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SYMPTOM-BASED SUBTYPES OF OBSESSIVE- COMPULSIVE DISORDER.

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Statement of Originality

This thesis is submitted to The University of Sydney in fulfillment of the requirements for the Degree of Doctor of Philosophy. The work presented in this thesis is, to the best of my knowledge and belief, original. I hereby declare that I have not submitted this material either in full or in part, for a degree at this or any other institution.

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ABSTRACT

Obsessive-compulsive disorder (OCD) is heterogeneous in its presentation and quests to clarify the best way to subtype OCD have remained elusive. This thesis aims to assess for symptom-based OCD subtypes in a sample of patients with OCD and to describe the characteristics of these OCD symptom subtypes. The methods used include principal components analysis of the results of the Yale-Brown Obsessive-Compulsive Disorder Scale – Symptom Checklist (YBOCS-SC) and the Vancouver Obsessional Compulsive Inventory (VOCI) self report obtained from a sample of 154 subjects with a primary diagnosis of OCD. Five symptom factors explained 67.9% of the variance. They were named: 1) hoarding; 2) contamination/cleaning; 3) symmetry/ordering; 4) unacceptable/taboo thoughts; and 5) doubt/checking. These factors were used as predictors of a number of systematically chosen characteristics and were subject to regression analyses. Results indicated that different OCD symptoms predicted different phenomenological characteristics, degrees of comorbidity, and different cognitive and emotional correlates. Results also indicate that psychological forms of therapy should be tailored to the patient's prominent OCD symptoms. The study supported 5 major symptom dimensions rather than four. In particular, it revealed significant differences between unacceptable/taboo thoughts and doubt/checking. The results encourage researchers using symptom-based subtypes to continue their efforts with the hope of improving our understanding of the aetiology of these symptoms and the treatments that we provide patients with these symptoms.

OVERVIEW

This thesis attempts to clarify the validity of symptom-based subtypes of obsessive-compulsive disorder.

Chapter 1 provides a general overview of the diagnostic challenges that exist in the area of OCD and how researchers have attempted to understand these. In Section 1.1, the disorder currently known as OCD is described with an emphasis on the current primary focus of research in OCD, i.e. understanding its heterogeneity. In Section 1.2, the concept of the heterogeneity of OCD is expanded on with the presentation of currently popular proposals for the sub-typing of OCD. This includes an overview of the literature pertaining to the concept of obsessive-compulsive spectrum disorders and its relevance to the diagnostic conceptualization of OCD. It also includes a rationale for focusing on symptom-based subtypes. Section 1.3 describes the literature regarding psychiatric classification and diagnosis in general and Section 1.4 presents an attempt at synthesizing all proposed methods of assessing the validity of a psychiatric diagnosis whilst expanding on the components that contribute to each validating feature. In Section 1.5, these validating features are used to assess the validity of each of the proposed symptom subtypes using available literature. Section 1.6 concludes the introduction with a review of the strengths and limitations of existing studies that have attempted to assess the validity of symptom subtypes using factor analytic techniques. It also includes the rationale

for using an exploratory approach that assumes a dimensional model for OCD subtypes.

Chapters 2 and 3 describe the aims and hypotheses of the study. These are organized according to a diagnostic validation scheme that is presented in Section 1.4.

Chapter 4 describes the methods used with specific reference to factor analysis and linear and logistic regression techniques.

Chapter 5 reports the results using the headings presented in Chapters 2 and 3.

Chapter 6 discusses the results of this study in relation to the symptom factors presented in Chapter 5. It begins by discussing the nature of the sample and the way in which the results supported a symptom-based approach to sub-typing rather than other proposed methods. It then discusses how the results supported the reliability, validity and clinical utility of OCD symptom dimensions. The implications of the results, the strengths and limitations of the study and directions for future research are also discussed.

Chapter 7 concludes the thesis.

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PREFACE

The study presented in this thesis represents research undertaken by the candidate in conjunction with other professionals and researchers within the Department of Psychiatry and the Nepean Anxiety Disorders Clinic of the Nepean Hospital. Ethics approval was granted by the Human Research Ethics Committee of the Sydney West Area Health Service Nepean campus.

The candidate was involved in all aspects of the study and responsible for coordinating the study under the supervision of Prof Vladan Starcevic.

The contributions of the candidate include:

- Planning and study design including selection of assessment tools, under the guidance of Prof Vladan Starcevic.
- Recruitment of patients via multiple talks to support groups, advocacy groups, community groups, general practitioners, psychiatric hospitals and clinics.
- Assessments of participants.
- Data collection and analysis, under the guidance of Prof Vladan Starcevic, Prof Philip Boyce and Dr Andrew Martin.
- Synthesis and presentation of results. The candidate was responsible for the conceptualization and interpretation of data and was the principal author of this thesis. There were also a number of publications, conference

presentations and public talks associated with the study that are listed below:

Publications:

- Brakoulias V, Starcevic V, Sammut P, Berle D, Milicevic D, Moses K, Hannan A. Obsessive-compulsive spectrum disorders – A co-morbidity and family history perspective. *Australasian Psychiatry* (2011); 19: 151-155.
- Brakoulias V, Starcevic V. The Characterization of Beliefs in Obsessive-Compulsive Disorder. *Psychiatric Quarterly* (2011); 82: 151-161.
- Brakoulias V, Starcevic V, Sammut P, Berle D, Milicevic D, Moses K, Hannan A. The Use of Psychopharmacological Agents in a sample of Patients with Obsessive-compulsive Disorder and their Relationship to Symptoms. *European Neuropsychopharmacology* (2011); 21: S527-S528.
- Starcevic V, Brakoulias V. Symptom subtypes of obsessive-compulsive disorder: are they relevant for treatment? *Australian and New Zealand Journal of Psychiatry* (2008); 42: 651-661.
- Starcevic V, Berle D, Brakoulias V, Sammut P, Moses K, Milicevic D, Hannan A. The nature and correlates of avoidance in obsessive-compulsive disorder. *Australian and New Zealand Journal of Psychiatry* (2011); 45: 871-879.
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Conference presentations:

- Brakoulias V. The Many Faces of OCD. 12th International Mental Health Conference, Gold Coast, QLD. August 2011.

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- Brakoulias V, Starcevic V, Sammut P, Berle D, Milicevic D, Moses K, Hannan A. Obsessive-compulsive spectrum disorders – a co-morbidity and family history perspective. RANZCP Congress Auckland, New Zealand. May 2010.

- Brakoulias V, Starcevic V, Sammut P, Berle D, Milicevic D, Moses K, Hannan A. Belief and OCD. RANZCP Congress Adelaide. May 2009.

- Brakoulias V. Belief and OCD. Nepean Scientific Day. Sydney. August 2008.

- Brakoulias V, Starcevic V, Sammut P, Berle D, Milicevic D, Moses K, Hannan A. Medications used for OCD and the relevance of OCD symptoms. *Poster presentation*. The Anxiety Spectrum Conference. Melbourne. November 2011.

- Brakoulias V, Starcevic V, Sammut P, Berle D, Milicevic D, Moses K, Hannan A. The Use of Psychopharmacological Agents in a sample of Patients with Obsessive-compulsive Disorder and their Relationship to Symptoms. *Poster presentation*. ECNP. Paris, France. September 2011.

- Brakoulias V, Starcevic V, Sammut P, Berle D, Milicevic D, Moses K, Hannan A. The Characteristics of Belief in Obsessive-Compulsive Disorder. *Poster presentation*. World Congress of the World Federation for Mental Health. Athens, Greece. September 2009.

Public talks:

- The Many Faces of OCD. 29th October, 2010. Hawthorne Melbourne. ARCVIC.

- Hoarding. 1st March, 2012. Penrith Council Chambers. Penrith City Council. Penrith.

- ABC Radio 702: Interview with host Deborah Cameron providing psychoeducation regarding OCD and discussing the Nepean OCD Study. 16 March, 2010.

- ABC Radio Riverina: Interview with host Chris Coleman providing psychoeducation regarding OCD and discussing the Nepean OCD Study. 9 March, 2010.

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CHAPTER 1

INTRODUCTION

1.1 OBSESSIVE-COMPULSIVE DISORDER

Obsessive-compulsive disorder (OCD) is a psychiatric disorder characterised by obsessions and compulsions. It can be very distressing to sufferers and is associated with significant disability. OCD is one of the most prevalent psychiatric disorders and together with its disability-related burden, commonly chronic course and limited response to treatment, it is of significant concern to the community in general.

1.1 (a) HISTORICAL OVERVIEW

Obsessive-compulsive phenomena have been described since ancient times. These typically involved what we would now term religious obsessions. Plutarch wrote about superstition in the first century: *"He sits outside his house, dressed in sackcloth and girdled with filthy rags. Many a time he rolls naked in the mire, confessing aloud his sins and transgressions. He ate this or drank that, or walked on a road forbidden by the spirit....No malady is so variable, so charged with emotion, so compounded of ideas opposed to and conflicting with one another, as superstition"* (1). Similarly, Saint John Climacus of the 6th century wrote of people who had blasphemous thoughts in religious contexts and who would

engage in excessive rituals for years in a futile hope to overcome these thoughts (2).

Modern terms such as obsessions and compulsions have been described since the medieval period (3, 4). Their current definitions appear in tables 1.1 and 1.2. These terms derive from the Latin *obsessio*, *compulsio*, *impulsio* and *scrupulus* which were again most commonly associated with a religious context. The term religious melancholy was often used in relation to these symptoms (4). During this period, these conditions were described and treated largely by clergy and so religious obsessions may have been overrepresented in descriptions (5). In the 19th century, French psychiatrists described OCD symptoms more commonly seen today, e.g. *"delire de toucher"* (disorder of touching) and *"folie de doute"* (insanity of doubt) (3). OCD was initially seen as a form of insanity and included in French psychiatry as "*folie raisonnante"* which described forms of insanity unaccompanied by delusions. In the early 1800's, Esquirol proposed that OCD was a *"volitional monomania"* where involuntary, irresistible activity had its origins neither in reason or emotion, but rather in a weakness of volitional faculty so that consciousness rejected the activity, but will could not suppress it (3). By 1850, this theory had fallen out of favour and Morel argued that OCD was not a disorder of will, but of emotion where heightened affective states led to compulsions. After the 1850s, OCD was redefined as "*folie avec conscience"* or insanity with insight alongside panic disorder, agoraphobia, and hypochondriasis (3). In the subsequent literature, OCD was viewed as a neurotic disorder and categorised along with many of the current anxiety disorders. Clusters of

symptoms within OCD were recognised since the 1830s, e.g. *"arithmomania"* (counting compulsions) and *"mysophobia"* (fear of contamination). However, OCD tended to be classified together with other disorders rather than as a distinct disorder (3).

Pierre Janet (1859-1947) and Sigmund Freud (1856-1939) regarded OCD as somewhat different from other neurotic conditions. Janet proposed that obsessions and compulsions arose in the third and deepest stage of psychasthenic illness (6). He believed that they arose as a result of insufficient psychological tension to complete the higher mental activities of will and directed attention. The resultant nervous energy was then diverted into more primitive psychological operations such as obsessions and compulsions. In Freud's view, obsessions and compulsions resulted from the conflict between unacceptable, unconscious sexual and aggressive Id impulses and the demands of conscience and reality (7). According to Freud, the central mechanism in obsessional neurosis is a regression to the anal stage of psychosexual development, which is characterised by concerns with control and certain modes of thinking. These include ambivalence, which is clinically manifested as doubting, and magical thinking, which is reflected in some superstitious compulsive acts. Freud also described an anal stage-congruent regard for thoughts as equivalent to deeds or facts. He termed this phenomenon 'omnipotence of thoughts' and viewed it as a defence against overwhelming, instinctual and emotionally charged material.

Until the introduction of clomipramine in 1966 and its wider use in the early 1980s (8), OCD had been viewed as a treatment-refractory chronic condition of

psychological origin. Existing pharmacological, physical and psychological treatments had been limited in their effectiveness (9) and many of those more severely effected were held in psychiatric institutions (5). The 1960s and 70s also saw the introduction of behavioural therapies and models of understanding OCD (5, 10, 11).

The severity with which OCD can present led to the development of psychosurgery as a treatment option for treatment-resistant OCD (12). This was first introduced by Egas Moniz in the 1930s and continued to be used until the last decade, where it has been largely superseded by an alternative less invasive surgical method known as deep brain stimulation (13). Despite significant advances in the way we treat OCD over the past several decades, the conceptualisation and classification of OCD remain a key focus of research.

1.1 (b) CLINICAL FEATURES AND DIAGNOSIS

OCD is a well described and recognised psychiatric disorder. It is characterised by recurrent and persistent thoughts, impulses, or images (obsessions) and repetitive behaviours or mental acts (compulsions) (14). Diagnostic criteria for OCD according to the Diagnostic and Statistical Manual of Mental Disorders (DSM IV-TR) (14) and the International Classification of Diseases (ICD-10) (15) are shown in tables 1.1 and 1.2. Obsessions in general increase anxiety and/or distress, and compulsions serve the function of reducing anxiety and/or distress. In addition to overt compulsions, OCD may be associated with covert (mental) compulsions,

reassurance-seeking or avoidance. This process of using these behaviours to reduce anxiety or distress is termed neutralisation (16). It is important to note that not all obsessions are accompanied by compulsions and some compulsions may not be associated with obvious obsessions. Obsessions are usually distressing or ego-dystonic and compulsions can take a significant time to perform. Often this is associated with significant functional decline. Most patients will recognise their symptoms as senseless or unreasonable, but a minority (15%) will lack insight into the senselessness of their symptoms (17, 18).

There are many types of obsessions and compulsions. These are listed in Table 1.3. The consistently most common symptoms are contamination obsessions accompanied by cleaning or washing compulsions and obsessions relating to a fear of harm to self or others accompanied by checking compulsions. There are many studies in relation to OCD symptoms and as these are central to this thesis, they will be elaborated on in due course.

Diagnosis is generally made by history and mental state examination. There are no objective tests that can be conducted to confirm the diagnosis. There are several instruments that are widely used in research studies to assess the severity and type of OCD symptoms. The most widely used instrument is the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) (19). This is a clinician-rated semi-structured interview that assesses the types of obsessions and compulsions and their severity. Another commonly used scale is the Padua Inventory (20). This is a self-report instrument that measures the severity of OCD symptoms. The Maudsley Obsessional Compulsive Inventory (MOCI) (21) and the Vancouver

Obsessional Compulsive Inventory (VOCI) are also commonly used self-report instruments that assess OCD symptoms (22).

There are several differential diagnoses that need to be considered when assessing someone for OCD. The distinction commonly lies in the description of the phenomena given by the patient and in particular the ego-dystonic nature of obsessions. Common differentials include: schizophrenic delusions (often persecutory in nature (23)); depressive rumination; overvalued ideas associated with hypochondriasis, body dysmorphic disorder and anorexia nervosa; pathological worry related to real-life problems in generalised anxiety disorder; preoccupation with fears in specific phobia; impulsive acts with the of relieving tension in impulse control disorders (e.g. trichotillomania, onychophagia); involuntary (seemingly purposeless) simple motor movements or vocalisations in tic disorders; seemingly driven, purposeful movements with the goal of self-stimulation in stereotypic movement disorder; excessive devotion, stubbornness and rigidity in obsessive-compulsive personality disorder (16).

1.1 (c) COMORBIDITY WITH OTHER DISORDERS

OCD often co-occurs with a number of other psychiatric disorders (24-27). The most common comorbidity occurs with depression and other anxiety disorders (25, 26, 28). Other important comorbid conditions include psychosis, tic disorders and personality disorders, in particular obsessive-compulsive personality disorder (25, 29-31).

Depression is thought to affect two thirds of patients with OCD during their lifetime and one third of patients have a diagnosis of depression at the time of their assessment (32). The relationship between OCD and depression is complex. It is thought that depression may be a complication of OCD (16, 33), but depression can also worsen OCD symptoms (33) and depressive ruminations may be difficult to distinguish from obsessions (16). Concurrent depression is not thought to have a negative impact on pharmacotherapy for OCD (16). In addition, non-serotonergic antidepressants and electroconvulsive therapy have not been proven efficacious for OCD (34, 35).

A comorbid anxiety disorder occurs in two-thirds of patients with OCD during their lifetime (36). Thus, OCD has high comorbidity with both depression and other anxiety disorders. Lifetime and current comorbidity rates for other anxiety disorders in patients with OCD appear to be similar. For example, the lifetime and current comorbidity rates for generalized anxiety disorder in patients with OCD are 39% and 35% respectively. This is also the case for: social phobia (33% and 22%); specific phobia (27% and 27%); and agoraphobia (19% and 13%) (36). This may signify a closer relationship to anxiety disorders than depression. However, there are still important differences between OCD and other anxiety disorders. These differences include its phenomenology, clinical presentation, the absence of a female preponderance and a poorer response to benzodiazepines.

Psychosis has been reported to occur in 10 to 15% of patients with OCD (36, 37). Half of these patients were thought to have delusional OCD, whereas the remainder had diagnoses of schizophrenia, schizotypal personality disorder and

delusional disorder (37). Such patients are thought to have a poorer response to treatment. Patients with psychotic OCD are thought to be best managed with serotonergic antidepressants rather than antipsychotics (38). Although obsessive-compulsive symptoms are often seen in the prodrome of schizophrenia and around 15% of patients with schizophrenia have OCD symptoms, patients with OCD do not have a higher risk of developing schizophrenia (16, 39, 40).

Tic disorders occur in 10 to 20% of patients with OCD (32, 41). These rates are thought to be higher in childhood OCD, e.g. 40% (42). Tics share a similarity to compulsions in that they are repetitive and can have a voluntary element whereby they are performed to relieve tension and achieve a “just right” feeling (41). Patients with tics and OCD tend to have certain characteristics that may differentiate them from OCD in general and form a subtype. This will be elaborated on in Section 1.2 (c).

Despite the common notion that OCD is accompanied by obsessive-compulsive personality traits, this does not appear to be the case. Obsessive-compulsive personality disorder is thought to occur in 20 to 35% of OCD patients (40, 43-47). However, some studies report even lower rates with higher rates of dependent, schizotypal and histrionic personality disorders (48). Obsessive-compulsive personality disorder can be difficult to distinguish from OCD, but can be differentiated by ego-syntonicity. The presence of comorbid obsessive-compulsive personality disorder is also associated with poorer response to treatment (29, 43).

1.1 (d) EPIDEMIOLOGY

Best estimates of the lifetime prevalence rate of OCD are between 1.5 and 2% (49-51). An Australian study estimated the 12-month prevalence rate as 1.9% (52). These rates are similar across cultures, which may indicate (in a manner contrary to other anxiety disorders) that OCD may be relatively independent of social, cultural and economic influence (49). Rates are similar among men and women (2.2% in women and 1.6% in men in an Australian study (52)). Higher rates are reported in males in childhood (53).

1.1 (e) COURSE AND PROGNOSIS

The onset of OCD occurs from the age of 10 to 25 in most cases with a steep increase in incidence around puberty (32). Males tend to have an earlier age of onset than females (32). Onset is usually insidious, but can occur rapidly following a traumatic event, postpartum or following loss (33). Due to embarrassment and the secretive nature of symptoms, most patients present late for treatment with estimates of around a ten-year delay (54, 55).

The course of OCD is usually chronic, although acute episodes have been documented and there is considerable variability in the periodicity, duration and severity of illness (32, 54, 56). Complete recovery is not common and there have been reports of OCD returning after long periods of time such as 20 years (57). A good prognosis is predicted by good social and occupational adjustment, the presence of a precipitating event, and an episodic course (33). A poor prognosis is predicted by early onset, greater initial severity of illness, longer duration of

illness, chronicity, being single, poor social adjustment, inadequate social skills, low levels of resistance to compulsions, low levels of insight and the presence of delusions, personality disorder or tics (33, 53, 57-59).

1.1 (f) HYPOTHESISED AETIOLOGY

The aetiology of OCD is unknown and likely to be multi-factorial. Research supports some biological and psychological models of OCD to a certain extent. Neuroimaging studies, for instance, reveal a complex interplay between biological and psychological factors, with psychological treatments leading to changes in fMRI scans as OCD symptoms improve. Neuroimaging supports the notion of OCD symptom subtypes, as studies (60) have shown that different anatomical structures are involved in different symptoms of OCD.

Studies of first-degree relatives of patients with OCD have found higher rates of OCD than in the general population (42, 61-64). This is particularly so for patients with an early onset OCD or comorbid tic disorder (61-63, 65). Several genetic studies have been conducted, but associations with genes have been inconsistent. Twin studies have indicated that genetic and environmental factors are significant (66-68).

Cortico-striatal-thalamic-cortical neurocircuitry is thought to play a key role in OCD. Evidence for this comes from several lines of clinical investigation and research. First, cases of OCD arising after encephalitis, Tourette's disorder, Sydneham's chorea, Huntington's chorea and Parkinson's disease which are

thought to involve the striatal regions of the brain (69). Neuropsychiatric (e.g. neurological soft signs, olfactory identification, evoked potentials, prepulse inhibition, intracortical inhibition) and neuropsychological (e.g executive function, visual memory function) research has also consistently supported cortico-striatal-thalamic-cortical dysfunction and impaired control of behavioural inhibition (69-71). Neuroimaging has revealed reduced volume and increased grey matter density in these circuits (72). Finally, functional neuroimaging has also shown increased activity in the orbitofrontal cortex, cingulate and striatum (73-75). OCD was one of the first disorders to demonstrate changes in functional neuroimaging findings after successful treatment with pharmacotherapy and behaviour therapy (76).

Studies indicate that several neurotransmitter systems may be implicated in the pathogenesis of OCD. Serotonin is believed to have a primary role in OCD. This is supported by findings of treatment studies where antidepressants with serotonergic activity were effective in treating OCD (77, 78) and by animal studies involving blockade of 5-HT receptors (79, 80). Dopamine is also thought to play a role. Dopamine blocking agents are helpful as augmenting medications for treatment-resistant OCD and OCD with tics and Tourette's disorder (81, 82). Binding to dopamine receptors has been seen on molecular imaging studies of OCD (83). Administration of dopamine agonists has also induced OCD symptoms (82). Glutamate, gonadal steroids and second and third messenger systems are also under investigation (84-86).

Neuroimmunological hypotheses have also been postulated for some types of childhood OCD. The association of OCD symptoms and Sydneham's chorea has been explained as a bacteria-induced autoimmune process affecting the basal ganglia (87). Some children have been found to develop OCD after infection with group A beta-haemolytic streptococci. This has been referred to as Paediatric Autoimmune Neuropsychiatric Disorder Associated with Streptococcal Infection or PANDAS (87). These children have abnormal striatal volumes on imaging (88). Their symptoms can improve with plasma exchange and intravenous immunoglobulin and antibiotic prophylaxis (89, 90). There are limitations to these findings and this theory regarding the aetiology of OCD is still regarded as controversial (91).

Psychological models of OCD arise from behavioural, cognitive and psychoanalytic theories. Behavioural models explain obsessions as learnt fear responses to neutral stimuli which are reinforced by compulsions (with these also being learnt responses to alleviate anxiety and/or distress from obsessions) or by avoidance. Because of their efficacy in reducing anxiety and/or distress, avoidance strategies can also become learnt patterns of behaviour (92). Cognitive models propose that intrusive thoughts are not pathological themselves, but that it is rather the way in which they are appraised or the cognitions associated with them that lead them to become obsessions (93-95). For example, an exaggerated sense of responsibility can lead to the formation of an obsession in the context of an intrusive thought that one had not locked the door on leaving the house which might then lead to burglary. Psychoanalytic models propose a regression to the

anal phase of psychosexual development (96-98). There is a defensive retreat in the face of anxiety-provoking oedipal wishes and magical thinking is representative of a regression to an earlier mode of thought. Inherent to this is an omnipotence of thoughts where people believe that merely thinking about an event can cause it to occur (99).

1.1 (g) TREATMENT

The treatment of OCD is often more challenging than that of other psychiatric disorders. Treatment has been shown to reduce symptom severity in 40 to 60% of patients (35), however most patients remain symptomatic. Patients are often resistant to treatment, distressed by recommendations their compulsions be abandoned, impaired in their functioning and distressing to their families or those around them.

Current treatment guidelines recommend either exposure and response prevention (ERP) or a selective serotonin reuptake inhibitor (SSRI) as first-line therapy (100, 101). If neither is successful then the two are combined. The first trial of an SSRI is usually followed by another trial of an SSRI before proceeding to clomipramine. Various augmenting strategies are then suggested, including antipsychotic medication, mood stabilizers, buspirone, clonazepam, and methylphenidate. Research regarding these practices is limited. Electroconvulsive therapy can be useful only in cases with comorbid depression. Psychosurgery and

deep brain stimulation tend to be used only is specialized research centres for severe and resistant cases.

Pharmacological approaches:

There have been several meta-analyses assessing the efficacy of commonly used antidepressants in the treatment of OCD (102-107). These show low placebo response rates in the vicinity of 5 to 10%. They also show that the SSRIs studied appear to have similar efficacy and some indicate that clomipramine maybe more efficacious than SSRIs in general. Although the studies did not show a higher drop-out rate for patients on clomipramine, adverse effects from clomipramine are clinically significant and hence this is not used first line. Unlike the pharmacotherapy of depression, SSRI treatment of OCD requires higher doses of medication and initial effects may appear after 4 to 6 weeks with maximum benefits at 8 to 16 weeks (16, 33).

Psychological approaches:

The classic psychological approach to treating OCD has been exposure and response prevention (ERP). This has been shown to be equally as effective as SSRIs and is likely to have longer-lasting effects (102, 103). The essential components of this are graded exposure to feared objects or situations and prevention of the behavioural response or compulsion that maintains the fear. There are many variations to the techniques used. In most cases, psychoeducation is included. Cognitive approaches addressing maladaptive cognitions related to obsessions and compulsions are also commonly used. The use of techniques such

as cognitive restructuring for OCD is variable in clinical practice. These variations depend largely on the OCD symptoms that the patient presents with (108). ERP is usually delivered in the outpatient setting. There are some inpatient programs however, that use ERP in individual and group settings. ERP requires commitment and is often difficult for patients with prominent distress and/or anxiety. In such patients, involvement of the patient's family, assessing for psychosocial stressors, and having some understanding of the psychodynamic factors may be helpful.

Predictors of a poor response to treatment include: greater severity of OCD symptoms (109, 110); schizotypal personality disorder (58); social phobia (111); comorbid tics (112, 113); prominent avoidance of feared stimuli (114); unemployment (115); and the OCD symptom subtype. For instance, hoarding symptoms (110, 116), sexual and religious obsessions without overt compulsions (110, 117), and the absence of overt compulsions in general (118) have been associated with a poorer response to treatment. There is also evidence that treatments often have to be tailored to the patient's OCD symptom subtype (108). The heterogeneity that results from multiple OCD symptom subtypes reduces the power of studies assessing the efficacy of treatment modalities (119). This is hence a key area of research in OCD. Proposals for reducing this heterogeneity will be described in Section 1.2.

CONCLUSIONS

OCD is a complex disorder whose conceptualisation and treatment has developed over the last hundred years. Although its aetiology is still uncertain, it is no doubt multifaceted. This is evident by the range of biological and psychological theories attempting to explain its symptoms. Treatment modalities are continuing to evolve and are likely to be influenced by individual variations within patients with OCD. Furthermore, OCD has considerable comorbidity with other psychiatric disorders and its diagnostic conceptualisation is still a key area of research.

1.2 PROPOSED SUBTYPES FOR OBSESSIVE-COMPULSIVE DISORDER

There is increasing evidence from research on the nature and treatment of OCD that it is heterogeneous (120). Understanding the heterogeneity of OCD has been identified as a key topic for research into OCD (121). In an attempt to reduce this heterogeneity there have been attempts in Plato's words to "carve nature at its joints" (122). The more extensively researched of these attempts have focussed on the clinical features of the disorder. These include the following:

- the types of symptoms (symptom-based subtypes);
- the level of insight (OCD with poor insight);
- the presence of comorbid tics;
- early versus late age of onset.

Other proposed subtypes that have a focus on clinical features include the following:

- autogenous and reactive obsessions;
- subtypes based on the presence of specific patterns of comorbidity;
- subtypes based on different courses of illness.

Some subtypes focus on potential aetiological factors, and these include the following:

- paediatric autoimmune neuropsychiatric disorders associated with streptococcus (PANDAS);
- familial OCD versus sporadic OCD.

In addition to these sub-typing strategies, others have proposed that OCD may be a part of a wider group of disorders called obsessive-compulsive spectrum disorders (123). According to this model, OCD symptoms may be drawn from broader dimensions of psychopathology (120).

1.2 (a) SYMPTOM-BASED SUBTYPES OF OCD

The most popular method of sub-typing OCD has been based on symptom theme (120, 124, 125). French psychiatrists had described symptom-based subtypes since the 19th century (e.g. "*folie de doute"* and "*delire de toucher"* (3)). In the 1980s there were studies showing differences in the characteristics of "washers" and "checkers". (These symptoms account for 75% of OCD symptoms in the treatment population (126).) In the 1990s studies of symptom-based subtypes expanded with the use of statistical techniques such as cluster analysis (127, 128) and factor analysis (113, 129-132). In the past decade, there have been meta-analyses of factor analytic studies of OCD symptoms (119, 133). These have supported four distinct symptom factors: 1) hoarding/saving obsessions and hoarding compulsions; 2) contamination obsessions and cleaning/washing

compulsions; 3) symmetry obsessions and ordering/arranging compulsions; and 4) aggressive/sexual/religious obsessions and checking symptoms (91, 134).

There have been over 20 factor analytic studies assessing symptom subtypes in OCD (119). These studies have used the Y-BOCS symptom checklist (YBOCS-SC) (see Appendix 8) which is regarded as a "gold standard" test in OCD research studies (19). When different instruments have been used in factor analytic studies (e.g. self-report measures such as the Padua Inventory revised (PI-R) (135)) or different methods have been used (e.g. current versus lifetime symptoms, dichotomous versus continuous scoring, *item* level versus *category* level analysis), the studies revealed similar symptom factors (136). Confirmatory factor analysis and cluster analysis techniques have also yielded identical results (26, 137).

There are concerns, however, regarding the use of the YBOCS-SC to determine predominant symptoms as it was not designed as a quantitative rating scale. As the name suggests, the section used to determine predominant symptoms is a "symptom checklist". One study showed that the items assessing checking on the YBOCS-SC did not correlate well with scores for checking from other scales (138). In order to assess the dimensional aspect of these symptom factors, a dimensional Y-BOCS has been developed (139). However, this has not been widely used due to the burden associated with collecting the additional data (91).

The fourth symptom factor identified by meta-analyses of the factor analytic studies (i.e. aggressive/sexual/religious obsessions and checking compulsions) (119, 133) and by some individual factor analytic studies (26, 132, 140-142) has

been subject to some debate. It is not supported by the majority of individual factor analytic studies (110, 113, 130, 143-148). These studies most often reported five symptom factors, but symptoms that constituted the fourth and fifth symptom factors were not always consistent (see Table 1.4).

In an attempt to better explain the inconsistent results for factors 4 and 5, researchers have assessed larger samples of OCD patients and have subjected the *individual items* of the YBOCS-SC (see Appendix 8) to factor analysis (see Table 1.4). (Most studies subject the pre-determined YBOCS-SC symptom *categories* to factor analysis due to difficulties obtaining large sample sizes.) In item-level analyses of the YBOCS-SC, factor 4 has included aggressive/sexual/religious obsessions and factor 5 has included checking compulsions (143, 145-149). In these item-level analyses, it has also been observed that some YBOCS-SC items grouped within the aggressive obsessions YBOCS-SC category are associated with sexual and religious obsessions and that some are associated with checking. This has led to some items of the aggressive obsessions category being grouped under the title "impulsive aggression" and others under the title "unintentional harm" (149) (see Figure 6). When impulsive aggression, sexual and religious obsessions occur together, this collection of symptoms is often referred to as "taboo", "unacceptable" or "forbidden" thoughts (149). When unintentional harm obsessions occur with checking, the resultant factor is commonly referred to as the "doubt/checking" factor (148, 149). Taboo or forbidden thoughts were thought to be synonymous with "pure obsessions" due to the absence of overt

compulsions. However, recent studies propose that that “pure obsessions” are associated with covert mental rituals and that this term is a misnomer (150, 151).

It is important to note the limitations of such lines of research. Unlike cluster analysis, factor analysis does not provide results that can be interpreted in a categorical manner. Hence, results from factor analytic studies do not infer that symptom-based OCD subtypes exist. Rather, a patient may have a predominant symptom from one of the described symptom groups without a clear distinction from another patient with a predominant symptom from another symptom group. This is an important element in the conceptualisation of OCD’s heterogeneity as symptoms have a lot of overlap. In recognition of this overlap, the term OCD “symptom dimensions” is used in reference to the results arising from studies that use factor analysis. This will be elaborated on in subsequent chapters.

There is also considerable evidence supporting the validity of these five symptom dimensions. This will be detailed in Section 1.5. Despite the large volume of research supporting these symptom dimensions, they have not been officially acknowledged in classificatory systems due to the inherent complexity of the dimensions, overlap between them and an expectation that more useful categorical endophenotypes will be discovered at some time in the future (91).

