the Anxiety Disorders Interview Schedule – Revised*. Albany, NY: Phobia and Anxiety Disorders Clinic, SUNY.
- Emmelkamp, P. M. G., & Aardema, A. (1999). Metacognition, specific obsessive-compulsive beliefs and obsessive-compulsive behaviour. *Clinical Psychology & Psychotherapy*, *6*, 139–145.
- Emmelkamp, P. M. G., van Oppen, P., & van Balkom, A. J. L. M. (2002). Cognitive changes in patients with obsessive compulsive rituals treated with exposure in vivo and response prevention. In G. Steketee & R. O. Frost (Eds.), *Cognitive approaches to obsessions and compulsions – Theory, assessment, and treatment* (pp. 391–401). Amsterdam: Elsevier.
- Exner, C., Kohl, A., Zaudig, M., Langs, G., Lincoln, T.M., & Rief, W. (2009). Metacognition and episodic memory in obsessive compulsive disorder. *Journal of Anxiety Disorders*, *23*, 624–631.
- Feinstein, S. B., Fallon, B. A., Petkova, E., & Liebowitz, M. R. (2003). Item-by-item factor analysis of the Yale–Brown Obsessive–Compulsive Scale Symptom Checklist. *Journal of Neuropsychiatry and Clinical Neurosciences*, *15*, 187–193.
- Fireman, B., Koran, L. M., Leventhal, J. L., & Jacobson, A. (2001). The Prevalence of Clinically Recognized Obsessive-Compulsive Disorder in a Large Health Maintenance Organization. *American Journal of Psychiatry*, *158*, 1904–1910.
- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (1995). *Structured clinical interview for DSM-IV axis I disorders – Patient Edition (SCID I/P, version 2.0)*. NY: Biometrics research department.
- Fisher, P. L. (2009). Obsessive compulsive disorder: A comparison of CBT and the metacognitive approach. *International Journal of Cognitive Therapy*, *2*, 107–122.
- Fisher, P. L., & Wells, A. (2005a). How effective are cognitive and behavioral treatments for obsessive-compulsive disorder? A clinical significance analysis. *Behaviour Research and Therapy*, *43*, 1543–1558.
- Fisher, P. L., & Wells, A. (2005b). Experimental modification of beliefs in obsessive-compulsive disorder: A test of the metacognitive model. *Behaviour Research and Therapy*, *43*, 821–829.

- Fisher, P. L., & Wells, A. (2008). Metacognitive therapy for obsessive-compulsive disorder: A case series. *Journal of Behavior Therapy and Experimental Psychiatry, 39*, 117-132.
- Flavell, J. H. (1979). Meta-cognition and meta-cognitive monitoring: a new area of cognitive developmental inquiry. *American Psychologist, 34*, 906-911.
- Foa, E. B., Huppert, J. D., Leiberg, S., Langner, R., Kichic, R., Hajcak, G. et al. (2002). The Obsessive-compulsive Inventory: development and validation of a short version. *Psychological Assessment, 14*, 485-495.
- Foa, E. B., & Kozak, M. J. (1986). Emotional processing of fear: Exposure to corrective information. *Psychological Bulletin, 99*, 20-35.
- Foa, E. B., & Kozak, M. J. (1996). Psychological treatment for obsessive-compulsive disorder. In M. R. Mavissakalian & R. F. Prien (Eds.), *Long-term treatment of anxiety disorders* (pp. 285-309). Washington DC: American Psychiatric Press.
- Franklin, M., & Foa, E. (2002). *Cognitive behavioral treatments for obsessive compulsive disorder*. In P. E. Nathan, & J. M. Gorman (Eds.), *A guide to treatments that work* (pp. 367-386). New York: Oxford University Press.
- Freeston, M. H., Ladouceur, R., Gagnon, F., Thibedeau, N., Rheaume, J., Letarte, H., & Bujold, A. (1997). Cognitive behavioral treatment of obsessive thoughts: a controlled study. *Journal of Consulting and Clinical Psychology, 65*, 405-413.
- Freeston, M. H., Rheaume, J., & Ladouceur, R. (1996). Correcting faulty appraisals of obsessive thoughts. *Behaviour Research and Therapy, 34*, 443-446.
- Frost, R. O., & Steketee, G. (1997). Perfectionism in obsessive-compulsive disorder patients. *Behaviour Research and Therapy, 35*, 291-296.
- Frost, R. O., Steketee, G., & Grisham, J. (2004). Measurement of compulsive hoarding: Saving inventory-revised. *Behaviour Research and Therapy, 42*, 1163-1182.
- Frost, R. O., Steketee, G., & Williams, L. (2000). Hoarding: A community health problem. *Health and Social Care in the Community, 8*, 229-234.
- Frost, R. O., Steketee, G., Williams, L. F., & Warren, R. (2000). Mood, personality disorder symptoms and disability in obsessive compulsive hoarders: A comparison with clinical and nonclinical controls. *Behaviour Research and Therapy, 38*, 1071-1081.
- Goodman, W. K., Price, L. H., Ramussen, S. A., Mazure, C., Delgado, P., & Heninger, G. R., et al. (1989a). The Yale-Brown Obsessive Compulsive Scale: II. Validity. *Archives of General Psychiatry, 46*, 1012-1016.
- Goodman, W. K., Price, L. H., Ramussen, S. A., Mazure, C., Fleischmann, R. L., & Hill, C. L., et al. (1989b). The Yale-Brown Obsessive-Compulsive Scale: I. Development, use and reliability. *Archives of General Psychiatry, 46*, 1006-1011.
- Goodwin, D. W., Guze, S. B., & Robins, E. (1969). Follow-up studies in obsessional neurosis. *Archives of General Psychiatry, 20*, 182-187.
- Grabill, K., Merlo, L., Duke, D., Harford, K-L., Keeley, M. L., Geffken, G. R., & Storch, E. A. (2008). Assessment of obsessive-compulsive disorder: A review. *Journal of anxiety disorders, 22*, 1-17.
- Grant, J. E., Mancebo, M. C., Pinto, A., Williams, K. A., Eisen, J. L., & Rasmussen, S. A. (2007). Late-onset obsessive compulsive disorder: Clinical characteristics and psychiatric comorbidity. *Psychiatry Research, 152*, 21-27.
- Greenberg, D. (1987). Compulsive hoarding. *American Journal of Psychotherapy, 41*, 409-416.
- Greenberg, D., Witztum, E., & Levy, A. (1990). Hoarding as a psychiatric symptom. *Journal of Clinical Psychiatry, 51*, 417-421.

- van Grootheest, D. S., Cath, D. C., Beekman, A. T., & Boomsma, D. I. (2005). Twin studies on obsessive-compulsive disorder. A review. *Twin Research and Human Genetics*, *8*, 450-458.
- Gwilliam, P. D. H., Wells, A., & Cartwright-Hatton, S. (2004). Does metacognition or responsibility predict obsessive-compulsive symptoms: A test of the metacognitive model. *Clinical Psychology and Psychotherapy*, *11*, 137-144.
- Hajcak, G., Huppert, J. D., Simons, R. F., & Foa, E. B. (2004). Psychometric properties of the OCI-R in a college sample. *Behaviour Research and Therapy*, *42*, 115-123.
- Hansen, B., Vogel, P. A., Stiles, T. C., & Götestam, K. G. (2007). Influence of Co-Morbid Generalized Anxiety Disorder, Panic Disorder and Personality Disorders on the Outcome of Cognitive Behavioural Treatment of Obsessive-Compulsive Disorder. *Cognitive Behaviour Therapy*, *36*, 145-155.
- Hermans, D., Martens, K., De Cort, K., Pieters, G., & Eelen, P. (2003). Reality monitoring and metacognitive beliefs related to cognitive confidence in obsessive-compulsive disorder. *Behavior Research and Therapy*, *41*, 383-401.
- Heyman, I., Fombonne, E., Simmons, H., Ford, T., Meltzer, H., & Goodman, R. (2003). Prevalence of obsessive-compulsive disorder in the British nationwide survey of child mental health. *International Review of Psychiatry*, *15*, 178-184.
- Hodgson, R. J., & Rachman, S. (1977). Obsessional-compulsive complaints. *Behaviour Research and Therapy*, *15*, 389-395.
- Hofmann, S. G. & Smits, J. A. (2008). Cognitive-behavioral therapy for adult anxiety disorders: a meta-analysis of randomized placebo-controlled trials. *Journal of Clinical Psychiatry*, *69*, 621-632.
- Huppert, J. D., Walther, M. R., Hajcak, G., Yadin, E., Foa, E. B., Simpson, H. B., & Liebowitz, M. R. (2007). The OCI-R: validation of the subscales in a clinical sample. *Journal of Anxiety Disorders*, *21*, 394-406.
- Irak, M., & Tosun, A. (2008). Exploring the role of metacognition in obsessive-compulsive and anxiety symptoms. *Journal of Anxiety Disorders*, *22*, 1316-1325.
- Ivarsson, T., Melin, K., & Wallin, L. (2008). Categorical and dimensional aspects of comorbidity in obsessive-compulsive disorder. *European Child and Adolescent Psychiatry*, *17*, 20-31.
- 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.
- Janowitz, D., Grabe, H. J., Ruhrmann, S., Ettelt, S., Buhtz, F., & Hochrein, A., et al. (2009). Early onset of obsessive-compulsive disorder and associated comorbidity. *Depression and Anxiety*, *0*, 1-6.
- Karno M., Golding, J. M., Sorenson, S. B., & Burnam, M. A. (1998). The epidemiology of obsessive compulsive disorder in five US communities. *Archives of General Psychiatry*, *45*, 1094-1099.
- Kazdin, A., E. (2007). Mediators and mechanisms of change in psychotherapy research. *Annual Review of Clinical Psychology*, *3*, 1-27.
- Kessler, R., Berglund, P., Demler, O., Jin, R., & Walters, E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, *62*, 593-602
- Kim, H. J., Steketee, G., & Frost, R. O. (2001). Hoarding by elderly people. *Health and Social Work*, *26*, 176-184.
- Koran L. M., Thienemann, M. L., Davenport, R. (1996). Quality of life for patients with obsessive-compulsive disorder. *American Journal of Psychiatry*, *153*, 783-788.

- Kozak, M. J., & Foa, E. B. (1997). *Mastery of obsessive-compulsive disorder: A cognitive-behavioral approach*. San Antonio, TX: The Psychological Corporation.
- Kringlen, E., Torgersen, S., & Cramer, V. (2006). Mental illness in a rural area: A Norwegian psychiatric epidemiological study. *Social Psychiatry and Psychiatric Epidemiology*, *41*, 713–719
- Krone, K., Himle, J., & Nesse, R. (1991). A standardized behavior group treatment program for obsessive-compulsive disorder: preliminary outcomes. *Behaviour Research and Therapy*, *23*, 627–631.
- Leckman, J. F., McDougle, C. J., Pauls, D. L., Grice, D. E., King, R. A., Scahill, L., Price, L. H., & Rasmussen, S. A. (2000). Tic-related versus non-tic related obsessive-compulsive disorder, in Goodman, W. K., Rudorfer, M. V. & Maser, J. D. (Eds.), *Obsessive-compulsive disorder*. Contemporary issues in treatment. NJ: Lawrence Erlbaum Associates.
- Leon, A. C., Portera, L., & Weissman, M. M. (1995). The social costs of anxiety disorders. *British Journal of Psychiatry*, *166*, 19–22.
- Lo, W. H. (1967). A follow-up study of obsessional neurotics in Hong Kong Chinese. *British Journal of Psychiatry*, *113*, 823-832.
- Machlin, S. R., Harris, G. J., Pearlson, G. D., Hoehn-Saric, R., Jeffrey, P., & Camargo, E. E. (1991). Elevated medical frontal cerebral glucose blood flow in obsessive-compulsive patients. *American journal of psychiatry*, *148*, 1240-1242.
- Magliano, L., Tosini, P., Guarneri, M., Marasco, C., & Catapano, F. (1996). Burden on the families of patients with obsessive-compulsive disorder: a pilot study. *European Psychiatry*, *11*, 192–197.
- Maina, G., Albert, U., Salvi, V., Pessina, E., & Bogetto, F. (2008). Early-onset obsessive-compulsive disorder and personality disorders in adulthood. *Psychiatry Research*, *158*, 217-225.
- Maltby, N., & Tolin, D. F. (2005). A brief motivational intervention for treatment-refusing OCD patients. *Cognitive Behavior Therapy*, *34*, 176-184.
- March, J., Frances, A., Kahn, D., Carpenter, D. (1997). Expert Consensus guidelines: treatment of obsessive compulsive disorder. *Journal of Clinical Psychiatry*, *58*, 1–72.
- Marks, I. M., Lelliot, P., Basoglu, M., Noshirvani, H., Monteiro, W., et al. (1988). Clomipramine, self exposure, and therapist aided exposure in obsessive compulsive ritualisers. *British Journal of Psychiatry*, *152*, 522–534.
- Mataix-Cols, D., Rauch, S., Baer, L., Eisen, J. L., Shera, D. M., Goodman, W. K., et al. (2002). Symptom stability in adult obsessive-compulsive disorder. Data from a naturalistic two-year follow-up study. *American Journal of Psychiatry*, *159*, 263-268.
- de Mathis, M. A., do Rasario, M. C., Diniz, J. B., Torres, A. R., Shavitt, R. G., Ferrao, Y. A., et al., (2008). Obsessive-compulsive disorder: Influence of age at onset on comorbidity patterns. *European Psychiatry*, *23*, 187-194.
- McDonald, R., Marks, I. M., & Blizard, R. (1988). Quality assurance outcome in mental health care: a model for routine use in clinical settings. *Health Trends*, *20*, 111–114.
- Meyer, V. (1966). Modification of expectations in cases with obsessional rituals. *Behavior Research & Therapy*, *4*, 273-280.
- 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.
- Molina, S., & Borkovec, T. D. (1994). The Penn State Worry Questionnaire: psychometric properties and associated characteristics. In: G. Davey & F. Tallis (Eds.), *Worrying: Perspectives on theory, assessment and treatment* (265–297). Chichester: John Wiley & Sons.

