

CHAPTER ONE

Introduction

Clinical features of what we recognise today as obsessive-compulsive disorder (OCD) have been documented for at least 500 years. Robert Burton described symptoms of the condition in his 1621 book, *The Anatomy of Melancholy*:

‘Feare of Divels, death, that they shall bee so sick, of some such or
such disease, ready to tremble at every object, they shall dye
themselves forthwith, or that some of their deare friends or neere
allies are certainly dead....If he be in a silent auditory, as at a
sermon, he is afraid he shall speak aloud at unawares, something
undecent, unfit to be said’(pg. 385) ^[1].

Later, in the 1890s, Sigmund Freud described OCD in more detail, and attempted to treat the condition using psychoanalytic techniques. These early descriptions of OCD were subsequently refined in the first Diagnostic and Statistical Manual (DSM) of the American Psychiatric Association ^[2], published in 1952, which described OCD as ‘obsessive compulsive reaction’. DSM-I described the presence of obsessions or ‘unwanted ideas’ and gave descriptions of compulsions including ‘touching, counting, ceremonials and hand-washing’. However the anxiety eliciting, and anxiety reducing relationship of obsessions and compulsions was not described until DSM-III, in 1980 ^[3].

Today OCD is recognised as a common anxiety disorder for which clinically effective psychological treatments exist. However, in Australia, fewer than 25% of those who seek

treatment for this condition receive an evidence-based intervention ^[4]. Internet-administered psychological treatment (IPT) is an innovative form of remote-delivered psychological treatment that has been recently used to improve access to treatment for people with other anxiety disorders. At the time of preparing the research plan for this thesis there were no published studies reporting the use of IPT interventions for OCD and very few reporting the use of bibliotherapy, that is, remote psychological treatments administered using printed workbooks. Given the potential of remote interventions in improving access to evidence-based treatments for people with OCD, the studies described in this thesis aimed to answer the following questions:

- 1) Will people with OCD use internet-administered treatments?
- 2) Is internet-administered psychological treatment for OCD clinically efficacious?
- 3) What are the relative benefits of two forms of remote treatment compared to a waitlist control group?
- 4) How much therapist time is required in remote treatments to obtain clinically significant outcomes?
- 5) Do demographic and clinical characteristics predict improvement and dropout of remote treatment?

The studies described in this thesis attempt to answer these questions. This chapter describes the nature of OCD, various theoretical models and treatment of OCD, including remote treatments. It also introduces the specific aims of this thesis.

1.1 The Nature of Obsessive-Compulsive Disorder

1.1.1 Definition and Classification

OCD is an anxiety disorder characterised by the experience of obsessions and compulsions. Obsessions are persistent, anxiety-eliciting, intrusive and unwanted thoughts, feelings or urges ^[5]. Compulsions are repetitive and/or time consuming overt or covert behaviours, which aim to reduce the anxiety or distress triggered by the obsessions ^[5]. Currently, OCD can be diagnosed if the individual experiences either obsessions *or* compulsions ^[5], however, it is rare to only experience one symptom type ^[6]. The diagnostic criteria for OCD have evolved considerably over time and are likely to change again with the next version of DSM (DSM-V). Whilst OCD is currently classified as an anxiety disorder, several researchers have proposed moving OCD to a new diagnostic category, termed the obsessive-compulsive spectrum disorders ^[7-9]. Although not all experts in the field support this reclassification ^[10-13], this change appears likely to occur ^[14].

1.1.2 Prevalence, Age of Onset, and Gender Differences

OCD is relatively common, with a DSM-IV 12-month prevalence of 1.9% in Australia ^[15]. Lower 12-month prevalence rates have been reported in other countries including Germany, 0.7% ^[16], the United States, 1.2% ^[17], Korea, 0.6%, ^[18] and Switzerland, 0.7% ^[19]. Onset for OCD tends to occur around adolescence and early adulthood ^[17], with most developing symptoms by the age of 20 ^[19]. Onset rarely occurs in late adulthood ^[20], unless caused by neurological trauma ^[21, 22]. Gender differences do not appear prominent in adults with OCD, but males appear to be over-represented in childhood presentations of OCD ^[17, 20].

1.1.3 Course and Impairment in Functioning

OCD symptoms wax and wane in response to life stressors, but rarely remit without treatment [19, 23-25]. Because many people delay seeking treatment for more than a decade [25, 26], considerable impairment in functioning in the domains of physical health, household duties, leisure time activities, social relations, and work are common [4, 17, 27]. The extent of impairment in functioning in these domains appears positively correlated with the severity of symptoms [27].

1.1.4 Comorbidity

OCD is highly comorbid with other Axis I and Axis II disorders; however, comorbidity rates vary widely across studies. Studies utilising nationally representative samples estimate that between 62-90% of individuals with OCD have a comorbid Axis I condition [16, 17, 28] and multiple comorbidities are common [4]. The most commonly co-occurring Axis I disorders include the mood and anxiety disorders [16, 17, 29]. Comorbid mood disorders occur in approximately 63% of individuals with OCD [17], whilst approximately 76% present with at least one comorbid anxiety disorder [17]. Other commonly comorbid Axis I disorders include substance use disorders [16, 17, 19, 29], tic disorders [25, 29], attention deficit hyperactivity disorder [17, 25, 29], eating disorders [25, 29] and impulse control disorders [17, 25].

Comorbidity with Axis II conditions is also common [28, 30-32] and as with Axis I comorbidity, the presence of multiple comorbid disorders is frequently reported [28]. The estimated comorbidity rates vary considerably across studies, but the most commonly occurring Axis II disorders include paranoid (reported to be comorbid in 7-35% of people with OCD), obsessive-compulsive (12-36%), avoidant (2-53%), schizoid (3-26%), narcissistic (0-22%), dependent (10-40%), borderline (4-14%) and schizotypal (3-25%) [25, 28, 30-36] personality

disorders. The rates of comorbid personality disorder in OCD are significantly higher than both the incidence seen in other internalising disorders^[28] and in age matched controls^[36].

1.1.5 Economic Cost

Earlier studies indicated that the economic cost of OCD is significant^[37, 38]. For example, DuPont^[38] estimated that the total direct cost of OCD in 1990 was US \$8.4 billion, whereas the indirect cost from lost productivity was an additional US \$6.2 billion. Data from epidemiological studies shows that, on average, individuals with OCD are absent from work for 3.23 days per month due to their symptoms, an amount significantly greater than those without OCD^[39].

1.1.6 Summary

OCD is a chronic and disabling condition, which causes considerable impairment in functioning. Axis I and II comorbidity is common in this population and OCD has a considerable economic impact on society. OCD is a clinically heterogeneous disorder, but clusters of symptoms are commonly seen. The various clinical presentations, as well as risk factors and clinical correlates are discussed below.

1.2 Clinical Presentation, Risk Factors and Clinical Correlates

1.2.1 Clinical Presentation

OCD is a heterogeneous disorder and several attempts have been made to identify sub-groups based on symptom profiles. One such strategy has involved techniques of cluster, factor or taxometric analyses, with most studies reporting a 3, 4, or 5 factor structure^[6, 40-46]. There has been some debate about the validity of some of these analyses as earlier studies relied on self-report measures which omitted mental compulsions^[40]. Results of more recent psychometric

studies indicate that when mental compulsions are emphasised a 5-factor structure emerges, which include obsessions and compulsions related to harming, contamination, hoarding, unacceptable thoughts, and symmetry ^[6, 40]. More recently symptoms of hoarding have been considered as separate to OCD ^[12, 47, 48], resulting in four main symptom subtypes in OCD, that is, harming, contamination, unacceptable thoughts, and symmetry.

In clinical practice, people with OCD often present with symptoms in multiple categories, thus classifying individuals based on their symptom presentation can be difficult. Consequently, alternative classification systems for OCD symptoms have been proposed. These include distinguishing between those with autogenous obsessions (those that enter the individual's mind without a triggering stimulus) or reactive obsessions (those triggered by a stimulus) ^[49, 50], whether individuals perform their compulsions based on fear avoidance or a sense of incompleteness ^[51, 52], whether the primary emotional reaction is fear or disgust ^[53, 54], or based on the age of onset of the disorder (childhood or adult) ^[55, 56].

Whilst considerable developments have been made in our understanding of the symptoms of OCD, there is substantial debate about the exact symptoms that constitute OCD and, as indicated previously, the most appropriate classification of this condition. Another important area for further research is the identification of the risk factors for developing OCD, discussed below.

1.2.2 Risk Factors and Clinical Correlates

A large number of risk factors and clinical correlates have been identified for OCD. These include genetic risk factors, infections, trauma and stressful life events, personality traits and brain injury.

Genetics

There is a high degree of heritability in OCD, with approximately 50% of the variance in the development of OCD attributed to genetic factors ^[57-60]. In the largest twin study conducted to date, the reported concordance rate between twins with an OCD diagnosis was 0.57 for monozygotic twins and 0.22 for dizygotic twins ^[57], indicating a highly genetic component to the disorder. Similarly, family studies have shown that relatives of individuals with OCD had higher rates of OCD symptoms than relatives of individuals without OCD ^[61-63] and one gene, *SLC1A1*, has been consistently identified as being related to OCD symptoms ^[64].

Paediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections (PANDAS)

Several studies have proposed a link between streptococcal infection and OCD symptoms ^[65-69], and these conditions have been described as Paediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections (PANDAS). These studies suggest that streptococcal antibodies cause changes to the basal ganglia, which then trigger OCD symptoms. Support for the presence of PANDAS related symptoms are derived from converging bodies of evidence including antibody studies, which indicate that individuals with OCD have elevated levels of antibodies in the basal ganglia compared to control groups ^[70], treatment studies, where reversal of the symptoms has been reported following plasma exchange or antibiotics ^[68, 71] and from neuroimaging studies, which demonstrate differences in the size of brain structures in those with infection compared to controls ^[72]. Whilst there is evidence to indicate that a subgroup of individuals may experience the onset of OCD symptoms after an infection, this hypothesis has not been uniformly accepted by researchers ^[73] and it is likely that only a small subgroup of individuals with OCD have this type of onset.

Trauma and Stressful Life Events

Traumatic or stressful life events have also been proposed as a risk factor in the development of OCD ^[74-78]. Traumatic events reported to potentially increase risk of developing OCD include sexual abuse, witnessing a crime or death, traffic accident, natural disaster, or combat ^[74-77], however, stressful life events including interpersonal, health or vocational problems, and childbirth have also been studied ^[78-81]. For example, Saunders et al. ^[82] found that women in a community sample who had experienced childhood sexual assault were more likely than those who did not experience such trauma to meet criteria for OCD. In addition, several studies have investigated perinatal experiences and have estimated that OCD may develop after childbirth in some 2-14% of women ^[83-86]. The evidence for the proposition that stressful or traumatic life events are a risk factor for the development of OCD is limited to retrospective studies and is not universally accepted. Moreover, a key criticism of this research is the limited evidence for significant comorbidity between post-traumatic stress disorder (PTSD) and OCD.

Personality Traits

Personality traits have also been implicated in the development of OCD symptoms. For example, relative to controls, individuals with OCD have been found to have elevated levels of neuroticism ^[87-90] and lower levels of extraversion ^[87-90], openness ^[88, 89], agreeableness ^[88, 89], and conscientiousness ^[89]. One longitudinal study indicated that higher negative emotionality and lower constraint, as measured by the multidimensional personality questionnaire at the age of 18 distinguished individuals with OCD from a healthy control group ^[37]. However, no prospective studies have measured personality and OCD symptoms from an earlier age and thus it is unclear how these personality traits affect the development of OCD or whether they are simply a consequence of the disorder.

Neurological Trauma

Symptoms of OCD have been reported to develop after neurological trauma to particular brain regions, especially the cortical-striatal regions ^[91-95]. One study found an increased rate of OCD symptoms post traumatic brain injury compared to controls ^[96] and several case studies have reported the onset of OCD symptoms in older adults after neurological injury ^[21, 97, 98]. This data is somewhat difficult to interpret however, as the majority of the research is described in case reports and the time to onset after the injury varies considerably ^[99].

1.2.3 Summary

Whilst several possible risk factors for the development of OCD have been identified, the strength of evidence supporting their roles varies considerably. The risk factor with the strongest evidence is genetics, but it is likely that onset of OCD results from a combination of the risk factors discussed above, and may vary across individuals or type of symptoms. Further research from prospective longitudinal studies would help to improve our understanding of the development of OCD.

1.3 Theoretical Models of Obsessive-Compulsive Disorder

Theoretical models of OCD generally fall into two categories, biological and psychological. Because they are not the main focus of this thesis biological models are presented briefly, followed by a more detailed discussion of psychological models. Both of these types of models have led to the development of effective, yet diverse treatments for OCD.

1.3.1 Biological Models

Neurological Models

Neurobiological models of OCD implicate orbitofrontal and subcortical regions and circuits of the brain ^[100-103] and propose that resting over-activity in particular regions or pathways lead to the development of OCD symptoms ^[104]. The majority of evidence supporting this model is derived from neuroimaging studies ^[105-112], which compare the brain functioning of individuals with OCD with matched controls without OCD. A meta-analysis using Functional Magnetic Resonance Imaging (fMRI) indicates that abnormalities have consistently been found in the orbitofronto-striatal circuits of individuals with OCD ^[102]. A recent meta-analysis of studies using Positron Emission Tomography (PET) or Single Positron Emission Computer Tomography (SPECT) indicates that specific differences in radiotracer uptake in the left orbital gyrus and the head of the caudate nucleus occur, rather than global differences in the orbitofrontal cortex ^[104].

Neurotransmitter Models

The two neurotransmitters reported to be primarily involved in the development and maintenance of OCD are serotonin and dopamine. One model of OCD implicating serotonin proposes that serotonin levels are reduced in the orbital-frontal circuits, resulting in the development of OCD ^[113-115]. This model was devised after pharmacotherapies altering serotonin levels were found to be effective in reducing OCD symptoms, however, the exact mechanisms of these medications is still largely unknown ^[115]. Studies investigating the role of serotonin have investigated the availability of the serotonin transporter and serotonin receptor subtypes. Results from these studies are equivocal, with some studies showing decreased serotonin availability compared to controls in several brain regions ^[116-122], whilst others have found increased availability ^[123] and others have found no differences ^[114, 124].

There is also some evidence to suggest that differences in serotonin levels are only seen in those with early onset of the disorder ^[114, 123], which may account for the discrepant results.

Alternatively, several authors have proposed that Selective Serotonin Re-Uptake Inhibitors (SSRIs) are effective because they normalise the dopamine system ^[115, 125], and that it is likely that there is an interaction between serotonin and dopamine, and potentially other neurotransmitters ^[125]. Studies investigating the role of dopamine have also examined dopamine transporter abnormalities and dopamine receptors. Some studies have reported a difference in dopamine levels between individuals with OCD compared to controls ^[116, 126-129] while other studies have found that changes in the dopamine transporter are evident after treatment with several SSRI medications ^[130, 131], suggesting a link between serotonin and dopamine.

Summary

Biological models of OCD have been helpful in contributing to the development of effective medical treatments for OCD. However, biological models do not explain or predict the comorbidities or symptom heterogeneity that is seen in OCD ^[11, 101]. An additional limitation of these models is that they currently do not indicate whether the identified changes in brain or neurotransmitter functioning cause, or are a result of the symptoms of OCD. Psychological models of OCD have arguably provided more helpful explanations to account for the etiology and maintenance of symptoms, and targets for treatment. These psychological models are discussed below.

1.3.2 Psychological Models

Psychological models of OCD reflect the historically dominant paradigms of psychological practice, including psychodynamic models, behavioural models, and subsequent cognitive-behavioural models.

Psychodynamic Model

Psychodynamic theory traditionally described compulsive behaviors as a strategy that allowed the individual to avoid thinking about previously repressed and distressing sexual experiences ^[132]. This theory was the dominant paradigm for many years and influenced psychodynamic treatments for OCD, which involved identifying experiences that may explain the behavior, and assisting the client to overcome this conflict ^[133, 134]. Contemporary perspectives on psychodynamic psychotherapy are similar to those originally proposed by Freud but have been extended to include aspects of object-relations theory ^[133, 135]. Although several case studies have demonstrated the efficacy of psychodynamic approaches ^[133, 134, 136], there are no controlled studies evaluating this treatment model, and psychodynamic psychotherapy is not currently recommended as a treatment in best practice guidelines ^[137].