1.2 (b) OCD WITH POOR INSIGHT

OCD with poor insight is currently the only officially recognised specifier in diagnostic classification. It was included in DSM IV-TR (14) after the study of

Foa and Kozak, in their DSM IV field trial, reported that not all OCD sufferers viewed their symptoms as unreasonable or excessive (152). In this study, 10 to 36% of OCD patients had poor insight. Insel and Aksiskal also described OCD with psychotic features in their classic 1986 paper (38). These patients are less common and it is thought that insight lies on a continuum, with OCD with psychotic features being on the poor insight end of a spectrum of insight (153). Several authors have subsequently concluded that insight cannot be dichotomised into good or poor insight (91, 154). This calls into question whether OCD with poor insight is a subtype that can be easily assessed clinically.

Poor insight has been assessed in research studies with the single item regarding insight in the Y-BOCS (19) and by means of the Brown Assessment of Beliefs Scale (BABS) (155) and the Overvalued Ideas Scale (OVIS) (156). Using such measures, poor insight has been associated with greater severity of OCD symptoms, hoarding, major depression, schizotypal personality disorder, obsessive-compulsive personality disorder, younger age of onset, being single, and a higher frequency of schizophrenia in first-degree relatives (157-161). The treatment implications of poor insight are unclear with some studies reporting a poor response to pharmacological and psychological treatments (37, 38, 162). Whilst other studies report no association between pharmacological treatment outcome and poor insight (17, 157).

Some authors believe that OCD with poor insight has considerable overlapping features with schizophrenia (163, 164). Evidence for this comes from the high comorbidity rates between OCD and schizophrenia (30, 165, 166), similar

neuropsychological findings in patients with poor insight and in those with schizophrenia (163, 167), neuroimaging studies (168) and the high level of disability in the two conditions (169). Based on these findings, some have proposed a schizo-obsessive subtype of OCD (165, 166, 169, 170).

1.2 (c) TIC-RELATED OCD

A tic-related subtype of OCD is easily recognised, common and has some genetic and treatment implications. Some suggest that OCD may be aetiologically related to tic disorders (171). In a survey of 187 OCD experts, 81% supported the inclusion of a tic-related subtype of OCD in DSM-5 (125).

Studies of tic-related OCD generally define this putative subtype by the presence or a history of a chronic tic disorder or Tourette's disorder. A chronic tic disorder involves the presence of either motor tics (e.g. movements of eyes, face, head, upper limbs) or vocal tics (e.g. throat clearing, grunting, squeaks), but not both, whereas Tourette's disorder involves multiple tics including at least one vocal tic. There is a history of a chronic tic disorder or Tourette's in 10 to 40% of OCD cases diagnosed in childhood or adolescence (171, 172) and in around 10% of general adult OCD samples (32, 142, 173).

Studies have found an association between tic disorders and symmetry/ordering symptoms, touching, tapping and blinking compulsions (31). These compulsions could be thought of as tic-like in their action and are often accompanied by antecedent sensory phenomena (31). These antecedent sensory phenomena

include “just right” feelings, localised tactile and musculo-skeletal sensations, visual, tactile or auditory stimuli, feelings of “incompleteness” or “urges” (41, 174, 175). The association of symmetry/ordering symptoms with tic-related OCD has been reported across cultures (176).

Tic-related OCD has also been associated with an early age of onset (177, 178), male predominance (31, 171, 176, 178), increased chances of remission (179, 180), attention-deficit hyperactivity disorder (181, 182), oppositional defiant disorder (178), trichotillomania (178, 182, 183) and pervasive developmental disorders (178). It has also been shown to be highly familial (42, 63, 177, 178, 182), but no genes have been identified (184). There are also differences in neuroimaging findings between OCD patients with and without tics (185) and there has been some suggestion that beta haemolytic streptococcal infection in childhood may be more common in those with tics (186).

Whether tic-related OCD has a differential response to treatment is uncertain and this introduces doubt regarding its usefulness as a subtype (120). There is no evidence of a differential response to behavioural therapies (187-189). Findings of studies of the efficacy of pharmacotherapy when there is a history of a chronic tic disorder have been conflicting. Thus, some research reported that tic-related OCD had a worse response to fluvoxamine (190) and a much better response when the medication was augmented with the antipsychotic haloperidol (112). This finding was not replicated in a study using the antipsychotic risperidone (191). There were no differences in treatment outcome when clomipramine was studied (192).

1.2 (d) OCD WITH EARLY AGE OF ONSET

OCD with an early age of onset shares features with tic-related OCD, and studies are confounded by the higher rates of tic disorders. Both tics and early-onset OCD can occur before the age of ten (91). Although there may be some distinguishing features between OCD with early and late onset, defining an early age of onset is problematic and there appears to be no consensus (125). Some studies have defined and early age of onset as less than 10 years, whilst others have used 15 years or even 18 years as an age cut-off (193). Whether this refers to the onset of subclinical symptoms or the onset of OCD is also unclear (91). In an attempt to clarify this issue, Delorme and colleagues (194) used admixture analysis (a method used to determine the model that best fits the observed distribution of a continuous variable). They found two Gaussian distributions for age of onset, with mean ages of 11.1+/-4.1 years (early onset) and 23.5+/-1.1 years (late onset). When such curves have considered the gender of the subject, there is a peak age of onset among male patients prior to puberty (195, 196). In females, age of onset appears to peak later, during adolescence (182). For those with an age of onset in adulthood, there is an equal gender distribution (182).

Early onset OCD is thought to be associated with some important clinical characteristics (197). It is associated with male gender (198-200), more compulsions than obsessions (201, 202), more sensory phenomena (200, 203), a higher rate of symptom remission (201, 204), higher comorbidity with tics (205-207), attention-deficit hyperactivity disorder (189, 207) and trichotillomania (198, 207, 208), higher rates of OCD in family members (198, 199), better executive

function and auditory attention on neuropsychological testing (209) and different directions of activity in the insula and components of the cortico-striato-thalamic neural systems on functional neuroimaging (210, 211). It should be noted that many of these reports have been made without adjusting for the presence of tics. Treatment response appears to be similar to OCD in general when adjustments for the presence of tics have been made (189, 212, 213).

OCD with early age of onset lacks sufficient evidence to distinguish it as a valid subtype. There are problems with its definition and overlap with tic-related OCD.

1.2 (e) OTHER SUBTYPES

Paediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcus (PANDAS):

Observations of increased rates of obsessive-compulsive symptoms in Sydneham's chorea (a neurological manifestation of rheumatic fever) and observations of increased rates of obsessive-compulsive symptoms and tic disorder in rheumatic fever without Sydneham's chorea (214, 215), have lead to a hypothesis that beta-haemolytic streptococcal infection leads to OCD and tic disorders via a post-infectious immune process (87). Leonard and Swedo (216) define PANDAS by the following criteria: the presence of OCD or tic disorder; prepubertal symptom onset; sudden onset or episodic course of symptoms; temporal association between streptococcal infections and exacerbation of

neuropsychiatric symptoms; and neurological abnormalities. There are also descriptions of a “saw tooth” waxing and waning of symptoms (87).

Evidence supporting this theoretical subtype is available, but limited. Case control studies have been replicated and show higher rates of streptococcal infection in the three months prior to the development of OCD or tic disorder (217). However, prospective longitudinal studies have been negative, indicating that 85% of exacerbations are not associated with infection (218, 219). In these cases, it is postulated that group beta-haemolytic streptococcal infection might be the inciting event, but that a common cold or mycoplasma infection might lead to an exacerbation (220, 221). Studies assessing for cross reactions of antibodies to basal ganglia structures have also been negative (222-224). There have also been mixed results with antibiotic treatment (90, 225, 226).

PANDAS is thought to be associated with an early age of onset, aggressive obsessions, ordering and arranging compulsions (227), tics and body dysmorphic disorder (215, 228). There are again overlapping features with an early age of onset subtype and a tic-related subtype of OCD. Its existence is doubted by some authors (229, 230) and it was supported by only 53% in a survey seeking to establish expert consensus (125). At this stage, PANDAS is regarded as controversial (197) and there is inadequate evidence to regard PANDAS as an OCD subtype.

Autogenous and reactive obsessions:

Lee and Kwon (2003) (231) have proposed two types of obsessions: autogenous and reactive. According to this method of sub-typing, autogenous obsessions intrude abruptly into consciousness without any clear antecedents. These obsessions are highly aversive and ego-dystonic, typically involving (or pertaining to) sexual, aggressive or immoral thoughts, images or impulses. The obsessions are threatening in their own right and this can lead to patients using thought control or avoidant strategies to overcome their anxiety. Reactive obsessions on the other hand, tend to be evoked or triggered by external stimuli. They are perceived as more realistic in that the feared negative consequence is possible, but improbable. Reactive obsessions commonly involve fears of contamination, making a mistake, having an accident, losing something or of something not being symmetrical (231). The perceived threat is not the obsession itself, but the potential negative consequence and so they are accompanied by corrective and usually overt actions aimed at reducing the risk of these negative consequences.

There is still a need to validate this recent proposal. This sub-typing scheme has been assessed in both student (231, 232) and clinical samples (233), with good interrater reliability (233). It has also been hypothesised that reactive obsessions may lie on a continuum with worry (234) and be associated with perfectionist personality traits (234). Autogenous obsessions have been associated with schizotypal personality traits (234, 235).

The autogenous-reactive sub-typing scheme also may have treatment implications. The symptoms associated with autogenous obsessions tend to be associated with poor insight and a poorer response to pharmacotherapy and ERP. One study showed that patients with autogenous obsessions tended to respond better to cognitive therapy than those with reactive obsessions (236). Studies are limited by the absence of a reliable instrument for assessing autogenous or reactive obsessions (237).

Familial OCD versus sporadic OCD:

There has been much interest regarding the heritability of OCD in view of the implications for genetic research. Although there have been characteristics associated with familial OCD, studies investigating causative genes have not yet yielded significant findings.

Patients with a positive family history of OCD tend to have an early age of onset, comorbid tic disorders, pathological grooming behaviours, body dysmorphic disorder, and eating disorders. They are more likely to be male and to present with symmetry and ordering symptoms (136, 154).

Less than 20% of patients are thought to have a family history of OCD (238), however it is often difficult to distinguish between clinical and sub-clinical symptoms in family members. The usefulness of a familial versus sporadic sub-typing scheme has generally been outweighed by two other overlapping sub-typing schemes, i.e. early age of onset and comorbid tic disorders.

Comorbidity:

Proposals to subtype OCD according to its comorbidity have arisen from the high comorbidity rates among patients with OCD. Their potential significance has been highlighted by one popular comorbidity sub-typing scheme, i.e. OCD with comorbid tic disorder.

Several other sub-typing schemes based on comorbidity have been proposed. These require further replication in large patient samples. Such sub-typing schemes arise from descriptions of different clinical characteristics in OCD when associated with comorbid panic disorder (239), impulse control disorders (240), psychosis (37), bipolar affective disorder (241) and schizotypal personality disorder (242).

Nestadt and colleagues (27, 243) have attempted to ascertain subtypes according to comorbidity by using the statistical technique of latent class analysis in large samples. Their first study involving 450 patients revealed 4 groups: 1) minimal comorbidity "pure" OCD; 2) comorbidity with depression and generalised anxiety disorder; 3) comorbidity with depression, anxiety and somatoform disorders; and 4) comorbidity with panic disorder, agoraphobia and lifetime separation anxiety disorder. In their second and larger study with 706 patients, they reported a sub-typing scheme with 3 groups. The 3 groups were: 1) an OCD simplex class where comorbidity was minimal and the most frequent additional diagnosis was major depressive disorder; 2) an OCD tic-related class with rarer additional comorbidity; and 3) an OCD comorbid affective related class where panic disorder and mood

disorders were highly comorbid. The third group was associated with female gender, younger age of onset, OCPD, more "taboo" obsessions and low conscientiousness. Such studies require further replication and are unlikely to be clinically useful, as most patients have comorbid mood or anxiety disorders.

Course:

Some authors propose that OCD with chronic course might be different from OCD with an episodic course (244, 245). Hence this is also a potential sub-typing scheme. More than half of all OCD patients tend to have a chronic course (246, 247). There have been few studies, however, that have assessed the associated characteristics and potential validity of such a sub-typing scheme. One study showed no differences in the rates of comorbid depression among those with a chronic course and those with an episodic course (247). Another study reported that an episodic course was characterised by a higher lifetime comorbidity with bipolar II and panic disorder, a higher rate of family history of a mood disorder, a later age of onset and a lower rate of generalised anxiety disorder (245).

1.2 (f) OBSESSIVE-COMPULSIVE SPECTRUM DISORDERS

Obsessive-compulsive spectrum disorders (OCSDs) were first proposed by Hollander in 1993 (248). The concept aims to broaden the OCD phenotype and include other comorbid and related disorders within the same diagnostic grouping. Using this approach it is hoped that common aetiological mechanisms may be determined and that this might assist the search for susceptibility genes (193). The

disorders that initially constituted this proposed group included hypochondriasis, body dysmorphic disorder, tic disorder, Tourette's disorder, impulse control disorders (trichotillomania, compulsive buying, kleptomania, non-paraphilic compulsive sexual behaviour and pathological gambling), self-injurious behaviour, eating disorders, depersonalisation disorder, schizo-obsessive disorders, Huntington's disease, autism, epilepsy, Sydneham's chorea, borderline personality disorder and antisocial personality disorder (249). This group has since been deemed too broad and there has been more support for a more narrow group including hypochondriasis, body dysmorphic disorder, trichotillomania and tic disorders (123, 125, 250). The disorders are thought to lie on a spectrum from an impulsive to a compulsive end, where impulsivity is said to persist due to deficits in the ability to inhibit repetitive behaviour with known negative consequences, while compulsivity persists as a consequence of deficits in recognizing completion of tasks (251). OCD lies on the compulsive end of the spectrum whereas trichotillomania for example lies on the impulsive end of the spectrum (251).

Although there is some support for this concept (123), there are inadequate research findings to link the proposed diagnoses to the obsessive-compulsive spectrum (252, 253). Some argue that the OCD is more closely related to anxiety disorders than to OCSDs (36, 250). Of the diagnoses proposed to belong to the spectrum, body dysmorphic disorder has the most empirical evidence (252) and support among professionals in the field (125). It has also been argued that despite the numerous revisions of the proposed spectrum since the 1990s, the spectrum

has done little to assist our understanding of the heterogeneity of OCD or its aetiology.

CONCLUSIONS

The heterogeneity of OCD remains a major challenge to OCD research. Several subtypes have been proposed, but most need further evidence to support their validity. Most research has focussed on symptom-based subtypes and tic-related OCD. Symptom-based subtypes have been the most popular as they are easily recognised and because symptoms constitute the defining features that a patient presents with. Symptom-based sub-typing attempts to capture the heterogeneity of OCD with four to five subtypes, whereas most other sub-typing schemes involve only two subtypes. Tic-related OCD is a popular sub-typing scheme due to findings related to an early age of onset subtype and heritability. This has led to the hope that research into tic-related OCD would result in a genetic marker or an insight into the aetiology of OCD. Unfortunately, such a result is still pending. The advantages and disadvantages of the main OCD sub-typing schemes presented are summarised in Table 1.5. This thesis will report findings from a clinical study where OCD patients' phenotype is mostly described by their OCD symptoms. Although other subtypes are also assessed, the main focus will be on symptom-based subtypes.

1.3 THE CLASSIFICATION OF PSYCHIATRIC DISORDERS

1.3 (a) A BRIEF HISTORY OF PSYCHIATRIC CLASSIFICATION

Many diagnostic terms in use today have their origins in Ancient Greece. Terms such as melancholia, mania, hysteria and paranoia were developed by physicians such as Hippocrates (460-370BC) in order to classify the phenomena that they observed in their patients. Both Hippocrates and Plato (429-347BC) are thought to have developed classificatory systems for mental disorders (254, 255). These were based on empirical observation and rational idealism with an emphasis on grouping like objects into categories (254, 256). The humoral theory is an example of how observations were combined with popular theories of the time (see Table 1.6). A psychiatric nosology was also thought to have been developed in India in 1400 BC and incorporated in the medical classificatory system of the Ayur-Veda (257) and there are likely to have been other systems throughout the course of ancient history.

Science and classification began to receive a renewal of interest in the European Renaissance. Thomas Sydneham (1624-1689) contributed to diagnosis through careful clinical observation and an interest in epidemiology (258). He defined a syndrome as a group of symptoms having a common course and prognosis. Carolus Linnaeus (1707-1778) attempted to apply taxonomic methods of biology to medical and psychiatric illnesses (259). Using these principles, William Cullen (1710-1790) proposed in 1769 a class of disorders called “neurosis”, which was subdivided into 4 orders, 27 genera, and over 100 species (260). As is the case

today, debate about how best to categorise mental disorders continued in the 18th and 19th centuries, with some basing their diagnosis on single symptoms, others on collections of symptoms, and others on more speculative early theories (259). Authors such as Foucault have questioned the validity of psychiatric diagnosis considering the paucity of biological markers and proposed that the concept of mental illness might have evolved in a complex field of power relations (261). Foucault argued that mental institutions had emerged in the late 18th century to exert increasing control over non-conforming behaviour and that psychiatric diagnoses exerted control by neglecting underlying psychological causes for deviant behaviour and ignoring the spectrum with normal behaviour. This is relevant to OCD, which was regarded as a disease (*folie de doubt, delire de toucher*), without consideration of its relationship to normality.

Reflecting such controversies, in 1856 two key figures in modern psychiatry were born. They were Emil Kraepelin (1856-1926) and Sigmund Freud (1856-1939). Kraepelin was influenced by biological scientific breakthroughs in Germany at the time and authored several editions of textbooks describing psychiatric disorders. Of particular note were his descriptions of dementia praecox (schizophrenia) and manic-depressive insanity (bipolar affective disorder), which were again largely drawn from clinical observation (in particular, follow-up studies of large numbers of patients in psychiatric institutions of the time) (258, 260). In contrast, Freud developed a developmental theory that arose from his observation of patients and how their symptoms were related to childhood trauma at different stages of development. Along with these observational contributions to diagnosis, the late

19th century also saw the development of consensus groups that met to agree on psychiatric diagnosis, with the aim of introducing uniformity and improving the credibility of the profession.

In 1900, representatives from 26 countries met to agree on "The International Classification of Causes of Death" (260). This was revised at subsequent conferences. In 1948, this was renamed as the "Manual of International Statistical Classification of Diseases, Injuries and Causes of Death" (ICD-6) and included a special section on mental disorders (260). In recognition of the increasing role of government in health care, the American Medico-Psychological Association (forerunner of the American Psychiatric Association) and the National Commission on Mental Hygiene met and established the first standardised psychiatric nosology in 1918. Its aim was to collect data regarding diagnosis uniformly across all mental institutions in the United States (259). It consisted of 22 disorders. There were successive revisions over time leading to the first edition of the Diagnostic and Statistical Manual (DSM) being published in 1952. The parallel development of ICD and DSM may be explained by the differences in use of terms and diagnostic concepts in different countries (262) rather than being based on a scientific approach. In addition to widespread consultation, improvements to existing classificatory systems have also been driven by scientific enquiry (263, 264). This will be elaborated on in subsequent chapters.

1.3 (b) THE PURPOSE OF PSYCHIATRIC CLASSIFICATION

Although it is common for clinicians to disagree with classificatory systems and to adopt concepts that are popular locally or that are suited to our individual practices, psychiatrists would not be able to operate without them (265). This is true in more ways than one. It is important to understand the purpose of psychiatric classification if we are to improve it.

1. **Communication:** A primary function of psychiatric classificatory systems is to allow efficient communication regarding the patients we treat (259, 260). This communication occurs among colleagues and other allied health professionals to allow us to quickly understand the likely symptoms, history, risk issues, mental state, prognosis and treatments associated with the diagnosis presented. The communication of a diagnosis to patients and their relatives also facilitates understanding. In a similar manner, a diagnosis is important for communicating needs in relation to service provision and future research. This is relevant to communities, governments, health services, insurance companies, epidemiologists, and researchers seeking to improve our understanding of the diagnosis at hand. It also has implications for our credibility as psychiatrists and the way in which we are paid for the services that we provide.

2. **Conceptual framework:** Diagnostic classification defines boundaries of concepts and through this diagnostic entities are defined (260). This is of particular importance for research, improving our understanding of the

diagnosis, its aetiology and treatment approaches. In grouping phenomena to form homogeneous diagnostic groups we improve the power of our scientific enquiries. When studies assess samples that are heterogeneous, such as samples where subjects have a variety of diagnoses, they tend to be underpowered and unable to detect statistically significant differences.

3. **Information retrieval:** When retrieving information regarding a disorder, a diagnosis is essential. The initiation of an enquiry is best facilitated by using diagnostic terms. Patients are able to retrieve information via books, magazines, news articles or the internet much more readily by using a diagnosis rather than a collection of symptoms. A diagnosis is also helpful for doctors who may be reviewing their patient's past history via written notes, letters or collateral history. For researchers, a literature search without a diagnosis of interest would be unfathomable.

4. **Outcome prediction:** As mentioned, without diagnosis it would be very difficult to predict the course or prognosis associated with a collection of symptoms and the treatment to which a patient is most likely to respond.

5. **Theory development:** Once a set of symptoms is identified as a diagnosis, more research can be conducted to better understand it. Scientific enquiry can also lead to the rejection of a diagnosis as a valid concept to explain a set of symptoms in question, or the development of subtypes. Since the development of classificatory diagnostic systems, psychiatric research associated with each diagnosis has flourished. The proposed diagnostic

group of obsessive-compulsive spectrum disorders is a good example of how a theoretical diagnostic concept has initiated increased scientific enquiry and debate.

1.3 (c) LIMITATIONS OF PSYCHIATRIC CLASSIFICATION

History has shown that psychiatric classification has been subject to much debate and that the most widely used diagnostic categories have developed through consensus and rigorous scientific validation. Despite the widespread use of DSM and ICD, many diagnoses are still the subject of much debate, as are the classificatory systems themselves. Hence, alternative diagnostic models have been developed such as patient centred diagnoses (266) and the Psychodynamic Diagnostic Manual (PDM) (267). Apart from lack of consensus and use of different terms in different settings which is also a limitation of medical diagnoses (e.g. chronic airflow limitation, chronic obstructive airways disease, chronic obstructive pulmonary disease), psychiatric diagnosis has additional challenges that arise from an absence of biological markers, a presumed multi-factorial aetiology that includes non-biological factors and the extensive comorbidity or overlapping symptoms.

1. Biomarkers in psychiatry: Although we have had an ever increasing amount of psychiatric research in the field of neuroimaging, neuropharmacology and genetics, we still lack a test that will assist us in our diagnosis in the same way that biomarkers assist our medical colleagues. The stumbling blocks appear to be

clinical heterogeneity, uncertain phenotype boundaries, genetic overlap between disorders and the great influence of non-genetic factors (268). In addition to these challenges, the organ that is likely to be affected by mental disorder (namely the brain) is not easily accessible for biological sampling (269).

2. Aetiological models and classification: Our currently most popular classificatory systems (ICD-10 and DSM-IV-TR) are viewed as simplistic by some, as diagnosis is defined at the level of operationally defined single symptoms at the expense of complex (albeit therapeutically relevant) psychopathological and intersubjective phenomena such as: the patient-doctor relationship; transference; and countertransference (270). The aetiology of mental disorders does appear to be complex and multifactorial and hence many psychiatrists operate using a biopsychosocial model (271) that in many cases is better expressed via a psychiatric formulation than a diagnosis.

3. Psychiatric comorbidity and classification: Comorbidity is defined as any distinct additional clinical entity that has existed or that may occur during the clinical course of a patient with the index disease under study (272). It occurs frequently and has a significant impact on the individual, their prognosis and treatment and the nature of health care systems, thus interacting at many different levels (273). Multiaxial systems of diagnosis have been introduced to ICD and DSM to highlight the importance of comorbidity and the need to recognise and treat comorbidity. The high comorbidity rates in psychiatry may be due to "pleiotropy" where multiple phenotypic effects are produced from a single gene, or "polygeneity" where there is an interaction between multiple common

responsible genes (273). They may also be due to shared environmental risk, with domestic violence, child abuse, poverty, homelessness and substance abuse often linked with various mental disorders (274).

Symptom overlap is also a significant problem, as most psychiatric disorders, for instance, are characterised by some level of anxiety or mood disturbance. A patient with a combination of such symptoms may be diagnosed with two disorders when, in fact, one disorder may explain both sets of symptoms. This would lead to an artificial increase in comorbidity rates. DSM and ICD attempt to control this by often stipulating a diagnostic criterion that excludes a diagnosis if it is better explained as a result of another diagnosis.

Despite all the limitations of diagnosis in psychiatry, it has proven to be integral to our practice and the advancement of our knowledge. It is important that psychiatric diagnoses continue to be refined, with empirical evidence supporting or refuting diagnoses, categories or subtypes.

1.3 (d) "LUMPING VERSUS SPLITTING"

In our quest to reduce the heterogeneity of psychiatric diagnosis, diagnoses have been "split" into smaller diagnostic entities or subtypes. This has led to a proliferation of diagnoses. On the other hand, the overlapping features and high comorbidity rates have led to proposals to "lump" together some conditions and form larger groups. Although the challenge as to whether to lump together diagnoses that are similar or whether to split them based on their internal

heterogeneity is also common to some medical disorders, this has become a key issue for the classification of psychiatric disorders as it may have led to an artificial proliferation of disorders and subtypes.

The tendency to "split" is illustrated by increases in the number of psychiatric diagnoses with each edition of the DSM. Pre-DSM-III, anxiety disorders were classified as neuroses: 1) anxiety neurosis; 2) phobic neurosis; 3) obsessive-compulsive neurosis; and 4) traumatic (compensation) neurosis (275). With DSM-III, anxiety neurosis was split into panic disorder and generalised anxiety disorder, and phobic neurosis was split into agoraphobia, social phobia and simple (specific) phobia (276). In DSM-IV, a number of subtypes were introduced: generalised and non-generalised subtypes of social phobia; animal phobia, natural environment phobia; blood-injection-injury phobia, and situational phobia subtypes of specific phobia; and poor-insight and good-insight subtypes of OCD (14).

The tendency to "lump" is illustrated by the proposed diagnostic groupings such as obsessive-compulsive spectrum disorders (described in Section 1.2 (f)) and "general neurotic syndrome" (277, 278). The general neurotic syndrome recognises the comorbidity of anxiety disorders, depressive disorders and neurotic personality traits and is supported by an association of depressive and anxiety disorder diagnoses with high levels of neuroticism. This has led to some hypothesising that neurotic personality traits should be a target for intervention (277).

History has seen an oscillation between “lumping” and “splitting” in relation to psychiatric diagnosis (279). There have been advantages and disadvantages to both approaches. Some argue that most progress in psychiatry has occurred as a result of splitting (280, 281). An instance in history is Kraepelin’s split of the unitary concept of psychosis into dementia praecox and manic-depression. Splitting emphasises the heterogeneity within categories and seeks more homogeneous groups in order to communicate and study more specific prognostic features and treatments for each of the diagnostic entities. The disadvantage of splitting is that it risks producing numerous diagnostic entities of dubious validity. This can artificially increase rates of comorbidity (282). Lumping has the advantage in that it looks for similarities between categories and results in a small number of broad diagnostic categories. Some clinicians find these diagnoses more practical, particularly when considering that some aspects of psychopharmacology apply to broad groups of disorders. The disadvantage of lumping is that it can result in a diagnosis that is too broad, suggesting non-specific or trans-diagnostic treatments that do not consider variations that occur with individual diagnoses. The advantages and disadvantages of each approach point towards the need for alternative classificatory models.

An alternative model is that presented by Foulds (1976) (283, 284). Foulds proposed what is commonly known as “Foulds’ Hierarchy” whereby psychiatric diagnoses can be viewed as existing on a hierarchical model, with failures of personal defences producing characterological disturbance at lower levels and more serious mental illness such as schizophrenia at the top of the hierarchy.

According to this model, schizophrenia, for example, can be comorbid with any disorder or phenomenon below it on the hierarchy, eg. depressed mood, anxiety, personality disturbance. However, diagnoses lower on the hierarchy cannot have comorbidity with diagnoses higher on the hierarchy. This model has the advantage of explaining how separate diagnoses can be explained by a single diagnosis within one person (280). However, it is problematic in that it favours a lumping model which goes against the notion of comorbidity. It could also be argued that Fould's hierarchy is limited in its ability to fulfil the functions of diagnosis described in Section 1.3(b).

Symptom-subtypes of OCD may be viewed as a further attempt to "split" psychiatric diagnoses, thereby contributing to the proliferation of diagnoses. However, the significant degree of symptom co-occurrence and shared phenomenological features preclude the formation of distinct diagnostic entities.

1.3 (e) DIMENSIONS AND CATEGORIES IN PSYCHIATRIC DIAGNOSIS

Dimensional models of mental illness provide some solutions almost in the same way as recognition of shades of grey in an argument between black and white, or in this case "lumping" and "splitting". Dimensional models argue that symptoms occur on dimensions from normal aberrations to severe and that symptom dimensions can co-exist and have similar aetiological factors (136, 285, 286). Dimensional approaches have been popular in conceptualising personality (e.g.

neuroticism, extraversion and psychoticism (287, 288)), child behaviour (i.e. internalising and externalising behaviours (289, 290)) and in explaining the heterogeneity of OCD (133). Symptom dimensions can then help clinicians to communicate the diagnosis, predict prognosis and treatment and improve research with less heterogeneity whilst acknowledging that symptoms can overlap significantly.

A dimensional approach to diagnosis has the advantage that it acknowledges that psychiatric disorders can co-exist whilst being able to quantify the significance of each disorder for the patient. In other words, a categorical diagnosis has only two values (1 for meeting criteria for a disorder and 0 for not meeting criteria for a disorder), whereas a dimensional approach represents a continuum from the minimum to the maximum value (a score of 3 or more for the disorder and 0 for no score on this disorder). A dimensional approach provides a more precise, numerical assessment which is possible owing to the reliable assessment scales that are available to assess psychopathology and the technology that we currently have available (e.g. computers) to score patients (279). Providing a score for a diagnosis can capture severity in the dimension measured and if an assessment scale has a cut-off score, e.g. a Y-BOCS score of less than 8 denotes a subclinical OCD, it can be used in a categorical way to decide whether an individual has the diagnosis or not. The disadvantage of this approach is that assessment scales are not widely used in clinical practice and would be more applicable to the research setting. It also introduces a level of complexity that is incongruent with current

paradigms in communication, training, treatment guidelines, recording and administrative systems (see Table 1.7).

Despite the advantages of dimensional models, clinicians have been trained in a medical paradigm, which is based on categorical models. Haslam (291) proposed that the boundaries of categories may be of a “natural kind” (which is rare in psychopathology), a “fuzzy kind” (which exists when there is a definable group, but when the characteristics of this group blend into other groups), or a “practical kind” (a debatable cut-off point, but serving a pragmatic purpose), or there is a “true dimension” (no justification for a cut-off point). Jaspers (292) suggests that different classificatory models might be required for different disorders. Although this further underscores the complexity of psychiatric diagnosis, it indirectly supports research using a dimensional approach.

1.3 (f) DIAGNOSTIC RELIABILITY

Diagnostic reliability refers to the level of diagnostic agreement among raters or clinicians (interrater reliability). It also refers to the longitudinal or temporal stability of a diagnosis (test-retest reliability). As a key function of a diagnosis is communication, it is important that the diagnosis is reliable. Prior to DSM-III (276), diagnostic reliability was poor among psychiatrists due to a lack of operationalised criteria. It remains less than optimal due to a lack of objective tests (293, 294). Patient factors that can reduce the reliability of a diagnosis are gender (295), race (296), age (297), socioeconomic status (298) and intellectual

disability (299). Attempts to increase the reliability of diagnosis have involved the introduction of clearer diagnostic criteria. It can be argued that improving the reliability of a diagnosis does not necessarily improve its validity. Clearer diagnostic criteria may lead to a disorder that is so "pure" that it does not represent the diagnosis as it exists within clinical samples (300). Structured diagnostic interviews based on these criteria are in common use in research and have improved the reliability of diagnosis. In such studies, the reliability of a diagnosis is assessed using the statistical technique called kappa. This is used in preference to levels of diagnostic agreement between raters as it corrects for chance levels of agreement between raters. This statistic becomes unstable when the base rate of a diagnosis within a sample is less than 5% (301).

1.3 (g) VALIDITY AND CLINICAL UTILITY

Validity and clinical utility are presented together as there has been some controversy regarding their definition. Kendell and Jablensky (302) wrote a very influential paper in 2003 which challenged the widely accepted Robins and Guze (264) criteria for the validity of psychiatric diagnosis.

Unlike diagnostic reliability which is clearly defined, measurable and which has been improved by clearer diagnostic criteria and structured assessments, psychiatric diagnostic validity remains somewhat more nebulous (294). In general terms, validity refers to whether a diagnosis is true or not. In the absence of distinct aetiologies for psychiatric diagnoses, validation has focussed on attempts

to prove scientifically generated hypotheses (303). There is no agreement as to the form this will take and so validity has generally been conceptualised via two approaches (260). One is the medical approach and the other arises from psychometric theory (260, 302). These are summarised in Table 1.8.

