

Phenomenology, etiology, and the religious counterpart of
Obsessive-Compulsive Disorder (OCD)

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I, Mathilde Karlijn Overduin, confirm that the work presented in this thesis is my own.
Where information has been derived from other sources, I confirm that this has been indicated
in the thesis.

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Abstract

This thesis reviewed the current state of research, including methodology, on the phenomenology and etiology of Obsessive-Compulsive Disorder (OCD), in addition to investigating predictors of its religious counterpart - scrupulosity. This thesis is organized into two theoretical chapters, two psychometric chapters, one empirical chapter, and one summary chapter. The first theoretical chapter introduced OCD as a diagnostic entity, and analyzed symptom structure and conceptualization of the disorder's heterogeneous symptoms. Chapter three, and first psychometric chapter, critically reviewed commonly used assessment methods of OCD in adults. The second theoretical chapter discussed the cognitive account of OCD's etiology, including three cognitive-behavioral models, and proposed a synthesis with the neurobiological etiological account of OCD. In the fifth chapter of this thesis, and second psychometric chapter, measures of obsessive beliefs and appraisals were reviewed. The sixth chapter of this thesis, the empirical chapter, examined the relationships between religion, obsessive-compulsive beliefs, and scrupulosity. Self-report questionnaires were used to measure strength of religious faith, maladaptive beliefs, and the tendency to blur thoughts and actions. Significant evidence of predictors and mediating effects in relation to scrupulosity and obsessive beliefs was found and discussed. This is the first study, to my knowledge, that demonstrated significant empirical support for applying cognitive-behavioral theory of obsessions to scrupulosity. The chapter concluded with a consideration of limitations, recommendations for future research, and implications for treatment. Finally, the last chapter provided a general summary of the thesis, including implications for OCD's conceptualization, measurement, and clinical practice.

To my parents

Contents

| | |
|--|-----------|
| Chapter 1: Introduction and organization | 10 |
| 1.1. Introduction | 10 |
| 1.2. Organization of the thesis..... | 13 |
| Chapter 2: Phenomenology of OCD | 15 |
| 2.1. Symptom structure | 15 |
| 2.2. Conceptualizing OCD as a spectrum of dimensions | 16 |
| 2.2.1. Temporal stability | 17 |
| 2.2.2. Genes and heritability..... | 18 |
| 2.2.3. Neuroimaging and neuropsychological studies..... | 19 |
| 2.2.4. Treatment response | 21 |
| 2.2.5. Patterns of comorbidity | 23 |
| 2.2.6. Conclusion..... | 23 |
| 2.3. Using subtypes to conceptualize OCD | 24 |
| 2.3.1. Family history and tic-related OCD | 25 |
| 2.3.2. Early-onset OCD | 26 |
| 2.3.3. Streptococcus-related OCD | 28 |
| 2.3.4. Conclusion..... | 29 |
| 2.4. Hybrid phenomenological models and future research | 30 |
| Chapter 3: How to measure OCD symptoms | 31 |
| 3.1. Introduction | 31 |
| 3.2. Diagnostic interviews | 32 |
| 3.2.1. Anxiety Disorder Interview Schedule for the DSM-IV | 33 |
| 3.2.2. Structured Clinical Interview for DSM-IV Axis I Disorders | 33 |
| 3.3. Clinician-rated measures | 35 |
| 3.3.1. Yale-Brown Obsessive Compulsive Scale | 35 |
| 3.3.2. Yale-Brown Obsessive Compulsive Scale Second Edition | 38 |
| 3.3.3. Dimensional Yale-Brown Obsessive Compulsive Scale | 40 |
| 3.3.4. Behavioral Avoidance Tests | 43 |
| 3.3.5. Family Accommodation Scale..... | 44 |
| 3.4. Self-report measures..... | 46 |
| 3.4.1. Padua Inventory-Washington State University Revision | 46 |
| 3.4.2. Padua Inventory-Revised..... | 48 |

| | |
|---|-----------|
| 3.4.3. Padua Inventory-Palatine Revision..... | 50 |
| 3.4.4. Obsessive-Compulsive Inventory-Revised..... | 52 |
| Table 3.1. Overview validation studies of the OCI-R in non-English languages..... | 55 |
| 3.4.5. Vancouver Obsessional Compulsive Inventory..... | 56 |
| 3.4.6. Vancouver Obsessional Compulsive Inventory-Revised..... | 58 |
| 3.4.7. Schedule of Compulsions, Obsessions, and Pathological Impulses | 60 |
| 3.4.8. Clark-Beck Obsessive-Compulsive Inventory..... | 62 |
| 3.4.9. Florida Obsessive-Compulsive Inventory | 63 |
| 3.4.10. Dimensional Obsessive-Compulsive Scale | 65 |
| 3.4.11. Obsessive-Compulsive Disorder Family Functioning Scale | 68 |
| 3.5. Discussion | 69 |
| Table 3.2. Summary Review | 71 |
| Chapter 4: Etiology of OCD | 74 |
| 4.1. Introduction | 74 |
| 4.2. Core concepts and purpose of the cognitive-behavioural account | 75 |
| 4.3. Salkovskis' cognitive behavioural theory of OCD..... | 77 |
| 4.3.1. Empirical support from questionnaire studies | 79 |
| 4.3.2. Empirical support from experiments | 82 |
| 4.4. Rachman's cognitive theory of obsessions..... | 84 |
| 4.4.1. Empirical support from questionnaire studies | 86 |
| 4.4.2. Empirical support from experiments | 87 |
| 4.5. Purdon and Clark's cognitive theory of obsessions..... | 89 |
| 4.5.1. Thought control and metacognitions | 91 |
| 4.5.2. Empirical support from questionnaire studies | 92 |
| 4.5.3. Empirical support from experiments | 93 |
| 4.5.4. Empirical support from naturalistic observations | 95 |
| 4.6. Review of the cognitive-behavioral account | 96 |
| 4.6.1. The generality and congruence criteria..... | 97 |
| 4.6.2. The specificity criterion..... | 99 |

| | |
|--|------------|
| 4.6.3. Conclusion | 101 |
| Table 4.1. Summary empirical evidence for cognitive-behavioral predictions | 101 |
| 4.7. Multidimensionality of OCD..... | 101 |
| 4.8. Discussion | 104 |
| Chapter 5: How to measure cognitive-behavioral constructs | 106 |
| 5.1. Introduction | 106 |
| 5.1.1. Obsessive Beliefs Questionnaire | 107 |
| 5.1.2. Interpretations of Intrusions Inventory | 111 |
| 5.1.3. Obsessional Intrusive Thoughts Inventory | 113 |
| 5.2. Specific measures related to Salkovskis' model | 115 |
| 5.2.1. Responsibility Attitudes Scale..... | 115 |
| 5.2.2. Responsibility Interpretations Questionnaire..... | 116 |
| 5.2.3. Pathways to Inflated Responsibility Beliefs Scale | 117 |
| 5.3. Specific measures related to Rachman's model | 118 |
| 5.3.1. Thought-Action Fusion Scale | 119 |
| 5.3.2. Thought-Action Fusion Scale-Revised..... | 121 |
| 5.4. Specific measures related to Purdon and Clark's model | 122 |
| 5.4.1. Thought Control Questionnaire | 122 |
| 5.4.2. Thought Control Ability Questionnaire..... | 124 |
| 5.4.3. Meta-Cognitions Questionnaire..... | 125 |
| 5.4.4. Magical Ideation Scale | 126 |
| 5.4.5. Illusory Beliefs Inventory | 126 |
| 5.5. Adjunctive cognitive-behavioral questionnaires | 127 |
| 5.5.1. Intolerance of Uncertainty Scale | 127 |
| 5.5.2. Frost Multidimensional Perfectionism Scale | 128 |
| 5.5.3. Multidimensional Perfectionism Scale-H..... | 128 |
| 5.5.4. The Perfectionism Inventory | 129 |
| 5.5.5. Penn Inventory of Scrupulosity | 129 |
| 5.6. Conclusion..... | 131 |

| | |
|--|------------|
| Chapter 6: Scrupulosity | 133 |
| 6.1. Introduction | 133 |
| 6.2. Literature review | 135 |
| 6.2.1. Early research on the relationship between religiosity and obsessionality | 135 |
| 6.2.2. Scrupulosity and dysfunctional beliefs across religious affiliations | 137 |
| 6.2.3. Scrupulosity and TAF across religious affiliations | 141 |
| 6.2.4. Religion as a positive influence on mental health | 143 |
| 6.2.5. Towards a rapprochement..... | 145 |
| 6.2.6. Conclusion | 146 |
| 6.2.7. The present study | 147 |
| 6.3. Methodology | 149 |
| 6.3.1. Participants and procedure..... | 149 |
| 6.3.2. Instruments | 149 |
| 6.4. Results | 151 |
| 6.4.1. Preliminary analyses..... | 151 |
| Table 6.1. Pearson’s product moment correlations..... | 152 |
| 6.4.2. Group comparisons on religiosity, scrupulosity, OC beliefs, and TAF..... | 153 |
| Table 6.2. The four measures (means and SDs) | 153 |
| 6.4.3. Religion and scrupulosity | 154 |
| 6.4.4. Obsessive-compulsive beliefs and scrupulosity | 155 |
| Table 6.3. Regression analyses identifying predictors of scrupulosity..... | 157 |
| 6.4.5. Mediator models of scrupulosity | 157 |
| Table 6.4. Bootstrap analyses identifying mediators in predicting scrupulosity | 160 |
| 6.4.6. Predictors of dysfunctional beliefs | 160 |
| Table 6.5. Regression analyses identifying predictors of OC beliefs | 162 |
| 6.5. Discussion | 163 |
| 6.5.1. Group comparisons on religiosity, scrupulosity, OC beliefs, and TAF..... | 163 |
| 6.5.2. Religion and scrupulosity | 164 |
| 6.5.3. Obsessive-compulsive beliefs and scrupulosity | 164 |

| | |
|--|------------|
| 6.5.4. Mediator models of scrupulosity | 165 |
| Figure 6.1..... | 166 |
| Figure 6.2..... | 167 |
| 6.5.5. Predictors of dysfunctional beliefs | 167 |
| 6.5.6. Limitations and future directions..... | 168 |
| 6.5.7. Conclusion and clinical implications..... | 171 |
| Chapter 7: General summary and implications | 173 |
| 7.1. Phenomenology of OCD | 173 |
| 7.2. Measuring OCD symptoms | 175 |
| 7.3. Etiology of OCD | 176 |
| 7.4. Measuring cognitive-behavioral constructs..... | 177 |
| 7.5. Scrupulosity and maladaptive beliefs..... | 179 |
| Figure 7.1..... | 180 |
| References | 181 |
| Appendices | 212 |

1. Introduction and organization

1.1. Introduction.

This thesis reviews the current state of research, including methodology, on the phenomenology and etiology of Obsessive Compulsive Disorder (OCD), in addition to investigating predictors of its religious counterpart - scrupulosity. The thesis focuses on prominent debates about conceptualizing OCD's heterogeneity, in addition to measurement of symptoms and etiological constructs. Though much research has been done, the systematic analysis of symptoms in relation to underlying cognitions should allow a greater depth of understanding of OCD in general, and scrupulosity in particular. This also provides an opportunity to integrate findings of different assessment methods and approaches, in order to contribute towards progress in OCD research.

OCD is a clinically widespread condition, with prevalence rates in the global population ranging from ~1% (current) and 2.0 % to 2.5% (lifetime; Torres & Lima, 2005). Individuals with OCD suffer from recurrent, unwanted, and intrusive thoughts ('obsessions') and/or engage in repetitive ritualistic behaviors ('compulsions'), usually with the aim to prevent, reduce, or eliminate distress or feared consequences of the obsessions. Compulsive behaviors are commonly overt (i.e., repetitive hand-washing, checking things, touching objects), though they can be covert (i.e., counting backwards from ten to one, silently saying a prayer a fixed number of times, creating a mental image of a certain description; de Silva, 2006). Relief provided by rituals is generally temporary and contributes to future ritual engagement (Deacon & Abramowitz, 2005). Consequently, untreated symptoms often persist or increase over time, causing significant impairment in social, professional, academic, and/or family functioning (Koran, Thienemann, & Davenport, 1996).

For a clinical OCD diagnosis to be justified, the obsession and/or compulsion must cause distress and/or interfere with the person's life and daily activities (de Silva, 2006). Yet various obsessions and compulsions are frequently present in children and adults without OCD - that is, in subclinical form. Subclinical OCD has been defined as the presence of an obsession and/or compulsion that is ego dystonic but does not cause enough distress or interference in functioning to qualify for full OCD diagnosis (Lenane et al., 1990). Most recently, Fullana et al. (2009) estimated

that 21%-25% of individuals from the general population endorse obsessions and/or compulsions as defined in the DSM-IV, of which 13% to 17% are adults without a mental disorder. Subclinical OCD can cause high levels of distress, and a better understanding of both clinical and subclinical OCD may benefit individuals with a high risk of developing OCD.

Researchers seeking a better understanding of the disorder face recalcitrant difficulties. From as far back as the earliest descriptions of OCD, investigators have attempted to divide the heterogeneous disorder into homogenous subtypes (Leckman, Rauch, & Mataix-Cols, 2007). For example, Falret distinguished ‘*Folie du doute*’ (madness of doubt) and ‘*Délire du toucher*’ (delusion of touch) in 1869 (Hantouche & Lancrenon, 1996). Most commonly thereafter, researchers separated ‘washers’ from ‘checkers’ (e.g., Rachman & Hodgson, 1980). These attempts have had limited success in relating the identified subtypes to biological characteristics or treatment response, in part because pure subtypes of patients rare. Yet even the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*; American Psychiatric Association, 1994) and the *International Classification of Diseases, Tenth Edition (ICD-10)*; World Health Organization, 1992) still define OCD as a unitary nosological entity. While this parsimony is formally appealing, it is incongruent with the variations seen in patients’ obsessions and compulsions (Leckman et al., 2010a).

Since the publication of the DSM-IV (APA, 1994), research on OCD has continued to expand tremendously. Studies on OCD symptomatology seem to consistently indicate that OCD patients present disparate, non-overlapping symptom patterns, indicating that the disorder is not a homogeneous diagnostic entity (Mataix-Cols, Rosario-Campos, & Leckman, 2005; Mataix-Cols, Pertusa, & Leckman, 2007). Therefore, it is important to consider how the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V)*; APA, in press) can better capture the heterogeneity of OCD symptoms than the DSM-IV (APA, 1994) and the ICD-10 (WHO, 1992) have done. Researchers have typically taken two paths for improving the understanding of OCD: analyzing the phenomenology (e.g., the symptom experiences of OCD patients) and investigating etiology (e.g., the causal factors that underlie the disorder).

As for the first, several phenomenological approaches within the field have emerged to conceptualize and elucidate OCD’s heterogeneity. Examples are: dimensional versus categorical

approaches, animal versus behavioral and functional models of OCD, and approaching OCD as a broader spectrum with other anxiety disorders. The dimensional versus subtyping debate will be discussed in the first theoretical chapter. Viewing OCD symptoms as dimensions means including subclinical phenomena experienced by numerous individuals of the healthy population. Creating subtypes, on the other hand, would lead to more homogeneous subgroups that could strongly benefit from subtype specific interventions. Researchers are increasingly trying to integrate the two approaches to enhance understanding of OCD (Leckman et al., 2010b; Taylor, 2010).

From an etiological point of view, it is emphasized that the identification of underlying mechanisms or factors should be incorporated in any phenomenological approach. In this domain of OCD research the debate revolves around which factors are considered responsible for the emergence and maintenance of the heterogeneous OCD symptoms. Neurobiological factors (Maltby et al., 2005; Rosenberg, Russell, & Fougere, 2010), information-processing factors (McNally, 2000), and cognitive-behavioral factors (Shafraan, 2010) have been proposed as paramount by different fields. The cognitive-behavioral account is reviewed in chapter three, the second theoretical chapter of this thesis, along with its assumed contrast to the neurobiological approach. The neurobiological etiological approach aims to identify biomarkers (e.g., substances, physiological characteristics, or genes, that possibly indicate the presence of OCD) of illness and treatment response. Cognitive-behavioral models, on the other hand, aim to define the role of dysfunctional beliefs and appraisals in the emergence and maintenance of OCD symptoms (Rosenberg, et al., 2010). Again, recent attempts have been made to integrate these two accounts into one synthesized model (e.g., Taylor & Jang, 2011).

Furthermore, OCD has been linked to religion in the psychological literature for a long time, though the connection is still far from being understood (Al-Solaim & Loewenthal, 2011). Perhaps one of the founding fathers of this line of research, Freud (1907/1961) emphasized the similarities between obsessionality and religious practices. He particularly noted the rituality of behaviors involved in both, in addition to the guilt when those rituals are abandoned or not executed properly. However, Freud (1907/1961) also noted the clear differences between religion and obsessionality; whereas religious practices are meaningful and carried out according to religious norms, obsessional symptoms are pointless even to the person who experiences them. The research interest in the relationship between

religion and OCD has grown and studies have gradually clarified the relationship between the two.

The religious counterpart of OCD has been called ‘scrupulosity’ in the literature. Scrupulosity is the fear of thinking or behaving immorally or against one’s religious beliefs (Celafu, 2010). Normal religious scruples can be distinguished from pathological scrupulosity by: compulsive behavior that goes beyond the requirements of religious law, which is both narrowly focused and often on trivial aspects, and scruples that ‘tend to misconstrue biblical maxims as laws’ (Celafu, 2010: 113). Several studies show that scrupulosity is a common presentation of OCD. Findings show that religion is the primary obsession of 5.9% of patients, making it the fifth most common OCD presentation, and part of the OCD obsessions (but not necessarily the primary obsession) for 24.2% of OCD research samples (Foa & Kozak, 1995; Antony, Dowie, & Swinson, 1998a). Nonetheless, scrupulosity has only recently received more attention by OCD researchers (Miller & Hedges, 2008).

This thesis thus aims to: 1) review the current state of research, including methodology, of the phenomenology and etiology of OCD; and 2) investigate predictors of scrupulosity, OCD’s religious counterpart. Reviewing conceptualizations, findings, and research methodologies will be extremely helpful in furthering these three domains of OCD research. The reviews of assessment methods for adults that measure OCD symptoms and cognitive-behavioral constructs furthermore fill important gaps in the literature, and will help improve future diagnosis and assessment of OCD. It is noteworthy that the psychometric review of OCD self-report measures included in chapter 3 is currently in press. Additionally, the critical review of the scrupulosity literature and the large empirical study assessing interrelated constructs shed new light on the religious counterpart of OCD, its symptoms, and its relationship with obsessive-compulsive (OC) cognitions. Moreover, this is the first study, to my knowledge, that demonstrates empirical support for applying cognitive-behavioral theory of obsessions to scrupulosity. Finally, the last chapter provides a general summary of this thesis including consideration of implications for OCD’s conceptualization, measurement, and clinical practice.

1.2. Organization of the thesis.

The first theoretical chapter addresses the current state of research on the phenomenology of OCD. For this, an overview of the literature on the symptom structure of the anxiety disorder is

provided. Secondly, the subtyping versus dimensional debate is laid out and evaluated. Chapter three, the first psychometric chapter, provides a psychometric review of diagnostic interviews, clinician-rated instruments, and self-report measures (which is currently in press) used to assess OCD severity in adults. The second theoretical chapter covers the cognitive etiological account of OCD, including three cognitive-behavioral models and their empirical support. Additionally, a synthesis of the cognitive and neurobiological etiological accounts is proposed. In the fifth chapter, and second psychometric chapter, a review study is presented on measures that assess beliefs and appraisals related to cognitive-behavioral theories. The sixth chapter, the empirical chapter, investigates scrupulosity. Both a critical literature review and a large empirical study are discussed, examining relationships with cognitive-behavioral constructs. The chapter concludes with a consideration of limitations and recommendations for future scrupulosity research. Finally, the last chapter of this thesis provides a general summary including consideration of implications of the thesis.

2. Phenomenology of OCD

2.1. Symptom structure.

In order for the DSM-V (APA, in press) to better capture the heterogeneity of OCD than the DSM-IV and ICD-10 do, symptom dimensions could be used as specifiers (Mataix-Cols et al., 2007). This proposition originated in the observation that numerous factor-analytic studies on large samples of OCD patients, have been relatively consistent in identifying possible symptom dimensions in OCD. Although results vary per study (depending on the nature of the sample, OCD measure used, and factor analytic techniques), the number of consistencies could indicate that there may be a set of replicable dimensions (Taylor, 2010). Moreover, content and structure of OCD symptoms are similar in clinical and nonclinical populations (Gibbs, 1996; Olafsson et al., 2010).

In the appendices a table of factor analytic studies on OCD symptoms is presented. The measures of the studies vary, though the majority reports their factor structure based on the Yale-Brown Obsessive-Compulsive Scale Symptom Checklist (Y-BOCS SC; Goodman et al., 1989a, 1989b). Even though some pairings of symptom categories have emerged consistently (i.e., hoarding obsessions with hoarding compulsions, contamination obsessions with cleaning compulsions, and symmetry obsessions with ordering compulsions), the appropriate conceptualization of other symptom categories have been less clear (Bloch et al., 2008). Additionally, miscellaneous symptoms have a poor conceptual fit within a particular symptom category, in spite of being functionally related. Storch et al. (2008a) found that, in an adult sample of OCD patients, most miscellaneous symptoms were related to one or more symptom dimensions in four- and five-factor models of OCD symptoms, with the exception of the contamination/cleaning dimension. Results of confirmatory factor analytic (CFA) studies that have compared different factor structures of OCD symptoms, are also included in the table in the appendices.

Although the identified factors seem very different, it could be that similarity is masked through different factor numbers or rotation methods. Therefore, Bloch and colleagues (2008) conducted a meta-analysis of 21 exploratory factor analytic studies of the Y-BOCS symptom checklist (identified by an asterisk in table 1 of the appendices), involving 5124 participants. The 13 major

symptom categories of the Y-BOCS symptom checklist were included, in order to see if a robust model could be formulated of the dimensional structure of OCD for both adults and children. The authors found that twenty of their 21 included studies associated hoarding obsessions with hoarding compulsions, and contamination obsessions with cleaning compulsions. The greatest disagreement was in the placement of checking compulsions, which was related to every other symptom category in at least one factor analysis. In their meta-analysis, Bloch et al.'s (2008: 1537) factor analysis generated four factors that explained 79.0% of the variance:

- ❖ Factor 1 (symmetry factor): symmetry obsessions and repeating, ordering, and counting compulsions (26.7% of the variance);
- ❖ Factor 2 (forbidden thoughts factor): aggression, sexual, religious and somatic obsessions, and checking compulsions (21.0% of the variance);
- ❖ Factor 3 (cleaning factor): contamination and cleaning (15.9% of the variance); and
- ❖ Factor 4 (hoarding factor): hoarding obsessions and compulsions (15.4% of the variance).

When solely focusing on adult-samples studies of the meta-analysis, the factor structure remained identical to the total sample, and explained 79.7% of the variance in the studies involving adults. The only differences between adults and children were: 1) checking compulsions loaded highest on the forbidden thoughts factor in adults and on the symmetry factor in children; and 2) somatic obsessions loaded highest on the forbidden thoughts factor in adults and on the cleaning factor in children. The shifting of the checking factor has probably to do with the inherent ambiguity of checking symptoms and individual items' heterogeneous association with other OCD symptom categories in the Y-BOCS-symptom checklist.

2.2. Conceptualizing OCD as a spectrum of dimensions.

Though the dimensions that have relatively consistently emerged from factor analytic studies (see appendices) are not evidence per se of the existence of symptom dimensions, their relative consistency suggests they can be useful in the identification of more robust endophenotypes.

Endophenotypes are biological markers that divide behavioral symptoms into more stable phenotypes

with a clear genetic connection; phenotypes are the observable physical or biochemical characteristics, as determined by both genetic makeup and environmental influences (Leckman et al., 2010a).

Endophenotypes can possibly more accurately depict individual differences among OCD patients, as there are no definitive etiological markers of vulnerability for OCD. To this end, a lot of research effort has been directed towards examining the existence of OCD symptom dimensions.

‘Symptom dimensions’ refer to the thematic content of an individual’s obsessions and related compulsions (e.g., washing compulsions preceded by contamination obsessions). These dimensions can be viewed as a spectrum of potentially overlapping features that are likely to be continuous with ‘normal’ worries and extend beyond the traditional nosological boundaries of OCD (Leckman et al., 2007). Support for the dimensional approach is provided through the dimensions’: temporal stability, distinct heritability, neurocircuits and structure, patterns of comorbidity, and differential treatment response. Each will be discussed briefly in the following sections.

2.2.1. Temporal stability. First, dimensions, or factors, are found to be temporally stable. Two studies with large samples have found that patients maintain their symptoms across time intervals as long as six years, and the most robust predictor of having a particular symptom was having that symptom in the past (Mataix-Cols et al., 2002b; Rufer et al., 2005). For those symptoms that changed across time, changes typically occurred within, instead of between, previously identified symptom dimensions, indicating that the symptoms of adult OCD patients are more stable than often assumed. For example, Mataix-Cols et al. (2002b) repeatedly administered the Y-BOCS symptom checklist to a sample of OCD adult patients, and most of the patients maintained their symptoms across follow-up. The partial correlations over the two-year period were the highest for the contamination/cleaning dimension ($r = 0.73$); the other dimensions (hoarding, symmetry, aggressive, sexual/religious) had partial correlations of $r = 0.57$ or higher. Fullana et al. (2005) replicated these findings in a nonclinical sample over a two-year period. In a later longitudinal community study, Fullana et al. (2009) again found OC symptom dimensions to be temporally stable, with the contamination/cleaning and symmetry/ordering dimensions showing the highest correlations. Similar results were reported in pediatric clinical samples over longer periods of time (Delorme et al., 2006).

2.2.2. Genes and heritability. Secondly, the various OCD symptom dimensions have been associated with distinct genetic and heritability variables, despite reduction in power of gene-localization methods (such as linkage analysis) due to the disorder's heterogeneity (Zhang & Risch, 1996). Highly important is dissecting the syndrome at the level of the phenotype into valid quantitative heritable components, as etiological heterogeneity could be reflected in phenotypic variability. Alsobrook, et al. (1999) found that the relatives of OCD probands (e.g., family members through whom a family's medical history comes to light) who scored high on the obsessions/checking and symmetry/ordering factors were at greater risk to develop OCD than family members of probands who scored low on these dimensions. This finding for symmetry has been replicated in two subsequent studies.

The first study was by Leckman et al. (2003), who conducted complex segregation analyses in a sample of Tourette Syndrome (TS) siblings and their parents, and found significant evidence for genetic transmission for the: 1) aggressive, sexual, religious, and checking obsessions, with their corresponding compulsions; and 2) for the symmetry/ordering dimension. Besides dominant major gene effects for these two factors, evidence for recessive major gene effects for the contamination/cleaning and the hoarding factors was found. The inclusion of TS sibling pairs is valuable as OC symptoms in these families generally have an early onset, and hence, are more likely to be homogeneous (Mathis et al., 2006). Using the same dataset of TS-affected sibling pairs, Zhang et al. (2002) conducted a genome scan of the hoarding dimension, and found significant allele sharing for both dichotomous and quantitative hoarding phenotypes for several markers and joint effects on specific loci. Also, high scores on the repeating/counting factor and the presence of tics, was found to be associated with an insertion/deletion polymorphism in the promoter region of the serotonin transporter gene (5-HTTLPR; Cavallini et al., 2002).

The second study to replicate Alsobrook et al. (1999), was by Hasler et al. (2007), who reported severity scores not to be familial, though sibling-sibling correlations were statistically significant for all four symptom dimensions. In particular, robust sibling-sibling intraclass correlations for the hoarding dimension and taboo thoughts (aggressive, sexual, and religious obsessions) were found. Conversely, somatic obsessions did not correspond to high familiarity (despite being on the same dimension as the taboo thoughts). Smaller, but significant familiarity was found for the

contamination/cleaning and symmetry/ordering/arranging factors.

Though these family-genetic and sibling studies provide evidence that familial factors contribute in the expression of OCD, they cannot distinguish between environmental versus genetic factors like twin studies could. Van Grootheest et al. (2008) were the first to evaluate OCD symptom dimensions in the context of twin studies. The three OCD dimensions (rumination, contamination, and checking) identified in a sample of 1383 female twins, were analyzed with multivariate genetic models. Results showed that all OCD symptom dimensions shared variance with a latent common factor: OCD behavior in general (van Grootheest et al., 2008). For this common factor, variation was explained by both genes (36%) and (nonshared) environmental factors (64%). Solely the contamination/washing dimension appeared to be influenced by specific genes. This could mean that usage of this specific symptom dimension might aid in detection of genetic susceptibility loci that contribute to OC symptoms, though it should be noted that the questionnaire used (Padua Inventory; Sanavio, 1988) did not include any precision/symmetry/ordering items or hoarding items.

In sum, a dimensional approach may be especially valuable for genetic studies, where researchers become more convinced that some vulnerability genes may be shared by more than a single disorder. It is likely that some genes will be specific to certain OC symptom dimensions, while others will be ‘generalist’ genes that influence the expression of OCD and closely related disorders. Yet despite the promising approach of detecting susceptibility loci that contribute to OCD presentations, environmental factors play an important role in the transmission of these states across generations (Leckman et al., 2007; van Grootheest et al., 2008). More research should be done on non-genetic familial transmission, in which family members can serve as exemplars for dysfunctional behaviors. So far, the strongest evidence leads to maternal adverse perinatal (e.g., occurring around birth) events (Geller et al., 2008), and early psychosocial adversities as being related to the future development of OCD (Khanna, Rajendra, & Channabasavanna, 1980).

2.2.3. Neuroimaging and neuropsychological studies. A third branch of support for the dimensional approach comes from neuroimaging studies researching the underlying neurocircuits of OCD. Results show a strong link of OCD symptoms with altered activation of the orbitofrontal cortex, with less

consistent involvement of anterior cingulate gyrus, lateral frontal and temporal cortices, caudate nucleus, thalamus, amygdale, and insula (Saxena & Rauch, 2000). Moreover, a significant portion of the individual variation seen in these studies may be accounted for by the particular combination of symptom dimensions in each patient (Leckman et al., 2007). For example, Philips et al. (2000) found that compared to age-matched controls, OCD patients with mainly contamination/cleaning symptoms showed higher activation in regions involved in disgust perception (visual regions and insular cortex) while exposed to either normally disgusting or washing-related pictures.

Similarly, Shapira et al. (2003) also used functional magnetic resonance imaging (fMRI) scans, while showing eight OCD patients a range of threat- and disgust-inducing pictures. Their results also indicated that for contamination/cleaning OCD patients, the disgust induction was strongly related to activation in the insula, the parahippocampal region, the inferior frontal gyrus, the caudate nucleus, and the primary sensory cortex. Mataix-Cols et al. (2004) used a comparable symptom provocation paradigm to investigate the neural correlates of washing, checking, and hoarding symptom dimensions of an OCD sample. Again, it was found that each of these dimensions was mediated by a distinct, though partially overlapping neural system.

In addition, Saxena et al. (2004) measured regional cerebral glucose metabolism in 45 adult OCD patients, and divided the group based on the prominence of their hoarding symptoms. Compared to controls, the hoarding group had significantly lower glucose metabolism in regions of the cingulate gyrus and higher metabolism in the right dorsolateral prefrontal cortex. In contrast, OCD patients without prominent hoarding symptoms had significantly higher glucose metabolism in the left orbitofrontal cortex, bilateral thalamus, left caudate, and left dorsolateral prefrontal cortex. Mataix-Cols et al. (2003) and Shapira et al. (2003) also found that anxiety associated with different symptom dimensions was associated with different patterns of activation in ventral, dorsal prefrontal, and limbic/paralimbic regions.

Furthermore, initial structural neuroimaging studies showed that patients with high scores on the aggressive/checking dimension had reduced gray matter (GM) volume in the right amygdale compared to age- and gender-matched controls (Pujol et al., 2004). More recently, van den Heuvel et al. (2009) used whole-brain voxel-based morphometry to examine the common and distinct

neuroanatomical substrates of the major symptom dimensions of OCD in 55 medication-free OCD patients and 50 age-matched healthy controls. For scores on the contamination/washing, harm/checking, and symmetry/ordering dimensions, negative correlations with GM volumes in specific neuroanatomical substrates were found. Specifically, for the harm/checking dimension GM volume was decreased in the bilateral temporal lobes, whereas for the symmetry/ordering dimension it was increased.

Finally, studies on the relation between neuropsychology functions and OCD symptom dimensions are few and not always consistent. This might be caused by small sample sizes, the range of neuropsychological tasks performed, and/or the heterogeneity of OCD (e.g., Menzies et al., 2008; Lawrence et al., 2006). An exception is the study by Lawrence et al. (2006), who examined 39 OCD patients and 40 controls on decision-making and set-shifting. OCD patients and controls showed comparable decision-making, but patients with prominent hoarding symptoms showed impairment in their decision-making. OCD patients as a group had poorer set shifting abilities than controls, and symmetry/ordering symptoms were negatively associated with set shifting. Nonetheless, these findings need to be replicated using larger samples. If replicated, these functional and structural findings contribute significantly to the view that OCD is a heterogeneous disorder, with both overlapping and distinct neural correlates for specific symptom dimensions (van den Heuvel et al., 2009; Leckman et al., 2010a).

2.2.4. Treatment response. Observed differences in treatment outcome highlights the fourth argument for a dimensional approach in conceptualizing OCD. In particular, various controlled and meta-analytic studies have reported Cognitive Behavioral Therapy (CBT) to be generally effective for OCD (Mataix-Cols et al., 2005; Leckman et al., 2007; Mataix-Cols et al., 2002a). Yet evidence consistently suggests that OCD patients with prominent hoarding symptoms or high on the taboo thoughts dimension respond less well to standard CBT (Abramowitz, Franklin, & Foa, 2002; Mataix-Cols et al., 2002a; Leckman et al., 2007). Mataix-Cols et al. (2002a) looked at 153 OCD outpatients and observed that high scorers on the hoarding dimension were more likely to terminate behavior therapy prematurely and also showed less improvement than nonhoarding OCD patients. Similarly,

after controlling for symptom severity, high scores on sexual/religious obsessions (though not for the mental rituals compulsions) predicted worse outcome with CBT. Overall, it seems that CBT is mostly effective for patients with contamination/washing, aggressive/checking, and symmetry/ordering symptoms, although empirical evidence for this is still inconclusive (Leckman et al., 2007).

Similar to behavioral interventions, the efficacy of pharmacotherapy seems to differentiate among OCD patients with varying prominent symptom dimensions. Nonetheless, research remains inconsistent about the direction of the relations for the varying symptom dimensions. For example, studies have reported that patients with high scores on the hoarding symptom dimension might respond more poorly to serotonin reuptake inhibitors (SRIs, including clomipramine and selective SRIs; Mataix-Cols et al., 1999; Saxena et al., 2002; Winsberg, Cassic, & Koran, 1999). Conversely, Saxena et al. (2007) reported that OCD patients with prominent hoarding symptoms reacted equally well to paroxetine, a selective serotonin reuptake inhibitor (SSRI), as other OCD patients. These contradictory findings are possibly due to different selection criteria and recruitment strategies across studies (Leckman et al., 2010a). Three other studies report that individuals who score high on the symmetry/ordering dimension tend to respond less well to SSRIs or clomipramine alone (Stein, Andersen, & Overo, 2007; Stein et al., 2008; Matsunaga et al., 2009). These findings are consistent with evidence that individuals with tic-related forms of OCD are likely to respond well to neuroleptic augmentation, as individuals with tic-related OCD frequently report their prominent symptoms to be in the symmetry/ordering domain (e.g., March et al., 2007; Leckman et al., 2007).

Finally, Landeros-Weisenberger et al. (2010) researched 165 adult OCD patients in one or more 8-week randomized controlled clinical trials with clomipramine, fluvoxamine, or fluoxetine (the last two are SSRIs). About 60 per cent of the patients in the sample with high scores on aggressive obsessions and checking and sexual/religious obsessions and compulsions showed a good response to all three SRIs. When Landeros-Weisenberger et al. (2010) stratified by pharmacological agent, the improvement of the aggressive/checking dimension and sexual/religious dimension was only seen for the SSRIs, not for clomipramine. Results of Landeros-Weisenberger et al. (2010) are in contrast to an earlier study by Mataix-Cols et al. (1999) however, who used similar methodology without finding a

relation between SRI response and either the aggressive/checking or sexual/religious symptom dimensions.

2.2.5. Patterns of comorbidity. Fifthly, distinct patterns of comorbidity in psychiatric conditions tentatively emerge with various OCD symptom dimensions, although again, results are far from consistent. Taboo thoughts and somatic obsessions, and checking compulsions have been differentially associated with comorbid anxiety disorders and depression (Hasler et al., 2005). Patients with prominent OCD symptoms in the symmetry/ordering dimension have been found to be more susceptible to bipolar disorder, OC personality disorder (OCPD), or agoraphobia (Hasler et al., 2005; Coles et al., 2008; Wheaton et al., 2008). Yet in a later study, Hasler et al. (2007) found that attention deficit hyperactivity disorder (ADHD), alcohol dependence, and bulimia were related to the symmetry symptom dimension, and that bipolar I/II and major depressive disorder were strongly associated with taboo thoughts (e.g., sexual, religious, and aggressive obsessions).

Baer (1994) found that patients with high scores on his symmetry/hoarding factor were more likely to have a comorbid diagnosis of chronic tics and OCPD. Mataix-Cols et al. (1999) found that male but not female OCD patients with chronic tics scored higher than patients without tics on the symmetry/ordering dimension. Whereas Hasler et al. (2005) reported that OCD patients with prominent contamination/cleaning symptoms have an enhanced probability of having an eating disorder, two other studies reported that a great percentage of anorexia nervosa patients has lifetime OCD with mainly symmetry/ordering symptoms, somatic obsessions, and hoarding compulsions (Hasler et al., 2007; Halmi et al., 2003). Finally, Wheaton et al. (2008) reported hoarding symptoms to be strongly related to all personality disorders, but especially to those from the anxious-fearful cluster.

2.2.6. Conclusion. Factor analytic studies seem to suggest a four-factor structure of OCD symptoms: symmetry/ordering, forbidden thoughts, contamination/cleaning, and hoarding. However, as of yet these symptom dimensions are neither well defined nor consistent enough with respect to distinctive patterns of comorbidity, recurrence risk in families, areas of brain activation, and differential treatment response, to suggest their inclusion in the DSM-V as specifiers or criteria (Leckman et al., 2010a). The

strongest evidence supports the validity and clinical utility of the symmetry/ordering, contamination/cleaning, and hoarding symptom dimensions. The ‘forbidden thoughts’ (e.g., aggressive, sexual, and/or religious intrusive thoughts) and miscellaneous symptoms are more complex to conceive in this approach. Besides inconsistencies in empirical evidence reported for the dimensional approach, more practical disadvantages include the inherent complexity and burden they would place on the practitioner (Leckman et al., 2010a). Though the dimensional approach may be clinically useful to understand the variations in OCD symptom presentation, categorical approaches are crucial for selecting the group to be studied, e.g., defining diagnostic boundaries. The next section will discuss various OCD categories.

2.3. Using subtypes to conceptualize OCD.

More traditionally, the wide variety of symptoms seen in OCD along with the differential response to treatment has led researchers and clinicians to propose that subtypes (e.g., categories or taxa) of OCD exist (Taylor, 2010). These categories are defined by being more homogeneous than OCD in general in some way. If important subtypes of the condition do exist, multiple conceptualizations of the disorder might be needed, as well as subtype-specific treatment (McKay et al., 2004). The dimensions-versus-subtypes distinction has important implications for theory and research, since a categorical variable implies a different set of causes than a continuous variable (e.g., the dimensional approach). Subtypes arise from a small set of causal factors (i.e., the presence or absence of an agent dysregulating the brain circuits involved in OCD). On the other hand, dimensions imply a multitude of factors contributing to the emergence of OCD. Dimensional approaches are in line with gene localization studies, as researchers aim to identify numerous genes that only make a small (i.e., 1-2 %) contributions to explaining phenotypic variance (Plomin et al., 2003).

Most importantly, subtype models of OCD imply that there are no intermediaries or ‘normal/subclinical’ OC phenomena, and that treatments should have similar effects on the disorder. Dimensions imply exactly the opposite: there is a continuum of severity (ranging from absent to very severe) and a continuum of treatment effectiveness (ranging from weak to very strong interventions). Various subtyping schemes have been proposed, varying in reliability and validity. In particular, a

commonly used approach, though not so promising, is subtyping based on symptoms. Cluster analyses of OC symptoms have yielded various cluster schemes, partly depending on the range of symptoms assessed (e.g., Abramowitz et al., 2003a; Taylor et al., 2006; Calamari et al., 2006). For example, Abramowitz et al. (2003a) found a five-factor solution (harming, contamination, hoarding, unacceptable thoughts, and symmetry), of which the hoarding subtype showed the poorest response to cognitive behavior therapy, replicating studies from the dimensional perspective.

The main problem with such an approach however, is that symptom categories are unable to account for the fact that OCD symptoms vary along a spectrum of severity, phenotypically (Taylor, 2010). Besides not accounting for ‘normal’ obsessions and compulsions in general populations (Fullana et al., 2009; Rachman & de Silva, 1978), discrete, non-overlapping subtypes of OC symptoms are the exception rather than the norm. Four more successful subtyping approaches, which are being considered for inclusion in the DSM-V either collectively or individually (Leckman et al., 2010a), are: 1) (a history of) tic-related OCD; 2) family history of OCD or tics; 3) early age at onset of OCD; and 4) streptococcus-related OCD as a result of post-infectious autoimmune processes at an early-onset age. Each of these will be discussed below.

2.3.1. Family history and tic-related OCD. As for the first and second subtype, it has been suggested that some forms of OCD can be etiologically related to chronic tic disorders. Tic-related OCD is consequently defined as being a condition in which tics are observed either in the probands or in one or more first-degree family members (Leckman et al., 2010a). The tic related subtype (in which OCD occurs in an individual with a lifetime history of a chronic tic disorder) may account for 10-40% of OCD cases diagnosed in childhood or adolescence (e.g., Rosario-Campos et al., 2005; de Mathis et al., 2009). Individuals with tic-related OCD are more likely to report the presence of antecedent sensory phenomena (Prado et al., 2008), such as ‘just-right’ perceptions linked to visual, tactile, or auditory stimuli, in addition to feelings of ‘incompleteness’ and ‘urge’. Furthermore, across cultures, aggressive, sexual, symmetry, and exactness obsessions are more common in OCD with comorbid tics. In turn, tic-like compulsions (i.e., blinking, tapping, touching) are more common in OCD patients with comorbid tics (Miguel et al., 1997).

There is a familial association between childhood onset OCD and tic disorders. In a study by Rosario-Campos et al. (2005) case relatives of the probands with a chronic tic disorder had a significantly higher recurrence risk of OCD in comparison to case relatives of probands without a tic disorder (23.8% versus 14.9%). The study also reported that a comorbid diagnosis of tics in the relatives was the best predictor of a diagnosis of OCD. Nonetheless, no specific genes have been associated with tic-related OCD yet (Pauls, 2008). Finally, though early-onset OCD tends to respond well to cognitive-behavioral interventions, especially when combined with SSRIs, it appears that the presence of tics reduces the beneficial effects of SSRI treatment with sertraline in children (Storch et al., 2008b; March et al., 2007). Overall, Leckman et al. (2010a) evaluate all these findings together as enough empirical support for the inclusion of a tic-related subtype of OCD. It is a highly familiar condition with specific clinical characteristics.

2.3.2. Early-onset OCD. As for the third subtype, empirical data seems to suggest that OCD has a bimodal age of onset: most cases develop in adolescence or early adulthood, whilst a subgroup develops the disorder in childhood (Pauls et al., 1995). Early-onset (or childhood) OCD generally means that the symptoms emerge before puberty, although empirical studies are not always consistent in the age serving as cutoff point (e.g., Busatto et al., 2001; Rosario-Campos et al., 2001; Rosario-Campos et al., 2005; Mathis et al., 2008). Even though studies generally report the same structure and symptoms of early-onset OCD and adult-onset OCD across cultures (e.g., Leckman et al., 1997; Bloch et al., 2008) the two do differ with respect to certain clinical features, gender distribution, and family-genetic data (e.g., Alsobrook et al., 1999; Geller et al., 2001a, 2001b). At puberty, the sex ratio generally switches from predominantly male to even distribution or sometimes predominantly female (Geller et al., 2001a). Childhood-onset OCD is more likely to be comorbid with tic disorder, such as Tourette's disorder and comorbid ADHD (Pauls et al., 1995; Geller et al., 2001b).

Some of the strongest evidence for early-onset being a distinctive subtype of OCD comes from family-genetic studies that have consistently shown that the familial aggregation in OCD is largely concentrated among families with early-onset OCD probands (Pauls et al., 1995; Nestadt et al., 2000). For example, in the study by Nestadt et al. (2000) it was found that the prevalence of OCD in the

relatives of probands with early- versus late-onset was 13.8% versus 0%. Similarly, Pauls et al. (1995) also reported an increase in the rate of subclinical OCD as well as OCD in the first-degree relatives of the early-onset probands. In a more recent review of family-genetic studies, Pauls (2008) reported that the rate of OCD among relatives of pediatric OCD patients was enhanced about ten-fold in those studies where comparison with controls was possible (e.g., Nestadt et al., 2000; Rosario-Campos et al., 2005). In contrast, when the probands were adults, the rate of OCD among relatives was about twice that among controls.

Evidence from neuroimaging shows that adults with early- versus late-onset OCD can be distinguished by patterns of regional cerebral blood flow in the frontal-subcortical regions involved in OCD (Busatto et al., 2001). This could mean that brain mechanisms in OCD vary depending on the age at which the disorder first arises. Similarly, early-onset OCD seems to have a distinctive pattern of comorbidity. For example, Hemmings et al. (2004) found that early onset of OCD cases was related to an increased frequency of chronic tic disorders and trichotillomania. Carter et al. (2004) further reported that early-onset OCD in adult and adolescent OCD probands was associated with higher rates of anxiety and depression among case relatives with (but not without) OCD.

In a recent review of the subtyping scheme by Taylor (2011a), strong support for distinguishing early-onset OCD from a comparatively later-onset OCD was provided. The author re-analyzed raw data of aforementioned studies, and latent class analyses of nine datasets (mix of clinical and community samples) were conducted, which consistently showed age of onset not to be a unimodal phenomenon. Findings show that two groups could be distinguished: early-onset (mean age is 11) and late-onset (mean age is 23). About 76 % of OCD cases were classified as early-onset. The second part of the review conducted meta-analyses, which indicated that compared to late-onset, early-onset: a) is more likely to occur in males; b) related to greater OCD global severity and higher prevalence of most types of OC symptoms; c) more likely to be comorbid with tics and proposed OC spectrum disorders; and d) associated with a greater prevalence of OCD in first-degree relatives. Early-onset and late-onset were also distinguishable on other psychosocial and biological variables.

Nonetheless, critics suggest it remains unclear whether this subtype would apply to the onset of subclinical symptoms, or only of the disorder itself (Leckman et al., 2010a). Adding to this is the

aforementioned confusion in the demarcation between early- versus late-onset OCD, as different cutoff points in years have been employed. Also, bimodality of age at onset may suggest a subtype, yet under particular circumstances a continuous/dimensional variable can manifest itself in a bimodal fashion phenotypically (Waller & Meehl, 1998).

2.3.3. Streptococcus-related OCD. Finally, various studies have reported high frequencies of OC symptoms, OCD, and tic disorders in rheumatic fever with and without Sydenham's chorea (Mathis et al., 2006). Rheumatic fever is an autoimmune disorder triggered by specific strains of β -hemolytic streptococci infections; Sydenham's chorea is a late central nervous expression of rheumatic fever (Mercadante et al., 2005). Studies have suggested that OCD patients with comorbid rheumatic fever have an early onset of symptoms, high frequency of aggressive obsessions and ordering/arranging compulsions, higher comorbidity with tics and other OC spectrum disorders, such as Body Dysmorphic Disorder (BDD; Mercadante et al., 2005; Hounie et al., 2004).

Moreover, some susceptible individuals are found to develop OCD symptoms and tic disorders as a result of post-infectious autoimmune processes at an early-onset age (Leckman et al., 2010a), without rheumatic fever/ Sydenham's chorea. Swedo et al. (1998) observed that some cases of childhood OCD are rapidly obtained after the child develops a Group A β -hemolytic streptococcal infection (e.g., a rheumatic fever implicated agent; GABHS), without developing rheumatic fever. This OCD subgroup follows a unique fluctuating course, reflecting the temporal relation with the GABHS infection. Streptococcus-related OCD is frequently associated with tics, separation anxiety, motoric hyperactivity, and neurological symptoms. This syndrome is referred to as 'Pediatric Autoimmune Neuropsychiatric Disorder Associated with Streptococcus' ('PANDAS'; Swedo et al., 1998). The abrupt onset and offset of PANDAS is truly consistent with a categorical rather than dimensional model of OCD: one either had the infection-related OCD or one does not (Taylor, 2010).

Yet many children develop streptococcal infections, though few develop OCD. Swedo (2002) proposes that susceptibility to PANDAS is probably due to a combination of genetic, developmental, and immunologic factors. Streptococcal infection is thought to produce OC symptoms through a process of inflammation of the basal ganglia (an autoimmune process), which occludes blood supply

to these regions and eventually causes tissue necrosis (Taylor, 2010). Brain imaging studies have consistently reported the involvement of the basal ganglia in PANDAS, in particular the transient enlargement of the striatum and the basal ganglia as a whole (Giedd et al., 2000). The strongest evidence that the GABHS may be involved in the onset OCD or Tourette's Syndrome (TS), comes from Mell, Davis, and Owens (2005). In their study, patients with OCD, TS, or tic disorder were more likely than controls to have had a streptococcal infection in the 3 months before onset date. Moreover, having multiple infections with group A β -hemolytic streptococcus within a 12-month period was related to an increased probability of TS with an odds ratio of 13.6. It has been suggested that GABHS infection must be the initial autoimmune response-inciting event, but that subsequent exacerbations can be triggered by other infectious agents. Preliminary evidence indicates that dopamine could directly influence key immunological mechanisms that may be involved in PANDAS, which would imply a new (still unproven) model of PANDAS pathogenesis (Martino et al., 2009).

In clinical longitudinal studies results for the PANDAS subtype have been mixed. For example, Luo et al. (2004) followed unselected OCD and TS cases for 1 year. Their results showed no more than a chance relation between newly acquired GABHS infections and tic symptom exacerbations. Kurlan et al. (2008) also reported challenging results from a two-year longitudinal study, observing that symptom exacerbations were not associated with a new GABHS infection. This last study did report a significantly higher rate of GABHS infections in PANDAS cases. However, a new study based on a more complete data set from the earlier report by Luo et al. (2004) observed promising findings for the impact of GABHS on the PANDAS subtype. Over a two-year period, using a more advanced structural equation modeling method for their longitudinal data, strictly defined new GABHS infections were found predictive of future tic and OC symptom severity, but not of future depressive symptom severity (Lin et al., 2010).

