THE SIGNIFICANCE OF OBSESSIONS

by

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ABSTRACT

The purpose of this thesis was to investigate a specific cognitive theory of obsessions; namely, that unwanted and repugnant intrusive thoughts cause distress and persist when the person interprets their occurrence as highly personally significant and important. Two studies were conducted. In the first study, we described the development and undertook a validation study of a new scale of obsessional-compulsive symptoms, the Vancouver Obsessional Compulsive Inventory (VOCI). This measure was a necessary first step because established measures of obsessional-compulsive symptoms are inadequate in their assessment of a number of domains of obsessional-compulsive complaints, particularly obsessions. Our findings in samples of people with obsessive-compulsive disorder (OCD), people with other anxiety disorders or depression, community adults, and undergraduate students suggest that the VOCI is a promising new measure. In the second study, we investigated the role of interpretations of the personal significance and importance of intrusive thoughts in the occurrence of obsessions. Specifically, we hypothesized that people who have repugnant obsessions or frequent, distressing intrusive thoughts would interpret their intrusive thoughts as highly personally significant and important. Our hypotheses were, in general, supported. There was a clear relationship between beliefs and interpretations of the importance of thoughts and obsessions in both OCD and nonclinical samples. In addition, these beliefs and appraisals appeared to be specifically related to repugnant obsessions, rather

than obsessive-compulsive complaints in general. This research represents one of the first attempts to evaluate the assertion that misinterpretations of intrusive thoughts are fundamental in the experience of obsessions. The development of the VOCI was a necessary first step in evaluating the relationship between interpretations of personal significance and particular obsessional-compulsive complaints. By demonstrating specific interpretations that are associated with clinical obsessions, we hope to refine cognitive-behavioural models of obsessions, and suggest ways in which current cognitive-behaviour therapy for obsessions can be sharpened and made more effective.

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CHAPTER I

GENERAL INTRODUCTION

1.1 Obsessive-Compulsive Disorder (OCD)

Obsessive-compulsive disorder (OCD) refers to the presence of clinically significant obsessions and/or compulsions; that is, obsessions or compulsions that result in significant distress or impairment in functioning (American Psychiatric Association, 1994). Obsessions are recurrent, intrusive, unwanted, and distressing thoughts, images or impulses that are recognized as coming from one's own mind, and are difficult to control. They are typically ego-dystonic, in that the person realizes they are excessive, do not make sense, or do not fit with his or her personality. Compulsions are repeated overt behaviours or covert mental acts that the person feels driven to perform, but they are clearly excessive and are usually performed to reduce anxiety or discomfort. The purposeful nature of compulsions distinguishes them from other repeated behaviours, such as habits, tics, and stereotyped behaviours exhibited by people with disorders such as schizophrenia or autism.

Compulsions are often, but not always, directly tied to obsessions,[1] in that they reduce the anxiety and discomfort associated with the experience of the obsession. The typical sequence in a person afflicted with OCD begins with an

[1] This assertion is based on the current, broad definition of obsessions, not the narrower definition of repugnant obsessions we propose below.

obsession, which may occur spontaneously (e.g., while having a shower, you suddenly experience an image of your mother lying in a coffin), or may be triggered by some internal or external stimulus (e.g., after touching a garbage can, you experience the thought that your hands are contaminated with potentially fatal germs; helping your wife pack for a trip triggers an image of her airplane exploding). Obsessions can occur in the form of thoughts (e.g., "my hands have been contaminated by germs,"), images (e.g., a mental picture of your home engulfed in flames), or impulses (e.g., a sudden impulse to throw your new puppy against the wall). The obsession is typically followed by a compulsive urge, that is, an urge to perform compulsive behaviour. Rachman and Hodgson (1980) referred to the compulsive urge as the "psychological activity that lies between an obsessional thought and the execution of a compulsive act," (p. 211). Note that obsessional impulses and compulsive urges are *not* synonymous. An obsessional impulse is an intrusive thought to do something dreadful that you find abhorrent, and the impulse is not acted upon.[2] A compulsive urge, on the other hand, is a feeling that you need to perform a compulsive behaviour. A compulsive urge is often acted upon, although it may be resisted and the compulsion not performed. Most people with OCD have at least some control over performing their compulsions; this ability is the cornerstone of behaviour therapy for OCD. However, most often people with OCD give into their compulsive urges and perform compulsions.

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[2] I have heard of very rare cases where people with OCD have acted upon their obsessional impulses, but this is not at all typical. In fact, even when patients are encouraged in therapy to give up their resistance of their impulses, they still do not actually act upon them.

The compulsion may be clearly and realistically connected to the content of the obsession (e.g., a woman with an obsessive thought that her hands are contaminated may feel compelled to wash her hands immediately; a man with an impulse to throw his puppy across the room may feel compelled to check the puppy repeatedly to ensure he has not harmed it). Alternatively, the compulsion may have a magical but clear connection to the content of the obsession (e.g., a man having an image of his mother lying dead may feel compelled to form an image of her standing alive and well, in an effort to neutralize the repugnant thought and, presumably, keep her safe). Finally, the compulsion may have a magical and remote connection to the content of the obsession (e.g., a man having an image of his mother lying dead may feel compelled to wash his hands a certain number of times). In addition to obsessions, compulsive urges, and compulsions, most people with OCD engage in other strategies such as avoidance. Avoidance most often takes the form of attempting to avoid stimuli that trigger obsessions. If you have frequent obsessions concerning contamination by germs, you will tend to avoid touching things you consider contaminated; if you have obsessions about your house burning down, you may tend to avoid leaving lights on overnight; if you have obsessions about harming babies, you may avoid holding them; if you have obsessions about the safety of your loved ones, you may attempt to suppress thoughts of them traveling by airplane.

While most people with OCD experience obsessions, compulsive urges, compulsions, and avoidance behaviour, only the presence of obsessions *or*

compulsions is required for diagnosis. Some people with OCD have obsessions without any compulsions; for example, a woman has graphic images of her children being mutilated, and responds only by attempting to suppress the thoughts, and to avoid situations where her mind is free to wander. More frequent are people with OCD who have compulsions without obsessions. For example, a man feels compelled to say multisyllable words over and over to himself, accenting each syllable in turn; there is no obsession that occurs before he feels the urge to repeat the words. In some cases, however, compulsions that appear to occur in the absence of obsessions were originally performed in response to an obsession (e.g., "I have to make sure I say the word properly so I don't say the wrong thing in the future"), but after considerable time has passed the person is no longer aware of the obsession that originally motivated the compulsive urge.

Until the 1980s, OCD was thought to be very uncommon, with a lifetime prevalence of less than 1%. More recent estimates based on the Epidemiological Catchment area studies suggested a lifetime prevalence of 2.5% (Robins et al., 1984), and a similar Canadian study found a lifetime prevalence of 3% (Bland, Newman & Orn, 1988). Some current researchers, however, believe that these figures are overestimates; in particular, the diagnostic tools used by lay interviewers may have detected people with subclinical obsessions and compulsions (that is, obsession-like thoughts or compulsion-like behaviours that do not cause significant interference or distress) and classified them as having OCD. Rasmussen and Eisen (1990), considering all the available

epidemiological data at that time, suggest that the lifetime prevalence is likely between 1% and 2%. They also report figures on the well-established comorbidity of OCD and depression. In their sample of 100 consecutive patients with OCD, 31% received a concurrent diagnosis of major depressive disorder, a figure far above any other Axis I disorder, and they estimated the lifetime prevalence of major depression in their OCD sample as 67% - 78%.

1.1.1 Types of Obsessions and Compulsions

OCD is a diagnosis that comprises a diverse collection of obsessions and compulsions. In this thesis we will be discussing different domains of obsessions and compulsions seen in OCD, and it will be useful at this point to review both what have traditionally been seen as the main types of obsessions and compulsions, and more recent attempts to empirically derive the main categories of obsessions and compulsions through factor analysis and cluster analysis. Most patients with OCD experience obsessions and compulsions in more than one domain (Rasmussen & Tsuang, 1986); nevertheless, there may be theoretical and practical differences among the different types of obsessive and compulsive complaints. For example, some authors have suggested there may be important differences between patients with washing compulsions and patients with checking compulsions, the two most common categories of obsessive-compulsive complaints (Rachman & Hodgson, 1980). For example, washers have been shown to exhibit more phobic-like fear and avoidance (Steketee, Grayson, & Foa, 1985).

Across different sites and studies, the two most common compulsions are checking and cleaning or washing (e.g., Antony, Downie, & Swinson, 1998; Rachman & Hodgson, 1980; Rasmussen & Eisen, 1998; Rasmussen & Tsuang, 1986). Other common compulsions include counting, reassurance-seeking, repeating, ordering and arranging, and hoarding (Antony, Downie, & Swinson, 1998; Rasmussen & Eisen, 1998). Rasmussen and Eisen (1998) reported that the most common obsessions are thoughts of contamination, doubts, somatic obsessions (i.e., thoughts that one may have contracted an illness), need for symmetry, aggressive obsessions, and sexual obsessions. Antony, Downie, and Swinson (1998) found that the most common obsessions were aggressive obsessions, thoughts of contamination, need for symmetry/exactness, somatic obsessions, and hoarding or saving obsessions. The main difference between the two studies is that in the former, doubts were recognized as a major category of obsessions; in fact, they appear to be the major obsessions that are associated with compulsive urges to check (Rachman & Hodgson, 1980). In contrast, Antony, Downie, and Swinson did not report doubts as a category of obsessions. We would argue that this difference is the result of an unfortunate feature of the Yale-Brown Obsessive Compulsive Scale symptom checklist (YBOCS; Goodman et al., 1989a,b,c), which was used in the Antony et al. study. The YBOCS symptom checklist does not include doubts as a specific category of obsessions; rather, thoughts about being responsible for something terrible happening (e.g., that you will be responsible for the house burning down because you left the lights on) is included in the category of aggressive obsessions. Not

only is it difficult to see why such thoughts, which for patients typically take the form of doubts ("Did I leave the lights on?") should be considered aggressive, but in doing so, YBOCS interviewers tend to miss such pathological doubts, which have long been considered a major characteristic of OCD (e.g., Rachman & Hodgson, 1980). In addition, this feature of the YBOCS symptom checklist has, in our view, distorted the results of factor analytic studies described below.

Leckman et al. (1997) conducted a factor analysis of the YBOCS symptom checklist data from two independent groups of patients with OCD (n = 208 and n = 99). The units of analysis were not individual checklist items (e.g., violent or horrific images; excessive concern with household contaminants), but the 13 categories of symptoms established a priori by the authors of the YBOCS: aggressive obsessions, contamination obsessions, sexual obsessions, hoarding/saving obsessions, religious/scrupulosity obsessions, obsessions with need for symmetry/exactness, somatic obsessions, cleaning/washing compulsions, checking compulsions, repeating rituals, counting compulsions, ordering/arranging compulsions, and hoarding/collecting compulsions (Goodman et al., 1989c). The YBOCS symptom checklist also includes categories for miscellaneous obsessions and compulsions, but these were not included in the factor analysis. In both samples of patients, Leckman et al. found four-factor solutions (based on principal components analysis with varimax rotation, using the Kaiser-Guttman rule of eigenvalues > 1 to determine the number of factors). The four factors were (1) aggressive, sexual, religious, and somatic obsessions and checking compulsions; (2) symmetry obsessions and ordering/arranging,

counting, and repeating compulsions; (3) contamination obsessions and cleaning compulsions, and (4) hoarding obsessions and hoarding/collecting compulsions.

Summerfeldt, Richter, Antony, and Swinson (1999) conducted a confirmatory factor-analysis of the YBOCS symptom checklist in 203 patients with OCD. When they factor analyzed the 13 categories, they found that the four factor solution found by Leckman et al. was superior to either a single-factor, two-factor (obsessions and compulsions), or three-factor solution (as found by Baer et al., 1994). They then attempted to replicate the four-factor solution based on the individual symptom checklist items (44 items) rather than the 13 categories, but the four-factor solution was no longer a good fit for the data. In particular, the obsessions and checking factor found by Leckman et al. was not well replicated at the item level—in fact, two traditionally recognized symptoms (fear of being responsible for something terrible happening, and checking locks, stoves, and appliances) had the lowest loadings on this factor. This finding supports our above contention that the YBOCS symptom checklist grouping of "aggressive obsessions" is ill conceived.

1.1.2 Research on Obsessions rather than Compulsions

Most research in the area of OCD has focused on compulsions, in particular the most common overt compulsions of washing and checking; obsessions have received much less attention. Overt compulsions are observable and easily measurable, and obviously interfere with functioning. Afflicted individuals may be observed washing, checking, repeating themselves, or arranging objects for many hours per day, behaviour that is noticed by their

families and often leads to presentation to health professionals. Clinicians and researchers interested in the application of behavioural theories to psychological problems in the 1950s - 1970s tended to focus on overt compulsions, which were ideally suited for behavioural observation, experimentation, and modification. The main theory of the persistence of compulsive behaviour, the anxiety reduction theory, held that the performance of compulsions reduces anxiety; compulsions are negatively reinforced and therefore persistent (see Rachman & Hodgson, 1980). A series of experiments by Rachman and his colleagues (see Rachman & Hodgson, 1980 for a review) demonstrated that, in most OCD patients, the performance of compulsions does successfully reduce anxiety. However, if compulsions are prevented, the urge to perform them and the associated anxiety appears to spontaneously decay, albeit at a slower rate. The main psychological treatment for OCD, exposure with response prevention, is particularly well suited to patients with overt compulsions, especially checking and washing; studies on its effectiveness for OCD patients with overt compulsions (patients without overt compulsions were often excluded from these studies) indicate that 60 - 70% are much improved (see Baer & Minichiello, 1998, and Rachman & Hodgson, 1980 for reviews).

Relatively little attention has been paid to obsessions, probably because, unlike overt compulsions, they are unobservable, internal phenomena that are difficult to measure and not directly amenable to behaviour therapy; they are usually treated indirectly through the modification of their associated compulsions. As described above, the most common obsessions in OCD

patients are thoughts of dirt and contamination, which are almost invariably associated with cleaning and washing compulsions, and pathological doubts, which tend to be associated with checking compulsions (Rasmussen & Eisen, 1998; Rachman & Hodgson, 1980). Exposure and response prevention aimed at reducing the compulsive behaviour has been shown to lead to a parallel reduction in the obsessions that provoked them (see Baer & Minichiello, 1998). Thus, there may be little benefit in attempting to directly modify the fears of contamination or recurrent doubts that trouble a large proportion of OCD patients, and the focus on overt compulsive behaviour may be well justified. However, it has been recognized for some time that behavioural treatment of obsessions without associated overt compulsions is more difficult, and it has less empirical support (e.g., see Freeston et al., 1997; Rachman, 1976; Salkovskis & Westbrook, 1989). Although Rachman (1976) recommended a modified version of exposure and response prevention, in which the patient was instructed to produce their obsession and refrain from any neutralization (Rachman referred to this method as *satiation*), this treatment often did not result in lasting improvement. The advent of cognitive theories of anxiety in general and OCD in particular have sparked renewed interest in theorizing about obsessions and modifying them using cognitive adjuncts to established behavioural techniques.

1.1.3 Explanation of Terms

Before describing current cognitive theories of OCD in general and of obsessions in particular, it will be helpful to define some common terms. First, current cognitive-behavioural models of OCD imply a continuity from "normal" to

"abnormal" obsessions. The so-called "normal" obsessions described by Rachman and de Silva (1978), while experienced occasionally by most people, do not tend to occur at a high frequency, and, by definition, do not produce clinically significant interference or distress. More recently, researchers have preferred to reserve the term *obsessions* for clinically relevant unwanted intrusive thoughts, images and impulses; similar thoughts in people without OCD have been termed *unwanted intrusive thoughts*. Through this thesis I will attempt to maintain this later terminology.

Secondly, there has been some confusion over what constitutes an obsession. Broadly defined, obsessions refer to unwanted, recurrent, and distressing thoughts, images, and impulses that are difficult to control; this definition has been adopted by the DSM-IV, its predecessors, as well as the influential YBOCS (Goodman et al., 1989c). This broad definition of obsessions includes virtually any thought that precedes a compulsion, including thoughts of dirt and contamination, recurrent doubts, a need for symmetry, and thoughts about needing to keep useless objects. However, in his recent papers outlining a cognitive theory of obsessions, Rachman assumes a narrower definition of obsessions (Rachman, 1997, 1998), although this is not made explicit in these papers. The obsessions to which Rachman refers are not only unwanted, recurrent, and distressing, but also repugnant, abhorrent, and alien: in a word, nasty. Because this type of abhorrent, nasty obsession is the main subject of the second study of this thesis, an unambiguous term is required to distinguish these particular obsessions from the broader category of obsessions as defined in the

DSM-IV. These obsessions, which typically focus on themes of harm happening to loved ones, aggression towards defenceless persons and creatures, sex, immorality, and blasphemy, may be described as *repugnant obsessions*.[3] Repugnant obsessions may occur in the form of thoughts (e.g., "If I pick up that spoon, I'll kill the baby"), impulses (e.g., an impulse to shout out obscenities during church services), or images (e.g., images of mutilated bodies).

Although repugnant obsessions are frequently associated with overt compulsive behaviour (e.g., repeating an action like going out of a door; checking that the children have not been kidnapped), they are also often the subject of mental neutralizing (e.g., attempting to replace the obsession with a good thought or phrase). Unlike typical patients with cleaning, checking, arranging, hoarding, and other compulsions, the most distressing and disabling problem for patients with these types of obsessions usually appears to be the obsession itself; thus, we may refer to such patients as being *primary obsessionals* or *obsessional* patients (e.g., Rachman & Hodgson, 1980). The term *obsessional* will be used to describe patients with repugnant obsessions as one of their main obsessive-compulsive complaints, regardless of the presence or form of compulsive behaviour.

1.2 Cognitive-Behavioural Models of OCD

The early behavioural theories of OCD were based on learning theory, in particular, Mowrer's two-stage theory of fear and avoidance (Mowrer, 1960).

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[3] A characteristic frequently associated with such repugnant obsessions is their unacceptability; I am choosing not to use unacceptability as a defining characteristic because it presupposes a tenet of the cognitive theory of obsessions, namely, that obsessional patients find the occurrence of such thoughts morally reprehensible, while non-obsessional subjects do not.

According to the two-stage theory, particular stimuli come to be associated with fear or anxiety due to classical conditioning; escape and avoidance behaviour reduce this anxiety and are thereby negatively reinforced (operant conditioning). Through successful escape and avoidance behaviour, the original anxiety is preserved. This theory is intuitively appealing for OCD: it suggests that certain thoughts may come to be anxiety-provoking or distressing through classical conditioning, and become obsessions (Rachman, 1971; Teasdale, 1974). Compulsions, in turn, may become persistent through negative reinforcement, and through the performance of compulsions, the anxiety associated with obsessions fails to extinguish. This theory, the anxiety reduction theory of OCD, was the basis of behaviour therapy for OCD developed by Meyer (Meyer, 1966; Meyer, Levy, & Schnurer, 1974). Meyer suggested that helping the patient to resist performing compulsions is a necessary feature of successful behaviour therapy for OCD. Meyer's approach was adopted and developed further by Rachman and colleagues (e.g., Rachman, Hodgson, & Marks, 1971), who advocated exposure in vivo (particularly with therapist modelling) and response prevention. Through exposure and response prevention, the person is exposed to stimuli that typically provoke the obsession, and is aided in resisting performance of their compulsions. Without the performance of compulsions, the anxiety associated with the obsessions spontaneously decays, and is eventually extinguished.

There were a number of problems with the behavioural theory of OCD and with behaviour therapy (exposure and response prevention) for OCD that

indicated to some researchers a need for cognitive approaches (see Salkovskis, 1998 for a review). These included the limitations of exposure and response prevention for many patients, in particular, patients who dropped out of the highly intensive treatment, and patients without overt compulsions. In addition, Salkovskis (1998) noted that the two-stage theory of anxiety applies equally well to all anxiety disorders, not just OCD; what, then, is the process that results in OCD in particular, rather than another anxiety disorder?

Prior to the advent of cognitive theories of OCD, Rachman and de Silva (1978) found that a large majority of unselected participants reported experiencing unwanted and repugnant intrusive thoughts that were indistinguishable in content from classic clinical obsessions. Thus, we can conceptualize a continuum of unwanted intrusive thoughts, with clinical obsessions (recurrent intrusive thoughts that cause significant distress or interference) representing a small proportion of intrusive thoughts at the most severe end. Rachman and de Silva hypothesized that unwanted intrusions may be generated by stress or mood disturbance. However, they were unable to explain why clinical obsessions result from these normal processes, and why certain subjects (sex, aggression, blasphemy) appeared to be over-represented as themes of obsessions. The input of cognitive theories in the 1980s has suggested mechanisms by which normal intrusive thoughts may progress to clinical obsessions.

Beck (1976), based on his influential cognitive theory of depression, developed a general cognitive theory of anxiety, suggesting that anxiety

disorders involve the persistent misinterpretation of particular stimuli as threatening (see also Beck & Emery, 1985), and/or the underestimation of one's ability to cope effectively with the threat. Beck's cognitive model of anxiety was itself based on Lazarus's cognitive appraisal theory (see Lazarus & Folkman, 1984). According to the appraisal theory, there are two basic types of appraisal: *primary* ("Am I in trouble or being benefited, now or in the future, and in what way?") and *secondary* ("What if anything can be done about it?") (Lazarus & Folkman, 1984, p. 31). Primary appraisals can be *irrelevant* (nothing important is happening), *benign-positive* (something desirable is about to happen), or *stressful* (indicating current or potential harm, loss, threat, or challenge). Of particular relevance for anxiety and anxiety disorders would be Lazarus's concept of threat appraisals (one form of stressful primary appraisal), namely, appraisals involving potential harm or loss occurring, which are associated with threat emotions of fear and anxiety. Secondary appraisal involves evaluating how one could respond to any sort of stressful situation. Lazarus's theory is important for cognitive theories of anxiety because it suggests that the degree to which we experience anxiety at any given time is dependent on the interaction of our primary appraisals of threat with our secondary appraisals of coping options.

1.2.1 Salkovskis's Cognitive-Behavioural Theory of OCD

The cognitive view of anxiety proposed by Beck and by Lazarus has led to two highly influential theories of specific anxiety disorders: Clark's (1986) theory of panic, and Salkovskis's (1985, 1989, 1996) theory of OCD. Clark's cognitive theory of panic states that panic is the result of catastrophic misinterpretation of

normal bodily sensations, especially sensations of anxiety. Just as Clark's theory is based on the idea that everyone experiences bodily sensations of anxiety, but not everyone interprets them catastrophically, Salkovskis's cognitive-behavioural theory of OCD suggests that the experience of unwanted intrusive thoughts is normal, but that only some individuals misinterpret their intrusions as indicating that they may be pivotally responsible for causing or preventing a feared outcome. The concept of pivotal responsibility in this context has been defined as "the belief that one has power which is pivotal to bring about or prevent subjectively crucial negative outcomes" (Salkovskis, Rachman, Ladouceur, and Freeston, 1992; cited in Salkovskis, 1996, p. 111).

More specifically, Salkovskis argues that "clinical obsessions are intrusive cognitions, the occurrence and content of which patients interpret as an indication that they might be responsible for harm to themselves or to others unless they take action to prevent it" (1989, p. 678). According to the theory, the appraisal of responsibility leads to distress, and the person seeks to neutralize the potential threat for which he feels responsible through some preventive action (such as overt or covert compulsions). The distress, neutralization, avoidance, and attempts to control or suppress the thought that result from this appraisal serve to enhance the salience and accessibility of the intrusion and related thoughts, and therefore the intrusions increase in frequency, becoming clinical obsessions. In addition, neutralization and avoidance are hypothesized to maintain the responsibility appraisals by preventing their disconfirmation. Salkovskis's cognitive-behavioural model of OCD is presented in Figure 1.

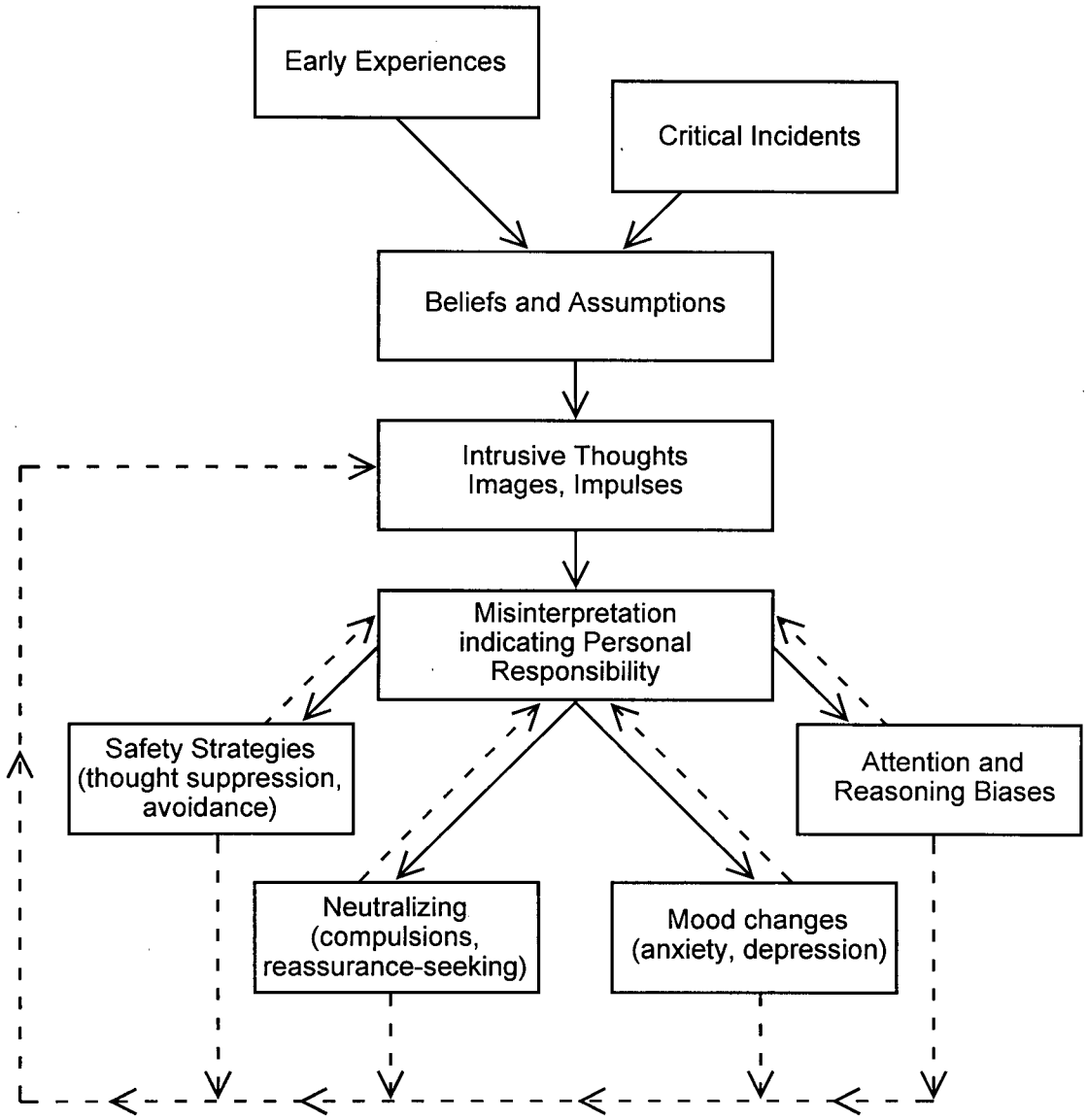

Figure 1. Salkovskis's cognitive-behavioural model of the origins and maintenance of obsessional-compulsive problems (based on Salkovskis et al., 2000). Dashed lines indicate potential feedback loops or *vicious circles*.