Robins and Guze (263) established five formal criteria for assessing diagnostic validity. These were: 1) clinical description (including symptom profiles, demographic characteristics and typical precipitants), 2) laboratory studies (including psychological tests, radiology and post mortem findings), 3) delimitation from other disorders (by means of exclusion criteria), 4) follow-up studies (including evidence of diagnostic stability) , and 5) family studies. Kendler (303, 304) expanded on the concept of validity by proposing: 1) antecedent validators (familial aggregation, premorbid personality and precipitating factors), 2) concurrent validators (including psychological tests), and 3) predictive validators (diagnostic consistency over time, rates of relapse and recovery, and response to treatment). Similar terms adopted from psychometric theory have also been described as validating criteria for diagnoses by Zubin (305). The additional criteria described are: 1) content validity (clinical description of criteria accurately describes the disorder), and 2) construct validity (the diagnosis correlates with expected external validators, such as family history or neurobiological markers). Andreasen (306) expands on Robins and Guze's (264) second criterion of laboratory studies to include validators arising from molecular genetics, molecular biology, neurochemistry, neuroanatomy, neurophysiology and cognitive neuroscience.

In an attempt to develop a consensus, the DSM-5 Obsessive-Compulsive Spectrum Study Group developed 11 validators in order to examine the similarities and differences between disorders (253). These are: symptom similarity, levels and types of comorbidity among disorders, course of illness, familiality, genetic risk factors, environmental risk factors, neural substrates, biomarkers, temperamental antecedents, cognitive and emotional processing abnormalities, and treatment response.

Kendell and Jablensky (302) are critical of the Robins and Guze criteria (264) for validity proposing that the criteria have implicitly assumed that psychiatric disorders are discrete entities. Kendell and Jablensky (302) proposed that one of two conditions needed to be met in order for a diagnostic category to be valid. The first condition was that the syndrome must be demonstrated to be an entity separated from neighbouring syndromes and normality by a zone of rarity (i.e. interforms or syndromes in-between would be very rare). The second condition was that if there were defining characteristics (e.g. a molecular or histological abnormality) for a syndrome, then these must be clearly different from the defining characteristics of other syndromes. Kendell and Jablensky (302) suggest that few psychiatric diagnoses are separated by a zone of rarity and hence the value of psychiatric diagnosis lies in its clinical utility rather than its validity. This has been opposed by authors who view psychiatric diagnoses as both valid and clinically useful (307). The conditions proposed by Kendell and Jablensky (302), for a diagnosis to be valid, are viewed as rigid and less relevant to psychiatric

diagnoses where there are high rates of comorbidity (lack of zones of rarity) and few defining characteristics currently available (307).

Clinical utility is defined by First et al (308) as the extent to which our diagnoses assist clinicians to (a) conceptualise disorders, (b) communicate clinical information to practitioners, patients, and patient families, (c) use diagnostic concepts during intake interviews, (d) choose effective interventions based on empirical evidence, and (e) predict what resources will be needed in the future. These are similar to the purpose of a diagnosis (see Section 1.3 (b)).

Kendell and Jablensky (302) propose that a diagnosis has utility if it provides non-trivial information regarding prognosis, likely treatment outcomes, and/or testable propositions about biological or social correlates. However, what Kendell and Jablensky (302) regard as clinical utility, other authors such as Robins and Guze (264), Kendler (303), Andreasen (306) and Phillips (253) regard as validity. They regard validity as an invariate characteristic in that a disorder is either valid or not valid. In contrast, they view clinical utility as graded in the sense that a diagnosis can be clinically useful to varying degrees. They also view clinical utility as context specific (302). For instance, distinguishing schizophrenia from bipolar affective disorder may have more clinical utility in an acute admission unit than in a psychiatric rehabilitation centre.

Kendell and Jablensky (302) highlight the challenge of diagnostic overlap in their attempts to improve the definitions of validity and utility. However, most authors would see the clinical utility of a diagnosis as referring to its ability to fulfil the

functions of a diagnosis as outlined by First (308). The assertion that psychiatric diagnoses are not valid, solely by virtue of their inability to be distinguished from one another and from normality, threatens to discredit psychiatric diagnostic classificatory systems and the very disorders that we treat. A more constructive view would incorporate Kendell and Jablensky's definition of diagnostic validity with existing criteria for validity. In this case, both validity and utility would be regarded as graded concepts.

CONCLUSIONS

Psychiatric diagnosis is not well conceptualised by the medical model of illness and so alternative conceptual models have been developed. As we do not have clear biological aetiologies to explain psychiatric disorders and no biomarkers, we rely on descriptive approaches. Such approaches have their limitations and it is important that these are acknowledged and that systematic approaches to psychiatric diagnosis, such as those outlined by authors like Robins and Guze (264), are used to develop widely accepted classificatory systems such as the DSM and the ICD. High rates of comorbidity have been a significant challenge for psychiatric diagnosis. A "splitting" approach produces more narrowly defined diagnoses at the expense of increased comorbidity, while a "lumping" approach produces less well defined, broader diagnostic groups that attempt to include comorbid conditions. A move away from a categorical diagnostic approach to a

dimensional diagnostic approach acknowledges that distinctions between diagnoses may not always be clear-cut, but may not be practical or widely accepted in clinical practice. Three concepts are particularly important for psychiatric diagnoses: 1) reliability; 2) validity; and 3) clinical utility.

1.4 ESTABLISHING THE VALIDITY OF PSYCHIATRIC DIAGNOSES

We have seen that a diagnosis needs to be reliably made, clinically useful and valid. These factors are interdependent in that a valid diagnosis is likely to be reliably made and clinically useful (260). Alternatively, the validity of a diagnosis can be assessed when it can be reliably made and when it has clinical utility (302). This chapter attempts to present a framework for assessing psychiatric diagnoses for validity. This is based on the conceptualisations of validity presented by Zubin (305), Robins and Guze (264), Kendler (303), First et. al. (308) and Phillips et. al. (253) which were presented in Section 1.3 and are summarised in Table 1.8.

1.4 (a) DESCRIPTION

The work on the validation of diagnostic criteria for psychiatric disorders by Robins and Guze was an important landmark in the history of psychiatry (309). Their first criterion was clinical description. They believed that the important first step was to describe the clinical picture of the disorder (264). They did not believe that this included only symptoms, but also race, sex, age of onset and precipitating factors. Race, sex and age can also be regarded as demographic data associated with the diagnosis rather than descriptors of the clinical features of the disorder. Similarly, precipitating factors are more likely to reflect potential aetiological factors rather than clinical description. From a psychometric perspective, clinical description pertains to content validity (310).

With the increase in studies using complex statistical techniques to assess for symptom groups, it would be negligent to omit them from discussions pertaining to the validity of the description of a disorder. Factor analysis, in particular, has assisted us in determining which symptoms appear to group together. Factor analysis consists of a number of statistical techniques with the aim of simplifying complex sets of data (311). Complex matrices of correlations are attempted to be explained in terms of a few underlying factors. Factor analysis is more correctly referred to as principal components analysis and can be exploratory or confirmatory in nature. Exploratory techniques search for factors without an initial hypothesis, whereas confirmatory factor analysis seeks to confirm hypothesised factors within a sample. Factor analysis lends itself particularly well to explaining the complex and overlapping symptoms in psychiatric disorders, and there have been over 20 studies assessing OCD symptoms with principal components analysis (193). There has been one study using confirmatory factor analysis (137). Other statistical techniques include latent class analysis and taxometric analysis. These have been used less commonly due to the need for large samples (312-314).

Although there are varying definitions of phenomenology, most regard phenomenology as the science of symptoms, signs and patient's underlying thoughts and emotions (315). This usually includes descriptions of how symptoms are experienced by the patient, their associated emotional and mental states, their level of insight and the function that the symptom might fulfil. The phenomenology of OCD is particularly important as obsessions, compulsions,

avoidance and ego-dystonia are phenomena that distinguish OCD from other psychiatric disorders.

The severity of a disorder and its level of disability are also important descriptive variables. These can be readily and objectively measured using validated rating scales.

Comorbidity has also been included with the description of the diagnosis by authors such as Phillips et. al. (253). Various patterns of comorbidity may be associated with various diagnoses. Although patterns of comorbidity may link diagnoses (or "lump") as in obsessive-compulsive spectrum disorders (123), patterns of comorbidity may also be so unique as to add evidence toward the distinct nature of a diagnosis, and hence its validity.

1.4 (b) DISCRIMINATION

Discrimination is viewed as an important aspect of validity (310). It refers to the ability of a diagnosis to be able to discriminate or delimit itself from other diagnoses. Some argue that a diagnosis in its true categorical sense cannot be made if it cannot be adequately discriminated from other diagnoses (294, 302). Kendell and Jablensky (302) propose that a genuine boundary or "point of rarity" between two related syndromes should be demonstrated by a much lower number of patients with the two syndromes than with either syndrome alone (294). A "point of rarity" can be tested for using discriminant function analysis. Thus far, such discrimination has only been demonstrated with the diagnosis of

schizophrenia (316). However, even this finding has been called into question, as some studies do not discriminate well between schizophrenia and bipolar affective disorder (302).

Despite the difficulties in demonstrating a "point of rarity", discrimination remains a key concept in establishing diagnostic validity. This has led some authors to assess discrimination based on the number of features that diagnoses have in common being less than the features that they do not share (253, 264). Although discriminant function analysis is one approach used to discriminate one diagnosis from another, it may be more practical to assess for distinct features that are associated with a diagnosis. When assessing for diagnostic subtypes, the aim is unlikely to involve demonstrating that one subtype has less in common with another subtype than they have in common. The aim would involve demonstrating that the subtype under investigation discriminates itself from other subtypes by being associated with distinct features.

1.4 (c) PREDICTIVE VALIDITY

Predictive validity is particularly relevant for the clinical utility of a diagnosis (302). A clinician uses a diagnosis to assist them in planning their treatment, and in understanding the course of the illness (prognosis).

Response to treatment is a particularly clinically useful predictive validator of a diagnosis. It refers to the response of a patient with a certain diagnosis to pharmacological and psychological therapies and any other aspect of treatment.

Course refers to whether the diagnosis in question fluctuates, remains steady, remits or worsens thereafter. Temporal stability can also be viewed as part of the course of the disorder and refers to whether a patient diagnosed with a disorder will continue to have the same disorder over time (317). Should disorders remit over time (especially with treatment) this does not necessarily mean that they lack temporal stability. A lack of temporal stability tends to arise if a large proportion of patients with a diagnosis turn out to have another diagnosis over time.

1.4 (d) POTENTIAL AETIOLOGICAL FACTORS

Research into the aetiology of mental disorders has come from many different areas. This is likely to be explained by the presumed multifactorial nature of psychiatric aetiology. Advances in neuroimaging and genetic research have been of particular interest in recent years. Unfortunately, well conducted longitudinal studies of potential aetiological factors are lacking.

Cognitive and emotional processing has been of particular interest to cognitive psychologists who view psychiatric symptoms as arising from maladaptive cognitions. Different cognitions and emotions are thought to be associated with different disorders. There are also many complex neuropsychological tests that are used to assess patients and certain neuropsychological deficits have been associated with certain diagnoses.

Assessing for psychosocial risk factors associated with the development of certain psychiatric disorders is also relevant to aetiology. This can refer to the

temperament of patients prior to developing the disorder, typical precipitants and any environmental risk factors that may be associated with the development of a disorder. Research has been conducted into risk factors such as parenting styles, adverse early childhood experiences, grief and adverse events in pregnancy.

Family studies have been conducted to assess for the familiality of psychiatric diagnoses, or in other words, the proportion of first-degree relatives who also have the same disorder. Family studies have used large twin samples to assess for concordance rates. They have also looked for specific gene abnormalities using genetic linkage studies.

Neuroimaging techniques have used findings from functional magnetic resonance imaging (fMRI), but also from standard computerised tomography (CT) and positron emission tomography (PET) scanning. Studies thus far have focussed on the hypothalamic pituitary adrenal (HPA) axis, and blood or CSF inflammatory or neurotransmitter markers. Animal models have been developed to explain various psychiatric conditions and together with evolutionary perspectives give some support to differences between psychiatric disorders.

1.4 (e) DEMOGRAPHIC CORRELATES AND EPIDEMIOLOGICAL STUDIES

Demographic correlates and epidemiological studies have been presented separately. Although demographic correlates are descriptors of a diagnosis to some extent, they represent specific details about the disorder that may not be

obvious clinically and are usually derived from large studies. These involve comparisons of gender ratios, age, marital status, employment, number of children, and socioeconomic status between diagnoses.

Epidemiological studies of large community samples have determined unique prevalence rates for different conditions and are important in determining the cross-cultural stability of a diagnosis. A diagnosis that has an equal prevalence rate in different cultures and/or societies is more likely to be valid than a diagnosis with very different prevalence rates in different cultures and/or societies.

CONCLUSIONS:

This chapter provided a synthesis of the techniques currently used to establish validity. It sets a framework for the systematic evaluation of OCD symptom subtypes that will be reviewed in Section 1.5 and throughout this thesis. In summary, the assessment of the validity of a diagnosis is best conducted by reviewing evidence from the following areas of research: 1) statistical methods such as factor analysis, phenomenology, severity, disability, age of onset and comorbidity (description); 2) discrimination; 3) course of illness, temporal stability and response to treatment (predictive validity); 4) cognitive and emotional processing abnormalities, neuropsychological testing, temperamental antecedents, typical precipitants and environmental risk factors, family and twin studies, genetic studies, neuroimaging studies, biomarkers, animal models and

evolutionary concepts (potential aetiological factors); and 5) age, gender ratios, cross-cultural studies and epidemiological studies (demographic correlates and epidemiological studies). This is summarised in Table 1.9.

1.5 – CURRENT EVIDENCE REGARDING THE VALIDITY OF SYMPTOM-BASED SUBTYPES

According to the literature review regarding symptom-based subtypes of OCD presented in Section 1.2, evidence from studies using factor analysis support five OCD symptom dimensions. These are: 1) hoarding (hoarding/saving obsessions and hoarding compulsions); 2) contamination/cleaning (contamination obsessions and cleaning/washing compulsions); 3) symmetry/ordering (obsessions with the need for symmetry or exactness and ordering/arranging compulsions); 4) unacceptable/taboo thoughts (impulsive aggression, sexual and religious obsessions); and 5) doubt/checking (unintentional harm obsessions and checking compulsions). The following literature review will attempt to assess the evidence supporting the validity of each of these proposed OCD symptom subtypes.

1.5 (a) HOARDING

Hoarding is considered the subtype of OCD that is most distinct from other symptoms of OCD. The unique qualities of the hoarding symptom has led some authors to propose that a diagnosis of hoarding disorder should exist (318). Although hoarding has been studied more extensively than other proposed OCD symptom subtypes, there are several limitations to these studies. Thus, studies often involve a broad group of individuals who have hoarding and who may not meet criteria for OCD. For instance, patients in these samples may have hoarding

associated with dementia or schizophrenia. In studies of samples of patients with OCD, the hoarding symptom has been largely determined using the YBOCS-SC (19). The checklist assesses hoarding by means of two dichotomous items which have not been validated against observations made in patient's homes or collateral history (319). As hoarding often occurs in a minority of patients with OCD, some studies are limited by small sample size.

1. Description:

Statistical approaches: Multiple factor and cluster analytic studies have consistently identified hoarding as a distinct symptom (91, 113, 127, 133, 137). Taxometric studies show evidence of taxonicity, indicating that hoarding constituted a discrete categorical latent subclass, whereas other OCD symptom subtypes were found to be dimensional in nature (312). Unlike symptoms of checking and washing, hoarding has only moderate inter-correlations with other OCD symptoms (320).

Phenomenology: Hoarding is a well described symptom of OCD. The phenomenology of hoarding is thought to be somewhat different from the obsessions and compulsions seen in other symptoms of OCD. Thoughts related to hoarding are not experienced as intrusive, but as part of an individual's normal stream of thought (321-323). They are not repetitive (322), are seldom experienced as distressing or unpleasant and are often ego-syntonic (322, 323). Patients with hoarding can experience grief or anger just as commonly as anxiety when asked to discard items (324, 325). Most studies report that hoarding is

associated with less insight and less resistance against the compulsion to hoard (140, 159, 326, 327). These studies appropriately compared insight associated with symptoms within samples of patients with OCD. However, one study showed similar levels of insight (328) and another reported better insight among individuals who hoard (329). It should be noted that some of these studies did not use a scale to measure insight such as the Brown Assessment of Beliefs Scale (BABS) (155) or Overvalued Ideas Scale (OVIS) (156), but rather the single insight item of the Y-BOCS (19).

Severity: Hoarding tends to present with greater OCD severity (140, 327, 330-332) and more disability (140, 331).

Age of onset: Hoarding is thought to have an earlier age of onset than other OCD symptoms (332, 333).

Comorbidity: When compared to other OCD symptom dimensions, hoarding reveals some conflicting findings relating to comorbidity. Some studies show that hoarding is not significantly linked with other anxiety disorders or depression (26), whereas others show that hoarding is associated with social phobia, generalised anxiety disorder, trichotillomania, obsessive-compulsive personality disorder and dependent personality disorder (327, 332). Interestingly, another study found that men with hoarding were more likely to have comorbid generalized anxiety disorder and tics, whereas women with hoarding were more likely to have social phobia, posttraumatic stress disorder, body dysmorphic disorder, nail biting, skin picking, schizotypal and dependent personality

dimensions and low conscientiousness (334). In children with OCD, hoarding has been associated with higher rates of attention-deficit hyperactivity disorder (ADHD) (335). Studies have not assessed rates of medical comorbidity when comparing different OCD symptoms, however hoarding was associated with higher rates of obesity and chronic or severe medical comorbidity when compared to their non-hoarding relatives (336).

Hoarding has been associated with a greater frequency of obsessive-compulsive, dependent and avoidant personality disorders (45, 327). One must bear in mind that hoarding is also a criterion for obsessive-compulsive personality disorder and so the association may be inflated by this. When the hoarding criterion for obsessive-compulsive personality disorder was excluded hoarders did not have higher rates of obsessive-compulsive personality disorder than controls (337). Although there are high rates of schizotypal personality in people who hoard (338), we are unsure if the association is specific for hoarding symptoms or OCD in general. In studies of schizotypy in OCD samples, the hoarding symptom shows no distinct relationship (242, 339, 340).

2. Discrimination:

Hoarding appears to best distinguish itself from other proposed OCD symptom subtypes. Although it can occur with other OCD symptoms, it is less likely to do so. It has correlations with other OCD symptoms in the small to moderate range, comparable to correlations with non-OCD measures, such as anxiety and

depression (320, 325, 341, 342). Where significant associations have been made with other OCD symptoms, they have been with symmetry, ordering and counting (332). It is important to note that hoarding can occur with conditions other than OCD, such as dementia, obsessive-compulsive personality disorder, schizophrenia and depression. This has led some authors to view hoarding broadly as a symptom (343), whereas many authors currently see differences with regards to other symptoms of OCD as evidence that it is a distinct disorder (325, 341).

3. Predictive validity:

Course: The symptom of hoarding tends to be chronic (344) and persists over time, i.e. it has temporal stability (345-348). Unlike other OCD symptoms, hoarding is likely to worsen (349, 350). Hoarding is a risk factor for delayed treatment seeking (351). Insight tends to develop much later in the course of illness (350).

Response to treatment: Hoarding generally responds poorly to SSRIs (110, 130, 330) and standard exposure and response prevention (ERP) (116, 352). Therapy is best tailored to address poor insight and organisational skills and includes motivational interviewing, skills training (organising, decision making, problem solving), exposure to sorting, discarding and not acquiring objects/possessions and cognitive restructuring (353, 354). Patients with hoarding are also significantly more likely to have received antipsychotic augmentation (140).

4. Potential aetiological factors:

Cognitive and emotional processing abnormalities: Hoarding has been associated with perfectionism and an increased sense of responsibility (321, 322, 355). This is not different from other OCD symptoms, except that the increased sense of responsibility pertains to possessions rather than reducing risk of harm (322). Patients with hoarding are also thought to have excessive sentimental attachment to possessions (321, 356-358).

Neuropsychological studies: Hoarding has been associated with the following neuropsychological deficits: difficulty initiating and completing tasks (327), indecisiveness (359) (360) (361), impaired memory and memory confidence (362), slow reaction time and increased impulsivity (363). Patients with hoarding exhibit problems grouping their possessions into categories (359, 364). They are thought to treat objects as unique and to create more categories, resulting in the disorganisation and clutter so commonly seen in their homes. When patients with high scores on compulsive hoarding were compared to OCD patients with low scores on compulsive hoarding, they were found to have impaired decision making and reduced skin conductance on the Iowa Gambling Task (365).

Temperamental antecedents: There have not been any prospective studies attempting to investigate temperamental antecedents. Traits of miserliness, preoccupation with details, difficulty making decisions, odd behaviour or appearance and magical thinking have also been noted (327). Using the

Temperament and Character Inventory in a group of patients with OCD, hoarding was associated with less self-directedness and higher persistence (366).

Typical precipitants and environmental risk factors:

Some studies indicate that traumatic life events may be associated with the onset of hoarding (344, 357, 367, 368). Although there have not been any prospective studies, changes in relationships and interpersonal violence have been reported with symptom onset and symptom exacerbation (344, 369). Stressful life events are more likely in those with a late onset of hoarding than in those with an early onset of hoarding (350, 369). Stressful life events were also found to be more common in patients with OCD and hoarding compared to OCD with no hoarding (369), however no difference was reported in another study that only investigated childhood trauma (370). Around 50% of patients with hoarding identify a stressful life event preceding the onset of hoarding (368, 369). Material deprivation in childhood is intuitively thought to be related to hoarding and is supported by studies of materially deprived rats (371, 372), however several human studies do not support this (321, 368, 369). On assessing OCD symptom dimensions for associations with perceived parenting styles, hoarding was associated with low parental warmth (373). Female patients with hoarding were reported to have an onset associated with menarche more commonly than females with other OCD symptoms (374). However, the association of OCD symptoms in general with the female hormonal cycle remains poorly understood.

Family and twin studies: Of all the OCD symptoms hoarding has the highest familiality (64, 142, 147, 375). In studies with large sample sizes, familiality has been investigated using intraclass correlations between siblings for consistent factor analytically derived symptoms. Heritability of hoarding symptoms has also been shown in non-clinical samples (376). In the John Hopkins OCD study, hoarding symptoms were diagnosed in 12% of first-degree relatives of subjects with hoarding compared to 3% of the first-degree relatives of non-hoarding OCD subjects (332). Higher rates of hoarding in first-degree relatives are reported in other studies, however these studies asked the patient about their relatives rather than assessing the patient's relatives for hoarding. For instance, Pertusa et al (341) reported a rate of hoarding in first-degree relatives of subjects with hoarding of 40%. In a twin study of hoarding, 50% of variance was accounted for by genetic factors (correlations of 0.52 for monozygotic and 0.27 for dizygotic female twins) (67, 377).

Genetic studies: There are studies showing specific genetic linkage for hoarding. One study assessed sibling pairs with Tourette's disorder and found that hoarding was associated with markers on chromosomes 4q, 5q and 17q (378). In another study of subjects with OCD of Afrikaner descent, the LL genotype of the catecholamine-O-methyltransferase (COMT) Val158Met polymorphism on chromosome 22q11.21 was significantly more common in hoarders (379). In addition, the OCD Collaborative Genetics Study found that hoarding was linked to a marker on chromosome 14q (380) and Alonso et al (2008) reported a link to

chromosome 15q25.3 (381). Unfortunately, each of these studies has found links to different chromosomes.

Neuroimaging studies: Functional neuroimaging studies consistently suggest that compulsive hoarding involves brain areas distinct from brain areas implicated in other OCD symptoms (382). Patients with compulsive hoarding have a different pattern of cerebral glucose metabolism from that found in non-hoarding OCD patients. They show significantly lower activity in the cingulate cortex and do not have the characteristic hypermetabolism in the orbitofrontal cortex, caudate nuclei, and thalamus seen in non-hoarding OCD patients (73). Symptom provocation studies using functional magnetic resonance imaging (fMRI) found different areas associated with different OCD symptoms. Hoarding was associated with greater activation in the left precentral gyrus and right orbitofrontal cortex (75) and the bilateral anterior ventromedial prefrontal cortex (383). Although there are few neuroimaging studies, they implicate fronto-limbic circuits in hoarding (regardless of whether or not hoarding is associated with OCD) in contrast to the fronto-striatal loops that are associated with other OCD symptoms (384). Reports of hoarding starting after brain lesions are rare and may not reflect the aetiology of compulsive hoarding, but they have implicated the orbitofrontal, prefrontal and caudate areas (385, 386).

Biomarkers: Several biomarkers for OCD have been identified as follows: platelet serotonergic markers (387, 388); lymphocyte antigens (389); and markers of oxidative imbalance (390). However, no study has investigated potential biomarkers in individuals with different symptoms of OCD.

Studies on animal models: Animal studies have involved rodents and birds that display hoarding behaviour as part of their behavioural repertoire. Hoarding behaviour has been associated with food deprivation in rats (371, 372). Animal studies reveal that specific areas of the brain are associated with hoarding and that these areas of the brain are similar to those reported by fMRI studies of humans with hoarding (391). Studies of neurotransmitters have implicated both the serotonergic and dopaminergic systems. Hoarding behaviour in mice has been successfully treated with serotonergic agents (392). There are also studies of mice that have reduced normal hoarding behaviour by ablating the dopaminergic neuronal systems (393). In such studies, normal hoarding behaviour has been restored with the administration of L-dopa (394). Animal studies thus implicate different biological processes in hoarding behaviours.

Evolutionary concepts: Evolutionary perspectives can help explain similarities between human and animal behaviour. From an evolutionary perspective, hoarding can be thought of as enhancing the survival of the species and of being beneficial in times of drought or famine (395). In contrast, other symptoms of OCD have evolved to deal with different threats (134, 396).

5. Demographic correlates and epidemiological studies: Apart from gender studies, in which hoarding occurs with the same frequency in males and females (142, 397, 398), comparative studies of demographic correlates between different OCD symptoms are lacking and those that do exist are limited by small sample

size. Epidemiological studies are also small and inconsistent in their findings. An American epidemiological study showed a lifetime prevalence rate of hoarding in general of 4% and associated hoarding with being male, older in age and of low income (338). No differences were found between individuals with and without hoarding in terms of their level of education, living arrangements or race. A European epidemiological study reported a lifetime prevalence rate of hoarding in general of 2% with no obvious differences in gender or race between individuals with and without hoarding (399). Studies of OCD symptomatology in different cultures show similar groups of symptoms (400-407) and support the cross-cultural stability of the compulsive hoarding symptom (141, 399).

Conclusions: The hoarding symptom dimension of OCD has a reasonably good descriptive validity, but this could be better supported by improvements to existing scales used to capture the heterogeneity of OCD. Hoarding is seldom experienced as ego-dystonic, is rarely resisted and is often associated with impaired insight. Hoarding is characterised by high levels of severity and disability, and an early age of onset. Comorbidity studies would benefit from larger samples, as individuals with hoarding often form a small proportion of samples of OCD subjects. Hoarding has a good discriminant and predictive validity. It has in general lower rates of co-occurrence with other OCD symptoms and tends to have a chronic and deteriorating course with poor response to treatment. It also has good evidence from neuropsychological studies, family and twin studies and neuroimaging studies to suggest a distinct aetiology. There is a

need for more epidemiological studies. Evidence supporting hoarding as a valid symptom dimension of OCD is summarised in Table 1.10 and areas requiring further research are highlighted in Table 1.11.

1.5 (b) CONTAMINATION/CLEANING

Unlike hoarding, contamination obsessions and cleaning compulsions are regarded as the prototypical symptoms associated with the diagnosis of OCD. They consistently occur in around half the OCD patient samples reported in research. Together with checking symptoms, they are the most common symptoms and hence there are several papers comparing "checkers" and "washers" (44, 408-412). However, there are fewer studies than hoarding investigating it as a distinct symptom subtype.

1. Description:

Statistical approaches: Contamination/cleaning symptoms are well described and easily identified with several items on the Y-BOCS (413). Numerous factor and cluster analytic studies consistently identify this group of symptoms as a distinct factor among OCD symptomatology (91, 113, 119, 127, 133, 137, 414).

Phenomenology: A patient who is unable to touch things and has their hands covered by their sleeves or whose hands are excoriated from repetitive washing is easily identified as having contamination/cleaning symptoms of OCD. Patients seldom report an intrusive, distressing thought arising in their mind as in unacceptable/taboo thoughts, but rather a constant concern, preoccupation and vigilance, which are often associated with avoidance of what is deemed contaminated. The phenomenological differences between contamination/cleaning symptoms and other OCD symptoms are supported by evidence that contamination obsessions are associated with more avoidance behaviours than other symptom subtypes (408, 415). The function of washing compulsions is thought to be different from that of checking compulsions in that checking can serve to prevent a future catastrophe or to provide reassurance that such a catastrophe has not occurred, whereas washing has a purpose of restoring a state of safety, cleanliness or hygiene (416).

Contamination/cleaning symptoms are thought to be triggered by environmental stimuli more than is the case with checkers (408). This corresponds to the concept advanced by Rachman (1994) of mental pollution (417). Mental pollution is a sense of "internal dirtiness", which is precipitated by thoughts, words, memories or physical contact. According to Rachman (417), no matter how much the patient then cleans themselves, this sense of "internal dirtiness" or mental pollution does not go away.

Patients with contamination obsessions are also thought to have an irrational understanding of how contagion is transmitted compared to anxious controls

(418). When OCD patients with contamination obsessions were asked to rate the degree of contamination of each of 12 pencils that successively touched one another after the first pencil had been contaminated, they regarded each pencil as equally contaminated; in contrast, control group members rated the level of contamination for each pencil as lower than that of the first (418).

Of all the OCD symptom subtypes, insight tends to be the best for contamination/cleaning symptoms (140, 161).

Severity: There is no evidence that contamination/cleaning symptoms are associated with overall OCD severity (116, 419, 420) or level of disability (411). Patients with these symptoms were shown to have a differentially worse health-related quality of life in one study (421).

Age of onset: Studies of age of onset have not differentiated contamination/cleaning symptoms from other OCD symptoms (198, 411, 422).

Comorbidity: Although there have been studies assessing comorbidity in OCD in general (27, 243, 423) and a latent class analysis of comorbidity that aimed to subtype OCD according to comorbidity (27), systematic studies of comorbidity among the OCD symptom subtypes are lacking. Two systematic studies evaluating OCD symptom subtypes have been conducted by Hasler et al (26, 142). The first study indicated a positive association between contamination/cleaning symptoms and eating disorders and a negative association with tic disorder (26). The second study found only a mild association between cleaning/contamination symptoms and separation anxiety (142). Another study

looked at the physical health of subjects with OCD and it found that contamination/cleaning symptoms were associated with the worst physical health (421).

There may be increased rates of personality disorders in OCD patients with contamination/cleaning symptoms. A study comparing washers and checkers reported increased rates of personality disorders in washers (44). In this study, the most frequent personality disorder was obsessive-compulsive personality disorder. Although an increased rate of borderline personality disorder in subjects with contamination/cleaning symptoms is not supported by the studies so far, there have been several related case reports (424-426).

2. Discrimination:

Contamination/cleaning symptoms often co-occur with other OCD symptoms. Although contamination/cleaning symptoms are reported to be present in 40 to 50% of OCD research samples, they are the primary symptom in approximately 25% of OCD samples according to studies using the Y-BOCS (116, 130, 419). In particular, cleaning/contamination symptoms have a significant overlap with symptom factors representing aggressive obsessions and checking compulsions (113, 137).

3. Predictive validity:

Course: Temporal stability has been shown in a number of studies (345, 348, 427). In these studies, changes from one symptom dimension to another were rare. In a study by Mataix-Cols et al (427), the contamination/cleaning symptom dimension along with the aggressive/checking and the symmetry/ordering dimension had the greatest reduction in symptom severity in the first six months of follow-up. The reduction continued for the aggressive/checking and symmetry/ordering symptom dimensions over the two-year period of follow-up, but this was not the case for the contamination/cleaning symptom dimension. This may indicate that improvements in cleaning/contamination symptoms can occur with treatment, but are unlikely to be sustained. The presence of contamination/cleaning symptoms does not appear to increase the risk of suicide (428, 429).

Response to treatment:

Contamination/cleaning symptoms appear to respond well to psychological treatments and in particular, exposure and response prevention (ERP) (108, 110, 116, 430). Pharmacological modalities of treatment have been shown to be equally effective as for other OCD symptoms in some studies (117, 130, 431), but have demonstrated poorer outcome in others (145, 375, 432). Danger ideation reduction therapy (DIRT) is an alternative psychological therapy shown to be effective for washing symptoms (433-435). Contamination/cleaning symptoms may have a better response to deep brain stimulation (91).