Behavioural Model

The early behavioural models of OCD were based on learning theory and hypothesised that OCD developed due to classical conditioning of a specific environmental event, and was then maintained by operant conditioning ^[138]. This model was criticised by Rachman ^[139] who argued that many individuals with OCD do not have a history of traumatic events that would explain the development of their symptoms and, conversely, many individuals with traumatic histories do not develop symptoms of OCD. More recently, some authors have proposed that this conditioning can occur after verbal transmission of information about the dangerousness

of certain stimuli from important caregivers rather than a traumatic event, per se ^[140]. Criticisms of the behavioural model facilitated the development of the cognitive-behavioural models of OCD, and these have been influential in the development of treatments for OCD.

Cognitive-Behavioural Models

The first cognitive-behavioural model of OCD was proposed by Carr ^[141]. This model hypothesised that individuals with OCD are prone to over-estimating both the probability of threat and the cost of the outcome, and proposed that the anxiety seen in OCD is a multiplicative function of these two aspects ^[141]. This model further suggested that compulsions reduce the anxiety caused by the over-estimation of threat by reducing the probability of the unfavorable outcome, and that mental rituals are used when no threat reducing behavior (i.e., compulsions) can be identified ^[141].

McFall and Wollersheim ^[142] also emphasised the role of over-estimation of threat as the primary cognitive bias maintaining OCD symptoms. However, they proposed that specific secondary appraisals make the individual more likely to overestimate threat. These secondary appraisals include beliefs related to perfectionism, the over importance of thoughts and thought-action fusion. According to this model, compulsive behaviors provide anxiety relief by providing the client with a sense of control and reducing uncertainty, which they argued, maintains the compulsive behaviors. While they made important contributions to the field, a limitation of the models of Carr ^[141] and McFall and Wollersheim ^[142] was that not all individuals with OCD experience an over-estimation of threat, and not all OCD symptoms could be explained using these models.

Salkovskis^[143-146] developed an alternative theory proposing that the obsessions characteristic of OCD develop when normal intrusive thoughts are perceived as threatening, and the individual appraises themselves as being responsible for preventing harm to themselves or others^[143, 145]. Salkovskis^[144] argued it is this appraisal of over-responsibility that is the main motivator for engaging in suppression or neutralising strategies (either compulsive behaviours or mental rituals)^[144, 145]. Salkovskis^[143, 144] argued that if an individual with OCD did not feel a sense of over-responsibility they would be more likely to have depression or develop a different anxiety disorder rather than OCD. Whilst this model adequately explains the unacceptable or harming symptoms of OCD, it explains the other symptom domains less well, suggesting other cognitive biases may also play a role.

Theoretical Model Used in the Current Study

The Obsessive Compulsive Cognitions Working Group (OCCWG)^[147], which comprised a group of international experts on OCD, developed a comprehensive model to explain OCD symptoms. This model is adopted in the interventions developed in this thesis and describes 6 main cognitive biases hypothesised to be involved in the development and maintenance of OCD symptoms^[147]. These include: 1) Inflated responsibility; 2) over-importance of thoughts; 3) excessive concern about the importance of controlling one's thoughts; 4) overestimation of threat; 5) intolerance of uncertainty, and; 6) perfectionism^[147]. All of these cognitive biases feature to various extents in the previously discussed models of OCD, and are described in more detail below.

In the OCCWG model *inflated responsibility* refers to the belief that the individual has the power to either prevent or cause negative feared outcomes^[147]. The inclusion of inflated responsibility in the OCCWG model is supported by studies that demonstrate that, in

situations where perceived responsibility is high, obsessive-compulsive symptoms increase [148-153]. Consistent with this, there is evidence from several studies that clinical subjects with OCD score higher on measures of responsibility than either community controls [154-156] or anxious control groups [154, 155].

The second bias, *over-importance of thoughts*, refers to the belief that the presence of an unwanted thought indicates that the belief is important [147]. Several studies have reported that individuals with OCD often misinterpret the meaning of unwanted thoughts, interpreting them as indicating something negative about them [157, 158]. This second cognitive bias is associated with the third bias [147], *the need to control thoughts*, which refers to the belief that it is possible and essential to control thoughts that enter one's mind [147]. Studies indicate that individuals with OCD are more likely to overestimate the importance of their own thoughts and the need to control unwanted thoughts, relative to community samples and non-anxious control groups [154-156].

Overestimation of threat refers to an individual's overestimation of the probability of a negative event occurring [147]. This cognitive bias has received considerable attention in the literature with studies indicating that individuals with OCD do overestimate threat more than non-clinical individuals [155, 156, 159]. However, research also indicates that individuals with OCD do not overestimate threat more than individuals with other anxiety disorders [154, 159], suggesting that this bias may be a vulnerability to anxiety generally, rather than specific to OCD.

The fifth cognitive bias described in the OCCWG model is *intolerance to uncertainty*, which refers to the belief that the individual should be able to obtain certainty about all events [147].

Some studies have reported that individuals with OCD score higher on measures of intolerance to uncertainty than community samples and anxious controls ^[155, 156]. However, other studies have found that individuals with OCD do not score higher than anxious control groups ^[154]. There is also some evidence to suggest that individuals with certain subtypes of symptoms, such as those with primarily doubting obsessions and checking compulsions, score higher on this bias than individuals with symptoms from other OCD subtypes ^[160]. This suggests that intolerance to uncertainty, like overestimation of threat, may be related to anxiety disorders generally, rather than specifically to OCD.

The final cognitive bias implicated in the OCCWG model is *perfectionism*. Perfectionism refers to an individual's belief that it is possible and essential to complete tasks perfectly or without error ^[147]. Empirical support for the inclusion of perfectionism in a model of OCD is weaker than for the other cognitive biases mentioned in the OCCWG model. For example, whilst some studies have found that perfectionism is an independent predictor of OCD symptoms ^[161] others have found that individuals with OCD do not differ in levels of perfectionism from anxious controls ^[154].

Summary

The OCCWG model is able to account for the various presentations in OCD, and is arguably the strongest theoretical model to date. It is important to mention that these cognitive biases are not mutually exclusive and it is common for individuals with OCD to show evidence of more than one bias. Limitations of the model include that several of the six biases are not exclusively related to OCD symptoms, and may be characteristic of anxiety more generally. In addition, even though the model was empirically derived, the range of biases reflect the measures of OCD symptoms available at the time, and other previously unstudied biases may also be involved in the development and maintenance of symptoms. For instance, it has been

recently argued that higher order factors such as perception of the self and the world resulting from insecure parental attachments are important in the development of OCD ^[162], with results from several studies supporting this theory ^[163-165]. In addition much of the evidence to support the OCCWG model is correlational, although there is prospective data emerging indicating that the presence of these biases may indeed lead to development of OCD symptoms ^[166]. Despite these limitations, this model has been very useful in guiding research and development of treatments.

1.4 Treatment of Obsessive Compulsive Disorder

The biological and cognitive-behavioural models discussed above have led to the development of effective treatments for individuals with OCD, which have evolved considerably over the past 50 years. Today, OCD is generally a manageable condition, with two main approaches to treatment, biological and psychological. The efficacy of these treatment approaches is discussed below. Because the focus of this thesis concerns cognitive-behavioural treatments, the majority of this section examines evidence for that treatment model.

1.4.1 Biological Treatment

Pharmacological Treatments

Pharmacological interventions are the most commonly used treatment for OCD ^[167, 168], and are suitable for both adults ^[169-171] and children ^[172-174]. The first pharmacological agent found to be efficacious in the reduction of OCD symptoms was Clomipramine (CMI), a non-selective serotonin reuptake inhibitor (SRI), first tested in 1968 ^[175]. Studies have consistently shown that CMI produces both statistically and clinically significant reductions in OCD symptoms ^[169, 176-178]. The mean percentage reduction of symptoms for individuals using CMI

on the Yale Brown Obsessive Compulsive Scale (YBOCS), a widely recognised clinician-administered measure of OCD severity, ranges from 39% ^[176] to 61% ^[178], and effect sizes following treatment range from 1.09 ^[177] to 1.55 ^[170].

Despite its efficacy, CMI frequently produced several significant side effects ^[179, 180], and thus alternatives to this drug were sought and CMI is now considered a second line intervention ^[181]. SSRIs are now the first-line treatment approach in pharmacotherapy for OCD. This class of drug has been used in the treatment of OCD since the 1980s and has been shown to result in both statistically and clinically significant reductions in symptoms of OCD when compared against placebo ^[169, 171]. The overall reduction in symptoms on the YBOCS ranges from 20% ^[176] to 29% ^[178], and large effect sizes, ranging from 0.82 ^[177] to 1.34 ^[170] are reported across meta-analytic studies. To try to improve the efficacy of SSRIs, intravenous administration has been advocated when there has been a low response to oral treatment ^[182]. Additionally, some clinicians have begun to augment treatment with second generation antipsychotics and there is some evidence from a recent meta-analysis to suggest that this might be useful in reducing symptoms further ^[183].

Whilst there are several advantages of pharmacological treatments for OCD, including the relative ease and convenience of treatment, and the less stigmatising nature of the treatment compared to psychological treatments, there are also several disadvantages. The main disadvantage is the high likelihood of relapse once pharmacological treatments are ceased, therefore, long term treatment is required ^[184-187]. Secondly, side effects are also common ^[171, 179, 180], which can lead to significant numbers of individuals prematurely discontinuing treatment ^[176, 177]. The financial cost of long-term pharmacological treatment is another barrier, particularly given the cost of medication over the lifetime. Finally, the rates of non-

response to pharmacological treatments vary from 13-48% ^[168, 185, 188, 189] and very few clients become symptom free ^[188]. Despite these limitations pharmacological treatments are the most commonly used treatment in OCD today ^[167].

Psychosurgery

Another biological treatment for OCD is psychosurgery. There are four main surgical procedures used in the treatment of OCD: subcaudate tractotomy; cingulotomy; limbic leucotomy, and; capsulotomy. During these procedures lesions are made in brain tissue using radiofrequency heat electrodes or gamma knife procedures using narrow beams of radiation ^[190]. More recently, deep brain stimulation (DBS) has also been used with encouraging results ^[191-194]. For example in the most well designed study to date 67% of participants with severe, treatment resistant OCD, met criteria for clinical improvement (a greater than 35% decrease in scores on the YBOCS, and a YBOCS end point less than 16) ^[191]. However, studies evaluating the efficacy of psychosurgery tend to include small samples, are largely retrospective reports of procedures conducted over many years by single research groups, and do not include control groups, limiting the ability to make firm conclusions about their efficacy. Whilst these treatments provide a treatment option for individuals with OCD who have previously exhausted all other available treatments, there are several disadvantages to these treatments including side effects that may include changes in neuropsychological performance ^[195] and seizures ^[196, 197]. In addition, these treatments are expensive and not available to all individuals with OCD ^[198].

In summary, pharmacological treatment results in significant reductions in OCD symptoms and large effect sizes. However, the improvements are not generally sustained after medication is ceased and long term maintenance on medication is required. Studies

researching psychosurgical techniques tend to use research designs that limit the ability to determine the efficacy of these treatments. These psychosurgical treatments are invasive, but the development of non-invasive DBS and gamma knife radiation procedures is promising. However, while encouraging, these developments are unlikely to be accessed by individuals with OCD on a large-scale basis, at least in the foreseeable future.

1.4.2 Psychological Treatment

Cognitive behavioural treatments are the main contemporary psychological treatments for OCD, and have consistently been demonstrated as clinically effective ^[170, 199-201]. These treatments are differentiated into three main groups that reflect the emphasis on cognitive or behavioural techniques, including cognitive and behavioural treatments with an emphasis on behavioural techniques (cBT), cognitive behavioural treatments with an emphasis on cognitive techniques (CbT), and cognitive behavioural treatments with an equal emphasis on both cognitive and behavioural techniques (CBT). The next section discusses the early versions of CBT for OCD and the development of the contemporary treatment approaches, while the following section reviews the efficacy of each of the contemporary approaches to treatment: cBT; CbT, and; CBT interventions.

Early Psychological Treatment and the Development of Contemporary Techniques

The earliest empirically supported psychological treatments were those using Exposure and Response Prevention (ERP) ^[202-205]. Traditional ERP is a technique that involves the individual confronting feared stimuli in vivo, but not engaging in overt behaviours that they would normally do to eliminate their anxiety ^[206]. The first study to report treatment of OCD using ERP was conducted in the United Kingdom in 1966. In that study two clients received ERP, which reportedly resulted in significant decreases in compulsive behaviors ^[203]. A case

series, reported between 1971 and 1975 with 20 clients ^[202, 204, 205, 207], again in the United Kingdom, extended these findings demonstrating that ERP significantly reduced compulsive behaviors. Importantly, follow-ups indicated that treatment gains were maintained over 2 years ^[208]. A separate study identified a possible dose-response relationship between symptom improvement and number of ERP sessions conducted ^[209]. This study found that those who received 30 sessions of exposure achieved greater outcome than those who received 15 sessions of exposure ^[209]. This finding was later replicated in a meta-analytic study that showed a significant correlation between effect size and number of hours spent in exposure ($r = 0.87$) ^[199].

These early studies were conducted in an inpatient setting, which was consistent with the belief that OCD required inpatient treatment. This belief was challenged by Boulougouris and Bassiakos ^[210], who described a case series of three outpatients who obtained similar results to those treated as inpatients. Larger trials then replicated these results ^[211, 212], indicating outpatient treatment was effective for OCD, and outpatient treatment is now the most common mode of face-to-face treatment.

During the 1970s and 1980s several variations to the ERP procedure were evaluated. For example, studies investigated the relative benefits of short versus long exposure to the feared stimulus, and indicated that exposure, per se, was not the essential ingredient, but rather prolonged or repeated exposure was required ^[213]. Graded exposure was subsequently compared with flooding, with results indicating similar outcomes across conditions ^[214]. This finding was also supported in a subsequent meta-analysis ^[26], however, because it is more acceptable to participants it is common for a graded form of ERP to be used over flooding in clinical practice.

Subsequent studies examined the effects of self-controlled, partner assisted and family assisted exposure compared with therapist-assisted exposure ^[215, 216], and partner-assisted exposure compared with family-assisted exposure ^[217, 218]. These studies generally reported no difference in outcome when using self-controlled, therapist controlled ^[215, 216], partner-assisted, or family-assisted exposure ^[217, 218]. In contrast, however, the results from recent meta-analyses conclude that therapist-assisted exposure produces superior benefits to self-controlled exposure ^[26, 219]. Additional and important extensions to this literature include studies that examined the efficacy of different types of exposure, including in-vivo exposure, and imaginal exposure, that is, imagining the feared outcome with the assistance of a script or audio tape ^[220, 221]. These studies reported that a combination of both exposure types was more efficacious than either one alone ^[220], a finding also supported in a subsequent meta-analysis ^[219].

Several studies have attempted to dismantle psychological interventions to try to determine which treatment component, exposure or response prevention, is the most useful in securing positive outcomes ^[220, 222]. These studies indicate that, while both components are important, exposure appeared more effective at reducing obsessional fears and anxiety ^[220] while response prevention is more effective at reducing compulsive behaviours ^[220, 222, 223]. Importantly, this body of research indicates that the combination of both exposure and response prevention produces better outcomes than either component alone ^[222].