2.3.4. Conclusion. Mathis et al. (2006) and Taylor (2010) further note that PANDAS resembles the early-onset, tic-related, familial subtype of OCD, and the three features possibly represent overlapping subtypes. That is, there appears to be a tic-related subtype, an early-onset subtype, a familial non-tic related subtype, in addition to sporadic cases where no family history is evident. Of these sporadic

cases, some may reflect a postinfectious autoimmune disorder (pediatric autoimmune disorders associated with streptococcal infections, PANDAS). Overall, it seems that these patients have more symmetry/ordering compulsions, usually preceded by aggressive obsessions and/or sensory phenomena, urges, and ‘just-right’ sensations (Mathis et al., 2006). Nevertheless, it remains unclear whether early-onset, tic-related, and familial OCD form subtypes of OCD or whether they are markers of psychobiological dimensions that determine risk for OCD (Taylor, 2010).

2.4. Hybrid phenomenological models and future research.

Future studies investigating OCD’s phenomenology should aim to integrate the dimensional and subtyping approaches. Namely, the observation that an early-onset of OCD, presence of tics, and previous streptococcal infections are all related to having a higher probability of having symptoms in the symmetry/ordering/ ‘just-right’ dimension, shows promise for a hybrid approach that cuts across diagnostic boundaries (Leckman et al., 2010b). Genetic linkage studies like Zhang et al. (2002) offer preliminary support for this integrative approach. To date, it seems that there are disorder-specific genetic factors (e.g., genes specifically for OCD), as well as more general genetic factors contributing to a range of anxiety disorders (e.g., Cavallini et al., 2002; van Grootheest et al., 2008). The same goes for specific environmental and non-specific environmental factors (e.g., Khanna et al., 1980), an area of OCD research which deserves far more attention than it has received so far (Geller et al., 2008).

3. How to measure OCD symptoms

3.1. Introduction.

OCD is considered a significant public health concern, because of its prevalence, associated costs, and the difficulty in recognizing the disorder (Abramowitz, Whiteside, & Deacon, 2005). Measuring OCD is complicated by its own heterogeneity and its high diagnostic comorbidity with other mental disorders (Clark, 2004). Improving assessment and diagnosis of OCD therefore remains an important area of focus for research and clinical practice. A critical component of identifying and assessing OCD accurately in any context (e.g., clinical, community, or research) is having a comprehensive overview of commonly used OCD measures. There are commonly three ways of measuring OCD: diagnostic interviews, clinician-rated instruments (of which some are family-report), and self-report questionnaires (of which some are family-report). Each instrument is designed to facilitate specific assessment goals, such as screening for OCD, diagnosis, establishing a baseline symptom severity to evaluate treatment progress, and further treatment planning (Grabill et al., 2008).

This chapter intends to: 1) provide a comprehensive overview of diagnostic interviews, clinician-rated, and self-report measures for OCD that are commonly used with adults; and 2) provide a resource for clinicians and researchers to facilitate their decision on most suitable OCD measure for their specific goals and setting. This chapter will add to the literature (Grabill et al., 2008; Storch & Benito, 2011) by serving as the most up-to-date, elaborate, and critical review of OCD assessment instruments for adult populations. For a comprehensive review of OCD instruments appropriate for assessing children and adolescents, see Merlo et al. (2005).

To evaluate psychometric properties of measures, first data on reliability and factor structure will be reported. Reliability refers to the reproducibility or consistency of scores from one assessment to the next; most commonly internal consistency and temporal stability are reported for OCD measures. For validity, researchers prefer to distinguish between content, construct, and criterion-related validity. Content validity basically entails item sampling adequacy - whether a specific set of items reflect a content domain (DeVellis, 2012). Construct validity can only be measured indirectly because the significant comparison is to a latent construct instead of an observable one (Cook &

Beckman, 2006; DeVellis, 2012). More concretely, criterion-related validity for OCD measures entails the diagnostic accuracy of a cutoff score of a measure, determining the measure's sensitivity (e.g., accurately identifying OCD patients) and specificity (e.g., correctly identifying non-OCD patients). Recent techniques to do so are receiver operating characteristic (ROC) analyses. These analyses use the association between sensitivity (true positives) and 1- specificity (false negatives) to estimate an area under the curve (AUC) that indicates how well the measure discriminates between positive and negative cases. An AUC value of 1.0 means that the measure is a perfect classifier, and a value of 0.5 means that the measure classifies by chance (Gönner et al., 2010a).

In addition to this predictive aspect, criterion-related validity also contains concurrent validity (DeVellis, 2012). Concurrent validity is demonstrated in two ways: 1) through strong correlations between independent assessment methods of the same diagnostic construct (e.g., convergent validity); and 2) by weak correlations between measures assessing conceptually distinct diagnostic constructs (e.g., discriminant or divergent validity; Campbell & Fiske, 1959). For OCD measures, this entails that strong correlations with other validated OCD measures is evidence of convergent validity, whereas low correlations with measures of depression, anxiety, worry, and stress is evidence of good divergent validity. As will be reported later in this chapter, OCD is generally found to be comorbid with depression and anxiety, leading to, for whichever OCD measure, at least moderate correlations between OCD and these divergent constructs.

In sum, this chapter aims to provide the most up-to-date comprehensive and critical review of current OCD measures for adults, their psychometric properties and practical aspects. First diagnostic interviews will be addressed, then clinician-rated instruments, after which self-report measures will follow (this review is in press in the *Journal of Obsessive-Compulsive and Related Disorders*; <http://dx.doi.org/10.1016/j.jocrd.2012.08.001>). The measures will generally be presented from old to new, but where related versions of an assessment tool are still used, these will follow one another.

3.2. Diagnostic interviews.

Diagnostic interviews can be used to diagnose a patient and to distinguish between other possible diagnoses. These interviews facilitate diagnostic decisions by utilizing specific questions to

assess symptoms according to the DSM-IV (APA, 1994) criteria. The interviews are divided into sections by disorders. Detailed questions concerning each disorder are administered only if the preliminary criteria are met. Each interview usually takes between 60-120 minutes to complete.

3.2.1. Anxiety Disorder Interview Schedule for the DSM-IV (ADIS-IV; Brown, DiNardo, & Barlow, 1994; Brown et al., 2001). The ADIS is a semi-structured diagnostic interview based on the DSM-IV. It was developed to distinguish between anxiety and other disorders that frequently co-occur with anxiety disorders (e.g., mood or substance abuse disorders). The ADIS also includes screening questions for other disorders such as psychotic and eating disorders (Summerfeldt & Anthony, 2002). Two versions of the ADIS exist: the standard version that assesses current symptoms, and the lifetime version that assesses both current and past symptoms. The interviewer asks questions about personal demographics and specific symptoms for each included disorder. Hereafter, diagnoses are assigned a severity rating, ranging from 0-8, based on the distress and impairment that the patient experiences (Grabill et al., 2008).

Brown et al. (2001) reported that interrater reliability of the ADIS was moderate to good ($\kappa = 0.56-0.81$) for most disorders, including OCD ($\kappa = 0.75$). Specifically, for OCD, the interrater reliability ranged from 0.43 (resistance to obsessive impulses) to 0.84 (clinical severity rating). There is limited data on the validity of the ADIS, as studies commonly examine symptoms rather than diagnostic categories. Yet, Brown, Chorpita, and Barlow (1998) verified convergent and discriminant validity of the ADIS based on its factor structure, by demonstrating that the symptoms loaded significantly on the expected latent factor without cross-loading on the latent factors of other disorders. In conclusion, the main advantages of the ADIS are its detailed descriptions per disorder and excellent reliability of the OCD category. However, the raters need to have a high level of expertise and the time and to administer the ADIS is burdensome, especially when the lifetime version is used (Grabill et al., 2008).

3.2.2. Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First & Gibbon, 2004). The SCID-I is also a semi-structured interview that can be used to establish a diagnosis for Axis I disorders according to DSM-IV criteria, though it can also be used in research. Interviewers ask

questions with respect to different diagnostic criteria (past and present), demographic, and other historical information such as treatment history. To be more efficient, the measure includes 'leave out' instructions, enabling clinicians to skip over questions about a particular diagnosis if it is clear that the diagnostic criteria are not met. A shortened clinical version of the SCID-I exists, which assesses disorders commonly seen in clinical practice. However, this version excludes a number of disorders such as eating disorders, social phobia, and some specifiers such as 'with poor insight' for OCD (First & Gibbon, 2004).

Test-retest reliability of the SCID-I ranges from $\kappa = 0.35$ to 1.0, depending on diagnostic category, time between testing, interviewer training, and study population. For OCD, test-retest reliability ranges from poor to moderate ($\kappa = 0.42-0.60$). The authors postulate that it is difficult to evaluate the validity of the SCID, as there is no 'gold standard' for psychiatric diagnosis with which to compare the SCID (First & Gibbon, 2004). Yet, First and Gibbon (2004) do cite a number of studies that used the 'Longitudinal evaluation by Experts using All Data available' (LEAD) standard and found that the SCID demonstrates superior validity for establishing psychiatric diagnoses at intake, relative to a standard clinical interview (Basco et al., 2000; Kranzler et al., 1996). The LEAD standard uses data collected over time from expert diagnosticians and all the available data from the patient (e.g., information from collaterals, behavioral observations, and medical records) and compares diagnoses obtained on the basis of one method to those obtained using the combined information (Grabill et al., 2008).

In sum, the main advantage of the SCID-I is the structured method of information gathering to diagnose OCD according to criteria in the DSM-IV. It also examines comorbid diagnoses, which could influence treatment and prognosis. Disadvantages of the SCID involve the level of expertise needed for administration, how time-costly the measure is, and the relative low reliability of specific OCD diagnoses. Furthermore, Taylor, Thordarson, and Sochting (2002) observed that the SCID does not generate as much clinically useful information related to OCD in comparison to other measures (e.g., the ADIS; Brown et al., 2001). Overall, the SCID could be preferred to the ADIS because of its simplicity, but would need to be used in combination with the Yale- Brown Obsessive-Compulsive Scale (Y-BOCS; Goodman et al., 1989).

3.3. Clinician-rated measures.

The use of a clinician-rated inventory allows trained individuals to make informed ratings of OCD related impairment and distress. Scores for all items are determined by the clinician on the basis of the person's report, parent(s)/spouse's report and behavioral observations. Some measures use the symptom checklist as a self-report inventory, in combination with the semi-structured interview with a trained clinician. Advantages of clinician-rated measures include the ability to gain more detailed information about specific symptoms and OCD triggers of the patient. Shaffer, Fisher, and Lucas (1999) also suggest that there is the opportunity to clarify items for respondents, so that responses are in concert with item content. Disadvantages of clinician-rated measures are the administration time, level of training required, potential rater bias when responses are coded, and the susceptibility to demand characteristic (Grabill et al., 2008). Finally, psychometric properties may be more variable than self-administered measures, due to variability in interviewer experience, thoroughness, and attitude (Shaffer et al., 1999). This section will present the following measures: the three most widely used clinician-rated measures, an observational assessment, and a family report measure.

3.3.1. Yale-Brown Obsessive Compulsive Scale (Y-BOCS; Goodman et al., 1989a, 1989b). The Y-BOCS is administered in two parts: first, clinicians utilize a symptom checklist to establish the types of obsessions and/or compulsions experienced by the patient. Hereafter, severity of these obsessions and compulsions are rated on a five-point scale with higher scores indicating greater severity. Baer (1991) developed a self-report version of the Y-BOCS symptom checklist (Goodman et al., 1989). The scale and symptom checklist can be used separately (and the latter in self-report form), but are designed to be used together.

For the symptom checklist, the participant first ticks (or leaves open) every symptom personally experienced, either 'current' or 'past', followed by circling the three main obsessions and three main compulsions. Subsequently, the severity of these main symptoms are rated on the severity scale. There are separate subtotals for severity of obsessions (sum of items 1 through 5) and compulsions (sum of items 6 through 10). Symptoms are assessed with respect to how much they occupy the patient's time, interfere with normal functioning, cause subjective distress, are actively

resisted by the patient, and can actually be controlled by the patient (Goodman et al., 1989a). The scale for the 10 items on the severity scale (Y-BOCS SS) are 0 (none) to 4 (extreme). Hence, the total Y-BOCS severity score ranges from 0 to 40.

Goodman et al. (1989a) reported interrater reliability to be excellent, for total Y-BOCS scores this was $r = 0.98$, for obsessions and compulsion subtotals $r = 0.95$ and 0.98 , and for items $r = 0.80 - 0.95$. Internal consistency for all four raters was also high, demonstrating homogeneity of the Y-BOCS, Cronbach's alphas were between 0.88 and 0.91, and the mean of all raters was 0.89. Steketee et al. (1996b) reported Cronbach's alpha for the total score of the self-report version, for a nonclinical sample ($n = 70$) to be 0.90-0.91 and for the clinical sample ($n = 36$) to be 0.55-0.78. For the interview version Cronbach's alpha ranged between 0.78 and 0.88 for the nonclinical sample and between 0.56-0.74 for the clinical sample. Later studies have generally reported high internal consistency rates for the Y-BOCS, with Cronbach's alphas between 0.80 and 0.87 in clinical samples (Wu, Watson, and Clark, 2007; Sulkowski et al., 2008). However, slightly lower internal consistency figures were obtained by Anholt et al. (2009) in their OCD sample ($n = 120$). The total Y-BOCS-SC was found to have a Cronbach's alpha of 0.72, whereas the symptom subscales ranged between 0.47-0.70. For the severity scale this was higher: the Cronbach's alpha of the total score was 0.80, and for the obsessions and compulsions subscales 0.68 and 0.70, respectively. Furthermore, Steketee et al. (1996b) reported excellent test-retest reliability ($r = 0.81-0.97$ over a two week interval). These authors also reported parallel forms reliability, between the self-report version and the interview, to be adequate (r s of 0.65-0.75 for nonclinical and 0.73-0.79 for clinical individuals).

The factor structure of the Y-BOCS severity scale (e.g., obsessions and compulsions being the two sub factors), has not consistently been replicated in the literature. Though some research has supported the original two-factor structure (e.g., Arrindell et al., 2002; McKay et al., 1995; Storch et al., 2005), many report different factor structures. For example, Deacon and Abramowitz (2005) found a two-factor solution comprised of symptom severity (e.g., time, distress, and interference from obsessions and compulsions) as distinct from resistance and control of obsessions and compulsions. The severity subscale showed good psychometric properties and construct validity, as opposed to the resistance/control subscale (these items comprise 40% of the Y-BOCS items without meaningfully

contributing to the measurement of OCD symptom severity; Deacon & Abramowitz, 2005). Amir, Foa, and Coles (1997) found a disturbance factor and a symptom severity factor, instead of the obsessions and compulsions factors. Moritz et al. (2002) even reported three factors: severity of obsessions, severity of compulsions, and resistance to symptoms. More recently, Anholt et al. (2010) replicated the same three-factor structure in a large sample of OCD patients.

As for convergent validity, Mataix-Cols et al. (2004) found small to moderate correlations between corresponding Y-BOCS symptom subscales and the corresponding Maudsley Obsessional Compulsive Inventory (MOCI; Hodgson & Rachman, 1977) and Padua Inventory (Sanavio, 1988) subscales in an OCD sample. The only exceptions were the washing/contamination subscales of the Y-BOCS-SC and those of the MOCI and PI, showing r s of 0.59 and 0.60, respectively. Yet, these results are limited as the MOCI does not assess a broad spectrum of OCD symptoms (Thordarson et al., 2004) and the PI does not include any items to assess hoarding symptoms. Moreover, the PI has been shown to fail to discriminate between general worries and obsessions (Burns et al., 1996). In a psychometric comparative study of the Y-BOCS-SC and the Obsessive Compulsive Inventory-Revised (OCI-R; Foa et al., 2002a), Sulkowski et al. (2008) found a moderately strong relationship between the two measures ($r = 0.63$). In addition, strong correlations were observed between corresponding subscales: the contamination/washing subscales ($r = 0.80$); the hoarding subscales ($r = 0.65$); and the symmetry/ordering subscales ($r = 0.62$). Further moderate relations were observed between the Y-BOCS-SC sexual/religious scale and the OCI-R obsessing scale ($r = 0.47$), and the Y-BOCS-SC aggressive/checking scale and the OCI-R checking scale ($r = 0.42$).

Equivocal findings for discriminant validity have generally been reported for the Y-BOCS. For example, Taylor (1995) found high correlations of the Y-BOCS with the Hamilton Depression Scale (HAM-D; Hamilton, 1960) and the Hamilton Anxiety Scale (HAM-A; Maier et al., 1988): r s of 0.53-0.91 and 0.47-0.85, respectively. Storch et al. (2005) also reported moderate correlations with the Beck Depression Inventory (BDI; Beck & Steer, 1993b). Conversely, Mataix-Cols et al. (2004) reported few significant correlations between the Y-BOCS SC dimensions and psychological state measures. Sulkowski et al. (2008) also found the divergent validity of the Y-BOCS-SC and severity scale to be good. In their study, the Y-BOCS-SC showed a correlation of $r = 0.29$ with the State-Trait

Anxiety Inventory-Trait (STAI-T; Spielberger, Gorsuch, & Lushene, 1970), and the Y-BOCS-SS showed a correlation of $r = 0.36$ with the Beck Depression Inventory Second Edition (BDI-II; Beck, Steer, & Brown, 1996). Subscales also correlated weakly or moderately with divergent constructs (e.g., the Y-BOCS-SC sexual/religious and aggressive/checking scales showed respective r s of 0.30 and 0.27 with the STAI-T; Sulkowski et al., 2008).

As for criterion-related validity of both the self-report and interview version of the Y-BOCS, the cut-off score of 16 showed very good sensitivity but relatively poor specificity (Steketee et al., 1996b). This means that true positives were accurately identified but true negatives to a lesser extent. Wu et al.'s (2007) between-groups data suggests that OCD and non-OCD patients differed significantly only on symmetry/ordering symptoms. Hence, the self-report Y-BOCS SC may be inappropriate for distinguishing OCD from non-OCD patients, as it leads to over-identification of OCD patients. It is important to note however, that the Y-BOCS was not developed to serve as a diagnostic instrument (Goodman et al., 1989a).

In conclusion, the Y-BOCS and its symptom checklist are commonly considered the gold standard for assessing OCD symptom severity (Grabill et al., 2008). Apart from the measure's unstable factor structure, psychometric properties and treatment sensitivity appear to be good. A separate severity scale is in concert with symptom severity independent of the number of different types of symptoms endorsed (McKay et al., 2004). There is also psychometric support for a strong convergence between the original, clinician-administered Y-BOCS and its self-report counterpart (Steketee et al., 1996b). Nonetheless, the Y-BOCS was not developed to serve as a diagnostic instrument. Its ability to distinguish OCD from non-OCD groups is not very good, which is important as cut-off scores on the Y-BOCS (i.e., 16) are normally used as inclusion/exclusion criteria for participation in clinical research. Therefore, the self-report Y-BOCS has limitations when used more broadly such as in: a) the assessment of OCD-like symptoms reported by non-OCD patients and non-patients; and b) differentiation between OCD and non-OCD patients (Wu et al., 2007).

3.3.2. Yale-Brown Obsessive Compulsive Scale Second Edition (Y-BOCS II; Goodman et al., 2006). The Y-BOCS was recently revised to address aforementioned shortcomings, by making the

following changes (Goodman et al., 2006): 1) within the severity scale (SS), the ‘Resistance against Obsessions’ item was replaced with an item assessing ‘Obsession-Free Interval’; 2) the Likert-type response scale was expanded from a 5-point to 6-point scale, making the upper limit on the total Y-BOCS II (sum of items 1-10) 50 instead of 40; 3) avoidance behaviors were given added emphasis in measuring symptom severity through revised instructions and anchor point definitions; and 4) modifications were made to the symptom checklist (SC) content and format.

Storch et al. (2010a) and Storch et al. (2010b) measured internal consistency using the KR-20 formula, resulting in coefficients ranging from 0.63 (avoidance items) to 0.91 (Y-BOCS-II SS total score). Interrater reliability was also high (with intra-class coefficients, ICCs, ranging from 0.83 to 0.97) and support for test-retest reliability was reported (ICCs ranged from 0.75-0.90). Storch et al. (2010b) found two factors to underlie the severity scale: obsessions and compulsions, accounting for 56.8% of the variance in the Y-BOCS-II. A promax rotation of the items on the symptom checklist resulted in a four-factor solution accounting for 60.78% of the variance. These four factors were largely consistent with the 4-factor structure generally found for the Y-BOCS (symmetry/ordering, contamination/washing, hoarding, and sexual/religious/aggression dimensions; Bloch et al., 2008). Though checking items did not load on a separate dimension, this can be explained by checking rituals serving multiple functions.

For convergent validity, Storch et al. (2010a) reported that the Y-BOCS-II symptom checklist total score correlated moderately with the Y-BOCS-II severity scale ($r = 0.39$) and with the OCI-R total score ($r = 0.69$). Corresponding dimensions of the Y-BOCS II SC and the OCI-R correlated more strongly than noncorresponding or more general dimensions. The relationship between the Y-BOCS II severity scale score and the OCI-R was also significant, although less robust. Storch et al. (2010b) furthermore reported strong correlations between the Y-BOCS II SS and the National Institute of Mental Health Global Obsessive-Compulsive Scale (NIMH GOCS; Insel et al., 1983). The Y-BOCS-II and Y-BOCS were strongly correlated ($r = 0.97$) and similarly related to the converging and divergent constructs.

Storch et al. (2010a, 2010b) reported good discriminant validity through weak to moderate correlations between the Y-BOCS-II symptom checklist and the Penn State Worry Questionnaire

(PSWQ; Meyer et al., 1990), with the highest *rs* being between 0.27-0.30 for hoarding and the taboo thoughts dimensions. The Inventory of Depressive Symptomatology—Self Report (IDS-SR; Rush et al., 1996) similarly correlated with the Y-BOCS-II-symptom and severity total scores (*rs* for contamination/washing scales and taboo thoughts dimensions: 0.29-0.38). Though there is considerable overlap between the Y-BOCS-II SC total score, several symptom dimensions, and measures of general worry and depression, these correlations are lower than other OCD measures have generally reported. Moreover, the obsession and compulsion severity subscales showed very weak or nonsignificant correlations with general worry or depressive symptoms, indicating good divergent validity (Storch et al., 2010b).

In sum, the original Y-BOCS-SC self-report did not rate ritualistic avoidance explicitly and it also misconceived that not all OC symptoms are driven by fear or anxiety (but can be motivated by ‘just-right’ feelings or disgust). The Y-BOCS II aimed at resolving these shortcomings and eliminating ‘resistance to obsessions’ items, as these are not a manifestation of psychological health. Replacing these items by ‘obsession-free interval’ items allowed for improved assessment of the time burden imposed by obsessions (Reid, Storch, & Murphy, 2009). By extending the upper ends of the severity scale items (from a 5-point range to a 6-point range), more accurate symptom assessment is enabled at the highest levels of symptom severity and subclinical presentations. The Y-BOCS-II SC appears to be a robust measure of OCD, and discriminant validity seems to have improved over its predecessor. However, more psychometric studies (and ROC analyses) are needed to assess its discriminant power further, whether the Y-BOCS II will accurately distinguish between OCD and non-OCD patients.

3.3.3. Dimensional Yale-Brown Obsessive-Compulsive Scale (DY-BOCS; Rosario-Campos et al., 2006). Despite the potential utility of using dimensional ratings and the availability of psychometrically sound self-report measures, there are almost no severity scales designed for expert-ratings available that adequately assess the dimension-specific OC symptom severity. This led Rosario-Campos et al. (2006) to revise the Y-BOCS and develop the DY-BOCS. The measure, like the Y-BOCS and Y-BOCS II can be used as an expert-rated measure, a self-report, or a combination of the two. The DY-BOCS symptom checklist is composed of 88 items, designed to provide a detailed

description of obsessions and compulsions that are divided into six different OC symptom dimensions (Pertusa et al., 2011): aggression/ harm, sexuality/morality/religion, symmetry/ordering/ just-right, contamination/cleaning, hoarding, and miscellaneous (e.g., somatic concerns and superstitions).

For the severity ratings, three ordinal scales with six anchor points are used: symptom frequency (0-5), amount of distress (0-5), and the degree to which symptoms interfered with functioning during the previous week (0-5). Besides the symptom checklist, the DY-BOCS self-report also asks the patient to assess the overall symptom severity in each of the dimensions for the previous week on a 0-10 scale. The expert raters rate global OC symptom severity with the same ordinal scale, and finally assess an individual's overall current level of impairment due to OCD on a 0-15 scale. The total global score is obtained by combining the sum of global severity scores in frequency, distress, interference, and the impairment score (0-15), yielding a maximum total global severity score of 30.

Rosario-Campos et al. (2006) reported excellent internal consistency across the severity domains of the six dimensions (Cronbach's alphas ranged between 0.94-0.95) and found interrater reliability between the expert raters on the DY-BOCS to be excellent, with ICCs of at least 0.98 for each component score. Parallel forms reliability was also very good in the original validation study, as the self-report and clinician measures of severity correlated between 0.75-0.87. Pertusa et al. (2010b, 2011) and Harsányi et al. (2009) replicated excellent internal consistency in an English external validation, Spanish adaptation, and Hungarian adaption of the DY-BOCS, respectively (Cronbach's alphas were 0.89 for the global severity scale and between 0.97-0.99 for the subscales). Pertusa et al. (2010b) furthermore found the interrater reliability between the expert raters on the DY-BOCS to be very strong (ICCs ranged from 0.81-0.95), and parallel forms reliability of the self-report and clinician version to be good, except of the symmetry and miscellaneous subscales. Given that the level of agreement between self-report and expert ratings may vary for these scales, caution should be taken to use the DY-BOCS as a reliable substitute for their clinician-administered counterpart.

Rosario-Campos et al. (2006), Harsányi et al. (2009), and Pertusa et al. (2010b, 2011) found correlations between each of the DY-BOCS dimensions and the total DY-BOCS and global severity scores to be generally low to moderate, indicating that the dimensions are largely independent and explain unique variance. However, all studies report the global severity and impairment scales to be

highly correlated ($r = 0.89$), suggesting that one could be eliminated without losing valuable information. As for convergent validity, Rosario-Campos et al. (2006), Harsányi et al. (2009), and Pertusa et al. (2011) reported high correlations between the DY-BOCS total global score, impairment rating, and the Y-BOCS total score and obsessions and compulsions subscale scores (all r s ranged between 0.62 and 0.85). In particular, Pertusa et al. (2010, 2011) reported the global severity and impairment scales of the DY-BOCS to both correlate most strongly with the OCI-R total score ($r = 0.45$). Between these two measures, the largest correlations appeared between the corresponding symptom subscales; correlations between non-corresponding subscales were smaller or nonsignificant. The DY-BOCS hoarding subscale was furthermore most strongly correlated with all the subscales of the Saving Inventory-Revised (SI-R; Frost, Steketee, & Grisham, 2004). These results were moreover confirmed through multiple regression analyses (Pertusa et al. (2010b, 2011).

The divergent validity of the DY-BOCS shows marginal improvement over the divergent validity of the Y-BOCS. In particular, the symmetry and miscellaneous dimensions were strongly related to the Work and Social Adjustment Scale (WSAS; Mundt et al., 2002), with r s of 0.57 and 0.58, respectively (Rosario-Campos et al., 2006). The global severity and impairment scales of the DY-BOCS were also strongly associated with the WSAS (r s of 0.67 and 0.70, respectively) and BDI (r s of 0.57 and 0.51, respectively; Rosario-Campos et al., 2006). Conversely, adequate divergent validity was reported by Pertusa et al. (2010b), as the correlations between the subscales of the DY-BOCS and measures of depression (HAM-D) and anxiety (HAM-A) ranged from nonsignificant to moderate. Harsányi et al. (2009) also reported adequate discriminant validity in their Hungarian validation of the DY-BOCS. They used the HAM-D to compare OCD dimensions with the most frequent comorbid disorder, depression. Only for the aggressive dimension a significant correlation with depression was found.

In conclusion, by dividing OC symptoms according to dimensions, the DY-BOCS is capable of inquiring about symptoms that are inherently ambiguous (e.g., checking, mental rituals, repetition, and avoidance behaviors) and that may be present in more than one symptom domain. Especially, the DY-BOCS allows for assessment of ‘hybrid symptom combinations’. A hybrid symptom combination is a compulsion that is usually conceptualized as belonging to a certain dimension, yet might be

triggered by an obsession that pertains to a different dimension. As opposed to the Y-BOCS and the OCI-R, the DY-BOCS focuses on the obsessions motivating the rituals, instead of the observable behaviors themselves. Further advantages of the DY-BOCS are its clarity by offering examples, making it more similar to the clinician-administered version when used as a self-report, and the aforementioned significant improvements over the Y-BOCS.

Nonetheless, the psychometric properties of the DY-BOCS in nonclinical populations remain to be studied, as it is still unclear whether the DY-BOCS is suitable to assess subclinical OCD presentations. Additional work is also needed to sort through the miscellaneous symptoms. Pertusa et al.'s (2011) study suggests that some of the symptoms currently included in the miscellaneous dimension are likely to become part of the already existing subscales. Finally, usage of the DY-BOCS has the disadvantage of its time burden, as patient need approximately 40 minutes to complete the self-report checklist, and the expert rater needs 49 minutes to administer the clinician version (Rosario-Campos et al., 2006).

3.3.4. Behavioral Avoidance Tests (BATs; Taylor, 1995; Steketee et al., 1996a). BATs are observational measures that examine avoidance behavior and accompanied levels of distress. Although the tests have traditionally been used to measure fear and avoidance in individuals with phobias, they have also started to be incorporated in OCD research (Grabill et al., 2008). BATs can involve one single or multiple tasks. For the single form, the patient is presented with a feared stimulus and asked to give a rating of their level of distress, e.g., the subjective unit of disturbance ('SUD'). In the multiple tasks form the patient performs and rates a variety of tasks from 0 (*none*) to 100 (*extreme*), which normally lead to compulsive behavior (Taylor, 1995). Rituals and avoidance for each task is assessed on a scale from 0 (*no avoidance*) to 2 (*complete avoidance*). A composite BAT score can be calculated by summing the percentage of steps, SUDS, avoidance, and rituals.

BATs are commonly administered by a clinician before and after treatment to examine the severity of fear and avoidance, in addition to treatment effects (Steketee et al., 1996a). Although there is mixed support for validity of the measure, it is generally considered to have good treatment sensitivity. Steketee et al. (1996a) researched a sample of 50 OCD patients with varying symptoms

using the multiple task BAT. Internal consistency of the composite BAT was adequate at pre-test (Cronbach's alpha = 0.64), but lower at post-test (Cronbach's alpha = 0.49). Interrater reliability was adequate ($r = 0.71$). Good convergent validity of the BAT and its subscales was demonstrated through significant correlations with the Y-BOCS total score ($r = -0.33-0.49$). Unlike the individual BAT variables, the composite BAT score showed reasonably good convergent validity with the Maudsley Obsessional Compulsive Inventory (MOCI; Hodgson & Rachman, 1977), correlations were between $-0.20-0.46$. Negative correlations reflect the association between the percentage of assigned steps completed with the Y-BOCS and MOCI total scores, with higher percentages of steps being completed linking to lower scores on the Y-BOCS and MOCI. Divergent validity was generally good, with low correlations observed among the BAT scores and the revised version of the Symptom Checklist's (SCL-90-R; Derogatis, 1977) depression subscale ($r = 0.01-0.36$) and SCID criteria for Obsessive Compulsive Personality Disorder (OCPD is often confused with the Axis II diagnosis; $r = -0.10-0.04$).

Advantages of the BAT are that it can offer in vivo measures of fear and avoidance related to obsessions and compulsions (Steketee et al., 1996a; Steketee, Frost, & Bogart, 1996b) and that it can be tailored to specific symptoms of the patients (Barlow, 1988). Further, Steketee et al. (1996a) propose that BATs can be an important addition to other interview or self-report measures, and hence, be part of a multimethod approach to assess OCD symptoms and severity. On the other hand, Taylor (1995) suggests that BATs may not be helpful with some compulsions, such as checking, ordering, or mental rituals, since these are situation-specific or unlikely to be observable. Finally, designing multi-task/multi-method BATs can be complicated, and there are no standardized procedures or guidelines for administration.

3.3.5. Family Accommodation Scale (FAS; Calvocoressi et al., 1999). The FAS is a clinician-administered measure designed to assess "the nature and frequency of accommodating behaviors of family members toward a family member with OCD" (Amir, Freshman, & Foa, 2000: 212).

Accommodation of OCD symptom refers to actions taken by family members that facilitate rituals (e.g., provide objects needed for the rituals), acquiesce the patient's demands (e.g., following a certain routine to minimize anxiety), and reassure the patient (e.g., answer questions repeatedly). Although

such actions are generally well-intentioned, they often result in greater impairment and symptom severity (Storch et al., 2007). Several studies have found significant positive correlations between family accommodation and Y-BOCS scores of the OCD patients (Ferrão et al., 2006; Guedes, 1997; Amir et al., 2000). Recently, Merlo et al. (2009) found that 88% of parents of OCD children reported to engage in at least mild accommodation of their child's symptoms.

The FAS is divided into three parts: 1) a detailed symptom list, which is designed for the family member to identify symptoms of which he/she is aware; 2) nine items that assess the degree to which family members have accommodated the patient's OCD symptoms during the previous months (family accommodation index; FAI); and 3) four items that evaluate the level of distress or impairment that the relatives and the patient experience as a result of this accommodation, or the absence of this accommodation (family distress index; FDI). The items in the second and third part are answered on a scale from 0 (*none*) to 4 (*extreme*).

Several studies have reported internal consistency to be variable but generally acceptable, with Cronbach's alphas ranging between 0.67 and 0.90 (Calvocoressi et al., 1999; Geffken, Storch, & Duke, 2006; Storch et al., 2007; Albert et al., 2010). Interrater reliability for the FAS was found to be good, with intraclass coefficients (ICCs) of 0.75-0.95 (Calvocoressi et al., 1999). Most recently, Albert et al. (2010) conducted exploratory factor analysis in an adult sample and found evidence for three distinct subscales of the FAS (i.e., Modification, Distress and Consequences, and Participation). Interestingly, type of onset was related to the FAS 13-item total score: family members of patients with an abrupt onset showed greater accommodation scores than those subjects with an insidious onset; means of FAS total score were 25.37 (*SD* 10.13) and 21.76 (*SD* 9.12), respectively.

Calvocoressi et al. (1999) reported good convergent validity through significant correlations with the Y-BOCS ($r = 0.49$), patient Global Assessment of Functioning scores (APA, 2000: $r = -0.45$), poor global family functioning on the Family Assessment Device (FAD; Epstein, Baldwin, & Bishop, 1983; $r = 0.50$), the Patient Rejection Scale (e.g., measure of relatives' rejecting attitudes towards the patients; Kreisman, Simmens, & Joy, 1979; $r = 0.67$), and Questionnaire on Resources and Stress (QRS) subscales measuring dependency and management (Holroyd, 1987; $r = 0.73$).

Support for divergent validity was furthermore found through low construct overlap between

the FAS and the other FAD and QRS subscales. Correlations with financial stress (Holroyd, 1987; $r = 0.05$), stress associated with caring for a terminally ill family member ($r = 0.001$), a cognitively impaired family member ($r = -0.05$), and physically impaired family member ($r = 0.18$) were reported to be weak (Calvocoressi et al., 1999). Geffken et al. (2006) compared the FAS with the subscales of the COPE Inventory (a 52-item questionnaire of coping responses with a range of distinct scales; Carver, Scheier, & Weintraub, 1989) and reported weak correlations. Secondly, they compared the FAS with the BDI-II, resulting in a correlation of $r = 0.23$; and with the Hunter Opinions and Personal Expectations Scale ($r = -0.21$; Nunn et al., 1996).

In sum, the FAS demonstrates good internal consistency, interrater reliability, and evidence of construct validity, whilst test-retest data and data on sensitivity to treatment effects are still lacking. Nonetheless, the FAS is a valuable tool as it is currently the only measures that examines accommodation behavior in family members of OCD patients.

3.4. Self-report questionnaires.

This section will review ten OCD self-report measures and one family-report measure for adults, their psychometric properties and practical aspects. Most of the measures assess symptom severity and/or of treatment progress, while some serve screening purposes. Where newer versions of OCD measures have evolved out of older ones to overcome the shortcomings of their predecessors, the modern version will be evaluated. The measures will generally be presented from older to new, but where related versions of an assessment tool are still used, these will follow one another. The family functioning measure will be presented last. As mentioned, this part of the psychometric review is currently in press (*Journal of Obsessive-Compulsive and Related Disorders*; <http://dx.doi.org/10.1016/j.jocrd.2012.08.001>).

3.4.1. Padua Inventory-Washington State University Revision (PI-WSUR; Burns et al., 1996).

The original Padua Inventory (PI; Sanavio, 1988) was found to be inadequate in differentiating obsessions from worries, creating content overlap with Generalized Anxiety Disorder (GAD; Freeston et al., 1994a). Consequently, Burns et al. (1996) excluded all content-unspecific items and constructed

the PI-WSUR. The PI-WSUR consists of 39 items, a priori assigned to five content categories relevant to obsessions and compulsions: obsessions about harm to self/others, impulses to harm self/others, contamination/washing, checking, and dressing/grooming. Each item is rated on a five-point scale according to the degree of disturbance caused by the obsession or compulsion. Burns et al. (1996) reported high internal consistency across the subscales and the total score (Cronbach's alphas ranged from 0.77-0.92). Test-retest reliability was also good, with a range of 0.61-0.84 for the total and subscale scores. Jónsdóttir and Smári (2000) and Gönner, Ecker, and Leonhart (2010a) confirmed the high internal consistency of the PI-WSUR total and subscales scores, but did not report on temporal stability of the PI-WSUR. Jónsdóttir and Smári (2000) supported the PI-WSUR's five-factor structure in a nonclinical Icelandic sample through confirmatory factor analysis.

Besides the improvements of the PI-WSUR over the PI, Burns et al. (1996) did not report data on convergent validity of the PI-WSUR. Jónsdóttir and Smári (2000) found moderate correlations of the Icelandic PI-WSUR with the MOCI total score, and the corresponding washing and checking subscales of both measures (*rs* of 0.61, 0.50, and 0.54, respectively). As for divergent validity, Burns et al. (1996) reported the correlation of the PI-WSUR total score and its subscales with the PSWQ to be relatively weak (*rs* of 0.34 and 0.08-0.37; obsessional thoughts about harm to self/others showed the highest correlation). These findings were replicated in a nonclinical Icelandic sample by Jónsdóttir and Smári (2000). Gönner et al. (2010a) reported moderate correlations between the PI-WSUR and divergent constructs in their mixed German sample. The total score of the PI-WSUR correlated with the PSWQ, BDI, and the Beck Anxiety Inventory (BAI; Beck & Steer, 1993a) by respectively: 0.43, 0.45, and 0.45. The obsessional thoughts about harm to self/others again showed the highest correlations out of the subscales with the divergent constructs.

Overall, the PI-WSUR shows important improvements in content over the original PI, which has been confirmed by its validations in non-English contexts (e.g., Icelandic and German). Practically, the PI-WSUR is reasonably time-efficient in its administration and scoring (10 + 5 minutes; Antony, 2002). The most important drawback of the PI-WSUR is that its factor structure and convergent validity have not been confirmed in a clinical sample (Gönner et al., 2010a). Furthermore, no ROC analyses have been conducted; there is no data available on optimal cutoff scores, or

treatment sensitivity. Finally, a big difference between the PI-WSUR and other measures of OCD, is that it does not include any items to assess hoarding symptoms. Whether this is a shortcoming is disputable in the field, as some researchers suggest that hoarding is not one of the ‘core’ OCD symptom domains (e.g., Grisham et al., 2005).

3.4.2. Padua Inventory-Revised (PI-R; van Oppen, Hoekstra, & Emmelkamp, 1995). Burns et al. (1996) used content distinction between obsession and worry to revise the Padua Inventory, but only validated their PI-WSUR in a nonclinical sample. Van Oppen et al. (1995) revised the original PI through factor analysis in a large sample of OCD patients, other anxiety disorder patients, and nonclinical individuals. The resulting PI-R contains 41 items over 5 factors (e.g., impulses, washing, checking, rumination, and precision). In their psychometric review of the PI-R, Anholt et al. (2009) found that one-third of their OCD patient sample scored below the PI-R cutoff score at pre-treatment (scores on the Y-BOCS did not differ for the two groups). Because this was an exceptionally high percentage, only their OCD group with PI-R scores above the cutoff score was further investigated.

Van Oppen et al. (1995) reported high internal consistency across the OCD, anxious, and nonclinical samples (e.g., Cronbach’s alphas between 0.89 and 0.92 for the total score and between 0.65-0.93 for the subscale scores). In a mixed clinical and nonclinical Turkish sample (n = 360) Besiroglu et al. (2005) found internal consistency to range between 0.79-0.95 and test-retest reliability between 0.86-0.91 across subscale and total scores. Anholt et al. (2009) and Gönner et al. (2010a) replicated high internal consistency coefficients for the PI-R total and subscale scores. Van Oppen et al. (1995) identified the five-factor structure in the OCD sample where it explained 47.5% of the variance, and these factors were also stable amongst other anxiety disorder patients and nonclinical individuals. Whereas Gönner et al. (2010a) reported structural deficits of both the PI-WSUR and the PI-R, Besiroglu et al. (2005) found their results to largely support van Oppen et al.’s (1995) factor structure, except for one of the impulses and precision factor items.

Good convergent validity of the total PI-R score was reported in the original validation study, as it correlated by 0.75 with the total score of the MOCI and by 0.61 with the obsessive-compulsive subscale of the SCL-90-R. The corresponding subscales of the PI-R and the MOCI also showed high

correlations: the washing/cleaning subscales 0.87, the checking subscales 0.62, and the rumination/doubting subscales 0.58. The total PI-R score correlated with a r of 0.32 with the Eysenck Personality Questionnaire-Revised (EPQ-R; Eysenck & Eysenck, 1982) neuroticism subscale. Convergence between the PI-R and the Y-BOCS has generally been found to be low, however. Denys et al. (2004b) found the two total scores of the measures to correlate with $r = 0.27$ and the compulsions subscales with $r = 0.42$. Anholt et al. (2009) found the total PI-R to be correlated by 0.31 with the Y-BOCS severity scale, and by 0.56 with the Y-BOCS symptom checklist total score. The authors reported correlations between the two checking subscales, the washing/contamination subscales, and the precision/symmetry subscales to be, respectively: 0.24, 0.79, and 0.49. Further, Besiroglu et al. (2005) reported a correlation of 0.48 between the total scores, and r s of 0.38 and 0.50 between the Y-BOCS obsessions and compulsions subscales with the PI-R total, respectively.

As for divergent validity, van Oppen et al. (1995) found moderate correlations of the PI-R total score and rumination subscale score with the SCL-90-R depression, anxiety, and interpersonal sensitivity scales (r s ranged between 0.46-0.52 and 0.37-0.54, respectively). Small correlations were found between all PI-R scales and the EPQ-R extraversion, social desirability, and psychoticism subscales (r s ranged between -0.33 to 0.21). Gönner et al. (2010a) found the PI-R total to correlate with the PSWQ, BDI, and BAI between 0.46-0.48. The rumination subscale showed the highest correlations with these divergent constructs, r s ranged between 0.49-0.58. In their Turkish mixed clinical and nonclinical sample, Besiroglu et al. (2005) found even higher correlations between the total PI-R and the BAI ($r = 0.37$) and the BDI ($r = 0.65$). For the PI-R subscales, the correlations with the BAI ranged between 0.22-0.48 and with the BDI between 0.54-0.61. Taken together, these results indicate significant content overlap between the PI-R scale and divergent constructs.

Nonetheless, van Oppen et al. (1995) found that except for the impulses subscale, the PI-R effectively discriminated between OCD, social phobic and panic, and nonclinical individuals. Besiroglu et al. (2005) also found that the total, contamination, and checking subscale scores were effective in distinguishing OCD patients from depressive and anxious individuals, whereas the rumination subscale was only able to distinguish other anxiety disorder patients from OCD patients, and the precision subscale only discriminated between depressive and OCD patients. The impulses

subscale was not a valid discriminator between the OCD and other clinical groups.

In all, though the PI-R shows improvements in content over the PI, it has retained its limited concurrent validity. This was demonstrated through inadequate divergent validity, limited discriminatory power of the rumination and impulses subscales, and low converging correlations with the Y-BOCS. Since one third of OCD patients in Anholt et al.'s (2009) sample scored below the PI-R cutoff score, the PI-R might additionally not be suitable to screen for the presence of OCD phenomena. Similar to the PI-WSUR (Burns et al., 1996), this reasonably time-efficient OCD measure does not include any items to assess hoarding symptoms. Furthermore, no ROC analyses have been conducted, and there is no data available on optimal cutoff scores or treatment sensitivity.

3.4.3. Padua Inventory-Palatine Revision (PI-PR; Gönner et al., 2010a). Gönner et al. (2010a) examined the psychometric properties of both the PI-WSUR and the PI-R in a large sample of OCD, other anxiety disorder, and depressed patients. Neither five-factor structures of the two revisions were replicated. Furthermore, the PI-R lacked divergent validity, whilst the PI-WSUR has not been validated in a clinical sample. Based on these considerations, Gönner et al. (2010a) constructed the PI-PR, a 24-item revision with six subscales: contamination/ washing, checking, numbers, dressing/grooming, rumination, and harming obsessions and compulsions. Their confirmatory factor analysis showed the empirical data to fit the theoretical six-factor structure, but also identifying three subfactors of the checking dimension and two subfactors of the harming obsessions and impulses. The PI-PR total score and subscale scores showed good internal consistency, with Cronbach's alphas ranging from 0.78-0.93 for the OCD and anxious samples across the total and subscales scores.

Moderate intercorrelations between the subscales supported the PI-PR's construct validity, as this indicates that subscales cover distinct aspects of OCD whilst belonging to the same content domain (Gönner et al., 2010a). As for convergent validity, the PI-PR showed high correlations with the OCI-R. Total scores of the two measures correlated between 0.83-0.85, the corresponding washing/contamination subscales between 0.70-0.92, the checking subscales between 0.70-0.83, and the PI-PR numbers and OCI-R neutralizing subscales correlated between 0.52-0.78, depending on the subsample. All correlations of the PI-PR subscales with the corresponding OCI-R subscales were

higher than the non-corresponding subscales. Though only a moderate correlation was found between the PI-PR total scale and the Y-BOCS self-report severity scale ($r = 0.48$), this was similar to the correlation between the OCI-R and the Y-BOCS self-report severity scale. Hence, this could indicate that the OCI-R and the PI revisions reflect the diversity of OCD symptoms, whilst the Y-BOCS severity scale assesses symptom intensity.

Gönner et al. (2010a) reported weak to moderate divergent validity for the PI-PR and its subscales, as evidenced through high correlations with measures of worry, depression and anxiety. Total PI-PR scores in both the OCD and anxious sample showed substantial correlations (although significantly lower than with the OCI-R) with the PSWQ, BDI, and BAI (r s ranged from 0.43-0.54). In the anxious sample, the PI-PR rumination, checking, and harming obsessions and compulsions subscales lacked in divergent validity (r s ranged from 0.33-0.60 for the three subscales with the PSWQ, BDI, and BAI). In the OCD sample, the same three subscales of the PI-PR correlated slightly less, between 0.28-0.49, with the PSWQ, BDI, and the BAI. As for discriminative power, the PI-PR was able to distinguish between OCD and anxious/depressive patients effectively, except for its harming impulses and obsessions subscale (Gönner et al., 2010a). Additionally, ROC analyses showed the PI-PR scale to effectively discriminate OCD patients from those with other diagnoses (AUC = 0.81). With the optimal cutoff score, a total of 77% of OCD patients and 76% of anxious/depressive patients were classified correctly.

In conclusion, major advantages of the PI-PR are its brevity (administration and scoring should take between 10-12 minutes) its coverage of a broad range of symptoms, and the validation of the factor structure in a clinical sample. Gönner et al. (2010a) compared the PI-WSUR, the PI-R, and the PI-PR on divergent validity with worry, depression, and anxiety. All PI revisions showed comparable and moderate construct overlap with anxiety and depression (r s range from 0.44-0.47). For worry, the revisions differ, as the PI-R subscale rumination showed the highest correlation with the PSWQ ($r = 0.58$), indicating a lack of specificity distinguishing worries from obsessions. The rumination subscale of the PI-PR showed improvement ($r = 0.49$ with the PSWQ), although the PI-WSUR still appeared to be slightly superior in this respect.

Disadvantages of the PI-PR are the lack of external validation studies, more psychometric

analyses are needed before this measure can be used for clinical or research purposes (e.g., on treatment sensitivity). Also, the initial validation study shows the measure to have insufficient discriminative power of the harming impulses and obsessions subscale, along with the inadequate divergent validity of the rumination subscale. Finally, the absence of hoarding items could be a drawback of the PI-PR, if hoarding were to be one of the core OCD symptom domains.

3.4.4. Obsessive-Compulsive Inventory-Revised (OCI-R; Foa et al., 2002a). The original Obsessive Compulsive Inventory (OCI; Foa et al., 1998) contained too many items in addition to overlapping subscales that lacked discriminant validity (Wu & Watson, 2003). Foa and colleagues (2002a) corrected these psychometric problems and shortened the measure to only three items on six subscales: washing, checking, ordering, obsessing, hoarding, and neutralizing. Hence, the OCI-R (Foa et al., 2002a) is a short self-report scale assessing a broad range of obsessive and compulsive symptoms. Participants assess the extent to which they were distressed by OC symptoms in the past month on a 5-point scale.

Foa et al. (2002a) reported internal consistency to be good, as alphas for the total scale across a mixed clinical/nonclinical sample ranged between 0.81 and 0.93. Similar coefficients were reported by Abramowitz and Deacon (2006), Hajcak et al. (2004), and Huppert et al. (2007). Generally lower internal consistency is found for the checking, but especially, the mental neutralizing subscale (alphas range between 0.34-0.57; Foa et al., 2002a; Hajcak et al., 2004; Huppert et al., 2007), which has been confirmed by studies on non-English validations of the OCI-R (see table 3.1.). This is likely due to the heterogeneity of the content of the neutralizing items (e.g. Woo et al., 2010). Sulkowski et al. (2008) were the only authors who reported good internal consistency of the neutralizing scale (Cronbach's alpha = 0.82). Furthermore, with an interval of one week, Foa et al. (2002a) reported high test-retest reliability for OCD patients (*rs* range from 0.74 to 0.91) and for non-anxious controls (*rs* range from 0.57 to 0.87). Hajcak et al. (2004) found similar test-retest reliabilities, based on a time interval of 4 weeks. Moreover, Fullana et al. (2005) reported no significant changes in symptom dimension scores for nonclinical Spanish individuals between the baseline and the follow-up after two years.