4. Potential aetiological factors:

Cognitive and emotional processing: Contamination/cleaning symptoms have traditionally been associated with the cognitive construct of overestimation of threat (433, 436). Recent formal testing for associations of proposed OCD cognitions as developed by the OCD Cognitions Working Group (436) with OCD symptoms supported this (437). This study used factor analytic techniques, as opposed to other studies that failed to show an association between different OCD symptoms and these cognitions (355, 438). Unlike other OCD symptoms, contamination/cleaning symptoms may be mediated by the emotion of disgust rather than fear (439-443). This is particularly significant considering that disgust is thought to involve biological pathways different from those implicated in fear (439, 440), and that current cognitive models of OCD are based on fear. One limitation to these findings is that the relationship between disgust and other OCD symptoms is not yet clear with a recent study showing that hoarding was also highly correlated with the emotion of disgust (443).

Neuropsychological studies: Neuropsychological studies tend to have small sample sizes and this reduces our ability to detect significant differences between symptom subtypes (360, 444). No differences between patients with contamination/cleaning symptoms and other OCD symptoms have been observed.

Temperamental antecedents: Prospective studies are again lacking and comparisons using factor analysis of temperament between different subtypes do

not reveal any important differences between contamination/cleaning symptoms and other symptoms of OCD (45, 46, 366, 445).

Typical precipitants and environmental risk factors: Washers were found to perceive their parents as obsessional and overprotective leading to a sense of fear and dependence (408, 416). Family members often change their daily activities to fit in with patients' symptoms and this has led some to hypothesise that certain family dynamics may play a role in the aetiology of this symptom (446-448). Women who have an onset of OCD during pregnancy have been reported to have contamination obsessions in 80% of cases (374, 449). Contamination obsessions were most common in women who developed OCD in the perinatal period (374). In addition, contamination symptoms along with other OCD symptoms were not thought to worsen pre-menstrually (450).

Family and twin studies: In well-conducted family studies using factor-analytically derived symptom subtypes, contamination/cleaning symptoms showed familiality (142, 147) as did other symptom subtypes (in particular, hoarding). In one study, the severity of the contamination/cleaning symptom appeared to be familial (148). Twin studies support the genetic basis of the contamination/cleaning symptom dimension by demonstrating that genetic factors account for approximately 50% of the variance for contamination/cleaning symptoms and other OCD symptoms (68).

Genetic studies: In a non-clinical sample, disgust related to contamination/cleaning symptoms was associated with DRD4 and COMT

polymorphisms (451). No other associations with specific genes have been reported.

Neuroimaging studies: The contamination/cleaning symptom is associated with greater activation of the bilateral prefrontal regions and right caudate (75, 452). These results arise from fMRI studies that indicate that different pathways are involved when subjects with contamination/cleaning symptoms are provoked with images that evoke contamination fears in comparison to subjects with different OCD symptoms. Several studies also link neuroimaging findings associated with contamination/cleaning symptoms with the emotion of disgust (452, 453). These findings arise from small samples of OCD patients with contamination/cleaning symptoms. In a study using whole-brain voxel-based morphometry to assess for differences between different OCD symptoms, contamination/cleaning symptoms were associated with reduced grey matter volume in the bilateral caudate nuclei and reduced white matter volume in the right parietal region (60). A functional neuroimaging study has also been conducted in children with contamination/cleaning symptoms. This study showed reduced neural activity in the right dorsolateral prefrontal cortex in children with contamination/cleaning symptoms when compared to children with symmetry/ordering symptoms. (454).

Biomarkers: There have not been any studies investigating biomarkers for contamination/cleaning symptoms.

Studies on animal models: Contamination/cleaning symptoms are modelled in animals by excessive grooming (455, 456). Such studies have involved the use of

genetically modified animals to model contamination/cleaning symptoms and to aid in identifying distinct neural pathways and pharmacological treatments.

Evolutionary concepts: Instances in history where water supplies have become contaminated or diseases have spread through communities due to poor hygiene, have given people who give importance to thoughts of contamination and cleaning an evolutionary advantage (396, 457). An evolutionary perspective proposes that contamination/cleaning symptoms associated with OCD have arisen in an attempt to increase survival rates in the context of contamination or infectious disease (285).

5. Demographic correlates and epidemiological studies: Several studies show no demographic differences between contamination/cleaning symptoms and other symptoms (116, 409, 411, 420). Other studies indicate that patients with contamination/cleaning symptoms are more likely to be female (145, 397-399). Studies often omit important demographic variables such as employment status or level of education. One epidemiological study using a small sample showed that contamination/cleaning symptoms had a lifetime prevalence rate of approximately 1%, occurring more often in females and equally in all socioeconomic groups (399). Contamination/cleaning symptoms are regarded as the most common OCD symptoms and they occur as a primary symptom in around 40% of adults with OCD (152). In factor analyses of OCD symptoms in samples from different

cultural groups, contamination/cleaning symptoms show cross-cultural stability in a similar manner to other OCD symptom dimensions (141, 399-407).

Conclusions: The contamination/cleaning subtype of OCD has good descriptive and predictive validity, however its discriminant validity is limited by the high rate of co-occurrence of contamination/cleaning symptoms with other OCD symptoms. The contamination/cleaning symptom factor has been consistently identified by studies using factor analysis. Significant phenomenological differences also exist between contamination/cleaning symptoms and other OCD symptoms. These include obsessions being characterised by constant concern, preoccupation or vigilance, rather than intrusiveness and distress, greater levels of associated avoidance, "mental pollution" and good insight. Comorbidity with personality disorders may be greater than with other OCD symptoms. Treatment response tends to be good with ERP. The cognitive construct associated with contamination/cleaning symptoms is overestimation of threat. Contamination/cleaning symptoms commonly arise in the perinatal period, in the context of parents who are overprotective and family members who tend to accommodate to contamination/cleaning symptoms. Recent work on the emotion of disgust coupled with neuroimaging findings have also held promise in differentiating contamination/cleaning from other symptom subtypes. (See also Table 1.10 and 1.11.)

1.5 (c) SYMMETRY/ORDERING

Symmetry/ordering symptoms have sparked a lot of research interest due to their associations with tics, male predominance, and early age of onset. Symptoms may be difficult to differentiate from neatness and perfectionism associated with the highly comorbid diagnosis of obsessive-compulsive personality disorder.

1. Description:

Statistical approaches: Symmetry and ordering symptoms have featured consistently as a distinct symptom dimension in studies using factor analysis and cluster analysis of the YBOCS-SC in clinical samples of OCD (113, 127, 132, 143, 148, 149, 414). This has also been confirmed in meta-analyses of these (119, 133). As with hoarding, some would argue that the checklist is an inadequate screen for symmetry/ordering symptoms as they are assessed by only 3 of the 64 items. Factor analyses of self-report measures also report symmetry/ordering symptoms as a symptom dimension in OCD (458). Symmetry/ordering symptoms tend to co-occur with counting and repeating in studies using factor analysis to assess the structure of OCD symptom scales (113, 132, 137, 143, 285).

Phenomenology: In contrast to other OCD symptoms except for hoarding, symmetry/ordering symptoms tend to be less associated with anxiety. Ordering and arranging appear aimed at reducing dissatisfaction, discomfort, or insufficiency associated with the feeling that things are “not just right” or that they are incomplete (41, 459). However, studies of non-clinical samples relate

“not just right” feelings to most OCD symptoms (particularly checking) rather than to symmetry/ordering alone (460, 461). The occurrence of tension preceding, and relief following, the performance of a compulsion has been noted to be more similar to the sensory experiences and premonitory sensory urges of individuals with tic disorders than to the anxiety experienced by patients with harm-portending symptoms (41). Patients are also noted to experience their symptoms as more ego-syntonic. Therefore, there is a difference in the usual motivation for performing ordering and arranging compulsions compared to other symptom subtypes. Also, hoarding and symmetry/ordering are the two symptom dimensions associated with the least insight (157, 330).

Severity: There are some reports that symmetry/ordering symptoms are associated with higher Y-BOCS scores (140, 420) and lower functioning (140). Although these results are statistically significant, the strength of the corresponding relationships appears to be modest.

Age of onset: Symmetry/ordering symptoms have been associated with an earlier age of onset in several studies using different methodology (26, 140, 200, 375). However, associations with an earlier age of onset have also been reported for hoarding and religious/aggressive obsessions (140, 200).

Comorbidity: Symmetry/ordering symptoms have been associated with tics, obsessive-compulsive personality disorder, bulimia nervosa, ADHD, panic disorder, agoraphobia, alcohol abuse/dependence, substance abuse/dependence and bipolar affective disorder (I and II) (26, 142, 462). This comorbidity is broad

and not unique to OCD with symmetry/ordering symptoms. The comorbidity reported resulted from the use of factor analytic techniques on large samples of patients from a variety of centres. Hasler et al (26, 142) appear to have repeated their assessment of comorbidity in an extension of their original large collaborative study. However, results were inconsistent and the association with bipolar affective disorder was not replicated. Comorbidity with ADHD and bulimia nervosa was replicated (142). Independent smaller studies have also supported the association with bulimia nervosa (462) and a weak association with bipolar affective disorder (241). Symmetry/ordering and hoarding are the symptoms most likely to be associated with obsessive-compulsive personality disorder (29). In one study of patients with Parkinson's disease, symmetry/arranging symptoms were associated with left sided motor symptoms (463). Symmetry/ordering symptoms have also been associated with tic disorder (113, 132). However, the association between symmetry/ordering symptoms and tic disorder is not unique. Tic disorder comorbidity has also been reported for aggressive, sexual and religious obsessions (142, 464) and the need to touch, tap and rub things (172).

2. Discrimination: In Baer's (113) study of symptom subtypes, ordering and arranging symptoms were significantly correlated with hoarding, repeating and counting, but not with other symptom subtypes (113). These same symptoms were also grouped together once factor analysed (113). The association with counting and repeating has been replicated (130, 132, 133, 137, 149). Hoarding has

emerged as a distinct factor in most factor analytic studies, but it is important to note that some analyses at the item level of the Y-BOCS have placed symmetry obsessions in the hoarding factor (148). Symmetry/ordering symptoms appear to have a significant overlap with other symptoms and this is indicated by a study reporting that symmetry symptoms were present in 36% of OCD patients, and yet were regarded as the primary symptom in only 9% of OCD patients (130). It is also important to note that orderliness and neatness can be a feature of obsessive-compulsive personality disorder and that such symptoms lie on a continuum with normal behaviour (465). The factors determining where someone lies on this continuum are likely to involve severity and level of distress or impairment (465).

3. Predictive validity:

Course: Symmetry/ordering tends to be temporally stable (345, 346, 348). Some studies indicate that there may be higher rates of symmetry/ordering symptoms in childhood (201) and that these rates fall as children mature (466). For many parents, ordering and arranging is the first sign indicating that their child may have a problem. On the other hand, ordering and arranging symptoms do not feature so prominently in adulthood (465). In interpreting such data, one must also consider that patients with symmetry/ordering symptoms are the least likely to seek professional consultation, with only 9.5% consulting a professional compared to 76.2% with violent/unpleasant obsessions and 30.2% with contamination/cleaning symptoms (467). Symmetry/ordering symptoms were

associated with a higher suicide risk in one study that assessed symptom dimensions derived by factor analytic techniques (428). A higher suicide risk in association with symmetry/ordering symptoms was not found in another study (429). Few other studies have assessed the course of symmetry/ordering symptoms, and there is a need for studies that would systematically assess rates of OCD symptoms throughout the lifespan.

Response to treatment: No specific treatments have been developed for symmetry/ordering symptoms (465), and research in this area is generally sparse. The presence of symmetry/ordering symptoms is not thought to be associated with a differential response to pharmacotherapy or exposure and response prevention (110, 116, 140, 430-432). However, there was one study that reported a poorer response to behaviour therapy (468) and another that reported a poorer response to citalopram (145). There was also a single report of the efficacy of phenelzine (a monoamine oxidase inhibitor) for symmetry/ordering symptoms (469). In a small prospective study, the presence of symmetry/ordering symptoms and hoarding was found to predict a better response to the neurosurgical procedure of cingulotomy (12). Summerfeldt (2004) proposed that affective/sensory experiences might be more dominant than cognitive appraisals and so behavioural techniques targeting these might be more effective (470).

4. Potential aetiological factors:

Cognitive and emotional processing: Symmetry and ordering have been associated with perfectionism (355, 471) and intolerance of uncertainty on the Obsessive-Beliefs Questionnaire (OBQ) (438). This is different from other OCD symptoms as symmetry/ordering symptoms did not predict beliefs related to overestimation of threat and importance of control of intrusive thoughts (472). Despite the Y-BOCS item on symmetry or exactness obsessions being accompanied by magical thinking, there are no studies linking magical thinking to symmetry or exactness obsessions (473). Rather, magical thinking has been associated with "obsessions" (unacceptable/taboo thoughts) and checking compulsions (473-475). A limitation of these studies is that they used non-clinical samples and self-report instruments that did not assess the symmetry/ordering symptoms well.

Neuropsychological studies: Symmetry/ordering symptoms have been significantly associated with reduced set shifting in one study (360). Another study associated symmetry/ordering symptoms with poorer performance on tests of logical memory and trail making tests (476). Research has been limited by small numbers of patients with symmetry/ordering symptoms in OCD samples and so more studies are needed.

Temperamental antecedents: There are few studies in this area and this is likely to be related to the small numbers of patients with symmetry/ordering symptoms in OCD samples. One study reported an overall negative correlation with

extraversion and positive correlation with neuroticism, however hoarding and unacceptable/taboo thoughts showed similar results (375).

Typical precipitants and environmental risk factors: There is one case report describing a temporal relationship between streptococcal infection and exacerbation of symmetry/ordering symptoms in an adult with comorbid tics (477). Group beta-haemolytic streptococcal infection is thought to precipitate and/or worsen childhood OCD and particularly when there are comorbid tics (87, 478, 479). However, this remains controversial and whether symmetry/ordering symptoms in particular can be precipitated by such an infection is not known. In a prospective study, symmetry/ordering symptoms and unacceptable/taboo thoughts were predicted by perinatal insults (480). Symmetry/ordering symptoms were found to occur more commonly than other OCD symptoms in patients who developed OCD after a traumatic event (481). There is no other indication that symmetry/ordering symptoms arise in the context of trauma.

Family and twin studies: In well conducted family studies using factor-analytically derived symptom subtypes, symmetry/ordering symptoms showed familiality (65, 142, 482). Familiality for symmetry/ordering symptoms has also been shown in non-clinical samples (376). In one study, the severity of the symmetry/ordering symptoms appeared to be familial (148). Twin studies support the genetic basis of the symmetry/ordering symptom dimension by demonstrating that genetic factors account for approximately 50% of the variance for symmetry/ordering symptoms and other OCD symptoms (68, 483).

Genetic studies: No specific genes have been linked to symmetry/ordering symptoms.

Neuroimaging studies: There is evidence that symmetry/ordering symptoms are mediated by unique neural processes. Clear differences in grey and white matter changes were seen in the right motor cortex, left insula, left parietal cortex and bilateral temporal areas when symmetry/ordering symptom were compared to contamination/cleaning and aggressive/checking symptoms (60). In a PET study, symmetry/ordering symptoms were negatively correlated with regional cerebral blood flow in the right striatum (74).

Biomarkers: Streptococcal antibody titres (antistreptolysin-O) and B lymphocyte antigen D8/17 have been found to be higher in OCD patients with an early age of onset (389, 484), but whether these patients had higher rates of symmetry/ordering symptoms is not known.

Studies on animal models: Animal models for symmetry/ordering have not been described in the literature.

Evolutionary concepts: Evolutionary explanations for symmetry/ordering symptoms do not differentiate very clearly from those for checking. Theory has it that heightened attention to the placement of specific objects in the environment has a role in improving one's sense of security (285, 457). The symptoms could also be viewed as a way of ensuring that "everything is in its place" in case it needs to be taken quickly in an emergency.

5. Demographic correlates and epidemiological studies: Although symmetry/ordering symptoms are commonly associated with male sex, early age of onset and comorbid tics, there is no male predominance when age of onset and tics have been controlled for (398). Rates of marriage have been reported as higher than in hoarding, lower than in contamination/cleaning, but similar to aggressive/checking symptom dimensions (333). Data support the cross-cultural occurrence of symmetry/ordering symptoms (401). Although symmetry/arranging symptoms tend to occur in around 10% of adults with OCD (152), epidemiological studies of children and adolescents reveal that arranging compulsions are among the more common compulsions (51, 485).

Conclusions: Symmetry/ordering symptoms are well recognised, with a significant level of evidence to support their validity as a subtype of OCD. There does appear to be a significant overlap, however, with obsessive-compulsive personality disorder, checking and hoarding. Despite individuals with symmetry/ordering symptoms having been in general underrepresented in research, there is evidence supporting the external validity of this symptom dimension, namely via neuroimaging, family studies, cognitive correlates and age of onset. The association between symmetry/ordering symptoms and "just right feelings", perfectionism/intolerance of uncertainty and tic disorder is relatively specific. The higher rate of symmetry/ordering symptoms in childhood compared to adulthood also appears unique to symmetry/ordering symptoms. (See also Table 1.10 and 1.11.)

1.5 (d) OBSESSIONS INVOLVING UNACCEPTABLE/TABOO THOUGHTS

The presence of obsessions without overt compulsions has been recognised since the first factor analysis of OCD symptoms by Baer (113). In this study, aggressive, sexual and religious obsessions formed one of three factors explaining OCD symptoms. Because of the absence of overt compulsions, such obsessions have often been termed "pure obsessions". Some argue that "pure obsessions" refer to the presence of obsessions with neither overt or mental (covert) compulsions (486). However, mental rituals involving counting or praying often accompany impulsive aggression, sexual and religious obsessions (150). More recently, studies evaluating these OCD symptoms have referred to the collection of impulsive aggression, sexual and religious obsessions as unacceptable/taboo thoughts (27, 148-150). This more appropriately characterises their ego-dystonic nature. This group appears to have some predictive validity in that behavioural therapy is often difficult for patients with unacceptable/taboo thoughts (487).

1. Description:

Statistical approaches: As mentioned previously, factor analytic studies have lent increasing support to an unacceptable/taboo thoughts symptom dimension. This has particularly been the case when factor analytic techniques have used the individual *items* of the YBOC-SC rather than the pre-specified *categories* of symptoms provided by the YBOCS-SC (see Table 1.4). When the Y-BOCS *items*

have been factor analysed in larger samples, almost all have found a distinct sexual/religious factor (129, 131, 143, 145, 146, 148, 149), with some also including aggressive obsessions (143, 148, 149). These studies have also reported an additional distinct aggressive/checking factor. In order to clarify the heterogeneity within the aggressive obsessions category of the YBOCS-SC, Pinto (147, 149, 488) has introduced the terms impulsive aggression obsessions and unintentional harm obsessions (see Section 1.2(a) and Figure 6). Analyses that have used this distinction have provided further evidence for an unacceptable/taboo thoughts symptom dimension (488). A recent analysis using the mental rituals item of the miscellaneous compulsions category of the YBOCS-SC has provided further support to the validity of this symptom dimension by confirming an association between unacceptable/taboo thoughts and mental rituals (150).

Phenomenology: There are several key distinguishing features between unacceptable/taboo thoughts and other OCD symptoms. These include the greater degree of ego-dystonicity associated with these obsessions, presence of relatively good insight and absence of overt compulsions. Unacceptable/taboo thoughts are typically distressing and ego-dystonic. As their name suggests, they are regarded as unacceptable or taboo (forbidden). In contrast, patients with hoarding/saving obsessions or symmetry/ordering obsessions tend not to be as distressed by their obsessions. One study suggests that unacceptable/taboo thoughts can be distinguished from other OCD symptom dimensions by their repugnant quality (489).

Unacceptable/taboo thoughts tend not to be characterised by poor insight (140), with patients suffering from these obsessions being most likely to seek professional help (467).

Overt compulsions do not typically accompany unacceptable/taboo thoughts. Mental rituals which are covert compulsive cognitive activities, aim to neutralise unacceptable/taboo thoughts more commonly than other OCD symptoms (486). Examples include thought/image substitution or replacement, distraction, rationalisation and self-reassurance (151). It has also been noted that unacceptable/taboo thoughts can be associated with more prominent avoidance (93), but this is also seen in response to contamination obsessions.

Severity: There are no reports suggesting differences in overall OCD severity or functioning between unacceptable/taboo thoughts and other symptom dimensions.

Age of onset: Sexual and religious obsessions have been noted to have an early age of onset (200, 490).

Comorbidity: Patterns of comorbidity with unacceptable/taboo thoughts are unclear. Early descriptions saw "pure obsessions" as more closely related to depression than anxiety (487). In factor analytic studies there were higher rates of major depressive disorder, however the association was with a symptom factor accounting for aggressive, religious, sexual and somatic obsessions with checking (26, 142). In one study comparing patients with and without sexual obsessions, there were no differences in rates of comorbidity with depression (490). Tics have

also been associated with unacceptable/taboo thoughts (142, 464) with this tending to occur in the presence of symmetry/ordering symptoms or checking.

2. Discrimination:

The co-occurrence of unacceptable/taboo thoughts with other OCD symptoms is evident from the results of factor analytic studies. However, there has been one taxometric analysis that lent support to a distinct unacceptable/taboo thoughts subtype (313). This study showed that unacceptable/taboo thoughts together with the cognitive construct of the importance of control of thoughts favoured a taxonic model. This was in contrast to contamination/cleaning symptoms and checking compulsions which favoured a dimensional model.

3. Predictive validity:

Course: Studies have confirmed the temporal stability of sexual and religious obsessions (345, 346), and this is supported by a child study which showed that sexual, religious and aggressive obsessions remained stable over an average of 4 years of follow-up (491). However, sexual and religious obsessions were found to be least temporally stable in one adult study, in which it was hypothesised that comorbidity with mood disorder and the effects of an improved mood accounted for this (348). Unacceptable/taboo thoughts were found to be strongly related to the odds of a precipitous onset of symptoms, unlike other OCD symptoms and

hoarding in particular, which were inversely correlated with a precipitous onset (375). Aggressive obsessions have been associated with higher rates of suicidal ideation (429). In this study, rates of suicidal ideation were also elevated in individuals with religious obsessions, but not in those with checking compulsions and sexual and somatic obsessions.

Response to treatment: Medication treatment response has been mixed, with some studies reporting a better response (some of these studies have also included checking) (145, 375, 468, 492), some a poorer response (130, 146) and some no difference (117, 431, 432). In this sense, unacceptable/taboo thoughts are difficult to distinguish from other symptom subtypes. Unacceptable/taboo thoughts do have a differential response to exposure and response prevention however, and several other approaches have been proposed to assist with these symptoms. Although some studies do not report a different response to ERP (116), most report that unacceptable/taboo thoughts are associated with a poorer response to behavioural interventions (110, 117, 430). This is consistent with clinical practice, in which behavioural strategies are difficult in the absence of overt compulsions and therapy has had to be adapted to the unique characteristics of unacceptable/taboo thoughts (such as their ego-dystonic and often repugnant nature and associated avoidance and mental rituals). Special treatments have been put forward and include thought stopping (493), audiotaped habituation training (494), loop tape exposure (94) and tailored cognitive restructuring (95).

4. Potential aetiological factors:

Cognitive and emotional processing: Patients with unacceptable/taboo thoughts are more likely to believe in the importance of controlling their thoughts. Studies using the OBQ report that aggressive/sexual/religious obsessions and checking were the only symptom subtypes associated with importance of control of thought (355, 437, 438, 495). Unacceptable/taboo thoughts have also been more closely associated with thought-action fusion compared to other OCD symptoms (496). This would be expected considering the high level of distress associated with these obsessions. Thought-action fusion has also been associated with the importance of controlling one's thoughts (496).

Neuropsychological studies: Unacceptable/taboo thoughts were associated with impaired spatial recognition in one study (444). No major differences on neuropsychological testing were reported between unacceptable/taboo thoughts and other OCD symptom dimensions (360, 497), but these findings need replication.

Temperamental antecedents: Unacceptable/taboo thoughts have been associated with harm avoidance (498), neuroticism (375) and schizotypy (242). They correlated negatively with extraversion and agreeableness (375). Similar correlations have also been found for hoarding and symmetry/ordering symptoms. As prospective studies are absent, one cannot conclude that these are temperamental antecedents.

Typical precipitants and environmental risk factors: Although more studies are needed, aggressive obsessions tend to be the prominent OCD symptom when OCD arises in the context of a traumatic event (481). This also appears to be the case when OCD occurs postpartum (374, 449). In a prospective study, unacceptable/taboo thoughts and symmetry/ordering symptoms were predicted by perinatal insults (480). When compared to other OCD symptoms, the parenting style of patients with prominent unacceptable/taboo thoughts and checking was associated with an authoritarian style characterised by strict rules and low levels of nurturing (499).

Family and twin studies: In well-conducted family studies using factor-analytically derived symptom subtypes, religious, sexual and aggressive obsessions (or taboo thoughts) showed familiality (65, 142, 147). Although this was not to the extent of hoarding, the correlations were stronger than with the other symptom subtypes (142). Unacceptable/taboo thoughts were not investigated by twin studies (66).

Genetic studies: Religious and somatic obsessions have been associated with the L genotype of the serotonin transporter polymorphism in one study (144).

Neuroimaging studies: Neuroimaging studies have not detected distinct neural correlates of unacceptable/taboo thoughts. This may be due to the relatively small numbers of subjects with such obsessions and a tendency to use four factors from previous factor analytic studies in which unacceptable/taboo thoughts were combined with checking (74).

Biomarkers: There are no studies investigating biomarkers for unacceptable/taboo thoughts.

Studies on animal models: It is impossible to conceptualise animal models of unacceptable/taboo thoughts as animals are unable to communicate mental processes.

Evolutionary concepts: Evolutionary conceptualisations of unacceptable/taboo thoughts alone have not been described. Obsessions relating to threat of embarrassment, performing taboo sexual acts or immoral acts may serve a protective function by preventing a person from not performing these actions. Aggressive, sexual and religious obsessions might serve an evolutionary function of improving social cohesion, order and harmony (285).

5. Demographic correlates and epidemiological studies: Aggressive and sexual obsessions are more likely to be experienced by males (140, 397, 398). There are no reported differences in marital status or educational level between individuals with aggressive/sexual/religious obsessions and those with other OCD symptoms (490). In the DSM-IV field trial involving 454 patients with OCD from health care services, 2% of the sample had prominent unacceptable/taboo thoughts (152). Small epidemiological studies of adolescents have shown a prevalence rate for unacceptable/taboo thoughts ranging from 0% (485) to 20% of those with OCD (51, 500).

Conclusions: Support for the validity of unacceptable/taboo thoughts arises from their clinical presentation which is characterised by the ego-dystonic and distressing obsessions, good insight and association with mental compulsions rather than overt compulsions. This is further supported by findings of the item-level factor analytic studies, reports of a poorer response to behavioural therapy, development of specific therapies for aggressive/sexual/religious obsessions, association with the cognitive construct of importance of control of thought and a higher incidence in males. Factors that have hampered research efforts and thus contributed to the insufficient level of evidence supporting the validity of unacceptable/taboo thoughts include co-occurrence with checking compulsions, uncertainty regarding a 4-factor versus a 5-factor model of OCD symptoms and their low prevalence within the OCD samples studied. (See also Table 1.10 and 1.11.)

1.5 (e) DOUBTING OBSESSIONS AND CHECKING COMPULSIONS

Together with cleaning or washing compulsions, checking compulsions are the most common and well-recognised OCD symptoms (152). They tend to be associated with a tendency to doubt and generally have a reasonable response to exposure and response prevention compared to other symptoms.

1. Description:

Statistical approaches: Factor analytic techniques using the Y-BOCS have lent partial support to the doubt/checking symptom dimension in a way similar to the unacceptable/taboo thought symptom dimension. Checking compulsions have been grouped with aggressive obsessions alone in some studies, whereas in others they have been grouped with religious and sexual obsessions as well. Four-factor models have generally formed a factor that includes checking compulsions with aggressive, religious and sexual obsessions (119, 132, 133, 137, 142). However, most five-factor solutions group checking compulsions with aggressive obsessions alone (130, 143, 145) or with pathological doubt or somatic obsessions (148, 149) and occasionally with contamination/cleaning (113, 131). Cluster analysis also groups checking compulsions with aggressive obsessions (116, 127, 128, 414). As discussed previously, subdividing aggressive obsessions into impulsive aggression obsessions and unintentional harm obsessions appears to best explain these discrepancies (see Figure 6) (488). According to this proposal, the doubting/checking symptom dimension is associated with unintentional harm obsessions.

Phenomenology: The compulsion to check usually follows an urge to do so because of the fear that something terrible will happen if one does not check. Checking fits into an anxiety reduction model in a similar way to washing and cleaning in that a patient's anxiety is relieved by the compulsion and if the compulsion is resisted anxiety reduces over a three hour period (501). Checking is also associated with pathological doubt, however this can also be a feature of

other OCD subtypes (502). Although most patients will view their checking as unreasonable or excessive, a small proportion lack insight and firmly believe that something bad will happen if they do not check (152). Levels of insight for checkers do not differ significantly from the corresponding levels for OCD in general (140, 161, 328). Checking compulsions have been associated with an increased need for reassurance-seeking (503, 504). Rachman (504) proposes that excessive reassurance-seeking is a variant of compulsive checking, and that both of these behaviours aim to reduce anxiety by attempting to reduce the likelihood of negative outcomes.

Severity: There are no reports suggesting differences in severity or functioning between individuals with doubt/checking symptoms and those with other OCD symptoms (140).

Age of onset: Doubt/checking symptoms have an earlier age of onset in comparison to contamination/cleaning symptoms (410).

Comorbidity: In factor analytic studies associating checking with aggressive, religious, sexual and somatic obsessions, there were higher rates of major depressive disorder, dysthymia, generalised anxiety disorder, social phobia, specific phobia and body dysmorphic disorder, compared to other OCD symptom dimensions (26, 505). Apart from the overlap with unacceptable/taboo thoughts, these associations were not seen in any other OCD symptom dimension. There were also associations with panic disorder, agoraphobia, alcohol abuse/dependence and substance abuse/dependence, but these were also seen with

symmetry/ordering symptoms. When comparing patients with checking compulsions to patients with washing compulsions, those with checking were less likely to have personality disorders (44).

2. Discrimination: Doubt/checking does not discriminate itself well from other symptoms. Checking compulsions were found to be present in 60% of patients in one study, and yet it was deemed the primary compulsion in only 32% (117). It is often intertwined with symptoms such as contamination/cleaning, where checking may have the purpose of ensuring that something has not become contaminated or has been cleaned well enough. Reassurance-seeking that occurs not only with other OCD symptoms, but also with disorders such as hypochondriasis, panic disorder and generalised anxiety disorder can also be viewed as a form of checking (504).

3. Predictive validity:

Course: Studies have confirmed the temporal stability of the doubt/checking symptom dimension (345, 346), however checking compulsions have been grouped with different symptoms and this is particularly so in studies of children (491).

Response to treatment: Of all the OCD symptom subtypes, patients with aggressive obsessions and checking compulsions in the absence of religious or

sexual obsessions are thought to respond best to pharmacotherapy (91, 492) and behavioural therapy (126). Assessing treatment response for the doubt/checking symptom dimension is difficult, as it can occur with so many other OCD symptoms (108) and most studies report that checking compulsions are associated with a pharmacological and behavioural treatment response similar to that for contamination/cleaning symptoms (110, 116, 117, 130, 430, 431). The pharmacological and behavioural treatment response rate is reported as 50-60% (506). As with other OCD symptoms, a common reason for a poor response to ERP is that it is too distressing (507). It is anticipated that future treatment for checking compulsions will include interventions targeting aspects of responsibility, changing beliefs about memory and improving memory confidence (508).

4. Potential aetiological factors:

Cognitive and emotional processing: Higher checking scores have been associated with the cognitive constructs of perfectionism (495) and overestimation of threat (509). Increased importance of control of thoughts was also associated with checking, but in conjunction with unacceptable/taboo thoughts (355, 509). Intolerance of uncertainty was first shown to be a prominent cognition in generalized anxiety disorder, but subsequent studies also show that subjects with checking compulsions score high in this cognitive domain (510-512). Repeated

checking has been shown to lead to less memory confidence, and this does not appear to be the case with other OCD symptoms (513).

Neuropsychological studies: Studies of patients who engage in checking compulsions have revealed that there is no memory deficit (514), but rather a problem of memory confidence (513, 515-517). These studies did not assess OCD patients with other symptoms.

Temperamental antecedents: Patients with checking compulsions have been found to be more conscientious and less extraverted, however their level of extroversion did not differ significantly from non-checking anxious controls (518) and there were no comparisons with patients with other OCD symptoms. There have been no prospective studies assessing this.

Typical precipitants and environmental risk factors: Checkers perceived their parents as more critical, meticulous and demanding, and this has been linked to fears that they will make a mistake (408, 416). When compared to patients with other OCD symptoms, the parenting of patients with prominent aggressive obsessions and checking compulsions was characterised by an authoritarian style with strict rules and low levels of nurturing (499). In a prospective study, poor childhood motor skills predicted doubt/checking symptoms (480).

Family and twin studies: Checking compulsions have been found to be familial (65, 142). Again, these associations have been made when checking compulsions were grouped with aggressive, sexual and religious obsessions. In a twin study

producing three symptom factors with one being checking, only the cleaning/contamination subtype appeared to be influenced by specific genes (66).