Table 1.1

Outcome of Randomised Controlled Studies, Post 1990 using the Clinician Administered YBOCS and Individual cBT

Study	Treatment Type	<i>n</i>	Amount of contact (hrs)	Dropout	Effect Size (<i>d</i>)	Symptom Reduction
Cottraux et al. (2001) ^[235]	Intensive ERP	32	20	26%	2.54 [±]	58% [^]
De Araujo, Ito, Marks and Deale (1995) ^[236]	In vivo ERP	28	12	22%	*	46% [^]
Fals-Stewart, Marks and Shafer (1993) ^[237]	In vivo-ERP + Imaginal Exposure	28	12	22%	*	48% [^]
	ERP	31	24	*	*	40% [^]
Foa et al. (2005) ^[179]	ERP	29	40	28%	2.17 [±]	55% [^]
Hiss, Foa and Kozak (1994) ^[238]	ERP + CMI	31	46	39%	2.40 [±]	59% [^]
	ERP + Attentional Control	10	28.5	0%	1.94 [±]	59% [^]
Lindsay, Crino and Andrews (1997) ^[239]	ERP	9	15	*	4.21	62%
Nakatani et al. (2005) ^[225]	ERP + Pill Placebo	11	9	9%	4.15 [±]	57% [^]
	ERP in therapist office	14	21	*	1.89 [±]	44% [±]
Rowa et al. (2007) ^[240]	ERP in home environment	14	21	*	2.37 [±]	48% [±]
	ERP + Pharmacotherapy	54	45	11%	1.97 [^]	44% [^]
Simpson et al. (2008) ^[232]	ERP	21	17	19%	1.44 [±]	35% [#]
Tolin et al. (2007) ^[241]	ERP	22	12	15%	0.97 [±]	32%
Van Balkom et al. (1998) ^[229]	Self-administered ERP	36	12	19%	1.06 [±]	32%
Van Oppen et al. (1995) ^[242]	ERP with experienced therapist	26	18	7%	1.19 [#]	35% [#]
Van Oppen et al. (2010) ^[228]	ERP with inexperienced therapist	31	18	13%	1.29 [#]	33% [#]
Whittal, Thordarson and McLean (2005) ^[226]	ERP	37	15	22%	1.65 [±]	52%
Wilhelm et al. (2008) ^[230]	ERP + D-Cycloserine	*	10	*	2.63 [±]	62% [±]
	ERP + Placebo	*	10	*	1.57 [±]	43% [±]
Vogel, Stiles and Götestam (2004) ^[243]	ERP + Relaxation	19	24	37%	1.35 [#]	32% [±]

Note. Studies described above reflect only the arm of the RCT describing cBT approaches. Effect sizes are based on within-group analyses pre-post on the YBOCS using Cohen's *d*. If effect sizes were not reported in the manuscript, or were calculated with a method other than Cohen's *d* they were calculated based on the means and standard deviations reported in the manuscript (indicated with [±]). Where duration of session was not reported, it was assumed the duration was 60 minutes. Symptom reduction on the YBOCS was calculated using the mean and standard deviations reported in the manuscript. * Indicates insufficient information to calculate the variable based on information in the manuscript. Where possible the model of analysis was ascertained: [#] Indicates ITT design used; [^] indicates completer analysis use, and; no symbol is used where the model was not able to be determined. Dropout indicates the proportion of participants who did not complete the treatment program.

Contemporary Psychological Treatment

The early studies described above led to the development of contemporary cognitive-behavioural approaches to the treatment of OCD. With improvements in research design and the advent of the YBOCS, a reliable outcome measure for OCD that measures the severity of symptoms independently of the type of symptoms, more rigorous testing of the different techniques used in the treatment of OCD became possible. All contemporary OCD treatment protocols include both cognitive and behavioural treatment components, however, the various approaches differ in the emphasis placed on each component ^[224]. Results of meta-analyses generally do not report a significant difference in the efficacy of these approaches. For example a meta-analysis by Rosa-Alcázar, Sánchez-Meca, Gómez-Conesa and Marín-Martínez ^[219] reported an overall effect size of 1.13 for cBT, 1.09 for CbT, and 1.00 for CBT, and another by Eddy, Dutra, Bradley and Westen ^[170] reported an overall effect size of 1.53 for cBT, 1.54 for CbT and 1.39 for CBT. The following discussion examines the evidence for these three contemporary approaches in the treatment of OCD.

Cognitive-Behavioural Treatments with an Emphasis on Behavioural Techniques (cBT)

ERP in its contemporary administration is primarily a behavioural technique and involves four components ^[206]: 1) Exposure in vivo, where the individual confronts feared stimuli in real life; 2) exposure in imagination, where fears are confronted in imagination; 3) response prevention, which involves instructing the individual to cease any overt or covert behaviours that they would normally do to eliminate their anxiety; and, 4) a processing component, which Foa ^[206] describes as reviewing with the client what they have learnt from completing an exposure task. Although there is no direct challenging of faulty appraisals, the processing component introduces cognitive phenomena to the traditional ERP technique, hence the small *c.*

The majority of contemporary studies incorporate cBT as described here and overall, outcome studies indicate that treatment using a cBT approach is efficacious. More specifically, cBT approaches produce statistically significant changes from pre-post treatment on the YBOCS^[225-227] and clinically significant changes in symptoms^[179, 225, 228]. Different studies have used different criteria to report clinically significant change, but using the percentage reduction on the YBOCS as a standard, studies report a 32%^[229,242] to 62%^[239] decrease in OCD symptoms. Many of the contemporary treatment studies report outcomes from only those who complete treatment, which can inflate treatment effect sizes. Using this approach, effect sizes (Cohen's *d*) range from large (0.97)^[229] to extremely large (4.15)^[225]. Using a more conservative intention to treat (ITT) approach effect sizes range from 1.19^[228] to 2.63^[230] for cBT approaches. Dropout rates across these studies range from 7%^[228] to 39%^[179]. An overview of existing outcome studies using a cBT approach is presented in Table 1.1.

Whilst the majority of treatment outcome studies using cBT approaches were conducted in specialised treatment settings by highly trained mental health professionals and experts in the field, recent studies have demonstrated that newly trained therapists can obtain equally impressive results^[228] and that excellent clinical outcomes can be obtained in day-to-day clinical practice outside of the research laboratory^[231]. Studies using cBT techniques have also shown that this treatment can produce significant changes when used as an adjunct treatment for those already undergoing pharmacological treatment^[232-234].

Cognitive-Behavioural Treatments with an Emphasis on Cognitive Techniques (CbT)

Contemporary cognitive techniques aim to reduce one or more of the cognitive biases seen in people with OCD, as identified in the OCCWG model, an approach referred to as CbT. Studies examining the efficacy of CbT interventions are fewer in number than those

emphasising behavioural components. The most widely studied purely cognitive treatment for OCD is Danger Ideation Reduction Therapy (DIRT). This treatment generally targets the over-estimation of threat ^[244, 245] and has been shown to be effective in two RCTs (one group treatment and one individual treatment) ^[246, 247], three case series ^[248-250], and three case studies ^[251-253]. Unfortunately, very few of the studies that evaluate the efficacy of the DIRT treatment use the YBOCS as an outcome measure, and for those that do, standard deviations are not reported, making it difficult to calculate effect sizes and compare these results with other studies. In the only RCT using individual therapy, an average reduction of 47% was seen on the YBOCS ^[247], indicating promising outcomes for this treatment approach.

The rationale behind the DIRT treatment is that once cognitive biases (in particular the over-estimation of threat) are reduced, the related anxiety should subside on its own, and thus compulsive behaviours should also cease without any direct intervention. Whilst DIRT is a purely cognitive treatment that does not advocate exposure or behavioural experiments, it is important to note that it does include a small behavioural component. In the DIRT treatment protocol, clients are advised not to confront feared situations or triggers until they experience no anxiety about facing them ^[244, 245]. Thus DIRT implies that a change in behaviour eventually needs to occur by confronting previously avoided situations. Whilst there are a small number of studies providing promising data on the efficacy of CbT treatments for OCD, this area is not as developed as the treatments emphasising ERP.

Cognitive-Behavioural Treatments Emphasising both Cognitive and Behavioural Techniques (CBT)

CBT treatments include a similar emphasis on cognitive and behavioural techniques. Exposure is included, and can either be in the form of ERP described above, or in the form of

behavioural experiments ^[145, 254-256]. Behavioural experiments involve confronting feared stimuli (as in ERP), however, the goal is to provide contradictory evidence against a belief, whereas the goal in ERP is habituation ^[224]. Another difference between ERP and behavioural experiments are that the behavioural experiments are not necessarily completed in a graded approach, whereas ERP generally is.

The majority of research studies on contemporary psychological treatments of OCD have used the CBT approach, as summarised in Table 1.2. Studies indicate that CBT treatments result in both statistically ^[226, 257, 258] and clinically significant changes in symptoms ^[257]. Based on treatment completers CBT treatments produce effect sizes (Cohen's *d*) ranging from large to very large (1.18 ^[257] - 3.63 ^[259]). Using an ITT model effect sizes range from 0.92 ^[260] to 2.23 ^[261]. Overall, percentage decreases in YBOCS pre-treatment to post-treatment range from 16% ^[268] to 72% ^[259]. Importantly, these results have also been replicated in effectiveness studies ^[262, 263], demonstrating that the techniques are also applicable outside of highly structured research settings.

1.4.3 Summary

There is considerable evidence for the clinical efficacy of cBT and CBT approaches in the treatment of OCD. There is also encouraging preliminary support for the efficacy of CbT treatments, however, the evidence for this approach is limited to a small number of trials performed largely by a single research group. No significant differences have been identified in studies that have directly compared CBT and cBT approaches ^[226, 243]. Head to head studies across the three different treatment approaches will facilitate the identification of the most effective components of the treatment. However, to date, no studies have compared CbT, cBT, and CBT approaches within a single controlled design.

Table 1.2

Outcome of Randomised Controlled Studies, Post 1990 using the YBOCS and Individual CBT

Study	Treatment Type	<i>n</i>	Amount of contact (hrs)	Dropout	Effect Size (<i>d</i>)	Symptom Reduction
Anand, Sudhur, Math, Thennarasu and Janardhan Reddy (2011) ^[261]	CBT	31	40	16%	2.23 [±]	45% [#]
Anderson and Rees (2007) ^[257]	CBT	21	10	19%	1.18 [^]	30% [^]
Cabedo et al. (2010) ^[264]	CBT	18	18	11	3.42 [^]	68% [^]
Cottraux et al. (2001) ^[235]	CBT	32	20	6%	2.36 ^{^±}	56% [^]
Freeston et al. (1997) ^[265]	CBT	15	40.5	*	1.69 ^{#±}	58% [#]
Hiss, For and Kozak (1994) ^[238]	ERP + CT	10	28.5	*	2.88 ^{^±}	62% [^]
Jaurrieta et al. (2008) ^[260]	CBT	*	15	*	0.92 ^{#±}	29% [#]
Jonsson, Hougard and Bennedsen (2011) ^[266]	CBT	46	16	20%	1.24 [#]	31% [#]
O'Connor, Todorov, Robillard, Borgeat and Brault (1999) ^[267]	CBT	6	20	*	1.52 ^{±^}	43% [^]
	CBT + SSRI	9	20	*	1.19 ^{±^}	25% [^]
	CBT	10	20	*	2.01 ^{±^}	53% [^]
	CBT+ SSRI	12	20	*	1.81 ^{±^}	43% [^]
O'Connor et al. (2006) ^[258]	Placebo + CBT	10	20	*	3.47 ^{±^}	44% [^]
	SSRI + CBT	11	20	*	2.69 ^{±^}	57% [^]
	CBT	*	20	*	*	16%
Rector, Cassin and Richter (2009) ^[268]	CBT + Depression modules	*	20	60%	*	18%
	ERP + D-Cycloserine	17	18	29%	3.63 ^{±^}	66% [^]
Storch et al. (2007) ^[259]	ERP + Pill Placebo	17	18	29%	3.09 ^{±^}	72% [^]
Twohig et al. (2010) ^[269]	ACT	40	8	13%	1.68 ^{±^}	47% [^]
Van Balkom et al. (1998) ^[229]	CBT	25	12	24%	1.42 ^{±^}	47% [^]
Van Oppen et al. (1995) ^[242]	CBT	35	12	20%	1.51 ^{^±}	45%
Vogel, Stiles and Götestam (2004) ^[243]	ERP + CT	16	24	6%	1.49 [#]	33% [#]
Whittal, Thordarson and McLean (2005) ^[226]	CBT	34	15	12%	2.20 ^{^±}	55% [^]
Whittal, Woody, McLean, Rachman and Robichaud (2010) ^[270]	CBT	40	*	8%	2.08 ^{^±}	64% [^]

Note. Studies described above reflect only the arm of the RCT describing CBT approaches. Effect sizes are based on within-group analyses pre-post on the YBOCS using Cohen's *d*. If effect sizes were not reported in the manuscript, or were calculated with a method other than Cohen's *d* they were calculated based on the means and standard deviations reported in the manuscript (indicated with [†]). Where duration of session was not reported, it was assumed the duration was 60 minutes. Symptom reduction on the YBOCS was calculated using the mean and standard deviations reported in the manuscript. * Indicates insufficient information to calculate the variable based on information in the manuscript. Where possible the model of analysis was ascertained: [#] Indicates ITT design used; [^] indicates completer analysis use; and; no symbol is used where the model was not able to be determined. Dropout indicates the proportion of participants who did not complete the treatment program.

1.5 Predicting Response to Treatment

Whilst cognitive and behavioural interventions are effective in reducing symptoms of OCD, response rates differ across participants. Several factors have been identified as possible predictors of treatment response including age of onset, sex, marital and occupational status, symptom profile, symptom severity, level of insight and comorbidity with Axis I and Axis II disorders [35, 227, 271-288]. Although identifying reliable predictors to indicate positive or negative outcome would help to match clients to treatment, few of these variables have been consistently found to predict outcomes.

1.5.1 Summary

OCD is a common and chronic mental disorder, which causes considerable disability and impairment in functioning for the individual. It is also costly to society. To date there are few reliably identified risk factors and the factors leading to the development of the disease are still largely unknown. Despite this, effective treatments are available for the treatment of OCD. These include those based on biological models, including the use of SSRI medication, as well as those based on psychological models, which include cognitive-behavioural treatments. Despite the availability of these treatments, few people obtain effective treatment [4, 168]. Barriers to treatment and potential ways to reduce these barriers are discussed below.

1.6 Barriers to Treatment

Although effective treatments exist, people with OCD experience multiple barriers to treatment. These include the direct financial costs associated with treatment, indirect costs of treatment which include taking time off from usual roles to travel to and attend treatment, difficulty accessing a trained therapist due to the low numbers of therapists experienced in delivering CBT for OCD or issues related to geographical isolation, and stigma [289-292]. For

instance Baer and Minichiello ^[289] found that 25% of respondents to an Internet survey reported that they had not sought treatment because there were no specialist treatment services near their home. In Australia, it has been estimated that when people with OCD do seek psychological treatment fewer than 25% receive an evidence-based intervention ^[4]. The consequences of limited access to evidence-based treatment means that a large proportion of people with OCD experience burden that could be averted.

One potential way to reduce or overcome some of the barriers to treatment is to administer CBT treatments for OCD remotely. Remote administration of CBT interventions has the potential to reduce barriers associated with indirect costs, geography, and lack of trained therapists. Remotely delivered interventions may also reduce direct treatment costs, and may be less stigmatising than face-to-face interventions. A review of the results of remote treatment for OCD is provided below.

1.7 A Review of Remote Treatment for Obsessive-Compulsive Disorder

Remote treatments are those that can be delivered without physically being in the same room as the client, and can thus improve access to evidence-based care. Remote treatments differ along multiple continua including whether they involve brief and often asynchronous contact with a therapist (low intensity remote interventions) or whether they use technology to deliver remote treatments in synchronous, or real time (high intensity remote interventions). The latter will not be discussed further, as this is not the focus of the current thesis, but further information and reviews are provided in Lovell, et al. ^[293]; Lovell, Fullalove, Garvey, and Brooker ^[294]; Taylor, et al. ^[295]; Turner, Heyman, Futh, and Lovell ^[296], and Himle, et al. ^[297].

Approaches for administering low intensity remote treatments for anxiety disorders include bibliotherapy, computer-administered cognitive-behavioural therapy (CCBT) and internet-administered psychological treatments (iPT) which include internet-administered treatments based on several psychological models including CBT, interpersonal, and problem-solving therapies. These approaches involve patients systematically reading structured lessons or modules that present the same information and skills typically taught in face-to-face treatment, often with support from a trained support person or clinician ^[298]. Literature describing outcomes of studies using these remote treatment methods in the treatment of OCD is discussed below.