- Moulding, R., & Kyrios, M. (2006). Anxiety disorders and control related beliefs: The exemplar of obsessive-compulsive disorder (OCD). *Clinical Psychology Review, 26*, 573-583.
- Muris, P., Merchelback, H., & Clavan, M. (1997). Abnormal and normal compulsions. *Behaviour Research and Therapy, 35*, 249–252.
- Myers, S. G., Fisher, P. L., & Wells, A. (2008). Belief domains of the Obsessive beliefs questionnaire-44 (OBQ-44) and their specific relationship with obsessive-compulsive symptoms. *Journal of Anxiety Disorders, 22*, 475-484.
- Myers, S. G., Fisher, P. L., & Wells, A. (2009a). An empirical test of the metacognitive model of obsessive-compulsive symptoms: Fusion beliefs, beliefs about rituals, and stop signals. *Journal of Anxiety Disorders, 23*, 436-442.
- Myers, S. G., Fisher, P. L., & Wells, A. (2009b). Metacognition and cognition as predictors of obsessive-compulsive symptoms: A prospective study. *International Journal of Cognitive Therapy, 2*, 107-122.
- Myers, S. G., & Wells, A. (2005). Obsessive-compulsive symptoms: The contribution of metacognitions and responsibility. *Journal of Anxiety Disorders, 19*, 806-817.
- Nakatani E, Nakgawa A, Ohara Y, Goto S, Uozumi N, Iwakiri M, Yamamoto Y, Motomura K, Iikura Y, Yamagami T. (2003). Effects of behavior therapy on regional cerebral blood flow in obsessive-compulsive disorder. *Psychiatry Research, 124*, 113-20.
- Nelson E, & Rice, J. (1997). Stability of diagnosis of obsessive-compulsive disorder in the Epidemiologic Catchment Area study. *American Journal of Psychiatry, 154*, 826–831.
- Nestadt, G., Samuels, J. F., Romanoski, A. J., Folstein, M. F., & McHugh, P. R. (1994). Obsessions and compulsions in the community. *Acta Psychiatrica Scandinavica, 89*, 219–224.
- Norberg, M.M., Krystal, J.H., & Tolin, D.F. (2008) A meta-analysis of D-Cycloserine and the facilitation of fear extinction and exposure therapy. *Biological Psychiatry, 63*, 1118-1126.
- Obsessive Compulsive Cognitions Working Group (1997). Cognitive assessment of obsessive-compulsive disorder. *Behaviour Research and Therapy, 35*, 667–681.
- Obsessive Compulsive Cognition Working Group (2005). Psychometric validation of the Obsessive Beliefs Questionnaire and the Interpretation of Intrusions Inventory: Part 2: factor analyses and testing of a brief version. *Behaviour Research and Therapy, 43*, 1527–1542.
- Pallanti, S. (2008). Transcultural observations of obsessive-compulsive disorder. *American Journal of Psychiatry, 165*, 169-170.
- Pleva, J., & Wade, T. D. (2006). The mediating effects of misinterpretation of intrusive thoughts on obsessive-compulsive symptoms. *Behaviour Research and Therapy, 44*, 1471-1479.
- Purdon, C., & Clark, D. A. (1994). Obsessive intrusive thoughts in nonclinical subjects. Part II. Cognitive appraisal, emotional response and thought control strategies. *Behavioral Research and Therapy, 32*, 403-410.
- Rachman, S. (1993). Obsessions, responsibility and guilt. *Behaviour Research and Therapy, 31*, 149-154.
- Rachman, S. (1997). A cognitive theory of obsessions. *Behaviour Research and Therapy, 35*, 793–802.
- Rachman, S. (1998). A cognitive theory of obsessions: Elaborations. *Behaviour Research and Therapy, 36*, 385–401.
- Rachman, S. J. (2003). *The treatment of obsessions*. New York: Oxford University Press.

- Rachman, S. J., & de Silva, P. (1978). Abnormal and normal obsessions. *Behaviour Research and Therapy*, *16*, 233–238.
- Rachman, S., & Hodgson, R. (1980). *Obsessions and compulsions*, Prentice Hall, Englewood Cliffs, NJ.
- Rasmussen, S. A., & Eisen, J. L. (1988). Clinical and epidemiological findings of significance to neuropharmacologic trials in obsessive-compulsive disorder. *Psychopharmacology Bulletin*, *24*, 466–470.
- Rasmussen, S. A., & Eisen, J. L. (1992). The epidemiology and differential diagnosis of obsessive compulsive disorder. *Journal of Clinical Psychiatry*, *53*, 4–10.
- Reed, G. F. (1985). *Obsessional experience and compulsive behavior. A cognitive-structural approach*. Academic Press, London.
- Rh eaume, J., Freeston, M. H., Dugas, M. J., Letarte, H., & Ladeouceur, R. (1995). Perfectionism, responsibility and obsessive-compulsive symptoms. *Behaviour Research and Therapy*, *33*, 785-794.
- Rosa-Alc azar, A. I., S anchez-Meca, J., G omez- Conesa, A., & Mar ın-Mart ınez, F. (2008). Psychological treatment of obsessive-compulsive disorder: A meta-analysis. *Clinical Psychology Review*, *28*, 1310-1325.
- Salkovskis, P. M. (1985). Obsessional-compulsive problems: a cognitive-behavioural analysis. *Behaviour Research and Therapy*, *23*, 571-583.
- Salkovskis, P. M. (1999). Understanding and treating obsessive-compulsive disorder. *Behaviour Research and Therapy*, *37*, 29-52.
- Salkovskis, P. M. (2007). Psychological treatment of obsessive – compulsive disorder. *Psychiatry*, *6*, 229-233.
- Salkovskis, P. M., & Forrester, E. (2002). Responsibility. In: R. Frost, & G. Steketee (Eds.), *Cognitive approaches to obsessions and compulsions: theory, assessment, and treatment*. Pergamon/Elsevier Science Inc. Amsterdam, Netherlands.
- Salkovskis, P. M., & Harrison, J. (1984). Abnormal and normal obsessions: A replication. *Behaviour Research and Therapy*, *22*, 549-552.
- Salkovskis, P. M., & Kirk, J. (1989). Obsessional disorders. In I. K. Hawton, P. M. Salkovskis, J. Kirk, & D. M. Clark (Eds.), *Cognitive-behavioural treatment for psychiatric disorders: A practical guide*. Oxford: Oxford University Press.
- Salkovskis, P. M., Richards, C., & Forrester, G. (1995). The relationship between obsessional problems and intrusive thoughts. *Behavioural and Cognitive Psychotherapy*, *23*, 281-299.
- Sassaroli, S., Lauro, L. J., Ruggiero, G. M., Mauri, M. C., Vinai, P., & Frost, R. (2008). Perfectionism in depression, obsessive-compulsive disorder and eating disorders. *Behaviour Research and Therapy*, *46*, 757-765.
- Shafran, R., Thordarson, D. S., & Rachman, S. (1996). Thought–action fusion in obsessive–compulsive disorder. *Journal of Anxiety Disorders*, *10*, 379–391.
- Shafran, R., & Rachman, S. (2004). Thought-action fusion: a review. *Journal of Behavior Therapy and Experimental Psychiatry*, *35*, 87-107.
- Sica, C., Steketee, G., Ghisi, M., Chiri, L. R., & Franceschini, S. (2007). Metacognitive beliefs and strategies predict worry, obsessive-compulsive symptoms and coping styles: A preliminary prospective study on an Italian non-clinical sample. *Clinical Psychology & Psychotherapy*, *14*, 258-268.
- Siev, J., & Chambless, D. L. (2007). Specificity of treatment effects: Cognitive therapy and relaxation for generalized anxiety and panic disorders. *Journal of Consulting and Clinical Psychology*, *75*, 513-522.

- Simpson, H. B., Zuckoff, A., Page, J. R., Franklin, M. E., & Foa, E. B. (2008). Adding motivational interviewing to exposure and ritual prevention for obsessive-compulsive disorder: An open pilot trial. *Cognitive Behavior Therapy, 37*, 38-49.
- Simpson, H. B., Foa, E. B., Liebowitz, M. R., Ledley, D. R., Huppert, J. D., Cahill, S., et al. (2008). A randomized, controlled trial of cognitive-behavioral therapy for augmenting pharmacotherapy in obsessive-compulsive disorder. *American Journal Psychiatry, 165*, 621-630.
- Skoog, G. & Skoog, I. (1999). A 40-year follow-up of patients with obsessive-compulsive disorder. *Archives of General Psychiatry, 56*, 121-127.
- Smits, J., A., J., Rosenfield, D., McDonald, R., & Telch, M., J. (2006). Cognitive mechanisms of social anxiety reduction: an examination of specificity and temporality. *Journal of Consulting and Clinical Psychology, 74*, 1203-1212.
- Sookman, D., Abramowitz, J. S., Calamari, J. E., Wilhelm, S., & McKay, D. (2005). Subtypes of obsessive-compulsive disorder: Implications for specialized cognitive behavior therapy. *Behavior Therapy, 36*, 393-400.
- 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* (pp. 63-89). Oxford: Elsevier.
- Spitzer, R. L., Williams, J. B. W., Gibbon, M., & First, M. (1990). *User's guide for the Structured Clinical Interview for DSM-III-R-Personality Disorders*. Washington, DC: American Psychiatric Association Press.
- Stein, M. B., Forde, D. R., Anderson, G., & Walker, J.R. (1997). Obsessive-compulsive disorder in the community: an epidemiologic survey with clinical reappraisal. *American Journal of Psychiatry, 154*, 1120-1126.
- Steketee, G., & Frost, R. O. (2003). Compulsive hoarding: Current status of the research. *Clinical Psychology Review, 23*, 905-927.
- Steketee, G., & Barlow, D. H. (2002). Obsessive-compulsive disorder. In D. H. Barlow (Ed.), *Anxiety and its disorders: The nature and treatment of anxiety and panic 2nd edition* (pp 516-550). New York: Guilford.
- Steketee, G., Frost, R., & Bogart, K. (1996). The Yale-Brown Obsessive Compulsive Scale: interview versus self-report. *Behaviour Research and Therapy, 34*, 675-684.
- Steketee, G., Frost, R., & Wilson, K. (2002). Studying cognition in obsessive compulsive disorder: Where to from here? In R. O. Frost & G. Steketee (Eds.), *Cognitive approaches to obsessions and compulsions: Theory, assessment, and treatment*. Oxford: Pergammon.
- Stewart, S., Geller, D., Jenike M., Pauls, D., Shaw, D., Mullin, B., et al. (2004). Long-term outcome of pediatric obsessive-compulsive disorder: a meta-analysis and qualitative review of the literature. *Acta Psychiatrica Scandinavia, 110*, 4-13.
- Tolin, D. F., Abramowitz, J. S., Brigidi, B. D., Amir, N., Street, G. P., & Foa, E. B. (2001). Memory and memory confidence in obsessive-compulsive disorder. *Behavior Research and Therapy, 39*, 913-927.
- Tolin, D. F., Frost, R. O., & Steketee, G. (2007). An open trial of cognitive-behavioral therapy for compulsive hoarding. *Behaviour Research and Therapy, 45*, 1461-1470.
- Tolin, D. F., Worhunsky, P., & Maltby, N. (2006). Are “obsessive” beliefs specific to OCD?: A comparison across anxiety disorders. *Behaviour Research and Therapy, 44*, 469-480.
- Torgersen, S., Kringlen, E., & Cramer, V. (2001). The prevalence of personality disorders in a community sample. *Archives of General Psychiatry, 58*, 590-596.

- Torres, A., Prince, M., Beggington, P., Bhugra, D., Brugha, T. S., Farrell, M., et al. (2006). Obsessive-compulsive disorder: prevalence, comorbidity, impact, and help-seeking in the British National Psychiatric Comorbidity Survey of 2000. *American Journal of Psychiatry*, *163*, 1978-1985.
- Tryon, W., W. (2005). Possible mechanisms for why desensitization and exposure therapy work. *Clinical Psychology Review*, *25*, 67-95.
- Tükel, R., Polat, A., Ozdemir, O., Aksüt, D., Turksöy, N. (2002). Comorbid conditions in obsessive-compulsive disorder. *Comprehensive Psychiatry*, *43*, 204-209.
- Valderhaug, R., Götestam, K. G., Larsson, B. (2004). Clinicians' views on management of obsessive-compulsive disorders in children and adolescents. *Nordic Journal of Psychiatry*, *58*, 125-132.
- Valderhaug, R., & Ivarsson, T. (2005). Functional impairment in clinical samples of Norwegian and Swedish children and adolescents with obsessive-compulsive disorder. *European Child and Adolescent Psychiatry*, *14*, 164-173.
- Valderhaug, R., Larsson, B., Götestam, K. G., & Piacentini, J. (2007). An open clinical trial of cognitive-behaviour therapy in children and adolescents with obsessive-compulsive disorder administered in regular outpatient clinics. *Behaviour research and therapy*, *45*, 577-589.
- Vogel, P. A., Stiles, T. C., & Götestam, K. G. (2004). Adding cognitive therapy elements to exposure therapy for obsessive compulsive disorder: a controlled study. *Behavioural and Cognitive Psychotherapy*, *32*, 257-272.
- Weissman, M. M., Bland, R. G., Canino, G. J., Greenwald, S., Hwu, H. G., Lee, C. K., Newman, S. C., et al. (1994). The cross-national epidemiology of obsessive compulsive disorder. *Journal of Clinical Psychiatry*, *55*, 5-10.
- Wells, A. (1997). *Cognitive Therapy of Anxiety Disorders: A Practice Manual and Conceptual Guide*. Chichester, UK: John Wiley & Sons.
- Wells, A. (2000). *Emotional Disorders and Metacognition: Innovative Cognitive Therapy*. Chichester, UK: John Wiley & Sons.
- Wells, A. (2005). Detached mindfulness in cognitive therapy: A metacognitive analysis and ten techniques. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *23*, 337-355.
- Wells, A. (2009). *Metacognitive therapy for anxiety and depression*. New York: Guilford Press.
- Wells, A., & Cartwright-Hatton, S. (2004). A short form of the metacognitions questionnaire: Properties of the MCQ-30. *Behaviour Research and Therapy*, *42*(4), 385-396.
- Wells, A., Gwilliam, P. D. H., & Cartwright-Hatton, S. (2001). *The Thought Fusion Instrument*. Unpublished Scale, University of Manchester, Manchester.
- Wells, A., & Matthews, G. (1994). *Attention and emotion. A clinical perspective*. Hove, UK: Lawrence Erlbaum & Associates.
- Wells, A., & Matthews, G. (1996). Modeling cognition in emotional disorder: The S-REF Model. *Behavior Research and Therapy*, *34*, 881-888.
- Wells, A., & McNicol, K. (2004). *The Beliefs about Rituals Inventory* (unpublished self-report scale). University of Manchester, UK.
- Wells, A., & Papageorgiou, C. (1998). Relationships between worry, obsessive-compulsive symptoms and meta-cognitive beliefs. *Behavior Research and Therapy*, *36*, 899-913.
- Whitaker, A., Johnson, J., Shaffer, D., Rapoport, J. L., Kalikow, K., Walsh, B. T., Davies, M., Braiman, S., & Dolinsky, A. (1990). Uncommon troubles in young people: prevalence estimates of selected psychiatric disorders in a nonreferred adolescent population. *Archives of general psychiatry*, *47*, 487-496.

- Whiteside, S., Port, J., Abramowitz, J. (2004). A meta-analysis of functional neuroimaging in obsessive-compulsive disorder. *Psychiatry Research: Neuroimaging*, *132*, 69-79.
- Whittal, M. L., Thordarson, D. S., & McLean, P. D. (2005). Treatment of obsessive-compulsive disorder: cognitive behavior therapy vs. exposure and response prevention. *Behaviour Research and Therapy*, *43*, 1559–1576.
- Whittal, M. L., Robichaud, M., Thordarson, D. S., & McLean, P. D. (2008). Group and individual treatment of obsessive-compulsive disorder using cognitive therapy and exposure plus response prevention: A 2-year follow-up of two randomized trials. *Journal of Consulting and Clinical Psychology*, *76*, 1003-1014.
- Wilhelm, S., Buhlmann, U., Tolin, D. F., Meunier, S. A., Pearlson, G. D., Reese, H. E., et al. (2008). Augmentation of behavior therapy with D-Cycloserine for obsessive-compulsive disorder. *American Journal of Psychiatry*, *165*, 335-341.
- Wilhelm, S., & Steketee, G. (2006). *Cognitive therapy for obsessive-compulsive disorder: A guide for professionals*. Oakland: New Harbinger Publications, Inc.
- Woodruff, R., & Pitts, F. N. (1964). Monozygotic twins with obsessional illness. *American Journal of Psychiatry*, *120*, 1075-1080.
- Woody, S. R., Steketee, G., & Chambless, D. L. (1995). Reliability and validity of the Yale-Brown obsessive compulsive scale. *Behaviour Research and Therapy*, *33*, 597-605.
- Wu, K. D., & Cortesi, G. T. (2009). Relations between perfectionism and obsessive-compulsive symptoms: examination of specificity among the dimensions. *Journal of Anxiety Disorders*, *23*, 393-400.
- Wu, K. D., & Watson, D. (2005). Hoarding and its relation to obsessive-compulsive disorder. *Behaviour Research and Therapy*, *43*, 897–921.