Salkovskis's model has received empirical support in both experimental and psychometric studies. In several studies, researchers have manipulated responsibility and found that, in conditions of reduced responsibility, distress and urges to neutralize following a provocation task were reduced. For example, Lopatka and Rachman (1995), using participants with OCD and, specifically, checking compulsions, found that reducing checkers' perceived responsibility for a feared outcome by persuading them to share responsibility with the experimenter resulted in decreased distress and urges to check. Shafran (1997) also found that, under conditions of reduced responsibility, patients with OCD experienced less distress and reduced urges to neutralize. Bouchard, Rhéaume, and Ladouceur (1999) and Ladouceur, Rhéaume and Aublet (1997) found that nonclinical participants checked more often during a task under conditions of high responsibility compared to low responsibility. Other studies have shown that responsibility beliefs and appraisals are correlated with obsessive-compulsive symptoms. For example, Wilson and Chambless (1999) found that beliefs in one's responsibility for negative outcomes were related to a measure of obsessions and compulsions in undergraduate students. Salkovskis et al. (2000) found that responsibility beliefs and appraisals predicted obsessive-compulsive symptoms in a mixed group of patients with OCD, anxious controls, and nonclinical controls. Other studies have shown that beliefs in responsibility are more highly endorsed in patients with OCD than in other groups (e.g., Freeston, Ladouceur, Gagnon, & Thibodeau, 1993; Salkovskis et al., 2000).

1.2.2 Other Cognitive-Behavioural Models of OCD

Salkovskis's theory has been influential in focusing attention on the interpretations that OCD patients make of their obsessions. However, other researchers have not adopted his emphasis on *responsibility* as the key factor in appraisals of intrusive thoughts.

Clark and Purdon (1993) have argued that one of the primary misappraisals in the genesis of OCD involves dysfunctional ideas about the necessity of *controlling* one's thoughts. Their model is based on the work of Wegner, who has suggested that thought suppression leads to a paradoxical increase in the frequency of unwanted thoughts after the suppression period (e.g., Wegner, Schneider, Carter, & White, 1987). Clark and Purdon suggest that dysfunctional beliefs about thought control may lead people to attempt to control their negative intrusive thoughts. This in turn may lead to a paradoxical increase in the frequency of their thoughts, as well as in their salience. In particular, if depressed mood is present, the person's ability to effectively control their thoughts is reduced. Obsessions develop when thought control strategies fail, and neutralization (e.g., compulsions) may represent a "last desperate attempt to control the intrusion once the more usual distracter strategies fail" (p. 166). They recommend that treating obsessional patients should focus on modifying their beliefs about the necessity of controlling unwanted intrusive thoughts.

Rachman (1993) introduced the concept of thought-action fusion, a way in which OCD patients interpret unwanted intrusive thoughts as having special significance through the psychological fusion of thoughts and actions. In our

development of the concept, we defined two major forms of thought-action fusion (TAF): moral TAF and likelihood TAF (Rachman, Thordarson, Shafran, & Woody, 1995; Shafran, Thordarson, & Rachman, 1996). Moral TAF refers to beliefs that thoughts are morally equivalent to actions; likelihood TAF refers to beliefs that thoughts can increase the probability of bad events actually occurring. Thus, TAF can be seen as two special cases of attaching excessive importance to unwanted intrusive thoughts; one can believe thoughts are important because they are morally unacceptable, and one can believe thoughts are important because they increase the risk of real-life negative events. In our development of a measure of TAF (Shafran, Thordarson, & Rachman, 1996), we found that TAF-Likelihood was associated with obsessive-compulsive symptoms. We postulated that this belief might be a precursor to a responsibility appraisal: if you believe your thought has increased the chances of a bad event happening, you are likely to feel an increased sense of responsibility for preventing the event (e.g., by performing compulsions).

Freeston, Rhéaume and Ladouceur (1996) proposed that a variety of misinterpretations of intrusive thoughts, including but not limited to interpretations of personal responsibility, may be involved in generating distress and urges to neutralize. Their hypotheses were based on their research on cognitive therapy for OCD patients without overt compulsions; many of these patients had repugnant obsessions as described earlier. Although they did not present an alternative cognitive-behavioural model of obsessions, they described a preliminary typology of such misinterpretations, including overestimating the

importance of thoughts; exaggerated responsibility; need for perfect certainty or control over thoughts; overestimating probability and severity of consequences of negative events; and believing that anxiety generated by intrusive thoughts is unacceptable or dangerous. Of these types of appraisals, they found that a common feature of all their patients was the importance they attached to the presence or content of their obsessions.

Freeston, Rhéaume, and Ladouceur (1996) described three ways in which their patients appeared to be overestimating the importance of their obsessions. First, some patients tended to interpret the presence (and presumably persistence) of their intrusion as meaning it must be important, a form of ex-consequentia reasoning: If I think it all the time, it must be important. Second, some patients interpreted their obsession as meaning that it must reflect their true nature, or that their thoughts mean that they are a morally bad person. Third, some patients made interpretations of thought-action fusion, namely, that thinking of a bad event made the event more likely to happen.

1.2.3 A Cognitive-Behavioural Model of Repugnant Obsessions

Drawing from Salkovskis' model, as well as our work on thought-action fusion and Freeston, Rhéaume, and Ladouceur's development of the concept of overimportance of obsessions, we have sought to sharpen the focus of what is misinterpreted in repugnant obsessions. We hypothesize that patients with repugnant obsessions tend to misinterpret the occurrence of their intrusive thoughts as highly *personally significant* and *important*. In other words, repugnant obsessions arise when one misinterprets the occurrence of normal

negative intrusive thoughts as signifying something important about oneself or one's immediate circumstances. This position has recently been developed in two papers by Rachman (1997, 1998), in which he proposes, "obsessions are caused by catastrophic misinterpretations of the significance of one's thoughts, images, and impulses" (1997, p. 793). The roots of this idea in fact predate cognitive theorizing in OCD: in his description of the satiation method for the modification of obsessions (essentially exposure and response prevention), Rachman (1976) wrote " . . . our satiation patients are told that most people experience unwanted, unacceptable intrusive thoughts but that they rarely attach significance to these useless ideas and therefore can dismiss them easily. The patients are encouraged to regard their obsessions as alien and useless . . ." The current cognitive-behavioural model of obsessions represents a narrowing of emphasis on the particular types of interpretation that we believe play a major role in the genesis and maintenance of repugnant obsessions. In our view, interpretations of (a) personal responsibility for preventing harm, as suggested by Salkovskis and (b) the necessity of controlling one's intrusive thoughts, as suggested by Clark and Purdon, require a preliminary interpretation of one's intrusive thought as highly important and personally significant.

Our cognitive-behavioural model of obsessions is shown in Figure 2. Misinterpreting the personal significance and importance of a repugnant intrusive thought leads to distress, avoidance, and neutralization. Avoidance and neutralization prevent the person from disconfirming his or her misinterpretations, and may also lead to preoccupation with the obsessions. Misinterpreting the

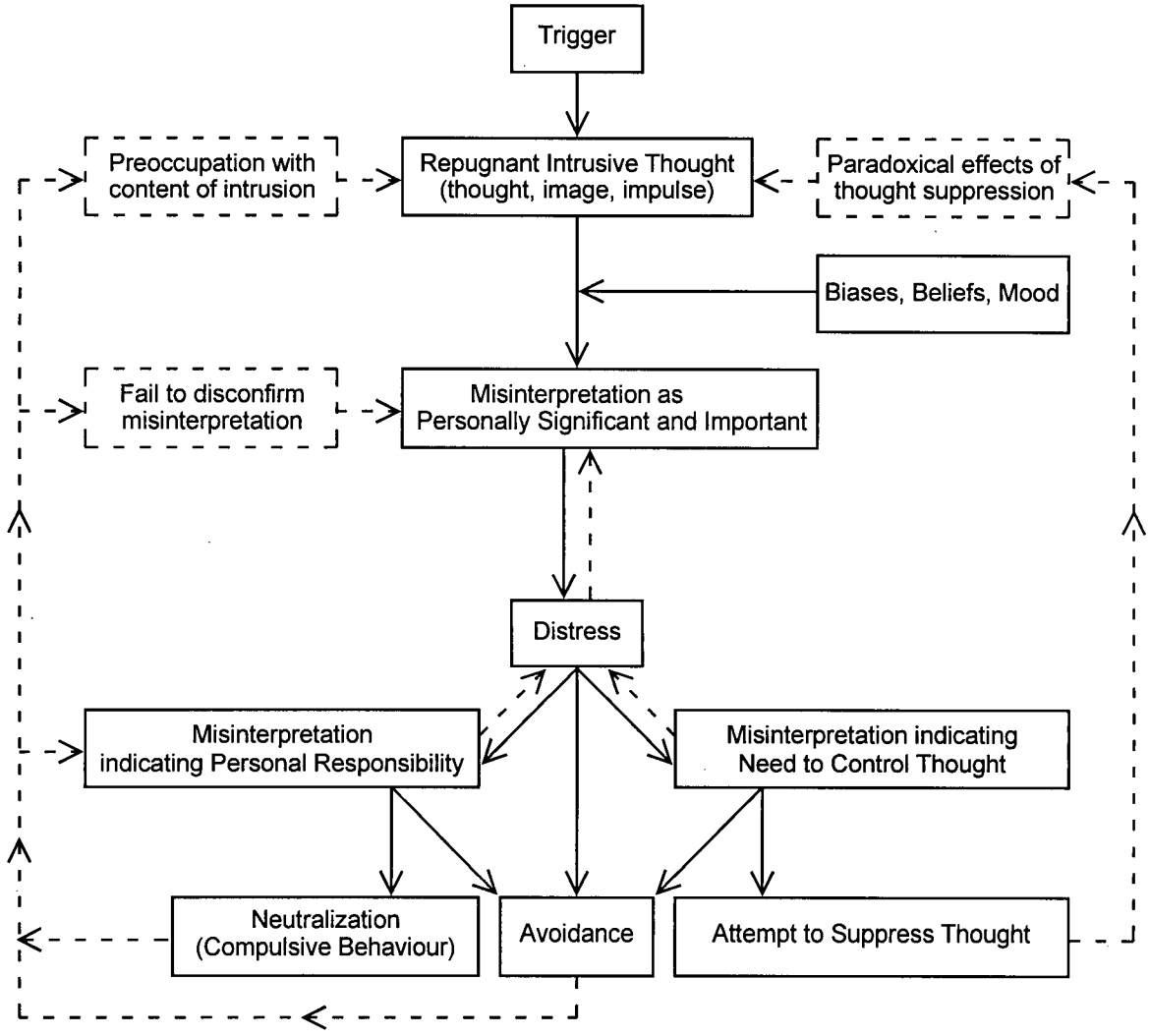

Figure 2. Cognitive-behavioural model of repugnant obsessions (based on Rachman 1997, 1998). Dashed boxes and arrows indicate potential feedback loops or vicious circles.

need to control thoughts may lead to attempts to suppress the thoughts, in turn potentially leading to an increase in their frequency.

Examples of misinterpretations of the occurrence of intrusive thoughts as denoting personal significance include:

- This thought reflects my true evil nature.
- Having this thought means I'm a bad person.
- If I think this, I must really want it to happen.
- Thinking this can make the event more likely to happen.
- If others knew I thought this, they would think I was a terrible person.
- Having this thought means I am likely to lose control over my mind or my behaviour.

People who make these interpretations are likely to become distressed by their intrusive thoughts and seek to neutralize them. People who interpret their negative intrusive thoughts as normal and meaningless should not be overly distressed by such thoughts. One of the goals of cognitive therapy for people with OCD is to change dysfunctional interpretations about intrusive thoughts, and replace them with more helpful, normalizing interpretations. The model suggests that successful treatment requires the modification of such interpretations as a necessary precursor for reduction in the persistence of obsessions.

We lack empirical support for the notion that repugnant obsessions are associated with different interpretations than normal intrusive thoughts, especially interpretations of personal significance. It is this question, the role of interpretation of unwanted intrusive thoughts in people with repugnant

obsessions, that the second study of this thesis seeks to address. In the first study, we aimed to demonstrate that our new scale of obsessional-compulsive complaints, the Vancouver Obsessional Compulsive Inventory, is a reliable, valid, and useful tool for quantifying obsessive-compulsive symptoms, especially repugnant obsessions. A good instrument for measuring different types of obsessive-compulsive complaints is necessary for evaluating the beliefs and interpretations that may be relevant for particular obsessive-compulsive complaints. In the second study, we have put forward several tests of the specific cognitive theory of obsessions. With the completion of this research, we hope to (1) present a much improved self-report measure of OCD complaints, and (2) have accomplished the first steps in establishing that misinterpretations of the significance of intrusive thoughts are critical in the persistence of obsessions.

CHAPTER II

DEVELOPMENT OF THE VANCOUVER OBSESSIONAL COMPULSIVE INVENTORY (VOCI)

2.1 Introduction

The purpose of this chapter is to describe the development of the Vancouver Obsessional Compulsive Inventory, which is based on a series of revisions of the Maudsley Obsessional Compulsive Inventory (MOCI).

The MOCI (Hodgson & Rachman, 1977) is a widely used self-report instrument for measuring observable compulsive behaviour such as washing and checking (Emmelkamp, 1988; Taylor, 1995). The MOCI is a 30-item, true/false scale, originally based on a four-component structure, with subscales for cleaning, checking, doubting/conscientiousness, and obsessional slowness. The MOCI has been shown to have good internal consistency and good criterion and convergent/discriminant validity. However, it has several limitations. First, as pointed out by Emmelkamp (1988) and Taylor (1995) and confirmed in our own work, the slowness subscale is neither internally consistent nor factorially distinct, and requires revision. Second, assessment of obsessive-compulsive phenomena other than washing and checking is limited (e.g., obsessions, hoarding, covert rituals). Although it was designed as a research instrument, many people have used it to assess therapeutic change, but the MOCI is not well

suited to measuring changes with treatment, both because of its dichotomous (true/false) response format, and because several items refer to past events rather than current behaviour and concerns (e.g., *My parents were rather strict.*). Finally, in order to control for the confounding effects of response set, half the items in the MOCI were negatively worded; a number of items are worded as double negatives and thus difficult to understand.

Other self-report scales for measuring problems characteristic of OCD are available, but they too have their drawbacks. The two main alternatives are the Leyton Obsessional Inventory (LOI; Cooper, 1970; Kazarian, Evans, & Lefave, 1977) and the Padua Inventory (Sanavio, 1988). The LOI was originally developed to assess "houseproud housewives," and, although it shows adequate reliability and validity (see Taylor, 1995 for a review), the content overemphasizes concern with cleanliness and excessive washing at the expense of other OCD themes.

The Padua Inventory is more commonly used than the LOI and is a considerably superior scale, at least in terms of coverage of the OCD domain. In its original form, it was shown to contain four factors in non-clinical subjects: (1) impaired control over mental abilities (inability to stop unwanted thoughts), (2) urges and worries of loss of control of motor behaviour (fears of acting on aggressive or sexual impulses), (3) contamination, and (4) checking. Thus, it is the only OCD self-report scale currently in common use that includes subscales dealing with obsessions. The Padua Inventory shows good internal consistency and convergent validity with the MOCI and LOI, and its factor structure has been

replicated in an American student sample; however, it has several drawbacks. First, all 60 items are not included in subscale scores, derived from factor loadings. Second, in the English version a number of items are odd and do not clearly correspond with OCD complaints (e.g., *Seeing weapons excites me and makes me think violent thoughts*); this could be due, at least in part, to problems in translation from Italian.

A final drawback of the Padua Inventory was noted by Freeston, Ladouceur, Rhéaume, Letarte, Gagnon, & Thibodeau (1994). They reported several items on the Padua Inventory obsessions subscales that could easily be answered based on worries rather than obsessions. Burns, Keortge, Formea and Sternberger (1995) produced a content-based revision of the Padua and evaluated the resulting 39-item scale. They reported that their revision (the Padua Inventory-Washington State University Revision, PI-WSUR) was more independent from worry than the original Padua, and they suggested slightly different factorially derived subscales (Obsessional Thoughts of Harm to Self/Others; Obsessional Impulses to Harm Self/Others; Contamination and Washing; Checking; Dressing/Grooming Compulsions).

Two additional self-report measures of obsessive-compulsive complaints are available. The Obsessive-Compulsive Inventory (OCI: Foa, Kozak, Salkovskis, Coles, & Amir, 1998) was developed and published recently, and is discussed on page 89. It contains 7 subscales, and its initial psychometric properties are promising. A self-report version of the Yale Brown Obsessive Compulsive Inventory has also been developed (see Baer, 1991, 2000), but it

provides only a severity index of obsessions and compulsions in general, rather than of different types of obsessive-compulsive complaints, so it serves a different purpose.

Our revision of the MOCI (the Vancouver Obsessional Compulsive Inventory, or VOCI) was designed to provide assessment of a range of obsessions, compulsions, avoidance behaviour, and personality characteristics of known or theoretical importance in OCD. Each item is rated on a 5-point Likert-type scale, to enhance its sensitivity to therapeutic change. All items refer to current concerns and behaviour, and are positively cued (as are most scales to assess psychopathology), leading to easier administration and scoring. The development of the new scale began in 1994, and followed a construct-based approach through several stages of development, including both factor and item analytic strategies.

2.2 VOCI Development: Phase 1

S. Rachman and Steven Taylor wrote a pool of 172 items, organized into 13 content domains relevant in OCD. We administered the item pool to 183 undergraduate students as part of a package that also contained the original 30-item MOCI. To reduce the item pool, we selected the best items from each of the 13 sections based on a principal components analysis of each section. Based on the principal components analysis, some sections appeared to contain two factors and were separated into two subscales. In addition, some sections appeared very similar in content and were combined. Based on this restructuring, we built an 84-item preliminary scale, comprising 17 internally

consistent subscales. Due to the large number of subscales, we arranged the subscales logically into four clusters (see Table 1). These results were presented at the World Congress of Cognitive and Behavioural Therapies in July 1995 (Rachman, Thordarson, & Radomsky, 1995).

2.3 VOCI Development: Phase 2

The 84-item VOCI was distributed to 272 undergraduate students, 122 community adults, 118 people who reported that they had received a diagnosis of OCD, and 55 people with other anxiety disorders (mostly panic disorder). Our analysis of these data suggested that the VOCI required further revision. In particular, some subscales failed to discriminate between people with OCD and either students or anxiety control subjects. This finding stood in marked contrast to the good known-groups validity of the original MOCI. Furthermore, an arrangement of 17 subscales and four clusters was clearly too unwieldy for a succinct final scale. With these issues in mind, we substantially revised the 84-item version.

First, we examined the factor structure of the 84 VOCI items, along with the 30 original MOCI items, in the sample of OCD sufferers. Given the large number of items (114) and the relatively small sample size (n = 118), these results must be considered tentative; the results of factor analysis can be unreliable without a high observation-to-variable ratio. An unweighted least squares factor analysis on the basis of 7 factors, with oblimin transformation, gave a good interpretable solution. The factors could be described as Checking,

Table 1

Phase 1: 84 item VOCI, Clusters and Subscales

Contamination	
	Contamination
	Avoidance of Contamination
	Cleaning
Danger	
	Thoughts of Danger
	Avoidance of Danger
	Checking
Other Obsessions and Compulsions	
	Obscene Thoughts
	Counting
	Ordering
	Hoarding
	Slowness
Personality Characteristics	
	Concern with Safety
	Responsibility
	Perfectionism
	Indecisiveness
	Moral Thought-Action Fusion
	Probability Thought-Action Fusion

Contamination, Indecisiveness/Perfection/Concern with Mistakes,[4] Obsessions, Routine/Slowness/Counting, and two thought-action fusion (TAF) factors, TAF-Moral (beliefs that bad thoughts are morally as unacceptable as bad actions), and TAF-Likelihood (beliefs that having a thought about something terrible happening increases the risk of it actually happening).

A number of content domains of items did not form clear and distinguishable factors, namely, responsibility (whose items were scattered amongst different factors, but mostly in the TAF-Likelihood factor), and hoarding (whose items were scattered). A 9-factor solution, which was not quite as good in terms of simple structure as the 7-factor solution, resolved the hoarding items into one factor, but did not resolve the responsibility items. This suggested that the hoarding items might form a separate factor in subsequent analyses, and the hoarding items were retained. The TAF items, on the other hand, were removed from the VOCI, for several reasons. First, we decided to make the VOCI more tightly focused on OCD complaints (most of the items refer to obsessions, compulsions, and avoidance); the TAF items, being the only items referring to beliefs, did not fit well with the rest of the scale, and may have contributed to difficulties with its factor structure. Secondly, in view of the content domain of potential beliefs and appraisals associated with OCD, it did not make sense to retain only one type of belief, namely TAF. Finally, at this point there was an important new development in OCD assessment research, namely, the formation

[4] While this factor may not appear to be conceptually homogeneous, indecisiveness in people with OCD often appears to be due to an excessive concern about making a mistake should they make the wrong choice.

of the international Obsessive Compulsive Cognitions Working Group (OCCWG). This group (which includes Dana Thordarson and S. Rachman) was founded to develop measures of beliefs that are thought to be important in OCD. Beliefs and appraisals such as responsibility and TAF have been incorporated into the OCCWG scales (Obsessive Compulsive Cognitions Working Group, 1996), and therefore need not be included in the VOCI. Therefore, from the 7-factor solution reported in the previous paragraph, two factors were removed (the TAF factor), and a set of items (hoarding) that had not been included in the 7-factor solution was added.

We picked the best items from the six remaining factors (Checking, Contamination, Indecisiveness/Perfection/Mistakes, Obsessions, Routine/Slowness/Counting, Hoarding) to form six new subscales. The subscales are described in Table 2. Items were selected based on non-complex factor loadings, discrimination between people with OCD and anxious, community adult, and student groups, and high corrected item-total correlations, within the existing data set. A number of items were rewritten to increase their pathological slant, in an attempt to improve their ability to discriminate among the groups. In particular, some items were rewritten to conform more closely to the original MOCI items, when the MOCI items appeared to discriminate better among the groups. The resulting scale comprised 52 items.

Table 2

Subscales of the Vancouver Obsessional Compulsive Inventory (VOCI), Phase 3

Contamination
• Feeling contaminated after touching particular objects, avoidance of contamination, and excessive cleaning and washing.
Checking
• Repeated checking of papers, household appliances, locks.
Obsessions
• Recurrent and distressing aggressive, sexual, and blasphemous intrusions.
Hoarding
• Feeling compelled to keep useless objects, difficulty throwing things away, accumulation of objects in the home.
Indecisiveness/Perfectionism/Concern over Mistakes
• Trouble making trivial decisions, feeling compelled to be perfect, difficulty accomplishing tasks because of concern over making mistakes.
Routine/Counting/Slowness
• Following strict routines; compulsions to count, memorize, or repeat; orderliness; taking too long to do ordinary tasks.

2.4 VOCI Development: Phase 3

The purpose of this phase was to make a preliminary assessment of the criterion validity of each item and subscale, in preparation for the final validation study. The 52-item VOCI was sent to approximately 100 members of the Participant Register of the Fear and Anxiety Laboratory at UBC, and was returned by 80 participants. The Participant Register is a confidential list of people who have volunteered to be contacted to participate in research in anxiety disorders in our laboratory. Most of the participants (and all of those to whom questionnaires were sent) have volunteered because they suffer from an anxiety disorder. Of the 80 participants who returned questionnaires by mail, 36 participants reported that they had OCD, and 44 reported that they had other anxiety problems or depression; we used the participants' self-reported disorder to classify them as having OCD or another anxiety disorder or depression. We also collected a sample of 214 undergraduate students at UBC who completed the questionnaires for subject pool credits. Eight students were excluded from analyses because of significant self-reported psychiatric history.

We examined the mean differences between OCD subjects and the two comparison groups (other anxiety disorder/depression subjects and students) on all subscales and each item within subscales. We also checked that each subscale appeared unifactorial in both students and OCD participants, by conducting a principal components analysis of the items within each subscale and examining the scree plot and the first principal component. Finally, we examined within-groups estimates of internal consistency (coefficient alpha;

Cronbach, 1951) and corrected item-total correlations. The results of these analyses are described below. Items that were found to perform poorly were replaced with new items. As far as possible, we chose new items based on items in well-established measures such as the MOCI.

Contamination. This was unifactorial in both student and OCD samples, and had good internal consistency (.86 in each sample). One item (*Touching the floor frightens me*) had a very low item-total correlation in both samples, and was infrequently endorsed, even in participants with OCD who reported cleaning compulsions. It was replaced by a different item referring to excessive use of disinfectants, based on an original MOCI item.

Checking. This was unifactorial in both student and OCD samples. All items showed good discrimination between participants with OCD, students, and participants with other anxiety disorders, and had high item-subscale total correlations. A few items were rewritten to improve their readability.

Obsessions. This was unifactorial in students, but one item formed a singlet factor in participants with OCD, and had a zero item-subscale total correlation. It was rewritten.

Hoarding. The hoarding subscale failed to discriminate among OCD and other groups of participants; students in particular scored highly on most items. We revised the hoarding scale thoroughly, developing an expanded content domain based on empirical and theoretical work of Frost (e.g., Frost & Gross, 1993).

Indecisiveness/Perfection/Concern over mistakes. This was unifactorial in students and OCD participants, with good discrimination among groups. It had good internal consistency in both the OCD (.94) and student (.86) groups. Depressed non-OCD subjects tended to score highly, which is consistent with the fact that indecisiveness is a common feature of depression. Thus, while indecisiveness is a common feature of OCD, there is likely to be true overlap with depression, for which indecisiveness is a diagnostic feature.

Routine/Counting/Slowness. This had good internal consistency in OCD (.89) and student (.76) samples. The two items on which depressed participants scored higher than OCD participants were rewritten or replaced.

Following the Phase 3 revisions, the resulting VOCI contained 55 items. The items were re-randomized in preparation for the final evaluation of the reliability and validity of the VOCI, which is presented in Chapter III. The final form of the VOCI is presented in the Appendix (p. 152).

CHAPTER III

VANCOUVER OBSESSIONAL COMPULSIVE INVENTORY (VOCI): FINAL VALIDATION STUDY

3.1 Introduction

In the final validation study the internal consistency and test-retest reliability of the VOCI was estimated, for both the total scale and each of the six subscales, and for both normal and clinical samples. A variety of information related to construct validity was also gathered:

1. The factor structure within both OCD and normal samples was examined.
2. The criterion-related (known-groups) validity was evaluated in two ways. First, the scores of OCD sufferers were compared with anxiety/depression control and community adult and student participants. Secondly, OCD participants were coded as to whether they had problems in each of five OCD symptom domains (contamination/cleaning, checking, hoarding, repugnant obsessions, and ordering/repeating), based on the main OCD themes reported by the interviewer. VOCI subscale scores of OCD participants with problems in each domain were compared with the subscale scores of OCD participants who did not have concerns in that particular domain.