1.7.1 Computer Administered Cognitive Behavioural Therapy

One of the first CCBT treatments for OCD was the Behaviour Therapy (BT) STEPS program. BT STEPS is a 9-step cBT program, in which individuals access self-help treatment via a fully automated interactive voice response system and manual ^[299]. Individuals access the computer generated program via a touch tone telephone rather than a computer, and they advance through each of the steps at their own pace ^[299]. Several studies have demonstrated the efficacy of BT STEPS ^[299-302], however, the technology used in this program is now largely out-dated and internet administration has become a popular remote treatment approach. Although the BT STEPS program was modified into an internet-administered program and renamed OC-FIGHTER, at the time of preparing this thesis, there was no published data about the efficacy of OC-FIGHTER.

1.7.2 Internet-Administered Psychological Treatment

iPT has been found to be effective across several anxiety disorders and depression, producing large effect sizes when treatment is supported by a therapist ^[303-305]. Additionally these

treatments appear to be as efficacious as traditional face-to-face interventions^[304, 306-308] and are acceptable to clients^[303, 309]. Whilst the clinical efficacy of therapist-guided IPT is established for disorders including major depressive disorder (MDD)^[310-314], social phobia (SP)^[315-320], generalised anxiety disorder (GAD)^[321-323], panic disorder (PD)^[306, 324-328], and PTSD^[329-333], at the time of preparing the studies for this thesis, there were no published reports of IPT for OCD, although important preliminary studies reporting the efficacy of IPT treatment for OCD have since emerged. Because these emerging studies and the treatment studies in this thesis involve the delivery of internet-administered CBT, (iCBT), unless otherwise specified, the term iCBT will be used forthwith in this thesis.

In addition to the studies reported in this thesis, to date, there have been two other reports of iCBT for OCD. The first study to show the efficacy of iCBT for OCD was an uncontrolled pilot study, published in 2011^[334], which reported promising results. That same research group has since reported results of an RCT using the same program^[335]. These important studies have both reported large effect sizes (Cohen's *d*) (1.55-1.56) and a 40 to 50% reduction in symptoms on the YBOCS^[334, 335], indicating the potential use of iCBT for OCD. A summary of treatment studies using CCBT or iCBT is included in Table 1.3.

An important advantage of CCBT and iCBT over other remote interventions is that they provide considerable therapeutic control over the sequencing and presentation of materials. For example, content may not become available until previous content has been completed, or until a pre-specified duration of time has elapsed (e.g., one week). However, one important disadvantage with CCBT and IPT is that regular access to computers and the internet is not uniform for all individuals^[336]. Additionally, individuals with OCD may avoid treatment over the internet due to fears about confidentiality and privacy. Self-guided bibliotherapy

overcomes some of these disadvantages, and is a method of remote treatment with a long history in psychiatric research.

1.7.3 Bibliotherapy Administered Psychological Treatment

Bibliotherapy is a self-help treatment where the individual is provided with a workbook to conduct his or her own treatment. Similar to other remote treatments, bibliotherapy involves teaching the individual the same skills and techniques taught in face-to-face treatment, however, material is presented in a paper workbook rather than online ^[337]. There is considerable evidence to suggest that such self-help treatments are useful in decreasing symptoms of depression and anxiety, particularly when the consumer also receives remote support from a therapist ^[338-342]. However, while there are several bibliotherapy manuals for OCD available for purchase by consumers, very few of them have been demonstrated to be empirically effective.

To date, two RCTs have demonstrated the efficacy of unguided bibliotherapy for OCD ^[241, 343] and further evidence for the efficacy of this mode of treatment is provided by an uncontrolled study ^[344]. Across these three studies, reductions in symptoms on the YBOCS range from 17% ^[241] to 31% ^[344], and within-group effect sizes (Cohen's *d*) range from 0.65 ^[241] to 0.97 ^[344], indicating bibliotherapy may be a promising remote treatment approach for OCD. An overview of the results of studies of bibliotherapy in OCD is also presented in Table 1.3. Bibliotherapy treatments also have several advantages over iCBT treatments, including that they can be reviewed at any time without needing internet access and may thus facilitate relapse prevention. Moreover, workbooks are not subject to technical difficulties that iCBT programs may experience.

Table 1.3

Outcome of Remote Treatment Studies Using CCBT, iPT and Bibliotherapy

Study	Treatment Type	<i>n</i>	Amount of contact (min)	Dropout	Effect Size (<i>d</i>)	Symptom Reduction
CCBT						
Bachofen et al. (1999) ^[300]	Unguided BT STEPS	21	99	52%	0.73 ^{±‡}	20% [^]
Greist et al. (1998) ^[301]	Unguided BT STEPS	40	*	58%	0.41 ^{±‡}	29% [^]
Greist et al. (2002) ^[299]	Unguided BT STEPS	57	*	66%	0.94 ^{±^}	23% [^]
Kenwright, Marks, Graham, Franes and Mataix-Cols (2005) ^[302]	Guided BT STEPS	22	76	14%	0.85 ^{±^}	24% [^]
	Unguided BT STEPS	22	16	59%	0.33 ^{±^}	9% [^]
iPT						
Andersson et al. (2011) ^[334]	Guided iCBT	23	92	4%	1.56 [#]	50% [#]
Andersson et al. (2012) ^[335]	Guided iCBT	101	129	4%	1.55 [^]	40% [^]
Bibliotherapy						
Moritz, Jelinek, Hauschildt and Naber (2010) ^[343]	CBT Bibliotherapy	43	*	16%	0.63 ^a	*
Tolin et al. (2007) ^[241]	cBT Bibliotherapy	20	0	15%	0.65 ^{±#}	17%
Tolin, Diefenbach, Maltby and Hannan (2005) ^[344]	cBT Bibliotherapy	11	0	9%	0.97	31%

Note. Studies described above reflect only the arm of the study describing CCBT, iPT or Bibliotherapy approaches. Effect sizes are based on within-group analyses pre-post on the YBOCS using Cohen's *d*. If effect sizes were not reported in the manuscript, or were calculated with a method other than Cohen's *d* they were calculated based on the means and standard deviations reported in the manuscript (indicated with [±]). ^a indicates between-group effect size compared with a waitlist control group. Symptom reduction was calculated based on the percentage reduction on the YBOCS reported in the manuscript. * indicates insufficient information. Where possible the model of analysis was ascertained: # indicates ITT design used, ^ indicates completer analysis used, and no symbol is used where the model was not able to be determined. ‡ indicates that the self-report YBOCS was used, rather than the clinician administered version. Dropout indicates to the proportion of participants who did not complete the treatment program.

1.7.4 Summary

At the time of planning the studies for this thesis, there were no reports describing outcomes of iCBT for OCD or reports exploring the use of remote treatments for OCD in an Australian population. Remote-administered treatments for OCD including iCBT and bibliotherapy have the potential to overcome many of the barriers to accessing evidence-based treatment in Australia and abroad. Since OCD is a common, chronic, and disabling disorder, treatments for OCD that can be administered remotely deserve further investigation. Remote treatment of OCD may not only improve access to treatment for people in rural and remote regions, but could potentially reduce waiting lists in urban areas. In the latter, remote treatments of OCD

could be a helpful component of a stepped-care model, and perhaps the only treatment option in the former. Studies examining the acceptability and efficacy of these programs are lacking and the redress of this evidence gap is the focus of this thesis.

Whilst emerging evidence indicates the efficacy of these treatments, there are several important outstanding questions. A key question is whether this type of treatment is acceptable to consumers. This deserves investigation, as consumer preferences will determine the success of attempts at implementation. Second, at the time of planning this thesis, no studies had reported the results of iCBT for OCD, and the question of whether this condition can be treated via the internet was unanswered. Third, if OCD can be treated via the internet, an additional and important outstanding question concerns the relative clinical benefits and acceptability of iCBT and bibliotherapy. Finally, and in order to inform future models of implementation, outstanding questions exist about the amount of therapist contact necessary to obtain positive outcomes in remote treatment of OCD and whether any reliable characteristics can be identified that predict treatment outcome and premature dropout from remote treatments.

1.8 Aims of the Thesis

The overarching aim of the current research was to develop and evaluate the clinical efficacy and acceptability of remote treatment strategies for OCD in order to improve access to evidence-based treatment for people with OCD. This was achieved by undertaking the following studies.

Study I

The primary aim of Study I was to explore the acceptability of internet-administered treatment to individuals with OCD using an online survey. The secondary aim was to compare the demographic characteristics and severity of symptoms of individuals with OCD who sought treatment via the internet with those who sought face-to-face treatment and those with OCD identified in a national epidemiological survey.

Study II

The aim of this study was to develop a treatment protocol for OCD that could be delivered remotely and to test the protocol in a feasibility pilot study using internet administration.

Study III

This study aimed to extend the results of the pilot study and compare two forms of remote treatment, internet-administered and bibliotherapy-administered treatment, with a waitlist control group using a RCT design. The secondary aim was to compare the relative efficacy of the two remote treatment types. The third aim was to examine whether the frequency of contact in the internet administration could be reduced, using an open trial design, utilising the control group from the RCT.

Study IV

The aim of Study IV was to explore whether response to treatment and dropout from remote treatment can be predicted using variables related to OCD classification, demographic characteristics, and symptoms.

It was hoped that by conducting these studies that this work would contribute to the development of services that would improve access to evidence-based interventions for people with OCD.

CHAPTER TWO

Study I: The Acceptability of Internet-Administered Psychological Treatment and Characteristics of an Adult Sample with Obsessive-Compulsive Disorder

2.1 Introduction

Internet-administered psychological treatments (iPT) are a recent and innovative approach to the treatment of psychological conditions that may improve access to evidence-based care. A variety of interventions can be delivered in an iPT format and they generally involve the administration of highly structured online lessons or modules that present the same information and skills typically taught in face-to-face treatment, often with telephone-administered or email support from a trained support person or clinician ^[298]. The results of recent meta-analyses of iPT and CCBT indicate that these treatments produce superior effect sizes over control conditions for several anxiety disorders ^[303, 304], but presently there is limited evidence for the efficacy of iPT specifically for OCD ^[299-302, 334, 335].

While clinical effectiveness is important, the acceptability of iPT is an additional criterion likely to affect wide-scale implementation of this form of treatment. Acceptability refers to the degree that consumers, clinicians or others are comfortable or at ease with a service and are willing to use it ^[345]. Clinician attitudes towards iPT and CCBT are largely neutral ^[346, 347] or unfavourable ^[348]. However, data emerging from clinical trials and online surveys indicates iPT for anxiety and depressive disorders are an acceptable form of treatment to consumers ^{[312,}

320, 349, 350]. Unfortunately, there is limited information about the acceptability of such interventions specifically for treating OCD.

The aims of the present study were to: 1) Examine the acceptability of iPT of OCD in a sample of Australian adults with elevated symptoms of OCD and; 2) compare the characteristics of these respondents with two existing datasets including a sample of people with OCD who had sought face-to-face treatment at a specialist outpatient anxiety clinic and a sample of people with OCD identified in a national epidemiological survey. This information will help determine whether there is demand for iPT programs from people with OCD symptoms. It will also help identify characteristics of individuals who find iPT to be acceptable relative to those who sought face-to-face treatment and those identified in the national survey. Based on recent results of a similar comparison of people with other anxiety disorders and depression ^[351], it was expected that respondents would rate iPT for OCD as an acceptable treatment option. It was also expected that respondents would have more severe symptoms than those identified in the national survey, and symptoms as severe as those attending an outpatient OCD treatment clinic.

2.2 Method

2.2.1 Participants

Three groups of people with symptoms of OCD were compared. Participants in all three groups were at least 18 years of age and either met diagnostic criteria for OCD, determined by a standardised diagnostic interview, or were likely to meet criteria based on their scores on an OCD-specific diagnostic screening questionnaire. Across all three groups OCD need not have been their principal diagnosis.

The Internet Survey Group (IS) comprised respondents to an internet survey developed for this study (see details below). This sample ($n = 128$) was restricted to people who were over the age of 18, were living in Australia and reported OCD symptoms that were of at least moderate severity, defined as a score of ≥ 16 on the YBOCS-Self Report Version (YBOCS-SR) ^[352, 353].

The second group comprised clients in an existing database from the Anxiety Disorders Clinic, St Vincent's Hospital, Sydney, Australia (ADC Group; ADC), a specialist outpatient anxiety clinic that treated people with OCD ($n = 135$). This group received face-to-face treatment for OCD between 2005 and 2010 and a diagnosis of OCD was assigned using the Computerised Composite International Diagnostic Interview 2.1 (CIDI 2.1) ^[354].

The final group comprised individuals meeting criteria for a diagnosis of OCD identified in a national survey of mental disorders in Australia, the National Survey of Mental Health and Wellbeing (NSMHWB) ($n = 297$). This survey was conducted by the Australian Bureau of Statistics between August and December 2007 ^[15] (National Survey Group; NS), and was based on 8841 Australian residents aged 16–85 years (response rate of 60%) and derived data on lifetime mental disorders using the CIDI 3.0 ^[355]. An unweighted subsample of respondents who met DSM-IV diagnostic criteria for lifetime OCD and who reported having symptoms in the last 12-months were selected.

2.2.2 Internet Survey Design, Development and Administration

The internet-administered survey was developed as an 'open' survey, using a convenience sampling method. Visitors to the VirtualClinic website (www.virtualclinic.org.au), a research website operated by the University of New South Wales and St Vincent's Hospital, were

invited to participate. Participation was voluntary. The questionnaire comprised 3 sections with a total of 72 questions. Section 1, comprising 11 questions, enquired about demographics. Section 2, comprising 55 questions, included questionnaires measuring symptoms of OCD, psychological distress, and disability (see below), as well as previous treatment experiences. Section 3, comprising 6 questions, enquired about the perceived advantages, perceived disadvantages, and acceptability of internet treatment of OCD. Questions about advantages and disadvantages of internet treatment were based on questions used in similar surveys and research ^[312, 320, 349]. Acceptability of IPT was determined with the following questions, which utilised Likert-style responses: *Do you think that therapy for OCD delivered via the internet would be effective?* (5 point scale ranging from *symptoms will get a lot worse* to *symptoms will get a lot better*), and; *"If you were seeking treatment would you try treatment for OCD delivered via the internet?"* (4-point scale ranging from *definitely would* to *definitely would not*). The term IPT was used instead of iCBT in this study in order to minimise the use of jargon for participants who may not have known what cognitive behavioural therapy entailed.

All participants received items in the same order and were able to change responses before submitting the survey. The questions and functionality of the survey was pilot tested on two occasions with a small non-clinical convenience sample of mental health clinicians ($n = 5$) and lay people ($n = 5$). The aim of the piloting was to examine comprehension, interpretability and functionality. Piloting was conducted in a two-stage process and questions were subsequently modified after each stage. No formal analyses of internal reliability or validity were conducted.

This study was approved by the Human Research Ethics Advisory Committees of the University of New South Wales and St Vincent's Hospital, New South Wales, Australia. All participants were provided with information about the study and completed a consent form before beginning the survey. No incentives were offered for participating, but respondents were invited to contact the investigator to request a copy of the final results. IP addresses of participants' computers were used to prevent users from repeating the survey. The survey took an average 15 minutes to complete and data from the IS Group was collected between May and October 2010 (22 weeks).

2.2.3 Internet Survey Measures

The following measures were administered online during the internet survey:

YBOCS, Self-Report Version; YBOCS-SR^[352]

The YBOCS-SR is a 10-item questionnaire that measures the severity of OCD symptoms independently of the type of obsessions and compulsions the individual experiences. Each item is measured on a 5-point scale, with 0 indicating *no symptoms* and 4 *extreme symptoms*. The range for the total YBOCS-SR is 0-40, with higher scores indicating greater severity of symptoms. The self-report scale has high internal consistency^[291, 356-358] and the internal consistency in the current study was 0.70. Using a cut off of 16, the sensitivity of the YBOCS-SR is excellent and ranges from 94-100%^[353, 358]. Scores on the YBOCS-SR are only available for the IS Group.

The Kessler 10 item (K-10)^[359]

The K-10 is a brief self-report measure of non-specific psychological distress. Scores are rated on a 5-point scale and higher scores indicate higher distress. Scores are summed and

range from 10-50. The scale has excellent internal consistency with a Cronbach's alpha of 0.92 ^[359]. The internal consistency in this study was 0.91. Scores on the K-10 are available for all 3 groups.