9. Papers I-IV

Paper I

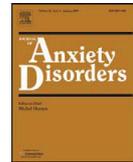
Is not included due to copyright

Paper II



Contents lists available at ScienceDirect

Journal of Anxiety Disorders



Research paper

An empirical test of the metacognitive model of obsessive-compulsive symptoms: Replication and extension

Stian Solem^{a,*}, Samuel G. Myers^b, Peter L. Fisher^c, Patrick A. Vogel^a, Adrian Wells^b

^aNorwegian University of Science and Technology, Department of Psychology, Norway

^bUniversity of Manchester, Academic Division of Clinical Psychology, United Kingdom

^cUniversity of Liverpool, Department of Clinical Psychology, United Kingdom

ARTICLE INFO

Article history:

Received 11 July 2009

Received in revised form 17 August 2009

Accepted 20 August 2009

Keywords:

OCD

Metacognition

Beliefs

Responsibility

Perfectionism

ABSTRACT

The aim of the current study was to further investigate the role of metacognitive beliefs implicated in Wells' (1997) model of obsessive-compulsive disorder (OCD). The metacognitive domains of thought-fusion beliefs and beliefs about rituals were positively correlated with obsessive-compulsive symptoms in a community control sample ($N = 269$) and in an OCD sample ($N = 57$). The OCD sample had significantly more obsessive-compulsive symptoms as well as higher scores on the metacognitive constructs than the control sample. In order to perform a more stringent test of the metacognitive model of OCD and to explore the role of a third metacognitive construct, that of stop signals, a second study was conducted using a community control sample ($N = 304$). All three metacognitive constructs were positively correlated with obsessive-compulsive symptoms. Thought-fusion beliefs and beliefs about rituals predicted obsessive-compulsive symptoms, even when controlling for worry, threat, and non-metacognitive beliefs such as perfectionism/certainty and responsibility. Results of this study provide further evidence for the importance of metacognitions in OCD.

© 2009 Elsevier Ltd. All rights reserved.

1. Introduction

Cognitive models of obsessive-compulsive disorder (OCD) share the assumption that individuals' appraisals of intrusions, and their response to this appraisal contribute to the disorder. They differ though as to which beliefs and unique processes they consider important in the development and persistence of the disorder. Two of the belief domains that have been proposed as playing a central role in the disorder are inflated responsibility and perfectionism.

Responsibility is elaborated in a model proposed by Salkovskis (1985) in which people with OCD perceive an intrusive thought as evidence that they may be responsible for harm (to self or others) if they do not take preventive action. These responsibility appraisals trigger emotional responses that motivate the need to carry out compulsive acts or rituals. These acts/rituals contribute to maintenance of the disorder as it reduces the subjectively perceived level of responsibility and therefore become reinforced. In a review, Clark (2004) concluded that responsibility is important in the persistence of obsessions, but may be overstated in regard to all subtypes of OCD.

In addition to responsibility, contemporary cognitive theorists have also suggested a role for perfectionism in the understanding of OCD. Several studies on non-clinical populations have found that

perfectionism is related to obsessive-compulsive symptoms (Hodgson & Rachman, 1977; Pleva & Wade, 2006; Rhéaume, Freeston, Dugas, Letarte, & Ladouceur, 1995), even when controlling for responsibility and depression (Wu & Cortesi, 2009). Frost and Steketee (1997) also found a relationship between OCD and perfectionism when using a clinical sample. However, they found that perfectionism was not specific to OCD as compared to other psychiatric disorders, a finding in agreement with Sassaroli et al. (2008). It has been proposed that perfectionism may be a necessary but insufficient trait for development of obsessive-compulsive symptomatology (Frost & Steketee, 1997).

In models of OCD which stress constructs such as perfectionism and responsibility cognitive beliefs play a central role. The metacognitive model of OCD (Wells, 1997; Wells & Matthews, 1994) has a different perspective. Metacognitions refer to beliefs and knowledge about thinking as well as strategies used to regulate and control thinking processes (Flavell, 1979). According to Wells' metacognitive model it is individuals' cognitions about their own cognitive processes and metacognitive regulatory strategies which are the key to understanding the development and maintenance of OCD. Wells (1997) proposed that cognitive beliefs are by-products of metacognition and that metacognitive beliefs are more important in contributing to obsessive-compulsive symptomatology. This model emphasizes three types of metacognitive knowledge: thought-fusion beliefs, beliefs about the need to perform rituals, and stop signals or criteria for terminating rituals.

* Corresponding author. Tel.: +47 73591801; fax: +47 73597694.
E-mail address: stian.solem@svt.ntnu.no (S. Solem).

In the metacognitive model interpretation of an intrusion depends upon the activation of thought-fusion beliefs. Wells (1997) proposed three different types of thought-fusion beliefs. Thought-Action Fusion involves believing that a thought alone can cause a person to carry out an action, or that a thought is equivalent to an action. Thought-Event Fusion involves thinking that having a thought can cause events, while Thought-Object Fusion is the belief that thoughts and feelings can be transferred into objects. The Thought-Fusion Instrument (TFI; Wells, Gwilliam, & Cartwright-Hatton, 2001) measures these metacognitive beliefs. Depending upon the strength of these fusion beliefs, intrusions are appraised as significant and possibly dangerous. For example, having thoughts that one might hurt one's children becomes threatening if one believes having such thoughts will make it happen. According to the metacognitive model these fusion beliefs are activated following a trigger (usually an automatic thought/intrusion) leading to negative appraisals which in turn activate beliefs about rituals.

Beliefs about rituals refer to assumptions an individual holds about the need to carry out rituals and neutralizing behavior in response to intrusions. For example a person may believe "if I keep knives locked in the cupboard I will not hurt my children." The Beliefs About Rituals Inventory (BARI; Wells & McNicol, 2004) assesses strength of such beliefs. These beliefs also consist of ideas of not being able to relax or have peace of mind if one is hindered from performing the ritual, the idea that something important will be forgotten, or there will be loss of thought-control, etc. Rituals and neutralizing behavior are performed until an internal subjective criteria, or stop signal, is met (Wells, 2000). Examples of such subjective criteria are "having a perfect memory of the action" or "having performed the rituals in the correct order." These stop signals have been assessed by a recent preliminary measure the Stop Signals Questionnaire (SSQ; Myers, Fisher, & Wells, 2009a).

Thought-Action Fusion was a term introduced by Rachman (1993) to label the cognitive distortions linked to inflated responsibility appraisals. The Thought-Action Fusion scale (Shafran, Thordarson, & Rachman, 1996) has received attention from several researchers as reviewed by Shafran and Rachman (2004). The Thought-Action Fusion addressed deals with experiences such as thinking that having an intrusive thought increases the likelihood that adverse events will occur to oneself or others, and a moral aspect where intrusive thoughts are almost considered as equivalent to acting out the thought. In contrast to this view of Thought-Action Fusion, the metacognitive model of OCD assesses thought-fusion differently (e.g., introduces Thought-Object Fusion and clearly distinguishes Thought-Event Fusion from Thought-Action Fusion). Furthermore, these are seen as metacognitive beliefs rather than cognitive distortions. In addition, the relationship between exaggerated responsibility and thought-fusion is more clearly stated where responsibility is viewed as the content and product of ruminative chains of thoughts activated by metacognitions.

Several studies have supported the relationship between metacognitive beliefs and obsessive-compulsive symptoms, and these results have held after controlling for worry, depressive symptoms, responsibility, and perfectionism. A detailed review of this research was recently presented by Fisher (2009). Cross-sectional studies based on self-report (e.g., Myers & Wells, 2005) have demonstrated positive relationships between specific metacognitive beliefs and obsessive-compulsive symptoms, with little or no additional contribution made by non-metacognitive belief domains measured. Experimental manipulations (e.g., Fisher & Wells, 2005) and prospective studies (e.g., Myers, Fisher, & Wells, 2009b) of metacognitive beliefs, provide support for the causal role of metacognitions implicated in the model. In addition, treatment data consisting of a case-series study of metacognitive therapy

(Fisher & Wells, 2008), group treatment studies (e.g., Rees & van Koesveld, 2008), and a study showing that change in metacognitions predicts treatment outcome following exposure and response prevention treatment (Solem, Håland, Vogel, Hansen, & Wells, 2009) have added to the accumulating evidence in support of the metacognitive model. However, a randomized controlled trial on the effect of metacognitive therapy for OCD has yet to be conducted. Furthermore, there are aspects of the model that remain to be tested consistently. In particular, contribution of beliefs about rituals and subjective stop criteria used to control neutralizing. Although preliminary results support their role in obsessive-compulsive symptoms (Myers et al., 2009a; Wahl, Salkovskis, & Cotter, 2008) their additional contribution alongside beliefs about intrusions requires further substantiation.

One study, by Myers et al. (2009a) investigated if fusion beliefs, beliefs about rituals, and stop signals could explain additional variance in obsessive-compulsive symptoms in their theorized causal sequence (fusion beliefs → beliefs about rituals → stop signals). This sequence is derived from Wells (1997) model of OCD, which states that thought-fusion beliefs are activated following the occurrence of intrusions. This process leads the intrusion to be appraised as dangerous or important. When such occurs it is the individual's beliefs about rituals which guide responses to the appraisal. The response first involves declarative beliefs about the need to carry out rituals and finally the plan for monitoring and controlling the compulsive behavior which includes criteria for when to stop.

The study by Myers et al. (2009a) used a sample of 238 students (mean age 21.8 yrs) enrolled in a variety of courses at the University of Manchester. For the regression analyses the study controlled for worry on step 1, overestimation of threat on step 2, and ordinary cognitive beliefs such as responsibility and perfectionism/certainty on step 3, before entering the metacognitive variables on steps 4, 5, and 6. Each of the metacognitive steps explained positively significant additional variance in two measures of obsessive-compulsive symptoms. However, unlike metacognitions, ordinary cognitive beliefs such as perfectionism/certainty and responsibility were not significant predictors of obsessive-compulsive symptoms in the final step of the equation. Beliefs about rituals and stop signals were significant predictors when their shared variance was controlled. Thought-fusion beliefs were also significant when using the Obsessive Compulsive Inventory (Foa, Kozak, Salkovskis, Coles, & Amir, 1998), but not when using the Yale-Brown Obsessive Compulsive Scale Self-Report (Baer, Brown-Beasley, Score, & Henriques, 1993).

1.1. Aims of the current study

The aim of our current study was to further explore the role of metacognitions in obsessive-compulsive symptoms (using both control samples and a clinical sample) and also to explore if the results obtained in the study by Myers et al. (2009a) would be replicated in a Norwegian sample. To test the metacognitive model of OCD, three hypotheses were examined:

1. Metacognitions will show a significant positive correlation with obsessive-compulsive symptoms.
2. Patients with OCD will score significantly higher on metacognitive constructs compared to community controls.
3. Metacognitions will continue to explain additional variance in obsessive-compulsive symptoms even when simultaneously controlling for worry, threat, responsibility, and perfectionism/certainty.

In order to investigate these hypotheses, two studies were conducted. Study I investigated the first two hypotheses using a

within and between group design. An OCD sample and a community sample completed self report measures of obsessive-compulsive symptoms and measures of metacognitive beliefs about intrusions and rituals. In study II, the aim was to assess whether the three fundamental components of the metacognitive model of OCD, namely, fusion beliefs, beliefs about rituals and stops signals would predict obsessive-compulsive symptoms when the effects of worry, threat, responsibility, and perfectionism/certainty were controlled. This is a replication of the Myers et al. (2009a) study and is a cornerstone of the scientific process. Replications using samples from different countries and languages reduce probability that systematic but unknown differences account for the outcomes.

2. Method

2.1. Participants and procedure

A community control sample was recruited through e-mail lists for introductory psychology students and from a separate group consisting of local government employees at the department for urban development. The questionnaires assessing obsessive-compulsive symptoms and aspects of the metacognitive model of OCD were administered using an internet survey yielding no missing items. The questionnaires were not administered in a random fashion because the software program did not allow this. The final sample consisted of 269 participants of which 69.9% ($N = 188$) were female. The mean age for the sample was 30.04 (12.21). A total of 782 psychology students and 70 local government employees were asked to participate giving a response rate of 36.1%.

In addition to the community control sample, a sample of people suffering from OCD was recruited. The OCD sample consisted of participants who had been offered exposure and response prevention treatment for OCD at a university clinic for adults. The primary inclusion criterion was a primary diagnosis of obsessive-compulsive disorder. The Anxiety Disorder Interview Schedule for DSM-IV (ADIS-IV; Brown, DiNardo, & Barlow, 1994) interview was used for diagnostic assessment by trained independent raters. The exclusion criteria for the treatment study were the presence of psychotic disorders, suicidality, developmental or autism disorders, and drug/alcohol dependence. The OCD sample completed the same questionnaires as the control sample, as well as the Yale–Brown Obsessive Compulsive Scale interview, before starting treatment. The OCD sample consisted of 57 participants with a mean age of 30.96 ($SD = 11.73$). The majority of the sample was female (59.6%, $N = 34$).

2.2. Measures

2.2.1. The Obsessive Compulsive Inventory Revised (OCI-R; Foa et al., 2002)

The OCI-R was used as the measure of obsessive-compulsive symptoms. Eighteen items are rated on a 0 (not at all distressing/bothering) to 4 (extremely distressing/bothering) scale. Examples of items include “I feel I have to repeat certain numbers” (from the neutralizing subscale) and “I frequently get nasty thoughts and have difficulty in getting rid of them” (from the obsessing subscale). The scale consists of six subscales. Several studies have indicated the OCI-R to be a good measure of obsessive-compulsive symptoms (e.g., Abramowitz & Deacon, 2006; Foa et al., 2002; Hajcak, Huppert, Simons, & Foa, 2004; Huppert et al., 2007). Compared to the original OCI the OCI-R has fewer items and according to Foa et al. (2002) it improves the OCI by removing the redundant frequency scale and reduces overlap between subscales. Cronbach’s alpha for the total scale in the control sample was .83

and .74 in the OCD sample. For the individual subscales the alpha values ranged from .54 (neutralizing) to .84 in the control sample and from .80 to .90 in the OCD sample.

2.2.2. The Yale–Brown Obsessive Compulsive Scale interview (Y–BOCS)

Y–BOCS (Goodman, Price, Ramussen, Mazure, & Delgado, 1989; Goodman, Price, Ramussen, Mazure, & Fleischmann, 1989) was used as a measure of obsessive compulsive severity in the OCD sample in addition to the OCI-R. Five obsession and five compulsion items are assessed on 0–4 ratings of frequency, control, resistance, interference, and distress. Only the total scores were used in our study. Cronbach’s alpha for the total scale was .83.

2.2.3. The Thought-Fusion Instrument (TFI; Wells et al., 2001)

The TFI assess metacognitive beliefs about the meaning, significance, and danger of intrusive thoughts. It was designed to measure the three types of thought-fusion implicated in the metacognitive model: Thought-Action Fusion (e.g., “If I have thoughts about harming someone I will act on them”), Thought-Event Fusion (e.g., “My thoughts alone have the power to change the course of events”) and Thought-Object Fusion (e.g., “My feelings can be transferred into objects”). The TFI consist of 14 items rated on a 0–100 scale. Gwilliam, Wells, & Cartwright-Hatton (2004) obtained acceptable reliability and preliminary evidence supporting its convergent and discriminant validity. Cronbach’s alpha was .88 in the control sample and .89 in the OCD sample.

2.2.4. The Beliefs About Rituals Inventory (BARI; Wells & McNicol, 2004)

The Beliefs About Rituals Inventory assesses beliefs about compulsions and consists of 14 items. Each item is rated on a 1 (disagree) to 4 (agree very much) scale. One example of an item is “I need to do my rituals or else I will be punished”. 12 of the items in the questionnaire assess positive beliefs about rituals. The current study uses the total score of these 12 questions as in the study by Myers et al. (2009a). The two items reflecting negative beliefs about rituals are therefore not included. These two items measure the uncontrollability of rituals and asks how dangerous or harmful they are perceived to be. Test-retest reliability after 3 months has shown a coefficient of .70 (Myers et al., 2009a). The Cronbach’s alpha for the questionnaire as obtained in our study was .82 in the control sample and .86 in the OCD sample.