The OCI-R showed good construct validity; Foa et al. (2002a) and all subsequent validation

studies found support for the six subscales in samples of OCD patients, generalized social phobia patients, posttraumatic stress disorder patients, and nonanxious controls (e.g., Hajcak et al., 2004; Fullana et al., 2005; Abramowitz & Deacon, 2006; Huppert et al., 2007). As for convergent validity, Foa et al. (2002a) reported that in the combined sample of clinical and nonclinical individuals, the OCI-R total score correlated moderately to well with the Y-BOCS total score ($r = 0.53$), the MOCI total score ($r = 0.85$), and the NIMH GOCS ($r = 0.66$). The corresponding subscales of the MOCI and the OCI-R generally also correlated well (washing: $r = 0.78$; checking: $r = 0.72$), in addition to the obsessions subscales of the OCI-R and the Y-BOCS ($r = 0.51$). Hajcak et al. (2004) found moderate correlations between the OCI-R total score and the MOCI total score ($r_s = 0.56-0.65$), though the OCI-R total score showed higher correlations with the PI-WSUR ($r = 0.75$).

Moderate correlations between the OCI-R scales and the Y-BOCS symptom checklist have been generally observed (total scores correlations range from 0.41-0.63; Abramowitz & Deacon, 2006; Sulkowski et al., 2008), with the OCI-R hoarding subscale showing no association to overall OCD severity. Sulkowski et al. (2008) reported high to moderate correlations for the corresponding subscales of the two measures: contamination/washing 0.80, hoarding 0.65, symmetry/ordering 0.62, the Y-BOCS-SC sexual/religious scale and the OCI-R obsessing scale the 0.47, and the aggressive/checking subscales correlated by 0.42. Huppert et al. (2007) found that each OCI-R subscale (with the exception of the obsessing or neutralizing subtypes) was scored highest in patients who identified the symptom subtype as primary on the Y-BOCS.

Divergent validity was found poor to moderate by Foa et al. (2002a), who reported high correlations between the OCI-R and two measures of depression; for the Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960) 0.58, and for the BDI 0.70. Hajcak et al. (2004) and Abramowitz and Deacon (2006) found more moderate diverging relations with pathological worry, depression, and anxiety (r_s of 0.39, 0.42, and 0.47, respectively). In the non-English validation studies, it was repeatedly found that the obsessing subscale of the OCI-R correlated strongly with measures of anxiety, depression, and pathological worry (see table 3.1.). This could be due to the content overlap between pathological rumination and obsessions (Woo et al., 2010). Sulkowski et al. (2008) also found a moderate correlation of $r = 0.47$ between the OCI-R obsessing subscale and the STAI-T, though the

total OCI-R only correlated by 0.23 with the divergent measure. Surprisingly, Sulkowski et al. (2008) found no significant correlation of OCI-R's total score with the BDI-II, though the OCI-R washing subscale was significantly correlated with the depression measure ($r = 0.36$).

Foa et al. (2002a) further found that OCD individuals scored significantly higher than nonanxious individuals on the total OCI-R scale and four of the six subscales; the hoarding and ordering subscales differentiated poorly between OCD individuals non-OCD individuals. The hoarding subscale was also found problematic by Abramowitz and Deacon (2006) as it was weakly correlated with other OCI-R subscales and not significantly related to the Y-BOCS score. All non-English OCI-R validation studies confirmed a lack of discriminatory power for the hoarding subscale of the OCI-R (see table 3.1.). As for ROC analyses, the following AUCs for the total score of the OCI-R have been reported: 0.70 (Foa et al., 2002a), 0.82 (Abramowitz & Deacon, 2006), 0.77 (Woo et al., 2010), and 0.86-0.89 (Sica et al., 2009). Depending on whether the specific sample was mixed OC-anxious controls or mixed OC-nonanxious controls, the obsession subscale showed higher discriminative power. The reported AUCs for the obsession subscale were 0.75 (Abramowitz & Deacon, 2006), 0.81 (Foa et al., 2002a), and 0.86 (Woo et al., 2010).

Furthermore, the following optimal cutoff total scores have been reported for mixed OC-anxious samples: 18 (sensitivity: 74.0% and specificity 75.2%; Foa et al., 2002a), 14 (sensitivity: 74.0% and specificity: 74.8%; Abramowitz & Deacon, 2006), and 17 (sensitivity: 74.0% and specificity: 78.0 %; Gönner et al., 2008). For the mixed OC-nonanxious sample, the following optimal cutoff total scores have been reported: 21 (sensitivity 65.6% and specificity 63.9%; Foa et al., 2002a) and 22 (sensitivity: 74.0% and specificity: 69.0%; Woo et al., 2010). For the obsession subscale, the optimal cutoff score in mixed OC-anxious samples was 5 (sensitivity: 68.8% and specificity: 72.7%; Foa et al., 2002a). For mixed OC-nonanxious samples, the reported optimal cutoff scores were 4 (sensitivity: 74.4% and specificity: 76.1%; Foa et al., 2002a) and 5 (sensitivity: 87.0% and specificity: 67.0%; Woo et al., 2010).

Overall, the OCI-R is a reliable and valid measure of OCD symptoms, though a lot shorter and less time consuming (administration time between 3 and 5 minutes) than other self-report or clinician-administered measures (Grabill et al., 2008). The measures has good psychometric properties in both

nonclinical and clinical populations, except for the low internal consistency of the neutralizing subscale and the inadequate discriminative power of the hoarding (and occasionally ordering) subscale. The usability of the OCI-R as a diagnostic tool has been replicated in various languages and cultural contexts (for an overview see table 3.1.), by means of clinically validated cutoff scores. Results from the ROC analyses have also indicated very good discriminative power of the OCI-R when distinguishing OC individuals from anxious or nonanxious controls. A drawback of the OCI-R is that it does not allow measuring overall symptom severity, since it lacks a separate severity scale. An overall severity scale could capture high extents of distress caused by very specific symptoms. Last but not least, compulsions are allocated more weight in assessment than obsessions (Foa et al., 2002a).

Table 3.1. *Overview validation studies of the OCI-R in non-English languages*

| Authors and year | Sample | Language | Internal consistency | Test-retest reliability | Same factor structure? | Convergent validity (evaluation and other OCD measure used) | Divergent validity (evaluation and constructs) | Discriminative power |
|-------------------------|---------------------|-----------|--|-------------------------|------------------------|---|---|--|
| Fullana et al. (2005) | 381; non-clinical | Spanish | Good, except for neutralizing subscale | Moderate | Yes | Adequate; based on PI and SI-R with OCI-R hoarding.. | Adequate; only weak to moderate correlations with depression and anxiety. | Data N.A. |
| Zermtaten et al. (2006) | 583; non-clinical | French | Good, except for neutralizing subscale | Data N.A. | Yes | Data N.A. | Data N.A. | Data N.A. |
| Smári et al. (2007) | 816; non-clinical | Icelandic | Good, except for neutralizing subscale | Good | Yes | Adequate to good; based on MOCI and PI-WSUR. | Limited; moderate correlations with worry and perfectionism. | Data N.A. |
| Gönner et al. (2008) | 381; mixed clinical | German | Good, except for neutralizing subscale | Data N.A. | Yes | Good; based on PI-WSUR, SOAQ, and Y-BOCS. | Adequate; weak to moderate correlations with perfectionism, anxiety, depression, and worry. | Good, except for the hoarding subscale |
| Lim et al. (2008) | 228; non-clinical | Korean | Good, except for neutralizing subscale | Moderate to good | Yes | Adequate; based on MOCI. | Limited; moderate to strong correlations with anxiety and depression. | Data N.A. |

| | | | | | | | | |
|----------------------|----------------------------|---------------------|--|-----------------------|-----|-------------------------------------|--|---|
| Sica et al. (2009) | 428; mixed (non) clinical | Italian | Good, except for neutralizing subscale | Very good | Yes | Adequate; based on PI. | Limited; moderate to strong relations with anxiety, worry, and depression. | Good, except for the hoarding subscale |
| Woo et al. (2010) | 793; mixed (non) clinical | Korean | Good, except for neutralizing subscale | Moderate to good | Yes | Good to adequate; based on PI-WSUR. | Limited; moderate to strong relations with anxiety, worry, and depression. | Good, except for the hoarding and ordering subscale |
| Solem et al. (2010a) | 1239; mixed (non) clinical | Norwegian | Good, except for neutralizing subscale | Data N.A. | Yes | Very good; based on Y-BOCS. | Limited; moderate to strong relations with anxiety, worry, and depression. | Good, except for the hoarding subscale |
| Souza et al. (2011) | 260; mixed (non) clinical | Portuguese (Brazil) | Good, except for neutralizing subscale | Excellent | Yes | Limited; based on Y-BOCS. | Adequate; weak to moderate relations with depression and anxiety. | Good, except for the hoarding and ordering subscale |
| Peng et al. (2011) | 265; mixed (non) clinical | Chinese | Good, except for neutralizing subscale | Moderate to very good | Yes | Limited; based on Y-BOCS. | Data N.A. | Good, except for the hoarding subscale |

Notes: MOCI = Maudsley Obsessional Compulsive Inventory (Hodgson & Rachman, 1977); SI-R = Saving Inventory-Revised (Frost, Steketee, & Grisham, 2004); SOAQ = Symmetry, Ordering and Arranging Questionnaire (Radomsky & Rachman, 2004);PI = Padua Inventory (Sanavio, 1988); Y-BOCS = Yale-Brown Obsessive-Compulsive Scale

3.4.5. Vancouver Obsessional Compulsive Inventory (VOCI; Thordarson et al., 2004). The VOCI is a revised version of the Maudsley Obsessional Compulsive Inventory (MOCI; Hodgson & Rachman, 1977), which has been criticized for having redundant subscales, incomplete coverage of obsessive-compulsive phenomena, being insensitive to treatment effects, and using confusing reverse scoring (a number of items are worded as double negatives). Thordarson et al.'s revision (2004) of the MOCI was designed to overcome these problems and to modernize the MOCI from the 'pre-cognitive area' (Thordarson et al., 2004). The VOCI uses a five-point Likert scale assessing the degree of symptom severity of 55 items on six symptom dimensions: contamination, checking, obsessions, hoarding, just right, and indecisiveness.

The VOCI demonstrated good to excellent internal consistency in the original validation

study, slightly varying across sub samples (Cronbach's alphas were 0.88-0.96 for the OCD sample, whilst for the community sample coefficients were 0.70-0.90). The authors furthermore reported limited to good test-retest reliabilities for the total and subscale scores, again varying across sub samples (for the OCD sample r_s were 0.90-0.97 over 47 days, but for the student sample r_s were 0.50-0.60 over an 11-day period). Radomsky et al. (English and French VOCI; 2006) and Gönner et al. (German VOCI; 2010b) both reported excellent internal consistency (alphas ranged between 0.81-0.96). Test-retest reliability coefficients were also very high in both the French and English VOCI; r_s for the total scores of both versions were 0.94 (interval of 24.9 days) and 0.91 (interval of 30.4 days), respectively; r_s for subscales ranged between 0.76-0.96 across the two versions.

A concern is the limited support for the factor structure of the VOCI. Support was only found for four subscales in small samples (Thordarson et al., 2004), and the factor structure has not been validated in a nonclinical sample so far. Convergent and divergent validity of the VOCI was separately evaluated by Thordarson et al. (2004) in the OCD and student samples. Convergent validity in the OCD sample was demonstrated by high correlations of the VOCI total score and the PI-WSUR total score ($r = 0.85$), the MOCI total score ($r = 0.74$), and the Y-BOCS self-report ($r = 0.67$, though with the interview version $r = 0.14$), which were roughly similar for the student sample. Corresponding subscales of the PI-WSUR and the VOCI were higher correlated than noncorresponding subscales in the OCD sample (r_s ranged from 0.55 to 0.90). This was also the case for the student sample, although correlations were slightly lower than in the OCD sample, in particular for the MOCI subscales.

Thordarson et al. (2004) found divergent validity to be adequate to limited, as demonstrated by moderate correlations with the BDI, BAI, and PSWQ (r_s between 0.36-0.47 for the OCD sample and between 0.43-0.59 for the student sample). For both samples, the indecisiveness subscales showed even higher correlations (r_s of 0.44-0.68). Whereas for the OCD sample correlations with the personality dimensions of the EPQ-R were very small and nonsignificant, in the student sample neuroticism and extraversion were significantly correlated with the VOCI total score (r_s of 0.56 and -0.32). Not all converging correlations were stronger than these diverging correlations. Whereas the VOCI and PI-WSUR were significantly stronger related to each other than the VOCI to the BDI, this did not uphold for the MOCI and the Y-BOCS in the OCD sample. In the student sample however, the

correlations with the PI-WSUR and MOCI were significantly greater than with the BDI.

Radomsky et al. (2004) partially replicated these findings on concurrent validity for the English and French VOCI. They reported excellent convergent validity of the English and French VOCI total scores, as they were both highly correlated with the total scores on the PI-WSUR (r s of 0.83 and 0.86, respectively). Corresponding subscales between the VOCI and PI-WSUR were also strongly correlated (r s ranged between 0.70-0.87). They found similar correlations with the BDI as Thordarson et al. (2004), in addition to significant correlations with claustrophobia (0.42-0.47). Nonetheless, these diverging correlations were significantly weaker than the reported converging correlations with the PI-WSUR. Furthermore, Thordarson et al. (2004) found that for the contamination, checking, obsessions, and hoarding subscales, OCD patients were distinguished from controls using the VOCI. For the indecisiveness subscale, OCD patients scored significantly higher than adult and student controls, but not significantly higher than anxious or depressive controls.

In conclusion, the main advantage of the VOCI is its assessment of both cognitive and behavioral aspects of OCD. Though the measure is not as time-efficient as the previously mentioned measures, the VOCI seems to have acceptable psychometric properties. Problematic for the VOCI however is the inadequate divergent validity and discriminatory power of the indecisiveness scale, in addition to the factor structure proposed by Thordarson et al. (2004). Even in an OCD sample, Gönner et al. (2010b) could not replicate the six-factor structure of the VOCI due to structural deficiencies in three subscales. Furthermore, more research needs to be done on the VOCI's relation to anxiety in nonclinical samples. Also, ROC analyses have to be conducted for the VOCI, and future studies have to investigate treatment sensitivity. Finally, another important shortcoming of the VOCI is the lack of ordering/arranging items or doubts and mental neutralizing items (Grabill et al., 2008). In order to overcome this, it is often suggested that the Symmetry, Ordering and Arranging Questionnaire (SOAQ; Radomsky & Rachman, 2004) is used as a supplement to the VOCI.

3.4.6. Vancouver Obsessional Compulsive Inventory-Revised (VOCI-R; Gönner et al., 2010b).

Gönner et al. (2010b) revised the VOCI because of its structural deficits, particularly concerning the obsessions, indecisiveness, and just right subscales. They furthermore integrated the VOCI with the

supplementary SOAQ, to achieve a more complete coverage of all OCD symptoms. The resulting 30-item VOCI-R has five subscales: contamination, checking, hoarding, symmetry/ordering, and obsessions. Items are rated on a scale from 0 (*not at all*) to 4 (*very much*). Internal consistency of the VOCI-R total score and its subscale scores was excellent; Cronbach's alphas ranged between 0.82-0.95 (Gönner et al., 2010b). Test-retest reliability of the VOCI-R has not been assessed yet. All correlations between the symptom scales were weak, except for a correlation between the symmetry/ordering dimensions and hoarding ($r = 0.41$). Correlations between the five symptom subscales and the total scale were significantly higher (r s ranged from 0.42-0.65), suggesting that the subscales explain unique variance, whilst belonging to the same content domain.

Gönner et al. (2010b) found support for the VOCI-R's convergent validity, through moderate to high correlations with the total scores of the SOAQ ($r = 0.66$), the OCI-R ($r = 0.88$), the PI-PR ($r = 0.83$), and the Y-BOCS self-report scale ($r = 0.48$). The VOCI-R checking, contamination, symmetry/ordering, and hoarding subscales were highly correlated with the corresponding OCI-R and PI-PR subscales (r s ranged between 0.83-0.95). The VOCI-R obsessions subscale showed a slightly lower correlation with the OCI-R obsessing and PI-PR harming obsessions/impulses subscales (r s were 0.57 and 0.60, respectively). This was also the case for the symmetry/ordering subscale with the PI-PR dressing/grooming subscale ($r = 0.63$), reflecting the weaker conceptual similarity of these corresponding subscales. Additionally, all correlations of the VOCI-R symptom scales with noncorresponding OCI-R or PI-PR subscales were only low to moderate. Moreover, discriminant validity, in comparison to the large construct overlap usually found between OC symptoms, anxiety, depression, and worry, was excellent for the VOCI-R. Correlation coefficients of the total PI-PR score with the BAI, BDI, and PSWQ were 0.34, 0.39, and 0.37. The subscales correlated even more weakly with these divergent constructs, showing a range of r s of 0.07-0.31 (Gönner et al., 2010b).

In sum, the psychometric properties of the VOCI-R are excellent and the measure is more time efficient than its predecessor. Although no test-retest reliability is known, internal consistency is very high, and evidence of excellent convergent and divergent validity has been reported. In addition to revising the VOCI's factor structure, symmetry/ordering items were added and a number of items deleted for theoretical considerations, improving content validity of the measure drastically.

Nonetheless, the major drawback of the VOICI-R is that it has not been evaluated externally yet.

Treatment sensitivity is unknown, and the VOICI-R's ability to discriminate OCD patients from other anxiety disorder patients and nonclinical controls is unknown. ROC analyses need to be conducted for the VOICI-R, and optimal cutoff scores need to be evaluated.

3.4.7. Schedule of Compulsions, Obsessions, and Pathological Impulses (SCOPI; Watson & Wu, 2005). The SCOPI was created based on the need for a measure that better reflected the research-supported symptom structure of OCD (e.g., Leckman et al., 1997; Summerfeldt et al., 1999). Watson and Wu (2005) used factor analysis of items derived from already existing instruments and a review of the literature to design the 45-item SCOPI, which has five subscales: checking, cleanliness, pathological impulses, compulsive rituals, and hoarding. Three different factor analyses provided empirical support for the rationally determined item composition of the five subscales. Each item is rated on a five-point scale according to severity.

In the mixed sample of the SCOPI validation study, internal consistency coefficients were strong: 19 out of 20 coefficients had a Cronbach's alpha above 0.80 and the median internal consistency coefficient was 0.86. Test-retest reliability (over an interval of two months) was also good, with *r*s of 0.79-0.82 across the subscales. These coefficients are higher than generally found for the OCI-R, and extra informative since Watson and Wu (2005) used a large subsample of 464 and a significantly longer time interval than commonly used in psychometric studies.

Watson and Wu (2005) reported good convergent validity of the SCOPI, since moderate to high correlations between the SCOPI and the OCI-R were observed in the nonclinical sample. Corresponding subscales of the two measures (e.g., checking, washing, compulsive rituals/ordering, and hoarding) correlated between 0.64-0.77, and these were significantly stronger than correlations between noncorresponding subscales. Similarly, the SCOPI showed good convergent validity with the Y-BOCS in two sub samples (clinical and nonclinical). Correlations of the corresponding contamination/cleaning and hoarding subscales of the two measures in both samples were between 0.58-0.62, and significantly higher than correlations with the noncorresponding subscales. Some construct overlap was found between noncorresponding items of the remaining subscales however.

Discriminant validity of the SCOPI scale was researched through comparison of the self-report with the spouse-rating version of the SCOPI, which is a limited way of assessing divergent validity. All five SCOPI scales produced a significant, but low to moderate level of self-spouse agreement (correlations ranged between 0.16-0.29), with the exception of a high level of agreement for the hoarding subscale ($r = 0.59$). These discrepant findings are due to different visibility effects of the symptoms, meaning that those with clear frequent behavioral manifestations yield higher self-other correlations than more internal, subjective traits (Watson & Wu, 2005).

Finally, discriminatory power varied across the subscales among clinical and community individuals. The obsessive checking, obsessive cleanliness, and compulsive rituals subscales were reported to have good discriminatory power. In contrast, the hoarding and pathological impulses subscales had low discriminative power, as the former showed no group differences at all, and the latter was scored significantly higher by students than OCD patients. Low discriminative power of the hoarding subscale is consistently found in the OCI-R measure as well, reflecting psychometric similarity of the SCOPI and the OCI-R (Watson & Wu, 2005).

Overall, the SCOPI is a reasonably time-efficient measure, with administration time between 10-15 minutes. Furthermore, the dimensions of the SCOPI correspond with a recent meta-analysis of factor-analytic studies of the Y-BOCS (e.g., obsessions/checking, contamination/cleanliness, symmetry/ordering, and hoarding; Bloch et al., 2008). Additionally, Watson and Wu (2005) propose their findings to be in favor of the SCOPI rather than the OCI-R, since the SCOPI is: 1) more stable over time; and 2) longer and broader in content than the OCI-R dimensions, since these focus more narrowly on a single core symptom feature. Nonetheless, there is not enough external psychometric data available to substantiate these claims further. Also, only three SCOPI subscales (checking, cleanliness, and compulsive rituals) significantly distinguished OCD patients from students, adults, and psychiatric outpatients. Additionally, the SCOPI has not been compared to measures of divergent constructs. The measure further requires ROC analyses to be conducted, and optimal cutoff scores to be determined. Finally, the SCOPI has not been tested for diagnostic sensitivity and specificity, or for sensitivity to treatment effects (Grabill et al., 2008).

3.4.8. Clark-Beck Obsessive-Compulsive Inventory (CBOCI; Clark et al., 2005). The CBOCI was developed as a quick screening tool of OCD frequency and severity based on the DSM-IV criteria and recent cognitive-behavioral formulations. The measure is meant to complement the BDI-II and the BAI, in order for a battery of highly compatible but discriminating symptom measures to be assembled. The item response format resembles that of the BDI-II, with respondents asked to choose “one statement in each group that best describes your thoughts, feelings, or behavior during the past two weeks including today”. The CBOCI has two subscales aimed at assessing obsessions (14 items) and compulsions (11 items) on a four-point scale. Factor analyses yielded support for the rationally determined item composition of the two subscales (Clark et al., 2005). Internal consistency was examined in sub samples of OCD patients, other clinical patients, and students, yielding Cronbach’s alphas of the CBOCI total and subscale scores between 0.79 -0.95. Test-retest reliability over an interval of one month ranged between 0.69-0.79 in the nonclinical sample. The CBOCI scored in this respect significantly weaker than the PI-WSUR in this sample ($r = 0.93$), but significantly stronger than the Y-BOCS ($r = 0.52$; Clark et al., 2005).

As for convergent validity, Clark et al. (2005) found the CBOCI obsessions and compulsions subscales to be highly correlated with the corresponding Y-BOCS subscales (r s of 0.80 and 0.66 in the OCD sample and r s of 0.55 and 0.52 in the nonclinical sample). In the OCD and nonclinical sample respectively, the total scores of the CBOCI and the Y-BOCS correlated by 0.78 and 0.60, and the total scores of the CBOCI and PI-WSUR by 0.65 and 0.77. Divergent validity was found to be weaker. In the OCD sample, the CBOCI correlated strongly with the BAI ($r = 0.61$), the BDI-II ($r = 0.75$), and the PSWQ ($r = 0.64$). For the nonclinical sample, these correlations were 0.49, 0.57, and 0.53 (Clark et al., 2005). Although high comorbidity between OCD and anxiety or depression related measures is expected, the correlation coefficients in the OCD sample are higher than found in other OCD measures. Nevertheless, z test comparisons indicated that correlations between the CBOCI and the PI-WSUR total scores were higher than correlations with the BAI in both samples. This did not hold for the correlations between the CBOCI and the BDI-II however, which were as high as the correlations with the Y-BOCS or PI-WSUR, questioning the scale’s divergent validity. Finally, the CBOCI effectively discriminated OCD patients from the nonclinical individuals, whilst lacking in

discriminatory power between OCD and other anxiety or mood disorder patients.

In sum, the CBOCI has good reliability (although no test-retest data for the OCD sample is available), convergent validity, and limited divergent validity. It is one of the first quick screening measures (administration time is around 5 minutes) with empirically validated obsession and compulsion subscales. An advantage over the OCI-R is that the CBOCI assesses obsessions and compulsions more equally. Only 17% of the OCI-R items assess obsessions, whereas for the CBOCI this is 56%. But besides the limited discriminatory power of the CBOCI, the usability of the scale in nonclinical samples is questionable. Again, ROC analyses need to be conducted for the CBOCI, and optimal cutoff scores need to be identified. Finally, the CBOCI has not been tested for diagnostic sensitivity and specificity, or for sensitivity to treatment effects (Grabill et al., 2008).

3.4.9. Florida Obsessive-Compulsive Inventory (FOCI; Storch et al., 2007). The FOCI was created to enable patients to quickly rate the severity of their symptoms on a unitary scale for obsessions and compulsions. Items from the symptom checklist were derived from the Y-BOCS symptom checklist and clinical experiences from the authors. Similar to the Y-BOCS, the FOCI contains two subscales: a symptom checklist with 10 obsessions and 10 compulsions (20 items) and a symptom severity scale (5 dimensions of severity: distress, interference, time occupied, resistance, and degree of control) using a six-point Likert scale. Storch et al. (2007) reported internal consistency for the FOCI symptom checklist to be 0.83 and for the severity scale to be 0.89 in a sample of OCD patients. The two scales were moderately related to each other ($r = 0.38$). Aldea et al. (2009) reported an internal consistency Kuder-Richardson 20 coefficient of 0.78 for the symptom checklist, and a Cronbach's alpha for the severity scale of 0.86 in their sample of OCD patients. In contrast to the original validation study, the authors reported no significant correlation between the two FOCI scales. No data on the temporal stability of the scale is available.

In the original validation study, Storch et al. (2007) reported evidence of convergent validity of the FOCI through its high correlations with the Y-BOCS; the two symptom scales and severity scales had corrected correlations of 0.93 and 0.89 (but these could be inflated due to the correction). Uncorrected correlations were lower, 0.40 for the FOCI symptom checklist with the Y-BOCS

symptom checklist and 0.78 between the severity scales. Aldea et al. (2009) reported strong correlations between the FOCI symptom checklist and the OCI-R self-report measure (r s of 0.76 at baseline and 0.66 at post-treatment) but not with the clinician-rated Y-BOCS severity scale (r s of 0.18 at baseline and 0.44 at post-treatment). For the FOCI severity scale, strong correlations with the clinician-rated Y-BOCS severity scale (r s of 0.61 at baseline and 0.82 at post-treatment) and moderate correlations with the self-report OCI-R (r s of 0.36 at baseline and 0.55 at post-treatment) were found.

As for divergent validity, Storch et al. (2007) reported moderate to strong correlations between the FOCI severity scale and measures of depression (0.63 with the BDI and 0.30 with the HDRS). The FOCI symptom checklist was moderately correlated with the BDI ($r = 0.35$) and the HDRS ($r = 0.34$), reflecting the consistently found high comorbidity rate of depression in patients with OCD.

Furthermore, these correlations were significantly weaker than the correlations between the self-report FOCI severity score and the clinician-administered Y-BOCS severity score. Aldea et al. (2009) found the FOCI symptom checklist to be moderately related ($r = 0.30$) with the State-Trait Anxiety Inventory-State (STAI-A; Spielberger, Gorsuch, & Lushene, 1970) at baseline, though surprisingly not with measures of depression; $r = 0.08$ with the BDI-II and 0.07 with the State-Trait Anxiety Inventory-Depression scale (STAI-D; Bieling, Antony, & Swinson, 1998). At post-treatment, conversely, the FOCI symptom checklist was found to correlate significantly higher with the BDI-II, the STAI-D, and STAI-A; r s were 0.29, 0.47, and 0.33. The correlation between the FOCI symptom checklist and the OCI-R was still significantly more robust however than its correlation with these divergent constructs.

As for the FOCI severity scale at baseline, Aldea et al. (2009) found moderate correlations with the BDI-II ($r = 0.38$), the STAI-D ($r = 0.44$), and the STAI-A ($r = 0.34$). Correlations with the Y-BOCS were found to be significantly more robust than the FOCI severity scale correlations with the BDI-II and the STAI-A, though this was not the case for the STAI-D. At post-treatment, the FOCI severity scale correlated even more strongly with the BDI-II, the STAI-D, and the STAI-A (r s of 0.73, 0.77, and 0.61, respectively). Moreover, these correlations were just as strong as the correlation between the FOCI severity scale and the Y-BOCS total severity score, not supporting the divergent validity of the FOCI severity scale.

Overall, the FOCI is useful for screening, as it includes both a symptom checklist and a

severity scale whilst only taking 5 minutes to complete. Advantages of the measure are its empirical support for treatment sensitivity, and the combination of obsession and compulsion severity into a unitary severity scale. Additionally, the FOCI severity scale assesses other dimensions of severity besides distress coupled with symptoms. This approach is supported by factor analytic studies of the Y-BOCS (e.g., Moritz et al., 2002; Storch et al., 2005). Disadvantages of the FOCI are its limited divergent validity, especially after treatment. Also, severity of individual symptoms is not assessed. Finally, more external psychometric studies on the FOCI are needed, including an assessment of temporal stability and discriminative power (e.g., ROC analyses in samples of OCD patients, other anxiety disorders/depression, and nonclinical controls).

3.4.10. Dimensional Obsessive-Compulsive Scale (DOCS; Abramowitz et al., 2010). The DOCS is based on recent structural analyses indicating that OC symptoms are dimensional and that particular kinds of obsessions tend to co-occur (Mataix-Cols et al., 2005; McKay et al., 2004). The DOCS thus assesses the severity of four consistently replicated OC symptom dimensions: contamination/cleaning, harm obsessions/checking compulsions, order/arranging, and sexual/religious/violent intrusions and compulsive neutralizing. Additionally, the DOCS conceptualizes ‘severity’ of endorsed OCD symptoms in a multidimensional manner. Within each symptom dimension, the DOCS contains 5 items measuring time occupied, avoidance, distress, functional impairment, and difficulty disregarding obsessions/compulsions. The total number of items is consequently 20, of which each item is rated on a 5-point scale with the past month as time frame. The instructions for each set of five dimension-specific items include a brief description and several examples of the types of obsessions and compulsions commonly observed in that dimension.

Abramowitz et al. (2010) found internal consistency in their initial validation study to be excellent; Cronbach’s alphas for total and subscale scores in their mixed clinical and nonclinical subsamples ranged between 0.83-0.96. Test-retest reliability was moderate, r_s for the total and subscale scores in a sub sample of 210 students over 12 weeks ranged between 0.55-0.66. Subscale correlations with the total DOCS score were moderate to high; r_s ranged from 0.61 to 0.83, indicating that subscales belong to the same content domain of OCD. Abramowitz et al. (2010) found support for

the four 5-item factors through both exploratory and confirmatory factor analytic methods in their OCD, other anxiety disorders, and student sub samples.

As for convergent validity, the total scores of the DOCS and the Y-BOCS correlated moderately in the OCD sample ($r = 0.54$), whereas the DOCS correlated more strongly with the OCI-R total score across the three subsamples (r s between 0.65- 0.71). Corresponding subscales of the DOCS and OCI-R also showed moderate to strong correlations across the three samples (washing/contamination 0.57-0.88; responsibility/checking 0.47-0.52; taboo thoughts/obsessing 0.60-0.64; and symmetry/ordering subscale 0.39-0.67). However, within the other anxiety disorder patients and student samples some noncorresponding subscales also correlated significantly, though these correlations were weaker than for the corresponding subscales.

Adequate divergent validity of the DOCS was demonstrated in the original validation study. In the student sample, the Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995) correlated moderately with the total DOCS score (r s between 0.37- 0.52). For the OCD and other anxiety disorders sample, correlations with the BAI and BDI were between 0.33 and 0.46. Correlations between the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998), and the DOCS score in the OCD, other anxiety disorders, and student sample were 0.08, 0.28, and 0.40, respectively. Correlations of the contamination and taboo thoughts subscales with divergent constructs were weaker than the converging correlations, though this was not the case for the symmetry and responsibility for harm subscales. Abramowitz et al. (2010) suggest that the dimensional structure of OCD needs to be further researched in nonobsessional anxious individuals, as co-occurrence of various obsessions and compulsions might differ in these individuals.

Furthermore, Abramowitz et al. (2010) found diagnostic accuracy of the DOCS total score to be excellent in differentiating OCD patients from nonclinical controls and good in differentiating OCD individuals from other anxiety disorders patients. ROC analyses showed the AUC of the total DOCS score to be 0.86 when distinguishing OCD patients from nonclinical individuals, and to be 0.77 when distinguishing OCD patients from other anxiety disorder patients. Abramowitz et al. (2010) also conducted an ROC analysis on the OCI-R total score which resulted in AUCs of 0.80 (OCD-nonclinical sample) and 0.70 (OCD-other anxiety disorders sample). Direct comparisons between the

DOCS and the OCI-R evidenced significantly greater AUC estimates for DOCS scores compared to OCI-R scores in both the OCD and nonclinical sample (AUC difference = 0.06), as well as the sample of OCD and other anxiety disorder patients (AUC difference = 0.08). Finally, a cutoff score of 21 provided the best balance of sensitivity (70%) and specificity (70%) in the OCD-other anxiety disorders sample, while a cutoff score of 18 was optimal in the OC-nonclinical individuals sample (sensitivity: 78% and specificity: 78%).

Overall, the DOCS show a substantial improvement over most other OCD measures in terms of assessing four replicated OCD dimensions (e.g., Bloch et al., 2008) and allowing for obsessions and compulsions to co-occur. Furthermore, the measure provides an assessment of overall symptom severity independent of types of obsessions and compulsions, whilst also encompassing multiple dimensions of severity within each symptom dimension. Both reliability and the pattern of concurrent validity indicate that the DOCS is an appropriate measure in both clinical and nonclinical samples. Additionally, the DOCS total score appears to have greater diagnostic accuracy than the OCI-R total score when it comes to identifying OCD patients relative to nonclinical individuals and those with other anxiety disorders. The measure furthermore seems to have good sensitivity to treatment effects, especially when the subscale(s) representing the patient's main OC symptoms is considered (Abramowitz et al., 2010).

Similar to the PI and its revisions (Sanavio, 1988; Burns et al., 1996; van Oppen et al., 1995; Gönner et al., 2010a), hoarding is not included in the DOCS. Abramowitz et al. (2010) argue hoarding to be: 1) more strongly associated with other forms of psychopathology (e.g., personality disorders); 2) related to an earlier age of presentation; 3) to have distinct neural activity patterns and genetic susceptibility loci; and 4) to have a weaker response to drug and psychological treatments with demonstrated efficacy for OCD. Hence, the authors consider hoarding to be a distinct syndrome of OCD (Grisham et al., 2005; Wu & Watson, 2005; Mataix-Cols et al., 2010). However, research remains inconclusive about the diagnostic conceptualization of hoarding (Pertusa et al., 2010a), and not including the symptom dimension therefore remains a limitation for the DOCS (Storch & Benito, 2011). Furthermore, the DOCS has not been externally validated so far, which is warranted to examine its validity in research and clinical contexts. In particular, the DOCS should be examined in more

homogeneous OCD groups. The large, multisample data set used by Abramowitz et al. (2010) is beneficial for generalizability, but creates limitations in terms of unaccounted inconsistency with respect to geography and procedural variability (Storch & Benito, 2011).

3.4.11. Obsessive-Compulsive Disorder Family Functioning Scale (OFF; Stewart et al., 2011).

The OFF scale is a 42-item questionnaire consisting of three subscales: family functioning impairment, symptom-specific impairment, and family role-specific impairment. For every item, the respondent reports on frequency of OCD-related impairment on a scale from 0 to 3 (*never – monthly – weekly – daily*). The OFF scale has distinct versions for the OCD patients and their relatives, though both scale versions assess family functioning impairment at the time of completing the OFF and the historical worst of the patient's OCD symptoms. The OFF scale can be used in both adult and pediatric OCD. In the OFF validation study, Stewart et al. (2011) used a sample of 150 OCD-affected individuals and 250 of their first or second relatives. Internal consistency of respective patient and relative versions was 0.95 and 0.96 for the overall OFF score, and between 0.85 and 0.96 for the three subscales separately. Test-retest reliability for a subgroup of 80 participants over an interval of 80.6 days, was good for the total and subscale scores (intra-class coefficients ranged between 0.79-0.83).

Convergent and divergent validity of the OFF Scale were evaluated based on correlations with the Y-BOCS, the WSAS, and the FAS. After controlling for age and gender, the OFF Scale was moderately correlated with the FAS score ($r = 0.52$) and the WSAS score ($r = 0.50$), but not with the Y-BOCS score ($r = 0.24$; p -value = 0.053). As for discriminant validity, the OFF scale was compared to social, occupational, and emotional impacts of family functioning impairment. Social and occupational impacts were not properly captured by the FAS, emotional impacts were not captured by the WSAS or FAS, and the OFF scale did not capture family accommodation behavior entirely (which the FAS did). At an item level, several OFF questions yielded unique information that was not captured by the Y-BOCS, FAS, or WSAS.

In conclusion, it is widely reported in the literature that family members of OCD patients tend to accommodate their relatives' ritualistic behaviors (as measured by the FAS; Calvocoressi et al., 1999) influencing OCD severity and functional impairment (Merlo et al., 2009; Peris et al., 2008;

Storch et al., 2007). However, studies hardly every examine the broader aspects of family functioning in OCD, and Stewart et al. (2011) designed the first specific measure of OCD's impact on family functioning. To this end, complementary perspectives of the OCD patient and their relatives are used by the OFF scale. Although the validation study shows excellent psychometric properties, more external psychometric studies need to validate these.

3.5. Discussion.

In this chapter various OCD measures have been reviewed (see table 3.2. for an overview), which assess the presence and severity of obsessions and compulsions in nonclinical and clinical individuals. This chapter focused first on diagnostic interviews and clinician-rated measures, of which some general strengths and weaknesses were observed. Diagnostic interviews are useful for differential diagnosis as they assess comorbid symptoms whilst distinguishing different psychiatric disorders; yet, they are very time-consuming and expensive. Clinician-rated measures, on the other hand, have the benefit of collecting data through both the patient and the clinician, whilst having the disadvantages of requiring extensive training and being subject to interviewer bias. Specifically, behavioral assessments can provide in vivo measures of fear and avoidance related to OCD symptoms that contribute unique information to the clinical picture, but they are difficult to standardize and implement. All in all, recent revisions of the previous 'gold standard' of OCD measures, the Y-BOCS, namely the Y-BOCS II and the DY-BOCS, show most promise in both their clinician-rated and self-report checklist form.

Furthermore, ten self-report measures assessing OCD symptoms for adults and one family functioning scale have been reviewed, based on their psychometrics, extent of external validation, and practical utility. Advantages of self-report measures involve ease of administration, utility in measuring treatment response, and large normative databases (Grabill et al., 2008). Disadvantages include the possibility of respondents interpreting response scales differently, the increased likelihood of response bias, and difficulty of use for patients with impaired reading capacities (Grabill et al., 2008). Furthermore, OCD tendencies that are very specific and idiosyncratic might not be accurately captured by self-report measures, and this could underestimate the severity of the symptoms or

impairment. By the same token, severity scores for patients with multiple types of symptoms can be inflated as they endorse a greater number of scale items, though the number of different types of symptoms endorsed is independent of actual symptom severity (McKay et al., 2004).

In general, measures should assess OCD obsessions and rituals as connected phenomena, in addition to OCD severity in a multidimensional fashion. Literature consistently shows that OCD severity consists of parameters such as distress, functional interference, duration of the obsessions or compulsions, and especially avoidance behavior aimed at reducing obsessional anxiety (e.g., Deacon & Abramowitz, 2005). Hybrid symptom combinations also need to be accounted for; measures must avoid solely ‘emphasizing the overt *form* of obsessions and rituals while overlooking the *function* of these symptoms’ (Wheaton et al., 2010: 950). Finally, measures are needed that can discriminate between OCD patients, nonclinical individuals, and patients with other anxiety disorders or depression, since OCD is highly comorbid with other anxiety disorders and depression.

Selecting an OCD measure for clinical or research purposes will always be a trade-off between obtained detailed information with a time-intensive method and screening for OCD tendencies time-efficiently in large mixed samples. Newer self-report measures like the DOCS and the VOCI-R show a lot of promise by being time-efficient but generating detailed information (see table 3.2. for an overview). These measures moreover show excellent psychometric properties and congruence with the most recent conceptualization of OCD in the literature. Unfortunately, their psychometric properties have not been externally validated yet. Hence for now, the OCI-R is recommended for screening and establishing baseline OCD severity, as it has good psychometric properties, is highly time-efficient, and has been validated in numerous studies in English and non-English contexts. Nonetheless, important limitations to the OCI-R have been indicated that should be improved.

Table 3.2. Summary Review

| <i>Measure</i> | <i>Format</i> | <i>Number of items</i> | <i>Description</i> | <i>Evaluation</i> |
|---|---------------------------------------|------------------------|---|---|
| ADIS (Brown et al., 1994; 2001) | Diagnostic interview | NA | Includes detailed symptom queries for each disorder. Each disorder is rated on severity (0-8 scale). | Excellent reliability. Enhanced diagnostic utility through detailed descriptions of disorders. However, time intensive and trained rater required |
| SCID-I (First & Gibbon, 2004) | Diagnostic interview | NA | Contains questions about past and present symptoms for DSM-IV diagnoses. | Assesses broad range of comorbid disorders. Good diagnostic utility with simple design. Disadvantages are: poor reliability of OCD diagnoses, time intensity, and requirement of trained rater. |
| Y-BOCS (Goodman et al., 1989) | Clinician administered | 54 | Contains a symptom checklist and separate obsession and compulsion severity ratings (0-4 scale). | Measures both symptom frequency and severity. Excellent reliability, good content and construct validity. Moderate convergent and divergent validity, questionable criterion-related validity. Disadvantages are disagreement over factor structure and requirement of trained rater. |
| Y-BOCS-II (Goodman et al., 2006) | Clinician administered | 67 | Contains a symptom checklist and separate obsession and compulsion severity ratings (0-5 scale). | Modifications overcome limitations of the Y-BOCS. Excellent reliability. Good construct and convergent validity, but still limited discriminative power and also requirement of trained rater. |
| DY-BOCS (Rosario-Campos et al., 2006) | Clinician-administered | 88 | Contains a symptom checklist and separate severity ratings (0-5 scale). Also assesses global symptom severity (0-10 scale) and impairment (0-15 scale). | Modifications overcome limitations of the Y-BOCS. Excellent reliability, though temporal stability unknown. Good construct and adequate concurrent validity. Too much overlap between global severity and impairment scale; miscellaneous symptoms also need revision. Psychometrics need to be tested in nonclinical samples. Time intensive and trained rater required. |
| BATs (Steketee, Chambless, Tran, & Worden, 1996) | Clinician administered | 3 or 4 | Patient performs single or multiple tasks related to feared stimuli or compulsions. Distress, completed steps, avoidance and rituals are rated. | In vivo measure of fear and avoidance could be useful as part of a multimethod assessment. However, overt compulsions are not observable. Adequate to poor reliability and validity. Good treatment sensitivity but difficult to standardize and implement. |
| FAS (Calvocoressi et al., 1999) | Clinician administered or self-report | 13 | Designed to be administered to family members. Includes 2 parts: a detailed symptom list and 13 questions about accommodation (0-4 scale). | Only externally validated measure that assesses family accommodation, which has been shown to deteriorate patients' symptoms further. Good to adequate reliability, though test-retest reliability unknown. Good convergent and discriminant validity. Sensitivity to treatment unknown. |

| | | | | |
|-----------------------------------|-------------|----|--|--|
| PI-WSUR (Burns et al., 1996) | Self-report | 39 | Assesses severity of: obsessions about harm, impulses to harm, contamination/washing, grooming compulsions, and checking (0-4 scale). | Good reliability, convergent validity seems moderate, and divergent validity good. Better specificity and discriminative power than PI and available in several languages. Disadvantages are absence of hoarding items and that the measure has not been used in a clinical sample yet. |
| PI-R (Van Oppen et al., 1996) | Self-report | 41 | Assesses severity of: impulses, washing, checking, rumination, and precision (0-4 scale). | Good reliability. Weak to moderate concurrent validity. Discriminative power varies. Validated in clinical sample and various languages. Does not include hoarding items. |
| PI-PR (Gönner et al., 2010a) | Self-report | 24 | Assesses severity of: harming obsessions and compulsions, contamination/washing, checking, rumination, numbers, and dressing/grooming (0-4 scale). | Good internal consistency and convergent validity. Good divergent validity for OCD patients, weaker for patients with other anxiety disorders/depression. Good discriminative power, except for harming subscale. Validated in clinical sample, is brief and has broad coverage of symptoms. Improved specificity over PI-R, but no test-retest or external psychometric data available. |
| OCI-R (Foa et al., 2002a) | Self-report | 18 | Assesses severity of: washing, checking, ordering, hoarding, obsessing, and mental neutralizing (0-4 scale). | Good internal consistency, except for the neutralizing subscale. Good test-retest reliability. Good concurrent validity, except for the hoarding subscale. Diagnostic utility in both clinical and community samples, and tested in numerous lingual contexts. Disadvantages are absence of a separate severity scale and compulsions weighing more than obsessions. |
| VOCI (Thordarson et al., 2004) | Self-report | 55 | Assesses severity of: contamination, checking, obsessions, hoarding, just right, and indecisiveness (0-4 scale). | Excellent internal consistency, varying test-retest reliability. Good to excellent convergent validity, moderate divergent validity and discriminative power. Problematic factor structure. VOCI assesses both cognitive and behavioral aspects, but does not assess ordering/arranging or doubts/mental neutralizing symptoms. |
| VOCI-R (Gönner et al., 2010b) | Self-report | 30 | Assesses severity of: contamination, checking, obsessions, hoarding, and symmetry/ordering, (0-4 scale). | Excellent internal consistency, no test-retest data available. Excellent concurrent validity. No data on discriminative power available. Yet broader coverage of symptoms than original VOCI and brief administration time. External psychometric studies need to validate the promising VOCI-R. |
| SCOPI (Watson & Wu, 2005) | Self-report | 45 | Assesses severity of: obsessive checking, obsessive cleanliness, pathological impulses, compulsive rituals, and hoarding (1-5 scale). | Good reliability. Adequate convergent validity, no data available on divergent validity. Multidimensional measure reflects OCD's heterogeneity and consistently replicated factor structure, but mixed evidence for discriminative power, and insufficient psychometric data available. |

| | | | | |
|--------------------------------------|-------------|----|---|---|
| CBOCI (Clark et al., 2005) | Self-report | 25 | Assesses severity and frequency of: obsessions and compulsions (0-3 scale). | CBOCI functions as a brief screening measure and equally weighs obsessions and compulsions. Good internal consistency, validated factor structure, and adequate test-retest reliability in the student sample. Depending on sample: moderate to good concurrent validity. Low discriminative power among OCD and anxious/depressed patients. More external psychometric data is needed. |
| FOCI (Storch et al., 2007) | Self-report | 25 | Assesses severity of five dimensions (0-5 scale) and symptom checklist notes presence of 10 obsessions and 10 compulsions. | Good internal consistency. Varying concurrent validity. Advantages are FOCI's quick administration, assessment of stress independent from symptoms, and preliminary evidence of good treatment sensitivity. Disadvantages are that individual symptom severity is not tested for, and the absence of test-retest data, data on factor structure, or discriminative power. |
| DOCS (Abramowitz et al., 2010) | Self-report | 20 | Assesses time occupied, avoidance, distress, functional impairment and difficulty disregarding obsessions/ compulsions of 4 symptom dimensions (0-4 scale). | Excellent internal consistency, moderate test-retest reliability in a student sample. Adequate convergent and good divergent validity. Good diagnostic accuracy in clinical and nonclinical samples. Advantages of the DOCS are its foundation on the validated factor structure of symptoms, its multidimensional conceptualization of symptom severity, and its preliminary evidence of good treatment sensitivity. Disadvantages are the absence of hoarding items. More psychometric data needed. |
| OFF (Stewart et al., 2011) | Self-report | 42 | Assesses impairment in: family functioning, specific symptoms, and specific family role. Distinct versions for OCD patient and relatives (0-3 scale). | First specific measure of OCD's impact on family functioning. Measure provides unique information not generated by related measures (e.g., the FAS). Although the validation study shows excellent psychometric properties, more external psychometric studies need to validate these. |

4. Etiology of OCD

4.1. Introduction.

Several lines of genetic, neuroanatomical, neuropsychological, neurochemical, and cognitive-behavioral research indicate OCD to be a complex neurobehavioral illness that likely has multiple etiological determinants (Markarian et al., 2010). In the phenomenology chapter, the involvement of biological factors has been addressed with regard to OCD dimensions. The same kind of studies have also been used to determine the etiological impact on OCD of: genetics (Nestadt et al., 2000; Pauls et al., 1995; Rosario-Campos et al., 2005; van Grootheest et al., 2008), neuroanatomy (Maltby et al., 2005; Saxena & Rauch, 2000; Whiteside et al., 2004; Busatto et al., 2001; van den Heuvel et al., 2009), neuropsychology (Lawrence et al., 2006; Markarian et al., 2010; Greisberg & McKay, 2003), and neurochemistry (March et al., 2007; Landeros-Weisenberger et al., 2010; Saxena et al., 2007; Stein et al., 2007).

Etiological biological models and studies aim to identify biomarkers (e.g., biological markers: substances, physiological characteristics, or genes, that possibly indicate the presence of a disease, a physiological abnormality, or a psychological condition) of illness and treatment response in OCD (Rosenberg et al., 2010). Although part of OCD's etiology can indeed be explained by these biological studies, the multidimensional nature of the disorder requires incorporation of cognitive-behavioral research. Namely, unlike biological models, the cognitive-behavioral account can explain the symptomatic heterogeneity of the disorder. Cognitive-behavioral models aim to define the role of cognitive variables and dysfunctional beliefs in the emergence and maintenance of OCD symptoms. These models are based on Beck's (1976) cognitive specificity hypothesis, which suggests that different types of psychopathology arise from different dysfunctional beliefs.

The aims of this chapter are threefold: 1) provide a theoretical account of cognitive-behavioral models and an up-to-date review of their empirical support; 2) critically review overall evidence of cognitive-behavioral assertions; and 3) review evidence of a synthesized cognitive-biological model. These topics will be presented as follows. First, three cognitive-behavioral models will be delineated and their empirical evidence reviewed. Secondly, the extent to which empirical studies support or

challenge the role of appraisals of intrusive thoughts in OCD will be discussed. Finally, this chapter will conclude with an account integrating biological and cognitive-behavioral etiological models, supported by recent empirical studies.