Genetic studies: There are no studies investigating the genetics of doubt/checking symptoms.

Neuroimaging studies: Checking has been associated with greater activation on fMRI of the putamen, globus pallidus, thalamus and dorsal cortical areas (75). MRI studies have reported differences in grey and white matter volumes in the bilateral temporal lobes in patients with aggressive/checking symptoms when compared to contamination/cleaning and symmetry/ordering symptoms (60, 519). In a PET study, checking symptoms were positively correlated with increased activation of the bilateral striatum, in contrast to other symptom subtypes (74).

Biomarkers: There are no reports of biomarkers for doubt/checking symptoms.

Studies on animal models: There are well-developed animal models for checking compulsions and these typically involve rats repeatedly checking objects and/or places in an open field. Repeated checking in rats can be produced by the administration of the dopamine agonist quinpirole (520-524). Checking compulsions have been shown to be delayed by the administration of clomipramine (521), reduced by surgical lesions to the nucleus accumbens core and shell (525, 526) and orbitofrontal cortex (526) and resisted with the administration of nicotine (522). One study induced checking compulsions in rats that had been hypophysectomised and compared rates of checking to those in control rats (524). Finding no differences in rates of checking, it was concluded

that checking compulsions were not hormonally dependent. The effect of pituitary hormones on other OCD symptoms using animal models does not appear to have been investigated.

Evolutionary concepts: Checking compulsions are thought to have given an evolutionary advantage in preventing harm (285).

5. Demographic correlates and epidemiological studies: Patients with doubt/checking symptoms are more likely to be male and single in comparison to washers (410). In an epidemiological study of high school students, most students with OCD experienced checking compulsions in conjunction with symmetry obsessions and cleaning compulsions (485). In transcultural studies, checking compulsions are reported to be among the most common OCD symptoms and more frequent in males (141, 399, 400, 405, 406).

Conclusions: Doubt/checking symptoms co-occur frequently with other OCD symptoms and this has limited research attempting to determine their validity. Despite doubt/checking symptoms being one of the most common symptoms of OCD, few studies have effectively investigated their characteristics to the extent of being able to report significant differences in the characteristics of doubt/checking symptoms from other OCD symptoms. Studies systematically comparing “checkers” with “washers” have found that checkers tend to be male with an earlier age of onset and that they have fewer comorbid personality

disorders (409-411). There have been some differences reported on neuroimaging and the cognitive constructs pertaining to perfectionism and overestimation of threat. Neuropsychological testing reveals problems with memory confidence, however there do not appear to be studies comparing these findings with neuropsychological testing results in other OCD symptoms. (See also Table 1.10 and 1.11.)

1.6 DIRECTIONS OF CURRENT RESEARCH

1.6 (a) THE STRENGTHS AND WEAKNESSES OF EXISTING RESEARCH

Symptom subtypes of OCD are a vibrant field of research. A multitude of studies have been and continue to be published pertaining to how best OCD should be subtyped. Findings regarding groups of OCD symptoms have been replicated with the consistent use of the YBOCS-SC, good interrater reliability rates and generally large sample sizes. Fewer studies have investigated the characteristics that distinguish one OCD symptom subtype from another. The studies that have reported associations between OCD symptoms and other important characteristics have provided strong evidence for the validity and clinical utility of symptom-based subtypes (140).

One of the major limitations of this line of research has been in the area of the discriminant validity of symptom-based subtypes. Unfortunately, all OCD symptoms appear to co-occur at high rates (albeit less so for the hoarding symptom). There have also been some inconsistencies in the way in which some studies have grouped symptoms, particularly for aggressive obsessions, sexual obsessions, religious obsessions and checking compulsions. There is also an additional problem in that studies of OCD symptom subtypes do not account for the less common obsessions and compulsions particularly well.

Thus, somatic and miscellaneous obsessions, repeating, counting and miscellaneous compulsions do not group consistently with the major symptom

subtypes reported in the literature. They also appear to be less common OCD symptoms. Somatic obsessions can resemble hypochondriacal symptoms and in some studies did not load significantly on any of the major symptom factors (130, 148). In other studies, somatic obsessions loaded with unacceptable/taboo thoughts (147, 150) or with doubt/checking symptoms (143, 149). Repeating compulsions most commonly load with symmetry/ordering symptoms (132, 143, 149, 150, 375), but have also loaded with counting (148), mental rituals (148, 150) and checking (147). Counting can also load with symmetry/ordering symptoms (149, 375, 527). It often does not load on any of the major OCD symptom groups (147, 150). Of the miscellaneous symptoms, the need to touch, tap or rub has loaded with symmetry/ordering symptoms (132) and mental rituals have loaded with unacceptable/taboo thoughts (150). However, miscellaneous symptoms are often excluded from the analyses due to their heterogeneity and small numbers.

There are also weaknesses inherent to the YBOCS-SC. Albeit it is our gold standard assessment tool, it assesses some obsessions and compulsions with only one item and cannot capture the history that may be given by a relative or the information that may be gained from a home visit. Although it is good that studies have consistently used the YBOCS-SC, use of alternative scales may improve our understanding of the complex co-occurrence patterns that OCD symptoms have with each other.

The characteristics of interest that have been studied have varied from study to study. This has left some gaps and the need for replication of some findings. For

instance, comorbidity studies have assessed different diagnoses and have used different diagnostic instruments, and this has resulted in inconsistent results. The methods used to detect the associations between OCD symptom subtypes and defining characteristics have also differed from study to study. Some studies have only presented findings for the symptom of interest, e.g. hoarders versus non-hoarders, whilst other studies have been more complex and have included most common symptoms. For instance, several key studies have used factor analysis in large samples to determine the distinguishing features.

1.6 (b) SUB-TYPING APPROACHES USED IN STUDIES OF OCD SYMPTOMS

Various approaches have been used in studies of OCD sub-typing. Each approach has its advantages and disadvantages. These four methods have been as follows: 1) focusing on the patient's dominant compulsive behaviour; 2) cluster analysis; 3) taxometric analysis; and 4) factor analysis.

The first approach subtypes patients in a categorical manner based on their predominant compulsion. Studies using this methodology include those that compared "washers" with "checkers" and "hoarders" with "non-hoarders". The advantages of this approach are that it does not require complex statistical analyses and clearly delineates one group from the other in a categorical way. The disadvantages are that it does not take into consideration a significant co-

occurrence of symptoms and the fact that it is not always easy to identify the most prominent compulsion. These studies also tend to focus on groups with commonly occurring symptoms, thus neglecting less common obsessions or compulsions. Validated assessment tools such as the YBOCS-SC, that correctly identify OCD symptoms, are not used in this approach.

Cluster analysis has been used to form symptom-based groups of individuals with OCD. In cluster analysis, individuals are assigned to groups created by maximizing between-group differences and minimizing within-group variability on a set of measures (528). It has the advantage in that it is a categorical approach that assigns patients unambiguously to unique groups (120). Unlike the first approach, cluster analysis can capture the complexity of OCD symptom presentation by forming clusters of symptoms that are not monosymptomatic. The advantage of having distinct clusters or groups lies in its clinical utility. At this point in time, clinicians tend to prefer making categorical diagnoses and this fits well with our current diagnostic classificatory system. A disadvantage of this approach is that it assumes that clear distinctions between one group and another can be made (529). In other words, it can yield categories whether or not underlying categories exist (530). Considering high rates of co-occurring symptoms in psychiatry and the continuum on which these symptoms lie between mental disorder and normal behaviour, such clear distinctions appear artificial.

Taxometric analysis has been used less commonly in OCD research, and there have been only two major studies assessing OCD in this way (312, 313). The goal of taxometric analysis is to differentiate between strong evidence of categorical

structure, strong evidence of dimensional structure and ambiguous evidence that suggests withholding judgment on the type of structure (530). This approach has the advantage of acknowledging that some diagnoses may be better explained by a categorical approach, whereas others might be better explained by a dimensional approach. It does this by using complex statistical tests that look for latent factors. Evidence for taxonicity is best for hoarding (312). Using taxometric analysis, other OCD symptoms have been found to have a dimensional nature (312, 313). A limitation of this statistical approach is that it can only establish a taxon and its complement. In other words, it can only identify two groups (313). Another challenge with this approach is the large sample size that is required for such analyses. Despite the evidence from taxometric analysis suggesting that hoarding is a categorical contsruct, this does little to explain the co-occurrence of hoarding with other OCD symptoms and other disorders. Results from studies using taxometric analysis appear to support a dimensional approach to sub-typing OCD.

Factor analysis provides a dimensional approach to sub-typing OCD and has been the most popular approach thus far. Over 20 studies assessing OCD symptoms with factor analysis have been published (119). It has the principle advantage of being able to account for OCD symptom co-occurrence (133). It can also account for symptom dimensions that occur in normal populations and other disorders, e.g. schizophrenia, depression and other anxiety disorders (286). The disadvantage of the factor analytic approach includes its assumption that symptoms in OCD are dimensional and hence it yields dimensions whether or not dimensions truly exist; this is analogous to cluster analysis yielding categories whether or not they truly

exist (530). As a result, individuals are not assigned to unique groups, but are rather given scores on all identified dimensions (528). Potentially, individuals with OCD may have a score for the contamination/cleaning symptom dimension that is equal to their score on the doubt/checking symptom dimension. This has limitations for the clinical utility of the sub-typing scheme, but it would provide a more useful model considering the significant co-occurrence of OCD symptoms and often inconsistent results in the areas such as genetic research. (The advantages and disadvantages of dimensional and categorical approaches to diagnosis have been described in Section 1.3(e) and are summarised in Table 1.6).

1.6 (c) FACTOR ANALYTIC APPROACHES TO OCD SYMPTOM SUBTYPES

Most of the factor analytic studies have also assessed whether the symptom factors can be predicted by specific characteristics or features. (These have been summarised in Table 1.12.) The expectation has been that the identified symptom dimensions can be validated through their association with distinct characteristics. The studies have been largely consistent in their resulting symptom factors and this is reflected in meta-analyses that have used data from these studies (see also Table 1.4) (119, 133). As indicated in Section 1.5, these studies have provided a good evidence that OCD symptom dimensions are associated with distinct patterns of comorbidity, neural substrates, neuropsychological correlates and

treatment response. However, results pertaining to these distinguishing features have been somewhat inconsistent and require replication.

Inconsistencies have arisen due to several issues. First, with regards to the techniques used to obtain symptom factors, all studies have used a principal components factor analysis, but some symptom factors were produced by the analyses of the YBOCS-SC *categories,* whereas others were derived from the YBOCS-SC *items* (see Section 1.2(a)). This has led to a number of different symptom factors being investigated. Studies have been largely consistent in excluding miscellaneous or "other" items of the Y-BOCS, unless an item is deemed relevant to the focus of their investigation. For instance, the compulsion to touch, tap or rub things was included in studies of children examining tic comorbidity (531). Also in relation to the YBOCS-SC, most studies have not reported interrater reliability.

OCD symptom factors appear to have been obtained from large and representative samples from many different countries. Sample sizes have ranged from 107 to 1224, and studies were conducted in the United States, Europe, South Africa, Korea, Japan and Italy. Larger studies appear to be collaborative efforts by large research centres which raises a question about the context in which these studies took place. Large collaborative studies often represent pharmacological treatment trials that are not designed to assess OCD symptoms. This would explain the inconsistency in the use of scales to measure associated characteristics. It is also likely that multiple comparisons were made using data from the same sample and

yet correction techniques to reduce the rate of false positive results have not been reported.

There has also been some variation between studies in the method of rotation used to interpret the factor analysis. Once symptom scores have been subjected to factor analysis, the resulting factors need to be rotated so that they can be interpreted (311). Most studies have used an orthogonal rotation (Varimax) for their factor analysis. Some have used an oblique rotation (Oblimin or Promax) suggesting that this is a more appropriate method when comparisons are being made (142). Although orthogonal rotations are simpler than oblique rotations, *in theory* orthogonal rotations should only be used when the factors are uncorrelated (119, 311). However, it is believed that the differences between the two methods are insignificant and this is supported by the studies listed in Table 1.12 that used both techniques and found no major difference in the factor solutions (142, 143, 147).

Inconsistencies have also arisen in the way that the factors are loaded ("loading techniques"). This refers to the weight given to each symptom. Some studies provided a weighting of 0 (absent), 1 (present) and 2 (predominant), whereas others used only 0 (absent) and 1 (present). The advantage of the first method is that predominant symptoms have greater weighting. These scoring methods were given to YBOCS-SC categories, and less commonly to YBOCS-SC items. In studies in which scores were given to YBOCS-SC items, category scores would equal the sum of the item scores. When obtaining a total score for a YBOCS-SC category by adding the scores of the YBOCS-SC items, the categories that are

made up by fewer items, such as hoarding/saving obsessions, would have lower maximum scores, than categories made up by multiple items, such as contamination/cleaning obsessions.

The instruments used to assess the characteristics of the OCD symptom subtypes differ from study to study. The primary goal of many of these studies was to investigate genetic aetiology or treatment response, and not OCD symptom subtypes. Despite the number of studies, when looking at Table 1.12, we see few associations that have been replicated and that are consistent. The characteristics assessed are important, but omit many of the validators presented in Sections 1.4 and 1.5. In particular, it is still uncertain whether OCD symptom dimensions have distinct patterns of comorbidity, temperamental antecedents, precipitants and environmental risk factors, patterns of inheritance, and demographic correlates.

Conclusions:

A number of studies using factor analysis have attempted to define OCD symptom dimensions. These studies were generally well powered and used similar investigative techniques. A significant difference is that some studies investigated the characteristics associated with four OCD symptoms factors, whereas others focussed on the characteristics associated with five OCD symptom factors. This has led to some gaps in our understanding of the unacceptable/taboo thoughts and the doubt/checking symptom dimensions, despite some evidence that they are associated with distinct characteristics (Section 1.5). It is also apparent that the

search for evidence that OCD symptom dimensions are associated with distinct characteristics has not been systematic, with most findings requiring replication. Many findings are products of larger studies that have been designed to test other hypotheses. Such studies are limited by the small number of associated characteristics that they assess and their increased chance of false positive results due to multiple comparisons. OCD symptom subtypes remain an important area of research and further studies addressing the limitations of current research are likely to clarify the heterogeneity associated with the diagnosis of OCD.

CHAPTER 2

AIMS OF THE STUDY

The primary aim of this study was to assess a broadly representative Australian sample of adults with OCD for OCD symptom dimensions and evaluate their validity. This was to be achieved through a systematic examination of the associations between OCD symptom dimensions and a comprehensive selection of measurable variables. This study was unique in that it was specifically designed to achieve this primary aim.

Two factor analyses were first used to replicate OCD symptom dimensions that had already been reported in the literature. The first was conducted on the YBOCS-SC, while the other was performed on a self-report instrument with good psychometric properties (namely, the Vancouver Obsessional Compulsive Inventory (VOCI) (22)). These symptom dimensions were to be compared to those obtained from other studies, which are summarised in Table 1.4. The replication of clinically meaningful OCD symptom dimensions in this study was hoped to add further support to their diagnostic reliability.

Once OCD symptom dimensions have been established as reliable, the study aimed to examine their validity via a systematic investigation of their associations with distinct variables. While acknowledging that OCD symptoms often co-occur,

this investigation was to use regression techniques to ascertain whether OCD symptom dimensions uniquely predicted the relevant variables. The variables to be investigated were based on the synthesis presented in Section 1.4 (and summarised in Table 1.9). These are listed below:

1. Description:
    a. OCD severity
    b. Level of disability
    c. Age of onset of OCD
    d. Level of insight
    e. Functions of the compulsions
    f. Degree of avoidance
    g. Degree of reassurance-seeking behaviour
    h. Type and degree of the associated psychopathology
    i. Suicide risk
    j. Comorbid psychiatric disorders
    k. Comorbid tic disorders
    l. Specific personality traits
    m. Current treatment
2. Discrimination:

    The discrimination of OCD symptom dimensions was to be examined by comparing their associations with the relevant variables.

3. Potential aetiological factors:
    a. Specific cognitive styles
    b. Disgust sensitivity
    c. Traumatic events
    d. Family history of OCD, OCSDs and specific OCD symptom subtypes
4. Demographic variables:
    a. Age
    b. Gender
    c. Marital status
    d. Number of children
    e. Level of education
    f. Employment status.

CHAPTER 3

HYPOTHESES

A number of hypotheses were made, as follows:

1. OCD symptom dimensions exist. Specifically the following was hypothesised:
    a) Factor analysis will reveal 5 OCD symptom dimensions similar to those derived from previous research. The three OCD symptom dimensions of hoarding, contamination/cleaning and symmetry/ordering have been consistently found in previous studies (119, 133). The additional OCD symptom dimensions of unacceptable/taboo thoughts and doubt/checking have been supported by the more recent and refined attempts to understand OCD symptom structure (147, 149, 150).
    b) The OCD symptom dimensions extracted from the YBOCS-SC are similar to, and associated with, those obtained from alternative assessments of OCD symptoms. In this study, the alternative assessment tool was the self-report instrument named the Vancouver Obsessional Compulsive Inventory (VOCI). It was hypothesised that a factor analysis of the VOCI will reveal OCD symptom dimensions similar to those derived from a factor analysis of the YBOCS-SC categories. This is based on previous

research (22). Additionally it was hypothesised that, YBOCS-SC-derived OCD symptom dimensions and VOCI-derived OCD symptom dimensions are strongly correlated.

2. OCD symptom dimensions are diagnostically valid, as demonstrated by their specific associations with a number of variables, as follows:

a. *Descriptive variables:*

In comparison to other OCD symptom dimensions, higher scores on the hoarding dimension predict the following:

1. Lower levels of insight, based on the findings of several previous studies (91, 140, 326, 327, 343).
2. Higher levels of schizotypy, based on the findings of previous research (327, 363).
3. Lower rate of having been prescribed psychotropic medication, based on previous research (349) and clinical observation.

In comparison to other OCD symptom dimensions, higher scores on the contamination/cleaning dimension predict the following:

1. Greater disability in work, social and family domains, based on the observation that a fairly large

number of patients with contamination/cleaning symptoms are housebound.

2. More prominent avoidance, based on clinical observation and case reports (16, 465).
3. Higher rates of comorbid eating disorders, based on a previous study (26).

In comparison to other OCD symptom dimensions, higher scores on the symmetry/ordering dimension predict the following:

1. Greater likelihood that the function of compulsions is to prevent negative consequences or to attain a "just right" feeling, based on clinical observation and previous studies (461, 498)
2. Higher rates of comorbid tic disorder, based on previous studies (31, 41, 532).
3. Early age of onset, based on previous studies (26, 200, 333, 375).

In comparison to other OCD symptom dimensions, higher scores on the unacceptable/taboo thoughts dimension predict the following:

1. Higher Y-BOCS obsessions scores, based on previous literature (231, 232).
2. Higher rates of comorbid major depression, based on previous studies (26, 142).
3. Increased suicide risk, based on findings of one study (429).
4. Higher rate of having been prescribed psychotropic medication, based on a study showing that subjects with these symptoms were more likely to seek treatment (467).

In comparison to other OCD symptom dimensions, higher scores on the doubt/checking dimension predict the following:

1. Greater severty of the overall OCD, as reflected by higher total Y-BOCS and CGI scores. This is based on clinical observation.
2. Greater severity of compulsions, as reflected by higher Y-BOCS Compulsion scores. This is also based on clinical observation.
3. Greater likelihood of reporting that the function of compulsions is to prevent negative consequences,

based on clinical observation and reports in the literature (416, 504).

4. Higher rate of reassurance-seeking behaviour, based on clinical observation and reports in the literature (416, 504).

b. Variables pertaining to potential aetiological factors:

1. In comparison to other OCD symptom dimensions, higher scores on the hoarding dimension predict a higher rate of hoarding in their first-degree relatives. This is based on previous research (64, 142, 375).
2. In comparison to other OCD symptom dimensions, higher scores on the contamination/cleaning dimension predicts higher levels of disgust sensitivity. This is based on the findings of previous studies (439-441, 443).
3. In comparison to other OCD symptom dimensions, higher scores on the unacceptable/taboo dimension predict higher scores on the belief about importance of control of thought, as measured by the OBQ. This is based on previous research (355, 437, 438, 495).

4. In comparison to other OCD symptom dimensions, higher scores on the doubt/checking dimension predict the following:
    a. Higher scores on perfectionism and overestimation of responsibility and threat beliefs as measured by the OBQ. This is based on previous studies (495, 509).
    b. Higher scores on conscientiousness, based on clinical observation and one study (518).
    c. Greater likelihood of a past traumatic event, based on clinical observation.

c. Demographic variables:

1. In comparison to other OCD symptom dimensions, higher scores on the hoarding dimension predict the following:
    a. Older age currently. This is based on studies showing that hoarding has a later age of onset than other OCD symptoms (140, 332).
    b. Being single. This is based on the findings of one study (140) and on report that patients with hoarding appear odd (327) and are less likely to marry.

2. In comparison to other OCD symptom dimensions, higher scores on the contamination/cleaning dimension predict female gender. This is based on previous studies (374, 398).
3. In comparison to other OCD symptom dimensions, higher scores on the symmetry/ordering dimension predict a younger current age and male gender. This is based on findings of previous research (132, 398).
4. In comparison to other OCD symptom dimensions, higher scores on the doubt/checking dimension predict a higher level of education and higher rates of employment. This is based on the report that doubt/checking symptoms have been associated with conscientiousness (518) which in turn may be linked to a greater need to attain higher educational levels and obtain employment.

3. OCD symptom dimensions can be discriminated from one other only to a certain extent, with the following hypotheses:

a) There is a significant overlap between OCD symptom dimensions, based on both clinical observation and a large body of research (113, 119, 132, 133, 137).

b) Symptoms that load onto the hoarding dimension are least likely to load onto other symptom dimensions. This is based on previous factor analytic studies (130, 132, 137, 142, 147, 149, 150, 173).

CHAPTER 4

METHODS

4.1 - Study design

This study represents a cross-sectional assessment of a large sample of Australian individuals with OCD. The assessment focussed on individuals' symptoms and other selected characteristics and evaluated these with structured clinical interviews and self-report instruments.

4.2 – Ethics approval

Prior to the study commencing, a proposal was sent to the Sydney West Area Health Service Human Research Ethics Committee for consideration and approval. No participant entered the study without giving signed informed consent (see Appendix 7). Prior to giving informed consent, participants were provided with the participant information sheet (see Appendix 6) that detailed the participant's rights, avenues for complaint, the nature and possible adverse consequences of the study. There were no invasive tests in this study, and it did not involve the treatment of participants. Where participants needed treatment, they were referred accordingly. Participants were free to withdraw from the study at any time without compromising their treatment. The confidentiality of collected information was protected by using de-identified codes, locked filing cabinets and

password protected computers. Participants were told prior to signing informed consent that confidentiality could be breached if there were safety concerns such as suicide or homicide risk or if there were any complaints. There were no instances where either of these circumstances arose.

4.3 – Recruitment and sample size

Recruitment aimed to capture a broadly representative sample of both patients referred by clinicians and individuals who referred themselves to the study. A standard invitation was used to promote recruitment and this can be viewed in Appendix 5. This invitation was sent in poster form to general practitioners, psychiatrists and health centres to be pinned to notice boards or placed on the walls of patient waiting rooms. The invitation was also sent for publication to local newspapers in surrounding local government areas and to larger metropolitan based newspapers. Educational talks regarding OCD were given to general practitioners, psychologists and psychiatrists to promote additional recruitment. Promotional material was also available via the Sydney University and Beyond Blue websites. Pathways for recruitment to the study are summarised in Figure 1.

Based on sample sizes in previous studies and the sample sizes required to conduct studies involving factor analysis, a sample size of 150 was aimed for. Factor analytic studies are generally best conducted on sample sizes that are ten times greater than the number of variables being investigated (311). As there were

15 symptom variables assessed by the YBOCS-SC that were of interest, this equates to a sample size of at least 150.

4.3 (a) Inclusion and exclusion criteria

With the aim of assessing all aspects of OCD, including its comorbidity, the study aimed to recruit any individual with OCD providing this was the individual's primary or principal diagnosis.

The inclusion criteria were as follows:

1. A primary diagnosis of OCD. (The primary nature of the diagnosis of OCD was defined by it being the condition for which help was sought or the condition which caused the most distress or impairment in functioning.)
2. Age of 18 years and older.
3. Ability to give informed consent.

The exclusion criteria were as follows:

1. Individuals with a current comorbid diagnosis of psychosis, bipolar disorder or other conditions that were judged to be more severe or disabling than their OCD were not considered eligible to participate. (The principal diagnosis of OCD was determined on the basis of a clinician-administered semi-structured interview, the Mini International Neuropsychiatric Interview (MINI) (533).)

2. Current or ongoing self-harm, suicidal or aggressive behaviour.

3. Current substance abuse or dependence (individuals with past histories must have been abstinent for at least 3 months).

4. Organic brain syndromes, severe brain injury, dementia, severe intellectual disability or severe pervasive developmental disorder.

4.4 - Clinical assessment:

Once informed consent was obtained, the structured interviews were conducted. This assessment ranged in duration between approximately 60 and 180 minutes. Participants were also asked to complete a series of self-report instruments which took approximately 60 minutes. These were checked for missing data and participants were asked to complete questionnaires that may have been incompletely filled.

The following interview-based scales were administered to the participants (copies of these can be found in Appendix 8):

1. The Mini International Neuropsychiatric Interview (MINI) (533). This instrument establishes both the principal and co-occurring DSM-IV diagnoses, along with their age of onset. The MINI has been validated against other widely used structured diagnostic interviews and its psychometric properties have been good (533-535). A diagnosis of OCD using the MINI has a test-retest reliability of 0.85 (533). The

diagnosis of OCD derived from the MINI has a good concordance with a diagnosis of OCD derived from the Structured Clinical Interview for DSM-III-R (SCID), Patient Version, with a kappa of 0.63 (534).

2. Record of treatment. A special form was developed to systematically document any other medical illnesses or disorders that the participants may have had. This form made it possible to document medication and other treatments that participants were receiving at the time of the assessment. Participants were asked about all psychiatric and non-psychiatric medications that they were taking at the time.

3. The Sheehan Disability Scale (SDS) (536). This scale assesses levels of disability in three domains: work, social life, and family life/home responsibilities using a 10 point scale. It has good psychometric properties when used for assessing disability associated with anxiety disorders (537). It has been used as a treatment outcome measure in treatment trials for OCD (538, 539).

4. The Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) (19). The Y-BOCS is a semi-structured interview used primarily to measure the severity of obsessions and compulsions in individuals already diagnosed with OCD. It consists of a comprehensive checklist of obsessions and compulsions (known as the Y-BOCS Symptom

Checklist) and a 10-item severity scale. On the severity scale, up to 3 most prominent obsessions and compulsions are rated in terms of time spent, interference with functioning, distress, efforts to resist and perceived degree of control. Each response is rated on a 5-point Likert scale, and ratings are summed to generate separate scores for the severity of obsessions and severity of compulsions, plus a total Y-BOCS score representing the overall severity of OCD. The Y-BOCS is a widely used instrument, with excellent psychometric properties (540-543). Many regard it as "gold standard" for OCD. Scores lower than 8 are regarded as subclinical. Scores 8-15 denote a mild OCD, 16-23 denote a moderate OCD, 24 to 31 denote a severe OCD and 32 to 40 denote an extreme OCD.

The Y-BOCS Symptom Checklist (YBOCS-SC) has been used widely in factor analytic studies investigating the heterogeneity of OCD symptoms. It includes a comprehensive list of specific obsessions and compulsions arranged by content category. There are 13 categories (aggressive obsessions, contamination obsessions, sexual obsessions, hoarding/saving obsessions, religious obsessions, symmetry/exactness obsessions, somatic obsessions, cleaning/washing compulsions, checking compulsions, repeating compulsions, counting compulsions, ordering/arranging compulsions, and hoarding compulsions) and

additional two miscellaneous categories (miscellaneous obsessions and miscellaneous compulsions).

5. Avoidance and Reassurance-seeking Interview. This is a brief instrument, constructed for this project. It was administered alongside the Y-BOCS, with the purpose of assessing avoidance and reassurance-seeking behaviour in OCD. Participants were asked to rate the extent to which they engaged in avoidance and re-assurance-seeking with the aid of a 5-point Likert scale. In the case of reassurance-seeking, participants were asked who they sought reassurance from.

6. Functions of the Compulsions Interview. This is a brief instrument, constructed for this project. It was administered alongside the Y-BOCS, following the avoidance and reassurance-seeking interview. It evaluates functions served by each of the three main compulsions identified by the Y-BOCS. This is achieved by asking participants the reasons for which they perform their compulsions, and six such reasons are given. Participants could also endorse another reason for performing their compulsion, that is, yet another function of compulsion. Participants could endorse as many of these functions as they thought were applicable to their particular compulsion.

7. Overvalued Ideas Scale (OVIS) (156). This instrument assesses levels of insight into beliefs of people with OCD and related disorders. In addition, the OVIS measures several other characteristics of belief, such as strength, reasonableness, fluctuation, accuracy, resistance, awareness of the beliefs of others, whether they perceived their compulsions as effective and the duration of the belief. The scale has good psychometric properties (156). It has been shown to have better predictive validity than the single item in the Y-BOCS assessing insight (544). It has also been used in OCD treatment studies assessing insight (545, 546).

8. The Shapiro Tic Scale (STSS) (547, 548). This instrument measures the overall severity of tic symptoms using a six-point scale across a range of dimensions (number, frequency, intensity, complexity, interference, and impairment). It is based on historical review and participant evaluation. This is less reliable than direct quantification of tics using video recording devices, however it is easier to administer and more practical. It has good psychometric properties when compared to other scales used to evaluate tics (548).

The following self-report measures were administered to the participants (see Appendix 9):

1. Demographic data collection sheet. This was designed for use in studies within the Department of Psychiatry at the Nepean Clinical School and collects demographic information such as age, gender, marital status, the number of children they have, their employment status and level of education.

2. Vancouver Obsessive Compulsive Inventory (VOCI) (22). This is a widely used instrument that measures the intensity of OCD symptoms using a 5-point Likert scale. It provides a total score and scores for each of the 6 subscales representing various symptom domains. These symptom domains are as follows: contamination, checking, obsessions, hoarding, "just right experiences" and indecisiveness. "Just right experiences" refer to doing things exactly right, following strict routines, repeating and memorizing, concerns about perfectionism and feeling compelled to count.

   The internal consistency, test-retest reliability and convergent and discriminant validity of the VOCI have been reported to be quite favourable in patients with OCD (22). Using coefficient alpha, internal consistency for the VOCI total scores and scores on its subscales was high (>0.85). Test-retest reliability was also high for the VOCI and its subscales with coefficients greater than 0.9. High correlations were reported between the VOCI total scores and total scores on other OCD

self-report measures. However, the correlation with the Y-BOCS total score was poor (r=0.14). VOCI symptom subscale scores were also highly correlated with symptom subscale scores on other OCD self-report measures, but the correlations with the YBOCS-SC categories have not been reported.

3. The Symptom Checklist 90-Revised (SCL-90R) (549). This is a widely used 90-item measure that assesses overall symptom distress and psychopathology and their specific aspects. Results are expressed through the scores on the Global Severity Index (representing a mean of the scores on all items) and nine subscales: Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation and Psychoticism. The SCL-90R is most commonly used in studies involving anxiety disorders where it has good psychometric properties (550-552).

4. Obsessive beliefs questionnaire (OBQ) (436, 553). This instrument assesses cognitive styles in OCD along the dimensions of responsibility/threat estimation, perfectionism/intolerance of uncertainty, and importance/control of thoughts. The beliefs assessed have been agreed to by consensus in an international consortium called the Obsessive Compulsive Cognitions Working Group (OCCWG) (553, 554). There is some evidence to indicate that symptom subtypes

of OCD may be associated with different cognitions as assessed by the OBQ (355). Its psychometric properties have been reported to be good (471).

5. Schizotypal Personality Questionnaire (SPQ) (555). The SPQ is a 74-item scale modelled on DSM-III-R criteria for schizotypal personality disorder. It has three symptom domains which have been named cognitive-perceptual, interpersonal, and disorganized (556). The SPQ has been used extensively to screen for schizotypal personality in both clinical and general populations (557), where it has been shown to have high internal reliability, test re-test reliability, convergent validity and discriminative validity (555, 557).

6. Disgust Emotion Scale (DES) (558). The DES is a 30-item scale that lists common disgust elicitors, which are rated on a 5-point Likert-type scale. The ratings yield a total score and scores on five domains of disgust. These are: rotting foods, blood and injection, smells, mutilation and death, and small animals. The internal consistency and convergent validity data suggest good psychometric properties of the DES (559). This scale has been used in studies of OCD and its scores were found to have an association with the presence of contamination obsessions (443, 558, 560).

7. Revised Neuroticism, Extraversion and Openness to Experience Personality Inventory (NEO-FFI) (561). This is a popular measure that assesses personality traits dimensionally according to the five-factor model. The five-factor model is the most rigorously tested model of personality traits (562). The NEO-FFI has the particular advantage of consisting of only 60 items and yet having psychometric properties similar to the more lengthy assessment tools (562-566).