3. The convergent and discriminant validity of the VOCI was evaluated, by correlating it with other measures of OCD, measures of other problems (depression, anxiety, worry), and personality traits (neuroticism, psychoticism, extraversion). It was hypothesized that, while the VOCI would be likely to be positively correlated with depression, anxiety and worry due to true construct overlap, it should be more highly correlated with other measures of OCD, especially the MOCI and revised Padua Inventory.

3.2 Method

3.2.1 Participants

OCD

The OCD sample included 88 adults with a diagnosis of OCD. The diagnosis was confirmed by structured interview (ADIS-IV or SCID-IV, see Measures section below). Participants who had a diagnosis of OCD were included in this group regardless of whether a different disorder (e.g., social phobia) was primary (more severe). The majority of participants (91%) had a primary diagnosis of OCD. Participants came from several sources: 23 from the Participant Register of the Fear and Anxiety Laboratory in the Department of Psychology, UBC (S. Rachman, A. S. Radomsky, R. Shafran, and D. S. Thordarson); 27 from a treatment study of OCD in the Department of Psychiatry, UBC (D. S. Thordarson and S. Taylor); 32 from a treatment study for OCD at the Anxiety Disorders Unit, UBC Hospital, (M. L. Whittal and P. D. McLean); and 6 from a psychiatric hospital (4 inpatients, 2 outpatients) in Arkansas (C. N. Sawchuk). At most of these sites, the VOCI was included in the standard

questionnaire packages being offered as part of the research protocol in place at that site. As a result, most participants did not complete the entire battery of measures described below. For each analysis, the relevant *n*s are reported as they vary depending on the measures and samples involved.

The average age of participants in the OCD sample was 35.3 years (range 18 - 77 years); 33 (38%) of the participants were men, 55 (63%) were women. The average number of years of education was 14.6 (range 9 - 23). Forty-six percent of the participants were married or cohabiting, 42% had never been married, 11% were separated or divorced, and 1% were widowed. Thirty-nine percent were employed full-time, 20% were employed part-time, 11% were students, 10% were unemployed, 9% were on disability pensions, 6% were full-time homemakers, and 5% were retired. Forty-six participants (52% of the sample) were comorbid for at least one Axis I anxiety or mood disorder. Sixteen participants had generalized anxiety disorder, 15 social phobia, 13 current major depressive disorder; 5 specific phobia, 5 panic disorder, 4 posttraumatic stress disorder, 1 panic disorder with agoraphobia, and 1 bipolar I disorder.

Anxiety/Depression (A/D) Controls

The A/D control group consisted of 60 adults with Axis I anxiety or mood disorders. Diagnosis was confirmed by structured interview (ADIS-IV or SCID-IV). Participants who had a diagnosis of OCD or subclinical OCD were excluded. Participants came from the same sources as the OCD group: 24 from the Participant Register of the Fear and Anxiety Laboratory; 1 from the OCD

treatment study in the Department of Psychiatry, UBC;[5] 7 from a treatment study for panic disorder (with or without agoraphobia) at the Anxiety Disorders Unit, UBC Hospital; and 28 from a psychiatric hospital (22 inpatients, 3 day hospital, 3 outpatients) in Arkansas. For the same reasons as with the OCD group above, most participants did not complete the entire battery of measures described below, and the *n*s for each analysis are reported.

The average age of A/D control participants was 36.0 years (range 17 - 68 years). Twenty-four (40%) of the participants were men, 36 (60%) were women. The average number of years of education was 14.3 (range 8 - 23). Forty-one percent of the participants were married or cohabiting, 41% had never been married, 16% were separated or divorced, and 2% were widowed. Fifty-four percent were employed full-time, 12% were employed part-time, 12% were students, 2% were unemployed, 12% were on disability pensions, 4% were full-time homemakers, and 4% were retired. Twenty-nine participants had a diagnosis of current major depressive disorder, 20 panic disorder with agoraphobia, 18 panic disorder, 10 generalized anxiety disorder, 7 social phobia, 6 posttraumatic stress disorder, 2 specific phobia, 3 dysthymic disorder, 1 anxiety disorder not otherwise specified, and 1 bipolar II disorder (frequencies sum to greater than 60 due to comorbidity).

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[5] This participant had a diagnosis of anxiety disorder not otherwise specified rather than OCD, but had been included in the OCD treatment study as a pilot participant.

Community Adults

The pool of participants consisted of 42 adults. They included family members, friends, and acquaintances of the Fear and Anxiety Laboratory researchers, as well as friends, family members, and co-workers of participants who distributed additional questionnaires. Of the 42 participants, 5 reported that they were currently suffering from depression, an anxiety disorder, or other mental health problem. Of these five, two reported that their problem was currently causing only slight interference in their lives, and these participants were retained. The other three participants reported that their problem caused definite interference in their lives. These three participants were also the only participants in the Community Adults sample who had Beck Depression Inventory (BDI) scores greater than 20. As it appeared likely that these three participants were currently suffering from a mood or anxiety disorder, they were excluded from the sample, leaving a group of 39 community adults.

The average age of community adults was 41.0 years (range 18 - 88 years). Fourteen (36%) of the participants were male, 25 (64%) were female. The average number of years of education was 15.7 (range 11 - 23). Forty-four percent of the participants were married or cohabiting, 38% had never been married, 13% were separated or divorced, and 5% were widowed. Seventy percent were employed full-time, 10% were employed part-time, 5% were students, 3% were unemployed, 3% were full-time homemakers, and 10% were retired.

Students

The pool of student participants consisted of 223 psychology undergraduate students who completed the questionnaires for the UBC Department of Psychology Subject Pool credits. For part of the sample, information about current psychiatric problems (including depression and anxiety disorders) was available, but unlike in the adult sample, it had a poor correspondence with BDI scores. Of the 123 participants for whom this information was available, only 2 reported experiencing problems that definitely or severely interfered with their lives, but an additional 8 participants had BDI scores over 20. Because of this lack of correspondence, and because BDI scores were available for the entire sample, a cut-off score (BDI greater than 20) was used to eliminate participants who were likely to be suffering from emotional problems such as depression.[6] Using this criterion, 23 participants were eliminated (10.3% of the sample), leaving a sample of 200 students. Their average age was 19.9 years (range 18 - 48); 63 were male (31.5%) and 137 female (68.5%). The average number of years of education was 14.1 (range 12 - 17).

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[6] Using the BDI to eliminate participants has the effect of slightly restricting the range of BDI scores, thus attenuating the correlations to some degree. However, this appears reasonable given that a range of 0-20 for nonclinical samples is substantial, and in fact, the presence of high BDI scores would otherwise distort the results.

3.2.2 Measures

Diagnostic Interviews

The purpose of the diagnostic interview was to establish DSM-IV diagnoses of anxiety and mood disorders, and to rule out psychotic disorders. OCD and A/D control participants were interviewed, using either the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; DiNardo, Brown, & Barlow, 1994), or the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-IV; First, Spitzer, Gibbon, & Williams, 1997). The ADIS-IV is a well-established semi-structured interview for assessing anxiety disorders, major depressive episodes, and dysthymic disorder according to DSM-IV criteria, with screening for substance abuse and psychotic symptoms. The SCID-IV is a well-established semi-structured interview for assessing Axis I disorders (anxiety disorders, mood disorders, eating disorders, substance abuse, etc.), and it includes a screen for psychotic symptoms. Trained interviewers, all of whom were investigators or research assistants in the Anxiety and Fear Laboratory, the Traumatic Stress Clinic, or the Anxiety Disorders Unit, administered the diagnostic interviews. Interviewers had been trained in accordance with the guidelines of the different research groups. In general, training involved watching an experienced interviewer for several participants, then conducting interviews under supervision and reviewing diagnostic ratings with the experienced interviewer.

Scales

Yale-Brown Obsessive-Compulsive Scale (YBOCS) (Goodman et al., 1989c). The YBOCS is an interviewer-rated scale that measures the severity of

obsessions and compulsions without regard to their domain. The YBOCS has excellent interrater reliability with trained interviewers, and good criterion-related and convergent validity; however, it tends to be highly correlated with depression (see Taylor, 1995, for a review). Trained interviewers administered the YBOCS to most of the participants with OCD. The OCD participants from the treatment study at the Traumatic Stress Clinic were administered a new version of the YBOCS, the DYBOCS (J. F. Leckman et al., unpublished scale), which yields global severity scores in a different metric than the original YBOCS. For the OCD group, the YBOCS or DYBOCS interview provided the means of determining the primary, secondary, and tertiary themes of the obsessional-compulsive problems.

Self-report Yale-Brown Obsessive-Compulsive Scale (YBSR). The self-report version of the YBOCS used in this study consisted of the definitions of obsessions and compulsions from the original YBOCS, space for respondents to write-in any obsessions or compulsions, and the ten items from the original YBOCS rewritten in a self-report format assessing the severity of the obsessions and compulsions. Several studies have shown that self-report versions of the YBOCS have good reliability and correlate well with the original YBOCS interview scores (Steketee, Frost, & Bogart, 1996; Warren, Zgourides, & Monto, 1993). However, in one study, scores on the self-report version tended to be higher than scores on the interview version (Steketee, Frost, & Bogart, 1996).

Vancouver Obsessional Compulsive Inventory (VOCI). This was the 55-item scale, as described in Chapter II, resulting from Phase 3 analysis and

revision. The VOCI questionnaire form administered to participants is presented in the Appendix (p. 152).

Maudsley Obsessional Compulsive Inventory (MOCI) (Hodgson & Rachman, 1977). The MOCI is the 30-item true/false questionnaire measure of OCD symptoms described in Chapter II. It contains four subscales: Washing, Checking, Doubting/conscientiousness, and Slowness. The total scale as well as the washing and checking subscales have been shown to have good test-retest reliability, internal consistency, known-groups validity, and convergent and discriminant validity (see Taylor, 1998 for a review). It was included to evaluate the convergent validity of the VOCI.

Padua Inventory, Washington State University Revision (PI) (Burns, Keortge, Formea, & Sternberger, 1995). This revised version of the original Padua Inventory (Sanavio, 1988) was used because it was designed to better assess obsessions rather than worries. The revised PI contains 39 items, with five subscales: Contamination Obsessions and Washing Compulsions; Checking Compulsions; Dressing and Grooming Compulsions; Obsessional Thoughts about Harm; and Obsessional Impulses to Harm. The revised PI has demonstrated good internal consistency, test-retest reliability, known-groups validity, and discriminant validity (see Taylor, 1998 for a review). The PI was included to evaluate the convergent validity of the VOCI.

Beck Depression Inventory (BDI) (Beck & Steer, 1993a). The BDI is a widely used 21-item self-report measure of depression. Its reliability and validity

have been well established (see Beck, Steer, & Garbin, 1988). The BDI was included to evaluate the discriminant validity of the VOCI.

Beck Anxiety Inventory (BAI) (Beck & Steer, 1993b). The BAI is a 21-item self-report measure of clinical anxiety. Its validity and reliability have been well established (Beck, Epstein, Brown, & Steer, 1988). Recent research suggests that the BAI is more sensitive to physiological arousal associated with anxiety, rather than worry or tension (Antony, Purdon, Swinson, & Downie, 1997). The BAI was included to evaluate the discriminant validity of the VOCI.

Penn State Worry Questionnaire (PSWQ) (Meyer, Miller, Metzger & Borkovec, 1990). The PSWQ is a 16-item questionnaire designed to measure the tendency to worry. It was included to evaluate the discriminant validity of the VOCI, as obsessions are conceptualized as being distinct from worry, and have been demonstrated to be different from worries (e.g., Turner, Beidel, & Stanley, 1992).

Eysenck Personality Questionnaire-Revised (EPQ-R) (Eysenck & Eysenck, 1983). The EPQ-R in its short form is a 48-item questionnaire that yields measures of the personality traits Neuroticism, Psychoticism, and Extraversion. It was included to evaluate the discriminant validity of the VOCI.

3.2.3 Procedures

OCD and A/D Control Samples

Participants completed the diagnostic interview (SCID-IV or ADIS-IV) and YBOCS, if applicable, in the clinic or laboratory. After their interviews, they were given the questionnaire package to complete at home and return to the clinic on

their next visit, or to the laboratory in a stamped envelope. A subset of participants with OCD completed the VOCI again after a test-retest interval of approximately 2 weeks to 3 months, depending on the project.

Community Adults

The community adults were either given the questionnaire in person through family and friends of the researchers, or had questionnaires distributed to their workplaces. Self-addressed stamped envelopes were provided in which the questionnaire package could be returned anonymously to the laboratory.

Students

Student participants responded to notice-board advertisements of Psychology Subject Pool study and picked up questionnaire packages at the Fear and Anxiety Laboratory. Participants completed the questionnaire packages at their convenience and returned them to the laboratory to receive course credits. Upon returning them to the laboratory, participants who had completed the VOCI at least one week earlier were asked to complete the VOCI again in the laboratory. We obtained additional test-retest data from participants who participated in a second study through our laboratory. The test-retest interval was 7 - 18 days (M = 11 days).

3.3 Results

3.3.1 Missing Data and Outliers

For all the self-report scales, participants who had valid responses for at least 80% of the items were given pro-rated scale scores. This is mathematically equivalent to substituting the mean response over the valid items for that

participant for the missing value. This approach to missing data prevents the large loss of participants for multivariate procedures. Estimating total scores based on items completed by the participant provides an accurate estimate of participants' true scores provided the scales have high internal consistency, a reasonable assumption for the scales used here (see below). To prevent inflation of estimates of internal consistency, missing data were not replaced at the item level.

Within each sample, item and scale scores exceeding 3.5 standard deviations from the mean were classified as outliers. Decisions about management of outliers (retention, deletion, or substitution of a less extreme value) were made on an analysis-by-analysis basis. Prior to the factor analysis conducted with the OCD sample, one potential outlier was found, having a *z*-score of 3.75 for VOCI item 28. This participant had scored 4 (the maximum value) on an item with a low mean score. This appeared to be a valid score for this participant, but the potential effects of this extreme response were reduced by substituting a value of 3 for the item for this participant for the factor analysis. For the test-retest reliability analysis, two outliers were detected within the sample of students who had completed retest questionnaires; because deleting these outliers had a negligible effect on the test-retest reliability estimates, these cases were retained. For the known-groups validity analysis, several outliers were detected in the VOCI subscales within the control samples (A/D, adults, and students), but none in the OCD sample. Because deleting these outliers had a trivial effect on the subscale means and the results of the analysis, the outliers

were retained to improve the generalizability of the results. In the convergent and discriminant validity analysis, there were no outliers detected on any of the scales within the OCD group. However, the other samples contained several outliers, and deleting the extreme values (retaining the rest of the data from that case) was found to have, at least in some cases, a substantial effect on the size of the correlation coefficients. Therefore, the results were obtained for the data set with outliers deleted.

3.3.2 Factor Structure and Examination of Subscales

A factor analysis of the 55 items of the VOCI was conducted with the OCD sample (n = 88). The results of this factor analysis must be considered provisional, as the low ratio of participants to items reduces the reliability of the factor loadings. It was not possible to pool the A/D control sample with the OCD sample to increase the number of observations, because the variance-covariance matrices of the two samples were significantly different based on Box's test (M = 4754.31, F (1540,44060) = 1.66, $p < .001$). The factor analysis was conducted using pairwise deletion of missing data in order to preserve as many observations as possible. All correlations in the correlation matrix that was factored were based on 87 or 88 participants. Pairwise deletion of missing data can result in a non-Gramian correlation matrix but, in this case, no negative eigenvalues were observed.

A scree plot of the eigenvalues (see Appendix, p. 155) suggested 5 or 6 factors. Five-, 6-, and 7-factor solutions were derived using unweighted least squares common-factor analysis, with direct oblimin transformation (δ=0), and

the pattern matrices were examined for simple structure and interpretability. In the 5-factor solution, there were seven items with complex factor pattern coefficients (items with coefficients > .3 on more than one factor), including three items with coefficients > .3 on at least three factors. The factors were easily interpretable, corresponding to contamination, hoarding, obsessions, checking, and a mixed factor of indecisiveness, needing things to look or feel just right, and counting, memorizing, and repeating compulsions. The 6-factor solution had better simple structure, with only two complex items and one item with coefficients < .3 on all 6 factors. Again, the factors could be readily interpreted, with the mixed factor resolving into separate factors for (a) needing things to seem just right, and (b) memorizing, repeating and indecisiveness. The 7-factor solution had five complex items, with the same factors as the 6-factor solution but with counting, memorizing, and bedtime routines as its own factor.

Based on considerations of simple structure and interpretability, we chose the 6-factor solution as the best fit for these data; the pattern matrix for this solution is presented in Table 3. (The pattern matrices for the 5- and 7-factor solutions are available in the Appendix, p. 156-159.) The 6-factor solution had good, although not perfect, convergence with the six subscales of the VOCI defined at the previous stage of development. The first factor contained all of the Routine/Counting/Slowness subscale items except for an item describing counting during a routine task. It also included three of the Indecisiveness/Perfection/Concern over Mistakes items, which described perfectionism and attention to detail. It included one Checking item, concerning

Table 3

Oblique Primary-Factor Pattern Matrix from the VOCI Factor Analysis: 6-Factor Solution in OCD Sample

Item #	Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	h^2
18	I feel compelled to follow a very strict routine when doing ordinary things.	.740	.121				-.105	.857
55	I spend far too long getting ready to leave home each day because I have to do everything exactly right.	.718	.178	-.106		-.227	.138	.902
14	I often have trouble getting things done because I try to do everything exactly right.	.713		-.125	-.114		-.157	.880
53	One of my major problems is that I pay far too much attention to detail.	.711						.808
47	I tend to get behind in my work because I repeat the same thing over and over again.	.655		-.194				.800
19	I feel upset if my furniture or other possessions are not always in exactly the same position.	.616						.828
5	I feel compelled to be absolutely perfect.	.571			.158		-.178	.850
24	I am often very late because I can't get through ordinary tasks on time.	.566		-.246				.862
1	I feel compelled to check letters over and over before mailing them.	.464		-.214	-.106	-.328	-.105	.814
38	I get very upset if I can't complete my bedtime routine in exactly the same way every night.	.409				-.295		.778
9	I often feel compelled to memorize trivial things (e.g., licence plate numbers, instructions on labels).	.316		.104	.259	-.234		.675
36	I am strongly compelled to count things.	.258		.180		-.189	-.232	.876
21	I find it very difficult to touch garbage or garbage bins.		.798				.215	.889

Item #	Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	h^2
23	I am excessively concerned about germs and disease.	-.194	.793	-.114			-.171	.829
50	I am afraid to use even well kept public toilets because I am so concerned about germs.		.773			-.126		.929
39	I am very afraid of having even slight contact with bodily secretions (blood, urine, sweat, etc.).		.766		.222		.106	.874
15	Touching the bottom of my shoes makes me very anxious.		.721			.110		.876
8	I use an excessive amount of disinfectants to keep my home or myself safe from germs.	-.178	.711			-.150		.821
25	I avoid using public telephones because of possible contamination.		.670			-.152		.867
3	I feel very dirty after touching money.		.630		.122	.156	-.148	.813
13	I spend far too much time washing my hands.		.617		-.147	.132		.835
44	One of my major problems is that I am excessively concerned about cleanliness.	.310	.558		-.143			.822
32	I feel very contaminated if I touch an animal.	.104	.540	-.180		.267	-.135	.764
49	I often experience upsetting and unwanted thoughts about illness.	-.246	.382		.263	-.257	-.262	.848
10	I have trouble carrying out normal household activities because my home is so cluttered with things I have collected.			-.814	.144			.872
45	I feel compelled to keep far too many things like old magazines, newspapers, and receipts because I am afraid I might need them in the future.		-.123	-.785		-.137		.923
51	Although I try to resist, I feel compelled to collect a large quantity of things I never actually use.	.131		-.784			.130	.818

Item #	Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	h^2
35	I find it almost impossible to decide what to keep and what to throw away.			-.727	-.119		-.268	.864
22	I become very tense or upset when I think about throwing anything away.			-.722		-.181	-.196	.902
26	I am embarrassed to invite people to my home because it is full of piles of worthless things I have saved.			-.719				.817
42	I have treat trouble throwing anything away because I am very afraid of being wasteful.		.136	-.704			-.127	.875
52	I repeatedly experience upsetting and unwanted immoral thoughts.				.795			.873
16	I am often upset by my unwanted thoughts or images of sexual acts.				.739	.148		.769
40	I am often very upset by my unwanted impulses to harm other people.	-.121			.709		.123	.868
27	I repeatedly experience the same upsetting thought or image about death.		.191		.661	-.195		.882
12	I find that almost every day I am upset by unpleasant thoughts that come into my mind against my will.		.190		.614			.774
2	I am often upset by my unwanted thoughts of using a sharp weapon.		-.156		.558	-.176		.821
54	I am often upset by unwanted urges to harm myself.		-.148	-.131	.558	.166	-.159	.828
46	I repeatedly experience upsetting and unacceptable thoughts of a religious nature.	.164			.549			.800
6	I repeatedly experience the same unwanted thought or image about an accident.			-.162	.510	-.157	-.242	.852
34	I often experience upsetting and unwanted thoughts about losing control.				.471	-.108	-.287	.744

Item #	Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	h^2
30	I am often frightened by unwanted urges to drive or run into oncoming traffic.	.131			.395	-.130	-.144	.711
28	I am often upset by unwanted thoughts or images of blurting out obscenities or insults in public.				.356		-.208	.721
43	I frequently have to check things like switches, faucets, appliances and doors several times.					-.903		.961
7	I repeatedly check and recheck things like taps and switches after turning them off.					-.903	-.108	.955
33	One of my major problems is repeated checking.	.124				-.857		.917
41	I spend a lot of time every day checking things over and over again.	.280				-.812		.947
20	I repeatedly check that my doors or windows are locked, even though I try to resist the urge to do so.					-.811		.934
37	I repeatedly check that my stove is turned off, even though I resist the urge to do so.		.108	-.101		-.810		.886
17	I become very anxious when I have to make even a minor decision.			-.161			-.844	.913
11	After I have decided something, I usually worry about my decision for a long time.						-.790	.847
4	I find it very difficult to make even trivial decisions.			-.224			-.765	.878
48	I try to put off making decisions because I'm so afraid of making a mistake.	.149	.115	-.196	.124		-.627	.905
29	I worry far too much that I might upset other people.	.283			.133		-.462	.810
31	I almost always count when doing a routine task.	.120		.223		-.124	-.318	.839

Note. Factor loadings less than ± .1 were omitted from the table. h^2 = communalities.

checking letters before mailing them. Taken together, this factor appeared to represent the construct of *just right*: doing things exactly right, following strict routines, repeating, memorizing, concern with being perfect, and feeling compelled to count. The second factor contained all the Contamination items, plus an item originally from the Obsessions subscale concerning obsessions about illness. The third factor contained the Hoarding items. The fourth factor contained the remaining Obsessions items. The fifth factor contained the remaining Checking items. The sixth factor contained the remaining Indecisiveness items, as well as one Routine item concerning counting during routine tasks.

In summary, the hypothetical factor structure of the VOCI was largely supported, with clear factors representing Contamination, Checking, Obsessions, and Hoarding. The previous subscales concerning Routine and Indecisiveness were re-organized, with Indecisiveness items concerning perfection and attention to detail now loading with most of the previous Routine items, forming a factor closely representing just rightness. Despite the direct oblimin transformation, which can permit factors to be highly oblique, the 6 factors were not highly correlated; the highest correlation was .33, between the Just Right and Indecisiveness factors (see Table 4). Given the interpretability of this factor structure, and the sensible re-organization of two of the previous subscales into more coherent factors, we re-organized the subscales based on the current factor analysis. The revised six subscales are Contamination, Checking, Obsessions, Hoarding, Just Right, and Indecisiveness. These six subscales

Table 4

Factor Correlation Matrix: 6-Factor Solution

Factor	1	2	3	4	5	6
1	1.000	.114	-.167	.151	-.301	-.333
2	.114	1.000	-.113	.114	-.105	-.179
3	-.167	-.113	1.000	-.056	.113	.183
4	.151	.114	-.056	1.000	-.247	-.275
5	-.301	-.105	.113	-.247	1.000	.210
6	-.333	-.179	.183	-.275	.210	1.000

were used for the rest of the reliability and validity analyses, as well as in the Significance Study presented in Chapter IV. The revised subscales with sample items are presented in Table 5. The full set of items, organized by subscale, is presented in the Appendix (p. 160).

3.3.3 Reliability

Test-Retest Reliability

Test-retest reliability estimates are based on 28 students and 28 participants with OCD. The mean test-retest interval for students was 11 days (range 7 - 18 days); for OCD participants, the mean interval was 47 days (range 9 - 100 days). Test-retest reliability estimates (Pearson *r* between the first and second administrations) for the VOCI total scale and subscales are presented in Table 6. The VOCI and its subscales appear to have excellent test-retest reliability in the OCD sample, with all coefficients .9 or above despite, on average, a long test-retest interval. For the students, on the other hand, test-retest reliability is poor, ranging from .5 to .6. Examination of a scatterplot of the test versus retest VOCI total scores for the students (presented in the Appendix, p. 163) indicates that the low correlations may be due to range restriction. Most of the students had VOCI scores between zero and one (recall that the VOCI is scored as a mean item response), with the exception of four participants, who appear to be bivariate outliers. Excluding the four outliers improved the test-retest correlations for some scales (e.g., VOCI total, $r = .62$, $p < .001$), but not others (e.g., VOCI Checking, $r = .44$). The test-retest correlations based on the subgroup of 24 students are presented in the Appendix (p. 164).

Table 5

Subscales and Sample Items from the Vancouver Obsessional Compulsive Inventory (VOCI): Final Version

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Contamination

- I find it very difficult to touch garbage or garbage bins.
- I am excessively concerned about germs and disease.

Checking

- I frequently have to check things like switches, faucets, appliances, and doors several times.
- I repeatedly check things like taps and switches after turning them off.

Obsessions

- I repeatedly experience upsetting and unwanted immoral thoughts.
- I am often upset by my unwanted thoughts or images of sexual acts.

Hoarding

- I have trouble carrying out normal household activities because my home is so cluttered with things I have collected.
- I feel compelled to keep far too many things like old magazines, newspapers, and receipts because I am afraid I might need them in the future.

Just Right

- I feel compelled to follow a very strict routine when doing ordinary things.
- I spend far too long getting ready to leave home each day because I have to do everything exactly right.

Indecisiveness

- I become very anxious when I have to make even a minor decision.
- After I have decided something, I usually worry about my decision for a long time.