4.2. Core concepts and purpose of the cognitive-behavioral account.

Cognitive theorists have proposed that obsessions and compulsions arise from specific sorts of dysfunctional beliefs or appraisals regarding regularly occurring intrusive thoughts, images, or impulses. This is based on the finding that intrusions are experienced by 84% of the general population yet developed into obsessions only by 2-3% (Rachman & de Silva, 1978). According to the Obsessive Compulsive Cognitions Working Group (OCCWG; 2001), *appraisals* are considered ways in which meaning is given (whether in the form of expectations, interpretations, or other types of judgments) to a specific event such as the occurrence of an intrusion. *Beliefs*, on the other hand are relatively enduring assumptions that are held by an individual and that are not specific to a particular event (e.g., dysfunctional attitudes or irrational beliefs). Later evidence of the OCCWG (2003, 2005) however, has shown that there is no empirical support for differentiating these terms, and that they probably represent overlapping features of dysfunctional thinking in OCD. Hence in this thesis the terms ‘dysfunctional beliefs’, ‘maladaptive beliefs’, ‘appraisals’, and ‘misappraisals’ will be used interchangeably.

The goal that cognitive-behavioral models of OCD work towards is understanding the essential phenomenological aspects of the disorder as covered in the previous chapters. The main behavioral symptoms that call for explanation are compulsive rituals (e.g., handwashing, checking, neutralizing (overt and covert), and avoidance behavior). Related aspects to be explained include why the themes of the obsessions are consistent (i.e., aggressive, blasphemous, and sexual). Studying nonclinical samples can be informative regarding the processes underlying the cognition (e.g., Novara et al., 2011). Namely, subclinical symptoms are present in 21%-25% of the population (Fullana et al., 2009), and intrusive thoughts are experienced by approximately 84% of the population (Rachman & de Silva, 1978). Yet no more than 2-2.5% develop obsessive-compulsive disorder (Torres & Lima,

2005). Cognitive-behavioral theorists seek answers in the underlying mechanisms involved. The cognitive aspects of OCD's phenomenology that require explanation are (Shafran, 2010):

- ❖ the occurrence of persistent, repetitive, intrusive thoughts, images, or impulses;
- ❖ experiencing these thoughts as appalling and unwanted; and
- ❖ thus attempting to ignore or suppress the thoughts.

In order for this chapter to contribute to the understanding of OCD's etiology, three models will be reviewed based on their theoretical assertions and empirical evidence. It is important to note that although the models differ in emphasis, they show significant similarity in their foundation. That is, the fundamental principle of each model is that obsessional problems are the result of the appraisal of otherwise normal intrusive thoughts, images, or impulses, as extremely significant or threatening. All of these theories view these appraisals as the key cognitive process that leads to an escalation in the frequency, duration, and intensity of obsessive intrusive thoughts (Clark, Purdon, & Wang, 2003).

There are several specific appraisals that have been linked to OCD (OCCWG, 2003, 2005):

- ❖ *Inflated responsibility*; an excessive sense of being personally responsible for unwanted or upsetting thoughts, including responsibility for acts of omission (failing to prevent harm), as well as for acts of commission (causing harm).
- ❖ *Overimportance of thoughts*; believing that the mere presence of an unwanted or distressing thought means that the thought is meaningful. Two variations exist hereof: the probability bias (e.g., thoughts can actually influence the external world) and the morality bias (e.g., thinking about a behavior is equivalent to the behavior itself).
- ❖ *Control of thoughts*; the belief that the complete control of one's thoughts is both possible and necessary.
- ❖ *Overestimation of threat*; making inflated estimates of the probability and costs of aversive events.
- ❖ *Intolerance of uncertainty*; assuming that certain situations or stimuli are dangerous unless one has complete (100%) assurance of safety. Often this implies avoidance, difficulty making

decisions, or excessive reassurance seeking in situations that others would consider having an acceptable level of risk

- ❖ *Perfectionism*; the belief that mistakes or imperfection is intolerable. This might relate to external stimuli (i.e., filling out a form without making a single mistake), or to internal stimuli (i.e., repeating a routine action until it feels ‘just right’).

Through factor analysis it was found that these six underlying constructs actually represent three domains that contribute to the emergence and maintenance of OCD symptoms: responsibility/threat estimation, perfectionism/certainty, and importance/control of thoughts (OCGWG, 2005).

The second general note on the three models is that they are similar in the quality and nature (self-report data and experimental studies) of their empirical supporting evidence (Shafran, 2010). Self-report data allows for the evaluation of hypotheses regarding relationships. The data is cross-sectional however, which prohibits any conclusions about direction of causality. Experimental studies do inform about the directions of causality and can therefore offer a suitable test of theory. However, while they maximize internal validity, such experiments often sacrifice ecological validity, and thereby generalizability (Abramowitz et al., 2006). Testing the causal hypothesis requires longitudinal research in which individuals are assessed for the presence of dysfunctional beliefs and followed over the course of a critical event that would lead to the occurrence of intrusive thoughts. Cognitive-behavioral models predict that individuals with misappraisals would experience greater difficulty with intrusive thoughts and neutralizing responses compared to individuals without such misappraisals (Abramowitz et al., 2006). A couple of these longitudinal studies have been conducted and will be reviewed in the respective sections of the cognitive-behavioral models.

4.3. Salkovskis’ cognitive behavioral theory of OCD.

Salkovskis (1985) proposed a cognitive-behavioral analysis of OCD in which responsibility appraisals of intrusive thoughts lead to compulsive behavior. That is, urges to perform neutralizing behavior to reduce discomfort from intrusive thoughts, arise from interpreting intrusive cognitions in terms of responsibility for harm to oneself or other people. The premise of the model is the regularity of intrusive thoughts happening in the normal population, without people attributing much

significance to them. Yet, when people are predisposed to appraise such intrusions as threatening or feel highly responsible for harm (or the prevention of harm), OC-related distress and neutralizing behavior will follow. The type of threat appraisals that generate anxiety are determined by the multiplicative interaction between the perception of likelihood of danger and the perception of the degree of catastrophic consequences would the danger indeed happen (Salkovskis et al., 1999).

Hence, this theory suggests that: 1) it is the appraisal (rather than content) of the intrusions prominent in obsessional problems that is the source of distress and neutralizing behavior in OCD; 2) the occurrence of both persistent discomfort and neutralizing behavior (including covert neutralizing) distinguishes normal intrusions from obsessional disorder; and 3) neutralizing occurs as a result of the person interpreting the occurrence and content of intrusions as evidence of being responsible for unacceptable and preventable harm to themselves or other people (Salkovskis et al., 1999).

Neutralizing behavior can entail a variety of compulsions, such as avoidance, reassurance-seeking, thought suppression, thought replacement; all aimed at reducing feelings of responsibility (Shafran, 2010). Because these behaviors will lead to temporary relief by reducing perceived responsibility, the complete elimination of the anxiety will never be achieved, since the definite disconfirmation of the person's appraisal of the intrusions is prohibited. As a result, the preoccupation with the intrusions, and consequently their frequency, will only be enhanced over time (Salkovskis & McGuire, 2003).

Cognitive theories presuppose that anxious patients are motivated by the same factors that motivate healthy individuals. Specifically, Salkovskis' model (1985, 1999) presumes that obsessional behavior is characterized by patients excessively trying to ensure that they are not responsible for harm. The origins of inflated responsibility lie in people's predisposition to appraise intrusive cognitions in a certain way in line with assumptions about past experiences. These assumptions are proposed to interact with critical incidents, leading to negative interpretations of certain thoughts. Specifically, Salkovskis et al. (1999) hypothesized that five kinds of learning experiences can add to the development of distorted beliefs about intrusive thoughts:

- 1) An early developed, broad sense of responsibility that is explicitly or implicitly stimulated during childhood (e.g., being the eldest sibling).

- 2) Rigid and extreme codes of conduct and duty (e.g., religious beliefs that sinful thoughts are the same as sinful actions).
- 3) Experiences during childhood where a sense of responsibility developed as a consequence of never being confronted by responsibility (e.g., due to highly overprotective parents).
- 4) An incident in which one's act of commission or omission did significantly contribute to a serious adversity.
- 5) An incident in which it seems that one's thoughts or acts of commission/omission actually contributed to a serious misfortune (e.g., wishing that someone died and this someone dying the next day).

Factors that are proposed to interact with these life experiences include blame and criticism, situational increases in responsibility, such as child birth (Leckman et al., 1999; Abramowitz et al., 2006), in addition to coincidental events as explained in number five above. These experiences and factors predispose one to make negative appraisals when normal intrusions occur. For instance, number two particularly refers to authoritative sources such as school and clergy that can reinforce attitudes about responsibility for some people. For educational and religious institutions there is also the explicit possibility of blame, guilt and punishment (whether in this world or afterlife). This learning experience can lead to the development of attitudes about, for example, the importance of controlling thoughts, that go beyond obsessions of religious content. Salkovskis et al. (2000) speculate that dysfunctional responsibility beliefs for this type are developed during childhood or puberty, that the speed of onset of OCD is gradual, and that rumination and perfectionism will be the main OCD symptoms for this type. Empirical evidence for Salkovskis' model (1985, 1999) comes from two sources: questionnaire studies and laboratory experiments, both will be discussed here.

4.3.1. Empirical support from questionnaire studies. Self-report questionnaires, such as the 'Responsibility Interpretations Questionnaire' (RIQ; Salkovskis et al., 2000) and the 'Responsibility Attitudes Scale' (RAS; Salkovskis et al., 2000) have been developed to assess whether people suffering from OCD have an inflated sense of responsibility compared to patients with other anxiety disorders and nonclinical individuals. Salkovskis et al. (2000) found that individuals with OCD

interpreted their intrusive thoughts in terms of responsibility significantly more than those with other anxiety disorders, who in turn scored significantly higher than nonclinical controls. The association between responsibility appraisals and OCD symptoms remained significant even when anxiety and depression levels were controlled for. Similar findings were obtained by the OCCWG (2003), with responsibility beliefs and appraisals made by 248 OCD patients being significantly higher than those made by 105 nonobsessional anxious controls and 300 nonclinical controls.

Foa et al. (2002b) examined inflated perception of responsibility for harm among OCD patients with checking compulsions, OCD non-checkers, and nonanxious controls in a low, moderate, and high-risk scenario. For low and moderate risk, OC responsibility beliefs, relief of rectifying the situation, and urges to rectify were significantly higher for OCD checkers than nonanxious controls. Yet no significant differences for any of the OC responsibility dimensions were found between nonanxious individuals and OCD patients without checking compulsions. More recently, Cogle, Lee and Salkovskis (2007) conducted the same research without using checking scenarios, eliminating the possibility that findings are due to criterion contamination. Hence, OCD checkers, OCD non-checkers, other anxiety disorder patients, and nonclinical individuals completed responsibility measures (the RIQ and the RAS) that do not have item overlap with OCD symptoms. Their results showed that OCD checkers endorsed greater responsibility appraisals than both anxious and nonclinical control groups. Conversely, OCD non-checkers endorsed greater responsibility appraisals than nonclinical controls, whilst not differing from anxious controls or OCD checkers (Cogle et al., 2007).

The difference between Foa et al.'s (2002b) and Cogle et al.'s (2007) results might be due to the OCD assessment tool used. Foa et al. (2002b) used the OCI-R (Foa et al., 2002a), that primarily assesses overt compulsions, making it biased against covert compulsions (e.g., ruminators), and thereby making it less likely for covert checkers to score high on the OCI-R checking subscale. Finally, Cogle et al. (2007) conclude by stating that different types of responsibility appraisals have different behavioral consequences; the "washing" and "checking" subtypes of OCD may be better labeled as "verification" and "restitution". The former reflects a person anxiously fearing they may be in danger of causing harm that must be compulsively checked. In restitution, on the other hand, there is more a sense of always having caused harm, which results in washing and other types of

neutralizing, accompanied by depression and discomfort in addition to anxiety.

Questionnaire studies have also been used to test the assumption that people with OCD regard any influence over an event equivalent to being responsible for that event. That is, OCD patients are proposed to be unable to distinguish being responsible for harm by errors of commission versus omission. Wroe and Salkovskis (2000) have found empirical support for this, as people with OCD were significantly more sensitive to errors of omission than people without OCD in distressing contexts, whereas for errors of commission there were no significant differences between obsessionals and nonobsessionals in distressing contexts. Forrester, Wilson, and Salkovskis (2002) provided obsessional and nonclinical individuals with details of ambiguous situations and either a negative or a neutral intrusive thought relating to the situation. Their results indicated that the occurrence of intrusions tends to transform a situation that might involve an omission into a situation requiring an active choice. This is consistent with Salkovskis' model as people with obsessional problems may be oversensitive to some situations because they are particularly likely to foresee harm in the form of intrusions, and that such foresight elevates anxiety (Forrester et al., 2002).

There have been various questionnaire studies that examined Salkovskis's model more precisely with respect to mediating and moderating effects of responsibility, other misappraisals, and distress. Smári and Hólmsteinsson (2001) were the first to report that responsibility and thought suppression were mediators between intrusive thoughts and OCD symptoms in a large nonclinical Icelandic sample. Secondly, Pleva and Wade (2006) incorporated perfectionism and tested the mediating effects of misinterpretation of intrusive thoughts on the respective relations of responsibility and perfectionism with OC symptoms. Their findings supported Salkovskis' theory, as it was found that the relationships of responsibility attitudes and perfectionism with OC symptoms are both partially mediated by misinterpretation of intrusive thoughts. Furthermore, while responsibility and perfectionism were shown to be significant predictors of misinterpretations of intrusive thoughts and OC symptoms, responsibility was a stronger predictor than perfectionism when all of the variables were included in the model.

More recently, Barrera and Norton (2011) also tested Salkovskis model (1985) with respect to moderators and mediators on the relationship between intrusive thoughts and OCD symptoms, in a

large nonclinical sample. Depending on which OCD measure was used (and their weighing of obsessions versus compulsions), significant interactions effects between frequency of intrusive thoughts, distress, and responsibility beliefs were found. Overall, the results indicate that the presence of high responsibility beliefs and/or distress about the intrusive thoughts is linked to enhanced OCD symptoms, especially when intrusions occur frequently. This is consistent with Salkovskis' assertion that the appraisal of intrusive thoughts as personally meaningful (and hence distressing and/or indicating responsibility to prevent harm) leads to OCD symptoms. It is also consistent with Smári et al.'s (2010) findings that supported the mediating role of inflated responsibility between pathways to responsibility beliefs and OCD symptoms as proposed by Salkovskis et al. (1999). However, all these results do not indicate the directionality of the relation, leaving alternative pathways to be studied.

4.3.2. Empirical support from experiments. Studies involving the experimental manipulation of responsibility have been employed to test whether higher levels of responsibility increase discomfort (e.g., anxiety) and neutralizing behavior; and whether decreasing responsibility will do the opposite. Two early studies manipulated the level of perceived responsibility. Lopatka and Rachman (1995) reported that under conditions of high responsibility, urges to perform compulsive behaviors (i.e., checking), subjective levels of anxiety, and estimates of threat were all increased in contrast to the low responsibility condition. Similarly, Ladouceur et al. (1995) found that participants in the high responsibility condition reported greater preoccupation with errors and anxiety during their 'pill-sorting task' (e.g., participants were told that sorting task had great importance for the development of a medicine), resulting in more hesitation and checking than in the low responsibility condition (e.g., sorting task was said to be in reference to studying perception of colors).

These findings were replicated more recently by Arntz, Voncken, and Goosen (2007) in a similar experimental study. It was found that subjective OCD-like experiences and checking behaviors were higher in OCD patients in the high responsibility condition than in all other groups. Because of the unclear role of perfectionism in relation to responsibility, Bouchard, Rheaume, and Ladouceur (1999) researched the relationship between the two factors. They found that, in concert with previous studies, there are more checking behaviors when responsibility is increased, both for moderate and

high perfectionists. Furthermore, when responsibility was increased, high perfectionists reported more influence and responsibility for negative outcomes than moderate perfectionists. This supports the hypothesis that high perfectionism is an intervening variable in having an inflated sense of responsibility for negative events.

A second prediction of Salkovskis' model that experimental studies test is whether neutralizing behaviors increase both the frequency of intrusions and their associated discomfort, in addition to preventing disconfirmation of patient's fears. In a nonclinical sample, Salkovskis et al. (1997) instructed half of the sample to neutralize and half of the sample to distract themselves without neutralizing. The participants who neutralized the first phase of the study experienced more discomfort and urges to keep neutralizing in the second phase. Salkovskis et al. (2003) replicated these findings in a sample of OCD patients, supporting the emphasis on responsibility in this cognitive account.

Furthermore, Salkovskis's model also proposes that due to their inflated perceptions of responsibility, people with OCD have an enhanced vigilance for a broad range of potentially threatening stimuli. Consequently, they might also show a decreased ability to inhibit other environmental stimuli such as irrelevant intrusive thoughts. Pleva and Wade (2001) investigated this hypothesis, e.g., inflated responsibility being related to deficits in attention. A correlation was found between responsibility and visual selective attention deficits beyond those that could be attributed to OCD symptoms. Responsibility was a stronger predictor of obsessive-compulsive symptoms than attention, and it was the only significant predictor of a person being in the low versus high obsessional symptom group. Specifically, the odds ratio from this model associated with responsibility showed almost a 10-fold increase in the risk for being in the high obsessional symptom group for every standard deviation increase in responsibility (Pleva & Wade, 2001).

Finally, experimental studies test for the assumption of Salkovskis' model (1985) that low mood will increase the persistence of intrusive thoughts. Startup and Davey (2003) conducted a study where both responsibility and mood were manipulated. Their explanatory variable was the number of 'catastrophizing' steps in a 'catastrophizing' interview where "what if?" questions are probed in relation to potential problematic life issues. It was hypothesized that participants with obsessional problems tend to respond with increasingly worse considerations (Shafran, 2010). Startup and Davey

(2003) indeed reported that, in the high responsibility condition, participants with a negative mood endorsed more catastrophizing steps than participants with a neutral or positive mood. Yet unexpectedly, in the low responsibility condition, participants with a positive mood endorsed more catastrophizing steps than participants in neutral or negative mood states.

Although catastrophizing steps are not the same as intrusive thoughts, and hence, this study is limited in directly assessing Salkovskis' (1985) model, some insight into the association between responsibility, mood, and cognitive processes is provided (Shafran, 2010). Davey et al. (2003) furthermore conducted two experiments associated with checking behavior in relation to safety/security when leaving the house. It was found that the urge to repeat the task was determined by certain configurations of mood. In particular, perseverance of compulsive checking occurred most when participants were asked to undertake the tasks in a negative mood (Davey et al., 2003).

4.4. Rachman's cognitive theory of obsessions.

Rachman developed a different cognitive account of OCD for two reasons: other cognitive-behavioral models appear to leave unexplained why obsessions can occur without compulsions; and 2) cognitive-behavioral treatment of patients with solely obsessions seemed relatively unsuccessful (Rachman, 1993). The foundation of the theory is similar to the models of Salkovskis (1985) and Clark (1986) however. Namely, this theory also postulates that the perceived importance of normal intrusions can become inflated if one suffers from certain cognitive biases. Yet for Rachman (1993) the cognitive biases are not limited to responsibility appraisals, and responsibility is not assumed to be the central causal agent in the development and maintenance of OCD. Specifically, Rachman (1993) proposed a mediated model whereby thought-action fusion (TAF) leads to responsibility appraisals and then to OCD symptoms (Matthews, Reynolds, & Derisly, 2006). An example is a very devoutly religious patient who has sexual images about Jesus whilst trying to pray. The obsessional patient would interpret herself as a hypocrite and a pervert, giving rise to a vicious circle of anxiety and distress, obsessions, personal significance, anxiety and distress, and so on (Shafran, 2010).

Initial empirical evidence in support of Rachman's theory (1997) include the observation that cognitions may cause anxiety (Clark, 1986), that patients report their obsessions to be meaningful

(Freeston et al., 1993), and the presence of cognitive biases such as TAF (Shafran, Thordarson, & Rachman, 1996). TAF can be seen as a subtle and complex variation of inflated responsibility. Namely, the trigger for TAF can be the person's own thoughts or images or external cues, both inflating feelings of responsibility, through two particular cognitive biases:

- ❖ Morality bias; thoughts, whether voluntary or involuntary, are treated as moral equivalents of actions (e.g., wishing someone harm is equally wrong as doing someone harm).
- ❖ Probability bias; the thought of a specific situation enhances the probability of this situation actually occurring. This bias can pertain both to oneself (e.g., becoming very ill) or to others (e.g., a loved one becoming ill; Shafran et al., 1996). The self-probability bias can be explained as self-fulfilling prophecies, e.g., internal phenomena that impact the real world through a person's behavior and consequences of such behavior.

Both the morality and probability biases imply a spurious relation between thoughts and actions (hence the collective term of 'thought-action fusion'; Shafran et al., 1996). Such beliefs will make one vulnerable to catastrophic misinterpretation of intrusive thoughts. Other vulnerability factors include elevated moral standards, depression, and anxiety (Shafran, 2010). Rachman (1998) subsequently elaborated his cognitive theory, in order to explain the frequency of obsessions, their persistence, the internal and external provocations of obsessions, and the nature and the content of obsessions. Specifically, Rachman (1998) proposed that:

1. When a catastrophic misinterpretation of the significance of the intrusion is made, this increases the range and severity of potentially threatening stimuli. For example, sharp objects become potential weapons. The increase in number of threats also enhances the opportunity of obsessions being provoked. Even internal sensations such as anxiety may become a threatening stimulus.
2. Avoidance or neutralization provides temporary relief from obsessional distress, though the significance of the obsessions remains unchanged. Neutralization can be seen as attempts to make things right, and result in a) relief; b) the belief that neutralization prevented the feared

event; and c) a failure to disconfirm the significance of the intrusive thought. It is predicted that the significance attached to an obsession will remain unaltered or increase after repeated neutralization efforts. The significance attached to an intrusion will decrease however, after repeated instances in which the obsession is not followed by neutralizing.

3. The frequency of the intrusions alone can be drastically misappraised as evidence of their significance.
4. Attempts at thought suppression as a result of an inflation in the significance of an intrusion can paradoxically increase the occurrence of the obsession.

Empirical evidence for Rachman's cognitive theory (1993, 1997, 1998) again mainly comes from questionnaire studies and laboratory experiments. Moreover, since the theory is strongly influenced by Salkovskis's cognitive-behavioral model, there are few competing hypotheses distinguishing the models. As mentioned, Rachman's cognitive theory only subtly differs from Salkovskis's model by emphasizing a broader range of appraisals, some of which (such as TAF) are closely related to responsibility appraisals. Empirical support of Salkovskis's account is therefore also consistent with the cognitive theory of obsessions (Shafran, 2010). Nonetheless, there are additional empirical studies that are relevant for both cognitive-behavioral models, which will be described below.

4.4.1. Empirical support from questionnaire studies. Although questionnaire studies cannot test for causality and provide a direct evaluation of Rachman's (1997) theory, they are consistent in reporting a significant relation between TAF and obsessionality. Questionnaire studies have used the Thought-Action Fusion Scale (TAFS), developed by Shafran and colleagues (1996). The TAFS contains the moral, likelihood-self, and likelihood-others subscales, operationalizing the aforementioned forms of biases. Shafran et al. (1996) and Rassin et al. (2001a, 2001b) all report the TAFS-likelihood subscales to be significantly related to OCD symptoms, even after controlling for depression. Especially checking symptoms showed a moderate correlation with the likelihood-others subscale, and cleaning compulsions with the likelihood-self subscale. In contrast, the TAFS-moral subscale was not found to significantly correlate with OCD symptoms, whether or not depression was controlled for.

However, there is much reported evidence of TAF not being specific to OCD patients, but

characteristic of anxiety orders in general (e.g., Abramowitz et al., 2003c; OCWG, 2003). Abramowitz et al. (2003c) compared levels of TAF in OCD patients and patients with other anxiety disorders, depression, and healthy controls. Though OCD patients scored highest on the likelihood biases, this difference was mainly due to differences in negative affect (e.g., anxiety and depression). That is, negative affect appeared to mediate the relationship between OCD and TAF (Abramowitz et al., 2003c). Shafran and Rachman (2004) reviewed studies demonstrating that TAF most likely plays a role GAD, panic disorder, and eating disorders. Taken together, these studies question the specificity of TAF to OCD. There seems to be an association between obsessional psychopathology and the TAFS-likelihood subscales, whereas TAFS-moral does not significantly correlate with OCD in nonclinical samples. Conversely, moral TAF does seem to be related to depression (Shafran et al., 1996; Abramowitz et al., 2003c) and religiosity (e.g., Nelson et al., 2006), which will be discussed in the sixth chapter of this thesis. This could mean that the total TAF score is less informative than subscale scores or researching TAF in a more idiographic manner (Shafran & Rachman, 2004).

In line with this, Corcoran and Woody (2008) examined how nonclinical individuals appraised vignettes involving prototypical themes of primary obsessions: aggressive, sexual, and blasphemous thoughts. Results showed that unwanted intrusive thoughts that were described as occurring more frequently were appraised as more personally significant. Furthermore, subclinical OCD symptoms were related to the tendency to interpret intrusive and socially unacceptable thoughts as indicators of possible faulty character, mental instability, or immorality. Finally, participants appraised these taboo thoughts similarly whether they imagined having personally experienced them, or a friend confiding them about having experienced these thoughts. These findings are consistent with the OCCWG (2001, 2003, 2005) and demonstrate that associations between appraisals and OCD symptoms are not due to differences in the content of intrusive thoughts reported by OCD patients and normal controls (Corcoran & Woody, 2008).

4.4.2. Empirical support from experiments. Experiments have been conducted to investigate the role of TAF in the etiology and maintenance of OCD. Rassin et al. (1999) wired up an experimental group of 19 high school students, and told them that the equipment would monitor their thoughts. In

particular, the experimental group was told that if they thought the word “apple” a mild shock would be given to another person. They were also told that this shock could be prevented by pressing a button as soon as an “apple” thought occurred. The control group was simply told that the equipment would read their thoughts. The authors established that participants found the experimental manipulation to be credible. Results showed that the experimental group had more “apple” thoughts, experienced more discomfort, and resisted the word “apple” more than the control group. The number of reported “apple” thoughts was also significantly related to the frequency of pressing the button. These findings support the hypothesis that if a person believes that his or her thoughts can have real-world detrimental consequences (i.e., TAF), normal intrusions are transformed into distressing, persistent, and obsessional intrusions (Rassin et al., 1999).

Rachman et al. (1996) conducted an experiment where participants had to write the sentence “I hope that is in a car accident” and insert the name of a loved one on the dotted line. The researchers hypothesized that misinterpreting the significance of one’s thoughts on a moral level, or based on the belief that such thoughts increase the likelihood of harm happening, will provoke the urge to neutralize. This neutralizing in turn will only provide temporary relief and the obsessional anxiety will remain unchanged. Rachman et al. (1996) indeed observed that among students prone to TAF, activating TAF-related beliefs by writing this sentence evoked anxiety and neutralizing urges (e.g., ripping the piece of paper, writing something positive next to the sentence). Yet different findings were reported in two studies investigating students without TAF inclinations.

These studies were conducted by van den Hout et al. (2002) and van den Hout, van Pol, and Peters (2001), who both divided participants in a three groups: one group was instructed to neutralize, one was not told anything about neutralizing, and one was prevented to neutralize by doing mental arithmetic. Van den Hout et al. (2001) found that after writing down an anxiety-provoking sentence, the no instruction group neutralized to the same extent as the group that was specifically instructed to neutralize. Van den Hout et al. (2002) also reported the effect of neutralizing instructions to be considerably less powerful than Rachman et al. (1996) reported in their sample of TAF-prone individuals. Both van den Hout et al. (2001, 2002) observed within two minutes anxiety to decrease to base line levels, making the three groups indistinguishable. Only when participants were asked to

think about the thought again, anxiety increased slightly. There was furthermore no significant difference in the increase in anxiety between the neutralization prevention and the other two groups.

A cross-sectional study of nonclinical participants, using structural equation modeling (SEM), found that TAF-likelihood had a direct effect on increasing OCD symptoms, whereas TAF-moral only appeared to increase OCD symptoms via thought suppression (Rassin et al., 2000). This was in concert with the authors' assertion that TAF-likelihood biases may lead to compulsions or avoidance as a way of preventing negative consequences, while TAF-moral biases are not directly related to catastrophic consequences, and more likely lead to thought suppression instead of overt compulsions (Berle & Starcevic, 2005). Using the sentence provocation method, Rassin (2001) investigated 40 nonclinical individuals, where half of the participants was instructed to suppress their thoughts and the other half was not. Unexpectedly, the group in the suppress condition after provoking TAF has lower levels of anxiety and discomfort, thus not supporting the cognitive-behavioral account of TAF in OCD. However, the sentence paradigm used to elicit TAF may not have elicited significant levels of the belief in the nonclinical sample used. Such a sample is unlikely to hold strong beliefs in TAF.

For this reason, Shafran and Rachman (2004) stress in their review the importance of using a sample of individuals with TAF and/or obsessional complaints, in order to investigate whether TAF plays a role in the maintenance of OCD. Berle and Starcevic (2005) conclude in their review that there is meager evidence indicating that manipulating TAF results in expected effects in OCD symptoms, such that decreasing TAF leads to reduced OCD symptoms. It seems that TAF plays some role in the maintenance of OCD (e.g., moral-TAF for religious OCD symptoms), but not for all forms of the disorder and all symptoms. Similar to Shafran and Rachman (2004), Berle and Starcevic (2005) provide a comprehensive overview of TAF's role in other disorders, challenging the construct's specificity to OCD.

4.5. Purdon and Clark's cognitive theory of obsessions.

Purdon and Clark (1999) developed a model where two cognitive aspects are given emphasis in explaining the pathogenesis of obsessional problems: 1) faulty beliefs about the importance of controlling one's thoughts; and 2) negative misinterpretations of the consequences of failure to control

unwanted intrusive thoughts. An example of such a faulty belief is “losing control of thoughts is as bad as losing control over behavior” (Purdon & Clark, 2002: 31). In her review, Purdon (2004) sums up why thought suppression is proposed to have this insidious effect: a) it leads to a paradoxical increase in thought frequency; b) it makes the individual hypervigilant to thoughts and thought processes so that triggers and traces of the thought are much more salient; c) it terminates exposure to the thought, preventing new learning about its importance; and/or d) the inevitable thought recurrences during suppression enhance negative appraisal of the thought’s meaning. In other words, increased frequency and enhanced negative appraisal induce a more negative mood, which makes negative thoughts and appraisals more accessible, making the individual more motivated to control the thought.

The importance of controlling one’s intrusive thoughts is in fact also incorporated in Salkovskis’ (1985, 1999) and Rachman’s (1997) models. In particular, Rachman (1998) suggested that “an inflated increase in the significance attached to an unwanted intrusive thought, such as an obsession, will lead to more vigorous and intense attempts to suppress such thoughts” (p.393). Like Clark and Purdon (1993), both the accounts of Salkovskis (1999) and Rachman (1998) delineate that suppressing intrusive or unacceptable thoughts represent one mechanism by which obsessions (paradoxically) increase in frequency. This model of the development of obsessions is based on Wegner and colleagues’ (1987) work, who reported that intentional suppression of a neutral thought (“white bears”) resulted in an increase in its frequency during and after thought suppression (‘rebound effect’). The subsequently experienced thought control, combined with a low mood resulting from the initial failed attempts, are suggested to escalate attempts to regain control (Clark & Purdon, 1993).

Purdon and Clark (1999) also proposed that these failed attempts to control unwanted thoughts may drastically reinforce beliefs about the responsibility and personal significance involved in the intrusions. Furthermore, Purdon (1999) suggested that OCD patients are more prone to attempt thought suppression than other anxiety disorders patients due to the unique ego-dystonic nature of obsessions. That is, obsessional stimuli evoke stronger resistance and urges to suppress or control, compared to cognitive phenomena that are more consistent with one’s personality or beliefs, such as worries (Purdon, 1999).

4.5.1. Thought control and metacognitions. Purdon and Clark's (1999) model emphasizing thought control can also be perceived as emerging from the more central metacognitions model.

Metacognitions have been implicated in recent models of psychological disorders and their treatment (Wells, 2000; Wells & Matthews, 1994), and presume that psychological disturbance is maintained and intensified by the 'Cognitive Attentional Syndrome'. This syndrome is characterized by worry and rumination, and its activation links to metacognitive beliefs about the uncontrollability and danger of thoughts. In other words, metacognitive beliefs are considered to be the central causal agent in this model, and responsibility, thought control, and TAF the mediating variables that arise from more general metacognitive beliefs (Matthews et al., 2006).

Support for the metacognitions model was provided by Janeck et al. (2003), who found that the metacognitive domain of cognitive self-consciousness (e.g., the tendency to be aware of monitor thinking) was significantly correlated with OC symptoms. OCD patients showed higher scores than individuals with other anxiety disorders and nonclinical controls. Similarly, Gwilliam, Wells, and Cartwright-Hatton (2004) found evidence for the relation between negative metacognitions and OC symptoms. Matthews et al. (2006) found support for the metacognitions model in a sample of nonclinical adolescents, where both inflated responsibility and metacognitions made a significant independent contribution to OC symptoms. Solem et al (2010b) replicated these results for adults.

Consistent with Wells' (2000), who placed TAF within the more general category of metacognitions, Matthews et al. (2006) found that TAF did not make an independent contribution to OC symptoms over and above the variance attributed to responsibility and metacognitions. Furthermore, tests of mediation showed that the relationship between TAF and OC symptoms was fully mediated by responsibility attitudes, and that the relationship between metacognitions and OC symptoms was partially mediated by responsibility attitudes. Despite the mediation between metacognitions and OC symptoms by responsibility attitudes, responsibility appraisal remained a significant direct predictor of OC symptoms (Matthews et al., 2006).

More recently, Barahmand (2009) examined specific metacognitive difference among various anxiety disorders (GAD, depression, and OCD) in adults. To test for the specific negative metacognitions, the Meta-Cognitions Questionnaire (MCQ; Cartwright-Hatton and Wells, 1997) and

the TCQ were used. Results showed metacognitive beliefs, anxious thoughts, and need to control thoughts to be significantly greater in all the clinical groups than in normal controls. Multivariate analyses furthermore showed that GAD was characterized by negative beliefs about uncontrollability, danger, and negative beliefs about cognitive competence, while OCD was characterized by increased cognitive self-consciousness, replicating Janeck et al. (2003) and Gwilliam et al. (2004). Finally, the diagnostic groups also differed in their reliance on thought-control strategies, with the depressed patients showing a preference for worry and OCD patients relying on distraction and punishment.

4.5.2. Empirical support from questionnaire studies. Self-report data show that patients with OCD attempt to control their intrusive thoughts, supporting both Purdon and Clark's (1999) account and the broader metacognitions model (Wells, 2000). Clark and Purdon (1995) developed the Meta-Cognitive Beliefs Questionnaire (MCBQ), which covers a range of beliefs about intrusive thoughts OCD patients usually suffer from, such as responsibility. The authors indeed found OCD patients to score higher on the MCBQ than nonclinical individuals. Moreover, only the subscale measuring control over thoughts significantly predicted the severity of obsessional symptoms among the nonclinical sample (Clark & Purdon, 1995). Another measure, the Thought Control Questionnaire (TCQ; Wells & Davies, 1994) assesses the tendency to use five kinds of strategies for controlling cognitive stimuli: 1) distraction (e.g., with something that is enjoyable); 2) social control (e.g., talking to friends about the intrusion); 3) reappraisal (e.g., challenging the thought's validity); 4) punishment (e.g., getting angry at oneself for having the thought); and 5) worry (e.g., focusing on other negative thoughts).

Wells and Davies (1994) found that worry and punishment strategies were particularly dysfunctional and associated with measures of psychopathology in their large nonclinical sample. Amir, Cashman, and Foa (1997) were the first to use the TCQ in a sample of OCD patients and found that OCD patients used the worry, social, punishment, and reappraisal thought control strategies significantly more than nonanxious controls. Especially the use of worry and punishment strategies significantly predicted greater severity of OCD symptoms. A second study with OCD patients was done by Abramowitz et al. (2003b), who found that after controlling for anxiety and depression, OCD patients used maladaptive thought control strategies more frequently than patients with other anxiety

disorders and nonclinical individuals. These findings are in line with reported metacognitive differences across anxiety disorders (Barahmand, 2009).

In concert with the OCCWG (2003), Abramowitz et al. (2003a, 2003b, 2003c) conclude that using control strategies like worry and punishment helps maintain the OCD symptoms, since interpretations of intrusions, images, and/or impulses remain unaltered and more attempts to suppress thoughts are elicited. These assertions are coherent with Clark et al. (2003), who reported in a large nonclinical sample a unique relation between beliefs about obsessions and controlling intrusions or negative consequences if controlling failed. Furthermore, as mentioned earlier this chapter, Rassin et al. (2001a, 2001b) found that thought suppression was specifically related to OCD severity, though not to the severity of other anxiety disorders. Taken together, these findings support the emphasis on cognitive control in the maintenance of OCD (Clark & Purdon, 1995; Purdon & Clark, 1999).

4.5.3. Empirical support from experiments. Though the aforementioned questionnaire studies provide support for Purdon and Clark's (1999, 2002) theoretical model, the precise mechanism by which thought suppression exacerbates the disorder remains unclear (Rassin & Diepstraten, 2003). Hence, experimental studies that address the causal hypotheses about the relationship between thought suppression and OCD symptoms have been conducted. It is important to note however, that these studies are often problematic, due to methodological problems or a lack of ecological validity (Purdon, 2004). Even results of methodologically sound laboratory experiments that assess whether attempted thought suppression creates the paradoxical effect of enhanced thought frequency, remain ambiguous.

Salkovskis and Campbell (1994) conducted one of the earliest experiments researching whether thought suppression can cause obsessions. They asked nonclinical participants who scored higher on obsessionality than average, to find naturally occurring intrusive thoughts/impulses/images. Five participants were subsequently instructed to suppress these thoughts for five minutes, whilst simultaneously the occurrence and aspects of the thought were evaluated. This evaluation continued also afterwards, during a non-suppression period. The authors observed an immediate effect of suppression such that frequency was greater during suppression than at other times (e.g., "immediate enhancement" effect), except for the participants who were given an attentionally engaging task to

perform during the suppression period.

Abramowitz, Tolin, and Street (2001) conducted a meta-analytic review of controlled studies of thought suppression. While they found overall evidence for the immediate enhancement effect (e.g., target thoughts increasing while the subject is attempting to suppress them) not very consistent, support for a small to moderate rebound effect was found. This entails that at some point after attempting to suppress the target thought, people experience more intrusions than others who had not tried to suppress the target thought. In addition, they found that studies that used thought expression instructions (e.g., actively generating a thought) as opposed to “think anything you like, including the target thought” instructions, had a greater rebound effect. Additionally, studies that measured thought frequency through overt means (i.e., ringing a bell) demonstrated a greater rebound effect than studies using more covert means (i.e., pressing a key when the thought occurs). The rebound effect was furthermore stronger for studies in which participants were suppressing thoughts about an entire story, rather than suppressing specific, discrete thoughts. Finally, there was no evidence of differences in size of the rebound effect between clinical and nonclinical samples, or whether the thought was emotionally charged or neutral. Yet the authors note that a severe limitation of these conclusions is that their meta-analytic review included only one study using a sample of OCD patients, participants who are actually suffering from repetitive, negative, and unwanted thoughts (Abramowitz et al., 2001).

In response to this limitation, Tolin et al. (2002) conducted an experiment with OCD patients, including two studies on thought suppression. In the first study, OCD patients, other anxiety disorder patients, and nonclinical controls were instructed to suppress the thought of a “white bear”. Only the OCD patients showed an increase in “white bear” thoughts during suppression attempts (e.g., an immediate enhancement effect), whilst for none of the three groups a subsequent rebound effect was observed. The second study by Tolin et al. (2002) was designed to surmount potential reporting biases by avoiding reliance on participants’ self-report of target thought occurrences. Therefore, the authors used a lexical decision paradigm that assessed the priming strength of a target word under the conditions of thought suppression. Participants were told to suppress a white bear thought and were subsequently given a lexical decision task that included words relevant to white bears, words not relevant to white bears, and non-words. As expected, OCD patients showed a decreased lexical

decision latency for their suppressed thought, that is, the paradoxical effect of thought suppression occurred. Hence, individuals with OCD seem to be more sensitive to target thought related stimuli (Purdon, 2004). Tolin et al. (2002) interpreted these findings as evidence for deficits in cognitive inhibitory processes that may underlie the repetitive nature of clinical obsessions.

Why OCD patients would have this deficit is unclear. Tolin et al. (2002) suggest that when OC individuals are trying to suppress a certain thought, they have stronger priming representations of that thought, which in turn makes the thought more accessible. It could also be that OC individuals have 'hyper-efficient' processes for detecting thoughts. This proposition is compatible with Janeck et al. (2003), who found that OC individuals could be distinguished from individuals with GAD through their tendency to be aware of and evaluate negative thinking. There may also be additional neurological factors that make it difficult for individuals with OCD to inhibit stimuli. Finally, Purdon (2004) emphasizes that cognitive-behavioral models of OCD that involve thought suppression are more complex than implying a straightforward paradoxical effect on frequency. Rather, misappraisal of intrusions most likely interacts with thought suppression, mood state, and thought occurrences during suppression.

4.5.4. Empirical support from naturalistic observations. Finally, naturalistic observations have examined whether thought suppression could serve the same function as neutralizing (Rassin, 2001). Purdon, Rowa, and Antony (2007) asked 24 OCD patients to monitor their thought suppression attempts over three days, using structured diaries and tallies for every suppression attempt. It was found that the number of daily suppression attempts was enormously variable and with mixed motives, but typically used prior to neutralizing. The motives provided in order of importance were: a) to get rid of the thought before it escalated in intensity and caused emotional distress; b) to get the obsession out of their mind before a ritual was necessary; and c) to get rid of it before it caused harm to self or others. Additionally, the primary suppression strategy was to say "stop", followed by distracting oneself, thought replacement, and rationalizing the thought. Participants found their suppression attempts to be completely successful 11% of the time, successful with prolonged effort 30% of the time, and successful with little effort 27% of the time. Purdon et al. (2007) interpret these data as

indicative of suppression being the first line of defense against an obsession, primarily used to avoid having to perform a ritual. Finally, suppression does seem to be used as a neutralizing strategy, to ameliorate negative effect and prevent harm, as suggested by Rassin (2001).

4.6. Review of the cognitive-behavioral account.

The previous sections have discussed empirical support for theoretical assumptions of the three cognitive-behavioral models. Though the models differ in their emphasis on specific appraisals, the literature generally seems to support the role of the various dysfunctional beliefs and appraisals in the emergence and maintenance of obsessions and compulsions. That is, the appraisals of responsibility, thought-action fusion, and thought control are generally associated with OC symptoms. Nonetheless, there is a vast amount of literature investigating overall explanatory power of dysfunctional beliefs in OCD symptomatology more systematically and critically. A critical review of the cognitive-behavioral account in explaining OCD's etiology will be provided in this section.

Importantly, there is evidence that OC-related beliefs are not present in all OCD patients. Two cluster analytic studies reported that some individuals with OCD, or certain presentations of the disorder, do not show elevated levels of three domains of obsessive beliefs: responsibility/threat estimation, perfectionism/certainty, and importance/control of thoughts (OCGWG, 2005). The first study was done by Calamari et al. (2006), who identified OCD subgroups based on differential OC-related beliefs in a sample of treatment-seeking clinical patients. Beliefs were assessed with the Obsessive Beliefs Questionnaire (OBQ; OCCWG, 2003, 2005). Similar to a second study done by Taylor and colleagues (2006), Calamari et al. (2006) identified a low-beliefs subgroup. This low-beliefs group had OBQ scores approximating scores of nonobsessional anxious patients or even nonclinical individuals. This means that in two studies with large OCD clinical samples, a substantial subgroup (56% in the sample of Calamari et al, 2006; 51% in the sample of Taylor et al., 2006) consisted of members who did not have elevated scores on dysfunctional beliefs or appraisals. For these OCD patients dysfunctional beliefs do not play a role in the emergence or maintenance of OCD.

These findings make it necessary to elucidate why and how OC-related beliefs and appraisals impact OCD symptoms for certain OCD patients. To this end, it is necessary to evaluate the robustness

of the relationship between OC-related appraisals and symptoms. Three patterns of empirical evidence would support a causal relationship between OC cognitions and symptoms (and will be discussed in the following sections):

- 1) Generality; referring to an association between at least one form of obsessive belief with all the different symptom dimensions;
- 2) Congruence; referring to meaningful different relations between various obsessive beliefs and OC symptoms; and
- 3) Specificity; referring to OCD patients having more obsessive-compulsive cognitions than patients with other anxiety disorders (Tolin et al., 2006).

4.6.1. The generality and congruence criteria. Apart from Taylor et al.'s (2006) and Calamari et al.'s (2006) studies, research has generally supported the generality criterion. Tolin, Woods, and Abramowitz (2003), the OCCWG (2005), and Tolin, Brady, and Hannan (2005) found that all of the assessed domains of OCD symptoms were predicted by at least one domain of maladaptive beliefs, even when comorbidity was controlled for. Furthermore, Taylor et al. (2010b) found through structural equation modeling (SEM) in a sample of 5015 participants, a pattern of the three belief domains of perfectionism/certainty, importance/control of thoughts, and responsibility/threat estimation (OCCWG, 2005). These domains could be linked to at least one of six types of OCD symptoms: ordering, checking, neutralizing, obsessing, hoarding, and washing (Taylor et al., 2010b).

Furthermore, studies also tend to (at least partially) support the congruence criterion. Namely, it has been repeatedly reported that discrete obsessive beliefs relate to specific OCD symptom dimensions in a way that is consistent with models of those symptoms. For example, contamination obsessions and washing compulsions have been commonly predicted by the misappraisals of overestimating the likelihood of threat. Ordering and precision-related symptoms, on the other hand, have generally been associated with a need for perfectionism and certainty (Myers, Fisher, & Wells, 2008; Woods, Tolin, & Abramowitz, 2004). Novara et al. (2011) demonstrated a similar close relation between particular dysfunctional beliefs and symptoms related to impaired mental control, contamination, and checking. Moreover, these congruent relations showed greater stability over time

than total OC beliefs scores (Novara et al., 2011).

Further support for the generality and congruence criteria of dysfunctional beliefs in OCD's pathogenesis was found by Abramowitz et al. (2006) in a naturalistic design study. Their study examined whether misappraisals are specific vulnerability factors in the pathogenesis of OCD symptoms during childbirth and postpartum. Results showed that the sample indeed experienced intrusions related to the infant and performed subsequent (albeit subclinical) neutralizing behaviors. The content of the intrusions resembled that of clinical obsessions as they focused on harm and aversive events, whilst the individuals described them as senseless and incongruent with their belief system. Moreover, participants' scores on dysfunctional beliefs predicted the development of OCD, after controlling for pre-existing OCD symptoms, anxiety, and depression. This means that expecting parents who believed that their intrusions are significant and threatening suffered more severely from postpartum OC symptoms in comparison to parents who did not hold such dysfunctional beliefs. The misappraisals also predicted the severity of the checking, washing, and obsessional symptom dimensions, whilst the misappraisals were not specific risk factors for the development of the neutralizing, ordering, and hoarding dimensions (Abramowitz et al., 2006).

In concert with this, Wheaton et al. (2010) found that each OCD symptom dimension is predicted by one or more domains of obsessive beliefs in a theoretically consistent manner, and that these associations remained significant even after controlling for general negative affect. Specifically, contamination symptoms were predicted by beliefs pertaining to inflated responsibility and elevated threat estimation beliefs. Secondly, these beliefs also predicted OCD symptom dimensions mainly containing obsessional guilt and doubt about being responsible for causing harm, along with excessive checking or reassurance-seeking rituals. Further, beliefs involving the need for certainty and perfection predicted symmetry and ordering OCD symptoms, including obsessional thoughts regarding things being 'incomplete', along with ordering and arranging rituals. Finally, beliefs about the importance of and need to control thoughts predicted the unacceptable thoughts dimension of OCD. This dimension involves religious, sexual, and violent obsessions along with neutralizing strategies (e.g., mental rituals), aimed at preventing negative outcomes or thought replacement (Wheaton et al., 2010).

In sum, apart from certain low-beliefs groups amongst OCD patients (Taylor et al., 2006;

Calamari et al., 2006), the generality and congruence criteria seem to be largely supported by the literature. All of the assessed OCD dimensions relate to dysfunctional beliefs, and the relations between specific misappraisals and specific OCD symptoms appear generally consistent with theory and clinical practice (e.g., Taylor et al., 2010b; Myers et al., 2008; Wheaton et al., 2010).

4.6.2. The specificity criterion. The specificity hypothesis has received less consistent support. Recently, Julien et al. (2008) found that their OCD sample score significantly higher on OC beliefs than both anxious and nonclinical controls. Controlling for general distress (e.g., anxiety and depression) and age, OCD patients scored significantly higher than nonclinical individuals on all subfactors and total score of OC beliefs. However, other empirical studies have largely remained equivocal (Taylor, Abramowitz, & McKay, 2007). For example, Tolin et al. (2006) researched the specificity hypothesis in a large sample of OCD patients, other anxiety disorder patients, and nonclinical controls. When not controlling for depression or anxiety, OCD patients scored higher than the other two groups on the maladaptive beliefs of perfectionism/certainty and importance/control of thoughts, but not on the responsibility/threat estimation belief. This is only partly in concert with findings of the OCCWG (2005), who reported significant differences between OCD and other anxiety disorder patients for the responsibility/threat estimation and importance/control of thoughts domains, but not for the perfectionism/certainty domain.

These findings together seem to indicate that the appraisal of importance and control of thoughts has a more robust relationship with OCD than the other dysfunctional beliefs. This notion was reinforced when Tolin et al. (2006) controlled for depression and anxiety, since only the misappraisal of control of thoughts significantly distinguished OCD patients from other anxiety disorder patients and nonclinical controls. The authors furthermore found that OCD patients with high scores on the control of thoughts dimension, also endorsed more thought control strategies. In other words, Tolin et al. (2006) found more empirical support for Purdon and Clark's (1995, 1999) model emphasizing thought control than for Salkovskis's (1985) model emphasizing inflated responsibility. Namely, Tolin et al. (2006) reported that OCD patients did not endorse responsibility more strongly than patients with other anxiety disorders. Moreover, when controlling for depression and anxiety,

OCD patients did not even score significantly higher than nonclinical individuals.

Myers et al. (2008) investigated whether belief domains across non-metacognitive and metacognitive areas (e.g., perfectionism, responsibility, and threat vs. importance and control of thoughts) contributed towards OC symptoms. In concert with Gwilliam et al. (2004) and Tolin et al. (2006), the metacognitive factor of importance and control of thoughts was found to be a better predictor of OC symptoms than responsibility and perfectionism. Whereas importance/control of thoughts explained significant additional variance over perfectionism and responsibility, the reverse was not the case. Though perfectionism and responsibility can function as significant predictors of particular symptom subtypes, the metacognitive domain of importance/control of thoughts in addition to threat, were found to be more consistent independent predictors of OC symptoms (Myers et al., 2008). This is in line with Tolin et al. (2003, 2005), who found that the only misappraisal that did not predict OCD symptoms was responsibility.