4.5 – Procedure

Participants who were interested in the study were asked to call the Department of Psychiatry at Nepean Hospital. The department secretary briefly explained the study to potential participants at the initial point of contact. Interested callers where then asked what symptoms of OCD they had by the department secretary. This ensured that they were suitable for the assessment. For instance, 2 people called with repetitive hair pulling believing that this was OCD (see Figure 1). These people were further screened over the telephone and were thanked for their interest, but excluded as their primary diagnosis was most likely trichotillomania. Potential participants were then mailed the participant information sheet and given an appointment for assessment.

After obtaining informed consent, participants were interviewed using the aforementioned scales. For the first 48 participants, there were two raters in order to obtain interrater reliability. The other rater was usually a clinical psychologist

working with the Nepean Anxiety Disorders Clinic. These co-raters were well trained in the use of these scales. The scales were generally administered in the order in which they were presented above. The first structured interview was the MINI. Two participants were excluded after the MINI as they did not meet criteria for a primary diagnosis of OCD (see Figure 1). Following the assessment, participants were asked to complete their self-report instruments in a separate room within the department and they were assisted where necessary. Participants were then asked to return for 6-month, 1-year and 2-year assessments. However, results of these follow-up assessments are not reported here.

4.6 – Statistical methods

All data were entered into the Statistical Package for the Social Sciences (SPSS) version 17 (567) and analysed. Additional analyses were conducted using SAS version 9.2 (568). The first part of the study involved identifying symptom dimensions in the sample of 154 patients using factor analytic techniques (see section 4.6 (a)). The second part of the study explored correlations between these symptom dimensions and other patient characteristics using general linear modelling methods detailed in Section 4.6(b). This was done by examining the associations between symptom dimension scores (independent variables) and a number of pre-specified patient characteristics (dependent variables).

4.6 (a) Establishing symptom dimensions:

A preliminary review of the intercorrelations between the YBOCS-SC categories was undertaken to guide a more formal analysis using principal components analysis and hierarchical cluster analysis.

Principal Components Analysis:

Principal components analysis was the exploratory factor analytic technique that was used to assesses for latent factors within the group of OCD symptoms derived from the YBOCS-SC and the VOCI (569). Although the terms "principal components analysis" and "factor analysis" are often used interchangeably and produce similar results, they are different. All studies referring to factor analysis used in OCD research refer to principal components analysis (see Table 1.12). It has been suggested that principal components factor analysis is more psychometrically sound than factor analysis (570) and is preferred when an empirical summary of a data set is required (571).

Both oblique (Direct Oblimin) and orthogonal (Varimax) rotational methods were used in the principal components analysis used in this study. Oblique methods are considered more appropriate when factors are considered to be associated with each other (311). However, as shown in Table 1.12, studies have often used orthogonal rotational methods with similar results.

The study used the technique for factor loading described by Baer (1994) (113) and Mataix-Cols et al (1999) (130) when analysing the YBOCS-SC. According to this technique, Y-BOCS symptom categories regarded as principal symptoms were given a value of 2, whereas other symptoms categories that were currently present were given a value of 1 and when there was no symptom in a given category it was given a value of 0. When analysing the VOCI, the scores of individual items (0 to 4) were used.

Suitability of the data for factor analysis was assessed using a Kaiser-Meyer-Olkin Measure of Sampling Adequacy value of 0.6 or above (572, 573) and a Bartlett's Test of Sphericity significance value less than 0.05 (574). Cattell's scree plot (575), eigenvalues >1 and parallel analysis (576, 577) were used to determine the number of factors to be extracted for rotation. Items loading >0.4 were regarded as statistically significant.

There were 15 variables included in the principal components analysis of the YBOCS-SC. These consisted of: 12 YBOCS-SC categories (contamination obsessions, sexual obsessions, hoarding/saving obsessions, religious obsessions, symmetry/exactness obsessions, somatic obsessions, cleaning/washing compulsions, checking compulsions, repeating rituals, counting compulsions, ordering/arranging compulsions and hoarding/collecting compulsions); 1 YBOCS-SC item (mental rituals); and 2 YBOCS-SC aggressive obsessions

category subtypes (impulsive aggression obsessions and unintentional harm obsessions).

All YBOCS-SC symptom categories were included except miscellaneous obsessions, miscellaneous compulsions and aggressive obsessions. The miscellaneous categories consisted of multiple apparently unrelated items and were hence too heterogeneous to be included. The aggressive obsessions category was also excluded in an attempt to improve the homogeneity of the YBOCS-SC categories. If the YBOCS-SC categories were not homogeneous, the study would need to perform an item-level analysis of the YBOCS-SC and this requires a much larger sample.

The aggressive obsessions YBOCS-SC category was divided into impulsive aggression obsessions and unintentional harm obsessions as described by Pinto et al (147, 149) and shown in Figure 6. According to Pinto et al (149), these two groups of aggressive obsessions are phenomenologically distinct and load with different symptom items in item level-factor analyses (143, 148). Impulsive aggression obsessions comprised of the following YBOCS-SC items: fear might harm self, fear might harm others, violent or horrific images, fear of blurting out obscenities or insults, fear of doing something else embarrassing, fear will act on unwanted impulses (e.g. to stab a friend) and fear will steal things. Unintentional harm obsessions comprised of the following YBOCS-SC items: fear will harm others because not careful enough (e.g. hit/run MVA) and fear will be responsible

for something else terrible happening (e.g. fire, burglary). In the rare instance where participants had described some “other” aggressive obsession, this was categorised as belonging to one or the other group.

All 55 items of the VOCI were subjected to principal components analysis as indicated above. Additional comparisons were made between the VOCI symptom sub-scores and the YBOCS-SC derived symptom factor scores using linear regression.

Hierarchical cluster analysis

Hierarchical cluster analysis has been proposed as an alternative to principal components analysis (528). This method was applied to the data as part of a sensitivity analysis to explore how robust conclusions from the primary analysis were. The technique used for hierarchical cluster analysis involved the use of the same 15 symptom variables used for principal components analysis of the YBOCS-SC. Ward’s hierarchical agglomeration analysis for partitioning the data was used to minimize within-groups variance and to maximise between-groups variance (116, 128). Squared Euclidian distance was calculated as the similarity measure. The percentage change in agglomeration coefficients was evaluated for solutions of 2 to 9 clusters. Results were displayed using an SPSS generated dendrogram.

4.6 (b) Examining associations of OCD symptom dimensions with dependent variables:

Factor scores were derived by averaging the scores on the component items (as has been described previously (113)). The dependent variables comprised a list of pre-specified patient characteristics (see Section 1.4 and Table 1.9). The association between factor scores and binary dependent variables was examined using logistic regression. The association between factor scores and continuous variables was examined using linear regression. Models initially comprised all factor scores as covariates and a backwards elimination procedure was used to identify a parsimonious model comprising covariates significant at less than 0.05.

An approach to constrain the type 1 error rate was applied given the multiple analyses that were performed. Although establishing *a priori* hypotheses should reduce the increased chance of false positive results originating from the multiple comparisons conducted on the same data set, it is still recommended that adjustments be made. Adjustments were made using the False Discovery Rate (FDR) approach (578, 579). This commonly used method is less conservative than the Bonferroni correction method.

Results of the multiple logistic regression analyses are presented using odds ratios, 95% confidence intervals and p-values. The odds ratio represents the change in odds of the outcome for every one unit increase in the dependent variable. Results of the linear regression analyses are presented using the beta (β) coefficient, 95% confidence intervals and p-values. The β coefficient is the

change in the dependent variable score with respect to every one unit increase in the independent variable.

CHAPTER 5

RESULTS

5.1 SAMPLE CHARACTERISTICS

5.1 (a) Recruitment

One hundred and fifty-four participants with a principal diagnosis of OCD were recruited to the study over a four-year period commencing in July 2007 and ending in July 2011. Ninety-five (58.6%) participants were self-referred to the study, whereas 67 (41.4%) were referred by their clinicians. Recruitment and referral details are illustrated in Figure 1.

All participants completed the interview-based part of the assessment, but 10 (6.5%) did not complete the self-report component (i.e., the questionnaires) and they were excluded from the second part of the analysis. The most common reason for not completing the questionnaires was their length, as the interview-based part of the assessment was already time-consuming, lasting an average of 131.1 minutes (SD=50.9). To facilitate questionnaire-based assessment, some participants took questionnaires home, completed them and returned them in a reply paid envelope.

5.1 (b) Demographic characteristics

There were 86 (59.7%) females and 58 (40.3%) males who completed the study. The demographics of the sample are presented in Table 5.1. The mean age of the sample was 45.5 years (SD=16.2). In terms of their marital status, most participants were never married (n=52, 36.1%) and married (n=49, 34.0%). Almost one half (n=68, 47.2%) had no children. The majority of participants either lived with their spouses/partners (n=63, 43.8%) or alone (n=34, 23.6%). More than a third of the sample (n=59, 41.0%) were engaged in full-time or part-time work, whereas 38 (26.4%) were unable to work due to illness or disability. Sixty-seven (46.5%) participants had post-high school qualifications.

5.1 (c) Clinical characteristics

The mean age of onset of OCD in this sample was 18 years (SD=10.8). Many participants reported an earlier onset of subclinical symptoms, and establishing the age of onset of OCD was not always easy. The mean Y-BOCS score was 22.0 (SD=6.7) (moderate severity) with a range from 7 to 36. The mean Y-BOCS obsession score was 10.6 (SD=3.8) and the mean Y-BOCS compulsion score was 11.4 (SD=3.3). The mean CGI score was 3.2 (SD=1.1). A score of 3 on the CGI denotes “moderate symptoms, functions with effort”. In relation to disability resulting from OCD, the mean SDS score for the work domain was 4.7 (SD=3.2). For the social life domain the mean SDS score was 4.6 (SD=3.1), and for the family life/ home responsibilities domain the mean SDS score was 5.6 (SD=2.8).

The mean disability level for the sample as measured by the SDS was therefore in the moderate range.

The frequency of symptoms as determined by the YBOCS-SC is shown in Tables 5.2(a) and (b). Aggressive obsessions were the most frequent type of obsession (n=98, 63.6%), whereas checking was the most frequent type of compulsion (n=110, 71.4%). Reassurance-seeking was reported by 67 (47.9%) participants. Seventy-four (59.7%) participants also exhibited behavioural avoidance.

Eight (5.2%) participants did not have an OCD-related belief. Five of these had counting compulsions and reported “I just do it” or “it’s a habit”. Of those participants who did have an assessable OCD-related belief, 33 (20.9%) regarded this belief as “reasonable”, 24 (15.2%) were totally convinced regarding the truth of their belief and 13 (8.8%) did not believe that they had a disorder or psychological cause that explained their belief. The OVIS provides scores from 1 to 10 on a number of domains pertaining to pre-defined characteristics of belief. Lower scores generally reflect greater insight and less delusional beliefs. The mean scores on the OVIS were as follows: for reasonableness of belief 3.3 (SD=3.0), for strength of belief 5.2 (SD=3.6), for insight about having a disorder 2.0 (SD=2.3). The mean total OVIS score was 4.4 (SD=2.4). There was also considerable fluctuation in the strength of the belief with the mean highest strength being 6.7 (SD=3.6) and the mean lowest strength being 3.4 (SD=3.3).

Psychiatric comorbidity was common and this is shown in detail in Table 5.3. Tics were assessed using the Shapiro Tic Severity Scale (STSS) and they occurred

in 16 (11.0%) participants. Half of these participants had mild tics, with the lowest score of 1 on the STSS. Medical comorbidity occurred in 115 (74.2%) participants with the most common comorbid conditions being hypercholesterolaemia (n=23, 14.8%), osteoarthritis (n=21, 13.5%), hypertension (n=20, 12.9%), asthma (n=19, 12.3%), and gastro-oesophageal reflux disease (n=19, 12.3%). According to the MINI, 43 (27.9%) participants were considered to be at a suicide risk, with this risk being "high" for 18 (11.7%) participants.

More than half (n=93, 60.4%) of the sample were taking psychopharmacological agents. Of those treated with psychopharmacotherapy, selective serotonin reuptake inhibitors (SSRI) were prescribed to 55 (59.1%) participants. Other psychopharmacological agents included: second generation antipsychotic medication (n=23, 24.7%); serotonin and noradrenalin reuptake inhibitors (SNRI) (n=16, 17.2%); tricyclic antidepressants (n=15, 16.1%); and benzodiazepines (n=12, 12.9%). The psychiatric medications prescribed to participants are presented in detail in Table 5.4. Of the participants taking them, only 2 commenced this treatment around the time of the assessment with all others taking medication for over one month. Seven (4.5%) participants had been treated with pharmacotherapy in the past, but were not on any medication at the time of the assessment.

A lifetime history of hospitalisation for OCD was reported by 21 (14.7%) participants. One woman had two leucotomies for OCD in the 1970's. Sixty-six (46.2%) participants had received either CBT or ERP (and in one case flooding), whereas 8 (5.6%) had undergone a non-behavioural psychological intervention

such as counselling, supportive psychotherapy or psychodynamic therapy in the past. Thirty-eight (26.6%) participants had never had any form of treatment for their OCD.

Results on the OBQ revealed that 67 (46.5%) participants scored high on perfectionism and certainty, 50 (34.7%) scored high on responsibility and threat estimation and 35 (24.3%) scored high on importance of control of thought. High scores on the OBQ dimensions denote that the relevant cognitive styles are more prominent. Averages of high scores in OCD sufferers are approximately double the averages of scores found in non-OCD sufferers (436). Disgust propensity scores on the DES tended to be high, with a mean of 50.5 (SD=26.8). This compares to a mean of 35.5 (SD=13.8) in non-clinical samples (558). Levels of schizotypy in the sample, as measured by the SPQ, were comparable to those in a non-clinical sample (the mean of 27.7 (SD=15.4) versus the mean of 26.6 (SD=11.2)). Levels of neuroticism as measured by the NEO-FFI were “high” or “very high” in 114 (79.2%) participants. Comparatively fewer participants scored “high” or “very high” on agreeableness (n=41, 28.5%), openness (n=38, 26.4%), conscientiousness (n=28, 19.4%) and extroversion (n=24, 16.7%).

According to the MINI, traumatic events occurred in 73 (47.4%) participants. Although not clearly documented in all cases, of those reporting traumas, 43 (58.9%) indicated a childhood trauma. Of those participants with a traumatic event in childhood, the most commonly reported was sexual abuse (n=17, 39.5%). A history of OCD in first-degree relatives was found in 98 (67.6%) participants.

5.2 DETERMINING OCD SYMPTOM SUBTYPES

5.2 (a) Intercorrelations between each of the major symptom categories

Participants had combinations of different obsessions and compulsions with each having a mean of 2.41 obsessions and 2.95 compulsions. The frequency with which each symptom occurred in the sample is presented in Table 5.2 (a). This Table also shows how often each of these symptoms was regarded as principal symptoms. Contamination obsessions, for example, were both commonly present and principal symptoms, in contrast to mental rituals which were commonly present, but less frequently regarded as principal symptoms. Of all the Y-BOCS-designated miscellaneous obsessions and compulsions, mental rituals were the most frequent. They occurred in 57 (36.3%) participants (see Table 5.2(b)).

Positive and strong correlations were found between hoarding obsessions and compulsions, contamination obsessions and cleaning compulsions and between symmetry obsessions and ordering/arranging compulsions. The relationship between other obsessions and compulsions was somewhat less clear. Although impulsive aggression obsessions correlated with sexual and religious obsessions, they also correlated strongly with unintentional harm obsessions. Both impulsive aggression obsessions and unintentional harm obsessions correlated strongly with checking. Figure 2 shows the correlations that were significant at the level of significance of $p \leq 0.001$.

5.2 (b) Factor analysis of symptom categories

A principal component analysis of the 15 modified OCD symptom categories of the YBOCS-SC with oblique rotational analysis yielded a five-factor solution. These components explained 64.9% of the variance.

Prior to performing principal component analysis, the suitability of the data for principal components analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.4 and above. The Kaiser-Meyer-Olkin value (572, 573) was 0.6 and Bartlett's Test of Sphericity (574) reached statistical significance with a value of 0.000. These supported the factorability of the correlation matrix.

A principal components analysis revealed six factors with eigenvalues exceeding 1, explaining 18.5%, 14.8%, 13.3%, 9.6%, 8.7% and 7.0% of the variance respectively (see Table 5.5). An inspection of the screeplot revealed a change in gradient after the third and fifth factors (Figure 3). Using Catell's scree test (575), it was decided to retain five factors for further investigation. This was also supported by the results of parallel analysis (577), which showed only five factors with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (15 variables x 154 participants).

To aid in the interpretation of these five factors, oblique rotation was performed. The rotated solution revealed the presence of a simple structure, with five factors showing a number of strong loadings and all variables loading substantially only on one factor. The exception was unintentional harm obsessions which loaded

substantially on both factors four (unacceptable/taboo thoughts) and five (doubt/checking) (see Table 5.6). The interpretation of the five factors was consistent with previous research. The five-factor solution is summarised below:

- Factor 1 - **Hoarding** (Hoarding/ saving obsessions and hoarding compulsions)
  - 18.5% of variance.
- Factor 2 - **Contamination/Cleaning** (Contamination obsessions and cleaning/washing compulsions)
  - 14.8% of variance.
- Factor 3 – **Symmetry/Ordering** (Symmetry/exactness obsessions and ordering/arranging compulsions)
  - 9.6% of variance.
- Factor 4 - **Unacceptable/Taboo thoughts** (impulsive aggression obsessions, sexual obsessions, religious obsessions and mental rituals)
  - 8.7% of variance.
- Factor 5 – **Doubt/Checking** (Unintentional harm obsessions, somatic obsessions, checking compulsions and repeating rituals)
  - 13.3% of variance.

Orthogonal rotation using a varimax procedure yielded an identical five-factor solution (see Table 5.7). The component correlation matrix is shown in Table 5.8.

It should be noted that counting compulsions loaded on a sixth factor on which no other OCD symptom loaded substantially. Six factors were only supported by the eigenvalue criterion (see Table 5.5) and not by the other criteria which are used to decide how many factors should be retained (i.e. Catell's scree test and parallel analysis). Counting compulsions loaded most strongly with factor 3 (symmetry/ordering) in a five-factor model.

5.2 (c) Cluster analysis of symptom categories

Cluster analysis using Ward's method supported five symptom clusters with some differences in the distribution of symptoms. A dendrogram is shown in Figure 4. According to this analysis, hoarding, contamination/cleaning, and symmetry/ordering symptom groups were supported. However counting was included in the symmetry/ordering group and there were some differences in the symptoms that made up the unacceptable/taboo thoughts group and the doubt/checking group (see Figure 4).

5.2 (d) Comparison of the findings derived from the Y-BOCS and VOCI

The VOCI-derived findings also gave partial support to a five-factor solution. After assessing the suitability of the VOCI items for factor analysis, the 55 items

of the VOCI were subjected to a principal components analysis. Inspection of the correlation matrix revealed the presence of many coefficients of 0.4 and above. The Kaiser-Meyer-Olkin value (572, 573) was 0.86, exceeding the recommended value of 0.6 and Bartlett's test of Sphericity (574) reached statistical significance with a value of 0.000. These supported the factorability of the correlation matrix.

Principal components analysis revealed ten factors with an eigenvalue greater than 1. However, inspection of the screeplot showed a clear break after the fifth factor (see Figure 5). A five-factor solution was supported by parallel analysis as it showed 5 factors with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (55 variables x 154 participants).

A five-factor solution explained 59.6% of the variance, with factor 1 (contamination/cleaning) contributing 27.1%, factor 2 (checking) contributing 13.3%, factor 3 (hoarding) contributing 8.3%, factor 4 (unacceptable/taboo thoughts) contributing 7.3% and factor 5 (indecisiveness) contributing 3.6% (see Table 5.9). Orthogonal and oblique rotation obtained identical solutions. There were a number of strong loadings and 38 (69.1%) items loaded substantially on only one factor. Specifically, items assessing impulsive aggression loaded only on factor 4 and not on factor 2, where checking items loaded strongly.

A hierarchical cluster analysis of the VOCI failed to meaningfully distinguish between groups of symptoms.

5.2 (e) Interrater reliability

There were high rates of interrater reliability. This was measured in 49 participants using the MINI and YBOCS-SC and in 48 participants using the Y-BOCS total score (one of the raters left half way through the Y-BOCS interview). The interrater agreement for the YBOCS-SC categories was 94.3% (SD=0.12), for the Y-BOCS total score it was 99.7% (SD=0.02) and for the MINI diagnoses of OCD and comorbid disorders, interrater agreement was 97.5% (SD=0.07). Ratings for the YBOCS-SC categories had a Cohen's Kappa of 0.94.

5.3 VALIDATING OCD SYMPTOM SUBTYPES

Using scores on the OCD symptom dimension resulting from our principal components analysis as independent variables, regression analyses revealed a number of statistically significant associations with scores on the measures used to validate OCD symptom dimensions. The methods are detailed in Chapter 4. Having controlled for 695 tests of association with the false discovery rate method, 54 tests met the threshold of significance at $p<0.004$.

Results are presented in the following sequence as described in Section 1.4 and summarised in Table 1.9: 1) *Description* (results pertain to specific associations between OCD symptom dimensions and phenomenological features, severity, disability, age of onset, suicide risk, comorbidity, personality dimensions and current treatment); 2) *Discrimination*; 3) *Potential aetiological factors* (results pertain to specific associations between OCD symptom dimensions and relevant

cognitive styles, levels of disgust sensitivity, traumatic events and family history); and 4) *Demographic data*.

Results that were statistically significant at $p<0.004$ are summarised in Table 5.11. Raw tables of results of the multiple logistic regressions and linear regression analyses with standard significance levels of $p<0.05$ appear for reference in Appendices 3 and 4.

5.3 (a) Description

Phenomenological features:

Obsessions associated with the unacceptable/taboo thoughts factor and to a lesser extent with the contamination/cleaning factor were more time-consuming and caused more distress. Thus, higher scores on the Y-BOCS item assessing time occupied by obsessive thoughts were predicted by higher scores on the unacceptable/taboo thought factor ($\beta=0.85$, 95%CI=0.37-1.33, $p=0.0006$) and the contamination/cleaning factor ($\beta=0.34$, 95%CI=0.12-0.55, $p=0.0025$). Higher scores on the Y-BOCS item assessing obsession-related distress were also predicted by higher scores on the unacceptable/taboo thoughts factor ($\beta=0.96$, 95%CI=0.55-1.37, $p<0.0001$) and the contamination/cleaning factor ($\beta=0.36$, 95%CI=0.17-0.54, $p=0.0002$). Scores on the Y-BOCS items assessing interference, resistance and control in relation to obsessions were not predicted by any symptom factor.

Compulsions associated with the doubt/checking factor were found to be more distressing and to take more time to be performed. The contamination/cleaning factor was also associated with more distressing compulsions. Higher scores on the Y-BOCS item assessing compulsion-related distress were predicted by higher scores on the doubt/checking factor (β=0.65, 95%CI=0.31-0.98, p=0.0002) and the contamination/cleaning factor (β=0.41, 95%CI=0.23-0.59, p<0.0001). Higher scores on the Y-BOCS item assessing time consumed by compulsions were predicted by higher scores on the doubt/checking factor (β=0.52, 95%CI=0.19-0.86, p=0.0023). Scores on the Y-BOCS items assessing interference, resistance and control in relation to compulsions were not predicted by any of the symptom factors.

Reassurance-seeking was more likely to be associated with the doubt/checking factor and less likely to be associated with the hoarding factor. The presence of reassurance-seeking was predicted by higher scores on the doubt/checking factor (OR=4.65, 95%CI=1.87-11.55, p=0.0009), but negatively predicted by higher scores on the hoarding factor (OR=0.42, 95%CI=0.25-0.70, p=0.0011).

A more severe avoidance was associated with the contamination/cleaning factor. Higher scores on the avoidance component of the avoidance and reassurance-seeking interview were predicted by higher scores on the contamination/cleaning factor (β=0.50, 95%CI=0.20-0.80, p=0.0012).

Different functions of compulsions were associated with different symptom factors. The function of compulsion to prevent negative consequences was

predicted by higher scores on the doubt/checking factor (OR=28.02, 95%CI=8.73-89.99, p<0.0001), whereas the function of compulsion to achieve a “just right” feeling was predicted by higher scores on the symmetry/arranging factor (OR=3.42, 95%CI=1.82-6.42, p=0.0001). Participants often reported “other” reasons for performing their hoarding compulsions, such as the need for the hoarded object at a later date. The function of compulsion to prevent negative consequences was negatively predicted by higher scores on the hoarding factor (OR=0.32, 95%CI=0.17-0.60, p=0.0004), as was the function to remove obsessions from one’s mind (OR=0.19, 95%CI=0.07-0.39, p<0.0001).

Insight and other characteristics of beliefs as measured by the OVIS did not have any statistically significant associations with the different symptom factors.

Higher levels of self-reported anxiety, depression and psychoticism were associated with the doubt/checking factor. The symmetry/ordering factor was also associated with anxiety, while the unacceptable/taboo thoughts factor was associated with hostility. Higher SCL-90R scores on anxiety (β=0.87, 95%CI=0.49-1.25, p<0.0001), depression (β=0.63, 95%CI=0.25-1.01, p=0.0015) and psychoticism (β=0.54, 95%CI=0.23-0.85, p=0.0008) were all predicted by higher scores on the doubt/checking factor. Higher SCL-90R scores on anxiety were also predicted by higher scores on the symmetry/ordering factor (β=0.42, 95%CI=0.16-0.68, p=0.0015), whereas higher SCL-90R scores on hostility were predicted by higher scores on the unacceptable/taboo thoughts factor (β=0.60, 95%CI=0.22-0.99, p=0.0021). Higher scores on the SCL-90R GSI were predicted

by higher scores on the doubt/checking factor (β=0.59, 95%CI=0.29-0.88, p=0.0001).

Severity:

The severity of OCD was measured using the Y-BOCS total score and scores on the Y-BOCS obsession and compulsion subscales and CGI. OCD was most severe in the presence of the contamination/cleaning symptom factor and the unacceptable/taboo thoughts factor. Higher Y-BOCS total scores were predicted by higher scores on the contamination/cleaning factor (β=2.18, 95%CI=0.81-3.55, p=0.0020) and higher scores on the Y-BOCS obsession subscale were also predicted by higher scores on the contamination/cleaning factor (β=1.25, 95%CI=0.49-2.02, p=0.0015). Higher CGI scores were predicted by higher scores on the unacceptable/taboo thoughts factor (β=0.74, 95%CI=0.26-1.22, p=0.0027).

Disability:

Higher scores on the SDS – family life/home responsibilities were predicted by higher scores on the contamination/cleaning factor (β=1.01, 95%CI=0.46-1.57, p=0.0004). No other significant relationship between SDS and OCD symptom factors was found.

Age of onset:

A younger age of onset of OCD was predicted by higher scores on the doubt/checking factor (β=-7.87, 95%CI=-11.85--3.88, p=0.0001).

Suicide risk:

Higher suicide risk was not predicted by any OCD symptom factor after adjustment for multiple comparisons.

Comorbidity:

Past illicit substance abuse was present in 6 participants and was strongly predicted by higher scores on the unacceptable/taboo thoughts factor (OR=27.9, 95%CI=3.34-233.0, p=0.0021). The presence of other comorbid categorical diagnoses, as assessed by the MINI, was not associated with any OCD symptom factor after adjusting for multiple comparisons. Scores on the Shapiro Tic Severity Scale (STSS) also failed to show any significant associations with OCD symptom factors.

Personality dimensions:

Scores on certain NEO-FFI personality domains were predicted by the scores on some OCD symptom dimensions. The NEO-FFI neuroticism was predicted by

higher scores on the doubt/checking factor (β=5.33, 95%CI=1.9-8.76, p=0.0025), the NEO-FFI openness was negatively predicted by higher scores on the symmetry/ordering factor (β=-2.62, 95%CI=-4.35--0.89, p=0.0033) and the NEO-FFI conscientiousness was negatively predicted by higher scores on the hoarding factor (β=-4.29, 95%CI=-6.01--2.57, p<0.0001).

Schizotypy was associated with the doubt/checking factor. The total SPQ score was predicted by higher scores on the doubt/checking factor (β=9.25, 95%CI=3.57-14.93, p=0.0016). Higher scores on the SPQ factor relating to cognitive/perceptual deficits were also predicted by higher scores on the doubt/checking factor (β=4.21, 95%CI=1.48-6.94, p=0.0027). The other 2 factors of the SPQ were not predicted by any OCD symptom factor.

Current treatment:

Participants with unacceptable/taboo thoughts and contamination/cleaning symptoms were more likely to have received treatment prior to being assessed. A history of treatment for OCD prior to assessment for the study was predicted by higher scores on the unacceptable/taboo thoughts factor (OR=9.09, 95%CI=2.17-33.33, p=0.0025) and the contamination/cleaning factor (OR=2.43, 95%CI=1.39-4.17, p=0.0021). The likelihood of ever having received behavioural therapy for OCD prior to the assessment was predicted by higher scores on the cleaning/contamination factor (OR=2.01, 95%CI=1.30-3.13, p=0.0018).

5.3 (b) Discrimination

Section 5.2 presents results indicating that OCD symptoms co-occur and are significantly associated with each other. Only hoarding obsessions (R=-0.281, p=0.000) and compulsions (R=-0.283, p=0.000) correlated negatively with contamination obsessions. Results suggest that OCD symptom factors have poor discriminant validity.

5.3 (c) Potential aetiological factors

Specific Cognitive Styles:

Higher scores on certain symptom factors predicted specific cognitive styles. In relation to the OBQ, cognitions related to perfectionism were predicted by higher scores on the symmetry/ordering factor (β=10.75, 95%CI=4.59-16.92, p=0.0007). Cognitions related to the importance of control of thought were predicted by higher scores on the unacceptable/taboo thoughts factor (β=19.64, 95%CI=11.41-27.86, p<0.0001), whereas cognitions related to responsibility and overestimation of threat were predicted by higher scores on the doubt/checking factor (β=20.51, 95%CI=11.28-29.74, p<0.0001).

Disgust sensitivity:

The emotion of disgust was related to the contamination/cleaning factor. Higher scores on the DES were predicted by higher scores on the contamination/cleaning factor (β=7.34, 95%CI=1.82-12.82, p=0.0090).

Traumatic events:

The disclosure of a past traumatic event according to the MINI was common and not predicted by any symptom factor.

Family history:

Rates of a positive family history were highest for hoarding. Any history of hoarding in a first-degree relative was predicted by higher scores on the hoarding factor (OR=2.42, 95%CI=1.52-3.85, p=0.0002). Family histories of other OCD symptoms were not predicted by their respective symptom factors.

There were some associations between symptom factors and a family history of other disorders. Any history of obsessive-compulsive personality disorder in first-degree relatives was predicted by higher scores on the hoarding factor (OR=2.10, 95%CI=1.34-3.28, p=0.0011) and any history of depression in first-degree relatives was predicted by higher scores on the doubt/checking factor (OR=4.26, 95%CI=1.17-10.25, p=0.0012). There was no association between a history of any

anxiety disorder or any of the putative OCSDs (body dysmorphic disorder, hypochondriasis, tic disorder, and trichotillomania) in a first-degree relative and any of the OCD symptom factors.

5.3(d) Demographic data

An older age at the time of the assessment was predicted by higher scores on the hoarding factor (β=6.12, 95%CI=2.97-9.26, p=0.0002). Being male was predicted by higher scores on the unacceptable/taboo thoughts factor (OR=5.69, 95%CI=2.06-15.67, p=0.0008). There were no significant associations between OCD symptom factors on one hand and marital status, having children, employment status and level of education, on the other.

CHAPTER 6

DISCUSSION

OCD was found to be a heterogeneous disorder with a variety of symptoms and varying degrees of severity, disability, insight, avoidance, and reassurance-seeking. Despite this variety of OCD symptoms and high rate of symptom co-occurrence, factor analysis revealed five symptom factors explaining much of the variance associated with OCD symptoms. Furthermore, these OCD symptom factors were associated with a number of important characteristics even when statistical adjustment was made for multiple comparisons. Adding to more recent literature, this study provided strong support for five symptom factors, rather than four. Specifically, scores on the unacceptable/taboo thoughts symptom factor and doubt/checking symptom factor each predicted a different set of characteristics. The distinction between the unacceptable/taboo thoughts symptom factor and the doubt/checking symptom factor was also supported by the factor analysis of a self-report measure (VOCI).

6.1 – GENERAL FINDINGS RELATING TO OCD

6.1 (a) Representativeness of the sample

The sample was representative of OCD in the clinical and general population. Participants were referred from a wide variety of sources (see Figure 1) with no

apparent referral bias as the ratio of those who were self-referred to those who were referred by clinicians was 1.4:1. The male to female ratio was 2:3 which is consistent with samples from other clinical studies and community samples (49, 52). The mean age of the sample was 45.6 years (SD=16.2) and this is consistent with OCD studies of adults (149, 527). Some other studies of adults report a younger mean age as they have also included children (142, 147, 148, 375).