2.3. Overview of data analysis

Means and standard deviations for the different questionnaires were calculated in order to allow comparison with previous research and to compare the OCD sample with the community control sample. Effect sizes were used in order to explore the differences among the two samples in regards to metacognitive beliefs and obsessive-compulsive symptoms. Pearson correlations were calculated in order to investigate the relationship between obsessive-compulsive symptoms and the two metacognitive constructs of thought-fusion beliefs and beliefs about rituals.

3. Results

3.1. Means, standard deviations, and sample comparisons

Means and standard deviations on the predictor and outcome measures for the samples are presented in Table 1. Independent samples t -tests showed that the OCD group endorsed higher total symptom scores and subscale scores apart from hoarding on which there was no statistical group difference. The OCD group

Table 1

Means, standard deviations, and effect sizes comparing the OCD group with the control group on obsessive-compulsive symptoms and metacognitions (study I).

	OCD (N=57)		Controls (N=269)		t	d
	M	SD	M	SD		
OCI-R total	30.12	10.50	9.77	6.37	14.10 ^a	2.34
Washing	5.02	4.24	.67	1.28	7.68 ^a	1.39
Obsessing	8.19	2.82	1.72	1.92	16.50 ^a	2.68
Hoarding	2.19	2.68	2.73	1.99	-1.44	-.23
Ordering	4.60	3.88	2.16	2.03	4.61 ^a	.79
Checking	6.04	3.68	1.89	1.66	8.32 ^a	1.45
Neutralizing	4.09	4.08	.60	1.22	6.40 ^a	1.16
TFI	316.13	274.04	125.81	148.18	5.09 ^a	.86
BARI	26.32	7.57	14.22	2.99	11.88 ^a	2.10

Note. BARI = Beliefs About Rituals Inventory; TFI = Thought-Fusion Instrument; OCI-R = Obsessive Compulsive Inventory-Revised.

^a $p < .00001$, two-tailed.

had significantly higher scores on fusion beliefs and beliefs about rituals. The effect size for these variables was very large (.86 and 2.10).

3.2. Correlation between obsessive-compulsive symptoms and metacognitions

In the control sample, the TFI and the BARI showed strong and significant correlations with the total OCI-R score. The metacognitive constructs also showed significant correlations with all the OCI-R subscales. For the TFI these correlations ranged from .24 (washing) to .52 (obsessing). For the BARI the correlations with the OCI-R subscales ranged from .30 (hoarding) to .54 (ordering).

The strength of the correlations showed a similar pattern in the OCD sample. The OCI-R total score showed a strong correlation with the BARI and the TFI. The BARI and the TFI also showed significant correlations with obsessive-compulsive severity as measured with the Y-BOCS. In the non-clinical sample all subscales of the OCI-R correlated significantly with metacognitions. However, in the clinical sample there were non-significant correlations between washing and hoarding and metacognitions, and the TFI was not significantly correlated with checking. In the OCD sample the BARI and the TFI showed an intercorrelation of .68, while in the control sample the correlation was .59. When combining the two samples into a mixed sample the strength of the correlations increased but the relationship between hoarding and beliefs about rituals was non-significant. The correlations between obsessive-compulsive symptoms and the two metacognitive constructs are summarized in Table 2.

In addition to the correlational analyses two regression analyses were conducted in order to investigate how much

Table 2

Correlations between obsessive-compulsive symptoms and metacognitions in the OCD sample, the control sample, and the mixed sample (study I).

	OCD (N=57)		Controls (N=269)		Mixed (N=326)	
	BARI	TFI	BARI	TFI	BARI	TFI
Y-BOCS	.48 ^{**}	.37 ^{**}	–	–		
OCI-R total	.65 ^{**}	.53 ^{**}	.70 ^{**}	.58 ^{**}	.85 ^{**}	.63 ^{**}
Washing	.19 ^{ns}	.14 ^{ns}	.30 ^{**}	.24 ^{**}	.58 ^{**}	.36 ^{**}
Obsessing	.49 ^{**}	.49 ^{**}	.52 ^{**}	.52 ^{**}	.78 ^{**}	.59 ^{**}
Hoarding	.07 ^{ns}	.18 ^{ns}	.30 ^{**}	.31 ^{**}	.06 ^{ns}	.21 ^{**}
Ordering	.43 ^{**}	.38 ^{**}	.54 ^{**}	.38 ^{**}	.56 ^{**}	.46 ^{**}
Checking	.32 ^{**}	.09 ^{ns}	.45 ^{**}	.29 ^{**}	.64 ^{**}	.37 ^{**}
Neutralizing	.40 ^{**}	.34 ^{**}	.50 ^{**}	.39 ^{**}	.65 ^{**}	.48 ^{**}

Note. BARI = Beliefs About Rituals Inventory; TFI = Thought-Fusion Instrument; Y-BOCS = Yale-Brown Obsessive Compulsive Scale; OCI-R = Obsessive Compulsive Inventory-Revised; ns = not significant.

^{*} $p < .05$.

^{**} $p < .01$ (two-tailed).

variance in obsessive-compulsive symptoms is explained by these two metacognitive constructs. When predicting the OCI-R scores in the control sample using a regression analysis and entering scores on the TFI on step 1 and the BARI on step 2, both metacognitive constructs were significant predictors and the adjusted R^2 of the model was .52. Thought-fusion belief was significant on the first step [$B = .025$, $SD = .002$, $\beta = .576$, $t(1, 267) = 11.517$, $p < .0001$] and beliefs about rituals was significant on step 2 [$B = 1.164$, $SD = .112$, $\beta = .546$, $t(2, 266) = 10.401$, $p < .0001$]. The same analysis on the OCD sample gave an adjusted R^2 of .42. Thought-fusion belief on the first step was significant [$B = .020$, $SD = .004$, $\beta = .531$, $t(1, 55) = 4.649$, $p < .0001$] and beliefs about rituals was significant on the second step [$B = .756$, $SD = .193$, $\beta = .545$, $t(2, 54) = 3.921$, $p < .001$].

4. Introduction

In study II, the aim was to conduct a more stringent test of the metacognitive model by including the third main component of the model, i.e.; the role of stop signals in addition to fusion beliefs and beliefs about rituals. We also explored whether these three aspects of the metacognitive model of OCD would continue to be predictive of obsessive-compulsive symptoms once a range of other belief domains (such as responsibility, perfectionism, worry, and threat) associated with OCD in other models were controlled. It is important to control for worry as it overlaps with obsessive-compulsive symptoms (e.g., Tallis & de Silva, 1992) and is implicated in some beliefs linked with OCD (e.g., Dugas, Freeston, & Ladouceur, 1997). Similarly, overestimation of threat has been linked with all anxiety disorders (Sookman & Pinard, 2002). Therefore, by controlling for these variables it is possible to assess the contribution of beliefs implicated in specific theories of obsessive-compulsive symptoms, over and above worry and threat beliefs.

5. Method

5.1. Participants and procedure

In the second study a total of 304 community controls were recruited. The participants were recruited through e-mail lists from the most popular classes at the university (philosophy, psychology [not the same classes as in study I], medicine, and physics). In addition, some psychology students who were helping with recruiting participants also invited their friends and family members to take part in the survey. Of the 304 participants, 202 (66.4%) were female. In the sample, 54.4% were single, and the remaining were married or cohabiting. The majority of the sample was students (75.7%), while 20.4% were in full-time jobs, and the remaining participants had either part-time work, disability, or were retired. The response rate for study II was uncertain due to the fact that several of the e-mail lists did not disclose the total number of students enrolled.

All questionnaires were completed online by the participants. The OCI-R and the Yale-Brown Obsessive Compulsive Scale Self-Report (Y-BOCSSR, Baer et al., 1993) were used as measures of symptom severity. The Y-BOCSSR was not included for one of the e-mail lists that were targeted, resulting in 98 students less for this measure. Metacognitions were assessed by administering the TFI, the BARI and the SSQ. To control for worry and cognitive constructs, the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) the Obsessive Belief Questionnaire-44 (OBQ-44; OCCWG, 2005) were included. In contrast to the study by Myers et al. (2009a) the questionnaires were not ordered randomly (due to the computer software), but were presented to the participants in the following order: OCI-R, BARI, TFI, SSQ, Y-BOCSSR, OBQ-44, and the PSWQ.

5.2. Measures

The OCI-R, the TFI, and the BARI which have already been described in study I were included. The Cronbach's alpha in study II for the OCI-R was .87, while for the TFI and the BARI it was .86 and .84 respectively.

5.2.1. The Yale–Brown Obsessive Compulsive Scale Self-Report (Y–BOCSSR; Baer et al., 1993)

This scale rates the severity of symptoms in patients with OCD. The Y–BOCSSR contains a total of 10 items where the first five items measure severity of obsessions and the last five quantify the severity of compulsions. Each item is scored on a 5 point scale from 0 (no distress) to 4 (extreme distress). Five items are assessed for both obsessions and compulsions: frequency, control, resistance, interference and distress. The current study used the total score. Steketee, Frost, & Bogart (1996) found that the self report version of the Y–BOCS has very good internal consistency and test–retest reliability. Grabill et al. (2008) also report good internal consistency, test–retest reliability and adequate validity for the Y–BOCSSR. The Cronbach's alpha for the total scale was .90.

5.2.2. The Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990)

PSWQ assesses the intensity, frequency, and uncontrollability of worry in general without referring to specific topics. It consists of 16 items that are rated on a 5 point scale from 0 (not descriptive) to 4 (very descriptive). An example of an item is "I am always worrying about something". The psychometric properties of the PSWQ have shown acceptable reliability and validity (Molina & Borkovec, 1994). The Cronbach's alpha value was .94.

5.2.3. The Obsessive Beliefs Questionnaire-44 (OBQ-44; Obsessive Compulsive Cognitions Working Group, OCCWG, 2005)

OBQ-44 assesses belief domains that have been proposed to be important in the etiology of OCD. There are 44 items, all rated on a 7 point scale from 1 (strongly disagree) to 7 (strongly agree). The OCCWG found the OBQ-44 had a three factor solution (OCCWG, 2005). However, subsequent analyses have found this factor structure did not fit. Myers, Fisher, & Wells (2008) conducted an exploratory factor analysis and found four factors: perfectionism/certainty (e.g., "For me, things are not right if they are not perfect"), importance/control of thoughts (e.g., "Having nasty thoughts means I am a terrible person"), responsibility (e.g., "For me, not preventing harm is as bad as causing harm"), and overestimation of threat (e.g., "Even ordinary experiences in my life are full of risk"). In order to compare the findings with the study by Myers et al. (2009a) we used this 4-factor solution. As in that study the current study did not use the importance/control of thoughts variable as it is in essence a generic metacognitive variable and overlaps with the more specific metacognitive questionnaires used in the current study. The Cronbach alpha values were .83 for responsibility, .91 for perfectionism/certainty, and .84 for threat.

5.2.4. The Stop Signals Questionnaire (SSQ; Myers et al., 2009a)

The SSQ was developed to capture the importance of certain stop criteria in deciding to stop carrying out rituals. The items are constructed based on a list of unhelpful stop signals prevalent in OCD patients as found in case-material. The questionnaire consists of 12 items and respondents are asked to rate how important each of these signals are for stopping their rituals on a 5 point scale from 0 (not at all important) to 4 (extremely important). All items begin with "An important signal of when I can stop my rituals is when ..." and one example of an item is "I have replaced the intrusive thought with a positive image." Test–retest reliability for the SSQ

after 3 months has been shown to be acceptable with a coefficient of .62 and the internal consistency for the questionnaire seems good (Myers et al., 2009a). The Cronbach's alpha was .89.

5.3. Overview of data analysis

Correlations were computed for the metacognitive beliefs (including the third construct of stop signals), non-metacognitive beliefs, obsessive-compulsive symptoms, worry, and threat. Two hierarchical regressions were computed with either the OCI-R or the Y–BOCS as the dependent variable. In the regressions the PSWQ was entered on step 1 to control for worry, followed by threat (from the OBQ-44) to control for this general belief which plays a role in all anxiety disorders (Sookman & Pinard, 2002). Non-metacognitive beliefs (responsibility and perfectionism/certainty from the OBQ-44) were entered on the next step. The metacognitive measures were then entered on separate steps with the order of entry based on their theorized temporal sequence of activation, with thought-fusion (TFI) on step 4, belief about rituals (BARI) on step 5, and stop signals (SSQ) on step 6.

As to be expected, when using student/community control samples and measures of pathology, the variables showed considerable skewness and they were therefore submitted to transformation according to the recommendations by Tabachnick & Fidell (2006), which improved the distribution among scores. All variables were transformed using square root transformation, except for the BARI which was subjected to a reciprocal transformation.

6. Results

6.1. Means, standard deviations, and correlations

Mean scores on symptoms and beliefs for the sample used in study II and their intercorrelations are shown in Table 3. All the measures were significantly intercorrelated. The correlation between the metacognitive measures was low enough (.50–.61) to suggest that each is measuring a different construct. All beliefs were significantly and positively associated with obsessive-compulsive symptoms.

As often found in OCD research, the correlation between the OCI-R and the Y–BOCSSR was moderate-strong ($r = .59$). All cognitive and metacognitive variables correlated with the OCI-R ranging from .50 (responsibility) to .61 (BARI). For the Y–BOCSSR the correlations ranged from .36 (TFI) to .60 (BARI). Worry and threat showed a consistent relationship with obsessive-compulsive symptoms.

6.2. Regression analyses

In predicting symptoms as measured by the OCI-R ($N = 304$) a significant incremental change was found for all steps except for stop-signals on the sixth and final step. In the final step of the equation when all of the predictors were entered, worry, perfectionism/certainty, thought-fusion, and belief about rituals were significant independent predictors of obsessive-compulsive symptoms. The model's final adjusted R^2 was .52 (compared with .63 in the original study).

With the Y–BOCSSR as the dependent variable ($N = 206$), worry, threat, and beliefs about rituals significantly contributed, while the cognitive factors, and one of the metacognitive factors (the SSQ) did not. The metacognitive factor TFI made a contribution that approached significance ($p = .059$). In the final step of the equation worry and beliefs about rituals were the only independent significant predictors. The final model's adjusted R^2 was .40

Table 3

Intercorrelations between OBQ-44 cognitive factors, metacognitions, worry, and obsessive-compulsive symptoms (study II).

		2	3	4	5	6	7	8	9	M (SD)
1	OCI-R (N=304)	.59	.52	.56	.50	.57	.55	.61	.51	9.18 (7.83)
2	Y-BOCSSR (N=206)		.47	.45	.38	.40	.36	.60	.47	3.27 (4.74)
3	PSWQ			.54	.41	.56	.41	.49	.43	45.35 (14.33)
4	OBQ-threat				.67	.68	.54	.56	.51	15.37 (8.02)
5	OBQ-responsibility					.66	.44	.46	.43	24.57 (9.57)
6	OBQ-Perf./Certainty						.43	.54	.51	47.71 (20.02)
7	TFI							.50	.51	150.74 (160.64)
8	BARI								.61	15.18 (4.02)
9	SSQ									8.97 (8.31)

Note. OCI-R=Obsessive Compulsive Inventory-Revised; Y-BOCSSR=Yale-Brown Obsessive Compulsive Scale Self Report; PSWQ=Penn State Worry Questionnaire; OBQ=Obsessive Beliefs Questionnaire-44; TFI=Thought-Fusion Instrument; BARI=Beliefs About Rituals Inventory; SSQ=Stop Signals Questionnaire. All correlations are significant at .0001 (two-tailed). Bonferonni corrected p = .001.

Table 4

Predictors of obsessive-compulsive symptoms (study II).