However, these findings are in contrast with the results of the OCCWG (2001) and Taylor, McKay, and Abramowitz (2005), who did show anxious and OCD patients to differ on their responsibility beliefs. In particular, Taylor et al. (2005) found support for Salkovskis's (1985) model in their hierarchical factor analysis of the Obsessive Beliefs Questionnaire-Short Form (OBQ-44; OCCWG, 2005) scores of 202 OCD patients. Besides loading on a higher-order factor, responsibility beliefs explained unique variance (between 6-7%) in the presentation of OCD symptoms. Conversely, Belloch et al. (2010) observed that although OCD patients differed from nonclinical controls in their obsessive beliefs, no evidence of OCD-specificity emerged for any of the beliefs domains.

In sum, studies on the specificity criterion have generated conflicting results. All in all, findings seem to suggest that the failure to distinguish between OCD and other anxiety disorder patients when controlling for depression and anxiety, means that the endorsement of misappraisals is related more to psychopathology in general than to OCD (Tolin et al., 2006). The importance/control of thoughts dimension has received slightly more empirical support for being specific to OCD. In line with Taylor et al. (2005) and Belloch et al. (2010), future cognitive-behavioral researchers should investigate how specific OC beliefs contribute to OCD symptoms (if at all), once the general factor is accounted for, instead of linking particular dysfunctional beliefs to specific OCD symptoms.

4.6.3. Conclusion. In sum, there is only moderately consistent evidence of OC-related beliefs being involved in the emergence and maintenance of OCD symptoms for certain groups of OCD patients. In particular, this evidence shows limited support for OC beliefs pertaining specifically to OCD. Also, the contribution of appraisals in terms of total variance predicted, varies significantly across studies and symptom dimensions (Wheaton et al., 2010). Table 4.1. provides an overview of the empirical evidence reviewed in this chapter, for predictions derived from the cognitive-behavioral account. Clearly, substantial unexplained variance remains, which indicates that additional factors are involved in explaining the multidimensionality of OCD (Mataix-Cols et al., 2005; Abramowitz et al., 2006).

Table 4.1. *Summary empirical evidence for cognitive-behavioral predictions*

| <i>Prediction</i> | <i>Empirical support</i> |
|---|--------------------------|
| 1. The six OC-related beliefs statistically predict or are correlated with OCD symptoms. | ++ |
| 2. The beliefs should show specificity; they should be more strongly correlated with OCD symptoms than with measures of general distress (e.g., depression and anxiety). | -- |
| 3. The beliefs interact with one another to statistically predict OCD symptoms. | + |
| 4. OCD patients should generally score higher than control participants on measures of the appraisals. | + |
| 5. Experimental manipulations of appraisals (e.g., increases or decreases in responsibility appraisals) lead to corresponding changes in OCD symptoms. | + |
| 6. Naturally occurring events that increase the strength of beliefs or occurrence of appraisals (e.g., events increasing perceived responsibility) lead to increases in OCD symptoms. | ++ |
| 7. Efforts to suppress unwanted intrusive thoughts lead to an increased frequency of these thoughts. | + |

* *Note.* This table has been adopted from Taylor et al. (2007: 19), but modified following recent empirical studies reviewed in this chapter.

4.7. Multidimensionality of OCD.

The previous sections have evaluated the cognitive-behavioral account in terms of coherency, theoretical soundness, and empirical support. It was concluded that though cognitive-behavioral theory explains part of OCD's heterogeneity (e.g., Taylor et al., 2010b), a substantial part of the variance

remains unaccounted for. This means that factors besides dysfunctional beliefs/appraisals are involved in explaining the multidimensionality of OCD (Mataix-Cols et al., 2005; Abramowitz et al., 2006). Other studies that have contributed towards understanding OCD's etiology, emphasize behavioral (e.g., Maltby & Tolin, 2003), information-processing (e.g., McNally, 2000), and neurobiological (e.g., Saxena & Rauch, 2000; Maltby et al., 2005; Rosenberg et al., 2010) etiological mechanisms. Cognitive-behavioral models have been particularly juxtaposed with biological and genetic models that attempt to explain OCD in terms of structural and functional abnormalities or deficits located in the brain or neurotransmitter systems (Shafran, 2010). However, integrating cognitive and biological factors in one comprehensive multidimensional model is in all likelihood a more fruitful approach than juxtaposing the two accounts. Therefore, this final section will address the explanatory power of the biological account and its complementary character with the cognitive-behavioral account.

Rosenberg et al. (2010) provide a comprehensive overview of the biological, or neuropsychiatric, account of OCD, referring to research on the neurocircuitry of OCD (e.g., abnormal information processing in cortico-striatal-thalamo-cortical circuitry), neuroanatomical structures (e.g., increased cortical gray-white matter ratios, disturbance in the basal ganglia's, prefrontal cortex, and thalamus), and neurochemical systems (e.g., serotonin, *N*-Acetyl-Aspartate, glutamate, and choline) involved in the pathogenesis of OCD. At the same time however, Rosenberg et al. (2010) emphasize that these neurobiological studies on biomarkers of illness and treatment response should be part of a larger, multidimensional account of OCD.

Shafran (2010) rightfully states that: a) the current state of the biological literature can draw conclusions about the involvement of biological substrates in OCD, but not of causal nature; b) that if neuropsychiatric research becomes too far removed from the phenomenology of clinical phenomena, it is not as likely that the approach will result in clinical advances; and c) that the cognitive-behavioral account has increased our understanding of OCD significantly. However, Shafran (2010) does not fully acknowledge that no single model, whether cognitive or biological, has fully accounted for the disorder's complexity (Markarian et al., 2010). In response to Shafran (2010), Rosenberg et al. (2010) stress that the cognitive-behavioral and neuropsychiatric models may seem to represent opposing ends of the spectrum, but actually merely differ in emphasis. While neurobiological models focus on

neuroanatomical and neurochemical dysfunctions, the cognitive account emphasizes the role of normal (yet biased) thinking and learning (conditioning) processes.

This means that important points of convergence should not be overlooked. For example, the observed neuroanatomical changes in OCD can be interpreted in various ways, such as being epiphenomena and reflecting the presence of OCD symptoms, or representing a compensatory response to illness. Moreover, alterations in neurobiological parameters have been reported following Cognitive Behavioral Therapy (CBT), suggesting that the modification of cognition and behavior can change biological functioning (Rosenberg et al., 2010). Hence, clinicians and researchers in the field of genetics, neuroanatomy, and psychology should work together to increase the understanding of OCD's multidimensional nature (Markarian et al., 2010). Recent studies have started to do this, and seem to suggest that OC symptoms and beliefs each arise from a combination of genetic and (non-shared) environmental effects (Taylor et al., 2010a; Taylor, Jang, & Asmundson, 2010c).

Whereas cognitive-behavioral models emphasize the role of shared environment (e.g., parenting style) in the development of maladaptive beliefs, family segregation studies focus on nonadditive genetic factors in explaining OCD's etiology. To investigate these different emphases in OCD research, Taylor (2011b) meta-analyzed 37 twin samples from 14 studies. Results showed, in terms of mean effect sizes, that: a) additive genetic effects and nonshared environment accounted for most of the variance in OC symptoms; b) shared environment and nonadditive genetic effects made little or no contribution; c) these results did not vary with gender or symptom severity; d) variance due to nonshared environment increased with age; e) gene-environment interactions play an etiological role; f) OC symptoms are shaped by a common etiological factor, though there are also distinct symptom etiologies; and g) OC symptoms are also influenced by very general etiological factors (e.g., those influencing negative affect). In other words, the findings suggest that OC symptoms have a complex etiological structure that is not adequately accounted for by either cognitive-behavioral models or neurobiological models (Taylor, 2011b).

In line with this, Taylor and Jang (2011) made the first attempt to integrate the three domains of dysfunctional beliefs (perfectionism/intolerance of uncertainty, importance/control of thoughts, and inflated responsibility/overestimation of threat) with genetic factors into a unified, empirically

supported model. They used a nonclinical sample of 307 pairs of monozygotic and dizygotic twins to evaluate three possible models that conceptualized the causal relations between genetic and environmental factors, in addition to OC beliefs and symptoms. Partly consistent with cognitive-behavioral models, their results showed the ‘belief causation model’ to have the best fit. In this model genetic and environmental factors influence beliefs and OC symptoms, and beliefs also influence symptoms. That is, OC symptoms are shaped by genetic and environmental factors that exert their influence independent of dysfunctional beliefs, and indirectly through them. Each of the three dysfunctional belief domains played a specific role in the etiology of six OCD dimensions: ordering, checking, neutralizing, obsessing, hoarding, and washing.

However, OC beliefs explained only 18 per cent of the phenotypic variance in OC symptoms in the belief causation model (Taylor & Jang, 2011). Genetic and environmental factors, respectively, explained an extra 36 and 47 per cent of the phenotypic variance. The finding that the dysfunctional beliefs responsibility/overestimation of threat had the broadest influence on OCD symptoms (e.g., 5 out of 6 symptom dimensions), is in line with Salkovskis’s model (1985, 1999). The finding that the domain of importance/control of thoughts had a narrower impact (e.g., only on the obsessing symptom dimension), is also compatible with contemporary cognitive models of OCD (Purdon & Clark, 1995; Clark, 2004), which propose that this set of dysfunctional beliefs is specifically related to the development of obsessions.

4.8. Discussion.

Contemporary biological models of OCD have reported evidence for the etiological role of genetics (Nestadt et al., 2000; Pauls et al., 1995; Rosario-Campos et al., 2005; van Grootheest et al., 2008), neuroanatomy (Maltby et al., 2005; Saxena & Rauch, 2000; Whiteside et al., 2004; Busatto et al., 2001; van den Heuvel et al., 2009), neuropsychology (Lawrence et al., 2006; Markarian et al., 2010; Greisberg & McKay, 2003), and neurochemistry (March et al., 2007; Landeros-Weisenberger et al., 2010; Saxena et al., 2007; Stein et al., 2007). Yet evidence has remain equivocal and moreover, the biological models do not account for the symptomatic heterogeneity of the disorder, e.g., why some individuals develop contamination obsessions with washing compulsions, whereas others develop

symmetry and ordering obsessions and compulsions (Abramowitz, Taylor, & McKay, 2009).

Hence, this chapter has aimed to explain the heterogeneous nature of OCD by delineating the cognitive-behavioral account. Though this approach was found particularly relevant for this thesis in light of the empirical study, it is by no means implied that this account is sufficient in explaining OCD's heterogeneous nature. As described in this chapter, the cognitive-behavioral approach proposes that obsessions and compulsions arise from certain types of dysfunctional beliefs or misappraisals that are applied to normally occurring intrusive thoughts, impulses, or images (Rachman & de Silva, 1978). Commonplace intrusions develop into obsessions when they are appraised as personally relevant, highly unacceptable or immoral, or as posing a threat for which the person is personally responsible. Such an appraisal evokes subsequent distress and motivates the individual to try to suppress or remove the unwanted intrusion, and to attempt to prevent any harmful events linked to the intrusion (Taylor et al., 2009).

Three cognitive-behavioral models have been reviewed in this chapter, which are more similar than dissimilar, but emphasize different beliefs as having primary importance in the emergence and maintenance of OCD. Salkovskis (1985) stressed responsibility, Rachman (1997) emphasized thought-action fusion, and Purdon and Clark (1999) proposed the importance of thought control to be the primary appraisal involved in intrusions becoming obsessions. Wells and Matthews' (1994) model is furthermore related to Purdon and Clark's (1999) model, as it proposed that appraisals are made through more general metacognitions linked to thought control. These models provide a theoretically sound and coherent account of OCD, and seem to be supported by empirical evidence. However, critics examining the cognitive-behavioral account have found mixed evidence for the general, congruent, and specific patterns of association between OC beliefs and OC symptoms. Hence, OCD is most likely a multidimensional construct that requires (at least) integration of biological and cognitive-behavioral factors. Promising attempts in this direction have been made (e.g., Taylor & Jang, 2011) and should be continued, to tie OC beliefs, genetics, environment, and OCD symptoms together.

5. How to measure cognitive-behavioral constructs

5.1. Introduction.

Whereas the previous chapter discussed evidence generated by measures that assess constructs relevant to the cognitive-behavioral account, this chapter will address psychometric properties of those measures. As discussed in the previous chapter, empirical support for the cognitive-behavioral account has not always been consistent. In order to more precisely evaluate the general, congruent, and specific patterns of association between obsessive-compulsive (OC) beliefs and symptoms, improving assessment of cognitive-behavioral constructs is crucial. A critical component hereof is having a comprehensive and up-to-date overview of commonly used OC cognitive-behavioral measures. Hence, this chapter intends to: 1) provide a thorough review of cognitive-behavioral measures that are commonly used with adults; and 2) provide a resource for clinicians and researchers to facilitate their decision on most suitable cognitive-behavioral OC measure for their specific goals and setting.

Similar to evaluation of measures in the phenomenology section, firstly data on reliability and factor structure will be reported for the cognitive measures. Furthermore, content, construct, and criterion-related validity will be discussed, where data is available. Namely, concurrent validity (e.g., convergent and divergent validity) is commonly assessed, though sensitivity (e.g., accurately identifying OCD patients) and specificity (e.g., correctly identifying non-OCD patients) data are rarely reported for OC cognitive measures.

In sum, this chapter will aim to provide the most up-to-date and comprehensive review of 17 currently used self-report cognitive-behavioral measures for adults, their psychometric properties and practical aspects. First, three measures of dysfunctional beliefs, appraisals, and cognitive intrusions will be evaluated. Secondly, measures that assess specific constructs relevant to the cognitive-behavioral models of Salkovskis (1985, 1999), Rachman (1993, 1997), and Purdon and Clark (1995, 1999), will be reviewed. Finally, adjunctive measures of beliefs and appraisals related to OCD (OCCWG, 2001, 2003, 2005), will be briefly discussed. Special attention is given to a measure of OC symptoms in religious context.

5.1.1. Obsessive Beliefs Questionnaire (OBQ-44; OCCWG, 2005). The original OBQ-87 (OCCWG, 2003) contained six scales measuring the dysfunctional beliefs: inflated responsibility, overimportance of thoughts, excessive concern about controlling one's thoughts, overestimation of threat, intolerance of uncertainty, and perfectionism. The overimportance and controlling thoughts subscales were largely adopted from the aforementioned Meta-Cognitive Beliefs Questionnaire (MCBQ; Clark & Purdon, 1995). The OBQ-87 was shown to have high internal consistency and test-retest reliability, adequate to good convergent validity, but problematic divergent validity (the OBQ correlated as highly with non-OCD symptom measures as with OCD symptom measures). Finally, intercorrelations among the OBQ-87 subscales and with subscales of the Interpretations of Intrusions Inventory (III; OCCWG, 2003, 2005) were very high. This suggested two things: the number of dimensions of the OBQ should be reduced via factor analysis, and the appraisals measured by the OBQ-87 and III (see section 5.1.2.) did not seem to be well differentiated.

To investigate the shortcomings of the OBQ-87 (OCCWG, 2003), a second study (OCCWG, 2005) assessed the psychometric properties of empirically based, rather than theoretically derived subscales. Exploratory factor analyses by the OCCWG (2005) showed a three-factor solution to provide a better fit, and only items with sufficient loadings were retained. This shortened the OBQ to 44 items, which explained 42.0% of the variance. The OCCWG (2005) suggested the following three subscales of the OBQ-44: responsibility/threat estimation, perfectionism/certainty, and importance/control of thoughts. Julien et al. (2008) replicated this three-factor solution in their French nonclinical sample. Again however, the subscales correlated highly with the OBQ-44's total score ($r_s = 0.77-0.87$), and moderately with one another ($r_s = 0.43-0.57$).

Because of these consistent high intercorrelations (indicating that there might be lower-order factors loading on one or more higher-order factors), Taylor et al. (2005) investigated the hierarchical structure of subscales in the OBQ-44. In concert with the OCCWG (2005), results showed a higher-order (general factor) and 3 lower-order factors: 1) responsibility and overestimation of threat; 2) perfectionism and intolerance of uncertainty; and 3) importance and control of thoughts. The general factor accounted for more variance in OBQ scores (22%) than the lower-order factors (between 6-7%). In spite of the importance of the higher-order factor, the lower-order factors significantly predicted

unique variance in measures of OC symptoms, including severity ratings of compulsions.

Yet other studies have reported different factor structures than the OCCWG (2005) and Taylor et al. (2005). Woods et al. (2004) tested both the OBQ-87 and OBQ-44 with their respective six-factor and three-factor structures. In a large nonclinical sample, both models proved to be an inadequate fit. Using exploratory factor analysis, Woods et al. (2004) reported a 66-item, four-factor solution as providing the best fit to their data; one large factor and three smaller factors that largely corresponded to importance/control of thoughts, perfectionism, and responsibility. Though internal consistency was good and intercorrelations between the subscales moderate ($r_s = 0.36-0.49$), the impact of Woods et al.'s (2004) study is lessened due to its focus on the OBQ-87 (Wu & Carter, 2008). Myers et al. (2008), on the other hand, also extracted a four-factor solution from their exploratory factory analysis, and this time from the newer OBQ-44. Their factors resembled the OCCWG (2005), since two of the factors represented perfectionism/certainty and importance/control of thoughts. Responsibility and overestimation of threat were reported to load on two separate factors. The newly found four factors intercorrelated by $r_s = 0.60-0.67$ in the nonclinical British sample (Myers et al., 2008).

Wu and Carter (2008) found no empirical support for any of the aforementioned three-factor or four-factor structures, and conducted a new exploratory factor analysis. This resulted in a 24-item, three-factor model: importance/control of thoughts, responsibility, and perfectionism. Only two of the original threat items (OCCWG, 2003) were retained (and placed on the first subscale), while three perfectionism/certainty items were reassigned to responsibility. Most recently however, similar to Myers et al. (2008), Moulding et al. (2011) extracted a four-factor solution through exploratory factor analysis in a nonclinical Australian and Israeli sample, with perfectionism/certainty, importance/control of thoughts, responsibility, and overestimation of threat. Their 'OBQ-TRIP' contained 38 items instead of 44, with the four subscales intercorrelating by $r_s = 0.49 - 0.64$. The authors also designed a shorter version of the OBQ-TRIP, consisting of 20 items. The TRIP subscales of this short version correlated highly with the 38-item OBQ-TRIP (r_s between 0.94 and 0.98).

As for reliability, the OCCWG (2005) reported the internal consistency coefficients for their three OBQ-44 subscales to be high and comparable to those of the OBQ-87. Across clinical and nonclinical samples, Cronbach's alphas ranged from 0.89-0.95. Julien et al. (2008) also found

excellent internal consistency for the total score and subscales, with coefficients ranging from 0.87 to 0.94. Moulding et al. (2011) found their 38-item OBQ-TRIP to have good internal consistency (Cronbach's alphas between 0.82 and 0.90), but their 20-item OBQ-TRIP to have slightly weaker internal consistency (Cronbach's alphas between 0.77 and 0.83). Finally, Bortoncello et al. (2012) replicated the OBQ-44 factor structure of the OCCWG (2005), reported good temporal stability, and good internal consistency (Cronbach's alphas = 0.91- 0.96) of the Brazilian version of the measure.

As for convergent validity, the OCCWG (2005) reported the OBQ-44 to perform adequately. Correlations between the OBQ-44 total score and the PI-WSUR subscale scores ranged from 0.27 to 0.59 and were all significant. Subscale correlations between the two measures were not always significant however (OCCWG, 2005). Julien et al. (2008) reported adequate convergent and divergent validity; the authors found the OBQ-44 to correlate at least with either the PI or the Y-BOCS. Each of the OBQ-44 scores furthermore correlated more strongly with the PI total score than with the BAI or BDI. When controlling for anxiety and depression however, only 15 out of 20 correlations between the OBQ-44 and the PI remained significant. Also, each of the OBQ-44 scores was less correlated with the Y-BOCS than with the BAI or BDI. Myers et al. (2008) furthermore reported acceptable convergent validity, as their four factors significantly correlated with the OCI and the Y-BOCS. Similarly, Wu and Carter (2008) found that the OBQ-44 measures content that is not overly saturated with nonspecific distress and relevant to OCD beyond the role of distress.

Additionally, the subscales of Moulding et al.'s (2011) 38-item OBQ-TRIP correlated weakly to moderately with the subscales of the PI-WSUR ($r_s = 0.09-0.49$). The highest correlation was found between the threat subscale of the OBQ-TRIP and the OCD symptom subscales, in particular obsessions ($r = 0.49$), checking ($r = 0.47$), and contamination ($r = 0.44$). Moulding et al. (2011) found similar correlations for their 20-item OBQ-TRIP and OCD symptoms. Moreover, the OCCWG (2005) assessed discriminant validity through hierarchical regression analyses with the PI-WSUR subscales as dependent variables. After controlling for general distress (e.g., anxiety and depression), the OBQ-44 responsibility/threat estimation predicted harming thoughts and contamination subscales of the PI-WSUR, while perfectionism/certainty predicted the PI-WSUR grooming and checking scales. The OBQ-44 importance/control of thoughts did not predict any PI-WSUR subscale.

Discriminant validity was further examined by Wu and Carter (2008), who reported modest specificity. Julien et al. (2008), on the other hand, reported their OCD sample to score significantly higher than anxious and nonclinical controls on the OBQ-44 total and subscale scores. Anxious controls furthermore scored higher than nonclinical controls on all scores except for the perfectionism/uncertainty subscale score. Most OBQ scales showed moderate relations to multiple OCD symptoms (particularly checking, washing, and rituals), while the perfectionism/certainty dimension was consistently associated with ordering, symmetry, and grooming rituals of three different OCD measures (Julien et al., 2008). Taken together, though the strict criterion for discriminant validity of the OBQ-44 was not always met, strong evidence for particular associations between obsessive beliefs and OCD symptoms was provided.

Finally, Anholt et al. (2010) were the first to assess OBQ's sensitivity to treatment change. Both for the OBQ-87 and OBQ-44, the overlap between clinical and nonclinical populations was found to limit the use of the OBQ as primary measure of treatment change. For both versions the same medium effect size was observed and symptom dimensions were not related to OBQ pre-treatment to post-treatment changes. Anholt et al. (2010) conclude that this makes the clinical utility of the concept as measured by the OBQ questionable. Conversely, Solem et al. (2009) reported good sensitivity to treatment change, as well as Bortoncello et al. (2012), for the Brazilian OBQ-44. For the latter, effect sizes of treatment for both the Y-BOCS and the OBQ-44 were strong in their OCD patients sample.

In sum, the empirically derived subscales of the OBQ-44 do not substantially improve convergent or discriminant validity of the OBQ-87's theoretically based scales. Nonetheless, they are at least comparable and all means are in the predicted direction for the shorter instrument (OCCWG, 2005). However, psychometric studies of the OBQ-44 should elucidate the OBQ's factor structure and validity of shorter versions suggested by several studies (Wu & Carter, 2008; Moulding et al., 2011). Another remaining problem of the OBQ-44 is that several studies report the scales to be OCD-relevant, but not OCD-specific. That is, it is not clear how appraisals could lead to the escalation of cognitive intrusions into obsessions (Julien et al., 2008). Possibly, culture, religion, and ethnicity influence OBQ-44 scores across countries, which future research should take into account (Anholt et al., 2010; Yorulmaz, Gencöz, & Woody, 2009; Matsunaga & Seedat, 2007).

5.1.2. Interpretation of Intrusions Inventory (III; OCCWG, 2003). The III is a 31-item semi-idiographic self-report that assesses dysfunctional appraisals of intrusive thoughts, images, and impulses. Respondents are given a definition of ego-dystonic mental intrusions, as well as examples of obsessive themes and content. Participants are asked to write down two intrusions they have recently experienced. After completing single-item ratings of the recency, frequency, and distress of the intrusions, respondents then rate their level of belief within the past 2 weeks for each of the 31 statements, which relate to the two intrusive thoughts they recorded on the questionnaire. Extent of belief is rated on a 100-point scale ranging from 0 (*I did not believe this idea at all*) to 100 (*I was completely convinced this idea was true*). To ease interpretation, the 100-point scale can be divided by 10 (OCCWG, 2003). The III contained three scales in the original validation study, measuring one of the following domains: importance of thoughts, control of thoughts, responsibility (OCCWG, 2003).

In the original validation study, internal consistency was found to be good, with Cronbach's alphas ranging from 0.79-0.92. Sica et al. (2004) replicated these findings for the Italian III in both clinical and nonclinical groups (Cronbach's alphas = 0.83-0.93). Given III that is expected to be more state than trait-like, its test-retest correlations were very high (OCCWG, 2003: $r_s = 0.64-0.77$ over a 2-3 months interval and Sica et al., 2004: $r_s = 0.71-0.77$ over a 1 month interval). Moreover, the OCCWG (2003) had constructed the OBQ and the III to differentiate between trait-like beliefs and state-like appraisals respectively, yet OBQ scores did not seem to be more stable than III over time. Furthermore, all of the III subscales were highly intercorrelated in both the OCD and non-OCD samples, and there was little support for the 3-factor structure (OCCWG, 2003; Sica et al., 2004). Also, corresponding subscales of the OBQ and III showed high content overlap ($r_s = 0.56-0.71$).

As for convergent validity with OCD-symptom measures, the III showed a questionable pattern of association. In the nonclinical control sample of the OCCWG (2003), the III showed moderate correlations with the PI-WSUR ($r_s = 0.45-0.49$) and the Y-BOCS ($r_s = 0.47-0.50$), but among OCD patients, the III was merely weakly correlated with the PI-WSUR ($r_s = 0.22-0.29$) and not at all with the Y-BOCS ($r_s = 0.05-0.12$). Though the OCCWG (2003) did find OC individuals to score significantly higher than nonclinical controls on all subscales, OC individuals did not significantly differ from anxious controls on the subscale 'importance of thoughts' (OCCWG, 2003).

Divergent validity was also found to be problematic for the III subscales, as its correlations with non-OCD symptom measures (the BAI, STAI, PSWQ, BDI; $r_s = 0.25-0.57$) were equally high as those with the PI-WSUR and Y-BOCS (OCCWG, 2003). This indicates that the III is relevant in explaining other negative affective states; the measure is therefore not specific to OCD (OCCWG, 2003). Sica et al. (2004) confirmed the weak convergent and discriminant validity of the Italian III. That is, the measure consistently failed to significantly correlate with any of the OCD measures in the OCD sample ($r_s = 0.00-0.28$), while associations with OC symptoms, anxiety, and depression were noticeable in nonclinical controls ($r_s = 0.23-0.42$).

Similar to the OBQ-87, the OCCWG (2005) subjected the III (OCCWG, 2003) to a factor analysis using a large sample of OCD patients, to determine whether the number of items and subscales could be decreased. The OCCWG (2005) found support in part two of their psychometric study of the III for a single factor that explained 44.0% of the variance. Internal consistency of this single dimension was very high (Cronbach's alpha = 0.94), both in clinical and nonclinical samples. As for convergent validity, the empirically derived III (OCCWG, 2005) performed slightly better than the theoretically derived III (OCCWG, 2003). The III-31 total score correlated between 0.19 and 0.43 with the PI-WSUR harm impulses, harm thoughts, and checking subscales; the other PI-WSUR subscales did not significantly correlate with the appraisal measure. As for discriminant validity, hierarchical regression analyses showed the III total score to only significantly predict the PI-WSUR harming thoughts subscale.

In sum, the original III shows weak psychometric properties, though the revised III with a 1-factor structure demonstrates some improvement. Nonetheless, there are no external psychometric validation studies that have further evaluated this, and these are required for future use of the measure. Especially divergent validity, discriminative power, and treatment sensitivity need to be investigated for the III. Furthermore, the theoretical distinction between appraisals and beliefs is not supported by the literature, as the OBQ-44 (assessing trait-like beliefs) actually seems less temporally stable than the III (measuring state-like appraisals). Consequently, since the OBQ-44 shows superior psychometric properties over the III, this measure has generally been preferred in OCD research. The

OCCWG (2003, 2005) and Sica et al. (2004) both suggest that the self-report III may be less well suited to assessment of intrusions than experimental methods.

5.1.3. Obsessional Intrusive Thoughts Inventory (INPIOS; García-Soriano et al., 2011). In the review by Julien, O’Conner, and Aardema (2007) it was concluded that the Revised Obsessional Intrusions Inventory (ROII; Purdon & Clark, 1993, 1994) is one of the best measures of obsessional intrusive thoughts, impulses, and images. Studies analyzing intrusions’ dimensionality consistently reported two main factors to underlie the ROII (Purdon & Clark, 1993; Lee & Kwon, 2003; Belloch et al., 2004; Moulding et al., 2007). The first factor includes aggressive, sexual, and immoral intrusions; the second factor includes doubts, contamination fears, and necessity to check intrusions. However, the ROII has been shown to have several shortcomings. For example, the ROII has limited presentation of clinically relevant obsessional themes (i.e., religion, order/symmetry, and superstition items are not included). Furthermore, some items are written very specifically, leading to the assessment of highly idiosyncratic or situation-specific intrusions. García-Soriano et al. (2011) designed the INPIOS to overcome the shortcomings of the ROII.

The first part of the INPIOS consists of 48 items measuring the frequency of unwanted intrusions on a 7-point scale. The second part of the INPIOS asks participants to rate the most upsetting intrusion on a 4-point scale with respect to: a) emotional reactions; b) the difficulty in control and interference; and c) associated dysfunctional appraisals. García-Soriano et al. (2011) found the INPIOS to be composed of six factors: 1) aggressive intrusive thoughts; 2) sexual, religious, and immoral intrusive thoughts; 3) contamination intrusions; 4) doubts, mistakes, and necessity to check intrusions; 5) symmetry and order intrusive thoughts; and 6) superstitious intrusions. These six factors were furthermore nested in two second-order factors: Type I intrusions (the first two subscales) and Type II intrusions (the other subscales that do not refer to moral issues). Hoarding was not included as a dimension in the INPIOS, as hoarding items showed significantly lower factor loadings and did not fit the usual criteria to retain items. These findings are consistent with recent proposals to separate hoarding from OCD (Grisham et al., 2005; Pertusa et al., 2010a).

Internal consistency was good in both the OCD sample and the community sample

(Cronbach's alphas ranged from 0.80 to 0.94) of the original validation study. Test-retest reliability (range 7-14 days) was excellent; ICCs in the community sample ranged from 0.90-0.97 (García-Soriano et al., 2011). To assess concurrent validity, the INPIOS was correlated separately in the OCD and community sample with the OCI-R, CBOCI, Y-BOCS, and three divergent measures. The INPIOS total score was more strongly correlated with the total scores of the OCD measures than with measures of depression, anxiety, and worry (the BDI-II, BAI, and PSWQ, respectively). Furthermore, all six INPIOS first-order factors had significantly higher associations with their corresponding OCI-R subscales than with the other OCI-R subscales.

As for discriminant validity, the OCD group scored significantly higher on the INPIOS total score and subscale scores (except for the symmetry/order subscale), with moderate to high effect sizes. Furthermore, OCD patients whose primary symptom dimension had been identified through OCD measures, scored highest on the corresponding subscale of the INPIOS (García-Soriano et al., 2011). Additionally, the INPIOS was able to assess OCD patients' main obsessions, improving previous results with the ROII, which was shown to represent 77.5% of OCD patients' obsessions (Morillo, Belloch, & García-Soriano, 2007). Since García-Soriano et al.'s (2011) results indicated clinical and nonclinical obsessions to be comparable, the INPIOS proves to be representative of all types of obsessions of which the contents are dimensional.

In sum, initial findings on the INPIOS show improvement over the ROII and hence, a lot of promise for measuring intrusions. Apart from minor differences, García-Soriano et al. (2011) reported the first order-structure of the INPIOS to be largely consistent with factor solutions that have been reported in studies examining OCD symptom measures (e.g., Leckman et al., 1997; Summerfeldt et al., 1999). Similarly, the second-order structure is analogous to the two-factor models extracted from studies on obsessional intrusive thoughts (e.g., Purdon & Clark, 1993, 1994; Lee & Kwon, 2003; Belloch et al., 2004; Moulding et al., 2007). In the original validation study it was furthermore shown that the INPIOS has good internal consistency and high temporal stability. Although preliminary evidence for concurrent validity is provided, more external studies need to research the INPIOS' psychometric properties. In particular, ROC analyses need to be conducted; INPIOS' discriminative power amongst OCD patients, anxious, and nonanxious controls needs to be assessed.

5.2. Specific measures related to Salkovskis' model.

In this section, three measures assessing responsibility attitudes and their role in the pathogenesis of OCD, as formulated by Salkovskis (1985,1999), will be reviewed. Firstly, the Responsibility Attitudes Scale (RAS; Salkovskis et al., 2000), then the Responsibility Interpretations Questionnaire (RIQ; Salkovskis et al., 2000), and finally, the Pathways to Inflated Responsibility Beliefs Scale (PIRBS; Coles & Schofield, 2008), will be discussed.

5.2.1. Responsibility Attitudes Scale (RAS; Salkovskis et al., 2000). The RAS is a 26-item questionnaire that measures general beliefs or assumptions related to inflated responsibility. Each item reflects a general statement about responsibility, and individuals rate their agreement from 1 to 7. Salkovskis et al. (2000) reported high internal consistency (Cronbach's alpha = 0.92) and good test-retest reliability ($r = 0.94$). Barrera and Norton (2011) reported a Cronbach's alpha of 0.88 and similar test-retest reliability to the original validation study. Mancini, D'Olimpio, and D'Ercole (2001) indicated that the RAS was composed of four factors: 1) prevention; 2) sense of danger; 3) thought-action fusion; and 4) self-granted power of harm. The authors found internal consistency (Cronbach's alphas = 0.69-0.90) and test-retest reliability ($r = 0.38-0.63$) to be satisfactory. Yorulmaz (2002) translated the RAS into Turkish and found similar psychometric properties as Mancini et al. (2001).

Furthermore, Bouvard et al. (2001) conducted a large validation study of the French RAS in a sample of OCD patients, anxious, and nonclinical controls. Besides supporting reliability of the RAS, Bouvard et al. (2001) found two factors by means of exploratory factor analysis. These reflected factors 1 and 4 of Mancini et al. (2001). The first dimension seemed less specific to OCD pathology than the second; only patients with OCD had significantly elevated scores on the 'need to prevent risks' compared to nonclinical controls. OCD and social phobia patients differed on the belief that 'one has power to harm' from the nonclinical group, but not from each other. Hence, the two subscales of the RAS seem to be OCD-related but not OCD-specific.

Salkovskis et al. (2000) examined concurrent validity of the RAS with two measures of obsessionality. The RAS correlated by $r = 0.57$ with the MOCI total score and $r = 0.54$ with the OCI total score. When BDI and BAI scores were partialled out, these correlations remained essentially

unchanged. Moreover, Salkovskis et al. (2000) showed through regression analyses that the total score of the RAS is specifically related to obsessionality as measured by the OCI and its subscales, more so than depression and anxiety. Ghassemzadeh et al. (2005) administered the RAS to an Iranian sample of OCD patients, other anxiety disorder patients, and nonclinical individuals. The authors basically replicated the psychometric findings of Salkovskis et al. (2000). The Iranian RAS explained significant variance of OCD symptomatology but not of depression or anxiety. Finally, Smári et al. (2010) found the RAS to be a significant predictor of the OCI-R total score in a Icelandic sample. In sum, these results support the psychometric properties of the RAS and its usefulness in OCD research, though the specificity criterion has not been met. Future research should further examine the different factor structures that have been reported, in addition to divergent validity and discriminative power.

5.2.2. Responsibility Interpretations Questionnaire (RIQ; Salkovskis et al., 2000). The 22-item RIQ was designed to assess the frequency of (on a 0-4 scale), and belief in (on a 0-100 scale), specific interpretations of intrusive thoughts about possible harm (as opposed to more enduring stable attitudes, which are measured by the RAS). The referent used in the RIQ is an intrusion the participant has experienced in the last two weeks (five examples of intrusive thoughts are given to clarify). Salkovskis et al. (2000) found internal consistency to be high. Cronbach's alphas of frequency ratings ranged from 0.86 to 0.93, depending on whether the intrusion was high or low in responsibility interpretation. For the belief score (high vs. low in responsibility interpretation) Cronbach's alphas ranged from 0.91-0.92. Furthermore, test-retest reliability was 0.90 and 0.69 for frequency of high vs. low responsibility interpretations, 0.80 for the belief of high responsibility interpretations, but only 0.22 for the belief of low responsibility interpretations. Hence, temporal stability is satisfactory for the high, but not the low responsibility interpretations factors. It was also found that the RIQ was highly correlated with the RAS (r s of 0.65 and 0.64 with the frequency and belief ratings of high responsibility interpretations).

Evidence for concurrent validity of the RIQ was demonstrated by significant correlations between the frequency score of high responsibility interpretations and the MOCI ($r = 0.56$) and the OCI ($r = 0.68$). When BDI and BAI scores were partialled out, the correlations decreased to 0.39 and 0.57, respectively. The RIQ belief score for high responsibility interpretations correlated by 0.55 and

0.63 with the MOCI and OCI respectively; partialing out BDI and BAI scores decreased the *rs* to 0.39 and 0.53. As for discriminant validity, results showed that OCD patients had significantly higher scores on both frequency and belief of high responsibility interpretations than anxious and nonclinical participants. Anxious controls in turn scored higher on both dimensions than nonclinical participants. Additionally, Salkovskis et al. (2000) demonstrated through regression analyses that the total scores of the RIQ were specifically related to obsessionality as measured by the OCI and its subscales, more so than depression and anxiety.

Ghassemzadeh et al. (2005) also administered the RIQ to an Iranian sample of OCD patients, anxious, and nonclinical controls. The authors replicated the psychometric findings of Salkovskis et al. (2000) and the RIQ explained additional variance in OCD symptomatology over the RAS in their sample. Nonetheless, the RIQ in relation to the RAS has the same problem as the III in relation to the OBQ-44. That is, though Salkovskis et al. (2000) have distinguished the two measures conceptually as state- versus trait-like measures, empirical data does not seem to support this (OCCWG, 2005). Cognitive-behavioral studies have generally preferred the RAS over the RIQ, as the former represents more enduring beliefs about responsibility in a manner consistent with the literature. However, more studies need to examine the psychometric properties of the RIQ and its relation with the RAS.

5.2.3. Pathways to Inflated Responsibility Beliefs Scale (PIRBS; Coles & Schofield, 2008).

Recently, Coles and Schofield (2008) have developed the PIRBS to assess the primary pathways that lead to the development of inflated responsibility, as proposed by Salkovskis et al. (1999). This is the first measure focusing on the etiology of responsibility beliefs. The PIRBS contains 23 items, rated on a 0-4 scale, with four factors: 1) heightened responsibility as a child; 2) overprotection as a child; 3) exposure to rigid and extreme codes of conduct and duty during childhood; and 4) incidents in which one's actions/inactions caused or influenced misfortune.

In the original validation study, the PIRBS was shown to have acceptable internal consistency (Cronbach's alphas for all subscales were ≥ 0.78) and test-retest reliability over 6 months ($rs = 0.58$ - 0.79). Though support for the hypothesized 4-factor structure was found, the fit indices were only marginally acceptable (Smári et al., 2010). Coles and Schofield (2008) furthermore reported good

convergent validity of the PIRBS through significant positive correlations between: the overprotection subscale and a measure of parental protectiveness and parental authoritarianism; between the heightened responsibility subscale and a measure of childhood chores; and between all subscales and the responsibility/overestimation of threat subscale of the OBQ-44. These last correlations were higher than correlations with the other subscales of the OBQ-44 (except for the rigid rules subscale that correlated similarly with all three OBQ-44 subscales). Finally, Coles and Schofield (2008) found moderate correlations between all subscales and the OCI.

Smári et al. (2010) investigated the psychometric properties of the PIRBS in an Icelandic sample. They found that neither the 4-factor structure proposed by Coles and Schofield (2008) nor the 5 pathway dimensions proposed by Salkovskis et al. (1999) fit their data optimally, though the 5-factor structure was slightly superior. Similar to the original validation study, Smári et al. (2010) reported internal consistency to range from 0.54-0.87, replicating Coles and Schofield's (2008) low internal consistency of the overprotection subscale. Support for convergent validity was found, as the PIRBS total and subscale scores significantly correlated with the RAS ($r_s = 0.17-0.42$) and the OCI-R ($r_s = 0.15-0.39$). Finally, Smári et al. (2010) found that inflated responsibility is a mediator between pathways to responsibility beliefs and OCD symptoms.

In sum, the PIRBS shows a lot of promise as the first measure to assess the etiology of responsibility attitudes involved in the pathogenesis of OCD. Nonetheless, future research should further investigate the internal consistency and factor structure of the subscales, divergent validity, and discriminative power. Moreover, the PIRBS's psychometric properties need to be investigated in clinical samples, in order to assess its specificity when including anxious and depressive controls.

5.3. Specific measures related to Rachman's model.

In this section, two measures assessing thought-action fusion and its role in the pathogenesis of OCD, as formulated by Rachman (1993, 1997), will be discussed. Firstly, the Thought-Action Fusion Scale (TAFS; Shafran et al., 1996), and secondly a revision of this scale, the Thought-Action Fusion Scale Revised (TAFS-R; Amir et al., 2001) will be evaluated based on their psychometric properties and practical utility.

5.3.1. Thought-Action Fusion Scale (TAFS; Shafran et al., 1996). The TAF-scale is a 19-item questionnaire designed to measure the TAF construct in relation to OCD. Items on the moral subscale assess the belief that thoughts are morally equivalent to actions (e.g., ‘when I think unkindly about a friend, it is almost as disloyal as doing an unkind act’). The likelihood scales assess the belief that thinking about something makes it more likely to happen, either to others or to oneself (e.g., ‘if I think of a relative falling ill this increases the risk that he/she will fall ill’ and ‘if I think of myself being injured in a fall, this increases the risk that I will have a fall and be injured’). Participants rate agreement with items on a 5-point scale. In nonclinical undergraduate and adult community samples, Shafran et al. (1996) extracted the three TAF-moral, TAF-likelihood-self, and TAF-likelihood-others subscales. Conversely, data from an obsessional sample yielded a two-factor solution, where the two likelihood factors were combined (Shafran et al., 1996). Internal consistency for the subscales has consistently been good or excellent in all samples, with Cronbach’s alphas of the subscales ranging from 0.85 to 0.96 (Shafran et al., 1996; Berle & Starcevic, 2005; Siev & Cohen, 2007). Whereas Shafran et al. (1996) reported good test-retest reliability, Rassin et al. (2001b) reported weaker temporal stability of the TAF in their nonclinical sample ($r = 0.52$ over a 3-month period).

The TAF has been translated in Dutch (Rassin et al., 2001b), Turkish (Yorulmaz, Yilmaz, & Gencöz, 2004), and Icelandic (Smari & Hólmsteinsson, 2001). The Icelandic and Dutch studies confirmed Shafran et al.’s (1996) 3-factor structure, whilst Yorulmaz et al. (2004) reported a two-factor structure in their nonclinical Turkish sample (consistent with Rassin et al., 2001b). Yet as Shafran and Rachman (2004) pointed out, more psychometric investigations of the TAF scale need to be conducted in clinical samples. Following this, Meyer and Brown (2012) examined the psychometric properties of the TAFS in a large clinically heterogeneous sample using an exploratory and confirmatory factor analytic framework. A two-factor solution (moral and likelihood TAF) was shown to be the most acceptable model. As for concurrent validity, Meyer and Brown (2012) found moderate converging r s (0.24-0.38) and weak diverging r s (0.09-0.20). Global TAF was significantly more strongly correlated with OCI-R scores than BDI-II and PSWQ scores. However, correlations between TAF-likelihood and OCI-R scores were not stronger than for the PSWQ scores.

Other studies assessing convergent validity, reported small to medium correlations between

the TAF and the MOCI. Shafran et al. (1996) reported a moderate relation between TAFS's likelihood-others subscale and checking compulsions ($r = 0.38$), which was maintained after controlling for depression. The correlation between the TAFS's moral subscale with the total MOCI score was also moderate ($r = 0.31$), but not significant after controlling for depression. Rassin et al. (2001b) found a lower correlation between TAFS-likelihood and the MOCI ($r = 0.23$), and no significant correlation at all between TAFS-moral and the MOCI. Rassin et al. (2001a) replicated these correlations for a small group of OCD patients, with particularly high correlations between the cleaning subscale and the TAFS-likelihood-self subscale ($r = 0.52$). Similar correlations between the TAFS and the MOCI have been reported by other studies (e.g., between 0.20 and 0.38; Gwilliam et al., 2004; Rassin & Koster, 2003; Rassin et al., 2000; Smári & Hólmsteinsson, 2001; Yorulmaz et al., 2004). Furthermore, comparable correlations have been found between the TAFS and the PI and PI-R (van Oppen et al., 1995; Einstein & Menzies, 2004; Gwilliam et al., 2004; Rassin et al., 2001b).

Yorulmaz et al. (2004) correlated the TAF scale with the RAS, including and excluding the thought-action fusion subscale of the RAS. The authors reported $r = 0.37$ for both instances. Yorulmaz et al. (2004) reported good criterion-related validity of the Turkish TAFS, as participants with more severe OC symptoms scored significantly higher on the TAF total, TAF-moral, and TAF-likelihood scores. Also, there was a significant interaction effect observed between OC symptoms and TAF, and this effect was particularly emphasized in the morality domain. This is in contrast with Shafran et al. (1996) and Rassin et al. (2001a, 2001b), who found that TAF-likelihood was more strongly associated with obsessionality than TAF-moral. An explanation for this finding could be factors embedded in Turkish culture (Yorulmaz et al., 2004).

In their review, Berle and Starcevic (2005) conclude that although psychometric findings on the self-report TAFS are moderately promising, the scale needs to be examined more. In particular, divergent validity has not sufficiently been addressed, with only Rassin et al. (2001b) and Yorulmaz et al. (2004) demonstrating the scale's ability to distinguish between individuals with and without OCD. Shafran and Rachman (2004) and Berle and Starcevic (2005) both found that the literature often reports nonclinical and clinical groups not to differ on their moral-TAF scores (the study by Yorulmaz et al., 2004, is an exception to this), whereas OCD and other anxiety disorders patients generally do

not differ on their total TAFS scores. Similar to the OBQ-44 and the RAS measures, this could mean that global TAF is OCD-related, but not OCD-specific.

5.3.2. Thought-Action Fusion Scale-Revised (TAFS-R; Amir et al., 2001). Amir et al.'s (2001) revised TAFS consists of 11 subscales. Two new subscales were added that assess the likelihood that thoughts could lead to positive events happening to others, and that they might prevent harm from happening to others. The remaining six scales were revisions of the original TAFS and assess perceived costs and responsibility for negative, positive, and harm avoidance events. Amir et al. (2001) found internal consistency to be good, with coefficients ranging from 0.77 to 0.95. Furthermore, the TAFS-R was found to correlate with measures of OC symptoms, depression, and anxiety, whilst showing evidence of discriminative power. That is, the authors reported that their OCD and non-OCD samples differed in their ratings of positive events happening as a result of positive thoughts. This indicates that TAF might relate to situations other than OCD, and perhaps represents a specific form of general 'magical' thinking (Amir et al., 2001). It was also found that OC individuals rated negative events as more costly than individuals without OC symptoms, while also feeling more responsible for having thoughts of negative events (Amir et al., 2001).

Pourfaraj, Mohammadi, and Taghavi (2008) evaluated the TAFS-R in a large nonclinical Iranian population. The authors extracted 8 factors instead of 11, which explained 80% of the variance of the total scale. Internal consistency (Cronbach's alpha = 0.79-0.95) and test-retest reliability ($r = 0.57-0.63$) were found to be acceptable. Concurrent validity was evidenced by positive significant correlations with the Padua Inventory (PI; $r = 0.34$). Moreover, evidence for criterion validity was demonstrated through comparison of TAFS-R scores between subsamples that scored high and low on the PI. The total TAFS-R score of the 'high OC symptoms group' was significantly higher than the 'low OC symptoms group'. All in all, though Amir et al. (2001) and Pourfaraj et al. (2008) show evidence of good psychometric properties of the TAFS-R, it has not replaced the original TAFS in OCD research. The original TAFS still seems to be preferred in cognitive-behavioral research, perhaps due to the unwieldy subscales of the TAFS-R or the TAFS specific assessment of Rachman's (1993, 1997) cognitive model of obsessions.

5.4. Specific measures related to Purdon and Clark's model.

In this section, five measures assessing importance/control of thoughts beliefs and their role in the pathogenesis of obsessionality, as formulated by Purdon and Clark (1995,1999), will be discussed. Firstly, two directly related measures, the Thought Control Questionnaire (TCQ; Wells & Davies, 1994) and the newer Thought Control Ability Questionnaire (TCAQ; Luciano et al., 2005) will be evaluated. Hereafter, three more general measures originating from the metacognitions model (Wells, 2000; Wells & Matthews, 1994) will be briefly reviewed: the Meta-Cognitions Questionnaire (MCQ; Cartwright-Hatton & Wells, 1997), the Magical Ideation Scale (MIS; Eckblad & Chapman, 1983), and the most recent Illusory Beliefs Inventory (IBI; Kingdon, Egan, & Rees, 2012).

5.4.1. Thought Control Questionnaire (TCQ; Wells & Davies, 1994). The TCQ contains 30 items that assess (on a 1-4 scale) strategies people use for controlling unwanted intrusive thoughts. Five strategy factors were derived in the original validation study: distraction, punishment, social control, reappraisal, and worry. Reynolds and Wells (1999) largely supported Wells and Davies' (1994) model, whereas Fehm and Hoyer (2004) replicated the original five-factor structure exactly in their German clinical and nonclinical samples. Wells and Davies (1994) reported weak to moderate internal consistency (Cronbach alpha's across the subscales ranged from 0.64 to 0.79). Similar coefficients were reported by Reynolds and Wells (1999) and Fehm and Hoyer (2004) in their clinical samples. However, in Fehm and Hoyer's (2004) nonclinical sample, along with Rassin and Diepstraten's (2003) study, even lower alphas were reported (ranging from 0.46 to 0.85). Wells and Davies (2004) found test-retest reliability to be better, with *r*s ranging from 0.67 to 0.83 over six weeks time.

As for concurrent validity, Wells and Davies (1994) found that TCQ's total score and punishment subscale correlated with the impaired mental control subscale of the Padua Inventory (PI; *r*s = 0.48 and 0.47), though also with the PSWQ (*r*s = 0.36 and 0.50), in addition to social- and meta-worry in measures of anxious thoughts. This indicates that self-punishment is one of the naturalistic techniques that individuals use when they attempt to suppress their thoughts. Whereas Wegner et al. (1987) suggested that distraction represents one of the major ways in which suppression is attempted, Wells and Davies (1994) found no significant relationship between distraction and various measures

of negative cognition. Overall, the pattern of significant and nonsignificant correlations suggests that the TCQ subscales of worry, punishment, and total score specifically tap into control strategies that predict emotional vulnerability and psychopathological constructs (Wells & Davies, 1994).