Table 6

Test-Retest Reliability: VOCI Total and Subscales

	Test-Retest Reliability	
	OCD (*n* = 28)	Students (*n* = 28)
Mean Test-retest interval	47 days	11 days
VOCI Total	.96**	.52*
Contamination	.97**	.53*
Checking	.96**	.59**
Obsessions	.91**	.60**
Hoarding	.96**	.56*
Just Right	.91**	.54*
Indecisiveness	.90**	.50*

** $p < .001$. * $p < .01$.

Internal Consistency

Estimates of the internal consistency of the VOCI and its subscales were made within each group (OCD, A/D control, adults, students) via coefficient alpha (Cronbach, 1951). The estimates are presented in Table 7. The total scale and its subscales appear to have very good internal consistency. The lowest estimates are within the Community Adults sample.

3.3.4 Validity

Known-Groups Validity

Means and standard deviations of the VOCI total score and subscales for each group are shown in Table 8. Group differences were investigated for each dependent variable (VOCI total score and the 6 subscales) using one-way Analyses of Variance (ANOVAs) with a Bonferroni-corrected Type I error rate of .007 (.05/7) to control for inflated family-wise Type I error. For each dependent variable, Bartlett's test of homogeneity of variance was significant, indicating that the homogeneity of variance assumption for each ANOVA was violated. To predict the direction of the bias in the apparent α level of the ANOVAs for each variable, a Spearman rank-order correlation coefficient between the group *n*s and standard deviations was computed. For each dependent variable the r_s was positive, indicating that the results of the ANOVA would be conservatively biased (i.e., true α < nominal α). Despite the conservative bias, the ANOVA for each scale (VOCI total and subscales) was significant ($p < .007$), and no correction for heterogeneous variances was required.

Table 7

Internal Consistency: VOCI Total and Subscales

	OCD	Anxiety/ Depression Control	Community Adults	Students
VOCI Total 55 items	.94 (*n* = 80)	.98 (*n* = 57)	.90 (*n* = 37)	.96 (*n* = 189)
Contamination 12 items	.92 (*n* = 85)	.92 (*n* = 59)	.79 (*n* = 39)	.87 (*n* = 198)
Checking 6 items	.96 (*n* = 88)	.94 (*n* = 60)	.70 (*n* = 39)	.92 (*n* = 198)
Obsessions 12 items	.88 (*n* = 86)	.93 (*n* = 59)	.70 (*n* = 39)	.88 (*n* = 198)
Hoarding 7 items	.92 (*n* = 88)	.90 (*n* = 60)	.80 (*n* = 38)	.85 (*n* = 197)
Just Right 12 items	.89 (*n* = 85)	.91 (*n* = 60)	.81 (*n* = 39)	.87 (*n* = 197)
Indecisiveness 6 items	.85 (*n* = 88)	.90 (*n* = 59)	.79 (*n* = 38)	.83 (*n* = 200)

Table 8

Known-Groups Validity: Mean VOCI Subscale Item Scores by Groups

VOCI Subscale	OCD *n* = 88	Anxiety/ Depression Controls *n* = 60	Community Adults *n* = 39	Students *n* = 200
VOCI Total	1.57	0.90*	0.21*	0.66*
	(0.68)	(0.79)	(0.20)	(0.48)
Contamination	1.62	0.59*	0.15*	0.61*
	(1.04)	(0.75)	(0.25)	(0.57)
Checking	2.05	0.65*	0.13*	0.53*
	(1.44)	(0.90)	(0.25)	(0.71)
Obsessions	1.05	0.96	0.16*	0.46*
	(0.88)	(1.00)	(0.25)	(0.50)
Hoarding	1.11	0.89	0.31*	0.80
	(1.10)	(1.00)	(0.40)	(0.70)
Just Right	1.94	1.01*	0.23*	0.75*
	(0.97)	(0.82)	(0.29)	(0.59)
Indecisiveness	1.83	1.47	0.33*	0.96*
	(1.08)	(1.09)	(0.42)	(0.74)

Note. * Indicates means significantly different from OCD mean using the Dunn (Bonferroni) method of multiple comparisons, $\alpha < .01$, 2-tailed.

For each variable, the OCD group was compared to each of the control groups (A/D controls, adults, and students) using the Dunn (Bonferroni) method for planned comparisons. An observed value of *t* was computed for each comparison (using Welch's correction for violations of homogeneity of variance where indicated) and compared to the critical value of *t* for the Dunn (Bonferroni) method for three comparisons at $\alpha < .01$, 2-tailed. Discrimination between OCD participants and A/D, Adult, and Student control participants was satisfactory for VOCI Total score, Contamination, Checking, and Just Right subscales. For the Obsessions and Indecisiveness subscales, the OCD group was well discriminated from the student and adult controls but not from the clinical controls. For the Hoarding subscale, the OCD group was not discriminated from A/D or student controls.

Because OCD is a very heterogeneous disorder, we would not expect the OCD sample as a whole to score highly on any particular subscale. For example, OCD sufferers who do not have concerns about contamination would not be expected to score higher than control participants on this subscale. Therefore, the mean scores for the OCD sample above are affected by both participants who have problems in the relevant domain, as well as participants who do not. For a more fine-grained analysis of known-groups validity, OCD participants were classified as to whether they had problems in several domains of OCD symptoms. This classification was *not* based on their VOCI scores, but on the three primary obsessive-compulsive problems indicated by the YBOCS or DYBOCS interviewer. Because OCD sufferers often have problems in more than

one domain, participants could be coded as having difficulties in more than one domain (e.g., both checking and cleaning). The domains that were coded were contamination/cleaning (cleaners), doubting/checking (checkers), repugnant obsessions (obsessionals), ordering/arranging/just right/repeating/counting (orderers),[7] and hoarding (hoarders). These domains are consistent with factors demonstrated in a recent factor analysis of YBOCS symptom checklist items by Leckman et al. (1997), with the exception of the separation between doubting/checking and repugnant obsessions. These domains were separated for the purpose of this study for three reasons. First, the VOCI, which was at least in part factor analytically derived, has separate subscales corresponding to these domains. Second, the characteristics of OCD sufferers with repugnant obsessions are of particular interest in the study presented in Chapter IV. Third, the factor analysis of Leckman et al. was, in fact, unable to discover that doubts and repugnant obsessions are distinct (as we are contending) due to a peculiarity of the YBOCS symptom checklist; namely, thoughts about causing harm due to carelessness, thoughts of harm coming to loved ones, and thoughts of causing harm directly are combined under the misnomer *Aggressive Obsessions.*

The following hypotheses were proposed:

1. OCD participants identified as cleaners by the YBOCS interviewer should have higher VOCI Contamination scores than other OCD participants.

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[7]This collection of OCD complaints was put into a single category based on Leckman et al.'s (1997) factor analysis, which suggested that these symptoms tend to load on a single factor. None of the symptoms alone is represented in enough participants to warrant a separate group.

2. OCD participants identified in the YBOCS interview as checkers should have higher VOCI Checking scores than other OCD participants.
3. OCD participants identified as obsessionals should have higher VOCI Obsessions scores than other OCD participants.
4. OCD participants identified as orderers should have higher VOCI Just Right scores than other OCD participants. (Although they do not perfectly correspond, the types of complaints represented by these participants are most consistent with the Just Right subscale.)
5. OCD participants identified as hoarders should have higher VOCI Hoarding scores than other OCD participants.

For each domain, the scores on the hypothetically relevant subscale were compared between participants identified as having or not having problems in that domain. The scores were compared using independent-samples *t*-tests, with a Bonferroni correction for family-wise error rate (as there were 5 domains, the α for each domain was set at .01). The results are presented in Table 9. The results clearly support the known-groups validity of the Contamination, Checking, Obsessions, and Hoarding subscales. The Just Right subscale, although it distinguished OCD participants from controls, did not appear to distinguish participants identified as orderers on the YBOCS interview from other participants.

Convergent and Discriminant Validity

OCD sample. The convergent validity of the VOCI was examined by correlating VOCI total and subscale scores with other measures of OCD

Table 9

Known-Groups Validity: OCD Subtypes

OCD Subtype	VOCI Subscale	*df*	*t*	*p*
Cleaner	Contamination			
Yes (*n* = 49)	*M* = 2.11, *SD* = 0.96	85	5.88	< .001
No (*n* = 38)	*M* = 0.98, *SD* = 0.78			
Checker	Checking			
Yes (*n* = 47)	*M* = 2.60, *SD* = 1.32	85	4.26	< .001
No (*n* = 40)	*M* = 1.39, *SD* = 1.32			
Obsessional	Obsessions			
Yes (*n* = 33)	*M* = 1.55, *SD* = 0.82	85	4.68	< .001
No (*n* = 54)	*M* = 0.73, *SD* = 0.77			
Orderer	Just Right			
Yes (*n* = 36)	*M* = 2.02, *SD* = 0.95	85	0.79	n.s.
No (*n* = 51)	*M* = 1.85, *SD* = 0.98			
Hoarder	Hoarding			
Yes (*n* = 11)	*M* = 2.60, *SD* = 1.20	85	5.51	< .001
No (*n* = 76)	*M* = 0.90, *SD* = 0.92			

symptom domains (PI, MOCI, YBOCS scales). To evaluate its discriminant validity, VOCI total scores were correlated with depression (BDI), anxiety (BAI), worry (PSWQ), and personality variables (Extraversion, Neuroticism, and Psychoticism from the EPQ-R short form). VOCI subscales were correlated with BDI, BAI, and PSWQ, as well as non-corresponding scales from the other OCD scales (PI, MOCI). The results are shown in Table 10.

The VOCI total score was highly correlated with the other self-report measures of OCD symptoms, namely PI total (r = .85), MOCI total (r = .74), and YBSR (r = .67), but only moderately correlated with measures of other kinds of psychopathology, namely BDI (r = .47), BAI (r = .43), and PSWQ (r = .34), and not highly correlated with the personality variables. As a test of the convergent/discriminant validity of the VOCI total score, the difference between the correlation coefficients for the PI total, MOCI total, YBSR, and BDI were tested using the test to compare two correlated correlation coefficients outlined in Meng, Rosenthal, and Rubin (1992). This procedure is an alternative to the more familiar Hotelling's t-test for dependent correlation coefficients, and is considered slightly more accurate (Glass & Hopkins, 1996), although the two procedures give very similar results. The formula is shown in the Appendix (p. 165). The VOCI-PI correlation was found to be significantly greater than the VOCI-BDI correlation (z = 5.95, p < .001), supporting the convergent/discriminant validity of the VOCI. The VOCI-MOCI and VOCI-YBSR correlations were greater than the VOCI-BDI correlation but the differences were not statistically significant at α = .05.

Table 10

Convergent and Discriminant Validity: OCD Sample

	VOCI Total	VOCI Contamination	VOCI Checking	VOCI Obsessions	VOCI Hoarding	VOCI Just Right	VOCI Indecisiveness
PI Total	.85* (*n*=87)						
PI Contamination		.90* (*n*=87)	.08 (*n*=87)	.11 (*n*=87)	.16 (*n*=87)	.12 (*n*=87)	.22 (*n*=87)
PI Dressing		.08 (*n*=86)	.30 (*n*=86)	.15 (*n*=86)	.15 (*n*=86)	.62* (*n*=86)	.15 (*n*=86)
PI Checking		.10 (*n*=87)	.84* (*n*=87)	.32 (*n*=87)	.34* (*n*=87)	.67* (*n*=87)	.45* (*n*=87)
PI Thoughts of Harm		.40* (*n*=87)	.41* (*n*=87)	.61* (*n*=87)	.13 (*n*=87)	.33 (*n*=87)	.49* (*n*=87)
PI Impulses to Harm		.10 (*n*=86)	.27 (*n*=86)	.55* (*n*=86)	.19 (*n*=86)	.31 (*n*=86)	.14 (*n*=86)
MOCI Total	.74* (*n*=56)						
MOCI Washing		.83* (*n*=56)	.06 (*n*=56)	.15 (*n*=56)	-.04 (*n*=56)	.22 (*n*=56)	.12 (*n*=56)
MOCI Checking		.19 (*n*=56)	.81* (*n*=56)	.66* (*n*=56)	.30 (*n*=56)	.55* (*n*=56)	.38 (*n*=56)
MOCI Doubting/ Conscientiousness		.13 (*n*=55)	.33 (*n*=55)	.36 (*n*=55)	.30 (*n*=55)	.53* (*n*=55)	.40 (*n*=55)
MOCI Slowness		-.09 (*n*=56)	.12 (*n*=56)	-.01 (*n*=56)	.02 (*n*=56)	.51* (*n*=56)	.24 (*n*=56)
YBOCS Interview Total	.14 (*n*=49)						
DYBOCS Interview Global Total	-.11 (*n*=27)						
YBOCS Self-report Total	.67* (*n*=49)						
BDI	.47* (*n*=87)	.22 (*n*=87)	.15 (*n*=87)	.40* (*n*=87)	.24 (*n*=87)	.33 (*n*=87)	.54* (*n*=87)
BAI	.43* (*n*=87)	.10 (*n*=87)	.09 (*n*=87)	.49* (*n*=87)	.25 (*n*=87)	.35* (*n*=87)	.48* (*n*=87)
PSWQ	.34 (*n*=67)	.12 (*n*=67)	.15 (*n*=67)	.35 (*n*=67)	-.06 (*n*=67)	.39* (*n*=67)	.38 (*n*=67)
EPQ-R							
Neuroticism	.17 (*n*=33)	.21 (*n*=33)	-.16 (*n*=33)	.31 (*n*=33)	.01 (*n*=33)	-.04 (*n*=33)	.33 (*n*=33)
Psychoticism	.02 (*n*=32)	.16 (*n*=32)	-.05 (*n*=32)	.10 (*n*=32)	-.09 (*n*=32)	-.06 (*n*=32)	-.24 (*n*=32)
Extraversion	-.23 (*n*=32)	-.13 (*n*=32)	-.08 (*n*=32)	-.20 (*n*=32)	-.18 (*n*=32)	-.08 (*n*=32)	-.23 (*n*=32)
Lie Scale	.06 (*n*=33)	-.13 (*n*=33)	.17 (*n*=33)	-.07 (*n*=33)	.12 (*n*=33)	.17 (*n*=33)	.09 (*n*=33)

* $p < .001$

The correlations between the VOCI total and the YBOCS interview measures (the original YBOCS or the DYBOCS global scale) were low. To clarify the possible reasons for this lack of relationship (e.g., a problem with the validity of the VOCI, or reflection of a difference in the constructs measured), the correlations between the PI total, MOCI total, and YBOCS/DYBOCS were calculated. We found that the PI-YBOCS correlation (r = .22) was similar to the VOCI-YBOCS correlation (r = .14), but the MOCI-YBOCS correlation appeared somewhat higher (r = .47). The correlations with DYBOCS were uniformly low: for VOCI-DYBOCS, r = -.11; for PI-DYBOCS, r = -.08; for MOCI-DYBOCS, r = -.12. These findings suggest that the YBOCS interview scales are measuring a different construct than the self-report scales, or the correlations are low due to nonshared method variance.

To examine the convergent and discriminant validity of the VOCI subscales, correlations between each VOCI subscale and the subscales of the PI, the subscales of the MOCI, and the BDI, BAI, and PSWQ were computed. For most VOCI subscales, there are high correlations with corresponding or conceptually related subscales in the PI and MOCI. There were relatively smaller correlations between VOCI subscales and noncorresponding subscales of the PI or MOCI, and BDI, BAI, and PSWQ. More specifically, VOCI Contamination was highly correlated with PI Contamination/Washing (r = .90) and MOCI Washing (r = .83), and VOCI Contamination was more weakly correlated with BDI, BAI, and PSWQ, and with unrelated subscales of PI and MOCI, except PI Thoughts of Harm (r = .40). VOCI Checking was highly

correlated with PI Checking (r = .84) and MOCI Checking (r = .81), had low correlations with BDI, BAI, or PSWQ, and had low to moderate correlations with other subscales of the PI or MOCI. VOCI Obsessions was highly correlated with the PI scales measuring obsessions of harming (PI Obsessional thoughts of harm, r = .61; PI Obsessional impulses to harm, r = .55), and generally had low correlations with unrelated scales except MOCI checking (r = .66). VOCI Obsessions was moderately correlated with BDI, BAI, and PSWQ.

The other VOCI subscales (Hoarding, Just Right, and Indecisiveness) do not correspond closely to any of the PI or MOCI subscales; nevertheless, they did correlate at least moderately with subscales on related themes. VOCI Just Right correlated with PI Dressing (r = .62), MOCI Doubting/conscientiousness (r = .62) and MOCI Slowness (r = .51). VOCI Just Right was also highly correlated with both PI and MOCI Checking, and moderately correlated with BDI, BAI, and PSWQ. VOCI Indecisiveness was highly correlated with BDI (r = .54), which may be due to true construct overlap (in fact, indecisiveness is recognized as a symptom of a Major Depressive Episode in the DSM-IV), and was moderately correlated with several other scales, including PI Obsessional thoughts of harm, BAI, PI Checking, MOCI Checking, and PSWQ.

Anxiety/Depression sample. Several outliers were detected within the Anxiety/Depression sample: 2 participants had z scores > 3.5 for VOCI contamination, 1 for PI total, 1 for PI contamination/washing, 2 for PI checking, and 1 for PI obsessional impulses to harm. These scores were deleted for the purposes of the convergent and discriminant validity examination below.

The convergent validity of the VOCI was examined by correlating VOCI total and subscale scores with other measures of OCD symptom domains (PI, MOCI). To evaluate its discriminant validity, VOCI total scores were correlated with depression (BDI), anxiety (BAI), and worry (PSWQ). The results are shown in Table 11. The VOCI total score was highly correlated with the other self-report measures of OCD symptoms, namely PI total (r = .87), MOCI total (r = .78), and YBSR (r = .68). However, it was also highly correlated with measures of other types of psychopathology (BDI, BAI, and PSWQ). The difference between the correlation coefficients for the PI total, MOCI total, YBSR, and BDI were tested as described for the OCD sample. The VOCI-PI correlation was found to be significantly greater than the VOCI-BDI correlation (z = 2.96, p < .003), supporting the convergent/discriminant validity of the VOCI. The VOCI-MOCI correlation was greater than the VOCI-BDI correlation but this difference was not statistically significant; the VOCI-YBSR correlation was similar to the VOCI-BDI correlation.

Compared to the results for the OCD sample, there was less support for the convergent/discriminant validity of the various VOCI subscales in the anxiety/depression control sample. In general, the subscales were correlated highly with corresponding subscales of the PI and MOCI, but also tended to be moderately or highly correlated with non-corresponding subscales, as well as with measures of non-obsessive compulsive psychopathology.

Table 11

Convergent and Discriminant Validity: Anxiety/Depression Sample

	VOCI Total	VOCI Contamination	VOCI Checking	VOCI Obsessions	VOCI Hoarding	VOCI Just Right	VOCI Indecisiveness
PI Total	.87* (*n*=52)						
PI Contamination		.83* (*n*=51)	.57* (*n*=52)	.42 (*n*=52)	.34 (*n*=52)	.57* (*n*=52)	.49* (*n*=52)
PI Dressing		.64* (*n*=51)	.57* (*n*=53)	.58* (*n*=53)	.54* (*n*=53)	.69* (*n*=53)	.57* (*n*=53)
PI Checking		.58* (*n*=50)	.66* (*n*=51)	.68* (*n*=51)	.58* (*n*=51)	.81* (*n*=51)	.67* (*n*=51)
PI Thoughts of Harm		.69* (*n*=51)	.68* (*n*=53)	.79* (*n*=53)	.56* (*n*=53)	.71* (*n*=53)	.65* (*n*=53)
PI Impulses to Harm		.39 (*n*=51)	.27 (*n*=52)	.63* (*n*=52)	.48* (*n*=52)	.55* (*n*=52)	.51* (*n*=52)
MOCI Total	.78* (*n*=53)						
MOCI Washing		.61* (*n*=51)	.59* (*n*=53)	.41 (*n*=53)	.38 (*n*=53)	.47* (*n*=53)	.44* (*n*=53)
MOCI Checking		.56* (*n*=51)	.67* (*n*=53)	.68* (*n*=53)	.47* (*n*=53)	.68* (*n*=53)	.47* (*n*=53)
MOCI Doubting/ Conscientiousness		.53* (*n*=51)	.52* (*n*=53)	.73* (*n*=53)	.59* (*n*=53)	.75* (*n*=53)	.74* (*n*=53)
MOCI Slowness		.20 (*n*=51)	.45* (*n*=53)	.02 (*n*=53)	.05 (*n*=53)	.29 (*n*=53)	.18 (*n*=53)
YBOCS Self-Report	.68* (*n*=23)						
BDI	.69* (*n*=56)	.47* (*n*=54)	.38 (*n*=56)	.68* (*n*=56)	.61* (*n*=56)	.70* (*n*=56)	.70* (*n*=56)
BAI	.75* (*n*=56)	.68* (*n*=54)	.58* (*n*=56)	.72* (*n*=56)	.61* (*n*=56)	.70* (*n*=56)	.65* (*n*=56)
PSWQ	.60* (*n*=52)	.39 (*n*=50)	.38 (*n*=52)	.58* (*n*=52)	.52* (*n*=52)	.55* (*n*=52)	.68* (*n*=52)

*$p < .001$

Community Adults. Several outliers were detected within the adults sample: 1 participant had a *z* score > 3.5 for VOCI contamination, 1 for VOCI obsessions, 1 for VOCI just right, 1 for PI total, 1 for PI contamination/washing, 1 for PI dressing/grooming, and 2 for PI obsessional impulses to harm. These scores were deleted for this set of analyses.

The convergent validity of the VOCI was examined by correlating VOCI total and subscale scores with other measures of OCD symptoms (PI, MOCI, YBSR). To evaluate its discriminant validity, VOCI total scores were correlated with depression (BDI), anxiety (BAI), worry (PSWQ), and personality variables (Extraversion, Neuroticism, and Psychoticism from the EPQ-R short form). The results are shown in Table 12. The VOCI total score was highly correlated with the other self-report measures of OCD symptoms, namely PI total (r = .70), MOCI total (r = .50), and YBSR (r = .59). However, it was also highly correlated with BAI (r = .55), and moderately correlated with Neuroticism, Psychoticism (in a counter-intuitive direction), and BDI. The difference between the correlation coefficients for the PI total, MOCI total, YBSR, and BDI were tested as described for the OCD sample. The VOCI-PI and VOCI-YBSR correlation coefficients were both found to be significantly greater than the VOCI-BDI correlation (z = 3.01, p < .003, and z = 2.13, p < .05, respectively), supporting the convergent/discriminant validity of the VOCI. The VOCI-MOCI correlation was greater than the VOCI-BDI correlation but this difference was not statistically significant.

There was mixed evidence of convergent/discriminant validity for the VOCI subscales in the adult sample. VOCI Contamination was highly correlated

Table 12

Convergent and Discriminant Validity: Adults Sample

	VOCI Total	VOCI Contamination	VOCI Checking	VOCI Obsessions	VOCI Hoarding	VOCI Just Right	VOCI Indecisiveness
PI Total	.70* (*n*=38)						
PI Contamination		.50 (*n*=37)	.10 (*n*=38)	.23 (*n*=38)	.34 (*n*=38)	.07 (*n*=37)	.22 (*n*=38)
PI Dressing		.20 (*n*=37)	-.05 (*n*=38)	.15 (*n*=37)	.37 (*n*=38)	.03 (*n*=38)	.14 (*n*=38)
PI Checking		.27 (*n*=38)	.61* (*n*=39)	.37 (*n*=37)	.28 (*n*=39)	.63* (*n*=38)	.55* (*n*=39)
PI Thoughts of Harm		.41 (*n*=38)	.16 (*n*=39)	.43 (*n*=38)	.23 (*n*=39)	.06 (*n*=38)	.23 (*n*=39)
PI Impulses to Harm		.01 (*n*=36)	.29 (*n*=37)	.34 (*n*=37)	.35 (*n*=37)	.42 (*n*=37)	.50 (*n*=37)
MOCI Total	.50* (*n*=39)						
MOCI Washing		.21 (*n*=38)	-.09 (*n*=39)	.13 (*n*=38)	-.13 (*n*=39)	.08 (*n*=38)	.01 (*n*=39)
MOCI Checking		.20 (*n*=38)	.55* (*n*=39)	.35 (*n*=38)	.16 (*n*=39)	.66* (*n*=38)	.47 (*n*=39)
MOCI Doubting/ Conscientiousness		-.18 (*n*=38)	.07 (*n*=39)	.20 (*n*=38)	-.08 (*n*=39)	.29 (*n*=38)	.37 (*n*=39)
MOCI Slowness		-.11 (*n*=38)	.15 (*n*=39)	.54* (*n*=38)	.49* (*n*=39)	.27 (*n*=38)	.24 (*n*=39)
YBOCS Self-Report	.59* (*n*=39)						
BDI	.29 (*n*=39)	.10 (*n*=38)	.03 (*n*=39)	.26 (*n*=38)	-.18 (*n*=39)	.33 (*n*=38)	.30 (*n*=39)
BAI	.55* (*n*=39)	.28 (*n*=38)	.17 (*n*=39)	.45 (*n*=38)	.17 (*n*=39)	.39 (*n*=38)	.46 (*n*=39)
PSWQ	.01 (*n*=38)	.04 (*n*=37)	-.03 (*n*=38)	.00 (*n*=37)	-.03 (*n*=38)	.04 (*n*=38)	.00 (*n*=38)
EPQ-R							
Neuroticism	.43 (*n*=39)	.17 (*n*=38)	.08 (*n*=39)	.39 (*n*=38)	.07 (*n*=39)	.31 (*n*=38)	.26 (*n*=39)
Psychoticism	.30 (*n*=39)	.30 (*n*=38)	-.14 (*n*=39)	.28 (*n*=38)	.08 (*n*=39)	.03 (*n*=38)	.07 (*n*=39)
Extraversion	-.09 (*n*=39)	-.07 (*n*=38)	.03 (*n*=39)	-.14 (*n*=38)	-.01 (*n*=39)	-.03 (*n*=38)	-.15 (*n*=39)
Lie Scale	-.11 (*n*=39)	.04 (*n*=38)	-.07 (*n*=39)	-.03 (*n*=38)	-.01 (*n*=39)	-.02 (*n*=38)	-.18 (*n*=39)

*$p < .001$

with PI Contamination (r = .50), but had a small correlation with MOCI Washing (r = .21), and had generally low to moderate correlations with other subscales. VOCI Checking was highly correlated with both PI and MOCI Checking, and had low correlations with other subscales. VOCI obsessions was moderately correlated with the obsessions subscales on the PI, but was also moderately correlated with BAI, Neuroticism, and PI and MOCI Checking.

Students. Several outliers were detected within the student sample: 2 participants had z scores > 3.5 for VOCI contamination, 10 for VOCI checking, 3 for VOCI obsessions, 1 for VOCI just right, 1 for VOCI indecisiveness, 1 for PI total, 1 for PI contamination/washing, 2 for PI dressing/grooming, 2 for PI checking, 5 for PI obsessional thoughts of harm, and 5 for PI obsessional impulses to harm. These scores were deleted for this set of analyses.