World Health Organisation Disability Assessment Schedule II (WHODAS-II) ^[360]

The WHODAS-II is a measure of general functioning and disability. The WHODAS-II is measured on a 5-point scale (1-5) and total scores range from 12-60, with higher scores indicating higher levels of disability. The WHODAS-II has a reported internal consistency of 0.86 and high test-retest reliability ^[360]. The internal consistency (Cronbach's alpha) in this study was 0.91. Scores on the WHODAS-II are available for all 3 groups.

The IS Group completed these questionnaires online. The NS Group were administered these questionnaires via a trained interviewer, whilst the ADC Group were administered the questionnaires in paper and pencil format.

2.2.4 Survey Response Rates and Analysis

Participant flow can be seen in Figure 2.1. Three hundred and five respondents logged into the survey, of these 236 began the survey. One hundred and eight respondents were excluded because they did not complete or scored less than 16 on the YBOCS-SR, and 3 individuals were excluded because they were less than 18 years of age. The resultant sample comprised 128 participants who reported at least moderate symptoms of OCD and were eligible for analysis in the IS Group.

2.2.5 Statistical Methods

Differences between samples in categorical demographic variables were assessed using chi-square tests, while mean differences in age and the symptom severity scales were assessed using one-way analysis of variance (ANOVAs). Post-hoc tests investigating differences between groups were conducted using adjustments for multiple comparisons. Participants with missing data were omitted from specific analyses where the missing values occurred. Analyses were performed using the Statistical Package for Social Sciences (SPSS) version 18.0 for Windows.

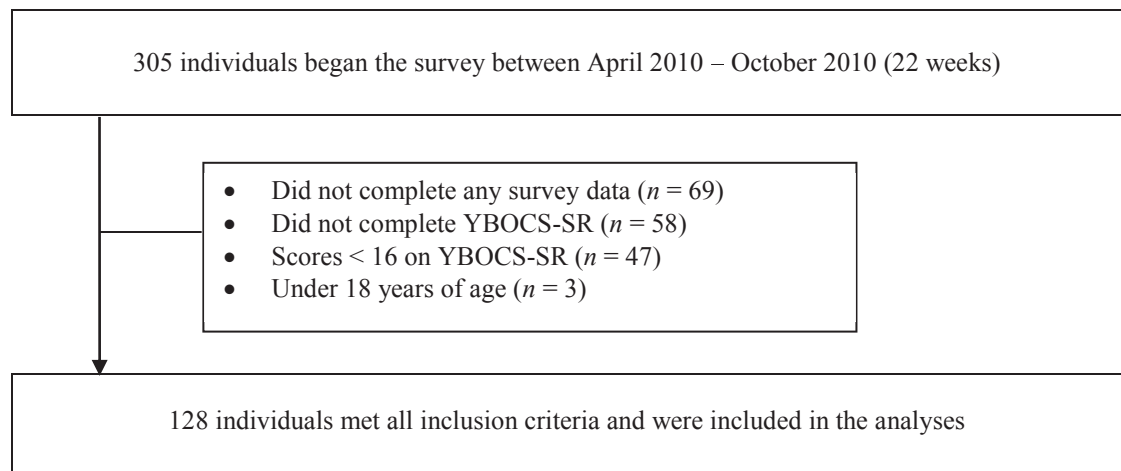


Figure 2.1 Survey flow chart

Note: YBOCS-SR: Yale Brown Obsessive Compulsive Scale – Self Report.

2.3 Results

2.3.1. Comparison of Demographic and Symptom Severity across Groups

Table 2.1 shows the demographic and symptom severity data for each group. The mean age for respondents in the IS Group was 34.29 years ($SD = 12.23$), compared to 32.04 ($SD = 9.83$) for the ADC and 40.72 ($SD = 15.51$) for the NS Group. The p -value was adjusted for multiple comparisons and set at 0.016 to reduce the rate of Type I errors. There was a significant difference in age between groups ($F_{(2,557)} = 22.56, p = 0.000$), with those in the NS Group

significantly older than those in the IS Group ($p = 0.000$) and ADC Group ($p = 0.000$), but there was no significant difference between the ADC and the IS Group ($p = 0.537$).

There was a significant difference between groups in gender ($\chi^2 (2, N = 560) = 11.05, p = 0.00$), with more males in the ADC Group than in the IS Group ($\chi^2 (1, N = 263) = 11.01, p = 0.001$). There were no differences in gender between the IS Group and NS Group or between the ADC Group and NS Group ($\chi^2 (1, N = 425) = 3.75, p = 0.053$; $\chi^2 (1, N = 432) = 3.94, p = 0.047$ respectively) using Bonferroni corrected p -values. A significant difference between groups was also found on educational achievement ($\chi^2 (6, N = 539) = 62.76, p = 0.000$) with specific differences in the frequency of those reporting tertiary qualifications between all groups (ADC vs. IS: $\chi^2 (1, N = 244) = 11.27, p = 0.001$; NS vs. IS $\chi^2 (1, N = 425) = 6.95, p = 0.008$; ADC vs. NS $\chi^2 (1, N = 411) = 41.06, p = 0.000$). Those in the ADC Group were the most likely to have obtained a tertiary education (68%). There was no significant difference between groups in marital status ($\chi^2 (6, N = 560) = 11.68, p = 0.069$) or employment rates ($\chi^2 (2, N = 534) = 1.85, p = 0.396$).

Table 2.1

Comparisons of Demographic Data and Severity of Symptoms for the Internet Survey (IS), Anxiety Disorders Clinic (ADC) and National Survey (NS) Groups

Category	Subcategory	IS (N)	IS Mean (SD)/ Percent	ADC (N)	ADC Mean (SD)/ Percent	NS (N)	NS Mean (SD)/ Percent	Test Statistic	p- Value
<i>Mean Age (SD)</i>		128	34.30 (12.22) †	135	32.04 (9.83) ‡	297	40.72 (15.51) †‡	$F = 22.56^{\wedge}$	0.000
<i>Age in Categories (%)</i>	18-24 Years	128	26.6	135	19.3	297	20.5	$\chi^2 = 65.56$	0.000
	25-34 years		29.7		49.6		18.9		
	35-44 years		20.3		17.8		23.9		
	45-54 years		14.1		9.6		15.8		
	55-64 years		9.4		3.7		13.1		
	65+		0.0		0.0		7.7		
<i>Gender (% Male)</i>		128	28.9*	135	48.9*	297	38.7	$\chi^2 = 11.05$	0.004
<i>Marital Status (%)</i>	Single/Never Married	128	51.6	135	54.1	297	43.8	$\chi^2 = 11.68$	0.069
	Widowed		0.8		1.5		2.7		
	Divorced/ Separated		13.3		7.4		17.8		
	Married/ Defacto		34.4		37.0		35.7		
<i>Highest Educational Qualification (%)</i>	No Qualification	128	4.7	114	0.0	297	0.0	$\chi^2 = 62.76$	0.000
	High School		28.1		19.3		42.4		
	Vocational/Other Certificate		21.1		13.2		24.9		
	Diploma/Degree or Above		46.1		67.5		32.7		
<i>Employment Status (% Employed)</i>		128	63.3	135	69.6	271	63.1	$\chi^2 = 1.85$	0.396
<i>K-10</i>		118	31.30 (8.25) *†	135	28.75 (7.40) *‡	297	20.20 (7.56) †‡	$F = 123.14^{\wedge}$	0.000
<i>WHODAS-II</i>		117	30.47 (9.92)* †	135	26.94 (8.12) ‡	297	19.44 (7.99) †‡	$F = 84.80^{\wedge}$	0.000

Note. *Significant difference between IS and ADC samples in follow-up t-tests; † Significant difference between IS and NS in follow up t-tests; ‡ Significant difference between ADC and NS in follow up t-tests; ^ Tested at corrected significance level of 0.016. K-10: Kessler 10-Item Scale. WHODAS-II: World Health Organization Disability Assessment Scale – Second Edition.

2.3.2 Internet Group: Acceptability of Internet Administered Treatment

Respondents were asked to select which options from a list of potential advantages and disadvantages were important in their potential use or rejection of internet-administered therapy (Table 2.2). The most commonly reported advantages for using internet-administered treatment were those related to *convenience*. Of the 115 respondents, 77 (67%) reported *time saving* and 72 (63%) reported *no need to travel to appointments* as the main advantages of internet-administered treatment. Other primary reasons included *reduced costs* 69/115 (60%) and *increased privacy* 64/115 (56%). Disadvantages of using internet-administered treatments were rarely endorsed. Of the 115 respondents, 11 (10%) reported *preferring face-to-face treatment*, 10 (9%) reported they perceived their problems to be *too severe for internet-delivered treatment*, and 9 (8%) reported *concerns about the lack of face-to-face contact, not being able to communicate ideas online*, and internet treatment *not seeming real*.

In response to the question: *Do you think therapy via the internet would be effective?* 25/115 (22%) indicated they believed their symptoms *would get a lot better*; 67/115 (58%) indicated that *their symptoms would get a little bit better*; 19/115 (17%) indicated that *there would be no change in their symptoms*; 2/115 (2%) reported that *their symptoms would get a little worse*; and 2/115 (2%) reported they thought *their symptoms would get a lot worse*. When asked if they would be willing to try internet therapy (*If you were seeking treatment would you try treatment for OCD delivered via the internet?*) 60/115 (52%) of the IS participants indicated that they *definitely would*, 38/115 (33%) indicated they *possibly would*, 15/115 (13%) indicated that they *maybe would* and 2/115 (2%) indicated that they *definitely would not* use internet therapy.

Table 2.2

Perceived Advantages and Disadvantages of Internet Psychotherapy (iPT) Reported by the Internet Survey Group (N = 115)

Advantages of iPT	n	%
Reduced time	77	67.0
No need to travel to appointment	72	62.6
Reduced costs involved	69	60.0
Privacy and anonymity	64	55.7
Embarrassment related to face to face	38	33.0
Face to face therapy is too confronting	24	20.9
Face to face therapy did not work previously	16	13.9
I did not think my symptoms were severe enough for face-to-face	16	13.9
Face to face treatment not available to me where I live	13	11.3
Disadvantages of iPT		
Prefer face to face	11	9.6
My problems are too complex or severe to be treated online	10	8.7
I need to be able to see the person I am talking too	9	7.8
I won't be able to communicate my ideas online	9	7.8
Internet therapy doesn't seem real	9	7.8
I don't understand what internet therapy is	7	6.1
Don't think it will help	5	4.3
I prefer to deal with symptoms on my own	4	3.5
Embarrassed to talk about problems over the phone/email	4	3.5
Lack of time	3	2.6
Sounds too risky	3	2.6
I would prefer medication	2	1.7
My problems are not severe enough	2	1.7
Too confronting	2	1.7
Someone told me not to	0	0.0
Don't have adequate access to a computer/ internet	0	0.0

2.4 Discussion

The aims of the present study were to examine the acceptability of iPT to a sample of Australian adults with OCD and to compare the characteristics of that sample with two existing groups of people with OCD. All participants met diagnostic criteria for OCD as determined by structured diagnostic assessments or were likely to meet criteria based on a psychometrically established cut-off on a measure of OCD symptom severity.

2.4.1 Comparison of Demographic Characteristics and Symptom Severity

Respondents to the internet survey were similar to those with OCD identified in a national epidemiological sample and those who had previously been treated in a specialist outpatient anxiety clinic with respect to marital status and employment levels. The outpatient sample had the highest level of education, followed by the internet sample and then the national sample. A similar pattern was found for age; the outpatient sample was youngest, followed by the internet sample, and then the national sample. The only demographic characteristic on which the internet sample differed from the other groups was gender, with the internet sample having more females. We conclude that the internet sample are generally representative of the wider population of those with OCD, albeit slightly younger and with a slightly greater proportion of females.

Consistent with the results of a previous comparison of an internet sample with an outpatient and a national sample ^[351], the internet sample and outpatient sample in the present study had significantly greater levels of psychological distress and disability than people in the national sample. Moreover, the severity of OCD symptoms in the internet sample, as measured by the YBOCS-SR ($M = 22.80$; $SD = 4.60$), was similar to those reported in face-to-face clinical samples ($M = 22.50$ - 26.00) ^[228, 262, 356] and remote treatment programs ($M = 18.60$ - 24.60) ^[299, 343]. These results indicate that the internet sample had non-trivial symptoms and are comparable to those who seek face-to-face and remote treatment for OCD.

2.4.2 Acceptability of Internet Administered Treatment for OCD

Overall, respondents to the internet survey endorsed iPT as an acceptable form of treatment. This is consistent with other recent studies indicating consumers are prepared to try iPT for anxiety and depression ^[349, 350]. Ninety-eight percent of respondents indicated that they would

definitely, possibly, or maybe try iPT for OCD. More than 50% of respondents endorsed reasons associated with convenience, reduced costs, and privacy/anonymity as potential advantages of using iPT. Potential disadvantages of iPT included preferring face-to-face treatment, perceiving one's problems as being too severe and concerns about the lack of non-verbal communication. However, these disadvantages were reported by less than 10% of the sample.

2.5 Limitations

The main limitation of this study was the use of a convenience sample of internet users who were visiting a clinical research website. It is likely this sample had a pre-existing favourable impression of iPT, and would be expected to find such an approach acceptable. However, the demographic similarities between the internet and national samples provides some indication that iPT may be attractive to a more general sample of individuals with OCD. Secondly, while used for pragmatic reasons, the use of different methods for determining probable OCD diagnoses or caseness across the samples represents a potential limitation. Nevertheless the CIDI-auto, CIDI and the use of a cut-score (i.e., ≥ 16) on the YBOC-SR are widely recognised as reliable indicators of caseness and frequently reported in the literature ^[353, 358]. Thirdly, it is possible that respondents were not fully aware of what iPT involved when answering questions about the acceptability of such treatments for OCD, and lastly, the methods of recruitment and delivery of questionnaires differed across the groups, which may introduce a level of bias to the results. However, with respect to this last point, several studies have now demonstrated that administration of psychological measures results in comparable results when administered in paper and pencil or online administration ^[361-363].

2.6 Future Research

Recent meta-analyses and systematic reviews have reported the efficacy of iPT for several anxiety disorders (including GAD, SP, PD, and PTSD), as well as MDD [303, 304, 364]. At the time this survey was conducted, there were no published studies examining the efficacy of iPT for OCD. Despite the limitations of the present study the relatively high levels of acceptability reported by respondents to trying iPT indicate that examining the feasibility of iPT for OCD is an important topic for future research. Another important future research question is whether there are characteristics of individuals who respond well or poorly to remote treatments.

2.7 Conclusions

Australian respondents to an internet survey had similar demographic characteristics to those identified in a national survey and had symptoms as severe as those identified in other clinical samples. This suggests the internet sample was not atypical of individuals with OCD more generally. Respondents to the survey reported they were willing to try iPT and this information is of interest to policy makers, funding bodies, and developers of iPT programs. While there are iPT programs for other anxiety disorders, at the time of conducting this survey there were no such programs for OCD. Such programs have the potential to increase access to evidence-based treatments for individuals with OCD. Overall, the results of this survey provide preliminary evidence for demand and acceptability of iPT programs for OCD. An investigation of the efficacy of iPT for OCD in an Australian population is now required.

CHAPTER THREE

Study II: An Internet-Administered Cognitive-Behavioural Treatment Program for Obsessive-Compulsive Disorder: A Feasibility Study

3.1 Introduction

Chapter 1 of this thesis described the efficacy of face-to-face CBT treatment for OCD. However, despite the existence of these effective treatments, only a minority of people with OCD are able to access them ^[4, 286]. Barriers to accessing treatment include direct and indirect costs of therapy, lack of access to appropriately trained clinicians, and stigma ^[20, 289-292]. A recent and innovative strategy for improving access to evidence-based treatment is to provide treatment delivered via the internet or computerised systems. Whilst there is now considerable evidence for the efficacy of iCBT and CCBT for several anxiety disorders (including GAD, SP, PD, and PTSD), as well as MDD ^[303, 304, 364], evidence for the treatment of OCD in particular is limited. The results of the online survey reported in the previous Chapter indicate that consumers may find iCBT for OCD an acceptable treatment option.