Further significant correlations between TCQ's subscales and general distress have been reported for post-traumatic stress disorder (PTSD) patients (Reynolds & Wells, 1999; Warda & Bryant, 1998). For nonclinical controls however, Fehm and Hoyer (2004) only found moderate significant correlations between the TCQ-punishment subscale, general distress, and worry. In their clinical sample, the authors reported that the worry and punishment subscales correlated more strongly with anxiety, depression, worry, and social anxiety. Moreover, Amir et al. (1997) found that OCD patients used the worry, social, punishment, and reappraisal strategies significantly more than nonanxious controls. Especially the use of worry and punishment strategies were strongly related to the severity of OCD symptoms as measured by the Y-BOCS (r s of 0.28 and 0.37). Abramowitz et al. (2003b) replicated these findings; controlling for anxiety and depression, OCD patients used maladaptive thought control strategies (especially worry and punishment) more frequently than anxious and nonclinical controls. Conversely, Rassin and Diepstraten (2003) could only replicate a significant association between punishment and the MOCI, whilst finding a significant negative association between the MOCI and the TCQ-reappraisal subscale ($r = -0.41$).

More recently, Tolin et al. (2007) reported across a large mixed clinical and OCD sample, the TCQ-punishment subscale to be significantly related to the OBQ-44 importance/control of thoughts subscale. Regression analyses also showed that beliefs about importance/control of thoughts accounted for the relationship between OCD and the use of punishment as a thought control strategy (Tolin et al., 2007). This is in concert with Moore & Abramowitz (2007) who reported that OBQ-44 scores, over and above OC symptoms, were significantly associated with the use of punishment (but not worry) as a thought control strategy. Secondly, dysfunctional beliefs as measured by the OBQ-44, fully mediated the relationship between punishment and OC symptoms. Hence, Abramowitz et al.'s (2003b) and Amir et al.'s (1997) findings can be at least accounted for by OC-related dysfunctional beliefs.

Solely Fehm and Hoyer's (2004) study investigated discriminant validity, reporting significant group differences between nonclinical and clinical individuals for TCQ-distraction and punishment

subscales. However, the clinical groups did not differ amongst each other; only for TCQ-social control it was found that social phobics used this strategy significantly less often than OCD patients and the nonclinical controls. Finally, Reynolds and Wells (1999) found promising results for sensitivity to treatment and sensitivity to recovery in the TCQ measure. In conclusion, the TCQ has operationalized an important construct for OCD and anxiety disorders more generally. Though the measure shows promise, there is limited evidence for the specific relations of certain thought control strategies with particular disorders. Also, the measure shows questionable internal consistency and discriminative power, which needs to be further investigated.

5.4.2. Thought Control Ability Questionnaire (TCAQ; Luciano et al., 2005). The 25-item TCAQ was developed to assess individual differences that determine thought suppression efficacy. The TCAQ was created after several psychometric and theoretical inconsistencies of the White Bear Suppression Inventory (WBSI; Wegner et al., 1987) were reported in the literature (see Luciano et al., 2005, for an overview). In the original validation study, internal consistency of the TCAQ (Cronbach's $\alpha = 0.92$) and test retest reliability ($r = 0.88$ over 8 weeks) was found to be very high. Factor analyses initially revealed five factors, though a one-factor solution appeared to provide a superior fit. Gay et al. (2008) furthermore evaluated the French TCAQ, and found that two items were problematic in terms of internal consistency. After removal of these items, the French 23-item TCAQ revealed similar internal consistency and temporal reliability as the original validation study.

As for concurrent validity, Luciano et al. (2005) showed that thought control disability may be regarded as an emotional vulnerability factor, as large negative correlations with the STAI-T ($r = -0.82$), the PSWQ ($r = -0.74$), and the EPQ-R neuroticism subscale ($r = -0.72$) were observed. Correlations with the TCQ were weak ($r = -0.23$), and surprisingly, not significant after controlling for trait anxiety and neuroticism. The expectation that the ability to control unwanted thoughts would be negatively associated with the use of most thought control strategies was thus only marginally supported. Of the MOCI subscales, the strongest relationship was found between TCAQ and the checking subscale ($r = -0.48$), which remained significant after controlling for trait anxiety and neuroticism ($r = -0.19$). No other significant relations with the MOCI scales were observed. Gay et al.

(2008) reported comparable convergent relations of the French TCAQ with OCD and worry measures.

Luciano et al. (2005) finally conducted hierarchical regression analyses, which demonstrated that a significant amount of unique variance (e.g., beyond the TCQ and the WBSI) in depressive symptoms, OC symptoms, worry proneness, and guilt feelings was explained by the perceived ability to control unwanted intrusive thoughts. This additional unique variance was small for the MOCI however, suggesting that the TCAQ has a greater specificity for depressive states and pathological worry compared to OC symptoms. For these psychopathologies the TCAQ explained an additional 21% and 22%, respectively. In other words, despite its sound psychometric properties, the TCAQ might not be as useful in explaining obsessionality.

5.4.3. Meta-Cognitions Questionnaire (MCQ; Cartwright-Hatton & Wells, 1997). The MCQ was designed as a 65-item questionnaire measuring beliefs about worry and intrusive thoughts. There are five subscales of the MCQ: 1) positive beliefs about worry; 2) beliefs about the uncontrollability and danger; 3) cognitive confidence; 4) beliefs about superstition, punishment, and responsibility; and 5) cognitive self-consciousness. Cartwright-Hatton and Wells (1997) reported good reliability and convergent validity. The subscales of negative beliefs about uncontrollability and danger, punishment and responsibility, and cognitive self-consciousness demonstrated good discriminative power. Especially the last subscale, as the OCD group scored higher than all clinical and nonclinical controls.

These psychometric properties have recently been validated in a shorter form of the MCQ, consisting of 30 items (Wells & Cartwright-Hatton, 2004). Factor analyses reported almost an identical five-factor structure as the larger, original version. Wells and Cartwright-Hatton (2004) found internal consistency to be good (Cronbach's alphas ranged from 0.72 to 0.93) and test-retest reliability acceptable ($r_s = 0.59-0.87$). Yilmaz, Gencöz, and Wells (2008) replicated the five-factor structure and internal consistency of the MCQ-30 in a large nonclinical Turkish sample. Test-retest reliability was again found to be more variable however: r_s ranged from 0.45 to 0.90 (Yilmaz et al., 2008). Furthermore, Wells and Cartwright-Hatton (2004) established convergent validity through correlations between the MCQ-30 and measures of worry and OC symptoms. These coefficients resembled the MCQ-65 converging relations (e.g., Wells and Papageorgiou, 1998). Yilmaz et al.

(2008) replicated these converging relations, reporting positive significant correlations with the PSWQ ($r = 0.58$), the PI-WSUR ($r = 0.50$), the STAI-T ($r = 0.49$), the BAI ($r = 0.39$), and the BDI ($r = 0.37$). Moreover, multiple regression analyses showed that negative beliefs about uncontrollability and danger, positive beliefs about worry, and beliefs about the need to control thoughts, explained unique variance in OC symptoms.

In sum, the brief MCQ-30 shows good psychometric properties whilst being more economical than the MCQ-65. Critics have suggested that the MCQ has greater relevance for the intrusiveness of ego-syntonic anxious or worrisome thoughts instead of ego-dystonic obsessional intrusions (Clark et al., 2003). That is, cognitive-behavioral theorists often suggest that Wells' (2000) meta-cognitive model is more related to GAD, and hence has less connection with current OC cognitive-behavioral research (Clark et al., 2003). However, there is substantial evidence of the MCQ-30 being related to OCD symptomatology and obsessionality (e.g., Yilmaz et al., 2008), in addition to the measure being sensitive to treatment change in OCD patients (Solem et al., 2009).

5.4.4. Magical Ideation Scale (MIS; Eckblad & Chapman, 1983). The MIS is a 30-item true/false measure that was used to establish convergent validity. It has good internal consistency, with Cronbach's alphas of 0.82 for males and 0.85 for females. Einstein and Menzies (2004) found the MIS to correlate more strongly with OCD than TAF or superstitious thinking. The main limitation of the MIS however, is that underlying the measure is the assumption that magical ideation is prominent in schizophrenia-prone persons. Hence, items that assess psychotic symptoms are included. Since these are not relevant for understanding the link between magical thinking and OCD, the Illusory Beliefs Inventory (IBI; Kingdon, Egan, & Rees, 2012) was developed for use in the general population (e.g., following the continuum view of Rachman & de Silva, 1978).

5.4.5. Illusory Beliefs Inventory (IBI; Kingdon, Egan, & Rees, 2012). The IBI is a new 24-item measure of magical thinking. The original validation study identified three factors: magical beliefs, spirituality, and internal state and thought-action fusion. Internal consistency was adequate for the total score and the three subscales (Cronbach's alphas = 0.75-0.87). Kingdon et al. (2012) furthermore reported a negative correlation with rational thinking and moderate correlations between the IBI and

MIS as evidence for convergent validity. The authors explain the last two measures not being higher correlated because of their difference in scope; the MIS taps into schizophrenia symptoms that are outside the scope of magical thinking. Furthermore, the IBI demonstrated criterion-related validity through significant, though small positive relationships between the IBI scores and OCI-R, which confirms that magical thinking and OCD symptoms are related in the general population. Finally, since there is little agreement in the literature on the breadth of view for ‘magical thinking’, the main limitation of the IBI is that it is unknown whether the measure covers all possible styles of magical thinking. More studies need to examine the psychometric properties of the IBI, and administer the measure to OCD patients.

5.5. Adjunctive cognitive-behavioral questionnaires.

This last section will briefly review measures that assess beliefs or appraisals identified by the OCCWG (2001, 2003, 2005) as relevant, but that do not have a prominent role in any of the cognitive-behavioral models discussed. First, the Intolerance of Uncertainty Scale (IUS; Freeston et al., 1994), then the Frost Multidimensional Perfectionism Scale (MPS-F; Frost et al., 1990), the Multidimensional Perfectionism Scale-H (MPS-H; Hewitt & Flett, 1991), and the Perfectionism Inventory (PI; Hill et al., 2004) will be briefly reviewed. Finally, the only questionnaire of the religious counterpart of OCD, the Penn Inventory of Scrupulosity (PIOS; Abramowitz et al., 2002), will be evaluated more extensively for its relevance in the next chapter.

5.5.1. Intolerance of Uncertainty Scale (IUS; French version: Freeston et al., 1994; English translation: Buhr & Dugas, 2002). The English version of the IUS is composed of 27 items and measures negative beliefs about, and reactions to, uncertainty. Buhr and Dugas (2002) found internal consistency (Cronbach’s alpha = 0.94) and test-retest reliability ($r = 0.74$ over five weeks) to be good. Factor analyses furthermore indicated that the IUS has a 4-factor structure that represents the idea that uncertainty is stressful and upsetting, uncertainty leads to the inability to act, uncertain events are negative and should be avoided, and being uncertain is unfair. Evidence of discriminant, convergent, content, and criterion validity have been reported in multiple populations (Buhr & Dugas, 2002, 2006; Carleton, Norton, & Asmundson, 2007; Norton, 2005). These studies moreover show uncertainty to be

strongly related to pathological worry (Buhr & Dugas, 2002), and equally strongly related to GAD and OCD (Holaway, Heimberg, and Coles, 2006). Finally, Carleton et al. (2007) have designed a psychometrically stable 12-item version of the IUS, containing two subscales, which correlate highly with the original IUS.

5.5.2. Frost Multidimensional Perfectionism Scale (MPS-F; Frost et al., 1990). The MPS-F contains 35 items that provide an overall perfectionism score in addition to scores for six subscales that specifically reflect: 1) concern over mistakes; 2) doubts about actions; 3) personal standards; 4) parental expectations; 5) parental criticism; and 6) organization. Whereas some studies support this structure (e.g., Gelabert et al., 2011), many studies have reported different factor structures (e.g., Stöber, 1998; Purdon, Antony, & Swinson, 1999; Cheng, Chong, & Wong, 1999; Cox, Enns, & Clara, 2002; Harvey, Pallant, & Harvey, 2004; Hawkins, Watt, & Sinclair, 2006). The total perfectionism score is the sum of all subscales except the last one, which tends not to correlate highly with the other subscales or with total perfectionism (Frost et al., 1990). The MPS-F seems to have good internal consistency (Cronbach's $\alpha = 0.90$; Frost et al., 1990; Harvey et al., 2004), temporal stability, and concurrent validity in a variety of linguistic and clinical samples (Frost et al., 1990; Cheng et al., 1999; Frost et al., 1993; Purdon et al., 1999; Cox et al., 2002; Hawkins et al., 2006; Gelabert et al., 2011). Frost and Steketee (1997) furthermore found OCD patients to score higher on total perfectionism than anxious and nonclinical controls, though OCD patients and other anxiety disorder patients scored similarly on various subscales. Finally, shorter versions of the MPS-F have been proposed (e.g., Khawaja & Armstrong, 2005), of which the psychometric properties need to be further evaluated.

5.5.3. Multidimensional Perfectionism Scale-H (MPS-H; Hewitt & Flett, 1991). The MPS-H contains 45 items over three subscales: 1) self-oriented perfectionism; 2) other-oriented perfectionism; and 3) socially prescribed perfectionism. This questionnaire does not have a total perfectionism score. Cox et al. (2002) replicated the originally proposed factor structure, though also reported two higher-order factors of adaptive and maladaptive perfectionism. Like the Frost et al. (1990) scale, the MPS-H is a reliable and valid measure of perfectionism (Hewitt & Flett, 1991; Cox et al., 2002). Antony et al. (1998b) did report that differences between various anxiety disorder samples are stronger for the MPS-

F than for the MPS-H. This is consistent with the assertion that the dimensions of the MPS-F are more directly related to the psychopathology underlying the anxiety disorders. Nonetheless, more psychometric validation studies of the MPS-H need to be conducted to replicate these findings.

5.5.4. The Perfectionism Inventory (PI; Hill et al., 2004). Hill et al. (2004) developed a new measure of perfectionism based on the shortcomings of the MPS-F and MPS-H. That is, the MPS-H provides a limited three-scale interpersonal interpretation of perfectionism without the capacity to distinguish specific relevant dimensions of perfectionism. The MPS-F, on the other hand does provide a more diverse set of subscales but omits the perfectionistic concern for the standards of others as well as planfulness. Additionally, some of the six subscales are redundant with each other. Hill et al. (2004) found support for an 8-factor structure in their PI with two higher-order factors: conscientious perfectionism and self-evaluative perfectionism (compatible with previous research describing adaptive and maladaptive dimensions of perfectionism; Cox et al., 2002; Frost et al., 1993). Internal consistency and test-retest reliability were reported to be good in the original validation study. Evidence for convergent validity was furthermore demonstrated through diverse relationships with the two MPS measures and the corresponding subscales of the PI. Moreover, Hill et al. (2004) demonstrated the PI's 59 items to have greater predictive power than the combined MPS measures' ninety items. Nonetheless, more external validation studies need to assess the properties of the PI.

5.5.5. Penn Inventory of Scrupulosity (PIOS; Abramowitz et al., 2002). The PIOS is a 19-item self-report measure that assesses scrupulosity in the context of OCD (i.e., religious obsessions). The PIOS was designed based on the assumption that religious obsessions and compulsions can be conceptualized according to aforementioned cognitive-behavioral premises (Rachman & de Silva, 1978; Salkovskis, 1985; Rachman, 1998; Purdon, 1999). The PIOS contains two subscales: 1) fear of sin (e.g., fears of having committed a religious sin) and 2) fear of God (e.g., fears of punishments of God). The former factor assesses the frequency of such doubts and fears, in addition to the extent it interferes with one's daily life (including neutralizing strategies such as avoidance and compulsive rituals). The second subscale measures concerns about having a poor relationship with God, being an evil person, and future disobedience of religious commandments. The PIOS was shown to be

internally consistent (Cronbach's alphas range from 0.88 to 0.93) and its two subscales to belong to the same content domain (they intercorrelated by $r = 0.67$).

As for convergent validity, Abramowitz et al. (2002) found moderate correlations of the PIOS total score with the MOCI total score ($r = 0.36$), the subscales of washing ($r = 0.22$), checking ($r = 0.28$), doubting ($r = 0.34$), and slowness ($r = 0.20$) in their nonclinical sample. The PIOS fear of sin subscale and the MOCI doubting subscale furthermore correlated by $r = 0.36$. Moreover, the relationship between the PIOS total score and the MOCI total score, and doubting and checking subscales, remained significant even when controlling for depression and trait anxiety. Abramowitz et al.'s (2002) PIOS is thus in line with the literature that has found highly scrupulous individuals to have high levels of OCD symptoms (Tek & Ulug, 2001; Nelson et al., 2006). However, there was no significant interaction effect found between the two variables in the original validation study. Hence, their combined presence does not necessarily increase the severity of scrupulosity.

Additionally, excellent divergent validity was established through weak and nonsignificant correlations between the PIOS and a measure of anger experience and expression. Abramowitz et al. (2002) furthermore reported highly devout participants to score higher on both PIOS subscales, though devout Jews evidenced fewer fears of sin and punishment from God compared to devout Catholics or Protestants. Significant effects of religiosity and religious affiliation/doctrine were moreover modified by a significant interaction effect between these two variables. In other words, the PIOS measure is sensitive to differences between religious doctrines.

Despite this promising preliminary support of the PIOS, few external psychometric validation studies have been undertaken to assess the measure further. An exception to this is the study by Olatunji et al. (2007). Their item-level analyses provided preliminary support for a 15-item PIOS (PIOS-R) as the original items 2, 6, 10, and 15 were found to be conceptually redundant. The two domains of scrupulosity identified on the revised PIOS were the same as identified by Abramowitz et al. (2002): fear of sin and the fear of God. The PIOS-R and its two factors yielded a better fit than the 19-item PIOS. Similar to the original PIOS however, all PIOS-R scales were strongly related to OC symptoms ($r_s = 0.30-0.47$ for PIOS scales with OCI-R total score). In particular, the OCI-R obsessions and hoarding subscales were highly correlated with the fear of sin subscale ($r_s = 0.51$ and 0.39).

Though higher scrupulosity was also related to higher self-reported anxiety and negative affect, the relationship between the PIOS and the OCI-R remained significant when controlling for these variables ($r_s = 0.22-0.42$; Olatunji et al., 2007). Moreover, though scrupulosity correlated moderately with a broad range of other psychopathological symptoms (i.e., state and trait anxiety, negative affect, disgust sensitivity, phobias), only OC symptoms and trait anxiety contributed unique positive variance to the prediction of scrupulosity.

Further examination of specific OC symptom dimensions revealed that only obsessions contributed unique positive variance to the prediction of fear of god. In contrast, OC obsessions, washing, and hoarding symptoms contributed unique positive variance to the prediction of fear of sin. Hence, preoccupation with sin may operate as a vulnerability factor for a wider range of OC symptoms than preoccupation with God. Consistent with Nelson et al. (2006), Olatunji et al.'s (2007) regression findings suggest that scrupulosity is most strongly associated with obsessional symptoms, as opposed to washing, checking, hoarding, or ordering/arranging rituals. This is in concert with findings that religious obsessions load together with violent and sexual obsessions, which may or may not be presented through overt compulsive behaviors (McKay et al., 2004; Bloch et al., 2008). In conclusion, the PIOS(-R) shows good psychometric properties and explanatory power in the religious counterpart of OCD. However, future research should investigate whether the PIOS-R is indeed preferable to the original PIOS, as Olatunji et al.'s (2007) results have not been further investigated yet.

5.6. Conclusion.

In this chapter 17 self-report measures assessing cognitive-behavioral constructs relevant for the emergence and maintenance of OCD have been reviewed. The first three measures, the OBQ, III, and INPIOS, cover a set of dysfunctional beliefs, appraisals, and content related to intrusive thoughts, impulses, and images. Whereas the INPIOS covers thematic content of intrusions more in line with phenomenological measures, the OBQ and III assess dysfunctional beliefs and appraisals as defined by the OCCWG (2001, 2003, 2005), independent of thematic content. The INPIOS is an improvement upon the ROII, and shows excellent preliminary psychometric properties, though more external data need to replicate these. The III was observed to have psychometric shortcomings, in addition to a

problematic conceptual differentiation from the OBQ. In turn, the OBQ has been evaluated in various linguistic and clinical contexts, and seems to perform well. Despite reported problems in discriminative power and specificity, the OBQ is currently the best measure of OC beliefs.

Secondly, this chapter reviewed measures that assess specific dysfunctional beliefs and appraisals relevant for each of the three cognitive-behavioral models of Salkovskis (1985,1999), Rachman (1993,1997), and Purdon and Clark (1995,1999). Of the responsibility measures, the RAS was shown to be preferable over the RIQ, for its psychometric properties and extent of external validation. The PIRBS in turn seems a psychometrically sound and theoretically relevant measure that needs to be further investigated. As for thought-action fusion, the TAFS-R does not seem preferable over the TAFS, due to brevity, theoretical relevance, and face validity of the original measure. Of the importance/thought control measures, the TCQ and the MCQ seem most relevant for OC symptoms, whilst also demonstrating good psychometric properties.

Thirdly, adjunctive measures of perfectionism and intolerance of uncertainty originating in the cognitive-behavioral account were reviewed. While these constructs have no paramount role in any of the cognitive-behavioral models, perfectionism and intolerance of uncertainty beliefs have been found relevant in explaining OCD symptoms. Finally, a measure of OCD in a religious context has been reviewed. Despite its few external validation studies, the PIOS seems psychometrically sound, conceptually coherent, and theoretically relevant. More research needs to investigate whether the revised PIOS is preferable over the original measure. The next chapter of this thesis will illustrate properties of the PIOS and the OBQ further, since these measures were used in the empirical study.

6. Scrupulosity

6.1. Introduction.

The relationship between religion and Obsessive-Compulsive Disorder (OCD) has attracted considerable attention from many theorists and professionals from different fields. During the first half of the 20th century, the debate marked the birth of the psychoanalytic approach to the human mind (Lavric & Flere, 2010). Freud (1953) was one of the first to portray religious people as neurotic and religious acts as obsessive-compulsive. In particular, Freud (1907/1961) remarked that the similarity between obsessive actions and religious practices can be demonstrated through the rituality in both kinds of behavior, the sense of guilt when these actions are neglected, and the exclusivity to which these practices are executed to all other behavior.

Furthermore, Freud (1953) proposed that obsessional neuroses and religious practices are both responses to instinctual demands. That is, obsessional actions are used by the individual to ward off the demands of the sexual instinct, whereas religious practices represent societal efforts to renounce the aggressive instinct. But Freud (1907/1961) does acknowledge the differences between religious and obsessive rituals: whereas the former is meaningful in every detail, the obsessional's private rituals seem senseless even to himself. However, according to Freud, ordinary worshippers give little thought to the significance of the actions they carry out. They may be as unaware as the obsessional of the motives impelling their participation (Wulff, 1991).

Theories have ever since been derived from Freud's (1953, 1907/1961) assertions, that research has endeavored to empirically test. For OCD research in particular, many interesting studies have been done to explain religious obsessions and compulsions. The name this line of research has given to the religious counterpart of OCD is 'scrupulosity'. Scrupulosity research has incorporated both phenomenology and etiology, thereby gradually clarifying the relationship between OCD and religion. Scrupulous obsessions typically involve "seeing sin where there is none", and are frequently focused on minor details of the person's religion, leaving out the more central areas (Nelson et al., 2006: 1072). Religious compulsions commonly include excessive praying, extreme attention to minor details of religious tradition, and seeking reassurance from clergy or loved ones about religious issues.

Usually, these compulsions are performed in a rigid manner, and rehearsed until the person's anxiety is decreased (Abramowitz et al., 2002). Scrupulosity seems to be a common presentation of OCD, with findings showing that religion is the primary obsession of 5.9% of patients, making it the fifth most common OCD presentation, and part of the OCD obsessions (but not necessarily the primary obsession) for 24.2% of OCD research samples (Foa & Kozak, 1995; Antony, et al., 1998a).

Five principles have been proposed to distinguish normal religious scruples from pathological scrupulosity (Greenberg and Witztum, 1991; Celafu, 2010): 1) more intense than normative religious experiences, often petrifying and preoccupying for the individual; 2) linked to an impaired social and self-care functioning; 3) often involving special messages from religious figures; 4) compulsive behavior that goes beyond the requirements of religious law, which is both narrowly focused and often on trivial aspects; and 5) involving a misconstrual of biblical maxims as laws, e.g., a pathological scrupulous person cannot make extrapolations from overriding maxims to particular, context-sensitive circumstances (Celafu, 2010). Research seems to confirm that a patient's religiosity can influence his or her OCD symptoms, and that scrupulosity is unintentionally reinforced by the teachings of the individual's religion (Miller & Hedges, 2008).

Besides influencing the thematic content of obsessions and compulsions, there appear to be different cognitive pathways through which religion can influence OCD. Cognitive-behavioral theorists have suggested that religious institutions imposing explicit moral standards for thinking and acting, which are reinforced by authority figures (e.g., clergy), and with the possibility of punishment (e.g., damnation) might facilitate the development of rigid and maladaptive beliefs about thoughts and their influence (Salkovskis et al., 1999; Rachman, 1997). In particular, research consistently demonstrates a relation between certain cognitive-behavioral constructs, such as importance of controlling thoughts and thought-action fusion (TAF), and OCD symptoms. The aim of this chapter is to increase understanding of the factors that might contribute to the development of scrupulosity.

In order to investigate the phenomenology and etiological pathways of the religious counterpart of OCD further, this chapter will aim to: 1) provide a comprehensive and critical literature review of research on scrupulosity so far; and 2) present a large empirical study where scrupulosity is analyzed in relation to religion, TAF, and obsessive beliefs. The term 'religiosity' refers to personal

religious commitment, and will be used interchangeably with ‘strength of faith’, and the term ‘religious affiliation’ will be used to categorize the religious group with which the person identifies. Finally, the term ‘religion’ will be used in a general way to encompass both variables simultaneously.

6.2. Literature review.

This section first provides a brief overview of early research on the relationship between obsessionality and religiosity, including initial support for the expected relation. Secondly, evidence for the relation between scrupulosity and dysfunctional beliefs is covered, comparing empirical data across religious affiliations. Thirdly, the specific construct of TAF is discussed in relation to scrupulosity. Again, different religious affiliations are compared in their TAF proneness. Fourthly, studies reporting religiosity to have a positive impact on mental health are concisely evaluated, as there is a vast amount of research demonstrating a beneficial impact of religion. Fifthly, an attempt to reconcile these seemingly contradictory effects of religiosity is made. This finally leads to the hypotheses regarding predictors of scrupulosity and obsessive-compulsive (OC) beliefs. The second part of this chapter will consequently outline the methodology used to test these hypotheses.

6.2.1. Early research on the relationship between religiosity and obsessionality. Possible pathways of culture to impact OCD symptomatology are religion and superstition, as religious or superstitious people tend to attach high significance to unwanted intrusive thoughts (de Silva, 2006). Researchers have especially focused on finding an empirically supported relation between religious practices and OC features, because of the following observations (Sica et al., 2002a):

- 1) across various religious rituals, decontamination and purification acts are practiced;
- 2) in many religions, blasphemous thoughts are warded off through repeated prayers, or guilt is alleviated through sin confession; and
- 3) some beliefs usually held by religious individuals appear to lie in the cognitive domains relevant to OCD, i.e., overimportance of thoughts and excessive concern about control of one’s thoughts.

Early studies investigating the religious and cultural affiliation of patients with OCD reported that culturally specific religious behaviors are often incorporated into patients' OCD symptoms. Namely, Okasha and colleagues (1994) found the obsessions of OCD individuals in their Muslim sample to be mostly linked to religious issues, and to cleanliness and contamination. Studies in India have shown a majority of OCD themes to be related to dirt and contamination among Hindu patients, which presumably reflects the preoccupation with cleanliness and emphasis on purification rituals in Hindu culture (Chaturvedi, 1993; Khanna & Channabavasanna, 1988). Two studies conducted in Nepal and Saudi Arabia also showed that obsessional themes were commonly linked to religious practices (Sharma, 1968; Maghoub & Abdel-Hafeiz, 1991).

In a more systematic study, Steketee, Quay, and White (1991) found that religiosity in OCD patients was significantly and positively related to overall illness severity, but not to general distress. Individuals with religious obsessions were also more religious than subjects without those obsessions. The authors furthermore found that the degree of religious devotion in OCD was significantly related to feelings of guilt about committing sinful acts, which is an affective correlate of scrupulosity. These results suggest some specific association of religiosity and OCD symptoms. Greenberg and Witztum (1994, 2001) replicated these findings, and showed obsessions to be significantly more concerned with religious matters for Egyptian and Israeli patients, in comparison to Indian and British samples. The authors proposed that OC ideas and symptoms of Egyptian patients were influenced by Muslim culture, and those of Israeli Jews by ultraorthodox Judaism.

Finally, Tek and Ulug (2001) investigated the relationship between religiosity, religious obsessions, and OCD symptoms in a sample of Turkish OCD patients using a semi-structured interview and factor analytic study. The authors found that 42 per cent of the patients suffered from religious obsessions. Consistent with previous studies (Leckman et al., 1997; Summerfeldt et al., 1999), five OCD symptom dimensions emerged from factor analysis, and religious symptoms loaded on a pure obsessions factor together with sexual obsessions. However, the level of religiosity was not associated with this dimension. In addition, no significant relation between religious obsessions and any particular type of obsession or compulsion was found. Tek and Ulug's (2001) logistic regression showed that the only predictor of an OCD presentation with religious obsessions was the patient's

number of types of obsessions (not compulsions). That is, patients who tend to have a greater variety of obsessions are more likely to also have religious obsessions. There was no significant difference in overall obsessions' and compulsions' severity between patients with and without religious obsessions. Hence, Tek and Ulug (2001) conclude that instead of being a determinant of the disorder, religion appears to be just another arena where OCD expresses itself.

6.2.2. Scrupulosity and dysfunctional beliefs across religious affiliations. After the development of the Penn Inventory of Scrupulosity (PIOS; Abramowitz et al., 2002), more standardized assessment of the religious counterpart of OCD has been possible. As mentioned in the previous chapter (section 5.5.5.), the PIOS was designed based on the assumption that religious obsessions and compulsions can be conceptualized according to aforementioned cognitive-behavioral premises (Rachman & de Silva, 1978; Salkovskis, 1985; Rachman, 1998; Purdon, 1999). The PIOS contains two subscales: 1) Fear of Sin (e.g., fears of having committed a religious sin) and 2) Fear of God (e.g., fears of punishments of God). In the original validation study of the PIOS, Abramowitz et al. (2002) reported highly devout participants to score higher on both PIOS subscales, though devout Jews evidenced fewer fears of sin and fears of punishment from God compared to devout Catholics or Protestants. Hence, the PIOS measure was found to be sensitive to differences between religious doctrines.

The cognitive-behavioral models of OCD have been used to explain the development of scrupulosity. In line with Rachman (1997), Abramowitz (2008) proposed that people who are taught that all their value-laden thoughts are significant, will be more susceptible to develop obsessions, especially certain religious beliefs and instructions. The hypothesized relationship between religion and OCD-related cognitive biases has been supported by some empirical studies, though equivocally. Ever since the cognitive-behavioral account was substantiated with measures to assess underlying cognitions of OCD, only a handful of investigations focusing on the relation between scrupulosity and maladaptive beliefs have been executed.

Such a study was done by Nelson et al. (2006), who reported that scrupulosity was significantly associated with obsessional symptoms, though unexpectedly, not to checking and neutralizing rituals. However, these unexpected findings could be explained by the study using the

OCI-R as OCD symptoms measure, as this instrument has been shown to lack sensitivity for certain kinds of neutralizing and checking rituals (see section 3.4.4.; Foa et al., 2002a). The moderately strong relation between scrupulosity and obsessionality is in line with McKay et al. (2004), who reported that religious obsessions load together with sexual and aggressive obsessions and include anxiety-evoking, repugnant, intrusive thoughts. The association between scrupulosity and sexual and aggressive obsessions suggest that an overly stringent moral code may be the link between the obsessional themes (Olatunji et al., 2007). In concert with cognitive theory, Nelson et al.'s (2006) results indicated that highly scrupulous individuals, 'who are hypervigilant of moral/religious sin' (Nelson et al., 2006: 1081), might be extremely sensitive to intrusive blasphemous thoughts.

Replicating Tek and Ulug (2001), Nelson and colleagues (2006) also found overall OCD symptom severity to be unrelated to scrupulosity, supporting the view that religious symptoms do not represent a more severe variant of OCD. Furthermore, scrupulosity was moderately correlated with multiple cognitive biases, which appear to underlie the development of obsessional symptoms, including moral TAF, overestimates of the importance of and need to control intrusive thoughts, and inflated perceptions of responsibility. Regression analyses confirmed that scrupulosity was best explained by obsessional symptoms, moral TAF, and maladaptive beliefs about the necessity of controlling unwanted intrusive thoughts (Nelson et al., 2006). Again, in line with cognitive-behavioral models (e.g., Salkovskis et al., 1999; Rachman, 1997), this suggests that among religious individuals, an overly restrictive moral code, coupled with the tendency to drastically misinterpret the significance of intrusive unwanted thoughts, provide the context for developing obsessional problems.

While research on the cognitive basis of scrupulosity is still at a preliminary stage, another important issue involves the cultural generalizability of scrupulosity as a construct. Studies with different religious groups have been conducted, allowing for comparison of scrupulosity levels and underlying cognitive mechanisms per religious and cultural affiliation. For example, Sica et al. (2002a) researched the relation between religiosity and OC symptoms in a sample of Italian Catholic students. Their results showed that OC symptoms, perfectionism, thought control, and overimportance of thoughts were all correlated with religious observance. Individuals with a high or medium level of religiosity showed higher degrees of obsessionality and OC cognitions than individuals with a low

level of religiosity, controlling for education, gender, and age. Within religious subjects, only correlations between overimportance and control of thoughts and OC symptoms were found. These findings are compatible with Sica et al.'s (2002b) study, where superstitious individuals appeared to differ from non-superstitious subjects with respect to OC symptoms, cognitions and worry, even when anxiety and depression were controlled for.

In a different study, Abramowitz and colleagues (2004) examined the relationship between Protestant religiosity and OC symptoms and related cognitions. Their sample consisted of highly religious and moderately religious North-American Protestants, in addition to self-reported agnostics and atheists. Controlling for depression and anxiety, results showed that highly religious Protestants suffered from more severe obsessional symptoms compared to both the moderately religious and the atheist/agnostic groups. Furthermore, highly devout Protestants endorsed more strongly beliefs about the importance, need to control, and responsibility for their thoughts in comparison to atheists and agnostics. Highly religious Protestants also reported significantly higher intolerance of uncertainty levels than did nonbelievers (Abramowitz et al., 2004).

Thirdly, Zohar et al. (2005) examined associations between religiosity and OC phenomena in a sample of nonclinical Israeli Jews. Unexpectedly, the relationship between OC beliefs, OC symptoms, and religiosity was not evident on the whole. The authors referred to the different nature of Judaism from that of Christianity to explain this finding. That is, scholars have proposed Judaism to be characterized more by orthopraxy than orthodoxy (e.g., 'doing' vs. 'believing'; Smart, 1999: 184). It is therefore plausible that TAF and dysfunctional beliefs would play a smaller role in the religious cognitive world of a Jew than that of a Christian. Nonetheless, Zohar et al. (2005) did find that individuals who had become more religious over time demonstrated more OC symptoms than people who had become less religious. Consequently, the authors debated whether psychopathology precedes religious behavior, or vice versa. Greenberg and Witztum (2001) had addressed the same question and found that nearly in all cases, psychopathology preceded the religious change. Although Zohar et al. (2005) only tested their subjects once, making causality impossible to infer, it seems likely that OC tendencies were a characteristic of the participants before they changed their religiosity, thus possibly partially accountable for that process.

Most recently, Inozu, Clark, and Karancci (2012) compared scrupulosity in high- and low-religious Muslims and Christians. Given doctrinal differences between Christianity and Islam, this study expected differences in expression of scrupulosity between the devout Muslims and Christians. Namely, Christianity is often thought to place higher value on individual conscience and maintaining certain beliefs, whereas Islam is more ritualistic, characterized by many predefined behavioral rules to follow (Okasha, 2004). Consistent with previous studies, Inozu et al. (2012) found that scrupulosity was elevated in both highly devout Muslims and Christians. In particular, obsessionality in both samples was related to the PIOS 'fear of sin', but not 'fear of god' subscale. Further multiple regression analyses showed obsessional symptoms, the importance and control of thoughts belief, and guilt to be significant predictors of scrupulosity. Beliefs about the importance and control of unwanted thoughts was also significantly related to fear of sin in both samples.

However, there were differences in the severity and content of the scrupulous symptoms between the two groups. Results showed that highly religious Turkish individuals scored significantly higher than the religious Canadian students on the PIOS fear of god but not fear of sin subscale. The relationship of obsessions with scrupulosity symptoms also showed a different pattern in the Muslim and Christian samples. Obsessionality showed a stronger relationship with scrupulosity for Christians than Muslims, in line with the aforementioned different conceptualizations of the two religions (Okasha, 2004). Yet the hypothesis that compulsive symptoms would be more strongly related to scrupulosity in the Muslim sample was not supported. Finally, only in the Canadian sample fear of sin was significantly related to an inflated responsibility/threat estimation belief (Inozu et al., 2012).

Taken together, the discussed studies seem to consistently indicate that religious OC symptoms are enforced by the individual's religious background, though the correlational nature of the data precludes causal inferences. Scrupulosity does not seem to be entirely culturally generalizable, as its specific associations with OC beliefs differ per religious and cultural affiliation. Nonetheless, there is a lot of evidence that religiosity is linked with cognitive biases that underlie OC symptoms for different religious groups. Since a lot of research has focused on TAF in particular, and its association with scrupulosity, this will be discussed next.

6.2.3. Scrupulosity and TAF across religious affiliations. Researchers have investigated whether religion impacts TAF, and whether religious affiliations differ in their impact. Studies so far seem to suggest that certain religious concepts tap into the moral component of TAF (Berle & Starcevic, 2005; Shafran & Rachman, 2004). Early evidence for this came from Cohen and Rozin (2001), who investigated whether certain mental states have differential moral status for Jewish versus Protestant individuals. Their results indicated that American Jews and Protestants differ in the moral status they attribute to mental states, in the context of three different kinds of moral values: honoring one's parents, thinking about marital infidelity, and thinking about harming an animal. Even though Jews and Protestants rated the moral status of the actions equally, Protestants rated a target person with inappropriate mental states significantly more negative than Jews did. These differences in moral judgment were partly mediated by Protestants' beliefs that mental status: can be controlled by people themselves, is likely to lead to action, and is morally relevant (Cohen & Rozin, 2001).

Rassin and Koster (2003) found that religiosity was moderately related to moral TAF, but not to total TAF scores. Also, Protestant individuals in their nonclinical sample were more religious than Catholics, and different associations with TAF were reported for the two groups. In particular, for the Catholic participants, religiosity correlated moderately with both TAF-moral and TAF-likelihood others, in addition to OC symptoms. In the Protestant sample, religiosity correlated even more strongly with the morality bias, but negatively with TAF-likelihood self and not significantly with OC symptoms. A possible explanation of these differences might lie in the idea of Divine predeterminism in Protestant teaching: thoughts could not possibly influence God's plans and actions. Overall, the findings support the hypothesis that religion 'embraces' certain cognitions that are clinically considered to be linked to obsessionality (Rassin & Koster, 2003).

As mentioned, reported differences in OC beliefs and TAF between Protestantism and Judaism have been speculatively interpreted as Jews emphasizing action and behavioral adherence much more than belief (e.g., orthopraxy vs. orthodoxy; Smart, 1999), which is reflected in predominantly behavioral and legalistic Rabbinic literature (Siev & Cohen, 2007). To investigate this claim further, Siev and Cohen (2007) researched the relationship between TAF and religious affiliation in a nonclinical sample of Jews (subsamples of Orthodox, Conservative, and Reform Jews)

and Christians, who affiliated strongly with their respective religions. Christians scored significantly higher on the TAF-moral subscale than non-Orthodox Jews, supporting Smart's (1999) hypothesis. Moreover, participants from all three Jewish groups scored approximately equal to or below the community sample used to establish the normative data for the TAF scale (Shafran et al., 1996). In contrast, the Christian group scored higher on moral-TAF than the obsessional sample from the normative data of Shafran et al. (1996). Also, solely within the Christian group, an interaction between religious group membership and religiosity in predicting moral TAF was found. On the two likelihood subscales of the TAFS however, Christians scored lower than both normative groups of Shafran et al. (1996) and all three Jewish samples in Siev and Cohen's (2007) study. Siev and Cohen (2007) concluded that religiosity per se is not related to obsessive cognitions; this depends on religious group.

Similarly, Siev, Chambless, and Huppert (2010) investigated the moderating role of religion on the relationship between moral TAF and OC symptoms. In line with previous studies, their results showed that Christians endorsed higher levels of moral TAF than Jews, independent of OC symptoms. Also, religiosity was correlated with moral TAF in Christians but not in Jews, suggesting that Christian religious adherence is related to beliefs about the importance of thoughts. For Jews, moral TAF was only related to OC symptoms. This means that for Christians, moral TAF was associated with religiosity but not OC symptoms. Conversely, for Jews, moral TAF was related to OC symptoms, but not religiosity. These results imply that moral TAF is only a marker of pathology when such beliefs are not culturally normative (e.g., function of religious doctrine; Siev et al., 2010).

Finally, Berman et al. (2010) researched the relationship between religion and TAF with an in-vivo paradigm. Protestant Christians were compared to atheists/agnostics on their in vivo ratings of anxiety, estimates of likelihood, and moral wrongness related to intrusive thoughts. Consistent with aforementioned studies, scores on the TAF-moral subscale were higher for the religious Protestants than the nonbelievers. In contrast to Rassin and Koster (2003) however, it was also found that for religious Protestants, the likelihood of a loved one being in a car accident was perceived to be enhanced by writing and thinking about it. For the religious group it was more morally unacceptable (e.g., higher moral TAF) to think and write about incest than for the nonbelievers, whilst this difference was not significant for the car accident thought. Unexpectedly, the two target thoughts did

not provoke more anxiety for the religious group than for the nonbelievers, which is inconsistent with Rachman's (1997) cognitive model of obsessions that proposed higher levels of TAF to be related to more anxiety. Berman et al. (2010) explained this finding proposing that neutralizing strategies may have been conducted by the religious individuals after the experiment (e.g., prayer or asking for forgiveness). Namely, acts to neutralize the effect of thinking and writing down the two target thoughts were more common among the highly religious individuals.

Berman et al.'s (2010) findings are consistent with Salkovskis et al.'s (1999) and Rachman's (1997) proposition that religious doctrine containing standards for the unacceptability of certain thoughts, combined with the threat of punishment for disobedience (on earth or in afterlife), may encourage TAF-like beliefs. Examples of particular Protestant teachings and instructive Bible verses (New American Standard Version) that explicitly reference "sin by thought" (Berman et al., 2010: 673) include: "Anyone who hates his brother is a murderer" (John 3:15), and "For as he thinks in his heart, so is he" (Proverbs 23:7). These verses imply moral TAF, and hence, that thinking about something immoral is equivalent to engaging in immoral behavior.

In sum, these studies seem to suggest that in nonclinical populations, there is a relationship between religiosity and OC beliefs and TAF, though the causal direction remains unclear and the strength of the relationship differs per religious affiliation. In particular, Muslims and Jews seem to be less vulnerable to moral TAF than Christian denominations. As with other presentations of OCD (e.g., checking, washing), there is a continuum of psychopathology associated with scrupulosity, with many individuals having subclinical symptoms that do not cause functional impairment.

6.2.4. Religion as a positive influence on mental health. There is a vast amount of studies reporting the opposite effect of religion on mental health and happiness - a beneficial effect. A large body of older research reports positive contributions of religious devotion to overall mental health in Judeo-Christian samples (Plante & Boccaccini, 1997). In particular, Ellison (1991) found that individuals with stronger religious faith reported higher levels of life satisfaction, greater personal happiness, and fewer negative consequences of traumatic life events than did low faith individuals. Larson et al. (1992) reviewed 139 studies utilizing measures designed to examine dimensions of religious

commitment. Overall, the majority of studies reviewed reported a positive relationship between degree of religious commitment and mental health (Larson et al., 1992).

More recently, in a large Muslim sample, Abdel-Khalek (2007) found that controlling for gender, self-reported religiosity was significantly and positively related to happiness, mental health, and physical health, whereas a significant negative relation was reported between religiosity and anxiety and depression. A higher-order factor of 'religiosity and well-being versus psychopathology' was extracted from the sample data, supporting the thesis of religiosity being positively associated with health and happiness, but negatively with psychopathology (Abdel-Khalek, 2007). Ivtzan et al. (2011) conducted a more comprehensive study amongst individuals from a wide range of religious affiliations and faith groups. In particular, this study investigated the respective effects of 'religion' and 'spirituality' on psychological well-being. Traditionally, spirituality is used to describe an inner, subjective experience, whereas religion is regarded as practices engaged in by members of a social organization, referring to outward theology (Ivtzan et al., 2011).

The authors proposed that an individual can have both components (e.g., a spiritual core and religious involvement) separately or together. After participants were assessed on the two dimensions, four groups emerged that were compared on several measures of psychological well-being: self-actualization, meaning in life, and personal growth initiative. On average, participants high on spirituality (independent of high scores on religious involvement) obtained higher scores on all three measures of psychological well-being. In particular, these groups of participants scored higher on self-actualization and meaning in life, whereas higher levels of personal growth initiative were only found for the group combining high levels of religiosity with spirituality. Hence, the authors conclude that spirituality has an important impact on psychological well-being, independent of whether it is experienced through participation in a religious institution (Ivtzan et al., 2011).

These findings replicate Green and Elliott's study (2010), who researched the effects of religiosity on health and well-being, job satisfaction, marital happiness, and financial status using a longitudinal data set from the General Social Survey (GSS). Methodological strengths of this study were the inclusion of multiple aspects of religiosity (e.g., religious behaviors, liberal or fundamentalist beliefs, attendance at services, and religious identity) and controls for social support outside the

religious setting. Similar to Ivtzan et al. (2011), Green and Elliot (2010) also reported that individuals who described themselves as more religious were healthier and happier, regardless of religious affiliation, religious activities, work and family, social support, or financial status. That is, rather than religious affiliation or participation in religious activities, it was the degree to which a person identified as religious that affected mental health and happiness. Finally, the authors found that people with liberal religious beliefs tend to be healthier but less happy than people with fundamentalist beliefs. A possible explanation for the link between increased happiness and fundamentalism might lie in the reduction of uncertainty that comes with a more stringent worldview (Green & Elliott, 2010).

In a related study, Park et al. (2011) developed empirically based typologies of religiosity/spirituality (e.g., religious activities, positive religious coping, and daily spiritual experiences), to investigate whether these typologies were related to health and psychological well-being. Multivariate analyses resulted in four classes: highly religious, moderately religious, somewhat religious, and minimally or nonreligious. These classes were significantly different in psychological well-being. The highly religious group scored highest on all measures of well-being and was most satisfied with finances. The moderately religious group had poorer perceived health, in addition to higher psychological stress. These effects were even more enhanced for the somewhat and minimally religious groups. The minimally religious group was least happy and least likely to be satisfied with their financial status, although it had significantly fewer depressive symptoms than both the moderately and somewhat religious groups. Overall, these findings supported the beneficial effect of religiosity/spirituality on several indicators of health and psychological well-being (Park et al., 2011).

6.2.5. Towards a rapprochement. If, in concert with cognitive theory, religious cultures nurture strong beliefs about particular thoughts being morally unacceptable, such cultures may contribute to the development and maintenance of OC-related phenomena. Yet, as the previous section has indicated, there is a lot of empirical evidence for the positive effect religion has on health and adjustment. On the whole, it seems that higher levels of religiosity are associated with lower levels of anxiety and depression (see for a complete overview of studies: Gonsalvez et al., 2010). Moreover, when positive health indicators are used, religious commitment has been found to increase life

satisfaction, promote happiness, and enhance one's perceived meaning in life (Abdel-Khalek, 2007; Green & Elliott, 2010; Ivtzan et al., 2011; Park et al., 2011). The positive impact of religion and the potential negative effects predicted by cognitive behavioral theory can be reconciled if it is demonstrated that religion is related to higher levels of OC phenomena but lower levels of other types of psychopathology, such as GAD and depression, at the same time.

The research on the relationship between religion and OC tendencies has been neither extensive nor consistent (Zohar et al., 2005). Hence, a closer investigation of this relationship is required. To this end, Gonsalvez et al. (2010) examined participants' religious affiliation, activities, intensity of religious commitment, and conceptualization of God. For the last, factor analyses of adjectives resulted in three factors: Absent-distant God, Caring God, and Punitive God. It was hypothesized that the belief in a punitive God would foster a culture of fear and guilt that may have a bearing on OC beliefs and scrupulosity. However, no differences between the conceptualizations of God and scrupulosity levels were found. Also surprisingly, the authors found that religious and nonreligious participants had similar levels of mental health and well-being. It is therefore possible that the positive effects reported in other studies (e.g., Abdel-Khalek, 2007; Green & Elliott, 2010; Ivtzan et al., 2011; Park et al., 2011) are due to demographic (e.g., age, education, social support, and stage of life) and trait (extrinsic versus intrinsic religiosity) variables.

The authors further reported religion to be significantly related to OC symptoms. Specifically, Catholic participants reported higher levels of OC symptoms than both the Protestant and the nonreligious groups. It is likely that affiliation differences, e.g., emphasizing religious rituals, sin, hell, and punishment in the Catholic doctrine, might be linked to higher levels of OC symptoms. However, this seems not the case for other psychopathological phenomena, such as anxiety and depression (Gonsalvez et al., 2010). Overall, Gonsalvez et al.'s approach (2010) towards rapprochement, suggesting that religion can lead to decreased general distress and simultaneously to OC cognitions, is assumed in this thesis.

6.2.6. Conclusion. After the development of the PIOS (Abramowitz et al., 2002), and the OBQ-44 (OCCWG, 2005) standardized assessment of the religious counterpart of OCD and OC-related beliefs

has been possible. Though authors tend to agree that religious symptoms do not represent a more severe variant of OCD in comparison to other types of obsessions and compulsions, scrupulosity has generally been found to significantly relate to cognitive biases (Tek & Ulug, 2001; Abramowitz et al., 2002; Nelson et al., 2006). In line with cognitive-behavioral models of OCD (e.g., Salkovskis et al., 1999; Rachman, 1997), it has been suggested that among religious individuals, an overly restrictive moral code, coupled with the tendency to drastically misinterpret the significance of intrusive unwanted thoughts, provide the context for developing religious OC symptoms. In other words, scrupulosity appears to be best explained by: obsessional symptoms, moral TAF, and maladaptive beliefs about the necessity of controlling unwanted intrusive thoughts.