The convergent validity of the VOCI was examined by correlating VOCI total and subscale scores with other measures of OCD symptoms (PI, MOCI). To evaluate its discriminant validity, VOCI total scores were correlated with depression (BDI), anxiety (BAI), worry (PSWQ), and personality variables (Extraversion, Neuroticism, and Psychoticism from the EPQ-R short form). The results are shown in Table 13. The VOCI total score was highly correlated with the PI total (r = .79), and MOCI total (r = .64). However, it was also highly correlated with PSWQ (r = .58) and Neuroticism (r = .56), and moderately correlated with BAI, BDI, and Extraversion. The difference between the correlation coefficients for the PI total, MOCI total, and BDI were tested as described previously. The VOCI-PI and VOCI-MOCI correlation coefficients were

Table 13

Convergent and Discriminant Validity: Student Sample

	VOCI Total	VOCI Contamination	VOCI Checking	VOCI Obsessions	VOCI Hoarding	VOCI Just Right	VOCI Indecisiveness
PI Total	.79* (*n*=196)						
PI Contamination		.85* (*n*=196)	.39* (*n*=187)	.38* (*n*=194)	.51* (*n*=197)	.59* (*n*=196)	.45* (*n*=196)
PI Dressing		.39* (*n*=193)	.38* (*n*=185)	.30* (*n*=192)	.33* (*n*=195)	.49* (*n*=194)	.43* (*n*=194)
PI Checking		.48* (*n*=193)	.71* (*n*=186)	.39* (*n*=192)	.49* (*n*=195)	.72* (*n*=194)	.59* (*n*=194)
PI Thoughts of Harm		.46* (*n*=190)	.44* (*n*=183)	.50* (*n*=190)	.51* (*n*=192)	.56* (*n*=191)	.57* (*n*=191)
PI Impulses to Harm		.24* (*n*=190)	.26* (*n*=182)	.45* (*n*=190)	.22 (*n*=192)	.27* (*n*=191)	.15 (*n*=191)
MOCI Total	.64* (*n*=200)						
MOCI Washing		.59* (*n*=198)	.07 (*n*=190)	.33* (*n*=197)	.29* (*n*=200)	.39* (*n*=199)	.36* (*n*=199)
MOCI Checking		.43* (*n*=198)	.45* (*n*=190)	.43* (*n*=197)	.35* (*n*=200)	.57* (*n*=199)	.44* (*n*=199)
MOCI Doubting/ Conscientiousness		.42* (*n*=198)	.27* (*n*=190)	.31* (*n*=197)	.37* (*n*=200)	.46* (*n*=199)	.45* (*n*=199)
MOCI Slowness		.12 (*n*=198)	.08 (*n*=190)	.03 (*n*=197)	.17 (*n*=200)	.24* (*n*=199)	.20 (*n*=199)
BDI	.43* (*n*=200)	.27* (*n*=198)	.10 (*n*=190)	.40* (*n*=197)	.43* (*n*=200)	.35* (*n*=199)	.44* (*n*=199)
BAI	.44* (*n*=200)	.31* (*n*=198)	.19* (*n*=190)	.39* (*n*=197)	.34* (*n*=200)	.38* (*n*=199)	.44* (*n*=199)
PSWQ	.58* (*n*=198)	.45* (*n*=196)	.31* (*n*=188)	.40* (*n*=195)	.46* (*n*=198)	.51* (*n*=197)	.61* (*n*=197)
EPQR							
Neuroticism	.56* (*n*=111)	.45* (*n*=110)	.24* (*n*=103)	.43* (*n*=109)	.47* (*n*=111)	.46* (*n*=110)	.63* (*n*=110)
Psychoticism	-.12 (*n*=110)	-.10 (*n*=109)	.05 (*n*=102)	.01 (*n*=108)	-.17 (*n*=110)	-.15 (*n*=109)	-.27 (*n*=109)
Extraversion	-.32* (*n*=110)	-.14 (*n*=109)	-.15 (*n*=102)	-.23 (*n*=108)	-.35* (*n*=110)	-.28 (*n*=109)	-.38* (*n*=109)
Lie Scale	.11 (*n*=110)	.12 (*n*=109)	.11 (*n*=102)	.17 (*n*=108)	.06 (*n*=110)	.15 (*n*=109)	.11 (*n*=109)

*$p < .001$

both found to be significantly greater than the VOCI-BDI correlation ($z = 6.13$, $p < .001$, and $z = 3.34$, $p < .001$, respectively), supporting the convergent/discriminant validity of the VOCI.

As in the adult sample, there was mixed evidence of convergent/discriminant validity for the VOCI subscales in the student sample. VOCI Contamination was highly correlated with PI Contamination ($r = .85$) and MOCI Washing ($r = .59$), and had generally low to moderate correlations with other subscales. VOCI Checking was highly correlated with PI Checking ($r = .71$), and moderately correlated with MOCI Checking ($r = .45$) as well as several other subscales. VOCI Obsessions was moderately to highly correlated with the obsessions subscales on the PI, but was also moderately correlated with most other scales.

Summary. A summary of the convergent and discriminant validity findings is presented in Table 14. For convergent validity, high correlations ($r > .5$) were considered to support the construct validity of the VOCI. Discriminant validity coefficients supported the construct validity of the VOCI if they were low to moderate ($r < .5$). The convergent/discriminant validity of the VOCI and its subscales within the OCD sample was largely supported by the data, with a few exceptions (notably, the lack of association with interview measures of OCD symptom severity). For the other samples, there was good evidence of convergent validity, but evidence for discriminant validity was weaker, especially for anxiety/depression control participants.

Table 14

Summary of Convergent/Discriminant Validity Findings

	OCD	A/D	Adults	Students
VOCI Total				
High correlation with self-report OCD scale total scores (MOCI, PI, YBSR)?	yes	yes	yes	yes
High correlation with interview total scores (YBOCS, DYBOCS)?	no	-	-	-
Low or moderate correlation with other measures?	yes	no	mostly	mostly
VOCI Contamination				
High correlation with corresponding OCD subscales?	yes	yes	no	yes
Low or moderate correlation with non-corresponding OCD subscales?	yes	no	yes	yes
Low or moderate correlation with other measures?	yes	no	yes	yes
VOCI Checking				
High correlation with corresponding OCD subscales?	yes	yes	yes	no
Low or moderate correlation with non-corresponding OCD subscales?	yes	no	yes	yes
Low or moderate correlation with other measures?	yes	no	yes	yes
VOCI Obsessions				
High correlation with corresponding OCD subscales?	yes	yes	no	no
Low or moderate correlation with non-corresponding OCD subscales?	mostly	no	mostly	yes
Low or moderate correlation with other measures?	yes	no	yes	yes
VOCI Hoarding				
Low or moderate correlation with other measures?	yes	no	yes	yes
VOCI Just Right				
High correlation with related OCD subscales?	yes	mostly	no	no
Low or moderate correlation unrelated OCD subscales?	mostly	no	mostly	mostly
Low or moderate correlation with other measures?	yes	no	yes	mostly
VOCI Indecisiveness				
High correlation with related OCD subscales?	no	yes	no	no
Low or moderate correlation unrelated OCD subscales?	yes	no	mostly	mostly
Low or moderate correlation with other measures?	mostly	no	yes	mostly

3.4 Discussion

The reliability and validity of the VOCI were, in general, supported by the findings of the present study. The factorial validity of the VOCI was supported for the Contamination, Checking, Obsessions, and Hoarding subscales, which all emerged as clear factors in the present factor analysis, as they had in the analysis described in Chapter II. This is an excellent result, especially given the relatively small sample sizes available for each study, which would tend to reduce the reliability of the factor loadings. The items from two factors identified in the scale development factor analysis (see Chapter II), Indecisiveness-Perfectionism-Concern over mistakes and Routine-Slowness-Counting, loaded on two factors in the present factor analysis, but were arranged differently. Most of the items involving being perfect, paying too much attention to detail, doing things in strict routines, and arranging things perfectly loaded on one factor; items concerning being unable to make trivial decisions loaded on a second factor. These factors were easily interpretable: the first is similar to Leckman et al.'s factor 3 (obsessions regarding being perfect, not making mistakes, things having to look or feel just right, and related compulsions of repeating, counting, arranging); the second is a purer indecisiveness factor. Because of the improved interpretability of the new factors, the subscales were based on the results of the present factor analysis, and the revised subscales were used in all subsequent analyses.

There are some outstanding concerns regarding the factor structure of the VOCI. First, due to the small sample size in the current analysis, these results

must be considered tentative. Repeating the factor analysis in a new sample of OCD participants would almost certainly result in a slightly different factor structure. This would be especially likely for the two new factors described above, which had been different in the previous analysis. On the other hand, the other factors (contamination, checking, obsessions, and hoarding) have been essentially replicated (except for a very few items) across the two samples, giving us some confidence in the current factor structure for these subscales. A replication of the factor analysis will be attempted with a larger data set. The next step will be to attempt to increase the sample size by continuing to accumulate data from OCD participants; once the scale is published we will hope to acquire data from researchers at other centres who are using the scale.

Not addressed in the present study is the issue of the factor structure of the VOCI in other samples, especially normal samples. For this study we have focused on the factor structure within OCD participants, because we were most interested in the underlying structure of the data within a sample who actually suffer from the phenomena in question. It is possible that the factor structure in non-clinical samples would be different; in particular, it may be difficult to detect clear factors for obsessional-compulsive phenomena that are occurring at a low frequency in a non-clinical group. We plan to examine the factor structure in a large student sample in future work.

The internal consistency of the VOCI subscales was very good in all four samples, indicating that the measurement error of the VOCI subscales is in an acceptable range. The test-retest reliability of the VOCI subscales in the OCD

sample was excellent, especially given the long retest interval. Without treatment, obsessive-compulsive symptoms are known to be stable over time in patients with OCD, and it appears that the VOCI scores were correspondingly stable. However, the sample available for test-retest reliability analysis was small (n = 28), so the true test-retest reliability may be somewhat different due to sampling error. In the student sample, the test-retest reliability coefficients were poor, indicating relatively poor test-retest reliability in this sample. This may have been due to measurement error, that is, an actual problem with the reliability of the scale; however, the high internal consistency of the subscales within the student sample would suggest that this is unlikely to be the major cause of the low test-retest reliability estimates. Another factor that may be contributing to the low reliability estimates is range restriction (i.e., the maximum possible correlation coefficient may have been less than 1.0 because of the restricted range of responses in the student sample). Examination of a scatterplot of the VOCI total score and retest VOCI total score in the student sample (see Appendix, p. 163) shows that the majority of participants were clustered between 0 and 1 (recall that the possible values for the scale are 0 to 4), with approximately 4 outliers; this indicates that there may be attenuation in the correlation coefficient due to sample range restriction, because most participants had very low scores. This finding suggests that the VOCI may not be a reliable measure of low levels of obsessive-compulsive symptoms seen in non-clinical samples. However, it remains to be seen whether the VOCI will be useful in

screening non-clinical samples for participants who score towards the clinical range, thus making the VOCI useful in analogue research for OCD.

There was evidence of good known-groups validity for the VOCI Total score, as well as the subscales for Contamination, Checking, and Just Right. For these scales, the OCD group scored significantly higher than each of the control groups. This finding indicates that these scales are measuring phenomena characteristic of OCD patients. For the Obsessions and Hoarding subscales, the OCD participants did not score significantly higher than the Anxiety/Depression control participants. This raised the question of whether these subscales were valid measures of the relevant constructs, whether these constructs occurred in other groups and therefore were not OCD-specific, or whether the OCD sample as a whole scored relatively low on these subscales because of a low frequency of repugnant obsessions and hoarding in the OCD sample. Fortunately, when participants in the sample with Obsessions were identified (based on their YBOCS interview, not questionnaire scores), these participants were found to have scored significantly higher than the rest of the OCD sample, supporting the validity of the Obsessions subscale. We found the same result for Hoarding, again supporting its known-groups validity. Thus, it appeared that the lack of discrimination between the OCD sample and the A/D control sample for the Obsessions and Hoarding subscales was due to the low scores on these subscales in the OCD sample as a whole, most of whom did not have symptoms in these two domains. In summary, there was evidence of good known-groups

validity for the VOCI total and its subscales, with the exception of the Indecisiveness subscale.

For the Indecisiveness subscale, OCD participants scored significantly higher than adult and student controls, but not significantly higher than A/D controls. Because indecisiveness is not closely associated with any major subtypes of OCD, it was not possible to conduct a known-groups validity examination within the OCD sample. It is very possible that the Indecisiveness scale is measuring a construct that is related to OCD, but not necessarily specific to OCD. In other words, the scale may be measuring not only the indecisiveness that is widely recognized and can be devastating to some patients with OCD, but also the indecisiveness that is characteristic for patients with other types of problems, such as depression and generalized anxiety. Indeed, as mentioned above, difficulty making decisions is a diagnostic symptom of a major depressive episode according to DSM-IV criteria. The tables of convergent/discriminant validity coefficients support this contention: even within the OCD sample, Indecisiveness was significantly related to BDI and BAI scores, indicating that it is related to current depression and anxiety. Within the A/D control sample, Indecisiveness was highly associated with depression, anxiety, and worry; and within the student sample, Indecisiveness was highly associated with worry and Neuroticism. In summary, while the Indecisiveness subscale may be measuring an important construct for OCD sufferers, it also appears to measure a construct that is related to depression and anxiety in general. Further research is required to determine whether this scale is too general to warrant inclusion in a measure

of OCD symptoms; it would be important to know whether it detects the paralyzing indecisiveness associated with some patients with OCD, above and beyond the indecisiveness associated with general anxiety and depression. In fact, there is little known about the nature of indecisiveness in the two disorders, for example, whether the indecisiveness that occurs in depression can be distinguished from that occurring in OCD.

There was also support for the convergent validity of the VOCI Total score and its subscales. In all the samples, the VOCI total score was highly correlated with the PI and MOCI total scores, two established measures of OCD phenomena. In addition, for the subscales with clear corresponding subscales in the other measures (Contamination, Checking, and to a lesser extent Obsessions), there were high and significant correlations with the corresponding subscales in the different samples. The VOCI scales tended to be uncorrelated with personality variables in the clinical samples (OCD and A/D control), but were correlated with Neuroticism in the normal samples, which itself could be considered an indication of convergent validity (within normal samples, obsessive-compulsive phenomena, as well as other indices of anxiety or depression would be expected to be associated with trait neuroticism).

This study also presented strong evidence for the discriminant validity of the VOCI and its subscales. While the VOCI scales did tend to be correlated with depression and anxiety, the VOCI-PI correlation coefficient was significantly higher than the VOCI-BDI correlation coefficient within each sample. In addition, the VOCI-MOCI and VOCI-YBSR correlation coefficients were significantly higher

than VOCI-BDI for at least some of the samples. Thus, there was good, although not perfect, evidence for the convergent and discriminant validity of the VOCI scales—they appear to be measuring constructs related to OCD, and similar to the well-established self-report measures of OCD, as opposed to general anxiety or depression.

The lack of convergence between the VOCI and the YBOCS interview scales in the OCD sample is interesting and potentially problematic. It does not appear to be due to range restriction on either of the variables; a scatterplot (see Appendix, p. 166) shows that a full range of VOCI and YBOCS scores is represented within the OCD sample, but that as YBOCS scores increase, the VOCI scores do not tend to increase. Instead, the lack of correlation may be due to one of several factors. One possibility is that it is due to excessive measurement error in the interview scales; this possibility, although discouraging considering that these were trained interviewers and the YBOCS interview is used as the gold-standard for treatment outcome in most clinical studies, would account for the high correlation between self-report YBOCS and VOCI total, but the low correlation between interview YBOCS/DYBOCS and VOCI total. Alternatively, the lack of correspondence may reflect the essentially different purposes of the two measurement methods: the self-report inventories (VOCI, PI, MOCI) are designed to assess different content areas of OCD, whereas the YBOCS (and the global DYBOCS) is designed to be a content-free measure of symptom severity. Some severely affected patients with OCD could obtain very high scores on the YBOCS, but low scores on the VOCI total if they only have

symptoms in one domain (such as Contamination or Hoarding). Nevertheless, the lack of correspondence between VOCI total scores and YBOCS interview scales suggests that the VOCI may be a poor indicator of overall symptom severity (i.e., interference and distress caused by OCD symptoms) within an OCD sample, and therefore, use of the VOCI total score in participants with OCD may be inadvisable as a measure of OCD severity.

Unlike the interview YBOCS, the self-report YBOCS (which is similarly content-free) was highly correlated with the VOCI. This finding suggests that correlations among all of the self-report measures, both of OCD and non-OCD psychopathology, may have been inflated due to common method variance (i.e., the self-report format). In addition, all of the self-report psychopathology scales with the exception of the MOCI contain only positively-cued items, so response biases could further be inflating the correlation coefficients. In order to systematically evaluate reliability, convergent validity, and discriminant validity, without the correlation-inflating effects of common method variance, Campbell and Fiske (1959) proposed the multitrait-multimethod matrix, in which at least two traits (e.g., OCD and depression) are measured via at least two different methods (e.g., self-report and interview). In the case of the VOCI, one could conduct a multitrait-multimethod analysis using self-report measures of OCD and depression (VOCI and BDI) as well as interview measures of OCD and depression (YBOCS and Hamilton Depression Rating Scale). An example of a multitrait-multimethod matrix for the VOCI is presented in Table 15. Evidence of the construct validity of a scale is provided if the reliability estimates are higher

Table 15

Example of a Multitrait-Multimethod Matrix for Evaluating the Construct Validity of the VOCI

		Self-Report		Interview	
		OCD (VOCI)	Depression (BDI)	OCD (YBOCS)	Depression (HAM-D)
Self-report	OCD (VOCI)	reliability			
	Depression (BDI)	discriminant validity	reliability		
Interview	OCD (YBOCS)	convergent validity	discriminant validity	reliability	
	Depression (HAM-D)	discriminant validity	convergent validity	discriminant validity	reliability

Note. VOCI = Vancouver Obsessional Compulsive Inventory. BDI = Beck Depression Inventory. YBOCS = Yale Brown Obsessive Compulsive Scale. HAM-D = Hamilton Depression Rating Scale.

than the convergent validity estimates, which are in turn higher than the discriminant validity estimates.

This strategy may not be useful for evaluating the VOCI total score against the YBOCS total score, as the VOCI total score, at least within OCD samples, appears to have a very low correlation with YBOCS total score, and may be a poor measure of symptom severity in this group. On the other hand, one could use this strategy to investigate individual subscales of the VOCI, where there are interview measures of similar constructs. For example, the DYBOCS described earlier, as well as providing a global severity score, also yields severity scores for several dimensions of OCD symptoms (hence its name, the Dimensional YBOCS). These dimensions include contamination/cleaning, hoarding, and symmetry/ordering/counting/arranging, so the DYBOCS has potential for evaluation of the validity of the VOCI subscales of Contamination, Hoarding, and Just Right.

Another important area of further evaluation for the VOCI is to examine its sensitivity to treatment effects, particularly in comparison to other measures of OCD, both self-report and interview. The YBOCS was designed to measure symptom change for treatment outcome trials, and has been considered the gold standard for treatment outcome research. While the MOCI has been shown to be sensitive to changes with treatment (see Taylor, 1995 for a review), we hope that the VOCI, with a more flexible item response format, will be more sensitive. According to Taylor (e.g., Taylor, Thordarson, & Söchting, 2000), the sensitivity of the revised Padua Inventory to treatment effects has yet to be established.

We are continuing to collect data on these measures via two ongoing treatment outcome projects for OCD, and are planning to conduct these analyses once enough patients have completed treatment and follow-up.

During the development of the VOCI, a new self-report measure of OCD phenomena has been published, the Obsessive-Compulsive Inventory (OCI: Foa, Kozak, Salkovskis, Coles, & Amir, 1998). The OCI consists of 42 items, each of which is rated for both frequency and distress. The scale comprises 7 subscales: Washing, Checking, Doubting, Ordering, Obsessing, Hoarding, and Mental Neutralizing. The VOCI and OCI have yet to be compared directly in terms of their psychometric properties, and so it is difficult to say which scale is likely to be superior. Unlike the VOCI, the OCI subscales were constructed by the authors to represent common symptoms of OCD rather than factor analytically derived. The OCI appears to have adequate to good internal consistency, test-retest reliability, known-groups validity, and convergent validity. As with the VOCI, correlations with the interview YBOCS tended to be low. The discriminant validity was only fair, with moderate to high correlations with BAI. Oddly, correlations with BDI were not reported. In the non-OCD samples, OCI frequency ratings tended to be higher than distress ratings. Thus a potential advantage of the OCI is that the separate scores for frequency and distress may be useful in research contexts where investigators are interested in "normal" obsessions and compulsions; on the other hand, requiring two ratings for each item increases the time required to complete the scale. It remains to be seen which scale, the VOCI or OCI, will perform better and be adopted by researchers

and clinicians working with OCD. While the VOCI has more evidence of construct validity built-in during scale development, the initial psychometric properties of the OCI are promising.

In further research, we may continue to develop scales, written in a similar format to the VOCI (so they could be easily administered together), for domains of OCD symptoms that are not well-represented by the VOCI. One example which has already been completed is the Symmetry, Ordering and Arranging Questionnaire (SOAQ: Radomsky & Rachman, 2000). Other useful subscales would include doubts and mental neutralizing. Further research is also required to establish the convergent validity of the VOCI with non-self report measures of OCD symptoms, such as interviewer ratings or peer ratings. Finally, we have yet to evaluate whether the VOCI is sensitive to treatment-related changes in OCD symptoms.

To conclude, the VOCI is a promising new instrument for the assessment of a wide range of obsessional compulsive complaints. Evidence has been presented of its reliability and validity. Further research will help to clarify its factor structure in both OCD and non-clinical populations, as well as its utility for treatment-outcome and analogue research.

CHAPTER IV

THE SIGNIFICANCE OF OBSESSIONS

4.1 Introduction

The aim of this study was to test the hypothesis that the occurrence of repugnant obsessions is determined in a large part by misinterpretations of negative intrusive thoughts as highly personally significant and important (signifying something important about oneself). We know that most, if not all, people at least occasionally experience unwanted intrusive thoughts which are very similar in content to the intrusive thoughts reported by obsessional patients. If both groups experience similar intrusions, why do some people experience such thoughts repeatedly, with a high level of distress, and make great efforts to neutralize them? The cognitive theory of obsessions proposed by Rachman (1997, 1998) suggests that normal intrusive thoughts do not become obsessions when they are dismissed by the participant as relatively meaningless and unimportant; on the other hand, intrusive thoughts whose occurrence is interpreted as highly personally significant and important are likely to cause distress, provoke neutralization, and may increase in frequency and interference to the point of becoming clinical obsessions.

It is important to distinguish between interpretations of the *content* of the intrusions, and interpretations of their *occurrence*. The content of negative

intrusive thoughts is usually very significant to the participant, even when the thought itself is easily dismissed as irrelevant. For example, intrusive thoughts of harming one's child are a common theme in obsessional patients, but also a very common experience in non-obsessional participants; many parents will admit that they have at least on one occasion had an intrusive thought of stabbing, shaking, or dropping their child from a high place. Obviously the *content* of this thought is extremely significant to patients and normal participants alike, their child's welfare being very close to their hearts. However, we presume that most normal parents (correctly) dismiss such thoughts as peculiar aberrations in their thought process and experience only a brief shudder. They do not infer anything in particular from the fact that they have experienced such a thought, or they might experience a benign interpretation (e.g., that they are feeling very stressed). In contrast, the person with an obsession along these lines, according to the theory, will make a misinterpretation of the significance of the occurrence of this thought, such as "If I think this I must really want to kill my baby; I'm really a murderer." By focusing on the interpretations participants make of the occurrence of their intrusive thoughts, that is, the fact that such an abhorrent thought enters their minds, we hope to sharpen the distinction between interpretations of normal intrusive thoughts and obsessions.

4.1.1 Hypotheses

This theory suggests a single, overriding hypothesis, namely, that the degree to which people experience intrusive thoughts that are recurrent and distressing is associated with the degree to which they interpret the occurrence

of such intrusions as personally significant. In the present study we planned several specific tests of this overall hypothesis:

1. We predicted that the occurrence of frequent and distressing negative intrusive thoughts would be positively correlated with holding general beliefs that negative intrusive thoughts are highly significant and important. As the theory specifically assumes a continuum from normal intrusive thoughts to clinical obsessions, such a relationship should be demonstrated not only within a sample of OCD patients, but also with non-clinical participants. Moreover, we predicted that such a relationship would remain significant when controlling for depression.
2. We predicted that the frequency and distress associated with intrusive thoughts would be positively correlated with interpreting these thoughts as highly significant and important, even when controlling for depression.
3. We predicted that repugnant obsessions in particular, not merely OCD symptoms in general, would be especially associated with misinterpretations of significance. To test this prediction, we planned two analyses.
   3a. We planned to compare the interpretations of intrusive thoughts in two groups of participants with OCD: (1) participants whose primary OCD theme was repugnant obsessions (e.g., harm, aggressive, sexual, blasphemous obsessions) and (2) participants without such obsessions as a major theme (i.e., the majority of OCD patients whose main themes are overt compulsions such as washing, checking, ordering, and so on). By using OCD patients without repugnant obsessions as the controls, we

were attempting to provide a stringent test of the hypothesized association between the occurrence of repugnant obsessions and misinterpretations of personal significance.

3b. We planned to compare the association between beliefs in the significance of thoughts and obsessions with the associations between significance beliefs and other symptoms of OCD (washing, checking, and so on).

In addition to the hypotheses described above, this study enabled us to complete an exploratory analysis. We were interested in whether beliefs that thoughts are highly significant are more important in predicting obsessions than two alternative sets of beliefs: beliefs about responsibility, and beliefs in the necessity of controlling thoughts. We chose these two sets of beliefs because they are the primary underlying assumptions made by two alternative models of OCD. Salkovskis's cognitive-behavioural model of OCD (e.g., 1985, 1989, 1999) suggests that intrusive thoughts are interpreted as indicating personal responsibility for preventing a subjectively negative outcome. Clark and Purdon (1993), suggest that beliefs about needing to control intrusive thoughts (and subsequent attempts to control them) are a primary source of obsessional problems (see Chapter 1 for a more detailed description of the cognitive models of OCD).

In contrast to Salkovskis and Clark and Purdon, we have suggested that, at least in the case of repugnant obsessions, beliefs in their personal significance and importance are primary. Interpreting a repugnant intrusive thought as

signifying something important about oneself or one's immediate circumstances may *lead* to further interpretations of personal responsibility and an imperative to control such thoughts, but these interpretations are logically secondary. If this hypothesis is true, the associations between both (a) beliefs about responsibility and obsessions, and (b) beliefs about the need to control thoughts and obsessions, should be reduced when the influence of beliefs about the significance of thoughts is partialed out.

4.2 Method

4.2.1 Participants

OCD sample

Participants were 69 adults with OCD, all of whom were participants in the VOCI study (Chapter 3). As described in Chapter 3, diagnosis was confirmed by structured diagnostic interview. Participants who had a diagnosis of OCD were included in this group regardless of whether a different disorder was primary. The majority of participants (97%) had a primary diagnosis of OCD. Participants came from one of three sources: 10 from the Participant Register of the Fear and Anxiety Laboratory at UBC; 27 from a treatment study for OCD in the Traumatic Stress Clinic at UBC; and 32 from the Anxiety Disorders Unit at UBC Hospital. The average age was 34.8 years (range 19-66); 25 (36.2%) of the participants were men, 44 (63.8%) were women. The average number of years of education was 14.8 (range 10-23). Forty-six percent of the participants were married or cohabiting, 42% had never been married, 10% were separated or divorced, and 2% were widowed. Forty percent were employed full-time, 19% were employed

part-time, 10% were students, 10% were unemployed, 9% were on disability pensions, 6% were full-time homemakers, and 5% were retired.