A recent review of the use of technology in the treatment of OCD found only six published studies, with the majority of these utilising the BT STEPS program ^[365]. BT STEPS is a CCBT program and results from four clinical trials reveal encouraging outcomes of this intervention, supporting the potential utility of remote treatments of OCD ^[299-302]. For example, the first published investigation of the BT STEPS program was an open trial with 40 participants ^[301], which reported a mean reduction of 30% on YBOCS scores for those who

completed at least two exposure tasks. However, only 43% of participants completed at least two of their exposure tasks ^[301], indicating a high level of non-compliance with the program. Estimates of the effect size for this study based on means and standard deviations provided in the manuscript revealed a within-group intention to treat (ITT) effect size (Cohen's *d*) of 0.41 on the self-report YBOCS at approximately 4-month follow-up ^[301]. Unless otherwise stated, all subsequent effect sizes described in this thesis were calculated using Cohen's *d* and the pooled standard deviation.

A replication of this study was published in 1999 ^[300] with 21 participants. This study found similar results to the initial pilot trial with a within-group effect size of 0.73 for completers, and a high dropout rate of 52%. In a subsequent RCT, the BT STEPS program was compared to systematic relaxation and to face-to-face treatment. In this study the BT STEPS program produced statistically superior reductions in symptoms compared to systematic relaxation, but was significantly less effective than face-to-face treatment ^[299]. Within-group effect sizes reported in the manuscript for this study were 0.35, 0.84, and 1.22 for the relaxation, BT STEPS, and face-to-face treatment, respectively ^[299]. However, these effect sizes were not calculated using the pooled standard deviation and thus were re-calculated to allow comparison with the effect sizes reported in this thesis. Using the pooled standard deviations the effect sizes in this study were 0.35, 0.94 and 1.39 for the relaxation, BT STEPS, and face-to-face treatment, respectively.

A subsequent study investigating BT STEPS demonstrated that the previously high dropout rates could be significantly reduced with scheduled calls by a clinician to the participant ^[302]. In this study participants were randomised to either a group receiving scheduled telephone calls from a clinician, or to a group who only received calls when requested. The dropout rate

in this study was 14%, which was considerably lower than in previous BT STEPS trials. The effect sizes reported in the manuscript were 1.2 for the scheduled calls and 0.3 for the requested calls ^[302], which were calculated using the smaller pre-treatment standard deviation as the denominator in the effect size formula. These were recalculated using the pooled standard deviation as the denominator, revealing effect sizes of 0.85 in the scheduled calls group and 0.33 in the requested calls group ^[302].

The original BT STEPS program used an automated voice response system, where the user completes the computerised program via their touchtone telephone system. This technology has been superseded by internet-administered technology, and BT STEPS has become OC FIGHTER, which is administered online, but for which no trials have yet been reported. However, recently there have been two published studies of iCBT for OCD using a treatment protocol developed and evaluated in Sweden ^[334, 335], with both studies producing large within-group effect sizes for the treatment groups (1.55 and 1.56).

Given the potential benefits of internet-administered treatments for OCD the present study sought to explore the feasibility, efficacy, and acceptability of an eight week iCBT treatment program for Australian adults with OCD. The protocol used in the current study differs from the BT STEPS program in two important ways. First, the BT STEPS program teaches predominantly behavioural skills, based on ERP, whilst the current protocol is a CBT treatment, using ERP, as well as cognitive techniques based on the OCCWG model ^[147] and behavioural experiments. Second, the current protocol is administered over the internet and is accessed via a personal computer or tablet, whilst the BT STEPS program is an interactive voice response system, accessed via a touch tone telephone. In addition, the study differs from previous iCBT studies by including people with extreme levels of symptoms (total score of

>31 on the YBOCS), those who had previously received CBT treatment, and those with personality disorders ^[335]. Thus, the present study comprised broader inclusion criteria than other studies.

3.2 Method

3.2.1 Design

The present study employed an open trial design comparing pre-treatment to post-treatment and post- to 3-month follow-up results.

3.2.2 Sample Size Calculations

Power calculations indicated that a sample size of 15 participants was sufficient to detect a pre-post within-group effect size difference in symptoms of OCD of 0.7 with alpha of 0.05 and power of 0.80, which was the minimum expected based on similar studies with participants with other anxiety disorders ^[366], but more were recruited to compensate for anticipated attrition.

3.2.3 Hypotheses

It was expected that participants would show: 1) Significant improvements in symptoms of OCD; 2) that there would be a reduction in the numbers meeting criteria for a diagnosis of OCD following treatment, and; 3) participants would rate the program as acceptable.

3.2.4 Participants and Recruitment

Recruitment Strategies

Participants from the previous study (Study I) who had volunteered to be informed about future iCBT studies were sent an email notifying them about the availability of the study. In

addition the University of New South Wales media office delivered a media release about the study, which was reported by several local newspapers. No formal advertising for this study was used.

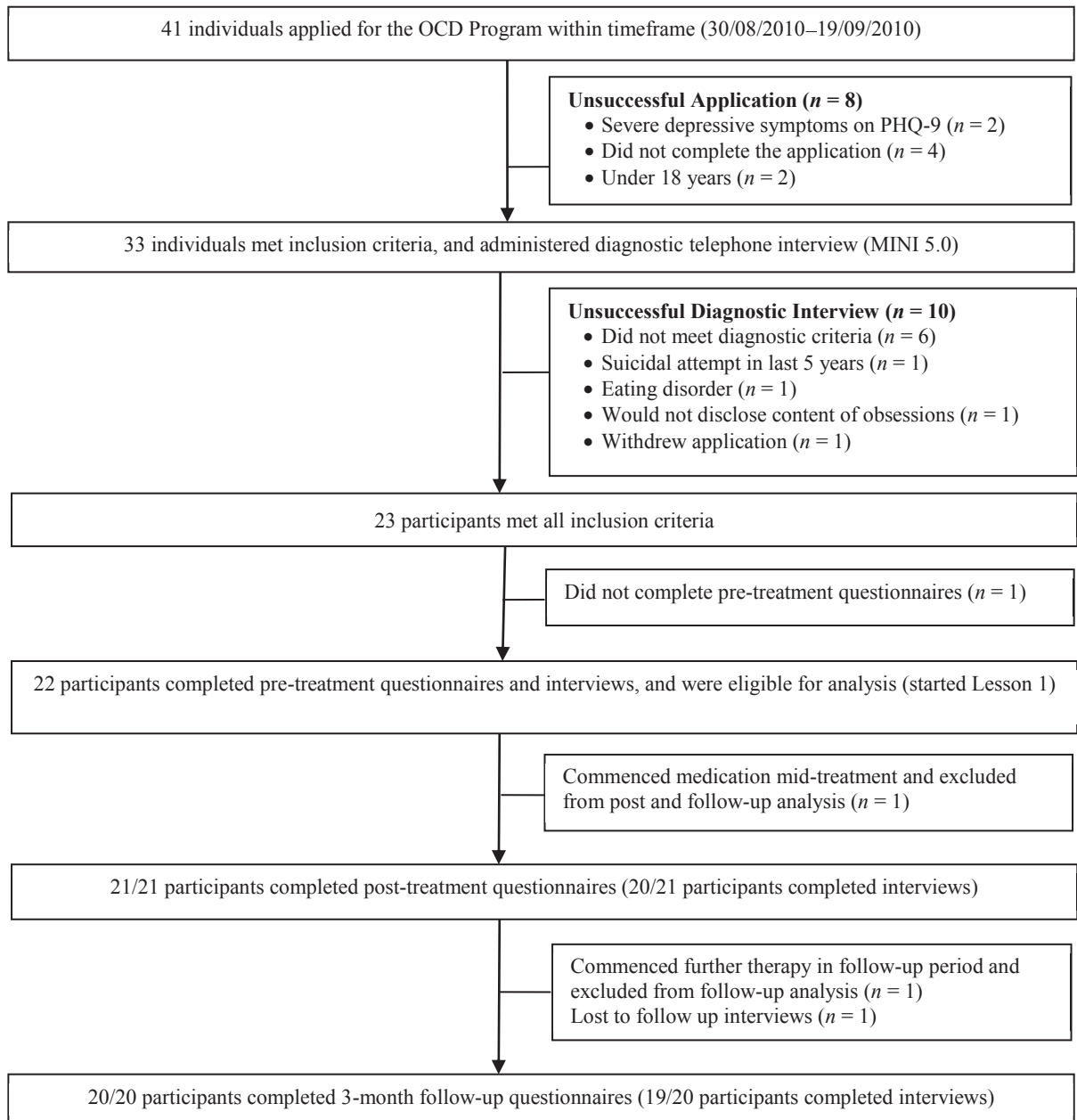


Figure 3.1 Participant flow

Note: PHQ-9: Patient Health Questionnaire-9 item. MINI: Mini International Neuropsychiatric Interview

Applications

Applicants applied online and read the participant information and consent form. Forty-one participants provided consent and applied for the program. Of these, 23 were eligible to participate. Participant flow is shown in Figure 3.1. Inclusion and exclusion criteria were: 1) An Australian resident; 2) aged 18-64 years; 3) had access to the internet and a printer; 4) not currently participating in CBT for OCD; 5) total YBOCS score ≥ 16 or subscale score ≥ 10 ; 6) no current drug or alcohol abuse or history of psychosis or mania; 7) had not commenced or changed dose of medication over the past three months; 8) no current suicidal plans or severe depression (defined as a total score > 22 or responding > 2 to Question 9 (suicidal ideation) on the Patient Health Questionnaire-9 Item, PHQ-9^[367], and; 9) hoarding was not the primary symptom subtype.

Applicants who met these inclusion criteria were administered the MINI International Neuropsychiatric Interview Version 5.0.0^[368] and the clinician-administered YBOCS^[369] during a telephone interview to confirm they met DSM-IV criteria^[5] for OCD, and to determine presence of other Axis I disorders including MDD, SP, PD, PTSD and GAD. The study was approved by the Human Research Ethics Committees of the University of New South Wales and St Vincent's Hospital, and registered with the Australian and New Zealand Clinical Trials Register (ANZCTR; ACTRN12610000687099). The characteristics of the sample are outlined in Table 3.1.

3.2.5 Outcome Measures

The outcome measures included the following:

MINI International Neuropsychiatric Interview (MINI)^[368]

The MINI is a structured clinician administered interview that assesses presence of DSM-IV criteria for common mental disorders including OCD. The MINI takes approximately 15-20 minutes to administer ^[368, 370]. For the diagnosis of OCD the MINI has a kappa of 0.63 with the Structured Clinical Interview for DSM (SCID) ^[368, 371]. It has an inter-rater reliability of 1.00 and a test re-test reliability of 0.85 for the OCD scale ^[368, 371]. Sensitivity for the OCD scale is 0.62, while the specificity is 0.98 ^[368, 371].

Table 3.1

Demographic Characteristics of the Sample at Pre-Treatment (N = 22)

Variable	<i>n</i>	%
Gender		
Male	9	40.9
Female	13	59.1
Age		
Mean (SD)	35.18 (11.32)	
Range	18-55	
Marital Status		
Single/Never married	11	50.0
Married/Defacto	7	31.8
Separated/Divorced/Widowed	4	18.2
Education		
High School	4	18.2
Other Certificate	17	77.3
Tertiary	1	4.5
Employment		
Employed	13	59.1
Unemployed	6	27.3
Student	3	13.6
Previous Treatment (% Yes)	21	95.5
Taking SSRI (% Yes)	6	27.3
YBOCS Severity		
Mild	1	4.5
Moderate	17	77.3
Severe	3	13.6
Extreme	1	4.5
Comorbidities		
Major Depressive Disorder	2	9.1
Social Phobia	9	40.9
Generalised Anxiety Disorder	9	40.9
Panic Disorder	0	0.0
Post-Traumatic Stress Disorder	2	9.1
Number of Disorders		
Mean (SD)	2.00 (1.02)	
Range	1-5	

Note. N = 22. Standard deviations are indicated in parentheses. SSRI: Selective Serotonin Reuptake Inhibitor. YBOCS: Yale Brown Obsessive Compulsive Scale.

Yale Brown Obsessive Compulsive Scale (YBOCS) ^[369]

The YBOCS is a 10-item clinician administered semi-structured questionnaire that measures the severity of symptoms independently of the symptom subtype. The scale has good internal consistency with reports of Cronbach's alpha ranging from 0.86-0.91 ^[369, 372]. Total scores range from 0-40, and the internal consistency (Cronbach's alpha) in the current study was 0.79.

The Obsessive Compulsive Inventory-Revised (OCI-R) ^[373]

The OCI-R is an 18-item self-report questionnaire measuring the severity of OCD symptoms across 6 subscales. Total scores ranging from 0-72 and a cut-off score of 21 has been found to represent clinically significant level of symptoms ^[373]. The OCI-R has good internal consistency, ranging from 0.80-0.93 for the total score ^[372-374]. The internal consistency in the current study was 0.86.

Obsessional Beliefs Questionnaire-44 item (OBQ-44) ^[375]

The OBQ is a 44-item self-report questionnaire measuring the strength of different cognitive distortions in OCD. It has 3 subscales: 1) Responsibility and threat estimation; 2) perfectionism and certainty, and; 3) importance/control of thoughts. The OBQ-44 has good internal consistency, with a Cronbach alpha of 0.95 for the total score and good criterion validity ^[375]. The internal consistency in the current study was 0.95.

The Sheehan Disability Scale (SDS) ^[376]

The SDS is a 3-item scale that measures impairment in functioning across three domains. Total scores range from 0-10 for each domain and 0-30 overall. The SDS has reported internal

consistency ranging from 0.56-0.89 ^[377] and was 0.69 in the present study. The SDS has a sensitivity of 83% and a specificity of 69% ^[378].

Patient Health Questionnaire (9 item) (PHQ-9) ^[367]

The PHQ-9 is a 9-item self-report questionnaire measuring symptoms of depression. Items are scored on a 4-point scale from 0 (not at all) to 3 (nearly every day) with total scores ranging from 0-27. The questions are based on the DSM-IV diagnostic criteria and thus can provide both a diagnosis as well as a measurement of depression severity ^[379]. A score of 5-9 is reported to represent a mild level of depression, 10-14 is a moderate level, 15-19 is moderately severe level and 20-27 is a severe level of depression ^[379]. A cut score of 10 or greater has a sensitivity and specificity of 88% and a drop of at least 5 points is considered a clinically significant response ^[379]. The internal consistency of the scale ranges from 0.86-0.89 ^[367] and was 0.91 in the current study. The PHQ-9 has been shown to be responsive to treatment effects ^[380].

Generalised Anxiety Disorder Scale (7 item) (GAD-7) ^[381]

The GAD-7 is a 7-item self-report questionnaire that measures symptoms of generalised anxiety. Items are scored on a 4-point scale from 0 (not at all) to 3 (nearly every day) and total scores range from 0-21. A score of 5-9 reflects mild severity, 10-14 indicates moderate severity, and 15 or more indicates severe anxiety levels ^[382]. A cut point of 10 has a specificity of 82% and sensitivity of 89% ^[381]. It has a test retest correlation of 0.83 and correlates highly when administered as self-report or via a clinician ^[381]. The GAD-7 has a high internal consistency, ranging from 0.89-0.92 ^[381]. The internal consistency in the current study was 0.88.

The YBOCS was the primary outcome measure, while the OCI-R, OBQ, PHQ-9, SDS, and GAD-7 were the secondary outcome measures. All questionnaires were administered online at pre-treatment, post-treatment and 3-month follow-up. Recent research indicates that the online administration of questionnaires results in acceptable reliability with several studies indicating equivalence between paper-and-pencil versions and online administration ^[361-363, 383]. The MINI and YBOCS were administered over the telephone at pre-treatment, post-treatment, and 3-month follow-up. At post-treatment and 3-month follow-up participants were sent an email asking them to log in and complete the questionnaires. Two further email prompts were sent if questionnaires were not returned. Participants were then phoned to complete the telephone interview on two occasions.