6.1 (b) Clinical characteristics relevant to OCD sub-typing

The study aimed to assess the validity of symptom-based subtypes of OCD, thus results relevant to alternative OCD sub-typing schemes are limited. The study gave a strong indication however, that the weaknesses of alternative OCD sub-typing schemes related to inadequate means of their assessment and the inability of often dichotomous diagnostic models to account for the multidimensional nature of OCD. Assessment of insight was difficult due to the complex nature of insight and the current inconsistent use of terms associated with insight. Assessment of tics was more easily achieved, but relied on a short window of observation. Asking participants to nominate an age of onset of OCD was limited by their recall and requires prospective assessment, which is not possible when assessing new patients. Symptom-based subtypes were more easily and accurately assessed in the study and appear to better explain the heterogeneity of OCD.

Having adopted a dimensional diagnostic model for OCD symptom sub-typing, the 5 symptom factors presented in the results of this study will be referred to as

symptom dimensions for the purpose of this discussion. The use of the word dimension emphasises the finding that individuals with OCD may have prominent symptoms on more than one OCD symptom dimension, that there is significant symptom overlap and that this discussion surrounds a dimensional, rather than a categorical, approach to classification.

6.1 (c) Obsessive-compulsive spectrum disorders (OCSDs)

The findings did not support a proposal for a broader diagnostic group of OCSDs. Comorbidity rates (see Table 5.3) were much higher for anxiety and depressive disorders than for the proposed OCSDs. Family history data revealed similar findings, with fewer participants having first-degree relatives with OCSDs than with other anxiety disorders or major depression. Therefore, from the comorbidity and family history perspectives, the findings do not support a removal of OCD from its current grouping among the anxiety disorders (36) (See also Appendix 10). The limitation of these findings is that there was no control group to compare comorbidity rates and family history data with. Nonetheless, the findings raise questions regarding the validity of the proposal for OCSDs in DSM-5.

6.2 – ESTABLISHING OCD SYMPTOM DIMENSIONS

Patients with OCD presented with a variety of OCD symptoms (see Tables 5.2). However, the results indicate that OCD cannot be categorised into distinct

symptom subgroups because there were high rates of co-occurring OCD symptoms. Some obsessions and compulsions were present in large proportions of participants, for example, 71.4% had checking compulsions (see Table 5.2(a)). Such findings would not support a symptom-based approach for the same reasons that highly comorbid conditions such as anxiety and depression are not supported as a useful basis for sub-typing OCD. However, some OCD symptoms tended to dominate a participant's presentation. These were readily identified as principal symptoms by the YBOCS-SC (see Table 5.2 (a)). For example, checking compulsions were regarded as a principal symptom in only 29.9% of the sample despite being present in 71.4% of the sample.

The descriptive validity of OCD symptom dimensions was further supported by correlational analyses that showed that various obsessions and compulsions correlated with each other in a way that was consistent with the literature and with clinical observation (see Figure 2). Thus, correlations involving hoarding, contamination/cleaning and symmetry/ordering symptoms were fairly clear. In contrast, correlations between aggressive obsessions and checking compulsions were less clear. Correlations between somatic obsessions and counting compulsions and other OCD symptoms were also unclear. These correlations are consistent with reports from other studies of OCD symptoms and are supported by the results of factor analysis.

Factor analysis and more specifically principal components analysis supported the first three symptom dimensions (i.e. hoarding, contamination/cleaning and symmetry/ordering symptoms) in the same way as the literature. Factor analysis

also added support to the distinction between an unacceptable/taboo thoughts symptom dimension and a doubt/checking symptom dimension. These symptom dimensions have only been partially supported in the literature thus far.

It is important to remember that factor analysis is a data reduction technique. In this study, 14 OCD symptoms were reduced to 5 OCD symptom dimensions. The results of factor analysis should always be interpreted with caution as the technique does not confirm the presence of OCD subtypes. Rather, it shows how the symptoms of participants with OCD group together (311). Clinical judgement must also be used to determine whether the resulting dimensions are consistent with clinical observation and this introduces a degree of subjectivity. Despite the limitations of factor analysis, the technique produced OCD symptom dimensions that were supported by statistical techniques and clinical observation. It provided a dimensional solution that accounted for the high rate of symptom co-occurrence and was supported by correlational methods, cluster analysis and analyses of data generated by a self-report instrument measuring OCD symptoms (the VOCI).

A hierarchical cluster analysis supported hoarding, contamination/cleaning and symmetry/ordering symptom subtypes. It did not support the separation of the aggressive/checking symptoms produced by factor analysis. However, one must bear in mind that cluster analysis looks for groups of symptoms in individuals and lends itself to distinct subtypes rather than dimensions as in factor analysis. It is clear from the rate of co-occurrence of these symptoms that the categorical nature of cluster analysis precludes it from being an effective technique for investigating OCD symptom subtypes (see Section 1.6(b)).

Additional factor analysis of the VOCI items provided support for four of the five OCD symptom dimensions derived from factor analysis of the YBOCS-SC categories. A principal components analysis of the VOCI lends support to a hoarding symptom dimension, a contamination/cleaning symptom dimension, and a checking symptom dimension being distinct from a dimension constituted by impulsive aggression obsessions, religious obsessions and sexual obsessions (unacceptable/taboo thoughts symptom dimension). This is of particular significance as the distinction between unacceptable/taboo thoughts and doubt/checking symptoms was supported by participant-rated items rather than pre-determined categories (like those of the YBOCS-SC), which may be subject to rater bias. The symptom dimension that was not supported was the symmetry/ordering dimension. Unfortunately, there are no items in the VOCI assessing symmetry obsessions or ordering/arranging compulsions.

The fifth symptom dimension identified by the VOCI was indecisiveness. Indecisiveness is not assessed by the YBOCS-SC. The items that constituted factor 5 were: “I try to put off making decisions because I’m so afraid of making a mistake.”, “I become very anxious even when I have to make even a minor decision.”, “I find it very difficult to make even trivial decisions”, and “I worry far too much that I might upset other people.” These items do not represent obsessions or compulsions and hence the finding has limited relevance in relation to OCD symptom dimensions.

Further support for the symptom dimensions derived from principal components analysis of the YBOCS-SC came from multiple linear regression analysis of the

association between the YBOCS-SC derived symptom dimensions and the symptom subscale scores on the VOCI. The results are shown in Table 5.10. The VOCI symptom subscale scores were strongly predicted by their respective YBOCS-SC derived symptom dimension scores. However, YBOCS-SC derived doubt/checking symptom scores also predicted scores on VOCI indecisiveness, VOCI just right and VOCI obsessions. The finding that VOCI obsessions were predicted by both YBOCS-SC derived unacceptable/taboo thoughts symptom dimension scores and doubt/checking symptom dimension scores, despite no doubt/checking items being included in the VOCI obsessions subscale, confirms a close relationship between these symptoms.

The five symptom dimensions derived from factor analysis were able to account for all but one compulsion. This was the compulsion to count. Counting compulsions were correlated with both symmetry obsessions and ordering compulsions and to a lesser extent with repeating compulsions (see Figure 2). Of the five symptom dimensions that resulted from the factor analysis in this study, counting also loaded most strongly on the symmetry/ordering symptom dimension (see Table 5.6). Although most studies associate counting compulsions with symmetry/ordering symptoms, this has not been a consistent finding and requires further clarification (119, 126, 143). Counting compulsions are not associated with “just-right” feelings and participants would generally state that they were not aware of any reason why they engaged in counting compulsions.

Repeating compulsions loaded strongly on the doubt/checking symptom dimension in this study (see Table 5.6). This association is less clear in the

literature, where repeating compulsions have also been associated with symmetry/ordering symptoms in some studies (119). In this study, a common reason for repeating was to be certain that the action was correct. For example, repeating manifested as re-reading of e-mails before clicking "send" in some participants (re-reading is listed as an item under repeating compulsions in the YBOCS-SC). In this example, repeating compulsions could be conceptualised as a form of checking. This is clearly a different phenomenon from the compulsion to repeat the manner by which one enters a room until it feels "just right".

Somatic obsessions were also associated with doubt/checking symptoms (see Table 5.6). This is a finding that is consistent with other studies (26, 119, 132, 142, 143, 149). The finding is also consistent with clinical observation where somatic obsessions are often followed by the compulsion to check. For instance, somatic obsessions relating to breast cancer are often followed by the compulsion to check one's breasts. Some studies do not support the association between somatic obsessions and checking compulsions however (147, 148, 150), and differentiating somatic obsessions from preoccupations with health or disease in hypochondriasis can be difficult clinically. This leads to an alternate hypothesis that somatic obsessions may be better classified as a symptom dimension of hypochondriasis rather than OCD.

The results revealed that mental compulsions were included in the unacceptable/taboo thoughts symptom dimension. This was consistent with another study that proposed that the name "pure obsessions" was really a misnomer (150). In both studies, mental compulsions were common, which

supports including them in factor analytic studies of symptom subtypes. Mental compulsions often follow unacceptable/taboo thoughts in the clinical setting and may represent unconscious attempts to hide these deeply embarrassing thoughts from others.

In summary, the study supported a five-factor model for OCD symptoms. This finding is largely consistent with the literature and is supported by clinical observation. Considering a considerable degree of co-occurrence of symptoms from the major symptom groups, placing greater weight on more predominant symptoms with a dimensional approach was the most appropriate method of investigation. The dimensions that resulted from factor analysis of the clinician administered YBOCS-SC were largely supported by the findings of the factor analysis of a self-report instrument (the VOCI). The only major symptom that was not well accounted for by the five-factor model was counting.

6.3 – RELIABILITY OF OCD SYMPTOM DIMENSIONS

There was a high level of interrater reliability for YBOCS-SC derived OCD symptom dimensions in this study. Studies have consistently reported good interrater reliability for the Y-BOCS (540-542). There has also been a study demonstrating the diagnostic reliability of clinicians assigning principal OCD symptoms (140).

The temporal stability of the five OCD symptom dimensions has not been assessed in this study. It would be important to show that patients who have one of the five predominant OCD symptoms continue to do so at different points in time. (This is being assessed as part of a follow-up study and preliminary results support the temporal stability of the five OCD symptom dimensions revealed by this study.) As there is support for the temporal stability of a four-factor model in the literature (345, 348, 427), there is no reason to suspect that there would be less support for the temporal stability of the five-factor model proposed by this study.

The stability of the five-factor model between one country and another, and over time, requires further assessment. There is some evidence that the frequency of different OCD symptoms is similar internationally (discussed in Chapter 1), however historical records tend to report religious obsessions and religious rituals more commonly (see Chapter 1). There are also animal models and evolutionary theories to explain most OCD symptom dimensions except for religious, sexual and impulsive aggression obsessions. It may be the case that these individual obsessions may be more likely to be influenced by socio-cultural factors and that an all-encompassing symptom theme such as “unacceptable/taboo thoughts” may change less between cultures and over time. The content of contamination/cleaning symptoms can also be influenced by socio-cultural factors whilst remaining within the same all-encompassing group. Contamination/cleaning symptoms have shown changes in content over the years, depending on what illnesses/infections are perceived to be a greater threat.

6.4 –VALIDITY OF OCD SYMPTOM DIMENSIONS

Scores on each of the five OCD symptom dimensions were associated with and predicted different clinical and non-clinical characteristics. Therefore, this finding supported the validity of the identified OCD symptom dimensions.

6.4 (a) HOARDING

The results of this study add to increasing evidence that hoarding forms a symptom dimension of OCD. The findings are particularly relevant, considering current debate regarding the proposal for a "hoarding disorder" in DSM-5. Although hoarding was associated with some unique characteristics, it was studied here only in the context of OCD and it often co-occurred with other OCD symptoms. Therefore, the question of whether hoarding is a separate disorder cannot be addressed on the basis of the findings obtained in the present study.

Findings related to descriptive characteristics:

Hoarding/saving obsessions and hoarding compulsions tended to be ego-syntonic. The study found that higher scores on the hoarding dimension did not predict higher levels of distress associated with hoarding obsessions or compulsions or more time consumed by hoarding. Higher scores on the hoarding dimension were

negatively predictive of reassurance-seeking suggesting that the phenomenology of hoarding is very different from the symptoms of doubt and checking where reassurance-seeking is common. This supports a clinical observations that individuals with hoarding are unlikely to ask others whether they should collect, keep or discard objects.

Patients with hoarding have been reported to be less likely to have insight in that they do not see their hoarding as excessive or unreasonable (91, 140, 327, 330, 343). This study did not show a statistically significant association between increasing hoarding scores and insight as measured by the OVIS. It was expected that hoarders would have poorer insight, especially since their obsessions and compulsions were more ego-syntonic. One of the potential reasons for the finding of the present study (about the lack of association between hoarding and insight) might have something to do with the instrument, that is, the OVIS. Another potential reason may be related to bias within the sample, in that participants with poor insight are less likely to seek medical attention or to respond to invitations to a study that assesses hoarding (351).

Participants with hoarding also reported reasons for hoarding that were different from the reasons for which other compulsions were performed. Thus, they often explained that they might need the collected objects at some time in the future. In contrast to other compulsions, hoarding compulsions negatively predicted the function to prevent negative consequences or to remove an obsession from one's mind.

Findings related to discriminant validity:

When comparing all correlations between OCD symptoms (see Figure 2), there was only one negative correlation and this was between hoarding compulsions and contamination obsessions. This does not necessarily imply that hoarding is distinct from contamination/cleaning, but less likely to co-occur with it than with the other OCD symptoms. This finding is consistent with clinical observation where people with contamination obsessions are likely to perceive cluttered environments as untidy and dirty and would have difficulty cleaning these environments.

Findings related to potential aetiological factors:

The finding that higher scores on the hoarding dimension were predictive of an increased likelihood of a first-degree relative also having hoarding was consistent with the literature and supports suggestions that hoarding is the most familial of all OCD symptom subtypes (361, 378, 380, 382). The finding that higher scores on the hoarding dimension predicted an increased likelihood of obsessive-compulsive personality disorder (OCPD) in first-degree relatives may be related to the inclusion of hoarding as a symptom of OCPD. However, the Family History Screen (FHS) used for this study did not screen for hoarding as a symptom of OCPD, but rather orderliness, perfectionism, rules and detail (see Appendix 8). This supports the inclusion of hoarding as a symptom of OCPD.

Somewhat contrary to the association with OCPD, higher scores on the hoarding dimension predicted lower levels of conscientiousness as measured by the NEO.

These lower levels of conscientiousness indicate that participants with hoarding were less organised, methodical and reliable, which is consistent with the observation that the homes of individuals with prominent hoarding are often in such disarray that they have been subject to forced clean ups by professional cleaning services. This has occurred after council orders, hospitalisation, death and in the context of reality television shows. Conscientiousness is therefore a potential target for intervention in hoarding (see Table 6.1) as this aspect of personality may be deficient when hoarding occurs in the context of OCD, but perhaps not in the context of OCPD.

Findings related to demographic characteristics:

Higher scores on the hoarding dimension predicted increased age at assessment. Hence, participants with hoarding tended to be older than participants with other OCD symptoms. This may reflect the chronic and progressive course of the hoarding symptom subtype.

One study has reported a tendency for individuals with hoarding to be single (333). This was not supported by this study and may oppose the common stereotype of an individual who hoards being a lonely person.

In summary, the hoarding symptom dimension was supported by some important differences in its characteristics (see Table 5.10). These were consistent with the literature apart from the additional findings with regards to the associated phenomenological differences and the lower levels of conscientiousness. The

issue of whether hoarding is separate from OCD requires further study because it is not clear how much "closeness" is needed for two conditions to be regarded as almost the same (or closely related) and how much "distinctness" is needed for two conditions to be regarded as different. The phenomenological differences between hoarding symptoms and other OCD symptoms, namely the uncertainty about the extent to which hoarding symptoms can be regarded as obsessions and compulsions, form a core argument against the retention of hoarding within OCD.

6.4 (b) CONTAMINATION/CLEANING

The contamination/cleaning symptom dimension was associated with a number of unique and relevant characteristics, however some results were not consistent with existing literature.

Findings related to descriptive characteristics:

The most interesting finding concerning the phenomenology of the contamination/cleaning symptom dimension was the high level of distress caused by contamination obsessions *and* cleaning compulsions. Contamination obsessions are generally regarded as less intrusive and rather as constant concerns or preoccupations. In addition, the study indicated that contamination obsessions were associated with higher levels of distress. The association between distress and contamination obsessions was not as strong as for unacceptable/taboo

thoughts, but nonetheless highlights the distressing nature of contamination obsessions.

Contamination/cleaning symptoms also predicted increased levels of distress in association with compulsions as measured by the Y-BOCS. The high levels of distress associated with cleaning compulsions may suggest that cleaning compulsions may not be a sufficient way of coping with contamination obsessions (as it is still causing much distress), calling for additional coping strategies such as avoidance. The importance of avoidance is supported by the literature (408, 415) and the finding of a unique association between contamination/cleaning and avoidance. Hence, in addition to obsessions and compulsions, avoidance needs to be targeted in the course of treatment of patients with prominent contamination/cleaning symptoms.

There was an association between contamination/cleaning and the overall severity of OCD and between contamination/cleaning and greater length of time spent on obsessions. Although the literature indicates that there is no relationship between contamination/cleaning and overall severity (116, 127, 128), contamination/cleaning symptoms predicted increased severity as measured by the Y-BOCS total score in this sample.

The finding of an association between contamination/cleaning and increased severity agrees with the hypothesis that contamination/cleaning symptoms predict greater disability. Patients with disabling contamination/cleaning symptoms are often referred by relatives and in some cases cannot be seen by clinicians as they

are housebound. This study confirmed that participants with higher scores on the contamination/cleaning symptom dimension had higher levels of disability around the home and family. This finding was unique to this symptom dimension suggesting that contamination/cleaning symptoms are in general more severe and debilitating.

It was also hypothesised that contamination/cleaning symptoms would predict an increased likelihood of eating disorders in accordance with existing literature (26). This was not the case, and there was no comorbid condition that was predicted by a higher score on the contamination/cleaning symptom dimension. The rates of past anorexia nervosa and bulimia nervosa were only 3.2% and 3.9%, respectively. No participant in the sample had a current diagnosis of anorexia nervosa and only 2 (1.3%) participants had a current diagnosis of bulimia nervosa. One must also consider that eating disorders can also be significantly disabling and are then likely to be the principal disorder. Studies have shown much higher rates of comorbid OCD in studies of samples where anorexia is the principal diagnosis (580, 581). Although the reasons for this are not well understood, it has been proposed that the relatively higher rates of OCD in patients with eating disorders is due to the female preponderance in eating disorder samples (582). The low frequency of eating disorders in this sample may be explained by the higher proportion of male subjects.

Current literature indicates that contamination/cleaning symptoms tend to have a good response to the behavioural technique of exposure and response prevention (ERP) (108). This supports the finding that contamination/cleaning symptoms

were the only symptoms to predict having had behavioural therapy in the past. Also, contamination/cleaning symptoms and unacceptable/taboo thoughts were the only OCD symptoms to predict ever having had any form of treatment for OCD. This may reflect the higher levels of distress associated with each of these symptoms. For contamination/cleaning, it may also reflect greater overall severity of OCD and family- and home-related disability in participants with contamination/cleaning. Because contamination/cleaning may be more likely than other OCD symptom dimensions to affect immediate family members, treatment is more likely to be instigated by family members, not necessarily by patients themselves, contributing thus to a greater likelihood of receiving treatment.

Findings related to discriminant validity:

The negative correlation between contamination obsessions and hoarding compulsions has been discussed. For all of the symptom subtypes, discrimination is poor due to the large degree of co-occurrence of symptoms. The degree of co-occurrence between OCD symptoms was not significantly different.

Findings related to potential aetiological factors:

Consistent with our hypothesis and existing literature (440, 441), higher scores on the contamination/cleaning dimension predicted higher disgust propensity scores. This unique association is of much significance as it has implications for the aetiology and maintenance of contamination/cleaning symptoms. As disgust circuits within the brain are different to fear circuits, it is likely that different neural pathways are involved in the expression of contamination/cleaning

symptoms. A better understanding of the role of disgust in contamination/cleaning symptoms could also lead to advances in biological and psychological treatment modalities for contamination/cleaning symptoms.

Contrary to the existing literature (436, 437), higher scores on responsibility/threat estimation on the OBQ were not predicted by higher scores on the contamination/cleaning symptom dimension. This adds further support to a different aetiological pathway for this OCD symptom dimension from doubt/checking symptoms, as increased responsibility/threat estimation beliefs are predicted by doubt/checking symptoms. The finding is also consistent with the absence of any relationship between contamination/cleaning symptoms and anxiety as measured by the SCL-90R. Perhaps the cognitive factors measured by the OBQ are less aetiologically relevant for contamination/cleaning than they are for some of the other OCD symptom dimensions.

Findings related to demographic characteristics:

The hypothesis that contamination/cleaning symptoms would be associated with female gender was not supported. The association with female gender has been reported in several studies (130, 143, 173, 330). However, the finding does not appear particularly robust as many studies do not report such an association with one study reporting an association in its initial phases and no association as the sample size increased (26, 142). There has been some evidence to suggest that oestrogen, menarche, childbirth and stressful life events can precipitate contamination/cleaning symptoms in women and that women may be more prone

to these symptoms due to cultural factors such as a woman's role within the household (398). The absence of an association with female gender in this study may be explained by differences in the socio-cultural context of this study compared to studies reporting a positive finding. The studies with positive findings in relation to female gender and contamination/cleaning symptoms tended to have been conducted in European countries where it is possible that cleaning is more readily identified as a female role.

Contamination obsessions and cleaning compulsions are uniquely associated with increased levels of distress, severity of OCD and disability. They are also uniquely associated with higher levels of avoidance (see Table 5.10). Their association with the emotion of disgust may provide a promising insight into our understanding of contamination/cleaning symptoms and this may lead to improvements in the treatment of these symptoms (see Table 6.1).

6.4 (c) SYMMETRY/ORDERING

Symmetry/ordering symptoms formed their own symptom dimension with several features characterising these symptoms as somewhat different from other OCD symptoms.

Findings related to descriptive characteristics:

Consistent with the literature (41, 461, 470), symmetry/ordering symptoms were associated with “just right” feelings. “Just right” feelings appear unique to symmetry/ordering symptoms and some believe that they implicate brain regions involved in the processing of sensorimotor information in the pathobiology of tic disorders (41). If “just right” feelings reflect basic sensory-affective dysfunction, standard CBT is likely to be challenging. This has led to the proposal that that behavioural methods aimed at habituation (e.g. ERP) should be preferred over conventional cognitive techniques (470). This implies that psychological therapies should be modified to address “just right” feelings where they exist in conjunction with symmetry/order symptoms.

A hypothesis that ordering compulsions frequently serve the function of preventing bad consequences was not supported. This is likely to be explained by the more precise nature of assessment (Functions of the compulsions interview) used in this study and adds further weight to the significance of “just right” feelings in relation to the function of symmetry/ordering symptoms.

The literature indicates that symmetry/ordering symptoms tend to be ego-syntonic and associated with reduced insight, like hoarding (157, 330). The ego-syntonic nature of these symptoms was supported by the lack of their association with levels of obsession- and compulsion-related distress. However, there was no association with level of insight. Insight was measured by a single item of the OVIS and, as with hoarding, this is likely to have been inadequate.

It was hypothesised that increasing scores on the symmetry/ordering symptom dimension would predict an increased likelihood of comorbid tics. This was not the case. The most likely explanations for this finding are the fact that only 11.0% (n=16) of the sample had comorbid tics and that children and adolescents were excluded from the study. Studies of individuals with OCD and older mean ages tend to report a lower tic comorbidity rate (26, 142, 176) and it may be that tic comorbidity is less relevant in the adult population.

Symmetry/ordering symptoms were not associated with OCPD. Although an association has been reported in one study (375), perfectionism needs to be considered as a mediator of this relationship. Beliefs regarding perfectionism as measured by the OBQ were predicted by symmetry/ordering symptoms and perfectionism is a diagnostic criterion for OCPD. The lack of an association with OCPD suggests that diagnostic criteria for OCPD, other than perfectionism, are unlikely to be associated with symmetry/ordering symptoms.

Symmetry/ordering symptoms predicted increased levels of anxiety as measured by the SCL-90R. This finding contrasts with the literature and is not in keeping with other results of the study. Symmetry/ordering symptoms have tended to be associated with tension in conjunction with objects that are not “just right” (41, 461), but not anxiety. The study revealed a strong association between symmetry/ordering and “just right” feelings and no association with any specific comorbid anxiety disorder. One study that measured anxiety using the Hamilton Rating Scale for Anxiety (HAM-A) found an insignificant association with symmetry/ordering symptoms (143), but no other factor analytic studies have used

self-report instruments to assess for any association between participant-rated anxiety and OCD symptoms. Although self-reported anxiety was more strongly associated with the doubt/checking symptom, its apparent association with symmetry/ordering symptoms in this study requires replication. Considering OCD is viewed as an anxiety disorder, the role that anxiety plays in the development of symmetry/ordering warrants further investigation.

Findings relating to discriminant validity:

In some studies using factor analysis, symmetry/ordering symptoms have been grouped with repeating, counting, and hoarding (113, 130, 143, 144). This indicates that symmetry/ordering symptoms may co-occur with other OCD symptoms and that they are more likely to co-occur with some OCD symptoms than with others.

Findings related to potential aetiological factors:

Consistent with the literature (355, 471), symmetry/ordering symptoms predicted higher scores on perfectionism as measured by the OBQ. No other OCD symptom dimension showed a relationship with this type of cognition. This may have unique implications for cognitive therapy in that strategies may need to be tailored to address perfectionism (see Table 6.1).

An unexpected finding was that symmetry/ordering symptoms predicted lower scores on the personality trait of openness on the NEO. Openness involves active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, and intellectual curiosity (561). Many aspects of openness indicate that an

individual is prepared to venture outside their usual realm of experience, e.g. the risk of trying a different cuisine or learning about a different religion. The low rates of openness associated with symmetry/ordering may signify that these individuals are afraid of allowing something to be a little different or perhaps not "just right". The association between symmetry/ordering and openness indicates a need to explore this aspect of personality in individuals with symmetry/ordering and to address cognitions associated with low levels of openness, just as clinicians need to address perfectionism and "just right" feelings. There may also be common elements to each of these features associated with symmetry/ordering.

Findings related to demographic characteristics:

Based on the literature, it was hypothesised that symmetry/ordering symptoms would predict male gender and younger age (132, 398). The study did not support these hypotheses. The most likely reason is the exclusion of children from the study. Studies that have used adult participants only have not reported any differences in gender or age in individuals with symmetry/ordering symptoms (26, 149). There is also some evidence that symmetry/ordering symptoms are more frequent in childhood compared to symmetry/ordering symptoms in adults (199, 491) and this may be related to changing developmental stages that are absent in adulthood.

A symmetry/ordering symptom dimension is characterised by unique associations with several aspects of phenomenology, cognitions and personality traits, supporting its validity (see Table 5.10). "Just right" feelings, high levels of

anxiety, perfectionism and decreased levels of openness are all potential targets of tailored psychological approaches for treating symmetry/ordering symptoms (see Table 6.1).

6.4 (d) UNACCEPTABLE/TABOO THOUGHTS

This study makes a significant contribution to the literature in identifying important differences between an unacceptable/taboo thoughts symptom dimension and a doubt/checking symptom dimension. There are clear differences in phenomenology, cognitions and psychiatric comorbidity.

Findings related to descriptive characteristics:

As expected, unacceptable/taboo thoughts predicted higher scores on the Y-BOCS for the items assessing the time occupied by obsessions and the distress caused by obsessions. The association with increased levels of distress would support the ego-dystonic nature of unacceptable/taboo thoughts. Contrary to our hypothesis however, unacceptable/taboo thoughts did not predict higher Y-BOCS obsession sub-scores. The association with Y-BOCS obsession sub-scores had a high parameter estimate (β=2.41), but failed to reach statistical significance after correction for multiple comparisons with a p=0.0058 (see Appendix 4). This finding may relate to the other items that contribute to this score. These other items assess functional impairment, resistance and degree of control over the obsessions. Although there were no statistically significant associations, it is

likely that participants with these distressing obsessions resist them to a greater extent than other obsessions.

Despite traditionally being associated with good insight, unacceptable/taboo thoughts did not predict scores that would indicate good insight. As mentioned previously, insight proved difficult to measure despite the use of the OVIS. In addition, the negative finding may be explained by the single assessable belief expressed by the participant and chosen by the rater for the OVIS. In this case, participants expressed beliefs relating to avoidance or mental rituals rather than whether they believed that their obsessions were true. An example of a belief associated with a paedophilic sexual obsession is "I believe I need to stay away from children." In such cases participants did believe that it was reasonable to avoid situations that made their obsessions more distressing and that it was reasonable to engage in mental rituals to reduce their distress associated with their obsessions. This demonstrates the multidimensional nature of insight. In other words, insight pertains not only to beliefs associated with obsessions, but also to behaviours (such as avoidance and compulsions) that OCD patients resort to. Hence, unacceptable/taboo thoughts may still be characterised by good insight pertaining to the appraisal of obsessions and beliefs related to obsessions despite the negative finding. A relatively good level of insight in participants with prominent unacceptable/taboo thoughts is also supported by the finding they were more likely to have received treatment for their symptoms prior to participating in the study.

A finding that higher scores on the unacceptable/taboo thoughts symptom dimension predicted higher CGI scores indicates that clinicians perceived these participants as more severely affected by their symptoms. In contrast, greater severity of distress and overall psychopathology, as measured by the Global Severity Index of the SCL-90R, was not predicted by higher scores on the unacceptable/taboo thoughts symptom dimension. This discrepancy, which calls for further investigation, suggests that people with unacceptable/taboo thoughts may not necessarily perceive themselves as severely ill, whereas clinicians may have the opposite view.

Unexpectedly, unacceptable/taboo thoughts predicted hostility on the SCL-90R. According to the SCL-90R. Hostility refers to thoughts, feelings, or actions that are characteristic of the negative affect state of anger and this includes aggression, irritability, rage, and resentment (583). There are two possibilities in the relationship between unacceptable/taboo thoughts and hostility. First, hostility may arise secondary to unacceptable/taboo thoughts so that people with deeply embarrassing or shameful obsessions become hostile as they try to avoid situations where others get too close and perhaps become aware of what they may be thinking. Also, the frustration associated with being unable to resist distressing obsessions may lead to irritability and hostility. Secondly, hostility may actually predispose to the development of unacceptable/taboo thoughts. Thus, some people may develop unacceptable/taboo thoughts as a way of “channelling” their prominent hostility when such hostility cannot be expressed in other ways due to socially imposed norms of behaviour.

It was hypothesised that unacceptable/taboo thoughts would predict comorbid major depression. There was some association in this regard, but it failed to reach statistical significance with a p-value of 0.0180 (see Appendix 3). Instead, unacceptable/taboo thoughts predicted a history of non-alcohol substance dependence with a very high odds ratio of 27.90. One may hypothesise that participants may have attempted to control their obsessions by using substances or alternatively that past substance abuse had caused unacceptable/taboo obsessions. If the second hypothesis were true one might expect a higher rate of unacceptable/taboo thoughts in the context of substance abuse and there is no evidence to support this. One study reported that 70% of their participants with OCD and comorbid substance abuse believed that their OCD had preceded their substance abuse (584). The finding relating to increased levels of hostility may mediate the relationship between unacceptable/taboo thoughts and non-alcohol substance dependence. People with this OCD presentation may try to alleviate their distress and control their thoughts by using substances. Although there are several studies reporting an increased rate of substance abuse in individuals with OCD (241, 423, 584-586), no studies have associated unacceptable/taboo thoughts with substance abuse.

Findings relating to discriminant validity:

Unacceptable/taboo thoughts do not discriminate themselves well from doubt/checking symptoms. Hence, many studies combined the two symptom dimensions within one dimension. Unintentional harm obsessions and impulsive aggression obsessions tend to co-occur (see Table 5.6), however the Y-BOCS

may be leading to rater bias. The YBOCS-SC lists unintentional harm obsessions and impulsive aggression obsessions together within the category of aggressive obsessions. By listing these obsessions together, raters are led to believe that they are similar and this might influence the way that these obsessions are assessed. The assumption that these two types of obsessions form a single category has led to most studies using factor analysis of YBOCS-SC categories to result in only four symptom dimensions.

Findings related to potential aetiological factors:

As hypothesised, higher scores on the unacceptable/taboo thoughts symptom dimension predicted higher scores on the importance of control of thoughts subscale of the OBQ. This means that these individuals were more likely to believe that the mere presence of intrusive thoughts indicates that such thoughts are very meaningful, and that control over such thoughts is both necessary and possible (553). This association has been demonstrated repeatedly in studies (355, 471, 472) where the relationship between importance of control of thoughts and obsessions subscale scores of the Obsessive-Compulsive Inventory-Revised (OCI-R; (458)) have been assessed. This study is the first to demonstrate a relationship between importance of control of thoughts and a clinician-rated scale, i.e. the Y-BOCS, using factor analysis. On the basis of these consistent results, cognitions relating to the importance of, and need to control, intrusive thoughts should be a specific target for cognitive interventions for individuals with unacceptable/taboo thoughts (see Table 6.1).