While research on the cognitive basis of scrupulosity is still at an early stage, another important issue involves the cultural generalizability of scrupulosity as a construct. It can be concluded from studies using different religious samples (Sica et al., 2002a, for a Catholic sample; Abramowitz et al., 2004, for a Protestant sample; Zohar et al., 2005, for a Jewish sample; and Inozu et al., 2012, for a comparison of Muslims and Christians) that religious OC symptoms are enforced by various religious and cultural backgrounds, though correlational study designs prevent from making causal inferences. Nonetheless, scrupulosity does not seem to be entirely culturally generalizable, as scrupulosity dimensions and OC cognitions associate differently per religious group.

Conversely, when positive health indicators are used, religious commitment and participation have been found to increase life satisfaction, promote happiness, and enhance one's perceived meaning in life (Abdel-Khalek, 2007; Green & Elliott, 2010; Ivtzan et al., 2011; Park et al., 2011). It seems that higher levels of religiosity are associated with lower levels of anxiety and depression. The positive impact of religion and the negative effects predicted by cognitive behavioral theory have been reconciled by assuming religion is related to higher levels of OC phenomena but lower levels of other types of psychopathology, such as GAD and depression, at the same time (Gonsalvez et al., 2010).

6.2.7. The present study. Although research has examined the clinical correlates of scrupulosity, e.g., OC symptoms, anxiety, and depression, there remains a gap in the literature with respect to the nature of associations between strength of religious faith, dysfunctional beliefs, and scrupulosity among

religious nonclinical individuals. For example, moderating and mediating effects between OC-related cognitions and scrupulosity have not been investigated yet. Furthermore, the reason why some studies (e.g., Greenberg & Witztum, 2001; Sica et al., 2002a) but not others (e.g., Witzig, 2005; Zohar et al., 2005) show higher levels of OC symptoms among religious groups, could be related to the degree to which religion is personalized into beliefs and commitment. The present study was thus conducted to further investigate the phenomenon of scrupulosity in relation to strength of religious faith, obsessive beliefs, and thought-action fusion by means of self-report questionnaires. Evidence from previous studies, as discussed in this chapter, led to hypothesize the following relations:

Hypothesis 1: Compared to nonbelievers, persons belonging to a religious group will show elevated strength of religious faith and scrupulosity levels.

Hypothesis 2: Compared to other religious groups and nonbelievers, Christians will show elevated levels of the maladaptive belief ‘importance and control of thoughts’ and moral TAF.

Hypothesis 3: There will be a positive relationship between religiosity and scrupulosity, which religious affiliation will moderate.

Hypothesis 4: OC beliefs (especially the importance/control of thoughts factor) will predict scrupulosity for both Christians and nonbelievers, above and beyond religiosity’s impact.

Hypothesis 5: OC beliefs, and particularly the responsibility/threat estimation belief, will mediate the relationship between TAF and scrupulosity, controlling for strength of religious faith.

Hypothesis 6: Religiosity, scrupulosity, and TAF will be positive predictors of OC beliefs, controlling for religious affiliation.

6.3. Methodology.

6.3.1. Participants and procedure. To increase the generalizability of the present findings, the hypotheses were investigated in a large unscreened sample from the general population, as opposed to students or clinical samples of OCD patients. The sample recruited therefore shows wide variation in age, education, political orientation, religiosity, and religious affiliation. The total sample consisted of 284 participants of which 171 (60.2%) were female and 113 (39.8%) were male. The participants ranged in age from 18 to 78 years with an average age of 26.35 years ($SD = 11.89$). Religious affiliations were reported as follows; 133 participants (46.8%) identified as Christian, 91 (32%) were Atheist/Agnostic, 17 (6.0%) were Jewish, 14 (4.9%) were Muslim, 23 (8.1 %) identified themselves as ‘other religion’, and 6 (2.1%) were not sure. Only 25 (8.8%) of the participants had undergone psychological treatment in their lifetime.

The study was approved by the UCL Research Ethics Committee (Project ID: CEHP/2011/036). The self-report measures described below were distributed either via e-mail communication or in paper (see appendices), using an opportunity sampling method. An online version of the questionnaire was also developed on surveymonkey.com. Differences in results produced by these two data collection methods were checked for, confirming these methods did not differ in the results they generated (independent samples t-test resulted in $p > 0.05$). All participants signed informed consent forms (see appendices) before completing the questionnaires and they were given the option to remain anonymous. Responses were aggregated and analyzed using SPSS 20.0.

6.3.2. Instruments. All participants received a comprehensive selection of questionnaires that covered four domains: a) religiosity; b) scrupulosity; c) cognitive determinants reckoned to underlie OCD, e.g., obsessive-compulsive beliefs and thought-action fusion; and d) demographic details.

Religiosity

The Santa Clara Strength of Religious Faith Questionnaire (SCSORF; Plante & Boccacini, 1997) is a 10-item self-report scale that provides a reliable and valid measure of one’s strength of religiosity (e.g., I pray daily) on a scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). Total

scores thus range from 10 to 40, with higher scores indicating greater religiosity. Psychometric research demonstrates that scoring at or above 33 indicates 'high religiosity' (Plante & Boccacini, 1997). The SCSORF has good reliability (alpha = 0.92 – 0.95, replicated in the present study) and converges well with other valid measures of religiosity (Plante & Boccacini, 1997; Sherman et al., 1999). This concise assessment device that measures strength of religious faith is useful for research that needs a brief, valid, and reliable measure of religiosity.

Scrupulosity

Scrupulosity was measured on the Penn Inventory of Scrupulosity (PIOS; Abramowitz et al., 2002), a 19-item self-report scale that measures religious obsessive-compulsive symptoms on a 5-point scale (scores thus range from 0-76). The PIOS contains two subscales: 1) Fear of Sin (e.g., fears of having committed a religious sin) and 2) Fear of God (e.g., fears of punishment from God). Scores of the first subscale range from 0 to 48 and scores on the second subscale range from 0 to 28. Since the previous chapter discussed the psychometric properties of the PIOS extensively, see section 5.5.5. for a complete evaluation of the measure. Cronbach's alpha of the PIOS in the current study was 0.90.

Obsessive-compulsive beliefs

The Obsessive Beliefs Questionnaire Short Version (OBQ-44; OCCWG, 2005) measures dysfunctional beliefs proposed to contribute towards the development and maintenance of OCD. Items assess attitudes such as "I must be certain of my decisions" on a scale from 1 (*disagree very much*) to 7 (*agree very much*), creating a score range of 44-308. The OCCWG (2005) suggested that the 44 items load on three subscales: responsibility/threat estimation (16 items, scores range from 16 to 112), perfectionism/certainty (16 items, scores range from 16 to 112), and importance/control of thoughts (12 items, scores range from 12 to 84). Since the previous chapter reviewed the psychometric properties of the OBQ-44 extensively, see section 5.1.1. for a complete evaluation of the measure. Cronbach's alpha of the OBQ-44 in the current sample was 0.83.

Thought-action fusion

The Thought-Action Fusion Scale (TAFS; Shafran et al., 1996) is a 19-item questionnaire

designed to measure the TAF construct in relation to OCD on a 5-point scale (scores range from 19 to 95). Items on the moral subscale assess the belief that thoughts are morally equivalent to actions (12 items, scores range from 12 to 60) and the likelihood scales assess the belief that thinking about something makes it more likely to happen, either to others (4 items, scores range from 4 to 20) or to oneself (3 items, scores range from 3 to 15). Again, since the previous chapter reviewed the psychometric properties of the TAFS extensively, see section 5.3.1. for a complete evaluation of the measure. Cronbach's alpha of the OBQ-44 in the current sample was 0.75.

Demographics

Finally, participants answered questions about their demographic details (age, gender, education, psychological treatment), their religious affiliation, and their political orientation on a scale ranging from 0 (*very left wing*) to 9 (*very right wing*).

6.4. Results.

Before testing the hypotheses, a preliminary analysis of the data set is provided, including a correlation matrix of the variables (table 6.1.) included in this study. Group means for the Christian, Muslim, Jewish, Agnostic/Atheist, Other Religious, and Not Sure groups, on religiosity, scrupulosity, OC beliefs, and TAF are presented in table 6.2. The level for statistical significance was set at $p < 0.05$, and values above this threshold are indicated as nonsignificant. First, scores of the six groups on the four measures were subjected to MANOVA to test hypothesis 1 and 2. Hypothesis 3 and 4 were tested by means of multiple linear regression analyses using scrupulosity (PIOS) as the dependent variable. Mediator models for hypothesis 5 were tested using bootstrapping, with scrupulosity (PIOS) again as the dependent variable. Finally, hypothesis 6 was assessed through multiple linear regression analyses, with dysfunctional beliefs (OBQ-44) as the dependent variable.

6.4.1. Preliminary analyses. Levene's tests supported the assumption of homogeneity of variances of the continuous variables in this research. Examination of skewness and kurtosis in the distributions of the variables showed that normality could also be assumed, which was confirmed by Kolmogorov-Smirnov and the Shapiro-Wilk (K-S) tests. Table 6.1. furthermore presents a correlation matrix of the

variables included in the present study. As can be seen from this table, the variables religiosity, scrupulosity, TAF, and obsessive beliefs showed considerable overlap. Hence, multicollinearity was tested for, comparing each of these four variables to the other three. Results showed that there was no multicollinearity, VIF statistics were below the threshold of 3.0; they ranged between 1.260 (obsessive beliefs and scrupulosity) and 1.706 (scrupulosity and TAF).

It is important to emphasize that religious groups in this study were not equally well represented. Though the Christian and Atheist/Agnostic groups had adequate sample sizes (n= 133 and 91, respectively), the Jewish (n = 17), Muslim (n = 14), Other Religion (n = 23), and Not Sure (n = 6) groups were not big enough for robust analyses. Meaningful combination of groups was also not possible, as the six groups differed significantly from each other on religiosity, scrupulosity, TAF, and obsessive beliefs (see table 6.2.). Hence, the hypotheses were tested in the sample as a whole (n = 284), in addition to comparing Christians and nonreligious participants. Where hypotheses asked for comparison of religious groups, it has been indicated how the religious (monotheistic) affiliations *seem* to differ. These results are presented as mere tendencies, and should not be interpreted otherwise.

Table 6.1. *Pearson's product moment correlations*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------------------|----------|----------|----------|---------|---------|--------|---------|----------|---------|---------|
| 1 SCSORF | - | 0.48*** | 0.45*** | 0.14* | 0.20*** | -0.05 | 0.14* | -0.37*** | 0.21*** | -0.01 |
| 2 PIOS | 0.48*** | - | 0.45*** | 0.50*** | -0.17** | -0.02 | -0.06 | -0.28*** | 0.12 | 0.04 |
| 3 TAFS | 0.45*** | 0.45*** | - | 0.45*** | 0.02 | -0.12* | 0.04 | -0.23*** | 0.06 | 0.03 |
| 4 OBQ-44 | 0.14* | 0.50*** | 0.45*** | - | -0.10 | -0.06 | 0.01 | -0.19** | 0.12* | -0.02 |
| 5 Age | 0.20*** | -0.17** | 0.02 | -0.10 | - | 0.09 | 0.21*** | -0.14** | 0.17** | -0.04 |
| 6 Gender | -0.05 | -0.02 | -0.12* | -0.06 | 0.09 | - | 0.11 | 0.09 | -0.03 | -0.10 |
| 7 Educ. | 0.14* | -0.06 | 0.04 | 0.01 | 0.21*** | 0.11 | - | -0.01 | -0.03 | -0.02 |
| 8 Rel. affil. | -0.37*** | -0.28*** | -0.23*** | -0.19** | -0.14** | 0.09 | -0.01 | - | -0.15** | 0.05 |
| 9 Polit. or. | 0.21*** | 0.12 | 0.06 | 0.12* | 0.17** | -0.03 | -0.03 | -0.15** | - | -0.16** |
| 10 Psych. treat. | -0.01 | 0.04 | 0.03 | -0.02 | -0.04 | -0.10 | -0.02 | 0.05 | -0.16** | - |

Notes. * p < 0.05 (2-tailed)

** p < 0.01 (2-tailed)

*** p < 0.001 level (2-tailed)

6.4.2. Group comparisons on religiosity, scrupulosity, OC beliefs, and TAF. To examine differences across (non)religious groups on strength of religious faith, scrupulosity, OC beliefs, and TAF (hypothesis 1 and 2), scores obtained by the six groups on the four variables were subjected to MANOVA with age, gender, and education included as covariates. Despite the small sample sizes of some of the groups, the MANOVA result for religious affiliation was significant ($F(5,278) = 2.93$; $p < 0.001$). Further univariate ANOVAs with the same covariates, demonstrated significant differences among the six groups for religiosity ($F(5,278) = 24.21$; $p < 0.001$), scrupulosity ($F(5,278) = 8.16$, $p < 0.001$), OC beliefs ($F(5,278) = 3.09$; $p < 0.001$), and TAF ($F(5, 278) = 8.08$; $p < 0.001$).

Table 6.2. *The four measures (means and SDs)*

| | Christian ($n=133$) | None ($n=91$) | Other ($n=23$) | Jewish ($n=17$) | Muslim ($n=14$) | Not sure ($n=6$) | Total ($N=284$) |
|---|-----------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| SCSORF | | | | | | | |
| | 26.21 \pm 8.35 | 14.85 \pm 7.45 | 28.35 \pm 6.69 | 24.35 \pm 8.27 | 27.79 \pm 10.36 | 16.17 \pm 4.22 | 22.50 \pm 9.66 |
| PIOS | | | | | | | |
| | 24.71 \pm 11.79 | 15.97 \pm 12.28 | 21.17 \pm 12.49 | 17.35 \pm 14.01 | 25.36 \pm 14.01 | 13.67 \pm 4.72 | 20.98 \pm 12.76 |
| Subscale Fear of Sin | | | | | | | |
| | 16.29 \pm 7.53 | 11.82 \pm 8.27 | 15.17 \pm 8.35 | 11.41 \pm 8.60 | 16.43 \pm 9.11 | 8.67 \pm 3.08 | 14.32 \pm 8.19 |
| Subscale Fear of God | | | | | | | |
| | 7.99 \pm 5.24 | 3.96 \pm 5.61 | 5.56 \pm 5.01 | 5.94 \pm 6.31 | 8.43 \pm 4.85 | 3.67 \pm 2.73 | 6.31 \pm 5.64 |
| OBQ-44 | | | | | | | |
| | 148.29 \pm 39.31 | 134.63 \pm 43.35 | 134.52 \pm 38.17 | 134.82 \pm 49.14 | 167.14 \pm 39.45 | 114.33 \pm 23.53 | 142.20 \pm 41.72 |
| Subscale Responsibility/Threat Estimation | | | | | | | |
| | 56.83 \pm 15.75 | 50.27 \pm 15.60 | 52.39 \pm 15.10 | 52.65 \pm 20.76 | 61.64 \pm 14.96 | 54.67 \pm 38.77 | 54.31 \pm 16.83 |
| Subscale Perfectionism/Certainty | | | | | | | |
| | 62.30 \pm 18.52 | 55.71 \pm 19.43 | 53.96 \pm 21.56 | 54.23 \pm 21.13 | 61.71 \pm 13.34 | 43.33 \pm 11.08 | 58.60 \pm 19.21 |
| Subscale Importance/Control of Thoughts | | | | | | | |
| | 33.73 \pm 11.95 | 29.35 \pm 14.94 | 30.78 \pm 9.27 | 27.59 \pm 13.18 | 42.64 \pm 13.97 | 24.17 \pm 3.43 | 31.96 \pm 13.23 |
| TAFS | | | | | | | |
| | 45.03 \pm 12.30 | 35.88 \pm 13.82 | 45.83 \pm 11.86 | 44.18 \pm 19.21 | 54.86 \pm 15.92 | 33.67 \pm 6.56 | 42.36 \pm 14.24 |
| Subscale Moral | | | | | | | |
| | 31.80 \pm 10.27 | 24.93 \pm 10.45 | 28.74 \pm 9.62 | 28.41 \pm 11.00 | 38.93 \pm 9.83 | 24.50 \pm 2.95 | 29.35 \pm 10.80 |
| Subscale Likelihood Others | | | | | | | |
| | 6.71 \pm 3.13 | 5.35 \pm 2.36 | 10.78 \pm 12.22 | 7.71 \pm 5.11 | 7.79 \pm 4.42 | 5.00 \pm 1.67 | 6.68 \pm 4.74 |
| Subscale Likelihood Self | | | | | | | |
| | 6.16 \pm 3.04 | 5.31 \pm 2.92 | 8.04 \pm 3.39 | 7.24 \pm 4.45 | 7.50 \pm 4.05 | 5.67 \pm 1.97 | 6.16 \pm 3.25 |

Post-hoc Tukey HSD comparisons (see table 6.2. for means and *SDs* of the variables per religious group) indicated that for the religiosity variable, atheists/agnostics scored significantly lower than all four religious groups ($p < 0.001$ in each instance). Yet nonreligious participants only differed from Christians in scrupulosity scores. Post-hoc Tukey HSD comparisons showed no significant differences in total OC beliefs between any of the samples. However, a significant difference on the importance/control of thoughts factor between Muslims and atheists/agnostics ($p < 0.001$) seemed to exist. As for TAF finally, Christians, Other Religious and Muslims tended to score significantly higher than atheists/agnostics ($p < 0.05$ in each instance). Particularly moral TAF scores were significantly higher for Christians and Muslims than nonreligious participants, whilst scores of the Jewish group seemed not to significantly differ from atheists/agnostics ($p < 0.001$ in each instance).

In conclusion, hypothesis 1 (compared to nonbelievers, participants belonging to a religious group will show elevated strength of religious faith and scrupulosity levels) was supported by these analyses. All religious groups scored higher on religiosity than the nonreligious participants. Though only Christians scored significantly higher on scrupulosity than the No Religion group, this could be due to the small sample sizes of the Jewish and Muslim groups. Conversely, hypothesis 2 (compared to other religious groups and nonbelievers, Christians will show elevated levels of the maladaptive belief ‘importance and control of thoughts’ and moral TAF), was not supported. Though larger sample sizes need to replicate this, mean TAFS and OBQ-44 scores appeared highest for Muslims, not Christians. Moreover, only Muslims seemed to differ on the importance/control of thoughts dimension from atheists/agnostics. Both for Christians and Muslims, elevated moral TAF scores were observed in comparison to the No Religion group. In all, since higher moral TAF appeared not specific to Christians, and Christians did not have higher importance/control of thoughts levels than nonbelievers, hypothesis 2 was rejected.

6.4.3. Religion and scrupulosity. To investigate the association between religiosity and scrupulosity, and the possible moderating effect of religious affiliation on this relationship (hypothesis 3), a series of multiple regression analyses were conducted with the total PIOS score as the dependent variable. For Model 1, religiosity and religious affiliation, in addition to their interaction, were investigated as

predictors. Age, gender, education, political orientation, and past psychological treatment (binary variable), were included as independent variables in Step 1. Strength of religious faith and religious affiliation were included as independent variables in Step 2. Finally in Step 3, an interaction effect of religiosity * religious affiliation was included. The results showed that age ($\beta = -0.19$, $p < 0.001$) and political orientation ($\beta = 0.15$, $p < 0.05$) were the only significant predictors of scrupulosity in Step 1. Strength of religious faith ($\beta = 0.48$, $p < 0.001$) and religious affiliation ($\beta = -0.15$, $p < 0.001$) both significantly predicted scrupulosity. Moreover, the interaction effect between religiosity and religious affiliation was also significant ($\beta = 0.32$, $p < 0.05$), supporting hypothesis 3.

Table 6.3. shows an overview of the regressions in Model 1. This model explained 45.5% of the variance in scrupulosity ($R^2 = 0.46$; $F(8,275) = 28.71$; $p < 0.001$). Surprisingly, when looking at the impact of religiosity on scrupulosity for Christians and atheists/agnostics separately, it was found that religiosity predicted scrupulosity levels by $\beta = 0.31$ ($p < 0.001$) for Christians and almost double for nonbelievers ($\beta = 0.59$; $p < 0.001$). For the Other Religion group this effect appeared the highest ($\beta = 0.81$, $p < 0.001$). A Fisher's exact test further indicated these differences to be significant ($p < 0.05$). Hence, hypothesis 3 was supported; though religiosity and religious affiliation significantly impacted scrupulosity overall, the relationship was modified by religious affiliation.

6.4.4. Obsessive-compulsive beliefs and scrupulosity. Further multiple hierarchical regressions were run to see whether OC beliefs, particularly the importance/control of thoughts dimension, would significantly predict scrupulosity for Christians and nonbelievers, above and beyond religiosity's impact on scrupulosity (hypothesis 4). First, the expected relation was investigated for the whole sample in Model 2. For Model 2, Step 1 and 2 were identical to Model 1, with PIOS again entered as dependent variable. In Step 3, OC beliefs explained additional significant variance of scrupulosity ($\beta = 0.40$, $p < 0.001$). The R^2 for this model was 0.48 ($F(8,275) = 31.22$; $p < 0.001$), slightly higher than for Model 1. See table 6.3. for an overview of the regressions in Model 2.

Furthermore, Model 3 examined explanatory power of the OBQ-44 when the three subscale scores, instead of the OBQ-44 total score, were entered in Step 3. Results showed that only the responsibility/threat estimation and importance/control of thoughts dimensions significantly predicted

scrupulosity (β s = 0.20 and 0.33 respectively; $p < 0.001$). Seeing that the importance/control of thoughts dimension explained the most variance of the dysfunctional beliefs, overall support for hypothesis 4 was found. Model 3 explained 52.2% of the variance in scrupulosity ($R^2 = 0.52$; $F(10,273) = 29.87$; $p < 0.001$), making Model 3 preferable over Model 2. See table 6.3. for a summary.

Finally, different patterns of association emerged when comparing these predictors of scrupulosity for Christians and atheists/agnostics separately. For the former, OC beliefs similarly impacted scrupulosity levels as for the whole sample. Yet for nonbelievers, when entering the OBQ-44 subscales separately, only the importance/control of thoughts dimension was significantly associated with scrupulosity. Responsibility/threat estimation did not significantly impact atheists' and agnostics' scrupulosity levels. Out of curiosity, these results were compared to Muslim and Jewish participants. For both these groups, the separate OBQ-44 subscales did not significantly predict scrupulosity. The total OBQ-44 score also did not seem to significantly relate to scrupulosity in Muslims. For Jews, on the other hand, overall OC beliefs' impact on scrupulosity appeared strong ($\beta = 0.95$; $p < 0.001$).

Table 6.3. Regression analyses identifying predictors of scrupulosity ($N = 284$)

| Variable | Model 1 | | | Model 2 | | | Model 3 | | |
|--------------------------------------|---------------|-------------|----------|---------------|-------------|----------|----------------|-------------|----------|
| | β | <i>SE B</i> | <i>t</i> | β | <i>SE B</i> | <i>t</i> | β | <i>SE B</i> | <i>t</i> |
| Step 1 | | | | | | | | | |
| 1 Age | -0.19** | 0.07 | -3.07 | -0.19** | 0.07 | -3.07 | -0.19** | 0.07 | -3.07 |
| 2 Gender | 0.01 | 1.55 | 0.13 | 0.01 | 1.55 | 0.13 | 0.01 | 1.55 | 0.13 |
| 3 Education | -0.02 | 0.64 | -0.29 | -0.02 | 0.64 | -0.29 | -0.02 | 0.64 | -0.29 |
| 4 Psych. treatment | 0.06 | 2.67 | 0.96 | 0.06 | 2.67 | 0.96 | 0.06 | 2.67 | 0.96 |
| 5 Polit. orientation | 0.15 | 0.47 | 2.57 | 0.15 | 0.47 | 2.57 | 0.15 | 0.47 | 2.57 |
| Step 2 | | | | | | | | | |
| 6 Religiosity | 0.48*** | 0.07 | 8.72 | 0.48*** | 0.07 | 8.72 | 0.48*** | 0.07 | 8.72 |
| 7 Religious affil. | -0.15** | 0.43 | -2.75 | -0.15** | 0.43 | -2.75 | -0.15** | 0.43 | -2.75 |
| Step 3 | | | | | | | | | |
| 8 Relig. * Rel. aff. | 0.32* | 0.05 | 2.28 | | | | | | |
| 9 Total OC beliefs | | | | 0.40*** | 0.01 | 8.88 | | | |
| 10 OBQ-44 R/TE | | | | | | | 0.20*** | 0.04 | 3.66 |
| 11 OBQ-44 P/C | | | | | | | -0.001 | 0.04 | -0.01 |
| 12 OBQ-44 I/COT | | | | | | | 0.33*** | 0.05 | 5.86 |
| R^2 | 0.455 | | | 0.476 | | | 0.522 | | |
| (<i>df1</i> , <i>df2</i>) <i>F</i> | (8,275) 28.71 | | | (8,275) 31.22 | | | (10,273) 29.87 | | |

Notes. * $p < 0.05$ (2-tailed)

** $p < 0.01$ (2-tailed)

*** $p < 0.001$ level (2-tailed)

6: Strength of Religious Faith; measured by the SCSORF

7: 1 = Christian ; 2 = Islam ; 3 = Judaism ; 4 = Agnostic/Atheist 5 = Other Religion; 6 = Not Sure

9: measured by the OBQ-44

10: OBQ-44 R/TE = Responsibility/Threat Estimation subscale

11: OBQ-44 P/C = Perfectionism/Certainty subscale

12: OBQ-44 I/COT = Importance/Control Of Thoughts subscale

6.4.5. Mediator models of scrupulosity.

Support was found for OC beliefs, and the responsibility/threat estimation belief in particular, mediating the relationship between TAF and scrupulosity, controlling for religiosity (hypothesis 5). Seeing the high content overlap between the importance/control of thoughts dimension and TAF, it was no surprise that initial regression analyses showed TAF not to predict significant additional variance for scrupulosity when OC beliefs were

included in the same regression. Therefore, to assess cognitive-behavioral models' of OCD (e.g., Salkovskis et al., 1999; Rachman, 1997) in the context of religion, mediating effects of total OC beliefs, in addition to the responsibility/threat estimation belief separately, on the TAF-scrupulosity relation were investigated. To this end, the sample was bootstrapped with first overall OC beliefs, and secondly solely the responsibility/threat estimation belief, as mediators between TAF and scrupulosity.

Since the Baron & Kenny method has significant limitations in smaller or skewed samples, and the Sobel test has lower statistical power (Preacher & Hayes, 2008), bootstrapping was selected to test the hypothesized mediating effects. Bootstrapping basically involves repeatedly randomly sampling observations with replacement from the dataset and computing the statistic of interest in each resample, generating an empirical approximation of the sampling distribution of the statistic that can be used for hypothesis testing (Shrout & Bolger, 2002). For the analyses in this section, the SPSS macro code found on the website accompanying the paper of Preacher and Hayes (2008) was used.

The bootstrapping analysis for mediating effects tests four paths:

- Path a. between the independent variable and the mediator (e.g., TAF and OC beliefs);
- Path b. between the mediator and the dependent variable (e.g., OC beliefs and scrupulosity);
- Path c. between the independent variable and the dependent variable (e.g., between TAF and scrupulosity); and
- Path c-prime. Significant reduction (partial mediation) or disappearance (full mediation) of the relationship between independent variable and dependent variable when the mediator is added (e.g., TAF not predicting scrupulosity when OC beliefs are controlled for).

In addition to the three variables of interest, strength of religious faith, age, gender, education, political orientation, and past psychological treatment (binary variable) were entered as covariates. Results indicated that path a ($\beta = 1.41$; $p < 0.001$), path b ($\beta = 0.12$; $p < 0.001$), and path c ($\beta = 0.25$; $p < 0.001$) were significant, whereas path c-prime ($\beta = 0.086$; $p > 0.05$) was not significant when the total OBQ-44 score was entered as mediator. This supports a full mediation of dysfunctional beliefs on the association between TAF and scrupulosity. Furthermore, the ratio of indirect (boot results; product

of path a and path b) to direct effect (path c) was $(0.1625/0.0858)$ 1.89, and the proportion of the total effect due to the indirect effect $(0.1625/(0.1625 + 0.0858))$ was 0.65. This model including the mediating effect of OC beliefs on the relationship between TAF and scrupulosity, accounted for 47.6% of the variance in scrupulosity ($R^2 = 0.48$; $F(8,275) = 31.21$; $p < 0.001$). See table 6.4. for an overview of these results.

Smári and Hólmsteinsson (2001), Smári et al. (2010), and Barrera and Norton (2011), have reported evidence of the responsibility/threat estimation belief specifically mediating the relationship between TAF and OC symptoms. To test this mediator model for OCD's religious counterpart, a different bootstrapping analysis was conducted with solely the responsibility/threat estimation factor as mediator. Hence, the dependent variable, independent variable, and paths were exactly like the first mediator model, but instead of the total OBQ-44 score, only the responsibility/threat estimation score was used in the bootstrap. Results indicated that path a ($\beta = 0.55$; $p < 0.001$), path b ($\beta = 0.26$; $p < 0.001$), and path c ($\beta = 0.25$; $p < 0.001$) were significant, whereas path c-prime ($\beta = 0.11$; $p = 0.035$) significantly decreased when the responsibility/threat estimation score was entered as mediator.

Since the c-prime path lost strength and the p-value increased, this model supports a partial mediation of responsibility/threat estimation on the association between TAF and scrupulosity. Again, ratios of indirect (boot results) to direct effect were computed: $0.1428/0.1055 = 1.35$, in addition to the proportion of the total effect due to the indirect effect: $0.1428/(0.1428 + 0.1055) = 0.58$. Model 2 explained 45.8% of the variance in scrupulosity ($R^2 = 0.46$; $F(8, 275) = 29.05$; $p < 0.001$). See table 6.4. for an overview of the bootstrapping results in mediator Model 1 and mediator Model 2. In sum, OC beliefs, and particularly responsibility/threat estimation, mediated the relationship between TAF and scrupulosity when controlling for religiosity. Therefore, the fifth hypothesis was fully supported.

Table 6.4. Bootstrap analyses identifying mediators in predicting scrupulosity ($N = 284$)

| Path/effect | Standardized | | | Standardized | | |
|---|--------------|----------------|---------|--------------|----------------|---------|
| | Model 1 | | | Model 2 | | |
| | β | SE | p | β | SE | p |
| Age \rightarrow Scrupulosity | -0.22 | 0.050 | < 0.001 | -0.22 | 0.051 | < 0.001 |
| Gender \rightarrow Scrupulosity | 1.81 | 1.16 | 0.12 | 1.13 | 1.19 | 0.34 |
| Education \rightarrow Scrupulosity | -0.99 | 0.48 | 0.041 | -1.24 | 0.49 | 0.012 |
| Psych. treatment \rightarrow Scrupulosity | 2.16 | 2.00 | 0.28 | 1.99 | 2.03 | 0.33 |
| Religiosity \rightarrow Scrupulosity | 0.57 | 0.68 | < 0.001 | 0.56 | 0.069 | < 0.001 |
| <i>a</i> TAF \rightarrow OBQ-44 total (M1) | 1.41 | 0.17 | < 0.001 | | | |
| TAF \rightarrow OBQ-44 R/TE (M2) | | | | 0.55 | 0.071 | < 0.001 |
| <i>b</i> OBQ-44 total \rightarrow Scrupulosity (M1) | 0.12 | 0.15 | < 0.001 | | | |
| OBQ-44 R/TE \rightarrow Scrupulosity (M2) | | | | 0.26 | 0.038 | < 0.001 |
| <i>c</i> TAF \rightarrow Scrupulosity | 0.25 | 0.049 | < 0.001 | 0.25 | 0.048 | < 0.001 |
| <i>c'</i> TAF \rightarrow Scrupulosity | 0.086 | 0.049 | 0.083 | 0.11 | 0.050 | 0.035 |
| <i>a x b</i> (Indirect effect) | 0.16 | 0.032 | < 0.001 | 0.15 | 0.038 | < 0.001 |
| R^2 | | 0.48 | | | 0.46 | |
| (<i>df1</i> , <i>df2</i>) F | | (8, 275) 31.21 | | | (8, 275) 29.05 | |

Notes. Bias corrected and accelerated confidence intervals = 0.106 to 0.231 (Model 1) and 0.078 to 0.220 (Model 2). Bootstrap resamples = 1000. The 95% confidence interval for the standardized result was produced with bias corrected and accelerated option in the bootstrap dialogue box. Religiosity was measured by the SCSORF. OBQ-44 subscale R/TE = Responsibility/Threat Estimation.

6.4.6. Predictors of dysfunctional beliefs. Finally, the last set of multiple regression analyses investigated the predictors of OC beliefs (hypothesis 6). The total score of the OBQ-44 was used as the dependent variable. Age, gender, education, political orientation, past psychological treatment (binary variable), and religious affiliation were included as independent variables in Step 1. Strength of religious faith was included as an independent variable in Step 2, in addition to total TAF and scrupulosity scores. Results showed age ($\beta = -0.16$, $p < 0.01$) and religious affiliation ($\beta = -0.19$, $p < 0.01$) to be significant predictors of OC beliefs in Step 1. In Step 2, significant predictors of OC beliefs were strength of religious faith ($\beta = -0.28$, $p < 0.001$), scrupulosity ($\beta = 0.45$, $p < 0.001$), and TAF ($\beta =$

0.35, $p < 0.001$). Model 1 explained 36.8% of the variance in OC beliefs ($R^2 = 0.37$; $F(9, 274) = 17.76$; $p < 0.001$). Apart from the negative, rather than hypothesized positive effect of religiosity on OC beliefs, Model 1 supported hypothesis 6. See table 6.5. for an overview of the regressions.

In Model 2, a variation of Model 1, strength of religious faith was alone entered in Step 2, but appeared not significant. Subscale scores of scrupulosity and TAF were entered as independent variables in Step 3, as opposed to their total scores in Step 2. In Step 3 of the final model, both PIOS subscales significantly predicted OC beliefs ($\beta = 0.32$ for fear of sin and $\beta = 0.17$ for fear of god, $p < 0.05$). Only TAF-moral ($\beta = 0.33$, $p < 0.001$) and TAF-likelihood others ($\beta = 0.11$, $p < 0.05$) significantly predicted dysfunctional beliefs. When entered in Step 3, strength of religious faith became significant and again showed a negative relationship with OC beliefs ($\beta = -0.31$, $p < 0.001$). Of this final model for OC beliefs, 39.3% of the variance in scrupulosity was explained, making Model 2 preferable over Model 1 ($R^2 = 0.39$; $F(12,271) = 14.59$; $p < 0.001$). See table 6.5. for an overview of the analyses in Model 1 and Model 2. In sum, hypothesis 6 (religiosity, scrupulosity, and TAF will be positive predictors of OC beliefs, controlling for religious affiliation) was only partly supported by these analyses. Strength of religious faith as a standalone variable did not contribute significant variance to OC beliefs, and when entered with TAF and scrupulosity, the variable impacted OC beliefs negatively rather than positively.

Table 6.5. Regression analyses identifying predictors of OC beliefs (N = 284)

| Variable | Model 1 | | | Model 2 | | |
|------------------------------|----------|----------------|-------|---------|----------------|-------|
| | β | SE B | t | β | SE B | t |
| Step 1 | | | | | | |
| 1 Age | -0.16** | 0.21 | -2.54 | -0.16** | 0.21 | -2.54 |
| 2 Gender | -0.04 | 5.04 | -0.60 | -0.04 | 5.04 | -0.60 |
| 3 Education | 0.05 | 2.07 | 0.79 | 0.05 | 2.07 | 0.79 |
| 4 Psychological treatment | -0.002 | 8.69 | -0.03 | -0.002 | 8.69 | -0.03 |
| 5 Political Orientation | 0.12 | 1.52 | 1.96 | 0.12 | 1.52 | 1.96 |
| 6 Religious Affiliation | -0.19** | 1.55 | -3.13 | -0.19** | 1.55 | -3.13 |
| Step 2 | | | | | | |
| 7 Total TAF score | 0.35*** | 0.17 | 6.20 | | | |
| 8 Total PIOS score | 0.45*** | 0.20 | 7.29 | | | |
| 9 Religiosity | -0.28*** | 0.27 | -4.51 | 0.09 | 0.28 | 1.35 |
| Step 3 | | | | | | |
| 10 PIOS Fear of Sin subscale | | | | 0.32*** | 0.35 | 4.70 |
| 11 PIOS Fear of God subscale | | | | 0.17* | 0.52 | 2.42 |
| 12 Moral TAF | | | | 0.33*** | 0.23 | 5.31 |
| 13 Likelihood Self TAF | | | | 0.04 | 0.72 | 0.74 |
| 14 Likelihood Others TAF | | | | 0.11* | 0.43 | 2.06 |
| R^2 | | 0.368 | | | 0.393 | |
| (df1, df2) F | | (9, 274) 17.76 | | | (12,271) 14.59 | |

Notes. * p < 0.05 (2-tailed) ** p < 0.01 (2-tailed) *** p < 0.001 level (2-tailed)
6: 1 = Christian ; 2 = Islam ; 3 = Judaism ; 4 = Agnostic/Atheist 5 = Other Religion; 6 = Not Sure
7 & 12-14: measured by TAFS
8, 10, 11: measured by the PIOS
9: Strength of Religious Faith; measured by the SCSORF

6.5. Discussion.

This chapter first provided a literature review including early research on the relationship between obsessionality and religiosity, in addition to contemporary research on scrupulosity, the religious counterpart of OCD. In particular, the impact of OC-related dysfunctional beliefs and the maladaptive tendency to fuse thoughts and actions (TAF) was discussed in relation to scrupulosity across religious affiliations. Additionally, studies that have reported religion to be a positive influence on mental health were briefly reviewed, along with an approach to reconcile these seemingly contradictory effects of religion. The literature review concluded with hypotheses of the present study regarding predictors, moderators, and mediators of scrupulosity and OC beliefs. This study used a nonclinical sample to examine the relationships between religion, dysfunctional beliefs, TAF, and scrupulosity across religious and nonreligious participants. This is the first study, to my knowledge, that demonstrated significant empirical support for applying a mediator model of cognitive-behavioral theory to scrupulosity. Interpretations of the results for the tested hypotheses are discussed below.

6.5.1. Group comparisons on religiosity, scrupulosity, OC beliefs, and TAF. Hypothesis 1 (compared to nonbelievers, persons belonging to a religious group will show elevated strength of religious faith and scrupulosity levels) was supported. All religious groups scored higher on religiosity than the No Religion group. Though only Christians scored significantly higher on scrupulosity in comparison to atheists/agnostics, the nonsignificant results for the Jewish and Muslim samples could be due to their small sample sizes. Conversely, hypothesis 2 (compared to other religious groups and nonbelievers, Christians will show significantly more OC beliefs and TAF), was rejected. Not Christians, but Muslims appeared to differ significantly on the importance/control of thoughts dimension from the nonreligious participants. Moreover, despite the small sample size of the Muslim group, it seemed that these participants scored highest on all TAFS and OBQ-44 scales. For both Christians and Muslims, higher moral TAF scores were observed compared to nonbelievers.

The present findings for the Jewish group seem in line with previous studies reporting Jews to have comparable levels of TAF to atheists/agnostics (Cohen & Rozin, 2001; Abramowitz et al., 2002;

Siev et al., 2010). Yet for Christians and unexpectedly also Muslims, religious adherence appeared to be related to beliefs about the morality of thoughts. That is, this study did not show moral TAF to be specific to Christian participants. Even though these results should be interpreted as mere tendencies, as the small sample size of Muslims and Jews limit robust comparisons, this was surprising. Namely, researchers have generally distinguished Christianity from Judaism and Islam for its orthodox nature (Smart, 1999). It is supposed that Muslims (Okasha, 2004; Inozu et al., 2012) and Jews (Siev & Cohen, 2007) observe their religion in a manner characterized more by orthopraxy than orthodoxy.

6.5.2. Religion and scrupulosity. The prediction that there would be a positive relationship between religiosity and scrupulosity, moderated by religious affiliation (hypothesis 3), was completely supported. Regression analyses showed strength of religious faith and religious affiliation to be significant main effects, while their interaction also significantly explained additional variance of scrupulosity. These results replicated the finding of Gonsalvez et al. (2010) that higher levels of religiosity are related to elevated scrupulosity scores. Surprisingly, the present study found these effects to be stronger for atheists/agnostics than for Christians. This could mean that religiosity has a bigger impact on the emergence and maintenance of scrupulous symptoms, when it is not culturally normative or congruent with theological principles of a certain group (Siev et al., 2010). As the present study included small Jewish and Muslim samples, robust comparisons between the three monotheistic religions were not possible. More studies need to investigate these relations for non-Christian religious affiliations.

6.5.3. Obsessive-compulsive beliefs and scrupulosity. Furthermore, it was found (in support of hypothesis 4) that OC beliefs, particularly the importance/control of thoughts dimension, significantly predicted scrupulosity above and beyond religiosity's impact. Since previous research emphasized the predicting power of OC subscales over the total score (Tolin et al., 2005, 2006), a different regression was run with the three OC dimensions (responsibility/threat estimation; perfectionism/certainty; and importance/control of thought), instead of the total obsessive beliefs score. Only the responsibility/threat estimation and importance/control of thoughts dimensions significantly predicted

scrupulosity for the whole sample. More total variance was explained by this model than with the total OBQ-44 score. In further support of hypothesis 4, the importance/control of thoughts dimension explained the most variance of the dysfunctional beliefs. This finding is compatible with previous studies demonstrating the experienced necessity of controlling thoughts for scrupulous patients across various affiliations and cultures. Specifically, Sica et al. (2002a) have reported similar results for an Italian Catholic sample, Abramowitz (2004) for a North American Protestant sample, and Inozu et al. (2012) for Turkish Muslims and Canadian Christians.

Though when comparing Christians and nonbelievers on the specific impact of two OBQ-44 subscales on scrupulosity, differences emerged. For Christians, total dysfunctional beliefs and the specific importance/control of thoughts and responsibility/threat estimation beliefs similarly predicted scrupulosity as reported for the whole sample. For atheists/agnostics, on the other hand, only total OBQ-44 and the importance/control of thoughts factor significantly predicted nonbelievers' scrupulosity levels; the impact of responsibility/threat estimation was nonsignificant. In line with Salkovskis et al. (1999) and Coles and Schofield (2008) this could indicate that a religious context or upbringing, with a stringent moral code and the possibility of punishment (whether in this world or another), facilitate the development of dysfunctional responsibility beliefs.

6.5.4. Mediator models of scrupulosity. Present findings supported the mediating effect of firstly OC beliefs, and secondly responsibility/threat estimation, on the relationship between TAF and scrupulosity (hypothesis 5). The reported mediator models in fact applied cognitive-behavioral theory (Salkovskis et al., 1999; Rachman, 1997; Purdon & Clark, 2002; Wells, 2000) of OCD to its religious counterpart for the first time. Specifically, in Rachman (1993)'s cognitive theory and Wells' (2000) metacognitions model, a mediator model was proposed whereby TAF leads to responsibility appraisals and then to OC symptoms. In line with both these cognitive-behavioral accounts, the present study found that TAF leads to OC beliefs in general, or specifically to responsibility/threat estimation appraisals, and then to scrupulous symptoms. In other words, the present findings thus supported the mediating role of inflated responsibility on the relationship between TAF and scrupulosity.

Besides supporting Rachman's (1993, 1997) cognitive theory of obsessions and Wells' (2000)

metacognitions model, these results furthermore replicated Smári and Hólmsteinnsson's (2001) study, where responsibility was found to be a mediator between intrusive thoughts and OC symptoms. The present findings are also in concert with Barrera and Norton's (2011), and Smári et al.'s (2010) results, which emphasized the impact of responsibility beliefs on enhanced OC symptoms. Moreover, the results replicated Matthews et al. (2006) and Solem et al. (2010b), who found that the relationship between TAF and OC symptoms was fully mediated by responsibility attitudes. Results of the hypothesized mediator models for scrupulosity are presented in figure 6.1. and 6.2.

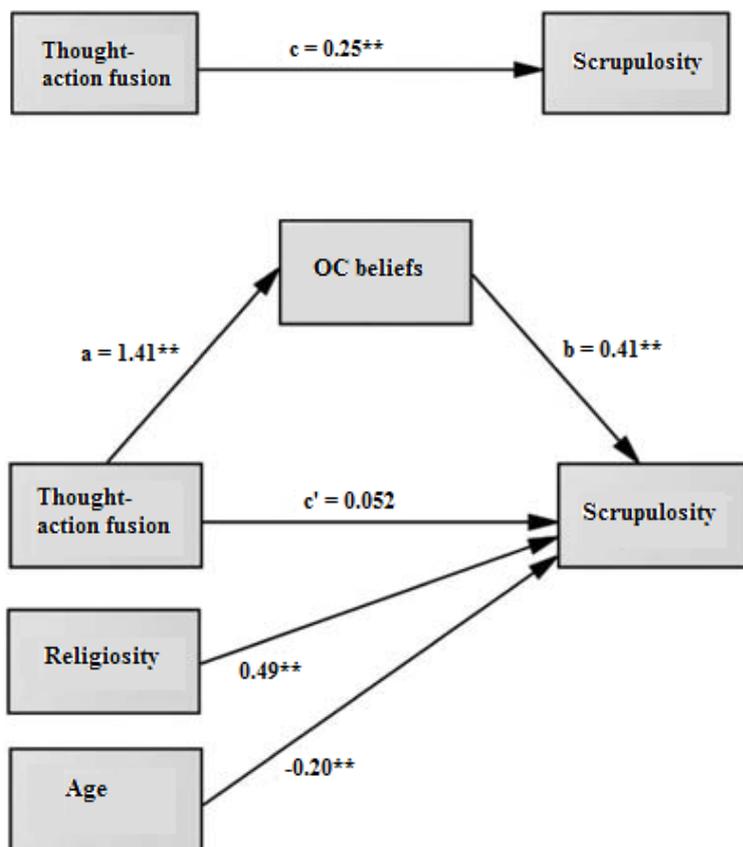


Figure 6.1. Tests of the theorized mediation in Model 1. Upper figure: the total effect (TAF predicting scrupulosity), with age and religiosity (strength of religious faith) as control variables. Lower figure: indirect effects (total OC beliefs as mediator). Together, the predictors accounted for 47.6% of the variance in scrupulosity. Standardized regression coefficients are displayed (* = $p < 0.05$; ** = $p < 0.001$).

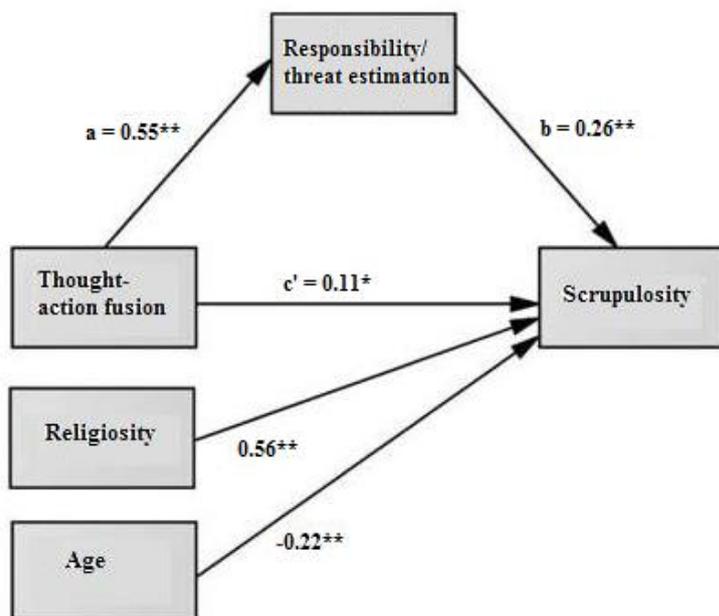


Figure 6.2. Tests of the theorized mediation in Model 2. Indirect effects in Model 2 (OBQ-44 subscale responsibility/threat estimation as mediator). Together, the predictors accounted for 45.8% of the variance in scrupulosity. Standardized regression coefficients are displayed (* = $p < 0.05$; ** = $p < 0.001$).

6.5.5. Predictors of dysfunctional beliefs. Finally, the last hypothesis predicted that religiosity, scrupulosity, and TAF would be positive predictors of OC beliefs, controlling for religious affiliation. Though religiosity indeed significantly predicted OC beliefs, the relationship was negative. This entailed that higher religiosity was related to a decreased level of maladaptive beliefs. This finding was unexpected, since the literature has generally reported a relation between strength of religious faith and decreased general distress (Abdel-Khalek, 2007; Green & Elliott, 2010; Ivtzan et al., 2011; Park et al., 2011), but increased OC symptoms and beliefs (Abramowitz et al., 2002; Sica et al., 2002a; Gonsalvez et al., 2010). Why more religious participants experienced a decrease in OC cognitions is unclear. It is possible that the demographic make-up of the sample accounts for this unexpected relationship, as contextual factors commonly moderate these relations (Gonsalvez et al., 2010).

That is, the present sample consisted mostly of educated, young people (average age was 26 years), and it is possible that both the direction and type of effects religion had, were influenced by demographic and other contextual factors. Also, this study did not distinguish between intrinsic and extrinsic religiosity (Allport & Ross, 1967), two dimensions that relate differently to mental health

(Genia, 1993). Moreover, the present sample included a substantial portion (23 respondents, 8.1% of the sample) that identified their religion as 'Other'. It is unknown what religions these were and how they effected dysfunctional beliefs. In conclusion, it is possible that the decreased OC cognitions for more religious people in this study is accounted for by demographic variables, religious trait, and unknown characteristics of religions other than Christianity, Islam, and Judaism.

Besides religion, TAF and scrupulosity significantly and positively predicted OC beliefs. When entering the subscale scores of the TAFS and PIOS, the best fit of model emerged. Both the PIOS fear of sin and fear of God dimensions significantly predicted variance in the total OBQ-44 score. This suggests that, as opposed to previous studies (Olatunji et al., 2007; Inozu et al., 2012), both preoccupation with God and preoccupation with sin account for the pathological element of scrupulosity. Furthermore, these analyses showed both likelihood-others and moral TAF to be significantly related to OC beliefs. This suggests that the moral component of TAF might play a bigger role in mechanisms underlying certain types of OC symptoms than reckoned so far (Berle & Starcevic, 2005). Nonetheless, OCD symptomatology was not completely covered, and these suggestions therefore remain of speculative nature.

6.5.6. Limitations and future directions. Despite the comprehensive measurement of constructs and strong evidence of patterns of association, there is a number of important limitations in the present study. First, the cross-sectional design and the statistical analyses used, permit only correlational conclusions rather than causal. Though the multiple regressions and bootstrapping in this thesis were adequate analyses, structural equation modeling (SEM) could possibly have been more suitable to test the causal direction of effects, in addition to moderating and mediating relationships simultaneously. Furthermore, the measurement of religiosity did not entirely capture how multifaceted the construct is. There is a vast variety of religiosity measures that assess different aspects of religion, such as dispositional religiousness and functional religiousness (Hill, 2005). Earlier research on the relation between obsessionality and religion did not consistently take these nuances into account (Lewis, 1998; Francis, 1997). Although the Santa Clara Strength of Religious Faith Questionnaire used in this study is considered a multidimensional measure (Hill, 2005), additional instruments could have achieved a

more fine-grain analysis of religiosity.