3.2.6 Intervention

The treatment protocol (*The OCD Program*) was written and developed by the Candidate over a three month period using a four stage process. The first stage of this process involved consulting relevant literature ^[244, 254, 384-386] including the OCCWG model ^[147] to identify best practice evidence-based techniques. After core skills were identified, the second stage involved developing the sequencing of teaching these skills across several lessons. Experts in the field of face-to-face treatment of OCD and internet administered treatments of anxiety and depression were consulted during this stage. The third stage of the process involved developing the Lessons. This process included scripting the textual content and creating illustrations from a library of existing images. Each lesson included between 40-70 slides, and each lesson took approximately 40-50 hours to develop. The fourth stage of the process involved developing homework assignments and additional written resources for participants. Both the Lessons and resources were then distributed amongst the VirtualClinic researchers for feedback, and multiple revisions were subsequently made. The final version of the

program comprises the following components: Eight online Lessons; a downloadable summary/homework assignment for each lesson in a text-based format; additional text based downloadable resources; regular automatic reminder and notification emails; an online discussion forum; and instant messaging to allow secure email-type messages with the clinician.

An overview of the Program structure and content is described in Table 3.2. The Lessons in the Program comprised a series of slides, which included text and illustrated images which told the story of 2 individuals who had previously undergone treatment for OCD with the assistance of a Clinical Psychologist. Examples of the program content are included below. Figure 3.2a demonstrates the cartoon therapist introducing the Program. Figure 3.2b shows one of the characters describing his symptoms of OCD and Figure 3.2c demonstrates the same character introducing the concept of habituation. Estimates of required reading level indicated the Lessons had an average Flesch-Kincaid grade reading level of 7.77 (range 6.2-8.9).

Participants were asked to complete the 8 Lessons in 8 weeks. Lesson 1 of *The OCD Program* provides an introduction to OCD and its treatment. This includes information on the prevalence of OCD, how OCD is maintained, and the rationale for CBT treatment. Lesson 2 includes information about the six common cognitive errors in OCD identified by the OCCWG. Lesson 2 also describes the *over importance of thoughts* error, and provided information about common intrusive thoughts ^[142, 145, 256, 386-389] and describes how to conduct behavioural experiments to test unhelpful beliefs maintaining OCD symptoms ^[145, 255, 256, 387, 389, 390].

Table 3.2

Lesson and Summary Contents, Release Schedule, and Forum Topics throughout the VirtualClinic OCD Program

Lesson	Days to complete lesson	Primary content/theme	Lesson summary / homework tasks	Additional Resources
1	7	Psycho-education about the prevalence of OCD, symptom presentation and treatment rationale	Exercises aimed at understanding symptoms and symptom cycle.	Information on who to contact in a mental health emergency and information about panic attacks and strong physical reactions
2	7	Introduction to cognitive biases and description of cognitive skills to target <i>the over-importance of thoughts</i> .	Exercises aimed to increase understanding about the 6 cognitive biases and written information about the normalcy of intrusive unwanted thoughts.	Information on sleep hygiene, assertiveness and communication skills
3	7	Introduction to ERP and description of cognitive skills to target <i>the overestimation of threat</i>	Exercises aimed at the construction of an exposure hierarchy and cognitive techniques aimed at reducing the over-estimation of threat including cognitive restructuring and the probability of catastrophe task.	Information for family and friends of participants doing the Course
4	7	Continuation of ERP and description of cognitive skills to target <i>the overestimation of responsibility</i>	Encouragement to continue climbing exposure hierarchies and to practice cognitive techniques aimed at reducing the overestimation of responsibility including the responsibility pie chart.	Nil
5	7	Continuation of ERP and description of cognitive skills to target <i>the need to control thoughts and thought-action fusion</i> .	Encouragement to continue climbing exposure hierarchies and to practice cognitive-behavioural techniques aimed at reducing the need to control thoughts including behavioural experiments.	Information on magical beliefs and how to overcome them
6	7	Continuation of ERP and description of cognitive skills to address <i>perfectionism</i>	Encouragement to continue climbing exposure hierarchies Exercises and cognitive techniques aimed at reducing perfectionism including the cost-benefit analysis.	Information on attentional focussing
7	7	Continuation of ERP and description of cognitive skills to address <i>the intolerance to uncertainty</i>	Encouragement to continue climbing exposure hierarchies and to practice cognitive techniques aimed at reducing intolerance to uncertainty, including the cost-benefit analysis.	Nil
8	7	Education regarding lapses and relapse and relapse prevention	Exercises aimed at increasing understanding of lapses versus relapses and the creation of a relapse prevention plan.	Nil

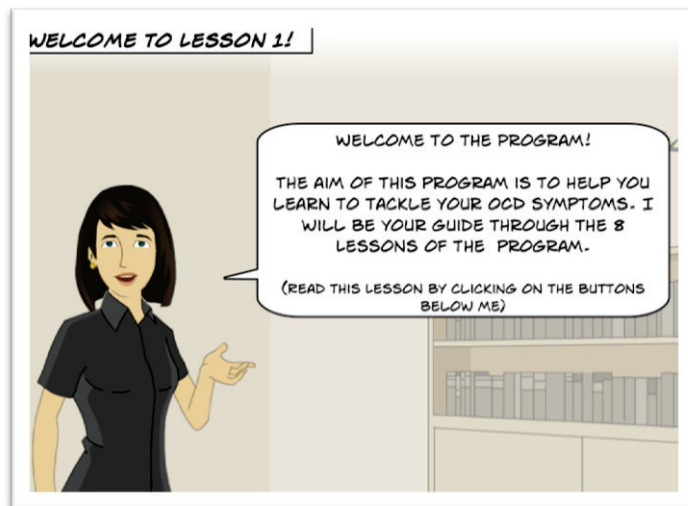


Figure 3.2a Example of the content of the VirtualClinic OCD Program: Cartoon therapist introducing the program



Figure 3.2b Example of the content of the VirtualClinic OCD Program: Cartoon character explaining relevant symptoms of OCD

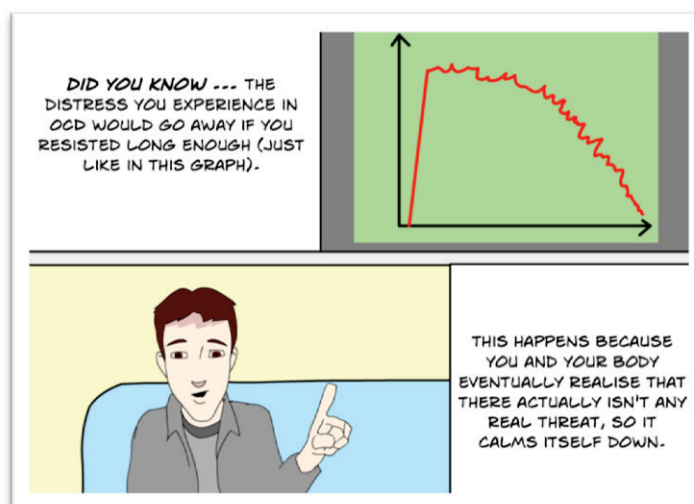


Figure 3.2c Example of the content of the VirtualClinic OCD Program: Cartoon character explaining the concept of habituation

Lesson 3 includes an introduction to unhelpful behaviours in OCD, introduces ERP, and describes the *overestimation of threat* error. Participants are asked to devise an exposure hierarchy and are presented with techniques to assist in reducing their estimate of threat including the thought challenging technique ^[145, 245, 251, 255, 256, 270, 387, 391, 392], and the probability of catastrophe task ^[245, 251, 256, 387]. Lesson 4-8 includes additional examples of ERP and encouraged participants to challenge one cognitive distortion each week including the *overestimation of responsibility* using the responsibility pie chart technique ^[145, 255, 256, 387, 393], *thought-action fusion* using behavioural experiments and the continuum task ^[384, 387, 393], and *perfectionism* and *intolerance to uncertainty* using the cost-benefit task ^[145, 255, 387, 393]. Lesson 8 comprises information about relapse prevention and encourages participants to devise a relapse prevention plan.

The summary/homework assignments were devised to build and extend on the information provided in the Lessons and provided participants with worksheets to complete their homework tasks. Participants also had access to written resources that included information about anxiety, magical beliefs, and information for family and friends. Automated emails were sent on a weekly basis to all participants to notify them of the availability of new Lessons, and automated reminder email were sent to those who did not complete the lesson within 7 days. The online discussion forum allowed participants in the group to post about their progress and this was moderated by the Candidate. If participants wished to email the therapist they were able to do so via the secure messaging system, which the Candidate responded to on a daily basis.

3.2.7 Procedure

Participants received an email on the start date of the program welcoming them to the program, and providing login details and instruction on how to use the software. Participants were instructed to read one lesson each week, attempt homework tasks, and post messages on the online discussion forum. Participants were telephoned twice each week by the Candidate to discuss the homework tasks and the frequency and duration of every contact with participants was recorded. This frequency of contact has been utilised in other face-to-face treatment studies in OCD ^[237, 394]. During the Week 3 telephone contact participants were assisted in devising a relevant exposure hierarchy. Participants were asked to practice their homework tasks, which consisted of practicing their exposure tasks and relevant cognitive techniques for at least one hour per day.

3.2.8 Therapist

The Candidate, a Clinical Psychologist with 4 years experienced working with people with OCD, provided all clinical contact with participants (telephone calls, instant messaging, and diagnostic interviews) and collated all the data.

3.2.9 Statistical Methods

All post-treatment and follow-up analyses involved an ITT design, which is a conservative and robust model that has been recommended for internet-based intervention research where attrition may result in selection bias ^[395]. Consistent with this conservative approach, missing data was addressed by carrying forward the first available data (baseline-observation-carried-forward model; BOCF).

Pre-treatment to post-treatment and pre-treatment to follow-up changes in questionnaire scores were analysed using paired-sample *t*-tests. Effect sizes (Cohen's *d*) were calculated for within-group changes, based on the pooled standard deviation. Following Cohen (1988) ^[396] an effect size of 0.20-0.49 is described as *small*, between 0.50-0.79 as *medium*, and greater than 0.80 as *large*. Acceptability of the program was interpreted using Likert-type responses enquiring about satisfaction with the program, as well as the percentage of individuals endorsing the acceptability items.

Three criteria of clinical significance were employed and measured at both post-treatment and 3-month follow up. First, changes in prevalence of OCD diagnosis were reported based on the results of the MINI. Second, an estimate of clinically significant change was made using the criteria applied in a recent meta-analysis where the percentage of individuals reaching a recovered status were identified (i.e., post-treatment or follow-up score ≤ 14 and a 10 point or greater reduction on the YBOCS) ^[200]. Third, a percentage reduction in scores from baseline was conducted. Whilst it is acknowledged that the percentage reduction in symptoms has limitations as a method of measuring clinical significance ^[397], it was used to facilitate comparisons with existing face-to-face studies. An adverse event was defined as a clinically significant deterioration in symptoms based on the classification suggested by Fisher and Wells ^[200] (greater than 10 point increase on the YBOCS) or other event leading to formal withdrawal or exacerbation of symptoms. All analyses were performed in SPSS version 18.0.

3.3 Results

3.3.1 Adherence and Attrition

During the treatment phase, one participant commenced an SSRI and was excluded from analyses, leaving 21 participants eligible for analysis in pre-post analyses. From post to

follow-up one participant commenced face-to-face treatment and was thus excluded from subsequent analyses, leaving 20 participants eligible for analyses from post to follow-up. Eighty-one percent (17/21) of participants completed the 8 Lessons within the 8 weeks of the program. The average number of completed Lessons was 7.81 (SD = 0.40; range = 7-8). Post-treatment and 3-month follow-up self-report questionnaires were collected from 21/21 (100%) and 20/20 (100%) participants, respectively. Telephone interview post-treatment and 3-month follow-up data was collected from 20/21 (95%) and 19/20 (95%) participants, respectively.

3.3.2 Outcome Measures

Pre, post, and follow-up means, standards deviations, and effect sizes with 95% confidence intervals are included in Table 3.3. Paired-sample *t*-tests comparing pre-treatment and post-treatment scores revealed significant reductions on the YBOCS ($t_{20} = 6.76, p = 0.000$), however, no further significant changes were evident from post to follow-up ($t_{19} = -.55, p = 0.590$). Paired-sample *t*-tests revealed significant reductions from pre-treatment to post-treatment on the OCI-R ($t_{20} = 4.96, p = 0.000$), OBQ ($t_{20} = 5.25, p = 0.000$), SDS ($t_{20} = 4.08, p = 0.001$), PHQ-9 ($t_{20} = 2.65, p = 0.015$), and GAD-7 ($t_{20} = 3.74, p = 0.001$). No further significant changes were found from post to follow-up (t_{19} range = 0.087- -0.981, p range = 0.339-0.932). However, an examination of Table 3.3 indicated that the confidence interval around the PHQ-9 pre-treatment to follow-up scores crossed zero, indicating that there was no significant change from pre to follow-up. This was confirmed in a subsequent *t*-test ($t_{19} = 1.60, p = 0.125$), and an additional *t*-test was conducted to examine change in the OCI-R from pre to follow-up, but this remained significant ($t_{19} = 4.14, p = 0.001$).

3.3.3 Effect Sizes

From pre-treatment to post-treatment, a large (1.53) within-group effect size was found on the YBOCS, which decreased to 1.26 at follow-up. Effect sizes for the secondary outcome measures revealed large within-group effect sizes from pre-treatment to post-treatment on the SDS (1.10) and GAD-7 (0.84), a moderate effect for the OCI-R (0.66), and a small within-group effect size on the PHQ-9 (0.45). Similar effect sizes were obtained at follow-up, although the magnitude of the GAD-7 effect size had dropped to within the moderate range (0.66).

3.3.4 Clinical Significance

Fifteen of 21 participants (71%) no longer met diagnostic criteria for OCD diagnosis at post-treatment and 11/20 (55%) no longer met diagnostic criteria at 3-month follow-up. The percentage of individuals scoring in the recovered range on the YBOCS was 6/21 (29%) at post-treatment and 7/20 (35%) at follow-up. On average a 37% reduction in symptoms was seen from pre-treatment to post-treatment, and from pre-treatment to follow-up a 35% reduction was seen.

3.3.5 Treatment Satisfaction

Treatment satisfaction was assessed at post-treatment. Participants reported a high level of satisfaction with the overall program with 21/21 (100%) reporting they were either *very satisfied* or *mostly satisfied*. All participants (100%) reported it was *worth their time doing the program* and 100% reported they would *recommend this program to a friend with OCD*.

Table 3.3

Within Group Effect Sizes for Primary and Secondary Outcome Measures (Cohen's d)

Measures	Means (SD)			Effect Size (95% CI)	Mean (SD)			Effect Sizes (95% CI)
	<i>n</i>	Pre-treatment	Post-treatment		Pre-Post	<i>n</i>	Pre-treatment	
Primary								
YBOCS	20	20.81 (4.93)	12.91 (5.38)	1.53 (0.82 – 2.19)	19	20.95 (5.01)	13.60 (6.54)	1.26 (0.56-1.91)
Secondary								
OCI-R	21	28.05 (13.43)	18.95 (14.28)	0.66 (0.02-1.26)	20	28.80 (13.32)	20.15 (15.60)	0.60 (-0.05-1.22)
OBQ	21	197.62 (47.08)	142.95 (59.87)	1.02 (0.35-1.64)	20	196.75 (48.13)	149.45 (64.22)	0.83 (0.17-1.46)
SDS	21	16.86 (5.75)	9.71 (7.27)	1.10 (0.43-1.72)	20	17.40 (5.32)	9.35 (7.79)	1.21 (0.51-1.85)
PHQ9	21	10.19 (6.31)	7.38 (6.21)	0.45 (-0.17-1.05)	20	10.55 (6.25)	7.90 (6.92)	0.40 (-0.23-1.02)
GAD7	21	11.29 (4.92)	7.05 (5.20)	0.84 (0.19-1.45)	20	11.55 (4.89)	7.95 (5.90)	0.66 (0.02-1.29)

Note. At post-treatment 20/21 participants completed the YBOCS interview and 21/21 participants completed the self-report questionnaires. At follow-up 19/20 participants completed the YBOCS interview and 20/20 participants completed the self-report questionnaires. The baseline observation carried forward (BOCF) method was used where data was missing.

3.3.6 Time Spent/Contact Events per Participant

The mean total therapist time per participant was 77 minutes ($SD = 52.53$ mins) including sending and reading instant messages, reading and responding to messages on the online discussion forum, and telephoning participants. During the program, participants received a total of 499 automatic emails ($M = 22.52$ ($SD = 2.71$) per participant) with the clinician sending a mean of 6.00 ($SD = 2.07$) additional personal instant messages per participant. The clinician also made a total of 330 telephone calls to participants ($M = 15.05$ ($SD = 2.69$) per participant, however, calls were not always answered by participants.