Community Adult Sample

This sample consisted of the 39 eligible community adult participants from the VOCI study reported in Chapter 3. Their demographic information is described in Chapter 3.

Student Sample

Participants were 198 students from the 200 eligible students in the VOCI study (see Chapter 3). Their average age was 19.9 years (range 18-48); 62 were men (31%) and 136 were women (69%).

4.2.2 Measures

Questionnaires

Vancouver Obsessional Compulsive Inventory (VOCI) (see Chapter 3). This is a 55 item self-report scale of OCD phenomena. Its reliability and validity were examined in Chapter 3 and found to be satisfactory. The revised subscales described in Chapter 3 were used. There are 6 subscales: Contamination, Checking, Obsessions, Hoarding, Just Right, and Indecisiveness. For the purposes of the current study, the Obsessions subscale was used to operationalize the degree to which participants experienced recurrent and distressing repugnant obsessions of harm, aggression, sex, and blasphemy.

Obsessive Beliefs Questionnaire (OBQ) (Obsessive Compulsive Cognitions Working Group, 1997, 2000). The OBQ is an 87-item self-report measure of OCD-related beliefs. It contains six subscales: *Intolerance for*

Uncertainty, *Overestimation of Threat*, *Control of Thoughts*, *Importance of Thoughts*, *Responsibility*, and *Perfectionism*. Each item is a statement of a belief believed to be relevant for OCD sufferers. Respondents rate each item on a 7-point scale (from *Disagree Very Much* to *Agree Very Much*), and subscale scores are determined by calculating the average item response for the items in that subscale. Although still under development, the OBQ is the best validated scale of OCD-related beliefs available, and was developed by an international working group of OCD researchers, in part using items from previously derived scales. For the purposes of this study, the Importance of Thoughts subscale was used as a measure of beliefs that intrusive thoughts are highly important and personally significant. The items from this subscale are presented in Table 16. Recent analyses of the reliability and validity of the OBQ (Taylor, Kyrios, & Thordarson, 2000) indicated that the subscales of the OBQ have excellent internal consistency, known-groups validity, and convergent validity, but poor discriminant validity. The OBQ subscales had good test-retest reliability in a student sample over a 90-day interval. The test-retest reliability in an OCD sample of 30 participants over an average of 65 days was poor: for the Importance of Thoughts subscale, the test-retest correlation was .51. The Importance of Thoughts subscale significantly discriminated OCD participants from anxiety disorder controls, community adults, and students. Its discriminant validity was poor, correlating as highly with measures of non-OCD pathology (worry, trait anxiety, and depression) as with measures of OCD symptoms in both students and OCD participants. However, analyses of an earlier version of the

Table 16

Items from the Importance of Thoughts Subscale of the Obsessive Beliefs Questionnaire (OBQ)

Item #	Item
1	Having bad thoughts or urges means I'm likely to act on them.
14	The more distressing my thoughts are, the greater the risk that they will come true.
18	The more I think of something horrible, the greater the risk it will come true.
24	For me, having bad urges is as bad as actually carrying them out.
34	If I have aggressive thoughts or impulses about my loved ones, this means I may secretly want to hurt them.
46	Having nasty thoughts means I am a terrible person.
48	If an intrusive thought pops into my mind, it must be important.
49	Thinking about a good thing happening can prevent it from happening.
55	I should not have bizarre or disgusting thoughts.
58	Having a blasphemous thought is as sinful as committing a sacrilegious act.
64	Having bad thoughts means I am weird or abnormal.
66	Having an unwanted sexual thought or image means I really want to do it.
76	Having violent thoughts means I will lose control and become violent.
83	Having a bad thought is morally no different than doing a bad deed.

OBQ (Obsessive Compulsive Cognitions Working Group, 2000) showed that correlations between the OBQ subscales and the OCD symptoms ranged from .33 to .52 when measures of depression and anxiety were partialed out, indicating that the association between OBQ scales and OCD symptoms is not entirely due to shared variance with non-OCD psychopathology.

Interpretations of Intrusions Inventory (III) (Obsessive Compulsive Cognitions Working Group, 1997, 2000). The III is a self-report measure of OCD-related interpretations of intrusive thoughts. The scale has three components. First, respondents read a description of unwanted intrusive thoughts, including several examples. The respondents are asked to write in two unwanted mental intrusions that they have experienced. Second, respondents give two ratings of their intrusive thoughts and any similar intrusions:

1. in the last 6 months, how frequently they experienced an intrusion of this kind (rated on a 6-point scale from *less than once a month* to *several times per day*), and
2. how much distress they usually experience when they have an intrusion of this kind (rated on a 5 point scale from *none* to *extreme*).

Third, respondents rate 31 items, each an OCD-related interpretation of intrusive thoughts, by circling a number from 0 (*did not believe this idea at all*) to 100 (*completely convinced this idea was true*) that best represents their belief in that particular interpretation when an intrusive thought such as the thoughts they have listed is occurring. The 31 items are divided into 3 subscales: *Control of Thoughts*, *Importance of Thoughts*, and *Responsibility*. For the purposes of this

study, the frequency and distress ratings were used to assess the frequency and distress associated with the participants' intrusive thoughts (although participants may report two intrusive thoughts, they give an overall rating of frequency and distress). In addition, a frequency x distress index was calculated to provide an estimate of the overall severity of the intrusive thoughts.[8] The Importance of Thoughts subscale was used as a measure of the degree to which the participant interprets their negative intrusive thoughts as highly important and personally significant. The items from the Importance of Thoughts subscale of the III are presented in Table 17. Recent analyses of the reliability and validity of the III (Taylor, Kyrios, & Thordarson, 2000) indicated that the subscales of the III have good test-retest reliability, adequate known-groups validity and convergent validity, but poor discriminant validity, correlating almost as highly with measures of non-OCD related psychopathology (worry, trait anxiety, depression) as with measures of OCD symptoms.

Beck Depression Inventory (BDI: Beck, Rush, Shaw, & Emery, 1979). The BDI is a widely used 21-item self-report measure of depression. Its reliability and validity have been clearly demonstrated (Beck, Steer, & Garbin, 1988). It was used in this study as a measure of depression and negative affect.

4.2.3 Procedure

The questionnaires specific to this study (the *OBQ* and III) were administered to participants as part of the VOCI questionnaire package (see

[8] Thoughts that occur frequently but are not distressing, or thoughts that occur only occasionally but are very distressing, would thus have similar scores on a frequency x distress index. Thoughts that are both frequent and highly distressing (as is the case with repugnant clinical obsessions) would have high scores on this index.

Table 17

Items from the Importance of Thoughts Subscale of the Interpretation of Intrusions Inventory (III)

Item #	Item
2	Having this unwanted thought means I will act on it.
4	Because I have this thought, it must be important.
6	Thinking this thought could make it happen.
7	This intrusive thought could be an omen.
11	Because this thought comes from my mind, I must want to have it.
16	Because I've had this thought, I must want it to happen.
20	This thought could harm people.
22	Having this thought means I'm weird or abnormal.
24	Having this intrusive thought means I am a terrible person.
27	The more I think about these things, the greater the risk they will come true.

Chapter 3). The questionnaires were completed at home and returned to the laboratory or clinic by mail or at the next appointment. Some of the OCD and student participants completed an earlier version of the OBQ and III. The earlier versions were slightly longer, but included all the items in the final version so the subscale scores could be calculated based on the items from the final version. However, the earlier version of the III did not include frequency and distress ratings for the intrusive thoughts, so the sample size for analyses presented below based on these ratings is correspondingly smaller.

4.3 Results

4.3.1 Obsessions and Beliefs about the Significance of Thoughts

In order to test the first hypothesis, that repugnant obsessions and beliefs about the significance of thoughts are related, correlation coefficients were computed between the VOCI Obsessions subscale (a measure of the degree to which participants experience recurrent and distressing repugnant obsessions) and the OBQ Importance of Thoughts subscale (a measure of beliefs that negative intrusive thoughts are highly important and significant). In Chapter 3, we found that VOCI Obsessions was correlated with depression in both the OCD and student control samples. In addition, the OBQ and III subscales are correlated with depression in OCD and student control samples (Taylor, Kyrios, & Thordarson, 2000). To eliminate the possibility of depression being a third variable responsible for the correlation between beliefs and obsessions, partial correlations between VOCI Obsessions and OBQ Importance of Thoughts were computed, with depression (as measured by the BDI) partialed out. The results

are shown in Table 18. Before computing the correlations, the data were screened for univariate outliers ($z > |3.5|$). Univariate outliers on the VOCI Obsessions and BDI scales were observed and deleted in the VOCI Study (see Chapter III); the screened data were used in this study. There were no outliers observed in the OBQ Importance of Thoughts scale within any of the groups.

The results support the hypothesis that beliefs in the importance of thoughts are associated with the experience of obsessions in all three groups. The association remains significant even with depression partialed out.

4.3.2 Intrusive Thoughts and Appraisals of their Significance

As described above, the cognitive theory of obsessions suggests that interpreting intrusive thoughts as highly significant and important should lead to increases both in their frequency and in the distress associated with their occurrence. The III gives an opportunity to directly test this hypothesis; participants were required to write two negative intrusive thoughts, rate their frequency and the distress associated with the thoughts, and then complete the interpretations subscales with direct reference to the intrusions experienced. Therefore we can investigate the relationship between interpreting *specific* intrusive thoughts as highly important and the frequency and distress associated with these particular thoughts.

Not all participants have complete data for frequency and distress ratings of their intrusive thoughts, either because they did not fill in the ratings, or because, as mentioned earlier, they completed an earlier version of the III that did not include these ratings.

Table 18

Descriptive Statistics and Correlations between VOCI Obsessions and OBQ Importance of Thoughts

		OCD	Adults	Students
	n (listwise)	68	38	192
VOCI[a] Obsessions	*M*	1.03	0.14	0.43
	(SD)	(0.87)	(0.21)	(0.42)
OBQ[b] Importance of Thoughts	*M*	3.18	1.50	2.17
	(SD)	(1.34)	(0.59)	(0.82)
Correlation between VOCI Obsessions and OBQ Importance of Thoughts				
	Zero-order	.51**	.53**	.39**
	Partial[c]	.45**	.47*	.32**

[a]Vancouver Obsessional Compulsive Inventory. [b]Obsessive Beliefs Questionnaire. [c]Controlling for BDI (Beck Depression Inventory).
*p<.01. **p<.001.

Intrusive Thoughts Reported by Participants

Before examining the relationship between frequency, distress, and interpretations, we are presenting here a description of the types of thoughts reported by the three groups (OCD, adult, student). As described earlier, in the III participants read a description and several examples of unwanted intrusive thoughts, and write in two intrusive thoughts that they have experienced recently. The unwanted intrusive thoughts were coded based on the coding scheme developed by the Obsessive Compulsive Cognitions Working Group, with several minor modifications (some categories, e.g., contamination and illness, were combined, and others relabelled to more closely represent the thoughts actually given by participants). The frequency of different types of thoughts reported by all 3 groups is presented in Table 19.

To determine whether OCD participants tended to report different types of intrusive thoughts than normal controls, we pooled the thoughts reported by the adults and students into a single group, and tested the differences between the proportions of each type of thought between the two groups using a chi-square test of association (Glass & Hopkins, 1996, p. 333) with $df = 1$, $\alpha = .01$.[9] Thoughts of contamination or illness were significantly more common in the OCD group than in the normal controls ($\chi^2 = 30.17$), as were thoughts involving symmetry/order/just right ($\chi^2 = 13.5$). Excluding contamination, the three most common types of thoughts were similar in frequency across all three groups:

[9] Note that thoughts were used as the unit of analysis. Because most participants reported two thoughts, thoughts represent independent observations between groups but not within groups.

Table 19

Frequency of Intrusive Thoughts Reported across Groups

	OCD	Adults	Students
n[a]	41	32	101
No. of Thoughts[b]	81	60	193
Intrusive Thoughts			
Contamination/Illness	18 (22%)	1 (2%)	7 (4%)
Causing harm by carelessness or leaving things undone	16 (20%)	13 (22%)	47 (24%)
Aggressive (Harming self or others)	13 (16%)	12 (20%)	34 (18%)
Harm coming to self or loved one	12 (15%)	19 (32%)	45 (23%)
Moral	3 (4%)	6 (10%)	21 (11%)
Blasphemous	0 (0%)	0 (0%)	2 (1%)
Sexual	3 (4%)	3 (5%)	11 (6%)
Symmetry/Order/Just Right	7 (9%)	0 (0%)	3 (2%)
Other obsession-like thoughts	3 (4%)	0 (0%)	5 (3%)
Not obsession-like thoughts (e.g., worries, fantasies)	6 (7%)	6 (10%)	18 (9%)

Note. Numbers in rows of intrusive thought types refer to frequency of that thought in each group; percentages refer to percentage of total number of thoughts for that group.
[a]Only those participants with valid ratings of both frequency and distress associated with the intrusive thoughts were included.
[b]Participants were asked to give two thoughts, but some reported only one.

1. thoughts of causing harm through carelessness or leaving things undone (e.g., thinking that you have left the stove on and it will cause a fire),
2. thoughts of causing harm through aggression towards oneself or someone else (e.g., thought of stabbing someone with a sharp knife), and
3. thoughts of accidents, death, or other harm occurring to oneself or a loved one (e.g., thought of a loved one being killed in an accident).

Despite being a classically recognized type of repugnant obsession, blasphemous thoughts were very rare in all three groups. However, some thoughts that were coded into other categories had religious content. For example, one student reported the intrusive thought, "Running up to the altar and hitting people," which was coded as aggressive rather than blasphemous. Finally, a proportion of participants in all three groups reported thoughts that were classified as worries or other types of thoughts that are not similar to obsessions. To illustrate the similarity among thoughts reported in all three groups, several examples of thoughts from the most frequent categories are presented in Table 20.

Associations between Frequency, Distress, and Importance of Thoughts

Correlations between frequency and distress ratings and the III Importance of Thoughts subscale were computed. In addition, as in the previous section, partial correlations (controlling for BDI scores) were also computed. Participants who did not have valid frequency and distress ratings and

Table 20

Examples of Intrusive Thoughts Reported across Groups

Type of Intrusive Thought	Example
Causing harm by carelessness	
OCD	I've left tap dripping, will waste water Left appliance on, causing fire
Adults	Left curling iron on causing fire Didn't lock door, someone will break in
Students	Lost the car key and car is stolen Left oven on
Aggressive	
OCD	Harming loved ones with a knife Harming my pets
Adults	Kill loved one Thought of running car off road
Students	Driving into oncoming traffic Running over a pedestrian who walks too slow
Harm to self or close others	
OCD	Image of myself dying Image of my children being murdered
Adults	Receiving news of death of husband Car accident, being trapped in car under water
Students	Best friend falling off a building and dying Family members having car accident
Moral	
OCD	Making comment that might hurt someone Impulse to say something rude
Adults	Blurting out something in church Saying something rude or embarrassing
Students	Swear words Impulse to do something shameful
Worries or other non-obsession type thoughts	
OCD	Spots and pimples all over my face I'm undesirable and difficult to love
Adults	Thoughts of upsetting incident Going out and getting drunk
Students	Afraid someone is watching me Losing all my hair

participants who reported a non-obsession type thought (such as a worry) for either of their intrusive thoughts were excluded from the analysis. In addition, participants who completed an earlier version of the III without frequency and distress ratings were excluded. No univariate outliers ($z > |3.5|$) were found for the III Importance of Thoughts scale, or the frequency, distress, or frequency x distress ratings from the III, within any of the groups. The results of this analysis are presented in Table 21. The results show that, for the non-clinical groups (adults and students) the frequency and distress associated with negative intrusive thoughts are related to the way in which these thoughts are interpreted. Even with BDI partialed out, there are significant associations in the student group between frequency, distress, severity (defined as frequency x distress) and interpreting the thoughts as highly significant and important. In the adult group, the correlation coefficients are of a similar magnitude but are not statistically significant with the smaller sample size. Within the OCD sample, there may be an association between *distress* and importance, but this was not statistically significant with $\alpha < .01$. However, there was no relationship between importance and frequency in the OCD group. Inspection of the distribution of frequency ratings within the OCD group revealed that the distribution of frequency ratings was highly negatively skewed, with over 50% of respondents giving the highest frequency rating (intrusive thought occurring several times per day). It appeared that, within a sample where intrusive thoughts were occurring at a very high frequency, interpretations of these thoughts was not related to frequency due to range restriction.

Table 21

Descriptive Statistics and Correlations between III Importance of Thoughts and Frequency, Distress, and Frequency x Distress Ratings

Scale	*n* (listwise):	OCD 36	Adults 28	Students 86
III[a] Importance of Thoughts	*M*	32.15	10.93	20.22
	(SD)	(26.06)	(13.91)	(15.66)
III Frequency	*M*	5.22	2.18	2.47
	(SD)	(1.15)	(1.31)	(1.25)
III Distress	*M*	3.53	1.89	2.28
	(SD)	(0.88)	(0.79)	(0.97)
III Frequency x III Distress	*M*	18.50	4.18	5.98
	(SD)	(6.55)	(3.35)	(4.45)
Correlations with III Importance of Thoughts:				
III Frequency	Zero-order	.05	.35	.39**
	Partial[b]	.06	.25	.31*
III Distress	Zero-order	.42	.41	.50**
	Partial[b]	.36	.38	.42**
III Frequency x III Distress	Zero-order	.32	.57*	.56**
	Partial[b]	.30	.48	.48**

[a]Interpretations of Intrusions Inventory. [b]Controlling for BDI (Beck Depression Inventory).
*p<.01. **p<.001.

4.3.3 The Specificity of Significance Beliefs

In order to evaluate whether beliefs in the significance of negative intrusive thoughts are specifically associated with obsessions, and not with obsessive-compulsive symptoms in general, we conducted two analyses exploring the relationship between obsessions and beliefs in the importance of thoughts.

First, OCD participants were classified as to whether they had a problem with repugnant obsessions, based on the three primary obsessive-compulsive problems reported by the YBOCS or DYBOCS interviewer (see Chapter 3 for a more detailed description of the classification). The mean scores on the Importance of Thoughts subscale of the OBQ were then compared between the two groups (OCD participants with and without repugnant obsessions). As predicted, the participants for whom obsessions were a major problem (n = 25) had a higher mean score on beliefs about the significance of thoughts (M = 3.78, SD = 1.24) than participants without repugnant obsessions (n = 43) (M = 2.80, SD = 1.24). This difference was statistically significant ($t(66) = 3.16$, $p = .002$, 2-tailed), suggesting that beliefs in the importance of thoughts are particularly relevant for OCD sufferers with repugnant obsessions rather than other types of symptoms. This analysis was conducted using the OBQ Importance of Thoughts scale rather than the III Importance of Thoughts scale because the latter involves interpretations of the particular intrusive thoughts listed by the participant, rather than beliefs that negative thoughts are important in general.

Second, correlation coefficients between OBQ Importance of Thoughts and the VOCI subscales were computed within the OCD group. The Importance of Thoughts-VOCI Obsessions correlation was compared to the correlations between Importance of Thoughts and other VOCI subscales. The results are shown in Table 22. In support of the hypothesis that beliefs in the significance of thoughts are related to obsessions in particular, not merely OCD symptoms in general, the OBQ Importance of Thoughts subscale correlates most highly with VOCI Obsessions. We tested whether the correlation between Importance of Thoughts and Obsessions was greater than the average correlation between Importance of Thoughts and the other subscales of the VOCI, using the formula given by Meng, Rosenthal, and Rubin (1992) for testing a contrast among correlated correlation coefficients. (The formula for this statistic is shown in the Appendix, p. 167.) The contrast was statistically significant ($z = 2.41$, $p = .02$), indicating that there is a stronger relationship between beliefs in the significance of intrusive thoughts and repugnant obsessions than between these beliefs and other OCD symptoms.

4.3.4 The Primacy of Beliefs in the Significance of Thoughts

To test whether beliefs in the significance of thoughts are more important than beliefs about responsibility or control of thoughts in the experience of obsessions, we examined the correlations between OBQ measures of Responsibility and Control of Thoughts with VOCI Obsessions, with and without partialing out the OBQ Importance of Thoughts scores. The results are shown in Table 23. In the OCD sample, Importance of Thoughts, Responsibility and

Table 22

Correlations between OBQ Importance of Thoughts and VOCI Subscales for OCD participants (n=69)

VOCI Subscale	Correlation with OBQ Importance of Thoughts
Obsessions	.50**
Contamination	.31
Checking	.22
Hoarding	.21
Just Right	.17
Indecisiveness	.41**

**$p < .001$. *$p < .01$.

Table 23

Zero-order and Partial Correlations of OBQ Subscales (Importance of Thoughts, Responsibility, Control of Thoughts) with VOCI Obsessions

OCD (n = 69)

	Correlation with VOCI Obsessions	Controlling for Importance of Thoughts	Controlling Responsibility	Controlling for Control of Thoughts
Importance of Thoughts	.50**	-	.34*	.33*
Responsibility	.41**	.13††	-	.19†
Control of Thoughts	.41**	.08††	.19†	-

Adults (n = 38)

	Correlation with VOCI Obsessions	Controlling for Importance of Thoughts	Controlling for Responsibility	Controlling for Control of Thoughts
Importance of Thoughts	.53**	-	.44*	.43*
Responsibility	.33	.09	-	.15
Control of Thoughts	.34	-.01†	.19	-

Students (n =192)

	Correlation with VOCI Obsessions	Controlling for Importance of Thoughts	Controlling for Responsibility	Controlling for Control of Thoughts
Importance of Thoughts	.39**	-	.24**††	.06††
Responsibility	.35**	.14††	-	.07††
Control of Thoughts	.45**	.24**††	.31**†	-

**p < .001. *p < .01
††p < .001 †p < .01 for the significance of the difference between the partial correlations and the zero-order correlation on each row

Control of Thoughts were all significantly correlated with Obsessions. The correlation between Obsessions and Importance of Thoughts was not significantly greater than the correlations between Obsessions and Responsibility or Obsessions and Control of Thoughts. However, these correlations (Obsessions-Responsibility and Obsessions-Control of Thoughts) became small and nonsignificant when Importance of Thoughts was partialed out. The differences between the zero-order and partial correlations were tested using the procedure described by Olkin and Finn (1995), the formula for which is presented in the Appendix (p. 168). Partialling out Importance of Thoughts significantly reduced the zero-order correlations of Obsessions-Responsibility and Obsessions-Control of Thoughts. In contrast, partialing out Responsibility or Control of Thoughts did not significantly reduce the correlation between Importance of Thoughts and Obsessions; it remained moderate in size and significant at $p < .01$.

A similar pattern of results was found in the adult sample. Partialing out Importance of Thoughts significantly reduced the correlation between Obsessions and Control of Thoughts. Partialing out Importance of Thoughts appeared to have reduced the correlation between Obsessions and Responsibility, but this was not significant at $p < .01$. Unlike in the OCD sample, the correlation between Obsessions and Importance of Thoughts was not significantly greater than the Obsessions-Responsibility or Obsessions-Control of Thoughts correlations.

For the student sample, the correlation between Obsessions and Importance of thoughts was not significantly larger than the Obsessions-Responsibility or Obsessions-Control of Thoughts correlations (in fact, the Obsessions-Control of Thoughts was slightly larger). Partialing out Importance of Thoughts significantly reduced the other correlations, but so did partialing out Control of Thoughts. In the student sample, Control of Thoughts appeared to be the primary beliefs related to Obsessions. These findings, being inconsistent between samples, provide only weak evidence for the hypothesis that appraising one's negative intrusive thoughts as highly personally significant is the *primary* misinterpretation that gives rise to clinical obsessions.

4.4. Discussion

In this study, we have attempted to make several tests of the theory that the occurrence of repugnant obsessions is due to the misinterpretation of normal negative intrusive thoughts as being highly personally significant and important. In order to test the theory, several specific hypotheses were made. In this section, the findings from each set of specific hypotheses will be discussed, followed by a general discussion of the implications and limitations of this study. The findings are summarized in Table 24.

In the first set of analyses, we predicted that the experience of recurrent, distressing intrusive thoughts (i.e., obsessions) would be correlated with beliefs that negative intrusive thoughts are highly important and significant. This hypothesis was supported. In all three samples of participants (OCD, Adult, and Student), there was a significant correlation between scores on the VOCI

Table 24

Summary of Findings

Prediction	Finding
Are obsessions related to beliefs about the importance of thoughts?	OCD: yes Adults: yes Students: yes
Is the frequency of intrusive thoughts associated with interpreting these thoughts as being important?	OCD: not demonstrated Adults: not significantly Students: yes
Is the distress resulting from intrusive thoughts associated with interpreting these thoughts as important?	OCD: not significantly Adults: not significantly Students: yes
Is the overall severity of intrusive thoughts (frequency x distress) associated with interpreting these thoughts as important?	OCD: not significantly Adults: yes Students: yes
Do OCD patients with repugnant obsessions endorse more beliefs in the importance of thoughts than other OCD patients?	Yes
Are beliefs in the Importance of Thoughts related more strongly to obsessions than to other OCD symptoms?	Yes
Are beliefs in the importance of thoughts the primary beliefs involved in obsessions? That is, is the relationship between other beliefs (responsibility and control) significantly reduced when Importance of Thoughts is partialed out?	OCD: yes Adults: partly Students: yes, but Control of Thoughts appears to be more primary.

Obsessions subscale (a measure of repugnant obsessions) and the OBQ Importance of Thoughts subscale (a measure of believing that having nasty thoughts is highly important or significant in some way). This finding, that believing that repugnant intrusive thoughts are highly important is related to the occurrence of unpleasant obsessions or obsession-like thoughts, supports the theory that holding such beliefs may, in fact, be a major contributor to the development of clinical obsessions. However, while the finding is consistent with a causal explanation, it does not provide evidence of such an explanation; the same finding could arise from either a reversed causal relationship (e.g., that experiencing recurrent repugnant thoughts leads to believing that they must be important and significant), or the influence of a third variable.

The magnitude of the correlation coefficients was only slightly reduced, and remained statistically significant, when scores on a measure of depression (the BDI) were partialed out. This finding is important because we know that depressed mood tends to increases the occurrence of obsessions (even in patients without OCD), and the negative thinking style that accompanies depression could contribute to making negative attributions and interpretations for their occurrence. Therefore, it was necessary to rule out depression as a third variable that could account for the relationship between obsessions and beliefs in the importance of intrusive thoughts.