Findings related to demographic characteristics:

In accordance with the literature (397, 398, 587), higher scores on the unacceptable/taboo thoughts symptom dimension predicted male gender. Despite two decades of research interest in this area, there are no clear explanations for gender differences in OCD symptoms. It is possible that evolutionary, environmental and cultural factors have lead to men and women giving varying levels of importance to different aspects of life, with men having to focus on controlling their aggressive and sexual impulses more than women. The positive findings in regards to increased hostility and past substance abuse may also play a role in explaining the increased likelihood of individuals with unacceptable/taboo thoughts being male, with both being more prevalent in males (588-590). From a biological perspective, one could hypothesise that testosterone increases hostility, however studies have not shown any significant association (591, 592).

In summary, there are distinct characteristics associated with unacceptable/taboo thoughts that are useful in differentiating them from other OCD symptoms and in particular from doubt/checking. Classic ego-dystonic obsessions are central to the phenomenology of these symptoms and are associated with increased substance dependence, perceived increased severity in symptoms, increase tendency to seek treat and a belief surrounding the need to control these obsessions (see Table 5.10). The male predominance among people with this symptom requires further investigation and in particular in regards to any role that hostility may play.

6.4 (e) DOUBT/CHECKING

It was clear that the doubt/checking symptom dimension had several important characteristics that distinguished it from the unacceptable/taboo thoughts symptom dimension and from other OCD symptom dimensions. In contrast to unacceptable/taboo thoughts where obsessions are more central to the phenomenology, compulsions appear to be the central feature of the phenomenology of doubt/checking symptoms. There also appears to be more prevalent additional psychopathology with increased levels of anxiety, depression, neuroticism and schizotypy.

Findings related to descriptive characteristics:

As hypothesised, higher scores on the doubt/checking symptom dimension predicted higher levels of compulsion-related distress and more time spent performing compulsions. The compulsion score of the Y-BOCS was also predicted doubt/checking, but failed to reach statistical significance after adjustment for multiple comparisons (see Appendix 4). These findings indicate that *compulsions* (namely checking compulsions) are the central phenomena in this OCD symptom dimension. It is worth noting that some participants performed checking almost automatically and did not immediately identify a preceding unintentional harm obsession. Only upon further reflection (or questioning) did they realise that there are some thoughts/obsessions driving them to check. For

example, participants did not consciously obsess about an intruder breaking into their house in a way that made them check their locks, but rather they had a compulsion to check their locks. This contrasts with unacceptable/taboo thoughts, where obsessions are conscious and more prominent.

As hypothesised, higher scores on the doubt/checking symptom dimension also predicted a higher rate of reassurance-seeking. This is an important target in behavioural therapy and should be assessed in patients with checking compulsions. Although some studies (447, 448) indicate that contamination/cleaning symptom may also predict an increased tendency to seek reassurance, such a finding was not supported by this study. The act of reassurance-seeking resembles checking in that there is a common function of reducing anxiety and/or preventing harm (503). Checking is believed to serve more purposes and to be used in a wider variety of circumstances (16). Reassurance-seeking is more likely to function to obtain another person's evaluation of one's performance or image (503). The phenomenon of doubt appears central to doubt/checking symptoms and reassurance-seeking, in that participants doubted their judgement and repeatedly checked or sought reassurance from others.

The primary function of the compulsion to check appeared to be related to a need to prevent negative consequences. This was a very significant finding that did not characterise any other OCD symptom dimension. This has implications for cognitive therapy where it can be a target for intervention. It may also signify the

involvement of neural circuits pertaining to fear in a way that is different to other OCD symptom dimensions.

Anxiety, depression, and neuroticism were all predicted by higher scores on the doubt/checking symptom dimension. When interpreting these results one must consider that they are all a product of self-report instruments and that they do not represent formal comorbid psychiatric diagnoses. OCD is often associated with depressed mood and symptoms of anxiety that are best explained as part of the diagnosis of OCD rather than an additional comorbid diagnosis. The high levels of anxiety associated with doubt/checking is likely to be secondary to the fear of an adverse consequence and would predispose individuals to reassurance-seeking behaviour. The finding of increased neuroticism being predicted by increasing scores on the doubt/checking symptom dimension is consistent with increased levels of anxiety and depressive symptoms.

As scores on the doubt/checking symptom dimension increased, symptoms may have become more bizarre and difficult to understand. This is supported by increased levels of psychoticism and schizotypy being predicted by higher scores in the doubt/checking symptom dimension. One participant with more severe doubt/checking symptoms was not simply delayed from leaving her home due to the need to repeatedly check the door lock, but rather, she spent hours calling people and searching through documents to see that she had not committed fraud five years ago. This particular participant had been diagnosed as having a psychotic disorder and was placed on antipsychotics prior to recruitment. Although it may be easy to see from this case illustration how higher scores on the

doubt/checking symptom dimension may predict psychoticism and schizotypy, previous studies have linked these characteristics with hoarding (363) and counting compulsions (242). This indicates that the relationship between schizotypy, psychoticism and OCD symptoms requires further investigation.

The sub-score of the SPQ which was predicted by higher scores in the doubt/checking symptom dimension related to interpersonal deficits. This means that individuals with prominent doubt/checking symptoms and schizotypy, were likely to have had interpersonal deficits. Although these findings require replication, they indicate that individuals with doubt/checking should be assessed for interpersonal deficits and if they are present, these deficits should be addressed with interventions such as social skills training.

Contrary to existing literature (26, 140, 200, 375) and to the hypotheses, it was not the symmetry/ordering symptom dimension that was associated with an early age of onset, but the doubt/checking symptom dimension. The finding emphasises the need for prospective studies in relation to age of onset. Recall bias may have resulted from participants having an increased ability to remember engaging in checking in the past and a reduced ability to recall symmetry/ordering symptoms.

Findings relating to discriminant validity:

As mentioned in relation to unacceptable/taboo thoughts, doubt/checking symptoms have significant rates of co-occurrence with unacceptable/taboo thoughts. The degree of symptom overlap is so prominent that some studies using factor analysis do not distinguish the two OCD symptom dimensions.

Discriminant validity for doubt/checking symptoms, like all OCD symptom dimensions, is thus quite poor.

In comparison to other OCD symptoms, doubt/checking symptoms are commonly observed to accompany various other OCD symptoms. The present study showed that doubt/checking symptoms accompanied unacceptable/taboo thoughts and symmetry/ordering symptoms to a greater extent than other OCD symptoms (see Tables 5.5, 5.7, 5.8 and 5.9). These findings support the notion that doubt/checking symptoms are more "generic" to OCD.

Findings related to potential aetiological factors:

Contrary to the hypotheses, increased scores on the doubt/checking dimension did not predict increased conscientiousness or increased frequency of traumatic events. This implies that participants with these symptoms are not checking to be thorough or conscientious. Nor does it appear that traumatic events have led to hypervigilance and a subsequent need to check. In the literature, traumatic events have also been linked to other symptom subtypes such as contamination/cleaning symptoms (593) and hoarding (594). The personality trait that was predicted by the doubt/checking symptom dimension was neuroticism. Neuroticism refers to the general tendency to experience negative affects such as fear, sadness, embarrassment, anger, guilt, and disgust (561). It has been thought that these disruptive emotions, that characterise neuroticism, interfere with the ability of an individual to adapt to change and that this leaves affected individuals to be more prone to irrational ideas, less able to control their impulses and to cope more

poorly with stress (561). This may explain the higher rates of anxiety and depression reported in patients with high scores on doubt/checking. It should also be noted that neuroticism is a very broad and non-specific construct. Although we may hypothesise that neuroticism predisposes to the development of doubt/checking symptoms, longitudinal studies with assessments prior to the development of OCD symptoms would be required in order to support a causal relationship.

The finding that doubt/checking symptoms predicted an increased likelihood of interpersonal deficits as measured by the SPQ may provide some evidence supporting the role of attachment in the development of doubt/checking symptoms. Interpersonal deficits refer to excessive social anxiety, no close friends, constricted affect and paranoid ideation/suspiciousness (556). Interpersonal deficits may have arisen in the context of the relations participants had with their significant attachment figures during their development. Observations linking compulsive checking with critical and authoritarian parenting have been well documented (408, 416, 499). Critical and authoritarian parenting is likely to be marked by fear, self-doubt and reassurance-seeking and these factors may increase the interpersonal deficits measured by the SPQ.

Doubt/checking symptoms were not found to be familial. However, increased scores in the doubt/checking symptom domain predicted an increased likelihood of depression in participant's first-degree relatives. This association did not occur with any other symptom dimension. An aetiological link between depression and doubt/checking symptoms is supported by the finding that doubt/checking

predicted higher scores for depression on the SCL-90R. However, there was no association between doubt/checking and rates of comorbid major depression and the response of doubt/checking symptoms to antidepressant treatment does not appear significantly better than other OCD symptom subtypes (108).

The cognition that is commonly associated with OCD, i.e. responsibility/threat estimation was only predicted by the doubt/checking symptom subtype. According to the OBQ, individuals who overestimate threat and have inflated responsibility exaggerate estimates of the probability and costs of negative events and believe themselves to be personally responsible for causing or preventing any disastrous consequences associated with their obsessions (436). Studies have associated responsibility/threat estimation with all OCD symptoms, but more commonly doubt/checking and contamination/cleaning symptoms (355, 471, 595). The unique association between increased responsibility/threat estimation in this study emphasises the need to address these cognitions when treating individuals with doubt/checking symptoms with cognitive therapy (see Table 6.1).

Findings related to demographic characteristics:

There were no associations between doubt/checking symptoms and any of the demographic characteristics. It was hypothesised that higher levels of education and employment would be predicted by higher scores on the doubt/checking symptom dimension based on a study that showed higher rates of conscientiousness (518). As this study did not show a relationship between doubt/checking symptoms and conscientiousness, an association with higher rates

of employment and higher levels of education would not be expected. One study associated doubt/checking with male sex (410), however this study had the limitation of only comparing ‘checkers’ to ‘washers’. Most other studies (see Table 1.12) do not show significant differences in demographic characteristics between doubt/checking and other OCD symptoms. Hence, this study’s results in relation to demographic characteristics are consistent with the literature.

In summary, the doubt/checking symptom dimension was characterised predominantly by compulsions. There is also an association with reassurance-seeking which is related to checking. Of particular interest were the associated increased levels of anxiety, depression and psychoticism. When viewed in the context of an increased family history of depression in first-degree relatives, increased neuroticism and interpersonal deficits, there are indications of a much more complex condition that may have biological underpinnings related to major depression (see Table 5.10). This has implications for diagnostic screening and the development of new treatment modalities. Psychological interventions can also be tailored to patients’ needs in view of the findings. Reassurance-seeking, responsibility/threat estimation cognitions, cognitions relating to preventing negative consequences and interpersonal difficulties all need to be targeted as part of a comprehensive management plan for patients with prominent doubt/checking symptoms (see Table 6.1).

6.5 –CLINICAL UTILITY OF OCD SYMPTOM DIMENSIONS

Although there is some evidence for the diagnostic validity of OCD symptom subtypes, this is limited by poor discriminant validity. Considering also the views of Kendel and Jablensky regarding the requirement of a "zone of rarity" between diagnostic groups in order to demonstrate diagnostic validity (302), it is important to examine the clinical utility of OCD symptom dimensions. According to First et al (308) (see Section 1.3(b)), clinical utility is defined as the extent to which our diagnoses assist clinicians to (a) conceptualise diagnostic entities, (b) communicate clinical information to practitioners, patients, and families, (c) use diagnostic concepts during intake interviews, (d) choose effective interventions based on empirical evidence, and (e) predict what resources will be needed in the future. The results of this study will be discussed according to this definition.

6.5 (a) Conceptualising diagnostic entities:

This study provides evidence that OCD symptom dimensions can provide a solution to the heterogeneity of OCD. The heterogeneity of OCD has long been recognised as a key area of research for OCD (121) and OCD symptom dimensions are able to reflect this heterogeneity whilst being able to account for symptom co-occurrence. OCD symptom dimensions do not simply aim to add a "specifier" as with OCD with poor insight or the proposal to add OCD with tic comorbidity (318). The multiple presentations that can occur within the current

diagnostic entity of OCD can be incorporated into a dimensional sub-typing scheme based on predominant OCD symptoms.

6.5 (b) Communicating clinical information to practitioners, patients and families:

A key advantage of adopting a symptom-based approach to the conceptualisation of OCD is that it makes the diagnosis more meaningful. Being able to label the principal symptoms that a patient with OCD presents with gives the receiver of this information a more detailed description whilst retaining the concise nature of a diagnosis. Patients and the families of those suffering with contamination/cleaning symptoms for example may watch a documentary on OCD and immediately recognise that the patient portrayed in the documentary is not like them as the symptoms of the patient portrayed primarily surround doubt and checking. Being able to communicate a diagnosis in a much clearer way improves a patient's and their relatives' understanding of their disorder. If laypersons can clearly identify their condition as different from or similar to someone else's with OCD based on predominant OCD symptoms, it seems reasonable to acknowledge this and specify the dominant OCD symptoms that characterise the patient's disorder.

In the clinical setting, communication among treating teams is enhanced when the diagnosis is described with greater accuracy. When we are handed over a patient by another doctor and told that the patient has OCD with prominent hoarding, we

immediately begin to think of the characteristics associated with the hoarding symptom dimension and how they may affect this patient's presentation.

6.5 (c) Using diagnostic concepts during intake interviews:

When assessing a patient at an intake interview a clinician who is aware of the five OCD symptom dimensions and their associated characteristics will be able to conduct a more detailed assessment, provide a more precise diagnosis and formulate a much more comprehensive management plan. An awareness of the five OCD symptom dimensions will prompt clinicians to enquire about these symptoms and to assess which symptoms are more prominent. A clearer diagnostic impression would then be documented and available for future reference. Being aware that OCD symptom dimensions are associated with certain clinical characteristics, clinicians would then structure their management plans to address each of these clinical characteristics.

As OCD is not seen frequently in the acute psychiatric setting (596), where most clinicians receive their training, OCD symptom dimensions have the potential to improve psychiatric education and training. If trainees and clinicians are aware of the characteristics associated with certain OCD symptom subtypes at intake, patient care is likely to improve. For instance, if the clinician is aware that contamination/cleaning symptoms are associated with disability in the home, they may be more likely to take a collateral history with regards to the level of disability from a family member. Subsequently, this improved assessment will

influence the doctor's decision to admit the patient, provide home support, provide family therapy, and in general improve the quality of the patient's management plan. A management plan that is informed by improved knowledge of contamination/cleaning symptoms is also more likely to address other associated characteristics, e.g. avoidance.

6.5 (d) Choosing effective interventions based on empirical evidence:

OCD symptom subtypes could potentially be most clinically useful in their ability to predict treatment response. The study has presented valuable insights into cognitions and behaviours which should inform psychological treatment approaches. It has also indicated that the doubt/checking symptom dimension predicts more anxiety and depressive symptoms which may explain the good response to antidepressant treatment that has been reported in the literature for this symptom subtype. Although there is preliminary evidence suggesting differential psychopharmacological treatment responses depending on the OCD symptom subtype, studies do not report consistent findings and further empirical investigation will be required if OCD symptoms are to be used as a guide to treatment response.

The study suggests that the choice of psychological methods should be informed by the patient's predominant symptom subtype (see Table 6.1). The hoarding symptom dimension was the least likely of the OCD symptom dimensions to have received any form of treatment. The study found that higher scores on the

hoarding dimension predicted less reassurance-seeking behaviour and a lower likelihood of needing to hoard in order to prevent negative consequences or to reduce obsessions. These findings indicate that psychological strategies targeting reassurance-seeking, negative consequences of obsessions and control of thoughts are unlikely to be of use in patients with predominant hoarding. The literature indicates that patients with predominant hoarding have a poorer response to treatment and so new treatment strategies are being called for. Two areas where the development of new psychological techniques may hold promise involve addressing the reduced levels of conscientiousness and impaired decision making that have been associated with hoarding (359, 361, 365).

Patients with principal OCD symptoms of contamination/cleaning will also benefit from diagnostic sub-typing and from the findings of this study. The study indicates that patients with higher scores on the contamination/cleaning dimension require tailored psychological interventions that address both obsessions and compulsions, avoidance, disability in the home environment, and emotion of disgust. Some researchers have reported a successful use of the antiemetic ondansetron for patients with OCD and high levels of disgust (597) and research regarding disgust and OCD is continuing.

Patients with predominant symmetry/ordering symptoms appear to have a central need to experience “just right” feelings. The identification of “just right” feelings in patients with predominant symmetry/ordering symptoms and subsequent cognitive interventions appear indicated in view of this study’s positive findings in relation to “just right” feelings. An increased tendency to perfectionism and

lower openness should also be addressed in the course of therapy. Although the finding with regards to openness will need to be replicated, they are consistent with a fear of experiencing something different. Such fears could be identified in patients with symmetry/ordering obsessions and addressed with targeted behavioural experiments.

Prominent ego-dystonic obsessions in patients with unacceptable/taboo thoughts have long been recognised as a challenge to behavioural therapy approaches. Behavioural therapy addresses behaviours and these are not prominent in this OCD symptom dimension. Hence alternative techniques for these patients such as audio-loop feedback and cognitive therapy to address cognitions such as the importance of control of thought have been developed. There were two additional findings in this study. These were higher levels of hostility and higher rates of past non-alcohol substance dependence. The treatment implications are uncertain, but are likely to relate to the intense emotions associated with these obsessions. When treating patients with prominent unacceptable/taboo thoughts, clinicians should be particularly mindful of emotions such as anger, shame and resentment and explore these with the patient. Clinicians should also be mindful of possible substance abuse and dependence and the possibility that substances are being used to cope with these intense emotions.

The doubt/checking symptom dimension appears dominated by checking compulsions. Compulsions are central to treatment, and together with reassurance-seeking, respond well to behavioural interventions. Cognitive approaches should aim to address cognitions relating to high responsibility/threat

estimation. The high levels of anxiety, depression and schizotypy that may be associated with doubt/checking symptoms could also be treated with cognitive and behavioural techniques. If schizotypy is prominent, there may be excessive social anxiety and/or persecutory ideation that can also be addressed with cognitive and behavioural strategies. For example, the successful treatment of excessive checking that is associated with leaving home to in order to attend a social function may involve additional strategies to address social anxiety.

In general, OCD symptom dimensions have good clinical utility when it comes to informing treatment choices for our patients with OCD. OCD symptom dimensions may assist clinicians to evaluate patients with OCD for characteristics specifically associated with OCD symptoms so that they can then be addressed as part of a comprehensive management plan. Additional research aiming to improve our understanding of OCD symptom subtypes and their response to treatment, could lead to further improvement in the clinical utility of OCD symptom dimensions.

6.5 (e) Predicting resources needed in the future:

OCD symptom subtypes are useful in predicting resources that may be needed in the future. The study found that the symptom dimension that best predicted disability was contamination/cleaning. If in-patient treatment programs are to be developed to assist such patients and their families, it might be a useful first step to assist patients with contamination/cleaning symptoms. This symptom occurs

frequently, has been shown to respond well to behavioural interventions such as ERP, and is likely to respond to an in-patient program when considering the structure, intensity and support able to be provided by the hospital setting.

Less commonly occurring OCD symptoms are often not well catered for by the mainstream mental health services. For instance, patients with unacceptable/taboo thoughts find it difficult to relate to other OCD patients in the context of support groups or in the course of group therapy due to the predominance of patients with contamination/cleaning and doubt/checking symptoms. These patients may gain most benefit from knowing that other people also experience highly distressing, ego-dystonic thoughts and so the development of on-line services or forums linking patients from different geographical areas may assist these patients. Such patients may also be more likely to use an online service as they may otherwise be too embarrassed to talk about their symptoms openly in a public forum.

Epidemiological surveys assessing prevalence rates in communities would also be more precise if OCD symptom subtypes were used. Hoarding for instance has received increased attention from the media in recent years. Yet good estimates of the prevalence of hoarding are lacking. As local councils are often involved in cases of severe hoarding due to complaints by neighbours, it is appropriate that this community problem be appropriately assessed from an epidemiological perspective and that educational and treatment programs become more widely available.

Conclusions:

OCD symptom subtypes have good clinical utility. The study has revealed several key differences between OCD symptom dimensions that can better inform psychological approaches to treating OCD. Communication, assessment and planning for service provision are likely to improve with the use of more accurate diagnostic sub-typing approaches such as OCD symptom subtypes. Further benefits may be obtained by improving the outlook for patients, their families and the community. Considering the degree of co-occurrence between OCD symptoms, the findings of this study support the clinical utility of OCD symptom dimensions rather than their diagnostic validity.

6.6 – STRENGTHS AND LIMITATIONS OF THE STUDY

The strengths and limitations of this study will be discussed in relation to the conduct of the study, the sample, the assessment tools used in the study and the dimensional approach to diagnostic classification adopted by the study. As many of these limitations have already been discussed, this section will serve to summarise the key limitations of the study, whilst outlining some of its strengths.

6.6 (a) Conduct of the study:

One is always presented with unforseen challenges despite the best planning prior to commencing a study. This study was no exception. The clinical assessments

and completion of self-report instruments took more time than initially expected. This led to a proportion of participants not completing their self-report instruments (n=10, 6.5%). The long time taken to assess participants also meant that there was a waiting list at times and this reduced the recruitment rate. Although most participants were assessed within a month of contacting our department, some participants had to wait two months. During this time 2 participants said that they were “too busy” and “not interested” in participating in research when the time came for them to be assessed.

The assessment could have been shortened by reducing the number of assessment tools. However, these tools were chosen systematically to reflect various areas of diagnostic validity (Table 1.9 provided the framework). Limiting the number of instruments would have made the assessment of the validity of each of the OCD symptom dimensions much less comprehensive. This study aimed to comprehensively evaluate the characteristics of OCD symptom dimensions in a way that had not yet been conducted. Thus the comprehensive nature of the assessment was a key strength of the study.

The assessment of the reliability of the OCD symptom dimensions could have been improved by asking the participant to be interviewed by two raters on two separate occasions. However, this would have probably placed an additional burden on the patient. In this study interrater reliability was tested by comparing assessments made by two raters at the same time. Although raters were blind to the assessment of the other clinician, they may have influenced each other by the questions they asked. Although not within the scope of this study, the assessment

of the reliability of OCD symptom dimensions could have been further improved by collaborating with other centres and ideally having clinicians from different centres assess patients independently.

6.6 (b) Sample:

The limitations of excluding children from the study have been discussed. These relate primarily to some discrepancy with the findings of other studies which included children. Findings relating to children however, would not be as relevant to the daily practice of clinicians who only work with adults. Including children would also make the sample more heterogeneous and reduce the study's power to detect significant results.

Recruitment was conducted systematically with the aim of capturing a broadly representative sample of patients with OCD. After reviewing the characteristics of the sample and referral sources, it appears that the study has achieved this goal. However, it is likely that OCD sufferers with poor insight, those who were homebound and who had commitments that prevented them from undergoing a long assessment were under-represented in the sample. Assessing patients with poor insight will always be difficult in research studies that require informed consent. Several relatives called the department to refer their affected family members, but were left disappointed when it was explained that informed consent was needed to participate in the study. One participant who was homebound was assessed in his home. In this case, the involvement of the participant's case manager from his local community mental health team was particularly helpful.

Some studies offer participants a fee or gift voucher to thank participants for taking time away from their busy schedules and this may have helped with recruiting such participants. Such incentives were not used in the present study due to the risk of potential participants exaggerating the severity of subclinical OCD symptoms in order to meet criteria for OCD.

6.6 (c) Assessment tools:

Assessment tools always have inherent limitations. Although only measures with good psychometric properties were chosen for the study, no instrument is perfect. Some tools proved more problematic in this study, than others. The most problematic assessment tool was the OVIS.

When using the OVIS in this study, at times it was difficult to identify the predominant belief. The instructions ask the rater to list the "main" belief that the patient has had in the last week. This belief should be associated with the greatest distress or impairment in social and occupational functioning. Some participants struggled to understand the concept of beliefs associated with OCD. Occasionally they identified beliefs that were not related to their OCD symptoms and both clinicians and participants had difficulty with the definitions for the characteristics of beliefs Clinicians were often left unsure as to what was truly meant by terms such as "strength", "reasonableness", and "accuracy". Clinicians were asked to rate fluctuations in beliefs and yet the aspect of belief that was to be measured was not defined. (See also Reference (598) and Appendix 10).

The alternative tool that could have been used in place of the OVIS is the Brown Assessment of Beliefs Scale (BABS) (155). This also has good psychometric properties and is used in assessing beliefs in OCD, however the OVIS was chosen as it is used almost exclusively for OCD, was freely available and it had been used in several key studies relating to OCD symptom dimensions. The BABS also shares problems with regards to defining the characteristics of the belief and instructions as to how to identify the belief. A new assessment tool called the Nepean Belief Scale (NBS) has been developed in the context of this study to address the problem of identifying OCD-related belief and the inconsistencies regarding the definitions of the characteristics of belief. Its psychometric properties are currently being tested. A copy can be found in Appendix 11.

6.6 (d) Dimensional approaches to diagnostic classification:

The advantages and disadvantages of a dimensional approach to psychiatric diagnosis are summarised in Table 1.7 and they are discussed in more detail in Section 1.3 (e). In relation to the results of this study, it is important to again emphasise that the proposed OCD symptom subtypes are really best viewed as symptom dimensions rather than categories. The degree of co-occurrence of OCD symptoms limits sub-typing of OCD to a dimensional model. This has clinical implications that have also been discussed in Section 1.3 (e), but they primarily relate to the measurement of these dimensions and the clinical utility of OCD symptom dimensions. Clinicians do not routinely use instruments such as the Y-BOCS in their everyday practice. There is only one Japanese study that showed that when clinicians determined the predominant OCD symptoms, without the use

of an instrument, that they agreed with the principal symptoms resulting from the use of the Y-BOCS (333). This study showed a 74% agreement and argued that OCD symptom dimensions have a good clinical utility.

6.7 – DIRECTIONS FOR FUTURE RESEARCH

Despite two decades of research into OCD symptom subtypes, clinically useful and meaningful results continue to be produced. Research in the field has also produced innovative methods of analysis and diagnostic conceptualisation. The distinction between unacceptable/taboo thoughts and doubt/checking symptoms appears to be a more recent clinically useful advance and results supporting this (such as those reported in this study), require replication. With future studies using instruments other than the YBOCS-SC to assess OCD symptoms, meta-analyses of these studies should give a more definitive answer to the question of whether there are four or five factors.

Studies will also need to be able to account for OCD symptoms such as counting compulsions, somatic obsessions and miscellaneous obsessions and compulsions that currently have inconsistent loading with other OCD symptom dimensions. Future research may involve pooling a number of studies in order to conduct factor analysis of the individual items of the YBOCS-SC, assessing symptoms by other means such as the VOCI or other self-report instruments for OCD, and longitudinal assessments of symptoms examining their temporal stability. Assessing the development of OCD symptoms over the lifespan with longitudinal

cohort studies would be particularly relevant for developmental models of psychopathology. Such studies would shed more light on the impact of OCD symptoms on the development of the personality. One study (491) has shown higher rates of symmetry/ordering symptoms in childhood than in adulthood. It would be important to assess the rates of OCD symptoms in childhood and conduct prospective studies that would establish to what extent various OCD symptoms continue into adulthood, evolve into other OCD symptoms or remit.

As results of more studies become available, pooling of data from different sites could lead to very large samples of patients with OCD that could be appropriately assessed for symptom subtypes using innovative statistical techniques such as latent class analyses. Using such analysis, all variables of interest with respect to sub-typing could be entered into the analysis (OCD symptoms and characteristics) to produce latent factors. We could then have a clearer idea as to which OCD symptoms and other important characteristics (e.g. comorbidity, insight, age of onset, gender ratio, treatment response, disgust propensity, neuropsychological findings) group together to form latent factors.

Although complex statistical techniques such as factor analysis may be useful in the research setting, future research also needs to address the usefulness of OCD symptom subtypes in the clinical setting. Studies asking clinicians to assess patients first without the use of rating scales and to determine OCD symptom subtypes, which would then be compared to instrument-based assessment made independently by researchers, are required in order to assess the clinical utility of OCD symptom sub-typing. History has shown that diagnostic practices have

changed in response to changes in diagnostic conceptualisation and diagnostic techniques. An alternative method of diagnosing symptom-based subtypes in OCD is to teach clinicians to use diagnostic tools (such as the YBOCS-SC) as these that are relatively user-friendly. More user-friendly diagnostic tools may be developed and tested in the future. These would be potentially useful in aiding clinicians to establish dimensional diagnoses.

Future research not only requires the development of better scales to measure OCD symptoms, but also better scales to assess its associated characteristics. This is best illustrated by the difficulties described in using the OVIS. It was evident that the characteristics of belief were significant descriptive variables associated with OCD symptoms and yet they were not well researched and lacked reliable assessment tools.

Future research should assess neuropsychological, genetic and neuroimaging correlates of OCD symptom subtypes. Such research is costly and it would have been an additional burden on participants who had already undergone a lengthy assessment process. Such avenues of research hold promise in improving our understanding of the potential biological pathways involved in the different OCD symptom dimensions.

The importance of tailoring treatment plans to individuals and their prominent OCD symptoms has been discussed and has the potential for the development of innovative treatment approaches e.g. the use of antiemetics in patients with high levels of disgust propensity. Most studies have assessed differential responses of

OCD symptom dimensions to generic treatments for OCD such as SSRIs (see Table 1.12). However, the findings of this study suggest that research involving more targeted approaches based on OCD symptom dimensions is required. Specific areas which the study indicates might be particularly fruitful include evaluation of the response to antipsychotics in patients with higher levels of psychoticism or schizotypy, and evaluation of the efficacy of antidepressants in patients with prominent doubt/checking. Novel treatment modalities such as deep brain stimulation (DBS) for treatment-resistant patients also need evaluation in the context of OCD symptom dimensions as there is evidence to suggest that different OCD symptoms are mediated by different neural pathways (60, 74). DBS is still not widely used and although there is a suggestion that resistant contamination/cleaning symptoms may respond better (91), sample sizes were too small to make any meaningful conclusions (599).

The evaluation of psychological modalities of treatment in the context of OCD symptom dimensions is also an area that requires further investigation. Several findings of this study indicate that different psychological modes of treatment may be required for patients presenting with certain symptom dimensions. Suggested differences in cognitive and behavioural therapy approaches depending on different cognitions and levels of avoidance and reassurance-seeking require empirical investigation.

Considering OCD is a debilitating disorder for many patients, the effectiveness of structured day or in-patient programs also needs to be evaluated. Differences in levels of disability, avoidance, and reassurance-seeking between the different

symptom subtypes indicates that not all patients will respond equally well to weekly sessions of ERP delivered by a clinician from their office.

In summary, future research needs to clarify how many OCD symptom dimensions exist and which OCD symptoms they consist of. This is likely to result from large collaborative studies that do not rely solely on the use of the YBOCS-SC to assess for OCD symptoms. Evaluation of the clinical utility of OCD symptom dimensions should be furthered by comprehensive evaluation of associated clinical characteristics and responses to targeted treatment modalities.

CHAPTER 7

CONCLUSIONS

In conclusion, OCD symptom dimensions improve the conceptualisation of the heterogeneity of OCD. OCD symptom dimensions appear to have clinical utility in that they are associated with a number of distinct clinical (and other) characteristics.

The study made a significant original contribution in being able to distinguish the characteristics of an unacceptable/taboo thoughts symptom dimension from a doubt/checking symptom dimension. Although five-factor models, such as the model produced by this study, have been recognised, few studies have attempted to systematically evaluate key differences between the two. Unacceptable/taboo thoughts can be seen as having ego-dystonic obsessions central to their phenomenology, whereas doubt/checking symptoms relate predominantly to compulsions that function to prevent negative consequences. There were also significant differences in the accompanying cognitions, behaviours and type and degree of associated psychopathology between the unacceptable/taboo thought symptom dimension and the doubt/checking symptom dimension; they warrant further investigation.

Other OCD symptom dimensions were also associated with distinct characteristics that have implications for psychological treatments and future research.

The study also highlighted the significant challenges in evaluating insight and beliefs associated with OCD. The current diagnostic specifier of poor insight is not supported by the findings of this study for the following reasons: some participants did not have an identifiable belief; the study indicates that insight is not a simple categorical measure that can be reliably assessed in clinical practice; and the characteristics of belief have been poorly defined in the literature and limit the reliability of current measures.

Comorbidity and family history findings do not support a notion of the obsessive-compulsive spectrum disorders. Comorbidity and family history were more common for anxiety disorders than for the proposed obsessive-compulsive spectrum disorders. Thus results of this study support the conceptualisation and classification of OCD as an anxiety disorder. Any change to the current status of OCD as an anxiety disorder is bound to have far reaching consequences. Hence, this study is relevant for the planning of DSM-5.

OCD symptom dimensions play a significant role in improving the conceptualisation of a severe, debilitating and poorly understood disorder. This study provided ample evidence that five OCD symptom dimensions (hoarding, contamination/cleaning, symmetry/ordering, unacceptable/taboo thoughts and doubt/checking) are associated with distinct clinical characteristics. Results have provided clear directions for future research and provide good evidence that psychological treatment should be tailored according to the symptom dimensions that are predominant in an individual suffering from OCD.

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