	Incremental change			Final step of the equation					
	F cha	p	R ² cha	B	SE B	β	t	p	
Dependent variable OCI-R total score (N=304)									
Step 1-PSWQ	109.05	.000	.27	.16	.06	.14	2.63	.009	
Step 2-Threat	53.86	.000	.11	.04	.08	.03	.48	.635	
Step 3	11.71	.000	.05						
Responsibility				.10	.07	.08	1.33	.184	
Perf./Certainty				.15	.06	.17	2.66	.008	
Step 4-TFI	32.53	.000	.06	.04	.01	.22	4.24	.000	
Step 5-BARI	28.61	.000	.05	24.24	5.11	.27	4.74	.000	
Step 6-SSQ	.55	.459	.00	.03	.04	.04	.74	.459	
Dependent variable Y-BOCSSR total score (N=206)									
Step 1-PSWQ	56.68	.000	.22	.30	.09	.23	3.36	.001	
Step 2-Threat	18.93	.000	.07	.12	.12	.09	1.00	.320	
Step 3	.69	.503	.01						
Responsibility				.05	.10	.04	.48	.633	
Perf./Certainty				-.13	.08	-.14	-1.53	.128	
Step 4-TFI	3.60	.059	.01	.00	.01	.02	.27	.791	
Step 5-BARI	37.69	.000	.11	41.18	7.85	.41	-5.25	.000	
Step 6-SSQ	2.56	.111	.01	.10	.06	.12	1.60	.111	

Note. OCI-R=Obsessive Compulsive Inventory-Revised; Y-BOCSSR=Yale-Brown Obsessive Compulsive Scale Self Report; PSWQ=Penn State Worry Questionnaire; OBQ-44=Obsessive Beliefs Questionnaire-44; TFI=Thought-Fusion Instrument; BARI=Beliefs About Rituals Inventory; SSQ=Stop Signals Questionnaire; Perf./Certainty=Perfectionism/Certainty.

(compared with .39 in the original study). A summary of these two regression analyses is shown in Table 4.

7. Discussion

Two studies were carried out to test hypotheses arising from the metacognitive model of obsessive-compulsive disorder (Wells, 1997, 2000). Consistent with the model the first study showed that the metacognitive beliefs of thought-fusion and beliefs about rituals correlated significantly and positively with obsessive compulsive symptoms. The control samples used in study I and II showed scores which were slightly lower compared to the values obtained in the study by Myers et al. (2009a). Our results suggested less variance in symptoms and beliefs which could possibly affect the results due to a restriction of range in the scores. However, intercorrelations were similar and comparable, and the strength of the correlations showed a similar pattern in both the OCD sample and control sample. The metacognitive constructs also showed significant positive correlations with the different OCI-R subscales. However, some of the OCI-R subscales did not reach a significant level in the OCD sample (washing and hoarding) which could be due to the sample size and restriction of range especially for the hoarding subscale. In the control sample metacognitive beliefs correlated with all subscales.

In addition to the correlations indicating a significant relationship between obsessive-compulsive symptoms and metacognitions,

the metacognitive measures differentiated between the OCD group and the control group adding to the validity of the metacognitions assessed as discriminatory factors. Constructs which separated the OCD sample most from the control sample was the OCI-R total score, the obsessing subscale, and beliefs about rituals.

Fusion beliefs and beliefs about rituals were predictors of obsessive-compulsive symptoms when entered together in a regression and they explained a large amount of variance (adjusted R^2 values ranged from .42 to .52) in obsessive-compulsive symptoms. This study supports the role of metacognitive beliefs in OCD.

Study II used a different non-clinical sample and included an additional metacognitive measure, stop signals, a measure of worry, and a measure of non-metacognitive beliefs as measured by the OBQ-44. This study was a replication of the analysis conducted by Myers et al. (2009a) and aimed to examine whether metacognitive measures would explain additional variance in obsessive-compulsive symptoms when controlling for worry and cognitive beliefs linked to OCD. Two measures of obsessive-compulsive symptoms were used as the dependant variables in separate equations and the different metacognitive beliefs were entered based on their hypothesized causal sequence. Fusion beliefs and beliefs about rituals contributed incrementally to the variance explained in the OCI-R above worry and the three factors of the OBQ-44. When the Y-BOCSSR was used as the outcome variable fusion beliefs made a

contribution bordering on significance ($p = .059$) and beliefs about rituals were significant. In both equations stop signals did not contribute on their step.

There were some differences as to the role of thought-fusion and perfectionism/certainty when using either the Y-BOCSSR or the OCI-R as the dependent variable in the regression analyses. The significant role of thought-fusion and perfectionism/certainty was clearer when the OCI-R was used as the measure of obsessive-compulsive symptoms. Research on the relationship between the interview version of the Y-BOCS and the OCI-R have shown correlations ranging from .41 to .53 (e.g., Abramowitz & Deacon, 2006; Foa et al., 2002) despite the fact that both measure obsessive-compulsive distress. These moderate correlations could be due to the fact that the Y-BOCS gives a general indication of severity of all types of obsessive-compulsive complaints, while the OCI-R differentiates between different subtypes of the disorder. As a consequence, a person with washing compulsions could get a relatively low OCI-R total score as long as no other obsessive-compulsive symptoms are present, but his or her Y-BOCS score could still be high due to the distress caused by the washing rituals. As a result, the OCI-R usually has larger standard deviations than the Y-BOCS (e.g., Abramowitz & Deacon, 2006; Gönner, Leonhart, & Ecker, 2008). These differences in measurement could explain the slightly different results obtained as well as the differences in the total amount of variance explained when dealing with non-clinical samples with restricted levels of symptoms.

The results show that the two key metacognitive constructs of fusion beliefs and beliefs about rituals contribute to obsessive-compulsive symptom scores. In the final equations metacognitive variables made independent contributions but other belief domains did not, apart from perfectionism/certainty.

Failure of the stop signals measure to make a contribution might be best explained in terms of the overlap between this measure and the measure of beliefs about rituals. This is an issue both conceptually and pragmatically. In the metacognitive model stop signals and beliefs about rituals are part of the same knowledge about coping strategies, they are part of a plan for guiding processing and action. It is therefore difficult to separate them. In the present study these measures were highly correlated (.61) suggesting they may assess components of a singular construct. Furthermore, examination of the items of the BARI (e.g., "I need to perform my rituals otherwise: I will never have peace of mind") shows that this measure incorporates implicit stop signals (having peace of mind). Therefore, the lack of additional contribution may be due to substantive overlap between these constructs at the conceptual and/or measurement level. However, Myers et al. (2009a) did find that stop signals made an additional contribution. A possible explanation for the different findings could be that the original study had more variance in obsessive-compulsive symptoms than the current study and that stop signals come in to play with higher symptom levels. Comparisons of the samples showed effect sizes (d) that ranged from .17 to .60 for the different beliefs and symptom measures. In summary, the results support the role of metacognition in OCD but suggest further research is needed into the additional contribution of stop signals. As in the Myers et al. (2009a) study responsibility did not emerge as an independent predictor in the regressions. However, unlike that study perfectionism/certainty was an independent predictor of overall obsessive-compulsive symptoms in the two regressions with the OCI-R.

The metacognitive constructs added 11–13% extra variance after controlling for worry, threat, responsibility/harm, and perfectionism/certainty. These results provide additional support for a role of metacognitive beliefs in understanding obsessive-compulsive symptoms.

7.1. Limitations

The first limitation was that the studies employed cross-sectional designs which mean conclusions about causation cannot be made. Prospective studies are needed to test the direction of causation. However, a recent prospective study supported thought-fusion as a predictor of obsessive-compulsive symptoms (Myers et al., 2009b). Second, the questionnaires were not randomly ordered due to the software program used, which could mean the results are affected by order effects. Third, although a clinical sample was used in the first study a number of analyses were carried out on non-clinical samples. However, obsessive-compulsive symptoms are likely to exist on a continuum of severity (Gibbs, 1996) and could therefore be analogous to clinical samples. Fourth, the response rate was 36.1% for study I and uncertain for study II. This could raise questions regarding the representativeness of the samples although a response rate of 36.1% is considered low but acceptable (Babbie, 2004) and comparable to other studies.

7.2. Conclusions

Findings of the current study provide further support for the metacognitive model of obsessive-compulsive symptoms. The potential clinical use of these results may be reflected in research on metacognitive therapy for OCD (Wells, 1997, 2009) which aims to challenge fusion beliefs, modify how thoughts are experienced and modify thought-control strategies. Metacognitive therapy, which has important clinical differences compared with cognitive behavior therapy (see Fisher, 2009) also aims at modifying beliefs about rituals and encourages the use of new stop signals. Preliminary results (Fisher & Wells, 2005, 2008) suggest this therapy may be a brief and effective intervention.

Acknowledgments

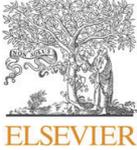
The authors would like to thank Tarik Kapidzic, Cecilie Sarheim, and Yngvil Ane Westad for their help with recruiting participants to the current study.

References

- Abramowitz, J. S., & Deacon, B. J. (2006). Psychometric properties and construct validity of the Obsessive-Compulsive Inventory-Revised: replication and extension with a clinical sample. *Journal of Anxiety Disorders, 20*, 1016–1035.
- Babbie, E. (2004). *The practice of social research*. Belmont, CA: Wadsworth.
- Baer, L., Brown-Beasley, M. W., Score, J., & Henriques, A. I. (1993). Computer-assisted telephone administration of a structured interview for obsessive-compulsive disorder. *American Journal of Psychiatry, 150*, 1737–1738.
- Brown, T. A., DiNardo, P. A., & Barlow, D. (1994). *Anxiety disorders interview schedule* (4th ed.). Boulder, CO: Graywind Publications.
- Clark, D. A. (2004). *Cognitive-behavioral therapy for OCD*. 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.
- Fisher, P. L. (2009). Obsessive compulsive disorder: a comparison of CBT and the metacognitive approach. *International Journal of Cognitive Therapy, 2*, 107–122.
- Fisher, P. L., & Wells, A. (2005). Experimental modification of beliefs in obsessive-compulsive disorder: a test of the metacognitive model. *Behaviour Research and Therapy, 43*, 821–829.
- Fisher, P. L., & Wells, A. (2008). Metacognitive therapy for obsessive-compulsive disorder: a case series. *Journal of Behavior Therapy and Experimental Psychiatry, 39*, 117–132.
- Flavell, J. H. (1979). Metacognition and metacognitive monitoring: a new area of cognitive-developmental inquiry. *American Psychologist, 34*, 906–911.
- Foa, E. B., Huppert, J. D., Leiberg, S., Langner, R., Kichic, R., Hajcak, G., & Salkovskis, P. M. (2002). The Obsessive-Compulsive Inventory: development and validation of a short version. *Psychological Assessment, 14*, 485–496.
- Foa, E. B., Kozak, M. J., Salkovskis, P. M., Coles, M. E., & Amir, N. (1998). The validation of a new obsessive-compulsive disorder scale: the Obsessive-Compulsive Inventory. *Psychological Assessment, 10*, 206–214.
- Frost, R. O., & Steketee, G. (1997). Perfectionism in obsessive-compulsive disorder patients. *Behaviour Research and Therapy, 35*, 291–296.

- Gibbs, N. A. (1996). Nonclinical populations in research on Obsessive-Compulsive Disorder: a critical review. *Clinical Psychology Review*, 16, 729–773.
- Goodman, W. K., Price, L. H., Ramussen, S. A., Mazure, C., Delgado, P., Heninger, G. R., et al. (1989). The Yale-Brown Obsessive Compulsive Scale: II. Validity. *Archives of General Psychiatry*, 46, 1012–1016.
- Goodman, W. K., Price, L. H., Ramussen, S. A., Mazure, C., Fleischmann, R. L., Hill, C. L., et al. (1989). The Yale-Brown Obsessive-Compulsive Scale: I. Development, use and reliability. *Archives of General Psychiatry*, 46, 1006–1011.
- 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 & Psychotherapy*, 11, 137–144.
- Grabill, K., Merlo, L., Duke, D., Harford, K. L., Keeley, M. L., Geffken, G. R., & Storch, E. A. (2008). Assessment of obsessive-compulsive disorder: a review. *Journal of Anxiety Disorders*, 22, 1–17.
- Göner, S., Leonhart, R., & Ecker, W. (2008). Validation of the German version in a sample of patients with OCD, anxiety disorders, and depressive disorders. *Journal of Anxiety Disorders*, 22, 734–749.
- Hajcak, G., Huppert, J. D., Simons, R. F., & Foa, E. B. (2004). Psychometric properties of the OCI-R in a college sample. *Behaviour Research and Therapy*, 42, 115–123.
- Huppert, J. D., Walther, M. R., Hajcak, G., Yadin, E., Foa, E. B., Simpson, H. B., & Liebowitz, M. R. (2007). The OCI-R: validation of the subscales in a clinical sample. *Journal of Anxiety Disorders*, 21, 394–406.
- Hodgson, R. J., & Rachman, S. (1977). Obsessional-compulsive complaints. *Behavioural Research and Therapy*, 15, 389–395.
- 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.
- Molina, S., & Borkovec, T. D. (1994). The Penn State Worry Questionnaire: psychometric properties and associated characteristics. In: G. Davey & F. Tallis (Eds.), *Worrying: perspectives on theory, assessment and treatment* (pp. 265–297). Chichester: John Wiley & Sons.
- Myers, S. G., Fisher, P. L., & Wells, A. (2008). Belief domains of the Obsessive Beliefs Questionnaire-44 (OBQ-44) and their specific relationship with obsessive-compulsive symptoms. *Journal of Anxiety Disorders*, 22, 475–484.
- Myers, S. G., Fisher, P. L., & Wells, A. (2009a). An empirical test of the metacognitive model of obsessive-compulsive symptoms: fusion beliefs, beliefs about rituals, and stop signals. *Journal of Anxiety Disorders*, 23, 436–442.
- Myers, S. G., Fisher, P. L., & Wells, A. (2009b). Metacognition and cognition as predictors of obsessive-compulsive symptoms: a prospective study. *International Journal of Cognitive Therapy*, 2, 132–142.
- Myers, S. G., & Wells, A. (2005). Obsessive-compulsive symptoms: the contribution of metacognitions and responsibility. *Journal of Anxiety Disorders*, 19, 806–817.
- Obsessive Compulsive Cognitions Working Group. (2005). Psychometric validation of the Obsessive Beliefs Questionnaire and the Interpretation of Intrusions Inventory: Part 2: factor analyses and testing of a brief version. *Behaviour Research and Therapy*, 43, 1527–1542.
- Pleva, J., & Wade, T. D. (2006). The mediating effects of misinterpretation of intrusive thoughts on obsessive-compulsive symptoms. *Behavioural Research and Therapy*, 44, 1471–1479.
- Rachman, S. (1993). Obsessions, responsibility and guilt. *Behaviour Research and Therapy*, 31, 149–154.
- Rees, C. S., & van Koesveld, K. E. (2008). An open trial of group metacognitive therapy for obsessive-compulsive disorder. *Journal of Behavior Therapy and Experimental Psychiatry*, 39, 451–458.
- Rhêaume, J., Freeston, M. H., Dugas, M. J., Letarte, H., & Ladouceur, R. (1995). Perfectionism, responsibility and obsessive-compulsive symptoms. *Behaviour Research and Therapy*, 33, 785–794.
- Salkovskis, P. M. (1985). Obsessional-compulsive problems: a cognitive-behavioural analysis. *Behaviour Research and Therapy*, 23, 571–583.
- Sassaroli, S., Lauro, L. J., Ruggerio, G. M., Mauri, M. C., Vinai, P., & Frost, R. (2008). Perfectionism in depression, obsessive-compulsive disorder and eating disorders. *Behavioural Research and Therapy*, 46, 757–765.
- Shafraan, R., & Rachman, S. (2004). Thought-action fusion: a review. *Journal of Behavior Therapy and Experimental Psychiatry*, 35, 87–107.
- Shafraan, R., Thordarson, D. S., & Rachman, S. (1996). Thought-action fusion in obsessive compulsive disorder. *Journal of Anxiety Disorders*, 10, 379–391.
- Solem, S., Håland, A. T., Vogel, P. A., Hansen, B., & Wells, A. (2009). Change in metacognitions predicts outcome in obsessive-compulsive disorder patients undergoing treatment with exposure and response prevention. *Behaviour Research and Therapy*, 47, 301–307.
- 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* (pp. 63–89). Oxford: Elsevier.
- Steketee, G., Frost, R., & Bogart, K. (1996). The Yale-Brown Obsessive Compulsive Scale: interview versus self-report. *Behaviour Research and Therapy*, 34, 675–684.
- Tabachnick, B. G., & Fidell, L. S. (2006). *Using multivariate statistics*. Boston, MA: Allyn and Bacon.
- Tallis, F., & de Silva, P. (1992). Worry and obsessional symptoms: a correlational analysis. *Behaviour Research and Therapy*, 30, 103–105.
- Wahl, K., Salkovskis, P. M., & Cotter, I. (2008). I wash until it feels right" the phenomenology of stopping criteria in obsessive-compulsive washing. *Journal of Anxiety Disorders*, 22, 143–161.
- Wells, A. (1997). *Cognitive therapy of anxiety disorders: a practice manual and conceptual guide*. Chichester, UK: Wiley.
- Wells, A. (2000). *Emotional disorders and metacognition: innovative cognitive therapy*. Chichester, UK: Wiley.
- Wells, A. (2009). *Metacognitive therapy for anxiety and depression*. New York: Guilford Press.
- Wells, A., Gwilliam, P., & Cartwright-Hatton, S. (2001). *The thought fusion instrument (unpublished self-report scale)*. UK: University of Manchester.
- Wells, A., & Matthews, G. (1994). *Attention and emotion: a clinical perspective*. Hove, UK: Erlbaum.
- Wells, A., & McNicol, K. (2004). *The beliefs about rituals inventory (unpublished self-report scale)*. UK: University of Manchester.
- Wu, K. D., & Cortesi, G. T. (2009). Relations between perfectionism and obsessive-compulsive symptoms: examination of specificity among the dimensions. *Journal of Anxiety Disorders*, 23, 393–400.