These findings also supported the idea of continuity between the experience of normal intrusive thoughts and clinical obsessions; that is, that clinical obsessions are an extreme form of normal intrusive thoughts. Cognitive-

behavioural theories of OCD suggest that there should be continuity between normal intrusive thoughts and clinical obsessions, because obsessions are thought to arise from normal intrusive thoughts. In this study, we found that the relationship between obsessions and beliefs in the importance of thoughts was similar between OCD participants and normal controls, suggesting that a similar cognitive process may be operating across the spectrum from normal intrusive thoughts to clinical obsessions. This finding is consistent with an assumption common to current cognitive-behavioural theories of anxiety disorders such as panic and OCD, namely, that the basic clinical phenomena of the disorders (be it panic attacks or obsessions) arise from the misinterpretation of normal and benign phenomena (e.g., normal fluctuations in bodily sensations, or normal negative intrusive thoughts). In contrast, if clinical obsessions were qualitatively distinct from the occasional negative intrusive thoughts experienced by most people, there would be no reason to expect that certain beliefs would be associated with these types of thoughts in both normal and clinical samples.

In the first set of analyses, we found that beliefs about the importance of thoughts were associated with the tendency to experience recurrent and distressing repugnant thoughts or obsessions. In the subsequent set of analyses, we conducted a similar test, examining whether the frequency of and distress resulting from specific, naturally occurring, intrusive thoughts reported by the participant were associated with interpreting these particular thoughts as being highly important and significant. In other words, while the first hypothesis referred to the relationship between beliefs and the experience of obsessions or

obsession-like thoughts in general, the second hypothesis referred to the interpretations made of intrusive thoughts reported by the participant, and how they related to the frequency and distress associated with *these* thoughts. We found that, within the student sample, frequency and distress, as well as overall severity (frequency x distress) of the particular negative intrusive thoughts were significantly correlated with interpreting those thoughts as highly important. In the adult sample, we found correlations of a similar magnitude, although not statistically significant (presumably due to a lack of power with the smaller sample size). In the OCD sample, distress appeared to be related to misinterpreting the thoughts as being highly important. There was no relationship between interpretations and frequency, because there was little variability in the ratings of frequency, with most participants rating the thoughts as occurring at a very high frequency. This is understandable, given that most people with OCD would be expected to be having obsessions very frequently.

In summary, from the first two predictions, we found that the experience of obsessions and of recurrent and distressing unwanted intrusive thoughts appeared to be related to both holding beliefs that such thoughts are highly important and significant, and to making interpretations of specific intrusive thoughts as important and significant.

In the next set of analyses, we investigated whether beliefs in the significance of thoughts were specifically associated with obsessions, and not with OCD symptoms in general. In doing so, we were hoping to bolster our contention that believing that one's thoughts are highly personally significant and

important is fundamental in the experience of obsessions, by using people with OCD but without repugnant obsessions as, in essence, a stringent control group. In support of our prediction, we found that OCD participants with repugnant obsessions endorsed significantly more beliefs in the importance of thoughts than OCD participants who did not experience repugnant obsessions as a major problem. In addition, using the entire sample of OCD participants, we found that there was a stronger relationship between beliefs in the importance of thoughts and obsessions (measured continuously, using the VOCI Obsessions subscale) than other OCD symptoms, taken together. By comparing repugnant obsessions with OCD symptoms in general, we can be more confident in the overall hypothesis that obsessions arise from misinterpreting intrusive thoughts as being highly significant.

In the final set of analyses, we attempted to show that, not only are beliefs in the importance of thoughts associated with obsessions, they are also the primary underlying beliefs contributing to obsessions. Alternative models of OCD, and research into beliefs and interpretations of intrusive thoughts, have focused on other types of beliefs, namely, beliefs about responsibility (e.g., Salkovskis et al., 2000; Wilson & Chambless, 1999), and control of thoughts (Clark & Purdon, 1993). Rachman's cognitive theory of obsessions specifically proposes that beliefs in the personal significance and importance attached to thoughts give rise to obsessions. From this point of view, beliefs about responsibility to prevent negative outcomes and beliefs in the necessity of controlling one's thoughts would appear to be logically secondary; without

interpreting a thought as personally significant and important, there would be no reason to believe one is responsible for preventing a negative outcome as a result of the thought, or believe one must control such a thought. If this approach is correct, then partialing out beliefs about the importance of thoughts from beliefs about responsibility, beliefs about the control of thoughts, and obsessions, should reduce the relationships between these beliefs and obsessions to near-zero.

The findings from the OCD and adults samples supported this idea; when OBQ Importance of Thoughts scores were partialed out, the correlations between OBQ Responsibility and VOCI Obsessions were significantly reduced from zero-order correlations in the range of .3 to .4 to partial correlations less than .15. In the OCD sample, partialing out Importance of Thoughts also significantly reduced the Obsessions-Control of Thoughts correlation. Conversely, when Responsibility and Control of Thoughts were partialed out, the correlations between Importance of Thoughts and Obsessions were not significantly reduced. These findings suggested that, for the OCD and Adult groups, the relationships between responsibility, control of thoughts, and obsessions were largely dependent on beliefs about the significance of thoughts. In the student sample, however, beliefs about the importance of thoughts did not appear primary. When beliefs about the importance of thoughts were partialed out, the correlations between the other beliefs and obsessions were significantly reduced, but there remained a moderate and significant relationship between obsessions and control of thoughts. Furthermore, when control of thoughts was partialed out, the

relationship between importance of thoughts and obsessions was significantly reduced. Therefore, it is difficult to make any firm conclusions about whether beliefs in the importance of thoughts are primary, compared to responsibility and control beliefs, in the experience of obsessions.

In summary, the results of this study supported most of the predictions that were made based on our cognitive-behavioural model of obsessions, namely, that obsessions result from misinterpreting normal intrusive thoughts as being highly personally significant and important. At the simplest level, there is a clear association between holding general beliefs that thoughts are important, and the occurrence of frequent and distressing intrusive thoughts. In addition, there is evidence that the distress associated with particular intrusive thoughts is related to how those thoughts are interpreted. In nonclinical subjects, where the occurrence of negative intrusive thoughts varies widely in frequency, the frequency also appears to be associated with interpreting the thoughts as highly significant and important. In people with OCD, believing that one's thoughts are highly important and significant appears to be specifically associated with obsessions, not with OCD symptoms in general. Finally, there is mixed evidence as to whether believing one's thoughts are important is primary in the experience of obsessions. Taken together, these findings are largely consistent with our cognitive-behavioural model of obsessions.

There are several limitations to this study. First, this study is unable to determine the causal relationship between beliefs, misinterpretations, and obsessions. Our cognitive model of obsessions is explicitly causal, that is, it

suggests that believing one's thoughts are highly significant and important (a) makes one vulnerable to developing repugnant obsessions, especially at times of stress or depression when unpleasant intrusive thoughts are likely to occur more often, and (b) is an important factor in maintaining the obsessions. Finding that beliefs and misinterpretations about the importance of thoughts is related to experiencing recurrent and distressing negative intrusive thoughts does not demonstrate that the beliefs and misinterpretations caused the thoughts to increase in frequency or cause additional distress. It is equally possible, given these data, that obsessions occur at a particular frequency and cause distress for other reasons (e.g., biological factors), and as a result of this experience, the afflicted come to believe that these unpleasant and distressing thoughts must be important and meaningful.

One approach to discovering whether misinterpreting one's negative intrusive thoughts as highly personally significant is to attempt to manipulate the interpretations, and look for changes in the experience of negative thoughts or obsessions. This has been tried recently in a study by Rachman (personal communication, 2000) of obsessional patients. When, with several sessions of cognitive therapy specifically targeted to the interpretations the patients were making of their obsessions, the misinterpretations of significance were reduced, the distress associated with the obsessions was also alleviated. However, in a number of patients they were unable to modify the misinterpretations. Other researchers (e.g., Freeston et al., 1997; McLean et al., in press) have also incorporated cognitive restructuring aimed at modifying patients' appraisals of the

importance of thoughts, but only as components in an overall cognitive-behaviour therapy package. Therefore, it is not clear whether modifying these appraisals in particular led to improvements in repugnant obsessions. Moreover, it is difficult to determine from treatment studies whether changes in beliefs and appraisals produce changes in symptoms, or whether patients experience changes in symptoms that lead to changes in beliefs and appraisals. Experimental manipulation of interpretations of intrusive thoughts (that is, manipulating interpretations of significance up or down and looking for immediate effects on the distress associated with intrusive thoughts) will be necessary. However, such manipulations are difficult to devise.

Although experimental and developmental evidence may be necessary to establish whether misinterpreting the significance of normal intrusive thoughts leads to the development of obsessions, we can devise path models that would clarify the relationships between beliefs and appraisals in the significance of thoughts and other types of beliefs and appraisals, such as responsibility, the need to control thoughts, and overestimating threat. For example, in future research we plan to use structural equation modelling techniques to determine whether, as we have suggested, interpretations of the significance of thoughts are primary in the experience of repugnant obsessions, and that appraisals of responsibility and the need to control thoughts are dependent on the initial appraisal of significance. The Obsessive Compulsive Cognitions Working Group has developed a large database that would be ideally suited to such analyses, and we plan to apply to the working group for permission to use the data.

A further limitation of this study is its reliance on questionnaire scores to operationalize the constructs. The validity and replicability of the results of any study is limited by the psychometric properties of the variables, and, because this area of research is new, this study relied on relatively new measures of symptoms and beliefs. It is possible that these findings would not be replicated with different measures of obsessions (e.g., the OCI Obsessing subscale; see Chapter 3) or different measures of interpretations and beliefs about the significance attached to intrusive thoughts (e.g., Personal Significance Scale, Rachman, 2000).

Another limitation of using questionnaire measures of the relevant constructs is that we may fail to assess highly idiosyncratic beliefs and symptoms. OCD is a highly heterogeneous disorder, and any scale that attempts to measure obsessions, such as the VOCI Obsessions subscale, by focusing on typical obsessions concerning harm, aggression, sex, and immorality, may give erroneous results for people with highly unusual repugnant obsessions. Similarly, people's interpretations and beliefs about their obsessions may be highly individual, and a person's particular misinterpretation of significance may not be well represented by the items on any particular scale. Although more time-consuming, idiographic measures of obsessions and of beliefs may be necessary to reveal an accurate picture of a particular person's experience. The YBOCS interview is a good example of a structured clinical interview of OCD symptoms that is unaffected by whether the person's symptoms fall into one of the typical categories. Idiographic measures of beliefs and interpretations related

to obsessive-compulsive symptoms are beginning to be developed. These include the interview outlined in Rachman's (2000) treatment manual for obsessions, as well as Freeston's semistructured interview (M. H. Freeston, personal communication, 2000) for determining the most prominent appraisals and underlying beliefs. Simply developing a collaborative cognitive-behavioural case formulation with a particular patient can help a therapist or researcher find the most prominent beliefs and appraisals that appear to maintain the disorder.

This study has represented an important first step in evaluating our cognitive-behavioural model of repugnant obsessions. For the most part, the results were consistent with the overall hypothesis that obsessions arise from misinterpreting the significance of negative intrusive thoughts. However, the role of misinterpretations of the significance of thoughts compared to other types of misinterpretations suggested in cognitive-behavioural theories of OCD (responsibility, control of thoughts, among others) has not been clearly demonstrated. Further work in this area, involving experimental manipulations of significance, as well as testing different theoretical models using structural equation modelling techniques in large samples, is anticipated.

CHAPTER 5

GENERAL DISCUSSION

In the first study, the validation of the Vancouver Obsessional Compulsive Inventory (VOCI), we found evidence to support the reliability and validity of the scale and its subscales. The subscales were internally consistent, and the test-retest reliability of the VOCI was excellent in a sample of participants with OCD. The test-retest reliability in students was low, indicating that this may not be a reliable measure of low levels of obsessive-compulsive problems. The VOCI had a clear and interpretable factor structure, and the known-groups validity of most of the subscales was supported. In addition, there was evidence of convergent validity between the VOCI and other self-report measures of OCD. There was some evidence of discriminant validity: in general, the VOCI was more highly correlated with similar measures of obsessive-compulsive complaints than with measures of depression and anxiety. The VOCI appears to be a promising measure of obsessive-compulsive problems, and we anticipate that it will be well received for both research and clinical purposes.

In the second study, we used the VOCI and the measures developed by the Obsessive Compulsive Cognitions Working Group to find at least preliminary evidence that misinterpretations and beliefs about the personal significance and

importance of unwanted intrusive thoughts are related to both clinical obsessions and the distress and frequency of normal intrusive thoughts. In addition, we found that people with OCD for whom repugnant obsessions are a major complaint endorsed more beliefs in the significance of thoughts, and that these beliefs are particularly related to repugnant obsessions rather than obsessive-compulsive symptoms in general. Finally, we found some encouraging evidence that beliefs in the importance of thoughts may be the primary beliefs underlying the experience of obsessions, compared to other beliefs such as responsibility and the need to control thoughts. The results provided initial evidence in support of Rachman's recent cognitive-behavioural model of obsessions.

5.1 Implications for Cognitive-Behavioural Models of OCD

The findings from the second study suggested that beliefs and appraisals other than those involving responsibility for subjectively negative outcomes may be important in OCD, at least for some types of symptoms such as repugnant obsessions. In this study, we found that beliefs about the personal significance of thoughts appeared to be at least as important as beliefs about responsibility in the experience of obsessions. Salkovskis has argued that what we have conceptualized as misinterpretations of the significance of obsessions (e.g., likelihood thought-action fusion: misinterpreting the occurrence of a thought of harm coming to loved ones as indicating you have put them at risk by having the thought) are in fact forms of responsibility appraisals (e.g., Salkovskis et al., 2000), because they ultimately indicate that the person may be responsible for harm or its prevention. However, other types of misinterpretations of personal

significance outlined in our model of repugnant obsessions do not necessarily imply any responsibility for harm. For example, people who have an obsessive thought about harm coming to their loved ones may misinterpret its significance several different ways. First, they may, as described above, interpret the occurrence of the thought as indicating that their loved ones are now in danger, and as a logical *next* step, make an appraisal of their responsibility to alleviate this risk through some form of neutralization or compulsive behaviour. Even in this case, it seems clearer to us to see that there are two levels of appraisal involved, with the second (responsibility) dependent on the first (significance). Alternatively, people having a thought of harm coming to their loved ones may interpret the thought as indicating that they are wicked and evil people, people who deep down must want their family to come to harm. Note that this misinterpretation of the significance of the obsession may occur without any implications of potential harm coming to their family; the interpretation is solely concerned with what the thought reflects about the true nature of the sufferer.

It is difficult to see how the concept of responsibility, no matter how broadly defined, could come to incorporate all potential misinterpretations of obsessions, and attempting to define a wide variety of potential appraisals as responsibility appraisals does not help us to clarify the nature and scope of obsessional thinking. Responsibility beliefs and appraisals may have great importance in OCD; in particular, they often appear to be the primary appraisal that leads a person to neutralize the potential for harm by taking corrective action and performing compulsive behaviours. But not all obsessions must be

interpreted as indicating potential harm, and not all compulsions are designed to prevent harm or reduce one's responsibility for subjectively negative outcomes. Therefore, responsibility beliefs and appraisals are not the only type of interpretations relevant to a cognitive-behavioural explanation of OCD. Understanding the full range of beliefs and interpretations operating in OCD may help us derive more precise theories and therapy for OCD. In particular, with improved understanding of underlying domains of obsessions and compulsions, coming from factor analytic studies of obsessions and compulsions reported by patients, as well as development of better measures of obsessive-compulsive symptoms such as the VOCI, we may find more evidence that specific appraisals and beliefs are associated with particular obsessive-compulsive complaints. As noted by Freeston, Rhéaume, and Ladouceur (1996), there appear to be a variety of appraisals and beliefs associated with different types of obsessions.

5.2 Implications for Cognitive-Behaviour Therapy for OCD

The personal significance and importance attached to the occurrence of repugnant obsessions can be highly idiosyncratic, and to be useful for therapy, both objective measures such as the OBQ and III, as well as idiosyncratic measures and case formulations, can lead to precise tactics for cognitive-behaviour therapy (CBT) for OCD. Understanding the full range of beliefs and interpretations operating in OCD, and targeting these may make therapy more effective and economical in terms of therapy time. The particular benefits of an individualized approach may be seen in the recent treatment study for OCD conducted at the Anxiety Disorders Unit at UBC Hospital (see McLean et al., in

press, for results from the first stage of this outcome study). In this study, we have recently found that individual CBT was superior to group CBT. However, individually provided exposure with response prevention was not clearly superior to exposure and response prevention delivered in a group format. In individual CBT, the therapist was able to focus treatment on the particular beliefs and appraisals that appeared most relevant for that particular patient. The superiority of the individual format suggests that there are important differences among patients in the particular beliefs and appraisals at the root of their obsessive-compulsive problems, and that individually tailored treatment can lead to better outcome.

Understanding the misinterpretations and beliefs that appear to be associated with repugnant obsessions may lead to improved treatment for these patients, who have been considered to be less responsive to conventional treatment (exposure and response prevention). From a cognitive perspective, treatment based on exposure and response prevention is thought to lead to the patient discovering that the outcomes they fear would occur if they did not perform their compulsions do not come to pass. However, exposure and response prevention for repugnant obsessions (e.g., the satiation method proposed by Rachman, 1976) has been thought to be less successful than exposure and response prevention for other major themes of obsessive-compulsive problems, such as washing and checking (Rachman, 2000). As noted by Rachman (2000), exposure with response prevention for repugnant obsessions may not provide the necessary disconfirmation for some patients with

repugnant obsessions. Patients who interpret their obsessions as indicating that there is an increased risk of harm coming to themselves or loved ones, and who perform compulsions (overt or covert) in order to prevent this harm, may benefit from exposure and response prevention, because it enables them to discover that their feared outcomes do not occur. However, patients who misinterpret their obsessions as indicating that they are insane, evil, or bad, may not have these misinterpretations disconfirmed through exposure to their obsessions. While prolonged exposure to the obsessions (satiation) may lead to decreases in anxiety, this decrease may be temporary if the underlying beliefs and misinterpretations are left unchallenged. For patients such as these, there is a clear need for cognitive interventions to challenge their beliefs and appraisals.

Freeston et al. (1997) conducted a study of CBT for patients with obsessions without overt compulsions. The treatment involved exposure and response prevention, supplemented by cognitive interventions for appraisals they found frequently in these and similar patients: overimportance of thoughts (a similar concept to our ideas of personal significance and importance attached to obsessions), responsibility, need for control over thoughts and actions, and overestimation of the probability and severity of feared outcomes (see also Freeston, Rhéaume, & Ladouceur, 1996). For patients who over-estimate the importance of their thoughts, they recommend strategies such as (a) acquiring new information about the prevalence of such thoughts (e.g., through surveys) and the ways in which other people tend to interpret them; and (b) behavioural experiments to discover whether the patients can produce a minor negative

event (such as a toaster breaking down) merely by thinking about it repeatedly. Freeston et al. found that 77% of their patients who completed the treatment showed clinically significant improvement in their obsessive-compulsive symptoms, a success rate on par with other treatment studies of OCD, which were not limited to this difficult-to-treat population of patients. Although this study did not involve a direct comparison of traditional exposure with response prevention compared to exposure with response prevention supplemented by the cognitive techniques, this study suggested that CBT might be more effective than exposure with response prevention for patients with obsessions without overt compulsions. In particular, the authors noted that a number of patients would have refused to comply with exposure and response prevention had they not been prepared for it using the cognitive therapy techniques.

Rachman (2000) has outlined cognitive-behavioural strategies that may improve treatment for patients with repugnant obsessions, based on our cognitive-behavioural model of obsessions. The goal of the treatment is to help patients replace their beliefs and misinterpretations in the personal significance and importance of their obsessions with more benign and accurate beliefs and interpretations. Treatment strategies include listing and evaluating evidence for and against the patient's beliefs in the personal significance of their thoughts, and obtaining additional evidence where indicated. Additional evidence that may disconfirm patients' misinterpretations can be gathered through surveys (e.g., asking friends and family members about their intrusive thoughts and how they interpret them), or estimating the frequency of the obsessions and the frequency

of the feared outcome (e.g., how often the patient has experienced the horrifying obsessional impulse; how often they have acted upon it). Evidence is also obtained through behavioural experiments, where the patient carries out a change in their avoidance, safety behaviour, or neutralization, to gather information relevant to their misinterpretation. Throughout, patients are encouraged to consider an alternative, benign interpretation of their obsessions, namely, that negative intrusive thoughts of this kind are ubiquitous, but because of their particular circumstances, beliefs, and responses to the thoughts, these thoughts have become excessively frequent and distressing. Rachman's therapist manual also outlines gradual exposure to avoided situations, teaching patients to refrain from thought suppression, and helping patients refrain from neutralizing (including overt or covert compulsions, reassurance-seeking, and rumination about the meaning of the obsessions). This form of cognitive-behaviour therapy for OCD, specifically targeting beliefs and interpretations about the personal significance and importance of thoughts, has yet to be empirically validated in a controlled study. However, in a series of case studies, he and his research assistants have found that when they were able to reduce the personal significance and importance that patients attached to their thoughts, patients experienced a considerable improvement in their symptoms. Unfortunately, they were unable to modify the beliefs and interpretations of a portion of the patients, and these patients failed to benefit from the therapy (S. Rachman, personal communication). Such patients may require different strategies or longer term therapy to overcome their strongly held beliefs in the

significance of their obsessions. Alternatively, we may still be faced with a minority of patients for whom our best cognitive and behaviour therapy techniques fail to provide relief. Nevertheless, this treatment programme suggests that correcting faulty interpretations of the significance of obsessions can lead to dramatic improvement in obsessive-compulsive symptoms for patients with repugnant obsessions.

5.3 Origins of Significance

If misinterpretations of the significance of negative intrusive thoughts are a key factor in the development of clinical obsessions, what are the origins of people's beliefs that negative intrusive thoughts are highly personally significant and important? The precise origins of any particular set of beliefs are extremely difficult to establish; reaching firm conclusions would require extensive developmental studies. Such studies would also be necessary to determine that beliefs in the significance of thoughts are a vulnerability factor that predisposes people to develop clinical obsessions. Nevertheless, we can speculate as to the potential origins of beliefs in the significance of thoughts.

Some patients appear to have acquired the belief that their negative thoughts can have dire consequences through the unfortunate coincidence of particular thoughts with events such as the death of a family member. Tallis (1994) gives an example of a young girl who prayed that her grandfather would die; the next day, the grandfather died of a heart attack, and the girl developed obsessions of harm befalling loved ones, believing that the occurrence of thoughts of harm coming to a family member could result in his or her death.

However, such unfortunate coincidences appear in only a minority of patients with repugnant obsessions.

It is possible that religious instruction or other direct moral teaching contributes to beliefs in the significance of thoughts. Some religious systems specifically suggest that certain types of thoughts are impure or immoral. For example, some Christians believe that sexual thoughts can be immoral:

> You have heard that it was said, "Do not commit adultery." But now I tell you: Anyone who looks at a woman and wants to possess her is guilty of committing adultery with her in his heart.
> (Matthew 5: 27-28)

and that sins by thought require confession:

> Most merciful God, we confess that we have sinned against you
> in thought, word, and deed,
> by what we have done,
> and by what we have left undone.
> (U.S. Book of Common Prayer for the Episcopal Church, 1979 edition).

Thus, at least in western cultures, there appears to be an underlying understanding that we are morally responsible for the content of our thoughts. In addition, although the concept that having a thought about something terrible happening can increase the risk of it actually happening may not appeal to the rationally-minded, this idea too may have roots in antiquity. In *The Golden Bough*, Frazier describes examples of words and actions being considered taboo by a variety of early societies (1996), because they in some way resembled an unfortunate event. According to Frazier, taboos of this kind can be understood as examples of a major principle of sympathetic magic, the Law of Similarity, or the idea that like produces like. The concept of one's mind influencing real-world

events at a distance would, according to Frazier, have been assumed by many pre-scientific societies.

More recently, in our own development of the concept of thought-action fusion (beliefs that thoughts are morally equivalent to actions, or that thoughts increase the risk of a negative event occurring), we found that a surprising proportion of our apparently rational colleagues and research assistants were unwilling to write on paper a sentence such as "My mother will die today." In fact, researchers in our laboratory (Rachman, Shafran, Mitchell, Trant, & Teachman, 1996) used a similar task as a laboratory provocation of thought-action fusion in normal undergraduate students. In this experiment, student participants were asked to write the sentence "I hope _____ is in a car accident" with the name of a close friend or relative in the blank. The task not only increased anxiety, but when invited to neutralize the sentence ("you may do whatever you wish to try to reduce or cancel the effects of writing the sentence"), all participants readily performed some action, such as destroying the piece of paper, or changing the sentence (e.g., inserting the word "not"). Although the participants in this study had been selected to participate in part because they had endorsed beliefs in thought-action fusion, the results suggested that two concepts may be relatively widespread: (1) that it is dangerous or morally wrong to have certain kinds of thoughts (or in this case, to write down certain sentences), and (2) that the threat or moral culpability associated with the thoughts can be reduced by a magical process, that is, some action that is not connected in any realistic way to the feared outcome.

Obsessions are often exacerbated by depressed mood, and for a number of patients with OCD, it appears that the obsessions originated during a major depressive episode. Rachman (2000), among others, has suggested that the negative thought patterns characteristic of depression (e.g., Beck's cognitive triad of negative thoughts about the self, others, and the world; see Beck, Rush, Shaw, & Emery, 1979) could increase the tendency of a person to make personally significant and negative interpretations of normal intrusive thoughts. In other words, if you are already beset by thoughts of worthlessness, you may fall easy prey to interpreting a negative intrusive thought about harming loved ones as an indication that you are bad or dangerous. Similarly, we have seen cases in which patients' obsessions about harming a family member (e.g., aggressive impulses, or thoughts about a loved one dying if one did not perform the correct remedial action) appeared to originate with a crisis in the health of that family member. For example, a woman whose father was suddenly taken ill developed obsessions that he would in fact die if she did not neutralize her intrusive thoughts of his dying; a woman whose mother had survived cancer had obsessions that her mother would experience a recurrence of cancer if she did not perform certain magical rituals. Obviously, the stress of having an ill family member would increase the frequency of worries and other negative intrusive thoughts about harm coming to them. For example, Parkinson and Rachman (1981) found that mothers whose children were about to undergo surgery had four times more negative intrusive thoughts about their children than a control group of mothers. In addition to having an elevated frequency of intrusive

thoughts, it is possible that having an illness in the family could also increase the significance that people attach to their unwanted thoughts.

In summary, it appears that there may be a variety of beliefs and interpretations that predispose people to developing obsessions and compulsions. In this research, we have focussed on beliefs and interpretations of the personal significance and importance of negative intrusive thoughts, and made some initial discoveries suggesting that personal significance may be an important misinterpretation in the development of clinical repugnant obsessions. The origins of such beliefs in the significance of thoughts are unknown; the seeds of this misconception may lurk in all of us in our less rational moments, especially during stress or depressed mood. If we are correct that people who experience obsessions are misinterpreting their thoughts as being highly personally significant and important, this may lead to improved treatment for people with repugnant obsessions. Various cognitive therapy techniques could be employed to directly test patients' interpretations, and more traditional forms of therapy (such as exposure and response prevention) could be sharpened, becoming more effective and well tolerated with a cognitive rationale. As with repugnant obsessions, there may be specific beliefs and appraisals associated with many different obsessional-compulsive problems, such as cleaning, checking, and hoarding. To the degree that we can elucidate the thought processes underlying these different problems, we can improve the provision of therapy by alerting clinicians to likely misinterpretations and suggest specific techniques to overcome them. Measures such as the Vancouver Obsessional Compulsive

Inventory (VOCI) can assist us in this research by providing a simple way of operationalizing several of the most prominent features of OCD. With the development of the VOCI, as well as the measures developed by the Obsessive Compulsive Cognitions Working Group and others, we are in a position to evaluate the most prominent cognitive features of different obsessive-compulsive complaints, thereby improving our understanding of this disorder and suggest ways in which cognitive-behaviour therapy for OCD could be improved.