For example, intrinsic and extrinsic religiosity could have been distinguished. The Allport-Ross I/E scales (Allport & Ross, 1967) have been extensively used in psychology of religion research to separate religious people who are intrinsically committed to their faith, from the more self-serving extrinsically religious (Genia, 1993). Another example is the Revised Religious Fundamentalism Scale (Altemeyer & Hunsberger, 2004), which assesses the belief that there is one set of religious teachings that clearly contains the fundamental, intrinsic, and inerrant truth about humanity and deity. Religious fundamentalism has not been researched in relation to scrupulosity and OC beliefs so far, and future research should investigate how the constructs associate with other. Moreover, a more in-depth assessment of belief systems could have been achieved by including a list of adjectives describing participants' conceptualization of God (Philips et al., 2004; Gonsalvez et al., 2010). Future research should attempt to replicate Gonsalvez et al.'s (2010) factors derived from adjectives describing God, and examine how images of God relate to OC beliefs, scrupulosity, and TAF.

Another important limitation of the present study concerns depiction of religious affiliations. In order to demonstrate an anticipated effect size for OC beliefs or scrupulosity for different religious groups, required sample sizes could have been estimated before data collection. Yet this approach was not followed due to the difficulty of recruiting participants from religious institutions, resulting in insufficient sample sizes of Muslims and Jews to make robust comparisons across the monotheistic religions. Besides the insufficient sample sizes for Muslims and Jews, no within-religion differences were accounted for. That is, no distinctions were made between Christian denominations or observant and non-observant Jews and Muslims. In order to place affiliations more accurately on the orthodoxy-orthopraxy spectrum, equally large samples of religious affiliations need to be recruited and within-religion differences need to be accounted for. Also, this study only included monotheistic religions. Though the sample included an 'Other Religion' group that made up 23.1% of the total sample, the religious affiliations of this group are unknown. Hence, (polytheistic) religions such as Hinduism and Buddhism were not represented, further restricting the generalization of the conclusions of this study.

Including bigger sample sizes of non-Christian affiliations in future studies, might also require multiple measures of scrupulosity and religiosity. Namely, critics have suggested that the PIOS

measure might not be as sensitive for scrupulous symptoms in Muslims or Jews (Greenberg & Huppert, 2010). For Islamic religiousness, research investigating conceptualizations and measurement have expanded greatly over the last few years (see Abu-Raiya & Pargament, 2011, for a review). In particular, this has resulted in more fine-grain measures of Islamic doctrinal orthodoxy and religious orientations (Chang-Ho & Ibrahim, 2007; Abu-Raiya et al., 2008). Newer measures assessing religiosity in non-Judeo-Christian samples should be considered for future research investigating scrupulosity. Also, future studies should consider incorporating religious change in analyses. Following Zohar et al. (2005) and Greenberg and Witztum (2001), it would be interesting to see how OC phenomena and scrupulosity influence each other amongst converted religious people or ex-members of religious institutions.

An additional consideration is the cultural generalizability of the reported relations and mediating effects. The present study was conducted in London, and most participants were students or relatives of students from University College London. Hence, a substantial variation of cultural attitudes could be assumed. However, it would be interesting to replicate the present study in distinct cultural settings. By doing so, culture's impact on relations between religion, scrupulosity, and maladaptive appraisals could be further researched. Recent studies started to do this and seem to support the influence culture has on OC-related phenomena (Lavric & Flere, 2010; Al-Solaim & Loewenthal, 2011; Yorulmaz & Isik, 2011).

Finally, prospective studies should determine whether religion contributes differently to OCD in general than to scrupulosity specifically, and how this impact compares to other pathologies. Some studies have reported significant relationships between religion, schizophrenia, and schizotypy (e.g., Maltby et al., 2000; Unterrainer et al., 2011). It would be interesting to see how these pathologies compare to OCD in their relation to religion. However, the present study used a community sample. Therefore, the relationships observed with respect to dysfunctional beliefs do not relate to OCD as a diagnostic entity. Replication of this study and comparison of results in clinical groups is necessary. In all, despite important limitations of this study, the significant patterns of association observed between religion, scrupulosity, and obsessionality are promising and deserve further research.

6.5.7. Conclusion and clinical implications. The relationship between religion and psychopathology is much more complex than early theories and conceptualizations have assumed. By the same token, religions and religious individuals (even within the same affiliation) differ from each other in many dimensions, which have relevance to psychopathology in general and OC symptoms specifically. This chapter has presented important evidence of variables predicting scrupulosity and dysfunctional beliefs. Specifically, present findings demonstrated the relevance of cognitive-behavioral models of OCD in the disorder's religious counterpart. Nonetheless, in light of the discussed limitations, the present study supports a more sophisticated investigation of religion and OC religious symptoms, including a more careful examination of the content and practices of religious beliefs. This will contribute towards clarifying their potential influences on OC phenomena. Moreover, this will inform clinical practice. Implications of the present study, and scrupulosity research more broadly, for the treatment of religious OC symptoms will be briefly discussed here.

Research seems to consistently indicate that exposure and response prevention (ERP) is the most effective treatment for OCD (Kozak & Coles, 2010a). However, many scrupulous patients have difficulty accepting and adhering to ERP because it involves directly confronting situations and thoughts that are perceived to be sinful (Nelson et al., 2006). Kozak and Coles (2010b) have suggested using cognitive therapy (CT) techniques to increase adherence to ERP. Though more empirical research is needed, certain CT techniques are likely to be helpful in facilitating ERP for scrupulous OCD patients (Huppert, Siev, & Kushner, 2007; Nelson et al., 2006). For example, patients could be taught that the vast majority of the population occasionally experiences intrusive and morally repugnant thoughts. The therapist could even invite a member of the clergy to disconfirm the idea that the occurrence of intrusive thoughts is equivalent to committing sinful behavior (Huppert et al., 2007; Miller & Hedges, 2008). In this case, it would be highly important that the clergy member understands the problematic nature of dysfunctional interpretations of intrusive thoughts.

Another possibility is to explain to the patient the vicious circle of intrusive thoughts becoming more frequent and creating more distress when attempts to suppress them are made (Purdon & Clark, 1999; Nelson et al., 2006). For example, the patient can conduct an in vivo test of the thought suppression paradox (e.g., Berman et al., 2010; Purdon, 2004), in order to gain insight in how

obsessional thoughts are maintained. When patients recognize that appraising normal intrusive thoughts as 'immoral' lead to distress and useless attempts to control such thoughts, he or she can engage with ERP as a way of learning to reduce the obsessional problem (Huppert et al., 2007). Clark (2004) has provided treatment descriptions illustrating the implementation of such strategies, in order to facilitate engaging in ERP for OCD patients.

7. General summary and implications

This thesis reviewed the current state of research on the phenomenology and etiology of OCD, in addition to investigating predictors of scrupulosity, its religious counterpart. Because of the vast amount of studies that has been done recently in these three domains, the thorough analysis of conceptualizations, findings, and research methodologies will be extremely helpful in furthering OCD research. In particular, this thesis provided indications how OCD symptoms can be more accurately conceptualized in the DSM-V (APA, in press) and measured accordingly in the future. Furthermore, there is little clarity on OC symptoms that relate to ‘taboo thoughts’, with aggressive, sexual, or religious content (Leckman et al., 2010a). The present review and empirical study of scrupulosity will contribute towards improving definition, measurement, and treatment of religious OCD.

This thesis included two theoretical chapters, two psychometric chapters, and one empirical chapter. The first theoretical chapter introduced OCD as a diagnostic entity, and analyzed symptom structure and conceptualization of the disorder’s heterogeneous symptoms. Chapter three, and first psychometric chapter, critically reviewed commonly used OCD assessment methods for adults. The second theoretical chapter discussed the cognitive account of OCD’s etiology and proposed a synthesis with the neurobiological account. In the fifth chapter of this thesis, and second psychometric chapter, assessment of obsessive-compulsive constructs was critically reviewed. Finally, the sixth chapter of this thesis, the empirical chapter, investigated the relationships between religion, dysfunctional beliefs, and scrupulosity.

For this final summary chapter, the aims are threefold: 1) summarizing the literature reviews, psychometric reviews, and empirical evidence contained in this thesis; 2) synthesizing conclusions of the phenomenology, etiology, and scrupulosity parts of this thesis; and 3) highlighting implications of the chapters in terms of OCD’s and scrupulosity’ future definition, measurement, and clinical practice. The order in which the topics are presented are similar to the structure of the thesis.

7.1. Phenomenology of OCD.

Factor analytic studies seem to consistently indicate OCD’s symptom structure to contain four dimensions: symmetry/ordering, forbidden thoughts, contamination/cleaning, and hoarding. However,

as of yet these symptom dimensions are neither well defined nor consistent enough with respect to distinctive patterns of comorbidity, recurrence risk in families, areas of brain activation, and differential treatment response, to suggest their inclusion in the DSM-V as specifiers or criteria (Leckman et al., 2010a). The strongest evidence supports the validity and clinical utility of the symmetry/ordering, contamination/cleaning, and hoarding symptom dimensions. The ‘forbidden thoughts’ (e.g., aggressive, sexual, and/or religious intrusive thoughts) and miscellaneous symptoms are more complex to conceive in this approach.

When it comes to subtypes of OCD, four are being considered for inclusion in the DSM-V either collectively or individually (Leckman et al., 2010a): 1) (a history of) tic-related OCD; 2) family history of OCD or tics; 3) early age at onset of OCD; and 4) streptococcus-related OCD as a result of post-infectious autoimmune processes at an early-onset age. Taken together, studies seem to support these four subtypes. Moreover, it seems that patients of these subtypes have more symmetry/ordering compulsions, aggressive obsessions and/or sensory phenomena, urges, and ‘just-right’ sensations (Mathis et al., 2006). Nevertheless, it remains unclear whether these taxa are subtypes of OCD, or whether they are markers of psychobiological dimensions that determine risk for OCD (Taylor, 2010).

Finally, this chapter made recommendations for future research with regard to integrating dimensional and subtyping approaches of OCD. The observation that having an early-onset of OCD, presence of tics, and previous streptococcal infections are all related to having a higher probability of symptom presentations in the symmetry/ordering/ ‘just-right’ dimension, shows promise for a hybrid approach that cuts across diagnostic boundaries (Leckman et al., 2010b). To date, it seems that there are disorder-specific genetic factors, as well as more general genetic factors contributing to a range of anxiety disorders (e.g., Cavallini et al., 2002; van Grootheest et al., 2008). The same goes for specific environmental and non-specific environmental factors (e.g., Khanna et al., 1980), an area of OCD research that deserves far more attention than it has received so far (Geller et al., 2008).

Overall, it can be concluded that the DSM-V could be enriched by a dimensional perspective, though the categorical approach needs to be simultaneously maintained. Subtyping approaches are critical in selecting the group to be studied, i.e., development of inclusion/exclusion criteria. However, using symptom dimensions as specifiers in the DSM-V may help clinicians appreciate variations in

symptom presentations across patients. If these variations can be better defined and are found to relate consistently to distinctive patterns of comorbidity, recurrence risk in families, areas of brain activation, and most importantly, treatment response, then their inclusion in the DSM-V will be justified. There is substantial evidence that this approach may also be useful in guiding initial treatment choices in addition to subsequent management of individual patients (Leckman et al., 2010a). Though a multidimensional ‘map’ would be complex and time-intensive for the practitioner, using symptom dimensions as specifiers in the DSM-V may help capture OCD’s heterogeneity (Leckman et al., 2007).

7.2. Measuring OCD symptoms.

Measuring OCD is complicated by the multidimensional structure of symptoms, in addition to its high diagnostic comorbidity with other mental disorders. Improving assessment and diagnosis of OCD therefore remains an important area of focus for research and clinical practice. A critical component of identifying and assessing OCD accurately in any context (e.g., clinical, community, or research) is having a comprehensive overview of commonly used OCD measures. There are generally three ways of measuring OCD: diagnostic interviews, clinician-rated instruments, and self-report questionnaires. Chapter three, the first psychometric chapter, aimed to provide a comprehensive overview of measures within each category that are commonly used with adults. General strengths and weaknesses of the various forms of assessment were observed, along with individual reviews per measure based on its psychometric properties, extent of external validation, and practical utility. Consequently, this chapter serves as a resource for clinicians and researchers to facilitate their decision on most suitable OCD measure for their specific goals and setting.

It was concluded that when it comes to diagnostic interviews and clinician-rated measures, recent revisions of the previous ‘gold standard’ of OCD measures - the Y-BOCS (Goodman et al., 1989a; 1989b) - show most promise. That is, the Y-BOCS II (Goodman et al., 2006) and the DY-BOCS (Rosario-Campos et al., 2006) reflect recent knowledge on OCD’s symptom structure in line with symptom specifiers considered for inclusion in the DSM-V. As for self-report measures, newer measures like the DOCS (Abramowitz et al., 2010) and the VOCI-R (Gönner et al., 2010b) show a lot of promise by being time-efficient but generating detailed information. These measures moreover

show excellent psychometric properties and congruence with the most recent conceptualizations of OCD in the literature. Unfortunately, their psychometric properties have not been externally validated yet. Hence for now, the OCI-R (Foa et al., 2002a) is recommendable for screening and establishing baseline severity purposes, as it has good psychometric properties, is highly time-efficient, and has been validated in numerous external studies in English and non-English contexts.

7.3. Etiology of OCD.

From an etiological point of view, it is emphasized that the identification of underlying causal factors or mechanisms should be incorporated in any phenomenological approach. In this domain of OCD research, different approaches debate about which factors are emphasized in explaining the emergence and maintenance of OCD symptoms. Besides identifying causal factors or mechanisms, etiological accounts are also required to clarify the heterogeneous nature of symptoms, e.g., why certain patients have contamination obsessions whereas others suffer from scrupulosity. Different etiological approaches have emerged, and two approaches have been particularly juxtaposed in the literature. The first places an emphasis on neurobiological factors (Maltby et al., 2005; Rosenberg, Russell, & Fougere, 2010), and the second on cognitive-behavioral factors (Shafran, 2010).

Contemporary biological models of OCD have reported evidence for the etiological role of genetics (e.g., Nestadt et al., 2000; van Grootheest et al., 2008), neuroanatomy (e.g., Maltby et al., 2005; van den Heuvel et al., 2009), neuropsychology (e.g., Markarian et al., 2010), and neurochemistry (e.g., March et al., 2007; Saxena et al., 2007) in OCD. Yet support for these models is mixed and moreover, they do not account for the symptomatic heterogeneity of the anxiety disorder (Abramowitz et al., 2009). Hence, this second theoretical chapter has aimed to elucidate the heterogeneous nature of OCD by delineating the cognitive-behavioral account. This approach proposes that obsessions and compulsions arise from certain types of dysfunctional appraisals that are applied to normally occurring intrusive thoughts, impulses, or images (Rachman & de Silva, 1978).

Three cognitive-behavioral models have been reviewed in this chapter, which are more similar than dissimilar, but emphasize different beliefs/appraisals as being paramount in the emergence and maintenance of OC symptoms. Salkovskis' model (1985,1999) stressed responsibility, Rachman's

(1993,1997) cognitive theory emphasized thought-action fusion, and Purdon and Clark's model (1999) proposed overestimating the importance of thoughts and thought control to be key in intrusions becoming obsessions. The metacognitions model of OCD (Wells & Matthews, 1994) is furthermore related to Purdon and Clark's (1999) model, as it proposed that appraisals are made in light of a broader range of dysfunctional beliefs about thought control. The three cognitive-behavioral models provide a theoretically sound and coherent account of OCD, with supportive empirical data. However, other studies investigating overarching cognitive-behavioral assumptions have found mixed evidence for the general, congruent, and specific patterns of association between OC beliefs and OC symptoms.

Hence, OCD is most likely a multidimensional construct that requires etiological models to (at least) integrate biological and cognitive-behavioral factors. Promising attempts in this direction have recently been made. For example, Taylor and Jang (2011) found that OC symptoms are shaped directly by OC beliefs, by genetic and environmental factors that exert their influence independent of maladaptive beliefs, and indirectly through them. Even so, OC beliefs appeared to explain a significantly smaller part of the phenotypic variance in OC symptoms than genetic and (non-shared) environmental factors. Overall, it can be concluded that clinicians and researchers in the field of genetics, neuroanatomy, and psychology should collaborate to increase the understanding of OCD's multidimensional nature. Future etiological studies should aim to tie dysfunctional beliefs, genetics, environment, and OC symptoms together in one coherent model.

7.4. Measuring cognitive-behavioral constructs.

In order to investigate OC beliefs/appraisals in relation to OC symptoms and other etiological mechanisms, reliable and valid assessment of cognitive-behavioral constructs is required. Again, an essential component in achieving this, is having a comprehensive overview of commonly used measures. Therefore, the second psychometric chapter of this thesis reviewed 17 self-report measures, which purport to assess cognitive-behavioral constructs relevant for the emergence and maintenance of OCD. Three types of measures were reviewed: 1) those assessing general dysfunctional beliefs/appraisals of intrusive thoughts; 2) those that examine constructs specifically related to the discussed cognitive-behavioral models of OCD; and 3) adjunctive measures of constructs related to

maladaptive interpretations of intrusive thoughts in particular contexts.

The first three measures, the OBQ (OCCWG, 2003, 2005), III (OCCWG, 2003, 2005), and INPIOS (García-Soriano et al., 2011), cover a set of dysfunctional beliefs, appraisals, and content related to intrusive thoughts, impulses, and images. Whereas the INPIOS covers thematic content of intrusions more similar to phenomenological measures of OCD, the OBQ and III assess dysfunctional beliefs or appraisals, independent of thematic content. The INPIOS was found to be an improvement upon the ROII (Purdon & Clark, 1993), and to show excellent preliminary psychometric properties. The III however, was observed to have psychometric shortcomings, in addition to a problematic conceptual differentiation from the OBQ. Despite reported problems in discriminative power and specificity, the OBQ-44 is currently the best measure of dysfunctional beliefs.

Secondly, this chapter reviewed measures that assess beliefs paramount in each of the three discussed cognitive-behavioral models (Salkovskis, 1985; Rachman, 1993; Purdon & Clark, 1999). Of the responsibility measures, the RAS (Salkovskis et al., 2000) was shown to be preferable to the RIQ (Salkovskis et al., 2000). The PIRBS, examining pathways to inflated responsibility beliefs (Coles & Schofield, 2008), further appeared to be a psychometrically sound and theoretically relevant measure that needs further examination. The original TAFS (Shafran et al., 1996), measuring thought-action fusion in line with Rachman's (1993, 1997) cognitive theory of obsessions, was preferred due to brevity and face validity. Of the importance/thought control measures, the TCQ (Wells & Davies, 1994) and the MCQ (Cartwright-Hatton & Wells, 1997) seemed psychometrically sound and most relevant for measuring thought control and metacognitions in relation to OCD symptoms.

Finally, adjunctive measures of perfectionism and intolerance of uncertainty were reviewed. Though these constructs have no paramount role in the discussed cognitive-behavioral models, perfectionism and intolerance of uncertainty beliefs have been found relevant in explaining OCD symptoms in particular contexts (OCCWG, 2001, 2003). Finally, a measure of OCD in a religious context was extensively evaluated. Despite its few external validation studies, the PIOS seems psychometrically sound, conceptually coherent, and theoretically relevant. The measure was furthermore evaluated as suitable for the empirical study in the sixth chapter.

7.5. Scrupulosity and maladaptive beliefs.

Whereas the previous chapters reviewed conceptualizations and measures of OC symptoms and etiological constructs, the sixth chapter investigated these aspects empirically for the religious counterpart of OCD. After reviewing previous studies on the relationship between religiosity and obsessionality, gaps in the literature were identified. In line with these gaps, the empirical study examined scrupulosity's associations with religiosity, obsessive beliefs, and TAF, by means of self-report questionnaires. Results of these analyses are illustrated in figure 7.1, but will first be discussed in turn in this section. The first set of analyses showed that Christians, Muslims, Jews, nonreligious participants, and participants from miscellaneous affiliations differed significantly on religiosity, scrupulosity, OC beliefs, and TAF measures. Unexpectedly however, Christians did not seem to score highest on all dimensions of TAF and OC beliefs. In contrast to previous studies, elevated moral TAF levels appeared not specific to Christianity. Though sample sizes of the other monotheistic religions included in the study were too small to make robust comparisons, these findings seem contradictory to previous theories presenting Christianity as the most orthodox monotheistic religion (Smart, 1999).

In line with previous studies, religiosity was found to significantly predict scrupulosity, while this impact was modified by religious affiliation. OC beliefs explained additional significant variance of scrupulosity, above and beyond religiosity's impact. Particularly, the responsibility/threat estimation and importance/control of thoughts dimensions were found to positively predict scrupulosity. Though these patterns of association seemed different for nonbelievers and the three monotheistic religious groups, these findings need to be replicated in larger sample sizes of Jews and Muslims. Even so, it can be preliminarily concluded that OC beliefs are only a marker of pathology when such beliefs are not culturally normative (e.g., function of religious doctrine; Siev et al., 2010).

In addition, present findings supported the mediating effect of OC beliefs, and particularly the belief of responsibility/threat estimation, on the relationship between TAF and scrupulosity. This is the first time, to my knowledge, that significant support for Rachman's (1997) and Wells' (2000) models of mediation is found for OCD's religious counterpart. These results are in line with previous studies reporting that responsibility mediates the relationship between TAF and OC symptoms (e.g., Solem et al., 2010b). Surprisingly, it was found that higher religiosity is related to a decreased level of

maladaptive beliefs. This finding was unexpected seeing the literature has generally reported a positive relation between religion and increased OC beliefs (Abramowitz et al.; Nelson, 2006; Inozu et al., 2012). Besides religiosity, TAF and scrupulosity explained additional variance for OC beliefs.

Finally, a consideration of limitations of the study was provided, in addition to suggestions for future research. In particular, research on the cognitive mechanisms underlying scrupulosity is still at a preliminary stage, and more multi-method studies across religious groups are needed. Also, multiple aspects of religion should be investigated in relation to scrupulosity and OCD, in addition to culture's impact on these relations. When it comes to scrupulosity's treatment, OCD's most effective treatment, ERP, is generally recommended (Kozak & Coles, 2010a, 2010b). This treatment poses specific challenges for scrupulous patients however, as it entails confrontation with situations or thoughts that they experience as sinful. CT techniques have therefore been proposed to aid adherence to ERP for religious OCD patients (Huppert et al., 2007).

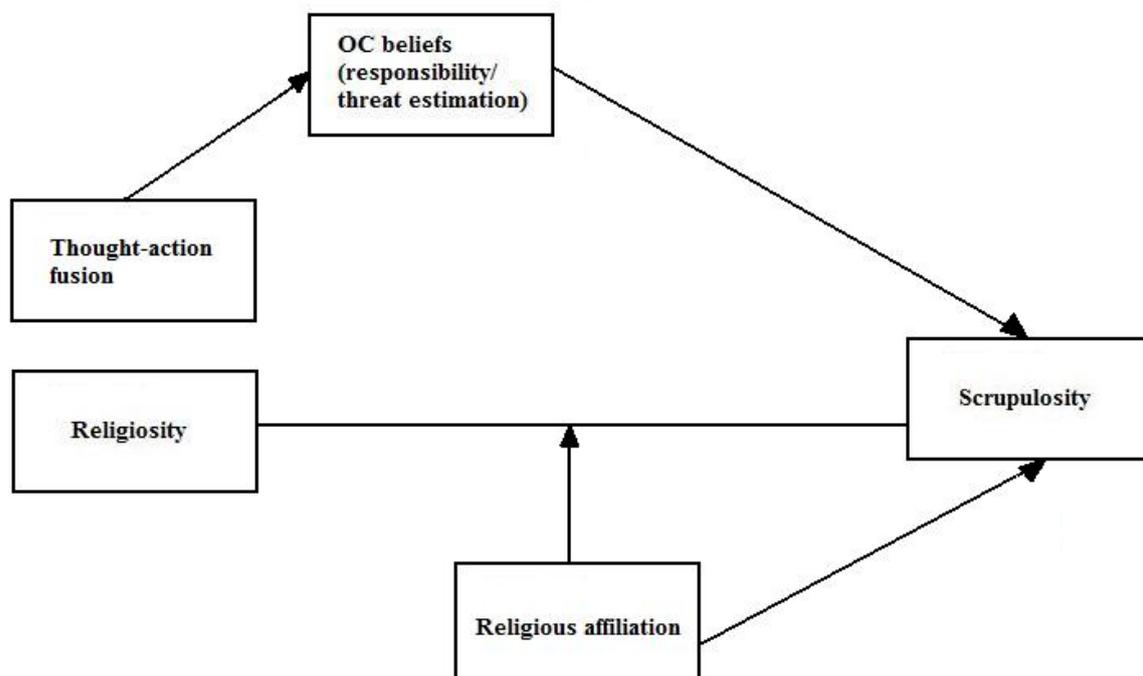


Figure 7.1. Integrated model of results from the regression and bootstrapping analyses with scrupulosity as dependent variable.

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Appendices

Table 1. *Symptom structure of OCD: evidence from factor analytic studies*

| <i>Author, Year, Measure</i> | <i>N</i> | <i>Age</i> | <i>Language</i> | <i>Current vs Lifetime Symptoms</i> | <i>Symptom Scoring System</i> | <i>Type</i> | <i>Factor Rotation Method</i> | <i>Factor Number</i> | <i>Factors</i> |
|---|----------|------------|-----------------|-------------------------------------|-------------------------------|-------------|---|----------------------|---|
| Burns et al. (1996) PI-WSUR | 2970 | Adult | English | Current | Symptom severity | Item | Varimax | 5 | Factor 1: Obsessional thoughts about harm to oneself or others Factor 2: Obsessional impulses to harm oneself or others Factor 3: Contamination obsessions and washing compulsions Factor 4: Checking compulsions Factor 5: Dressing/grooming compulsions |
| Baer (1994) Y-BOCS* | 107 | Adult | English | Current | Symptom severity | Category | Varimax | 3 | Factor 1: Hoarding obsessions and compulsions, repeating, ordering, counting (20.7%) Factor 2: Contamination, cleaning, somatic, checking (16.0%) Factor 3: Aggression, sexual, religious (11.3%) |
| Van Oppen et al. (1995) PI-R | 858 | Adult | Dutch | Current | Symptom severity | Item | Varimax rotation followed by oblique procedure) | 5 | Factor 1: Impulses Factor 2: Washing Factor 3: Checking Factor 4: Rumination Factor 5: Precision (total variance for OCD, other anxiety disorders, and nonclinical sample ranged between 39.8-47.5%) |
| Hantouche & Lancrenon (1996) Y-BOCS* | 615 | Adult | French | Current | Present/absent | Both | Varimax | 3 | Factor 1: Hoarding obsessions and compulsions, symmetry, repeating, ordering, checking Factor 2: Aggressive, sexual, religious, miscellaneous obsessions and compulsions Factor 3: Cleaning, contamination, somatic obsessions |
| Leckman et al. (1997) Y-BOCS* | 292 | Adult | English | Lifetime | Symptom number | Category | Varimax | 4 | Factor 1: Aggression, sexual, religious, somatic, checking (30.1%) Factor 2: Symmetry, ordering, repeating, |

| | | | | | | | | | |
|--|-----|-------|---------|----------|------------------|----------|------------------------------|---|---|
| Mataix-Cols et al. (1999) Y-BOCS * | 354 | Adult | English | Current | Symptom severity | Category | Varimax | 5 | counting (13.8%) Factor 3: Contamination and cleaning (10.2%) Factor 4: Hoarding obsessions and compulsions (8.5%) Factor 1: Symmetry, ordering, repeating, counting (19.0%) Factor 2: Hoarding obsessions and compulsions (13.8%) Factor 3: Contamination, cleaning (12.7%) Factor 4: Aggressive, checking (10.4%) Factor 5: Sexual, religious (9.7%) |
| Summerfeldt et al. (1999) CFA; Y-BOCS | 203 | Adult | English | Current | Present/absent | CFA | CFA of Leckman et al. (1997) | 4 | Factor 1: Obsessions, checking Factor 2: Symmetry, ordering Factor 3: Contamination, cleaning Factor 4: Hoarding |
| Tek & Ulug (2001) Y-BOCS * | 45 | Adult | Turkish | Current | Symptom severity | Category | Varimax | 5 | Factor 1: Contamination, cleaning, repeating (17.8%) Factor 2: Symmetry, somatic, ordering (15.2%) Factor 3: Aggressive, counting (13.7%) Factor 4: Sexual, religious (9.7%) Factor 5: Hoarding compulsions and checking (9.2%) |
| Girishchandra & Khanna (2001) Y-BOCS * | 202 | Adult | India | Lifetime | Present/absent | Item | Varimax | 5 | Factor 1: Contamination, cleaning (14.3%) Factor 2: Symmetry, ordering, hoarding obsessions and compulsions (6.4%) Factor 3: Harm, checking (5.4%) Factor 4: Superstitious fears, mental rituals, need to touch, tap, and rub (4.6%) Factor 5: Sexual and religious (4.2%) |
| Mataix-Cols et al. (2002b) Y-BOCS * | 153 | Adult | English | Current | Present/absent | Category | Varimax | 5 | Factor 1: Aggressive, religious, checking, repeating, counting (23.3%) Factor 2: Contamination, cleaning (13.3%) Factor 3: Symmetry, ordering, counting (10.9%) |

| | | | | | | | | | |
|-------------------------------------|-----|-------|---------|----------|------------------|----------|---------|---|---|
| Cavallini et al. (2002) Y-BOCS * | 180 | Adult | Italian | Lifetime | Symptom number | Category | Varimax | 5 | Factor 4: Hoarding obsessions and compulsions (8.3%) Factor 5: Sexual, somatic (7.9%) Factor 1: Contamination, cleaning (17.0%) Factor 2: Hoarding obsessions and compulsions (13.0%) Factor 3: Aggressive, sexual, somatic, religious, checking, repeating (11.5%) Factor 4: Symmetry, ordering, religious (5.9%) Factor 5: Repeating, counting, symmetry (8.8%) |
| Feinstein et al. (2003) Y-BOCS * | 160 | Adult | English | Current | Present/absent | Both | Varimax | 4 | Factor 1: Symmetry, ordering, repeating, counting (14.2%) Factor 2: Contamination, cleaning, aggressive, checking (14.2%) Factor 3: Hoarding obsessions and compulsions (13.9%) Factor 4: Sexual, religious (11.8%) |
| Denys et al. (2004a) Y-BOCS * | 335 | Adult | Dutch | Current | Symptom severity | Item | Varimax | 5 | Factor 1: Contamination, cleaning (16.4%) Factor 2: Aggressive, sexual, religious (9.8%) Factor 3: Somatic, checking (5.9%) Factor 4: Symmetry, repeating, ordering, counting, hoarding obsessions and compulsions (5.6%) Factor 5: High-risk and checking (4.0%) |
| Denys et al. (2004b) PI-R | 150 | Adult | Dutch | Current | Symptom severity | Item | Varimax | 5 | Factor 1: Contamination obsessions and cleaning/washing compulsions (16.4%) Factor 2: Impulses and fear of loss of control (14.9%) Factor 3: Checking compulsions (11.0%) Factor 4: Rumination (7.1%) Factor 5: Need for symmetry/exactness and arranging/ordering compulsions (5.3%) |
| Denys et al. (2004b) | 150 | Adult | Dutch | Current | Symptom severity | Item | Varimax | 5 | Factor 1: Aggressive, sexual, religious obsessions (14.5%) |

Y-BOCS-
SC

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|--------------------------------------|-----|---------------------------------|---------|----------|---------------------|---------------|---------|---|---|---|
| | | | | | | | | | | Factor 2: Contamination obsessions and cleaning compulsions (11.0%) Factor 3: Somatic, checking (6.3%) Factor 4: Need for symmetry/exactness and ordering/arranging compulsions (5.8%) Factor 5: High-risk and checking (4.8%) Factor 1: Aggression, sexual, religious, somatic, checking (19.5%) Factor 2: Symmetry, ordering, repeating, counting (18.6%) Factor 3: Contamination, cleaning (13.7%) Factor 4: Hoarding obsessions and compulsions (12.9%) |
| Hasler et al. (2005) Y-BOCS * | 169 | Adult | English | Lifetime | Present/ absent | Cate- gory | Varimax | 4 | Factor 1: Aggression, sexual, religious, somatic, checking (19.5%) Factor 2: Symmetry, ordering, repeating, counting (18.6%) Factor 3: Contamination, cleaning (13.7%) Factor 4: Hoarding obsessions and compulsions (12.9%) | |
| Kim et al. (2005) Y-BOCS * | 124 | Adult | Korean | Current | Symptom severity | Cate- gory | Varimax | 4 | Factor 1: Hoarding obsessions and compulsions, repeating, ordering, counting (34.0%) Factor 2: Contamination, cleaning (11.1%) Factor 3: Aggression, sexual (10.0%) Factor 4: Religious, somatic (7.7%) | |
| Delorme et al. (2006) Y-BOCS * | 73 | Child and adole- scent | French | Current | Symptom number | Cate- gory | Varimax | 4 | Factor 1: Symmetry, checking, repeating, ordering (35.2%) Factor 2: Aggressive, sexual, somatic, counting (12.7%) Factor 3: Contamination, religious, cleaning (11.0%) Factor 4: Hoarding obsessions and compulsions (8.1%) | |
| McKay et al. (2006) Y-BOCS * | 137 | Child | English | Current | Symptom number | Cate- gory | Oblimin | 4 | Factor 1: Cleaning, checking, repeating, counting, ordering, superstitious behaviors, rituals involving others (17.3%) Factor 2: Aggressive, sexual, magical thinking (15.9%) Factor 3: Contamination, aggressive, sexual, magical thoughts, somatic, religious, repeating, counting, | |

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|--------------------------------------|-----|-------|----------------------|----------|------------------|----------|---------|---|--|
| Pinto et al. (2007) Y-BOCS * | 293 | Adult | English | Current | Symptom number | Category | Varimax | 5 | symmetry, rituals involving others (12.7%) Factor 4: Hoarding obsessions and compulsions, somatic, counting, ordering (11.9%) Factor 1: Symmetry, ordering, repeating, counting (22.5%) Factor 2: Hoarding obsessions and compulsions (13.3%) Factor 3: Pathological doubt, somatic, checking (12.2%) Factor 4: Contamination, cleaning (10.3%) Factor 5: Aggressive, sexual, religious (7.4%) |
| Cullen et al. (2007) Y-BOCS * | 221 | Adult | English | Lifetime | Present/absent | Category | Varimax | 4 | Factor 1: Aggressive, sexual, religious, somatic Factor 2: Cleaning, contamination Factor 3: Symmetry obsessions, repeating, ordering, counting, sensory/ motor compulsions Factor 4: Hoarding obsessions and compulsions |
| Hasler et al. (2007) Y-BOCS * | 418 | Adult | English | Lifetime | Symptom number | Category | Promax | 4 | Factor 1: Aggressive, sexual, religious, somatic, checking (17.7%) Factor 2: Symmetry, repeating, counting, ordering (15.4%) Factor 3: Cleaning, contamination, (15.4%) Factor 4: Hoarding obsessions and compulsions (14.2%) |
| Stein et al. (2007) Y-BOCS * | 434 | Adult | Mixed (12 countries) | Current | Symptom severity | Item | Varimax | 5 | Factor 1: Contamination, cleaning Factor 2: Harm, checking Factor 3: Aggression, sexual, religious Factor 4: Symmetry, repeating, ordering, counting, hoarding obsessions and compulsions Factor 5: Somatic |
| Stewart et al. (2007) Y-BOCS * | 231 | Child | English | Lifetime | Symptom number | Category | Promax | 4 | Factor 1: Symmetry, ordering, repeating, checking (27.0%) Factor 2: Contamination, cleaning, aggressive, somatic (14.4%) |

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|--|-----|-------|----------|----------|------------------|----------|---------|---|---|
| Wu et al. (2007) Y-BOCS * | 568 | Adult | English | Current | Symptom severity | Item | Promax | 3 | Factor 3: Hoarding obsessions and compulsions (11.1%) Factor 4: Religious, sexual (9.1%) Factor 1: Pure obsessions (32.0%) Factor 2: Checking/arranging (35.0%) Factor 3: Contamination/cleaning (34.0%) |
| Wu et al. (2007) clinical sample; Y-BOCS * | 149 | Adult | English | Current | Symptom severity | Category | Promax | 5 | Factor 1: Aggressive, sexual, religious obsessions (28.0%) Factor 2: Checking, ordering, counting, and repeating compulsions, somatic obsessions (24.0%) Factor 3: Symmetry obsessions, ordering compulsions (16.0%) Factor 4: Contamination obsessions, cleaning compulsions (14.0%) Factor 5: Hoarding obsessions and compulsions (19.0%) |
| Wu et al. (2007) non-clinical sample; Y-BOCS * | 419 | Adult | English | Current | Symptom severity | Category | Promax | 5 | Factor 1: Aggressive, and sexual obsessions (23.0%) Factor 2: Checking, and repeating compulsions (20.0%) Factor 3: Symmetry obsessions, ordering and counting compulsions (26.0%) Factor 4: Contamination obsessions, cleaning compulsions (16.0%) Factor 5: Hoarding obsessions and compulsions (15.0%) |
| Matsunaga et al. (2008) Y-BOCS * | 343 | Adult | Japanese | Lifetime | Symptom number | Category | Varimax | 4 | Factor 1: Cleaning, contamination (21.2%) Factor 2: Hoarding obsessions and compulsions (14.3%) Factor 3: Symmetry, repeating, ordering (11.9%) Factor 4: Aggression, checking (10.3%) |
| Mataix-Cols et al. (2008) Y-BOCS * | 238 | Child | English | Lifetime | Symptom number | Category | Varimax | 4 | Factor 1: Hoarding obsessions and compulsions, checking (14.1%) Factor 2: Aggressive, sexual, religious (13.7%) Factor 3: Contamination, cleaning, somatic |

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|------------------------------------|------|--------------------------|-----------|----------|------------------|----------|--------------------------|---|--|
| Stewart et al. (2008) Y-BOCS * | 356 | Child, Adolescent, Adult | English | Lifetime | Symptom severity | Category | Promax | 4 | (13.6%) Factor 4: Symmetry, ordering, repeating, checking (13.1%) Factor 1: Aggressive, sexual, religious, somatic, checking Factor 2: Symmetry, ordering, counting, repeating Factor 3: Cleaning, contamination Factor 4: Hoarding |
| Storch et al. (2010a) Y-BOCS-SC II | 130 | Adult | English | Current | Present/absent | Category | Promax | 4 | Factor 1: Symmetry obsessions, ordering compulsions, repeating rituals, counting compulsions Factor 2: Contamination obsessions, washing compulsions Factor 3: Hoarding obsessions and compulsions Factor 4: Sexual, religious, and aggressive obsessions |
| Olafsson et al. (2010) CFA; Y-BOCS | 427 | Adult | Icelandic | Current | Present/absent | CFA | CFA of Wu et al. (2007) | 5 | Factor 1: Pure obsessions Factor 2: Checking Factor 3: Arranging Factor 4: Contamination, cleaning Factor 5: Hoarding |
| Stewart et al. (2011) OFF Scale | 150 | Adult | English | Lifetime | Symptom severity | Items | Promax | 4 | Factor 1: Symmetry, ordering, repeating, counting Factor 2: Scrupulosity, aggressive, religious, and sexual obsessions Factor 3: Contamination obsessions and cleaning compulsions Factor 4: Hoarding obsessions and compulsions (total variance: 63.8 %) |
| Foa et al. (2002a) OCI-R | 1135 | Adult | English | Current | Symptom severity | Item | Promax | 6 | Factor 1: Washing (40.9 %) Factor 2: Obsessing (10.8 %) Factor 3: Hoarding (8.8 %) Factor 4: Ordering (7.8 %) Factor 5: Checking (6.7 %) Factor 6: Neutralizing (5.8 %) |
| Hajcak et al. (2004) CFA; OCI-R | | Adult | English | Current | Symptom severity | CFA | CFA of Foa et al. (2002) | 6 | Factor 1: Washing Factor 2: Obsessing Factor 3: Hoarding Factor 4: Ordering |

| | | | | | | | | | |
|---|-----|-------|---------|---------|------------------|-----|--------------------------|---|--|
| Abramowitz & Deacon (2006) CFA; OCI-R | 322 | Adult | English | Current | Symptom severity | CFA | CFA of Foa et al. (2002) | 6 | Factor 5: Checking Factor 6: Neutralizing Factor 1: Washing Factor 2: Obsessing Factor 3: Hoarding Factor 4: Ordering Factor 5: Checking Factor 6: Neutralizing |
| Huppert et al. (2007) CFA; OCI-R | 203 | Adult | English | Current | Symptom severity | CFA | CFA of Foa et al. (2002) | 6 | Factor 1: Washing Factor 2: Obsessing Factor 3: Hoarding Factor 4: Ordering Factor 5: Checking Factor 6: Neutralizing |

Note * indicates inclusion in meta-analysis by Bloch et al. (2008)

Informed Consent Form

Title of Project: **Religion and individual differences**

This study has been approved by the UCL Research Ethics
Committee as Project ID Number:

CEHP/2011/036

Participant's Statement

I (possible to stay anonymous)

agree that I have

- read the information sheet
- had the opportunity to ask questions and discuss the study; and
- received satisfactory answers to all my questions or have been advised of an individual to contact for answers to pertinent questions about the research and my rights as a participant.

I understand that I am free to withdraw from the study without penalty if I so wish, and I consent to the processing of my personal information for the purposes of this study only and that it will not be used for any other purpose. I understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.

Signed:

Date:

Investigator's Statement

I,

confirm that I have carefully explained the purpose of the study to the participant and outlined any reasonably foreseeable risks or benefits (where applicable).

Signed:

Date:

Santa Clara Strength of Religious Faith Questionnaire (SCSORF)

Please answer the following questions about religious faith using the scale below. Indicate the level of agreement (or disagreement) for each statement.

1 = strongly disagree 2 = disagree 3 = agree 4 = strongly agree

- _____ 1. My religious faith is extremely important to me.
- _____ 2. I pray daily.
- _____ 3. I look to my faith as a source of inspiration.
- _____ 4. I look to my faith as providing meaning and purpose in my life.
- _____ 5. I consider myself active in my faith or church.
- _____ 6. My faith is an important part of who I am as a person.
- _____ 7. My relationship with God is extremely important to me.
- _____ 8. I enjoy being around others who share my faith.
- _____ 9. I look to my faith as a source of comfort.
- _____ 10. My faith impacts many of my decisions.

Thought-Action Fusion Scale (TAFS)

Do you *disagree* or *agree* with the following statements? You are encouraged to answer by yourself, to your best knowledge and honestly. Since your answers will remain entirely confidential, please let your answers reflect your initial reaction to a question.

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

- ___1. Thinking of making an extremely critical remark to a friend is almost as unacceptable to me as actually saying it.
- ___2. If I think of a friend/relative losing their job, this increases the risk that they will lose their job.
- ___3. Having a blasphemous thought is almost as sinful to me as a blasphemous action.
- ___4. Thinking about swearing at someone else is almost as unacceptable to me as actually swearing.
- ___5. If I think of a friend/relative being in a car accident, this increases the risk that he/she will have a car accident.
- ___6. When I have a nasty thought about someone else, it is almost as bad as carrying out a nasty action.
- ___7. If I think of a friend/relative being injured in a fall, this increases the risk that he/she will have a fall and be injured.
- ___8. Having violent thoughts is almost as unacceptable to me as violent acts.
- ___9. If I think of a friend/relative falling ill, this increases the risk that he/she will fall ill.
- ___10. When I think about making an obscene remark or gesture in church, this is almost as sinful as actually doing it.
- ___11. If I wish harm on someone, it is almost as bad as doing harm.
- ___12. If I think of myself being injured in a fall, this increases the risk that I will have a fall and be injured.
- ___13. If I think about making an obscene gesture to someone else, it is almost as bad as doing it.
- ___14. If I think of myself being in a car accident, this increases the risk that I will have a car accident.
- ___15. When I think unkindly about a friend, it is almost as disloyal as doing an unkind act.
- ___16. If I think of myself falling ill, this increases the risk that I will fall ill.
- ___17. If I have a jealous thought, it is almost the same as making a jealous remark.
- ___18. Thinking of cheating in a personal relationship is almost as immoral to me as actually cheating.
- ___19. Having obscene thoughts in a church is unacceptable to me.

Penn Inventory of Scrupulosity (PIOS)

Directions: The statements below refer to experiences that people sometimes have. Please indicate how often you have these experiences using the following key:

0 = never 1 = almost never 2 = sometimes 3 = often 4 = almost always

- ___ 1. I worry that I might have dishonest thoughts
- ___ 2. I fear that I might be an evil person
- ___ 3. I fear I will act immorally
- ___ 4. I feel urges to confess sins over and over again
- ___ 5. I worry about heaven and hell
- ___ 6. I worry I must act morally at all times or I will be punished
- ___ 7. Feeling guilty interferes with my ability to enjoy things I would like to enjoy
- ___ 8. Immoral thoughts come into my head and I can't get rid of them
- ___ 9. I am afraid my behavior is unacceptable to God
- ___ 10. I fear I have acted inappropriately without realizing it
- ___ 11. I must try hard to avoid having certain immoral thoughts
- ___ 12. I am very worried that things I did may have been dishonest
- ___ 13. I am afraid I will disobey God's rules/laws
- ___ 14. I am afraid of having sexual thoughts
- ___ 15. I worry I will never have a good relationship with God
- ___ 16. I feel guilty about immoral thoughts I have had
- ___ 17. I worry that God is upset with me
- ___ 18. I am afraid of having immoral thoughts
- ___ 19. I am afraid my thoughts are unacceptable to God

Obsessive Beliefs Questionnaire – Short Version (OBQ-44)

This inventory lists different attitudes or beliefs that people sometimes hold. Read each statement carefully and decide how much you agree or disagree with it.

For each of the statements, choose the number matching the answer that *best describes how you think*. Because people are different, there are no right or wrong answers. You are therefore encouraged to answer individually, to your best knowledge and honestly.

To decide whether a given statement is typical of your way of looking at things, simply keep in mind what you are like *most of the time*.

- Use the following scale:

1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____

From *disagree very much*

to *agree very much*

In making your ratings, try to avoid using the middle point of the scale (4), but rather indicate whether you usually disagree or agree with the statements about your own beliefs and attitudes.

1. I often think things around me are unsafe.

1 2 3 4 5 6 7

2. If I'm not absolutely sure of something, I'm bound to make a mistake

1 2 3 4 5 6 7

3. Things should be perfect according to my own standards.

1 2 3 4 5 6 7

4. In order to be a worthwhile person, I must be perfect at everything I do.

1 2 3 4 5 6 7

5. When I see any opportunity to do so, I must act to prevent bad things from happening.

1 2 3 4 5 6 7

6. Even if harm is very unlikely, I should try to prevent it at any cost.

1 2 3 4 5 6 7

7. For me, having bad urges is as bad as actually carrying them out.

1 2 3 4 5 6 7

8. If I don't act when I foresee danger, then I am to blame for any consequences.

1 2 3 4 5 6 7

9. If I can't do something perfectly, I shouldn't do it at all.

1 2 3 4 5 6 7

10. I must work to my full potential at all times.

1 2 3 4 5 6 7

11. It is essential for me to consider all possible outcomes of a situation.
1 2 3 4 5 6 7
12. Even minor mistakes mean a job is not complete.
1 2 3 4 5 6 7
13. If I have aggressive thoughts or impulses about my loved ones, this means I may secretly want to hurt them.
1 2 3 4 5 6 7
14. I must be certain of my decisions.
1 2 3 4 5 6 7
15. In all kinds of daily situations, failing to prevent harm is just as bad as deliberately causing harm.
1 2 3 4 5 6 7
16. Avoiding serious problems (for example, illness or accidents) requires constant effort on my part.
1 2 3 4 5 6 7
17. For me, not preventing harm is as bad as causing harm.
1 2 3 4 5 6 7
18. I should be upset if I make a mistake.
1 2 3 4 5 6 7
19. I should make sure others are protected from any negative consequences of my decisions or actions.
1 2 3 4 5 6 7
20. For me, things are not right if they are not perfect.
1 2 3 4 5 6 7
21. Having nasty thoughts means I am a terrible person.
1 2 3 4 5 6 7
22. If I do not take extra precautions, I am more likely than others to have or cause a serious disaster.
1 2 3 4 5 6 7
23. In order to feel safe, I have to be as prepared as possible for anything that could go wrong.
1 2 3 4 5 6 7
24. I should not have bizarre or disgusting thoughts.
1 2 3 4 5 6 7
25. For me, making a mistake is as bad as failing completely.
1 2 3 4 5 6 7
26. It is essential for everything to be clear cut, even in minor matters.
1 2 3 4 5 6 7
27. Having a blasphemous thought is as sinful as committing a sacrilegious act.
1 2 3 4 5 6 7

28. I should be able to rid my mind of unwanted thoughts.
1 2 3 4 5 6 7
29. I am more likely than other people to accidentally cause harm to myself or to others.
1 2 3 4 5 6 7
30. Having bad thoughts means I am weird or abnormal.
1 2 3 4 5 6 7
31. I must be the best at things that are important to me.
1 2 3 4 5 6 7
32. Having an unwanted sexual thought or image means I really want to do it.
1 2 3 4 5 6 7
33. If my actions could have even a small effect on a potential misfortune, I am responsible for the outcome.
1 2 3 4 5 6 7
34. Even when I am careful, I often think that bad things will happen.
1 2 3 4 5 6 7
35. Having intrusive thoughts means I'm out of control.
1 2 3 4 5 6 7
36. Harmful events will happen unless I am very careful.
1 2 3 4 5 6 7
37. I must keep working at something until it's done exactly right.
1 2 3 4 5 6 7
38. Having violent thoughts means I will lose control and become violent.
1 2 3 4 5 6 7
39. To me, failing to prevent a disaster is as bad as causing it.
1 2 3 4 5 6 7
40. If I don't do a job perfectly, people won't respect me.
1 2 3 4 5 6 7
41. Even ordinary experiences in my life are full of risk.
1 2 3 4 5 6 7
42. Having a bad thought is morally no different than doing a bad deed.
1 2 3 4 5 6 7
43. No matter what I do, it won't be good enough.
1 2 3 4 5 6 7
44. If I don't control my thoughts, I'll be punished.
1 2 3 4 5 6 7

Finally, please provide some personal details:

Age (in years): _____ Sex: Male Female

Religion: Christian Islam Judaism None/Atheist Other:..... Not sure

What is your political orientation? *Very left wing* 0 1 2 3 4 5 6 7 8 9 *Very right wing*

Highest educational qualification: _____

Have you every studied Psychiatry or Psychology Yes No

Have you personally ever had treatment for a psychological illness Yes No