Paper III



Change in metacognitions predicts outcome in obsessive–compulsive disorder patients undergoing treatment with exposure and response prevention

Stian Solem^{a,*}, Åshild Tellefsen Håland^b, Patrick A. Vogel^a, Bjarne Hansen^{c,d}, Adrian Wells^e

^a Department of Psychology, Norwegian University of Science and Technology, Norway

^b Department of Psychiatry, Sørlandet Hospital HF, Kristiansand, Norway

^c Department of Psychiatry and Behavioural Medicine, Norwegian University of Science and Technology, Trondheim, Norway

^d St. Olavs University Hospital, Division of Psychiatry, Department of Research and Development, Norway

^e Department of Clinical Psychology, University of Manchester, UK

ARTICLE INFO

Article history:

Received 2 July 2008

Received in revised form

6 January 2009

Accepted 7 January 2009

Keywords:

Metacognition

Exposure

Obsessive–compulsive disorder

Treatment outcome

ABSTRACT

Wells' (Wells, A. (1997). *Cognitive therapy of anxiety disorders: a practice manual and conceptual guide*. Chichester, UK: Wiley) metacognitive model of obsessive–compulsive disorder (OCD) predicts that metacognitions must change in order for psychological treatment to be effective. The aim of this study was to explore: (1) if metacognitions change in patients undergoing exposure treatment for OCD; (2) to determine the extent to which cognitive and metacognitive change predicts symptom improvement and recovery. The sample consisted of 83 outpatients with a diagnosis of OCD who completed exposure and response prevention treatment. The Yale–Brown Obsessive–Compulsive Scale (Y-BOCS), the Metacognitions Questionnaire (MCQ-30) and the Obsessive Beliefs Questionnaire (OBQ-44) were administered before treatment, after treatment, and at 12-month follow-up. Treatment resulted in significant changes in symptoms, metacognition score, responsibility and perfectionism. Regression analysis using post-treatment Y-BOCS as the dependent variable indicated that when the overlap between predictors was controlled for, only changes in metacognition were significant. Changes in metacognitions explained 22% of the variance in symptoms at post-treatment when controlling for pre-treatment symptoms and changes in mood. A further regression revealed that two MCQ-30 subscales made individual contributions. The patients had significantly higher scores compared to community controls on the MCQ-30. Patients who achieved clinical significant change had lower scores on the MCQ-30 compared to patients who did not change. The results did not change significantly from post-treatment to follow-up assessment. These findings provide further support for the importance of metacognitions in treating OCD.

© 2009 Elsevier Ltd. All rights reserved.

Introduction

Few studies have examined the cognitive predictors of outcome in patients with obsessive–compulsive disorder (OCD) undergoing psychological treatments. Early studies (see Steketee & Shapiro, 1995) discussed factors such as comorbid depression and the presence of over-valued ideas as potential markers of poor response to exposure and response prevention treatments. A study by Whittal, Thordarson, & McLean (2005) found that cognitive behaviour therapy (CBT) produced changes in measures of beliefs (Obsessive Beliefs Questionnaire-44; OBQ-44) considered important in OCD. Using CBT and exposure and response prevention

(ERP) they found effect sizes ranging from 0.80 to 1.22 for the OBQ-44 subscales. Change scores for these cognitive measures showed moderate to strong correlations with changes in obsessive–compulsive symptoms (0.34–0.52 for the OBQ-44).

Emmelkamp, van Oppen, & Balkom (2002) conducted two studies investigating cognitive change following ERP for OCD. In their second study, 28 patients completed ERP treatment. The scores for the original version of the Obsessive Beliefs Questionnaire (OBQ-87) and the Interpretation of Intrusions Inventory (III-31; Obsessive Compulsive Cognition Working Group, 2001) changed significantly from pre-treatment to post-treatment. However, the only significant difference between responders and non-responders was on the total score on the III-31 and its two subscales known as "Importance of thoughts" and "Responsibility". In their concluding remarks they noted that evidence supporting the importance of changing cognitions in ERP for OCD is far from conclusive and that other assessment procedures may be more useful.

* Corresponding author. Psykologisk Institutt, NTNU-Dragsvoll, 7491 Trondheim, Norway. Tel.: +47 73 59 18 01; fax: +47 73 59 76 94.
E-mail address: stian.solem@svt.ntnu.no (S. Solem).

A study by van Oppen et al. (1995) included a different cognitive measure of irrational beliefs and found effect sizes of 0.36–0.40 when using cognitive therapy or ERP. A later study introduced related measures of cognition (O'Connor et al., 2006) and found that responders showed significantly more changes in obsessional conviction, beliefs in consequences, and in beliefs about the need to perform rituals as compared to non-responders.

Although different cognitive factors have been suggested as important in the maintenance of OCD, disappointingly few treatment studies have demonstrated the impact of these cognitions. Perhaps it is this lack of treatment studies including measures of cognition that has led to questions about the need to challenge thoughts in cognitive behaviour therapy (Longmore & Worrell, 2007) and whether a focus on cognition in CBT for OCD is really necessary (Clark, 2005).

Cognitive changes may appear to occur in cognitive- and exposure-based treatments. However, the development of measures to assess beliefs considered important in OCD is much more recent and little is known about the domains of belief change that correlate best with improvement in OCD symptoms during treatment. The picture is more complicated because different models of OCD have emphasized different belief domains in the etiology and maintenance of disorder. Cognitive approaches based on schema theory propose that beliefs concerning inflated responsibility for preventing harm are central (e.g. Salkovskis, 1985). On the other hand domains such as intolerance of uncertainty (e.g. Frost & Shows, 1993) and perfectionism (e.g. Frost & Steketee, 1997) have been given prominence by other theorists. In contrast to these approaches, the metacognitive theory (Wells, 1997) is based on the principle that OCD is a consequence of the over-importance given to thoughts because of underlying metacognitive beliefs and processes. In this model a range of metacognitive beliefs and processes are implicated.

According to the metacognitive model, intrusive thoughts or doubts activate meta-beliefs (Wells, 1997). These beliefs include beliefs about the danger and meaning of such thoughts and encompass beliefs about the harmful effects of thoughts, the need to control them, and beliefs about the importance of monitoring for them and engaging in perseverative coping strategies such as worry and rumination. According to Wells these beliefs influence appraisals of intrusions and responses to them which affect emotional reactions.

Evidence of relationships between metacognitions and OCD symptoms has been demonstrated using non-patient samples (Gwilliam, Wells, & Cartwright-Hatton, 2004; Myers & Wells, 2005; Myers, Fisher, & Wells, 2008), experimental studies (Fisher & Wells, 2005b), and patient group comparisons (Janeck, Calamari, Riemann, & Heffelfinger, 2003). Metacognitive Therapy (MCT; Wells, 2009) has been pilot tested in a case series (Fisher & Wells, 2008), and as a component of small group treatment (Rees & van Koesveld, 2008).

It is beyond the scope of our study to describe in depth the different cognitive models of OCD. However, Purdon & Clark (1999) have highlighted the differences among the cognitive behavioural model of Salkovskis (1985, 1989, 1998), Rachman's (1997, 1998) model for obsessions and the metacognitive model of Wells (1997). Some of the most important aspects involve the fact that neither Wells' metacognitive model nor Rachman's theory deals directly with perfectionism, and the metacognitive model gives no importance to the role of responsibility. The metacognitive model is the only approach that specifies that OCD can be explained by a small set of metacognitive beliefs and it is also unique in its focus on the role of beliefs about rituals, and the unhelpful criteria used for when a ritual can be stopped (stop-signals). The metacognitive model and treatment focus on the thought-process used in order to

deal with the intrusive thoughts (e.g. preservative thinking such as worry, and self-monitoring) and does not focus on the actual content of obsessions or self-schemas. In contrast Rachman focuses on misinterpretations of the personal significance of obsessions and underlying self-schemas. In contrast, other CBT approaches focus on the probability of threat and challenge responsibility. The MCT approach focuses on beliefs about thoughts and the processing style used to deal with them. For instance, a CBT therapist could use pie-charts and guided discovery in order to challenge the patient's probability and responsibility beliefs concerning contamination and ask questions such as: "could you deliberately murder someone by not washing your hands?" (e.g. Salkovskis, 1999), but the MCT therapist asks: "what's the point in worrying about contamination?"

Different instruments have been developed in order to measure the constructs highlighted by the cognitive and metacognitive models of OCD. The Obsessive Compulsive Cognition Working Group (1997, 2001) developed the Obsessive Beliefs Questionnaire to assess a range of beliefs thought to be linked to OCD and a revised version, the Obsessive Beliefs Questionnaire-44 (OBQ-44), followed. The OBQ-44 has three subscales that assess responsibility/threat, perfectionism/certainty and importance/control of thoughts. The questionnaire distinguishes between patients with OCD and other controls, and changes on the OBQ-44 seem correlated with improvement in obsessive-compulsive symptoms (Whittal et al., 2005).

The Metacognitions Questionnaire 30 (MCQ-30; Wells & Cartwright-Hatton, 2004) was developed in order to measure beliefs about worry and intrusive thoughts and metacognitive processes such as the tendency to focus attention on and monitor thinking. The scale measures beliefs about the need to engage in worry, negative beliefs about the uncontrollability and danger of thoughts, beliefs about need to control thoughts, and domains of cognitive confidence and cognitive self-consciousness. Research using the original version of the MCQ with 65 items found that the subscales distinguished patients with OCD and non-patient controls (Cartwright-Hatton & Wells, 1997).

Given the paucity of research on the effects of OCD treatment on cognition, the different emphasis given by theories on cognitive and metacognitive domains, and the recent availability of published measures of these domains, the current study explored the effects of exposure therapy and cognitive behaviour therapy (mainly exposure based) on beliefs and addressed the question: which type of change – metacognitive or cognitive predicts improvement in symptoms following treatment?

Method

Participants

Eighty-three outpatients were included. Fifty completed individual exposure and response prevention treatment (ERP), while 33 completed cognitive behaviour therapy (mainly exposure and response prevention-based treatment) in a group format. The main criteria of inclusion for all studies involved having OCD as the dominant disorder. Diagnostic interviews including Y-BOCS assessment (Goodman et al., 1989a, 1989b) were completed by trained independent raters before and after treatment. Sixty clients were interviewed using the Structured Clinical Interview for DSM-IV (First, Spitzer, Gibbon, & Williams, 1995), while the remaining 23 were assessed using the Anxiety Disorder Interview Schedule for DSM-IV (Brown, DiNardo, & Barlow, 1994). A detailed description of the final sample's demographic and diagnostic information is provided in Table 1. Different OCD subtypes were present: 21.7% had mainly washing rituals, 30.1% checking, 25.3% had both

Table 1
Characteristics of the OCD sample ($N = 83$).

Demographics	M (SD)/% (N)	Comorbidity	% (N)
Age	34.2 (11.9)	Depressive disorder	37.3 (31)
Female gender	71.1 (59)	Panic/Agoraphobia	18.1 (15)
Working/studying	54.2 (45)	Social anxiety disorder	21.7 (18)
Married/cohabitant	63.9 (53)	GAD	18.1 (15)
Duration of OCD in years	14.4 (11.5)	Specific phobia	12.0 (10)
Using SSRI/SNRI	50.6 (42)	PTSD	7.2 (6)

Note. Depressive disorder includes dysthymia, major depression and recurrent depression. GAD = Generalized anxiety disorder, PTSD = Post-traumatic stress disorder.

washing and checking, 21.7% had mental rituals/order/symmetry, and one patient presented hoarding problems.

Patients were excluded if they met criteria for psychotic disorders, alcohol- or drug addiction, showed suicidal behaviours, had a general assessment of functioning below 50, or if they had received exposure therapy during the last six months. A total of 28 patients were excluded from the individual treatments. For the group therapy sample, six patients were excluded and 12 people with OCD symptoms refused treatment. A total of four patients dropped out of the individual treatment condition and one dropped out of the group therapy. Assessments and sessions were audio- or videotaped. Sixteen randomly chosen videos of diagnostic assessment were checked with inter-rater analysis completed by independent raters. The agreement rate for the OCD diagnosis was 100% and a correlation of 0.97 was found for 20 Y-BOCS interviews.

Treatment and adherence

The individual treatments were based on Kozak & Foa (1997). The therapists included graduate psychology students, psychologists, and one psychiatrist. The group therapy used groups consisting of six participants and they were led by one psychologist and one psychiatrist. The groups met once a week for a total of twelve 2.5-h long sessions. The group treatment was adapted from a manual developed by Krone, Himle, & Nesse (1991). Every group therapy session included the presentation of a topic that was relevant to the treatment of OCD (e.g. the nature of OCD, principles of behaviour therapy, family life, and lifestyle). Other interventions employed in the groups in addition to ERP included the use of workbooks (with information about OCD, space for taking notes and forms to document daily compliance and progress), attempts at externalizing the OCD (e.g. "OCD is a bully, let's fight back"), and finally the use of coping statements (e.g. "it's not me it's my OCD"). No other cognitive techniques were used for the group treatments.

Thirty-six of the individual treatments used ERP with no extra cognitive techniques. However, 14 of the individual treatments included cognitive techniques such as Socratic questioning, pie-charts, and cognitive restructuring. In a control analysis we compared any potential differences between the individual CBT treatments and the individual ERP treatments using t -tests. No significant differential effects were found on change scores for the Y-BOCS ($t(48) = 0.60, p = 0.55$), the OBQ-44 ($t(48) = 0.67, p = 0.51$), the MCQ-30 ($t(48) = 0.59, p = 0.56$), and the Beck Depression Inventory ($t(48) = 1.14, p = 0.26$). Likewise, additional control analyses using t -tests and the Chi-square tests indicated that there were no differences between the two groups in demographic and diagnostic variables such as age, gender, civil status, subtype, and comorbid disorders.