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APPENDIX

1. Vancouver Obsessional Compulsive Inventory (VOCI) Form

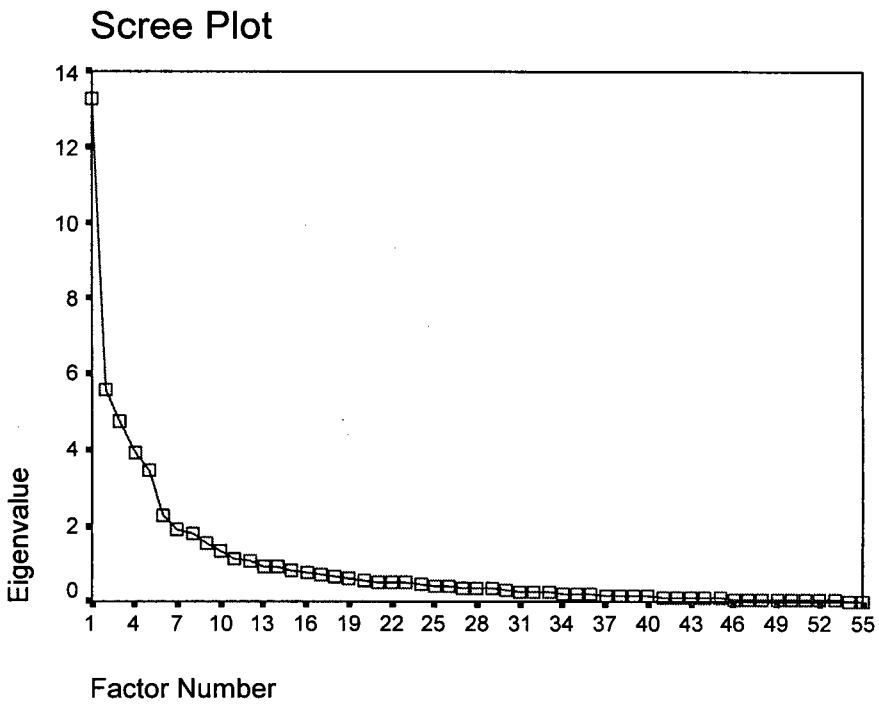
Please rate each statement by putting a circle around the number that best describes how much the statement is true of you. Please answer every item, without spending too much time on any particular item.

How much is each of the following statements true of you?		Not at all	A little	Some	Much	Very Much
1.	I feel compelled to check letters over and over before mailing them.	0	1	2	3	4
2.	I am often upset by my unwanted thoughts of using a sharp weapon.	0	1	2	3	4
3.	I feel very dirty after touching money.	0	1	2	3	4
4.	I find it very difficult to make even trivial decisions.	0	1	2	3	4
5.	I feel compelled to be absolutely perfect.	0	1	2	3	4
6.	I repeatedly experience the same unwanted thought or image about an accident.	0	1	2	3	4
7.	I repeatedly check and recheck things like taps and switches after turning them off.	0	1	2	3	4
8.	I use an excessive amount of disinfectants to keep my home or myself safe from germs.	0	1	2	3	4
9.	I often feel compelled to memorize trivial things (e.g., licence plate numbers, instructions on labels).	0	1	2	3	4
10.	I have trouble carrying out normal household activities because my home is so cluttered with things I have collected.	0	1	2	3	4
11.	After I have decided something, I usually worry about my decision for a long time.	0	1	2	3	4
12.	I find that almost every day I am upset by unpleasant thoughts that come into my mind against my will.	0	1	2	3	4
13.	I spend far too much time washing my hands.	0	1	2	3	4
14.	I often have trouble getting things done because I try to do everything exactly right.	0	1	2	3	4
15.	Touching the bottom of my shoes makes me very anxious.	0	1	2	3	4
16.	I am often upset by my unwanted thoughts or images of sexual acts.	0	1	2	3	4
17.	I become very anxious when I have to make even a minor decision.	0	1	2	3	4
18.	I feel compelled to follow a very strict routine when doing ordinary things.	0	1	2	3	4

How much is each of the following statements true of you?	Not at all	A little	Some	Much	Very Much
19. I feel upset if my furniture or other possessions are not always in exactly the same position.	0	1	2	3	4
20. I repeatedly check that my doors or windows are locked, even though I try to resist the urge to do so.	0	1	2	3	4
21. I find it very difficult to touch garbage or garbage bins.	0	1	2	3	4
22. I become very tense or upset when I think about throwing anything away.	0	1	2	3	4
23. I am excessively concerned about germs and disease.	0	1	2	3	4
24. I am often very late because I can't get through ordinary tasks on time.	0	1	2	3	4
25. I avoid using public telephones because of possible contamination.	0	1	2	3	4
26. I am embarrassed to invite people to my home because it is full of piles of worthless things I have saved.	0	1	2	3	4
27. I repeatedly experience the same upsetting thought or image about death.	0	1	2	3	4
28. I am often upset by unwanted thoughts or images of blurting out obscenities or insults in public.	0	1	2	3	4
29. I worry far too much that I might upset other people.	0	1	2	3	4
30. I am often frightened by unwanted urges to drive or run into oncoming traffic.	0	1	2	3	4
31. I almost always count when doing a routine task.	0	1	2	3	4
32. I feel very contaminated if I touch an animal.	0	1	2	3	4
33. One of my major problems is repeated checking.	0	1	2	3	4
34. I often experience upsetting and unwanted thoughts about losing control.	0	1	2	3	4
35. I find it almost impossible to decide what to keep and what to throw away.	0	1	2	3	4
36. I am strongly compelled to count things.	0	1	2	3	4

How much is each of the following statements true of you?	Not at all	A little	Some	Much	Very Much
37. I repeatedly check that my stove is turned off, even though I resist the urge to do so.	0	1	2	3	4
38. I get very upset if I can't complete my bedtime routine in exactly the same way every night.	0	1	2	3	4
39. I am very afraid of having even slight contact with bodily secretions (blood, urine, sweat, etc.).	0	1	2	3	4
40. I am often very upset by my unwanted impulses to harm other people.	0	1	2	3	4
41. I spend a lot of time every day checking things over and over again.	0	1	2	3	4
42. I have great trouble throwing anything away because I am very afraid of being wasteful.	0	1	2	3	4
43. I frequently have to check things like switches, faucets, appliances and doors several times.	0	1	2	3	4
44. One of my major problems is that I am excessively concerned about cleanliness.	0	1	2	3	4
45. I feel compelled to keep far too many things like old magazines, newspapers, and receipts because I am afraid I might need them in the future.	0	1	2	3	4
46. I repeatedly experience upsetting and unacceptable thoughts of a religious nature.	0	1	2	3	4
47. I tend to get behind in my work because I repeat the same thing over and over again.	0	1	2	3	4
48. I try to put off making decisions because I'm so afraid of making a mistake.	0	1	2	3	4
49. I often experience upsetting and unwanted thoughts about illness.	0	1	2	3	4
50. I am afraid to use even well-kept public toilets because I am so concerned about germs.	0	1	2	3	4
51. Although I try to resist, I feel compelled to collect a large quantity of things I never actually use.	0	1	2	3	4
52. I repeatedly experience upsetting and unwanted immoral thoughts.	0	1	2	3	4
53. One of my major problems is that I pay far too much attention to detail.	0	1	2	3	4
54. I am often upset by unwanted urges to harm myself.	0	1	2	3	4
55. I spend far too long getting ready to leave home each day because I have to do everything exactly right.	0	1	2	3	4

2. Scree plot of eigenvalues from the factor analysis of VOCI items within the OCD sample



3. Pattern & Factor Correlation Matrices from VOCI factor analysis:

5 factor solution

Pattern Matrix

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
VOCI18	.775	.107			
VOCI14	.757		-.154	-.143	
VOCI53	.677				
VOCI19	.654				
VOCI5	.643			.159	
VOCI47	.607	-.102	-.186		
VOCI55	.607	.148			-.294
VOCI29	.498			.271	
VOCI1	.493		-.247	-.112	-.332
VOCI24	.484		-.224	-.144	
VOCI48	.414	.152	-.338	.320	
VOCI17	.408		-.349	.334	.139
VOCI36	.392		.123		-.150
VOCI38	.353				-.330
VOCI9	.340		.101	.255	-.243
VOCI11	.334	.140	-.269	.224	
VOCI31	.299		.146	.167	
VOCI23	-.124	.813	-.156		
VOCI21		.776			-.100
VOCI21		.776			-.100
VOCI50		.776			-.132
VOCI50		.776			-.132
VOCI39	-.137	.762		.180	-.112
VOCI39	-.137	.762		.180	-.112
VOCI8	-.147	.727			-.122
VOCI8	-.147	.727			-.122
VOCI15		.712		-.107	
VOCI15		.712		-.107	
VOCI25		.677			-.149
VOCI25		.677			-.149
VOCI3	.138	.638		.149	.168
VOCI3	.138	.638		.149	.168
VOCI13		.624		-.136	.144
VOCI13		.624		-.136	.144
VOCI44	.348	.560		-.154	

VOCI32	.130	.542	-.199		.268
VOCI49	-.114	.409		.387	-.193
VOCI45		-.128	-.812		-.147
VOCI35			-.806		
VOCI10	-.197		-.794		
VOCI22			-.785		-.161
VOCI51			-.744		-.117
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
VOCI42		.135	-.740		
VOCI26			-.727		
VOCI4	.346		-.395	.304	.120
VOCI52			.102	.745	
VOCI16				.701	.110
VOCI40	-.205			.662	-.133
VOCI27		.189		.662	-.206
VOCI12		.186		.616	
VOCI6			-.209	.589	-.130
VOCI54	.109	-.151	-.146	.587	.163
VOCI34	.183			.571	
VOCI2		-.159		.560	-.189
VOCI46				.481	
VOCI30	.174		-.104	.431	-.123
VOCI30	.174		-.104	.431	-.123
VOCI28	.130			.423	
VOCI28	.130			.423	
VOCI43				.133	-.880
VOCI33	.130		-.109		-.842
VOCI33	.130		-.109		-.842
VOCI7					-.838
VOCI7					-.838
VOCI41	.293				-.805
VOCI41	.293				-.805
VOCI37		.120	-.115		-.793
VOCI37		.120	-.115		-.793
VOCI20			-.127	.141	-.779
VOCI20			-.127	.141	-.779

Factor Correlation Matrix

Factor	1	2	3	4	5

1	1.000	.163	-.261	.243	-.274
2	.163	1.000	-.149	.146	-.088
3	-.261	-.149	1.000	-.122	.120
4	.243	.146	-.122	1.000	-.218
5	-.274	-.086	.120	-.218	1.000

4. Pattern & Factor Correlation Matrices from the VOCI Factor analysis:

7-factor solution

Pattern Matrix

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
VOCI43	.920						
VOCI33	.887				.138		
VOCI7	.882						
VOCI37	.839	.106					
VOCI41	.804				.230		.128
VOCI20	.798						
VOCI21		.799				.231	
VOCI23		.790	-.114		-.175	-.159	
VOCI50	.104	.773					
VOCI39		.765		.215		.110	
VOCI15		.725			.135		-.159
VOCI8	.117	.709			-.202		
VOCI25	.148	.669					
VOCI3	-.142	.629		.122		-.146	
VOCI13	-.119	.616		-.144			
VOCI44		.560		-.133	.311		
VOCI32	-.232	.540	-.158		.140	-.161	
VOCI49	.258	.379		.257	-.227	-.250	
VOCI49	.258	.379		.257	-.227	-.250	
VOCI51			-.832			.162	
VOCI10			-.825	.132			-.103
VOCI10			-.825	.132			-.103
VOCI45	.123	-.126	-.786				
VOCI45	.123	-.126	-.786				
VOCI22	.139		-.751			-.154	
VOCI22	.139		-.751			-.154	
VOCI35			-.737	-.134		-.242	
VOCI35			-.737	-.134		-.242	
VOCI26			-.722				
VOCI26			-.722				
VOCI42		.133	-.709			-.119	
VOCI42		.133	-.709			-.119	
VOCI52				.793			

VOCI16	-.110			.743			-.108
VOCI40	.135			.717			-.158
VOCI27	.215	.191		.661			
VOCI12	-.102	.190		.605			
VOCI2	.191	-.156		.558			
VOCI54	-.194	-.148	-.169	.546		-.115	.152
VOCI46				.538	.112	.101	.110
VOCI6	.122		-.197	.492		-.188	.184
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
VOCI34	.132			.473		-.277	
VOCI30	.103		-.111	.382		-.100	.177
VOCI28				.345		-.151	.185
VOCI14					.789	-.225	-.124
VOCI53				.101	.719		
VOCI47			-.176		.628		
VOCI18		.125			.622		.324
VOCI55	.207	.182	-.143		.606	.177	.236
VOCI5			.104	.170	.588	-.209	
VOCI24			-.223		.566		
VOCI19					.462		.447
VOCI1	.356		-.191	-.105	.445	-.114	
VOCI17			-.136			-.804	.105
VOCI4			-.182			-.757	
VOCI4			-.182			-.757	
VOCI11						-.741	.120
VOCI11						-.741	.120
VOCI48		.112	-.173	.121	.169	-.607	
VOCI48		.112	-.173	.121	.169	-.607	
VOCI29			.137	.142	.338	-.494	
VOCI29			.137	.142	.338	-.494	
VOCI36				-.117			.849
VOCI31			.119		-.103	-.179	.670
VOCI31			.119		-.103	-.179	.670
VOCI9	.152			.239	.160		.440
VOCI9	.152			.239	.160		.440
VOCI38	.206		-.151		.244	.200	.416
VOCI38	.206		-.151		.244	.200	.416

Factor Correlation Matrix

Factor	1	2	3	4	5	6	7

1	1.000	.107	-.195	.234	.232	-.136	.278
2	.107	1.000	-.125	.108	.098	-.175	.084
3	-.195	-.125	1.000	-.090	-.223	.244	-.083
4	.234	.108	-.090	1.000	.101	-.242	.206
5	.232	9.766 E-02	-.223	.101	1.000	-.220	.260
6	-.136	-.175	.244	-.242	-.220	1.000	-.202
7	.278	.084	-.083	.206	.260	-.202	1.000

5. VOCI Items, Arranged by Final Subscales from Chapter III

Contamination

Item #	Item
3	I feel very dirty after touching money.
8	I use an excessive amount of disinfectants to keep my home or myself safe from germs.
13	I spend far too much time washing my hands.
15	Touching the bottom of my shoes makes me very anxious.
21	I find it very difficult to touch garbage or garbage bins.
23	I am excessively concerned about germs and disease.
25	I avoid using public telephones because of possible contamination.
32	I feel very contaminated if I touch an animal.
39	I am very afraid of having even slight contact with bodily secretions (blood, urine, sweat, etc.).
44	One of my major problems is that I am excessively concerned about cleanliness.
49	I often experience upsetting and unwanted thoughts about illness.
50	I am afraid to use even well kept public toilets because I am so concerned about germs.

Checking

Item #	Item
7	I repeatedly check and recheck things like taps and switches after turning them off.
20	I repeatedly check that my doors or windows are locked, even though I try to resist the urge to do so.
33	One of my major problems is repeated checking.
37	I repeatedly check that my stove is turned off, even though I resist the urge to do so.
41	I spend a lot of time every day checking things over and over again.
43	I frequently have to check things like switches, faucets, appliances, and doors several times.

Obsessions

Item #	Item
2	I am often upset by my unwanted thoughts of using a sharp weapon.
6	I repeatedly experience the same unwanted thought or image about an accident.
12	I find that almost every day I am upset by unpleasant thoughts that come into my mind against my will.
16	I am often upset by my unwanted thoughts or images of sexual acts.
27	I repeatedly experience the same upsetting thought or image about death.
28	I am often upset by unwanted thoughts or images of blurting out obscenities or insults in public.
30	I am often frightened by unwanted urges to drive or run into oncoming traffic.
34	I often experience upsetting and unwanted thoughts about losing control.
40	I am often very upset by my unwanted impulses to harm other people.
46	I repeatedly experience upsetting and unacceptable thoughts of a religious nature.
52	I repeatedly experience upsetting and unwanted immoral thoughts.
54	I am often upset by unwanted urges to harm myself.

Hoarding

Item #	Item
10	I have trouble carrying out normal household activities because my home is so cluttered with things I have collected.
22	I become very tense or upset when I think about throwing anything away.
26	I am embarrassed to invite people to my home because it is full of piles of worthless things I have saved.
35	I find it almost impossible to decide what to keep and what to throw away.
42	I have treat trouble throwing anything away because I am very afraid of being wasteful.
45	I feel compelled to keep far too many things like old magazines, newspapers, and receipts because I am afraid I might need them in the future.
51	Although I try to resist, I feel compelled to collect a large quantity of things I never actually use.

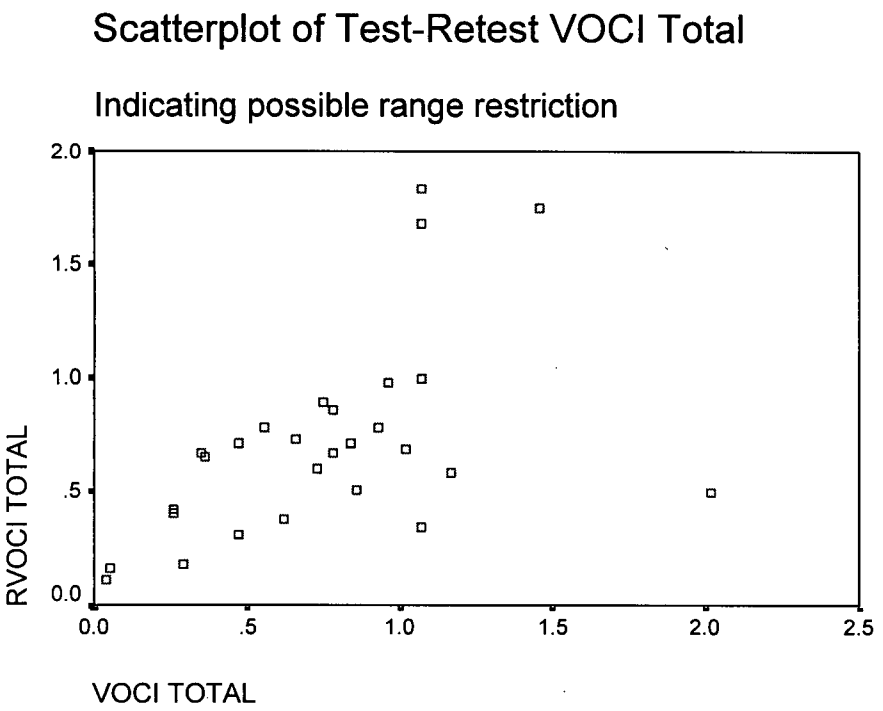
Just Right

Item #	Item
1	I feel compelled to check letters over and over before mailing them.
5	I feel compelled to be absolutely perfect.
9	I often feel compelled to memorize trivial things (e.g., licence plate numbers, instructions on labels).
14	I often have trouble getting things done because I try to do everything exactly right.
18	I feel compelled to follow a very strict routine when doing ordinary things.
19	I feel upset if my furniture or other possessions are not always in exactly the same position.
24	I am often very late because I can't get through ordinary tasks on time.
36	I am strongly compelled to count things.
38	I get very upset if I can't complete my bedtime routine in exactly the same way every night.
47	I tend to get behind in my work because I repeat the same thing over and over again.
53	One of my major problems is that I pay far too much attention to detail.
55	I spend far too long getting ready to leave home each day because I have to do everything exactly right.

Indecisiveness

Item #	Item
4	I find it very difficult to make even trivial decisions.
11	After I have decided something, I usually worry about my decision for a long time.
17	I become very anxious when I have to make even a minor decision.
29	I worry far too much that I might upset other people.
31	I almost always count when doing a routine task.
48	I try to put off making decisions because I'm so afraid of making a mistake.

6. Scatterplot of Test-retest VOCI total scores in Students



7. Test-retest Correlation coefficients for the student sample, with 4 bivariate outliers deleted

	Students (n = 24)
Mean Test-retest interval	11 days
VOCI Total	.62**
Contamination	.69"*
Checking	.44
Obsessions	.65**
Hoarding	.60*
Just Right	.49
Indecisiveness	.52*

** $p < .001$. * $p < .01$.

8. Comparing two correlated correlation coefficients

The following is equation (1) from Meng, Rosenthal, & Rubin (1992), to compare two correlation coefficients (r_{x_1y} and r_{x_2y}) by means of a *z*-test:

$$Z = (z_{r_1} - z_{r_2})\sqrt{\frac{N-3}{2(1-r_x)h}}$$

where z_{r_1} is the Fisher *z*-transformation of r_{x_1y};

z_{r_2} is the Fisher *z*-transformation of r_{x_2y};

N is the number of subjects;

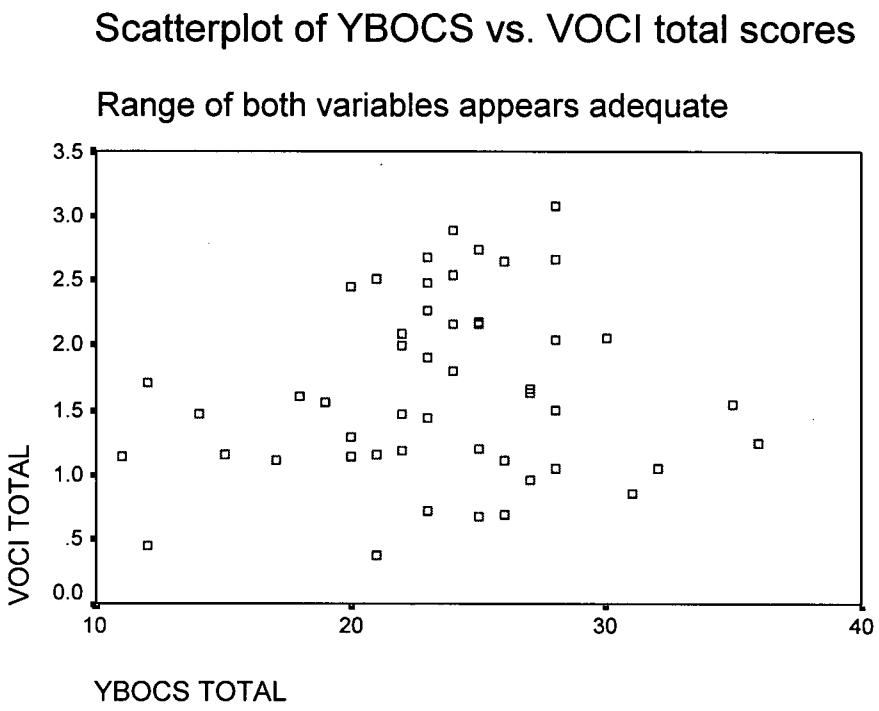
r_x is the correlation between the two predictor variables (X_1 and X_2);

$$h = 1 + \frac{\overline{r^2}}{1-\overline{r^2}}(1-f);$$

$$f = \frac{1-r_x}{2(1-\overline{r^2})}; \text{ and}$$

$$\overline{r^2} = \frac{r_{x_1y}^2 + r_{x_2y}^2}{2}$$

9. Scatterplot of YBOCS vs. VOCI total scores



(OCD Sample, N=49)

10. Testing a contrast among correlated correlation coefficients

The following is equation (6) from Meng, Rosenthal, & Rubin (1992), to test a contrast among *k* correlated correlation coefficients ($r_{x_i y}$'s) by means of a *z*-test:

$$Z = \sum_{i=1}^{k} \lambda_i z_{r_i} \sqrt{\frac{N-3}{(\sum_{i=1}^{k} \lambda_i^2)(1-r_x)h}},$$

where the z_{r_i}'s are the Fisher *z*-transformations of the $r_{x_i y}$'s;

the λ_i's are the contrast weights assigned to the z_{r_i}'s;

N is the number of subjects;

r_x is the median intercorrelation among the *k* predictor variables;

$$h = 1 + \frac{\overline{r^2}}{1-\overline{r^2}}(1-f);$$

$$f = \frac{1-r_x}{2(1-\overline{r^2})}; \text{ and}$$

$$\overline{r^2} = \frac{\sum_{i=1}^{k} r^2_{x_i y}}{k}$$

11. Testing the difference between a zero-order and partial correlation coefficient

The following formula for the test is based on Olkin and Finn (1995), Model C (determining the effect of a third variable on the association of two others). This model analyzes the extent to which the correlation of two variables X_0 and X_1 can be attributed to a third variable X_2. If the correlation between X_0 and X_1 can be explained by X_2, the partial correlation $r_{01.2}$ will be smaller than the zero-order correlation r_{01}.

Test whether $r_{01.2}$ is significantly different from r_{01} using a z-test:

$$z = \frac{r_{01} - r_{01\bullet 2}}{\sigma_\infty}$$

where r_{01} is the zero order correlation between X_0 and X_1,

$r_{01\bullet 2}$ is the partial correlation between X_0 and X_1 controlling for X_2, and

$$\sigma_\infty^2 = \frac{\underline{a}\Phi\underline{a}'}{(1-r_{02}^2)(1-r_{12}^2)} .$$

The horizontal vector $\underline{a}$ has elements

$$a_1 = 1 - \sqrt{(1-r_{02}^2)(1-r_{12}^2)} ,$$

$$a_2 = \frac{r_{01}r_{02} - r_{12}}{1-r_{02}^2} , \text{ and}$$

$$a_3 = \frac{r_{01}r_{02} - r_{02}}{1-r_{02}^2} .$$

The matrix Φ is the variance-covariance matrix of the sample correlations. It has elements

$$\Phi = \begin{bmatrix} \phi_{11} & \phi_{12} & \phi_{13} \\ & \phi_{22} & \phi_{23} \\ & & \phi_{33} \end{bmatrix} , \text{ where}$$

$$\phi_{11} = (1-r_{01}^2)^2 / n ,$$

$$\phi_{22} = (1-r_{02}^2)^2 / n ,$$

$$\phi_{33} = (1-r_{12}^2)^2 / n ,$$

$$\phi_{12} = [0.5(2r_{12} - r_{01}r_{02})(1-r_{12}^2 - r_{01}^2 - r_{02}^2) + r_{12}^3] / n ,$$

$$\phi_{13} = [0.5(2r_{02} - r_{01}r_{12})(1-r_{12}^2 - r_{01}^2 - r_{02}^2) + r_{02}^3] / n , \text{ and}$$

$$\phi_{23} = [0.5(2r_{01} - r_{02}r_{12})(1-r_{12}^2 - r_{01}^2 - r_{02}^2) + r_{01}^3] / n$$