For 23 of the individual treatments, therapists' ratings of average minutes of exposure per session and number of completed homework assignments were measured. A total of 43.3 ($SD = 23.1$) homework assignments were completed and the amount of

minutes with exposure per session averaged 53.8 ($SD = 9.9$). These results were similar to previous reports of adherence to the same manual using experienced professional therapists (Vogel, Stiles, & Göttestam, 2004). For the remaining individual treatments, the therapists' confidence in using the manual was measured on a 0–100 scale before treatment, yielding a mean of 76.1 ($SD = 6.9$). There was no adherence measure for the group therapy, but supervision by one of the developers of the manual was given and the detailed protocol was not deviated from. The individual treatments used 90-min sessions which were delivered twice a week. A mean of 15.88 ($SD = 2.82$) sessions was given.

Patients on a stable dose of selective serotonin-reuptake inhibitors (SSRI) or selective serotonin-norepinephrine reuptake inhibitors (SNRI) were allowed. Approximately half the sample used these medications, but five did not have adequate clinical dosages. The patients using these medications had higher Y-BOCS scores at pre-treatment compared to the non-medicated patients, but there were no differences regarding Y-BOCS, MCQ-30, or the OBQ-44 results at post-treatment or follow-up. Participants were encouraged to remain on a stable dosage throughout the treatment. However, one patient started taking SSRI/SNRI during the treatment, while another patient reduced the dosage during treatment.

Measures

OCD symptoms

The Yale-Brown Obsessive Compulsive Scale interview (Goodman et al., 1989a, 1989b) was used as the measure of treatment outcome. Five obsession and five compulsion items are assessed on 0–4 point ratings. Only total scores were used in our study. Ten of the 45 Y-BOCS follow-up scores were based on a self-report version. Cronbach's alphas were 0.58 at pre-treatment and 0.91 at post-treatment. The low alpha at pre-treatment is considered a consequence of excluding patient with Y-BOCS scores below 16. The Y-BOCS at pre-treatment has a high degree of kurtosis and is not normally distributed. This leads to decreased internal consistency.

Metacognitions

The MCQ-30 (Wells & Cartwright-Hatton, 2004) is a 30-item self-report scale measuring beliefs about thinking. Responses are required on a four-point scale ranging from 1 (do not agree) to 4 (agree very much). A five-factor structure exists: (1) positive beliefs about worry; (2) negative beliefs about the controllability of thoughts and corresponding danger; (3) cognitive confidence; (4) negative beliefs about thoughts in general/need to control thoughts; and (5) cognitive self-consciousness. High scores reflect more reported problems with the item in question (note: a high cognitive confidence score indicates lesser trust in one's memory). Alpha levels were acceptable with 0.90 for the total scale. The alphas for the subscales ranged from 0.75 to 0.83.

Obsessive beliefs

The OBQ-44 (Obsessive Compulsive Cognition Working Group, 2005) is a 44-item self-report measure with three subscales. The OBQ-44 is a measure which is designed specifically to measure cognitions in OCD. The three subscales are: (1) responsibility/threat, referring to the belief that one is obligated to prevent negative events due to exaggerated beliefs in the likelihood of harm occurring; (2) perfectionism/certainty, referring to intolerance of imperfection and mistakes; and (3) importance/control of thoughts, referring to the belief that the mere occurrence of thoughts implies that they are meaningful and dangerous and that these thoughts should be controlled. The importance/control of thoughts subscale has been labelled as a "metacognitive" construct in the original paper on the OBQ (Obsessive Compulsive Cognition

Working Group, 1997) with reference to the work of Clark & Purdon (1993). The subscale has items which resemble some of the items in the MCQ-30, but it does not provide the wide range of domains represented with the MCQ-30. Cronbach's alpha was 0.93 for responsibility/threat, 0.91 for perfectionism/certainty, and 0.82 for importance/control of thoughts.

Depressed mood

The Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979) is a 21-item self-report inventory, which has been shown to be a reliable and valid measure of depression severity in both clinical and non-clinical populations (Beck, Steer, & Garbin, 1988). The Cronbach alpha in the present study was 0.90.

Overview of data analyses

For our first analyses we calculated effect sizes for comparisons with other studies. Furthermore, we calculated the proportion of patients achieving clinically significant change, improving, and showing no change according to the criteria of Fisher & Wells (2005a). Comparisons of treatment responders' and non-responders' change scores on obsessive beliefs and metacognitions were also calculated using independent *t*-tests. These analyses were followed by correlational analyses investigating the relationship between changes in symptoms and changes in beliefs.

We then conducted regression analyses to predict outcome using pre-treatment levels of obsessive–compulsive symptoms in step 1, changes in depressed mood on the second step, before entering change scores in the non-metacognitive beliefs measured by the OBQ-44. For the last step we investigated the influence of the metacognitive variables. In the fourth and final step the change score for the MCQ-30 was entered along with changes in the importance/control of thoughts subscale of the OBQ-44 since it was originally described as a metacognitive construct (Obsessive Compulsive Cognition Working Group, 1997). For the second regression we reversed the order of the metacognitive and the non-metacognitive factors. For the third and final regression analysis we used forward regression in order to explore which individual subscales made independent contributions. Finally, correlation coefficients for post-treatment and follow-up results were calculated for the obsessive–compulsive symptoms, cognitive beliefs, and metacognitive beliefs in order to assess the stability of the results.

Results

Treatment effects

Y-BOCS changes indicated a large effect size, although the intention to treat effects would be smaller because five patients dropped out of treatment. Individual treatment was more effective than group therapy at post-treatment, $t(81) = -3.35$, $p = 0.001$, however, there was no difference at follow-up. Greater MCQ-30

changes were observed at post-treatment for the individual treatments, $t(81) = -2.31$, $p = 0.023$, but again this difference was not significant at follow-up. A summary of the pre–post effects on obsessive–compulsive symptoms, metacognitions, and obsessive beliefs is presented in Table 2.

According to Fisher & Wells' (2005a) criteria for treatment response, 23% were asymptomatic and 53% achieved clinically significant change. These results are in line with other research using exposure and response prevention for OCD. Gender, civil status, employment status, use of medication, number of comorbid disorders, age, and duration of OCD were not related to outcome. However, patients with comorbid generalized anxiety disorder (GAD) had more symptoms after treatment, $t(81) = -2.04$, $p = 0.045$. The effect of GAD was not significant at follow-up.

Clinical significant change analyses

Using convenience sampling our research group has collected MCQ-30 data from 385 community controls in preparation of a study on the psychometric properties of the MCQ-30. A comparison of the patient and normal control samples is displayed in Fig. 1, which employs a bar graph including 95% confidence intervals for the mean MCQ-30 scores. We investigated how MCQ-30 scores were distributed among different categories of outcome for the patient group. The figure also shows mean MCQ-30 scores at post-treatment for patients who achieved clinical significant change, were improved, or did not change. Clinical significant change (CSC) indicates a post-treatment result of 14 points or less on the Y-BOCS and at least a 10-point change. Improvement involves achieving reliable change which is a 10-point change or more, but scoring above the clinical cut-off. No change involves having neither reliable change nor ending up below the clinical cut-off of 14.

The patients had higher total scores on the MCQ-30 when starting treatment compared to the controls (64.37 [SD = 15.40] vs. 52.66 [SD = 11.76], $t(466) = 7.82$, $p < 0.0001$). Patients who achieved CSC had significantly lower scores at post-treatment compared to patients who were improved (45.51 [SD = 9.77] vs. 59.66 [SD = 13.60], $t(49) = 3.37$, $p = 0.001$) as well as patients who did not achieve change (60.06 [SD = 17.91], $t(74) = 4.54$, $p < 0.0001$). In addition the patients who achieved CSC actually had significant lower scores compared to the controls ($t(426) = -3.90$, $p = 0.0001$).

Comparisons of responders and non-responders

Emmelkamp et al. (2002) defined treatment response as achieving at least 33% improvement on the Y-BOCS. Using the same criteria in our study we find that 68.7% of the total sample responded to the treatment. Independent *t*-tests were used to test possible differences between the two groups. Table 3 shows a summary of the comparison for the change scores obtained by the treatment responders and non-responders on the OBQ-44 and the

Table 2
Paired samples *t*-tests and effect sizes (*d*) for pre-treatment and post-treatment tests of obsessive–compulsive symptoms, metacognitions, and obsessive beliefs ($N = 83$).

Measure	Range	Pre-treatment	Post-treatment	<i>t</i>	<i>d</i> (<i>r</i>)
Y-BOCS	0–40	23.84 (3.72)	12.23 (6.36)	16.33 ^a	2.23 (0.74)
MCQ-30	30–120	64.37 (15.40)	52.31 (15.42)	8.26 ^a	0.78 (0.36)
OBQ-44 – Responsibility/Threat	1–7	4.04 (1.47)	2.95 (1.28)	8.01 ^a	0.79 (0.37)
OBQ-44 – Perfectionism/Certainty	1–7	3.85 (1.33)	3.22 (1.33)	4.94 ^a	0.47 (0.23)
OBQ-44 – Importance/Control of thoughts	1–7	3.10 (1.10)	2.54 (1.17)	4.74 ^a	0.49 (0.24)

Note. Y-BOCS = Yale–Brown Obsessive–Compulsive Scale, MCQ-30 = metacognitions questionnaire 30; and OBQ-44 = Obsessive Beliefs Questionnaire-44.

^a $p < 0.0001$.

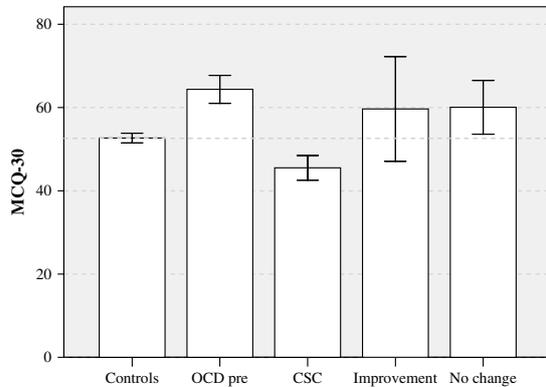


Fig. 1. Means and confidence intervals for the MCQ-30 total scores (range 30–120) for community controls ($N=385$) and the OCD sample ($N=83$) at pre-treatment and post-treatment for those achieving clinically significant change (CSC), reliable improvement, or no change.

MCQ-30. The treatment responders had significantly higher change scores for all the cognitive and metacognitive subscales.

Correlational analyses

Changes in the OBQ-44 and the MCQ-30 subscales were all significantly correlated ($p < 0.01$) with both the Y-BOCS post-treatment score and the change scores. For the OBQ-44, the correlations ranged from 0.35 for the importance/control of thoughts subscale to 0.48 for the perfectionism subscale. For the MCQ-30 subscales the correlations ranged from 0.35 for the cognitive self-consciousness subscale to 0.39 for the positive beliefs about worry and the need to control thoughts subscales. The OBQ-44 subscales and the MCQ-30 intercorrelations ranged from 0.55 to 0.69. A summary of these correlations is shown in Table 4.

Regression analyses

Deciding on variables to control for in regression analyses is difficult since research on predictors for OCD has shown inconsistent results (Steketee & Shapiro, 1995). As previously mentioned demographic variables were not related to outcome in our study. Due to the lack of potential predictors and the limited sample size

Table 3
Mean pre–post change scores for treatment responders and non-responders on measures of cognitive and metacognitive beliefs.

Change scores	Mean (SD), Non-responders ($N=26$)	Mean (SD), Responders ($N=57$)	t
OBQ-44 total	0.17 (0.49)	1.05 (1.02)	-5.27**
Responsibility/Threat	0.40 (0.93)	1.39 (1.23)	-3.63**
Perfectionism/Certainty	-0.04 (0.78)	0.94 (1.19)	-3.83**
Importance/Control	0.15 (0.89)	0.75 (1.12)	-2.40**
MCQ-30 total	4.26 (10.20)	15.75 (12.93)	-4.00**
Positive beliefs about worry	-0.22 (1.71)	1.23 (2.63)	-2.57**
Uncontrollability and danger	2.08 (4.02)	4.80 (4.08)	-2.83**
Cognitive confidence	-0.38 (2.98)	2.07 (3.86)	-2.87**
Need to control thoughts	1.78 (3.37)	4.51 (4.12)	-2.95**
Cognitive self-consciousness	1.00 (4.14)	3.14 (3.50)	-2.44*

Note. OBQ-44 = Obsessive Beliefs Questionnaire-44, MCQ-30 = metacognitions questionnaire 30.

* $p < 0.05$, ** $p < 0.01$.

we chose to control for pre-treatment levels of obsessive-compulsive symptoms and changes in mood. We conducted three regression analyses for the post-treatment data. For the first analysis (model 1) we wanted to explore the impact of changes in metacognitions on obsessive-compulsive symptoms when controlling for changes in responsibility/threat and perfectionism/certainty. Pre-treatment levels of obsessive-compulsive symptoms were entered in step 1. The results indicated that symptoms at pre-treatment were related to outcome and explained 7% of the variance. Change in depressed mood was entered in the second step and added another 7% of the variance in the model. On step 3 the block of variables consisting of change in responsibility/threat and perfectionism/certainty was entered and they explained a significant additional 18% of the variance in post-treatment Y-BOCS score. In the fourth step the total MCQ-30 change score along with the change in the importance/control of thoughts subscale of the OBQ-44 explained an additional 7% of the variance in Y-BOCS. On the final step of the equation only Y-BOCS pre-treatment scores and change in MCQ-30 emerged as significant independent predictors of post-treatment symptom levels.

In a second follow-up regression analysis we reversed the order of the metacognitive and the non-metacognitive dimensions. The results indicated that metacognition explained a significant additional 22% of the variance in symptoms after controlling for pre-treatment symptom levels and change in depressed mood. The non-metacognitive constructs of responsibility/threat and perfectionism/certainty in the fourth step did not make a significant contribution. As a block the responsibility and perfectionism variables did not explain additional variance in the model after metacognitions were entered.

For the final regression analysis (model 2) we were interested in determining the relative importance of the five MCQ-30 subscales. Since all five subscales have previously been shown to be correlated with obsessive-compulsive symptoms, we chose to do a forward regression in order to see whether some were more important than others. Two subscales came out as significant. The strongest subscale was change in "need to control thoughts" which explained 11% of the variance. In addition, changes in the subscale "positive beliefs about worry" also explained 4%. A summary of the regression analyses is given in Table 5.

Follow-up analyses

Data from 45 patients (54.2%) were available from a 12-month follow-up assessment. The 45 who agreed to take part in the follow-up assessment were not different compared to those who did not in terms of Y-BOCS, OBQ-44, or MCQ-30 scores at pre- and post-treatment. Obsessive-compulsive symptoms did not change much from post-treatment to follow-up (from 12.13 [SD = 5.61] at post-treatment to 13.00 [SD = 8.35] at follow-up). The correlation between Y-BOCS post-treatment and Y-BOCS follow-up was 0.67, while the correlation between MCQ-30 at post-treatment and at follow-up was 0.83, and for the OBQ-44 the correlation was 0.74. Twenty-three patients were categorized as having clinical significant change at follow-up and 22 were categorized as having no change/deterioration. One patient was classified as having deteriorating Y-BOCS scores. When comparing the clinical significant change group with the no change/deterioration group a significant difference for the MCQ-30 scores at follow-up was found (45.94 [10.07] vs. 61.25 [15.21], $t(43) = 4.00$, $p < 0.0005$). For the OBQ-44 scores the difference was also significant (2.29 [1.00] vs. 3.16 [1.26], $t(40) = 2.47$, $p = 0.018$). Due to the smaller sample size at follow-up as well as the relatively stable results (paired samples t -test showed no significant changes in any of the measures).

Table 4
Intercorrelations for changes in belief domains (metacognitive and non-metacognitive) and obsessive–compulsive symptoms.

	2	3	4	5	6
1 Y-BOCS post-treatment	–0.83	–0.53	–0.47	–0.40	–0.44
2 Y-BOCS Δ		0.51	0.41	0.48	0.35
3 MCQ-30 Δ			0.69	0.55	0.58
4 OBQ-44 Responsibility/Threat Δ				0.59	0.56
5 OBQ-44 Perfectionism/Certainty Δ					0.47
6 OBQ-44 Importance/Control of thoughts Δ					

Note. All correlations are significant at $p < 0.01$. Y-BOCS = Yale–Brown Obsessive–Compulsive Scale; MCQ-30 = metacognitions questionnaire 30; and OBQ-44 = Obsessive Beliefs Questionnaire-44.

Discussion

This study set out to evaluate cognitive and metacognitive changes in patients undergoing exposure treatment for OCD, and to

Table 5

Statistics for each step of the regressions with post-treatment Y-BOCS regressed on pre-treatment Y-BOCS, change in mood, and change in cognitive and metacognitive predictors ($N = 83$).

	F cha	R ² cha	B	SE B	β	t
Model 1						
Step 1	5.90	0.07*				
Y-BOCS pre			0.45	0.18	0.26	2.43*
Step 2	6.77	0.07*				
Y-BOCS pre			0.56	0.18	0.33	3.07**
BDI total Δ			–0.20	0.08	–0.28	–2.60*
Step 3	9.96	0.18***				
Y-BOCS pre			0.49	0.17	0.29	2.86**
BDI total Δ			–0.04	0.08	–0.05	–0.47
Responsibility/Threat Δ			–1.42	0.63	–0.27	–2.25*
Perfectionism/Certainty Δ			–1.39	0.67	–0.26	–2.06*
Step 4	4.63	0.07**				
Y-BOCS pre			0.42	0.17	0.25	2.51*
BDI total Δ			0.06	0.08	0.08	0.72
Responsibility/Threat Δ			–0.30	0.71	–0.06	–0.43
Perfectionism/Certainty Δ			–1.02	0.66	–0.19	–1.54
MCQ-30 total Δ			–0.18	0.07	–0.38	–2.63**
Importance/Control of thoughts Δ			–0.48	0.69	–0.08	–0.70
Reversed order						
Step 1	5.90*	0.07				
Y-BOCS pre						
Step 2	6.77*	0.07				
BDI Δ						
Step 3	13.61***	0.22				
MCQ-30 Δ						
Importance/Control of thoughts Δ						
Step 4	1.68	0.03				
Responsibility/Threat Δ						
Perfectionism/Certainty Δ						
Model 2						
Step 1	5.90*	0.07				
Y-BOCS pre			0.45	0.18	0.26	2.43*
Step 2	6.77*	0.07				
Y-BOCS pre			0.56	0.18	0.33	3.07**
BDI Δ			–0.20	0.08	–0.28	–2.60**
Step 3	12.00***	0.11				
Y-BOCS pre			0.42	0.18	0.24	2.35*
BDI Δ			–0.06	0.08	–0.08	–0.66
Need to control thoughts Δ			–0.61	0.18	–0.39	–3.46***
Step 4	4.30*	0.04				
Y-BOCS pre			0.46	0.18	0.27	2.66**
BDI Δ			–0.04	0.08	–0.05	–0.44
Need to control thoughts Δ			–0.49	0.18	–0.31	–2.67**
Positive beliefs about worry Δ			–0.57	0.28	–0.22	–2.07*

* $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

Note. The second regression analysis used forward regression for all the five subscales of the MCQ-30. Y-BOCS = Yale–Brown Obsessive–Compulsive Scale; MCQ-30 = metacognitions questionnaire 30; and BDI = Beck Depression Inventory.

determine which of these changes best correlate with symptom improvements. The treatment delivered was effective and the overall clinical effectiveness commensurate with other trials of OCD as analysed by Fisher & Wells (2005a).

We found that metacognitive beliefs and beliefs concerning perfectionism and responsibility decreased significantly during the course of treatment. The correlations between changes in the OBQ-44 and changes in obsessive–compulsive symptoms were similar to that of previous research (Whittal et al., 2005). Patients who made clinically significant change but not those that were simply improved or made no change had significantly lower post-treatment scores on metacognition.

The main finding of our study was that change on the MCQ-30 explained a large proportion of the variance in obsessive–compulsive symptoms. Change in metacognitions was a better predictor of outcome symptom levels than change in beliefs about responsibility and perfectionism. When the overlap between predictors was controlled for, only metacognition was significant.

Further analyses showed that during treatment, change in two dimensions of metacognition independently predicted post-treatment symptom severity. These were beliefs about the need to control thoughts and positive beliefs about the need to worry. These results are consistent with the idea that response to treatment is associated with change in metacognitions and identifies two particular domains that are relevant in the metacognitive model of OCD.

The design of the present study cannot address issues concerning the causal relationship between metacognitive belief change and symptom improvement during treatment. It could be the case that improvement in symptoms causes improvement in metacognitions rather than the converse being the case. Exposure and response prevention therapy was originally based upon habituation, not cognitive change, which could suggest that change in cognitions is a consequence of symptom reduction. This could be addressed in future studies that make repeated measurements throughout treatment to assess which variables change first. However, a prospective study using the MCQ-30 and other metacognition measures shows that they predict the subsequent development of OCD symptoms (Sica, Steketee, Ghisi, Chiri, & Franceschini, 2007). This at least provides evidence supporting a causal role of metacognitions in the development of OCD. It seems reasonable to assume on the basis of these data that metacognitions could probably contribute to OCD and that changing them may be instrumental in recovery.

The study might be improved by including multiple measures of obsessive–compulsive symptoms. The inclusion of other self-report measures of obsessionality or distress could possibly lead to different results. However, the Y-BOCS is the gold-standard for measuring obsessive–compulsive symptoms and it covers all different subtypes of OCD. Also, the Y-BOCS shows meaningful correlations with the cognitive and metacognitive measures suggesting that it is a reasonable measure for the purposes of our study. How specific cognitions and metacognitions could affect the wide range of obsessive–compulsive subtypes differently could be a topic for future research. A possible limitation of our study is the use of the OBQ-44 as the only measure of responsibility and perfectionism. Using more detailed measures of these constructs could possibly lead to different results. However, a related study by Myers & Wells (2005) which included the Responsibility Attitude Scale (Salkovskis et al., 2000) found that responsibility was not associated with obsessive–compulsive symptoms when controlling for metacognitions and worry, while metacognitive beliefs predicted obsessive–compulsive symptoms independent of responsibility and worry.

Emmelkamp et al. (2002) noted that the results regarding the evidence documenting the importance of changing cognitions in ERP for OCD are far from conclusive and that other assessment procedures may be more useful. The results from our current study indicate that it could be a question of which cognitions or metacognitions are actually addressed.

That metacognitions change and this is associated with better clinical outcomes is entirely consistent with the metacognitive model and treatment of OCD (Wells, 1997, 2009). However, exposure and response prevention is not designed to alter metacognitions but is instead predicated on principles of habituation. It is possible that treatment focusing on altering metacognitions specifically may produce more effective or faster outcomes. Moreover, it may be the case that extensive exposure may not be necessary to promote recovery if the mechanism is metacognitive change rather than habituation. Two studies shed some light on this supposition. In the first, Fisher & Wells (2005b) ran an experimental study in which patients with obsessive-compulsive disorder were exposed to a loop-tape of their intrusive thoughts under two experimental conditions. Under one condition they were given a habituation-rationale while under the other condition they were given a metacognitive-rationale that emphasized exposure to thoughts as means of testing beliefs about them. The metacognitive condition produced significantly greater reductions in distress, urge to neutralize and reductions in metacognitive beliefs than the habituation condition. In another study, Fisher & Wells (2008) treated a series of patients with Wells' metacognitive therapy. Even though that treatment did not involve prolonged or repeated exposure it was associated with large improvements in OCD symptoms and metacognitive beliefs that were stable across follow-up.

In conclusion, the present study is the first to show that good response to exposure and response prevention treatment is associated with reduction in metacognitions. Although the study cannot address the causal role of metacognitive change in determining response to treatment, the findings are consistent with the metacognitive model of OCD and the emphasis it gives on focusing on modification of metacognitions in treatment.

References

- Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression*. New York: Guilford Press.
- Beck, A. T., Steer, R. A., & Garbin, M. C. (1988). Psychometric properties of the Beck Depression Inventory: twenty-five years of evaluation. *Clinical Psychology Review*, 8, 77–100.
- Brown, T. A., DiNardo, P. A., & Barlow, D. (1994). *Anxiety disorders interview schedule* (4th ed.). Boulder, CO: Craywind Publications.
- 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. (2005). Focus on "cognition" in cognitive behavior therapy for OCD: is it really necessary? *Cognitive Behaviour Therapy*, 34, 131–139.
- Clark, D. A., & Purdon, C. (1993). New perspectives for a cognitive theory of obsessions. *Australian Psychologist*, 28, 161–167.
- Emmelkamp, P. M. G., van Oppen, P., & van Balkom, A. J. L. M. (2002). In G. Steketee, & R. O. Frost (Eds.), *Cognitive approaches to obsessions and compulsions – Theory, assessment, and treatment* (pp. 391–401). Amsterdam: Elsevier.
- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (1995). *Structured clinical interview for DSM-IV axis I disorders – patient edition*. (SCID I/P, version 2.0). NY: Biometrics Research Department.
- Fisher, P. L., & Wells, A. (2005a). How effective are cognitive and behavioral treatments for obsessive-compulsive disorder? A clinical significance analysis. *Behaviour Research and Therapy*, 43, 1543–1558.
- Fisher, P. L., & Wells, A. (2005b). Experimental modification of beliefs in obsessive-compulsive disorder: a test of the metacognitive model. *Behaviour Research and Therapy*, 43, 821–829.
- Fisher, P. L., & Wells, A. (2008). Metacognitive therapy for obsessive-compulsive disorder: a case series. *Journal of Behaviour Therapy and Experimental Psychiatry*, 39, 117–132.
- Frost, R. O., & Shows, D. (1993). The nature and measurement of compulsive indecisiveness. *Behaviour Research and Therapy*, 26, 275–277.
- Frost, R. O., & Steketee, G. (1997). Perfectionism in obsessive-compulsive disorder patients. *Behaviour Research and Therapy*, 35, 291–296.
- Goodman, W. K., Price, L. H., Ramussen, S. A., Mazure, C., Delgado, P., Heninger, G. R., et al. (1989a). The Yale-Brown Obsessive Compulsive Scale: II. Validity. *Archives of General Psychiatry*, 46, 1012–1016.
- Goodman, W. K., Price, L. H., Ramussen, S. A., Mazure, C., Fleischmann, R. L., Hill, C. L., et al. (1989b). The Yale-Brown Obsessive-Compulsive Scale: I. Development, use and reliability. *Archives of General Psychiatry*, 46, 1006–1011.
- Gwilliam, P. D. H., Wells, A., & Cartwright-Hatton, S. (2004). Does metacognition or responsibility predict obsessive-compulsive symptoms: a test of the metacognitive model. *Clinical Psychology and Psychotherapy*, 11, 137–144.
- 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.
- Kozak, M. J., & Foa, E. B. (1997). *Mastery of obsessive-compulsive disorder: a cognitive-behavioral approach*. San Antonio, TX: The Psychological Corporation.
- Krone, K., Himle, J., & Nesse, R. (1991). A standardized behavior group treatment program for obsessive-compulsive disorder: preliminary outcomes. *Behaviour Research and Therapy*, 23, 627–631.
- Longmore, R. J., & Worrell, M. (2007). Do we need to challenge thoughts in cognitive behavior therapy? *Clinical Psychology Review*, 27, 173–187.
- Myers, S. G., & Wells, A. (2005). Obsessive-compulsive symptoms: the contribution of metacognitions and responsibility. *Journal of Anxiety Disorders*, 19, 806–817.
- Myers, S. G., Fisher, P. L., & Wells, A. (2008). Belief domains of the Obsessive Beliefs Questionnaire-44 (OBQ-44) and their specific relationship with obsessive-compulsive symptoms. *Journal of Anxiety Disorders*, 22, 475–484.
- Obsessive Compulsive Cognitions Working Group. (1997). Cognitive assessment of obsessive-compulsive disorder. *Behaviour Research and Therapy*, 35, 667–681.
- Obsessive Compulsive Cognition Working Group. (2001). Development and initial validation of the Obsessive Beliefs Questionnaire and the Interpretation of Intrusions Inventory. *Behaviour Research and Therapy*, 39, 987–1006.
- Obsessive Compulsive Cognition Working Group. (2005). Psychometric validation of the Obsessive Beliefs Questionnaire and the Interpretation of Intrusions Inventory: part 2: factor analyses and testing of a brief version. *Behaviour Research and Therapy*, 43, 1527–1542.
- O'Connor, K. P., Aardema, F., Robillard, S., Guay, S., Pelissier, M.-C., Todorov, C., et al. (2006). Cognitive behaviour therapy and medication in the treatment of obsessive-compulsive disorder. *Acta Psychiatrica Scandinavica*, 113, 408–419.
- van Oppen, P., de Haan, E., van Balkom, A. J. L. M., Spinhoven, P., Hoogduin, K., & van Dyck, R. (1995). Cognitive therapy and exposure in vivo in the treatment of obsessive compulsive disorder. *Behaviour Research and Therapy*, 4, 379–390.
- Purdon, C., & Clark, D. A. (1999). Metacognition and obsessions. *Clinical Psychology and Psychotherapy*, 6, 102–110.
- Rachman, S. J. (1997). A cognitive theory of obsessions. *Behaviour Research and Therapy*, 35, 793–802.
- Rachman, S. J. (1998). A cognitive theory of obsessions: elaborations. *Behaviour Research and Therapy*, 36, 385–401.
- Rees, C. S., & van Koesveld, K. E. (2008). An open trial of group metacognitive therapy for obsessive-compulsive disorder. *Journal of Behaviour Therapy and Experimental Psychiatry*, 39, 451–458.
- Salkovskis, P. M. (1985). Obsessional-compulsive problems: a cognitive-behavioural analysis. *Behaviour Research and Therapy*, 23, 571–583.
- Salkovskis, P. M. (1989). Cognitive-behavioural factors and the persistence of intrusive thoughts in obsessional problems. *Behaviour Research and Therapy*, 27, 677–682.
- Salkovskis, P. M. (1998). Psychological approaches to the understanding of obsessional problems. In R. P. Swinson, M. M. Antony, S. Rachman, & M. A. Richter (Eds.), *Obsessive-compulsive disorder: Theory, research and treatment* (pp. 33–50). New York: Guilford.
- Salkovskis, P. M. (1999). Understanding and treating obsessive-compulsive disorder. *Behaviour Research and Therapy*, 37, S29–S52.
- Salkovskis, P. M., Wroe, A. L., Gledhill, A., Morrison, N., Forrester, E., Richards, C., et al. (2000). Responsibility attitudes and interpretations are characteristic of obsessive-compulsive disorder. *Behaviour Research and Therapy*, 38, 347–372.
- Sica, C., Steketee, G., Ghisi, M., Chiri, L. R., & Franceschini, S. (2007). Metacognitive beliefs and strategies predict worry, obsessive-compulsive symptoms and coping styles: a preliminary prospective study on an Italian non-clinical sample. *Clinical Psychology and Psychotherapy*, 14, 258–268.
- Steketee, G. S., & Shapiro, L. J. (1995). Predicting behavioural treatment outcome for agoraphobia and obsessive compulsive disorder. *Clinical Psychology Review*, 15, 317–346.
- Vogel, P. A., Stiles, T. C., & Götestam, K. G. (2004). Adding cognitive therapy elements to exposure therapy for obsessive compulsive disorder: a controlled study. *Behavioural and Cognitive Psychotherapy*, 32, 275–290.
- Wells, A. (1997). *Cognitive therapy of anxiety disorders: a practice manual and conceptual guide*. Chichester, UK: Wiley.
- Wells, A. (2009). *Metacognitive therapy for anxiety and depression*. New York: Guilford Press.
- 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.
- Whittal, M. L., Thordarson, D. S., & McLean, P. D. (2005). Treatment of obsessive-compulsive disorder: cognitive behavior therapy vs. exposure and response prevention. *Behaviour Research and Therapy*, 43, 1559–1576.

Paper IV

Is not included due to copyright