3.3.7 Adverse Events

No participants (0/21; 0%) met criteria for a significant deterioration in symptoms at either post-treatment or 3-month follow-up. No other adverse events were reported during or after the trial.

3.4 Discussion

The aim of the present study was to evaluate the feasibility, efficacy, and acceptability of a clinician guided iCBT protocol for OCD, *the OCD Program*. Based on previous research with other anxiety disorders and depression [306, 310, 320, 321, 325, 366, 398-404] it was expected that participants would show significant improvements on symptom measures of OCD and on secondary measures of anxiety, depression and disability from pre-treatment to post-treatment, with gains sustained at follow-up. Again, based on previous research [349, 405], it was also expected that participants would rate the iCBT program as acceptable. These hypotheses were supported. Statistically and clinically significant results were obtained on the primary and secondary outcome measures and 11/20 (55%) of participants no longer met DSM-IV diagnostic criteria for OCD at 3-month follow-up. The within-group effect sizes on the

primary outcome measure, the YBOCS, was large (1.53), and for the secondary measures the effect sizes ranged from small (0.45) to large (1.10). These results were generally maintained over 3 months. Importantly, 81% of participants completed the entire program and all participants reported they were *very* or *mostly satisfied* with the program, which is also consistent with the wider literature on internet-administered interventions ^[313, 320, 406]. Taken together, the findings of the present study provide preliminary support for the efficacy and acceptability of iCBT for OCD in an Australian population.

The magnitude of effect sizes found in this study are generally large and consistent with those reported in studies of face-to-face treatment for OCD as well as the iCBT literature more generally. For example, results from individual outcome studies of OCD treatment using an ITT analysis vary from 0.92 ^[260] - 2.63 ^[230] and results from meta-analyses of face-to-face studies demonstrate mean effect sizes ranging from 1.13-1.48 ^[170, 199, 219]. Meta-analyses of iCBT treatments for other (non OCD) internalising disorders indicate effect sizes of 0.61-0.88 ^[303, 364], which is also consistent with the present results.

Importantly, the results from this study are also similar to those reported in other remote treatment protocols of OCD ^[299-302, 334, 335]. For example the within-group effect size on the YBOCS reported in the current study (1.53) compares favourably with a guided version of the BT STEPS program (0.94) ^[302], as well as two recently published iCBT studies from Sweden ^[334, 335] (1.55 and 1.56). In the most recent of these iCBT trials, one-hundred and one participants were randomly allocated to a ten week iCBT treatment, or to a control condition, which comprised an online supportive therapy condition ^[335]. The iCBT condition produced a within-group effect size of 1.55 on the YBOCS, compared to 0.47 for the Control Group. Additionally, 60% of participants in the iCBT condition met criteria for clinically significant

change (using the Jacobson & Truax criteria), compared with 6% in the control condition. Similar results were also demonstrated in a pilot study by the same authors who utilised an open trial design and reported that 48% of participants no longer met criteria for OCD at post-treatment ^[334].

In addition to large effect sizes on the primary outcome measure, the proportion of participants in the present study meeting criteria for clinically significant recovery (29%) are also encouraging, and are within the range reported in a meta-analysis of face-to-face studies (mean = 45%; range: 17-74%) ^[200]. Moreover, the results of the present open trial extend the results of the Swedish trials as it included participants with low or extreme scores on the YBOCS as well as those with an 'Axis II diagnosis that could jeopardise treatment participation', who were excluded from the most recent Swedish trial ^[335].

The present results also compare favourably with those described in a recent effectiveness study of iCBT for OCD ^[407] conducted at AnxietyOnline (www.anxietyonline.org.au), an open access website providing education and treatment for several mental health conditions, including OCD. Preliminary outcome data from AnxietyOnline indicate that an unguided iCBT program for OCD produced effect sizes of 0.23-1.17 across several measures of OCD symptoms, psychological distress and functioning ^[407]. Unfortunately the YBOCS or other commonly used OCD outcome measures were not reported making it difficult to compare that treatment to other iCBT studies or face-to-face treatment studies of OCD more generally. However, these results provide preliminary support for the effectiveness of self-guided treatments for OCD.

The results of the present study also provide indirect support for the OCCWG model, which informed the development of the treatment protocol. The OCCWG model ^[147] identifies six main cognitive biases involved in the development and maintenance of OCD symptoms including: 1) Inflated responsibility; 2) over-importance of thoughts; 3) excessive concern about the importance of controlling one's thoughts; 4) overestimation of threat; 5) intolerance of uncertainty, and; 6) perfectionism ^[147]. Participants in this study were provided with cognitive and behavioural techniques aimed at reducing these biases, and results on the OBQ indicate that these biases reduced significantly from pre- to post-treatment (effect size = 1.02). Scores on other OCD measures such as the YBOCS also reduced, which is a measure of severity of symptoms independent of relevant cognitive biases or symptom characteristics. These results suggest that techniques aimed at reducing these biases are useful in reducing OCD symptoms, providing indirect support for the model. Future dismantling studies would help to understand the relative importance of each of these biases, how they respond to treatment, and their importance relative to each other.

3.5 Limitations

Limitations of the current study include use of an open trial design which does not control for spontaneous remission, and potential bias due to the same therapist conducting the treatment and follow-up interviews. An open trial design was utilised because at the time this study was conducted there were no published studies examining the efficacy of iCBT treatment for OCD, and the present study was designed as a *feasibility* study to gain preliminary data about the efficacy of iCBT for OCD prior to conducting a controlled trial. In addition, whilst blind administrations of the YBOCS would have been preferable, University rules stipulate that Candidates must complete all work relevant to their research project. However, it should be

noted that data from all the self-report questionnaires consistently indicated improvement with treatment, providing converging evidence that the results on the YBOCS were also valid.

3.6 Future Research

The results reported here highlight several issues that can be addressed in future research. First, it is important that the results of this study are replicated in a randomised controlled design to control for the possibility that symptoms may have remitted spontaneously. Second, the treatment used in the current study was internet-administered, and requires access to computer hardware and the internet. A controlled comparison examining the relative benefits of iCBT and other remote treatment options, such as bibliotherapy, a well-established remote treatment that has been used with many mental health conditions including OCD, will help inform whether iCBT provides any additional benefit over an alternative and more traditional form of remote treatment.

The current study used a contact frequency of twice per week, as recommended for face-to-face studies ^[394] and whilst remote treatments appear to require less clinician contact than standard face-to-face treatments, the amount of therapist time required to provide beneficial outcomes for clients with OCD in internet-administered treatments is unknown. Therefore, a third topic for future research is to determine how much therapist contact is necessary to obtain clinically significant benefits. Some studies of the iCBT literature demonstrate the potential of a dose-response relationship between outcome and clinician contact ^[408], however, this review did not include any OCD samples, and it is unknown if such a relationship exists in remote treatment of OCD.

Another important area for future research includes determining whether predictors of outcome in the remote treatment of OCD can be identified. That is, are there specific demographic characteristics, symptom characteristics, or other characteristics that may help to explain good or poor outcome or premature dropout in remote treatment studies? Some researchers have investigated this in iCBT treatment of depression ^[409, 410], however, results have been equivocal. Similarly several studies have investigated predictors of outcome in face-to-face OCD studies, but the results have also been equivocal ^[35, 227, 271-288].

3.7 Conclusions

The results of the present study provide preliminary evidence for the efficacy of iCBT treatment for Australian adults with OCD. Encouraging clinical outcomes were obtained, even though a mean of only 77 minutes of therapist time was required per participant. These results indicate the potential of using the internet to improve access to evidence-based care for people with OCD. Whilst RCTs are required to replicate and extend the current results, there is also a need to investigate other remote treatments, as it is likely that not all individuals will have access to computers and the internet, or will find such an approach acceptable. Further research is also needed to determine the amount of clinician contact required, and to identify potential predictors of outcome.

CHAPTER FOUR

Study III: Remote Treatment of Obsessive-Compulsive Disorder: A Randomised Controlled Trial Comparing Administration via Bibliotherapy vs. the Internet vs. Waitlist Control

4.1 Introduction

Remote treatments are those that can be administered without seeing the individual face-to-face and, thus, have the potential to improve access to treatment. Results from Study II provide preliminary data demonstrating the efficacy of an iCBT intervention for OCD with an Australian population. However, other forms of remote treatment exist. Bibliotherapy for example has been used to treat anxiety disorders since the 1970s ^[411]. Bibliotherapy can be administered either with or without clinician support and involves providing the individual with psycho-education and evidence-based treatment techniques in a paper copy workbook ^[337]. The workbook is also often accompanied by homework tasks to help facilitate the practice and mastery of the skills described.

Bibliotherapy has been found to significantly reduce symptoms across several disorders including problematic alcohol use ^[412], depression ^[413, 414] and anxiety disorders ^[338, 339], including OCD ^[415], and a previous study has demonstrated that bibliotherapy is an acceptable mode of treatment administration to people with OCD ^[416]. Whilst there are many bibliotherapy books for OCD available for purchase, very few have any empirical support.

There have been three studies, including two RCTs, conducted to date demonstrating the efficacy of bibliotherapy for OCD. In the first study 41 participants who had previously undergone a trial of SSRI medication were randomly allocated to either 7.5 weeks of twice-weekly face-to-face clinician-administered ERP or 6 weeks of unguided bibliotherapy ^[241]. Both groups showed a significant decrease in symptoms on the YBOCS and analyses using an ITT model revealed a 35% decrease in symptoms in the clinician-administered group and 17% decrease in the bibliotherapy group ^[241]. Effect sizes calculated on the pre-post treatment means and standard deviations reported in the manuscript revealed a moderate effect size (0.65) in this study for the bibliotherapy arm and a large effect size (1.44) in the clinician arm.

In another study, 86 participants were randomly allocated to receive either an unguided bibliotherapy manual or to a waitlist control group ^[343]. The manual included mostly cognitive techniques with some behavioural experiments and was devised for individuals who were unable or unwilling to undergo standard behavioural treatment of OCD ^[343]. Results indicated significantly greater improvement on the self-report YBOCS for the bibliotherapy group with a between-group effect size at post-treatment of 0.63 reported in the manuscript ^[343].

Further support for the efficacy of bibliotherapy for OCD has been reported from uncontrolled studies. In the first open trial of unguided bibliotherapy for OCD, Tolin, Diefenbach, Maltby and Hannan ^[344] reported encouraging results with a 31% decrease in symptoms on the YBOCS from pre-treatment to post-treatment, a large effect size (0.97), and a low formal dropout rate (10%) ^[344], defined as participants who did not complete the bibliotherapy stage of treatment. Other studies have demonstrated that using bibliotherapy as

part of a stepped-care package results in similar results to face-to-face treatment, but is associated with considerably improved cost-effectiveness ^[417, 418].

The results from the small number of studies in this area provide promising but preliminary evidence indicating that bibliotherapy may be an effective remote treatment for OCD. Importantly, all of the abovementioned bibliotherapy studies were unguided, and improvements in effect sizes may occur with the inclusion of therapist guidance as a number of meta-analyses have now demonstrated improved outcomes in remote treatments that are guided by a clinician ^[305, 338].

Whilst bibliotherapy and internet-administered interventions are both remote treatments, they offer different advantages and disadvantages, and individuals may prefer one form of treatment delivery over the other. There are few studies that have compared these two remote treatment types in any disorder, and to the Candidate's knowledge, to date, no studies have compared these two remote treatment types in OCD. Previously, these two remote treatment modalities have been compared in an RCT which investigated the remote treatment for insomnia and results from this study demonstrated that the two forms of treatment resulted in similar treatment gains ^[419].

An additional and important question surrounding the efficacy of remote treatment concerns the amount of clinician contact required to achieve positive outcomes. In an analysis of 15 iCBT studies across various disorders, Palmqvist, Carlbring and Andersson ^[408] found a correlation between outcome and therapist time of 0.75, suggesting a dose-response relationship may exist. However, Klein et al. ^[329] directly explored the effect of different levels of therapist contact in iCBT for PD. Those results revealed that those who received at

least tri-weekly email support obtained equivalent benefit to those who received weekly emails from a therapist indicating that for PD, similar outcomes can be obtained with reduced clinician contact during an iCBT treatment. In the studies of iCBT for OCD participants are contacted between two and four times each week, which may not be sustainable in clinical practice. This raises the question of whether reducing frequency of contact could still result in significant clinical improvements while maintaining acceptability to participants. Reduced therapist contact would improve the cost-effectiveness of this type of treatment and increase the number of people who can access the treatment.

The primary aim of the present study was to examine the relative benefits of two forms of remote treatment compared to a waitlist control group. At the planning stage of this study it was acknowledged that it was unlikely that a sample size sufficient to provide a strong test of these aims would be obtained. However, it was hoped that sufficient data would be collated to allow preliminary analyses and to inform future and more highly powered studies. The secondary aim was to examine the relative acceptability of each form of remote treatment. The third aim was to examine the effect of reduced therapist contact when the control group were treated at post-treatment.

4.2 Method

4.2.1 Design

The present study employed a randomised controlled design and compared 3 groups from pre-treatment to post-treatment. The first group received a remote CBT treatment protocol administered via bibliotherapy (Bibliotherapy Group). The second group received the same protocol, but received this as an iCBT treatment, delivered online via a research website (www.ecentreclinic.org) (iCBT Group). The third group was a waitlist-deferred treatment

control group who received no treatment (Control Group). These three groups were compared from pre-treatment to post-treatment. At post-treatment the Control Group was provided with treatment, and the two treatment groups were followed up from post to 3-months follow-up. The Control Group received the same treatment as the iCBT Group, but to test the final aim, the Control Group received 50% less therapist contact than the treatment groups.

4.2.2 Sample Size Calculation and Randomisation

Based on effect sizes obtained in Study II, power calculations indicated that a sample size of 30 participants in each group was sufficient to detect a between-group effect size of 0.65 between participants in each treatment group and the Control Group (power of 0.80, alpha of 0.05, one tailed). Equal numbers of participants in each group, however, meant that the design was only powered to detect a between-group effect size difference between treatment groups of 0.75 (power of 0.80, alpha of 0.05, two tailed). This weakness was acknowledged during the development of the design, but considered acceptable given this study was planned as a feasibility study to help determine power required for a more comprehensive future study. For the treatment phase of the Control Group, power calculations indicated that a sample size of 15 participants was sufficient to detect a pre-post within-group effect size difference in symptoms of OCD of 0.7 with alpha of 0.05 and power of 0.80, which was the minimum expected based on the results of Study II of this thesis. An overseas colleague, who was not involved in this trial, created a random list of integers to use for assigning successful applicants to the three groups, using the website www.random.org.

4.2.3 Hypotheses

It was expected that participants in the treatment groups (Bibliotherapy Group and iCBT Group) would show significant improvements in primary and secondary outcome measures

compared with the Control Group, and would rate the program as acceptable. It was expected that gains would be maintained at 3-month follow-up. Notwithstanding the limited power of the design, it was also hypothesised that there would not be a significant difference in the efficacy of the treatment groups. The final hypothesis was that the Control Group, who would receive less clinician contact than the treatment groups, would still show significant improvements on symptom measures of OCD and on secondary measures of anxiety, depression and disability from pre-treatment to post-treatment.

4.2.4 Participants and Recruitment

Applicants applied online at the eCentreClinic website (www.ecentreclinic.org). One hundred and fifty-six participants provided consent between July 2011 and February 2012, and 88 completed an application. Of these, 56 were eligible to participate. Twenty participants were allocated to the Bibliotherapy Group, 17 to the iCBT Group and 19 to the Control Group. However two participants in the iCBT Group and two participants in the Control Group did not complete the pre-treatment questionnaires and were withdrawn from the study. Participant flow is shown in Figure 4.1.

Participants were recruited and given access to the treatment in four phases due to slow recruitment rates. Considerable efforts were made to boost recruitment by organising promotions via newsletters and websites of relevant non-government organisations, media releases from the Macquarie University Media Office, and advertisements in local newspapers. In addition 500 coloured flyers and emails promoting the study were sent to General Practitioners, Psychiatrists, and specialist anxiety clinics across Australia. Recruitment continued until 6 months before this thesis was submitted.

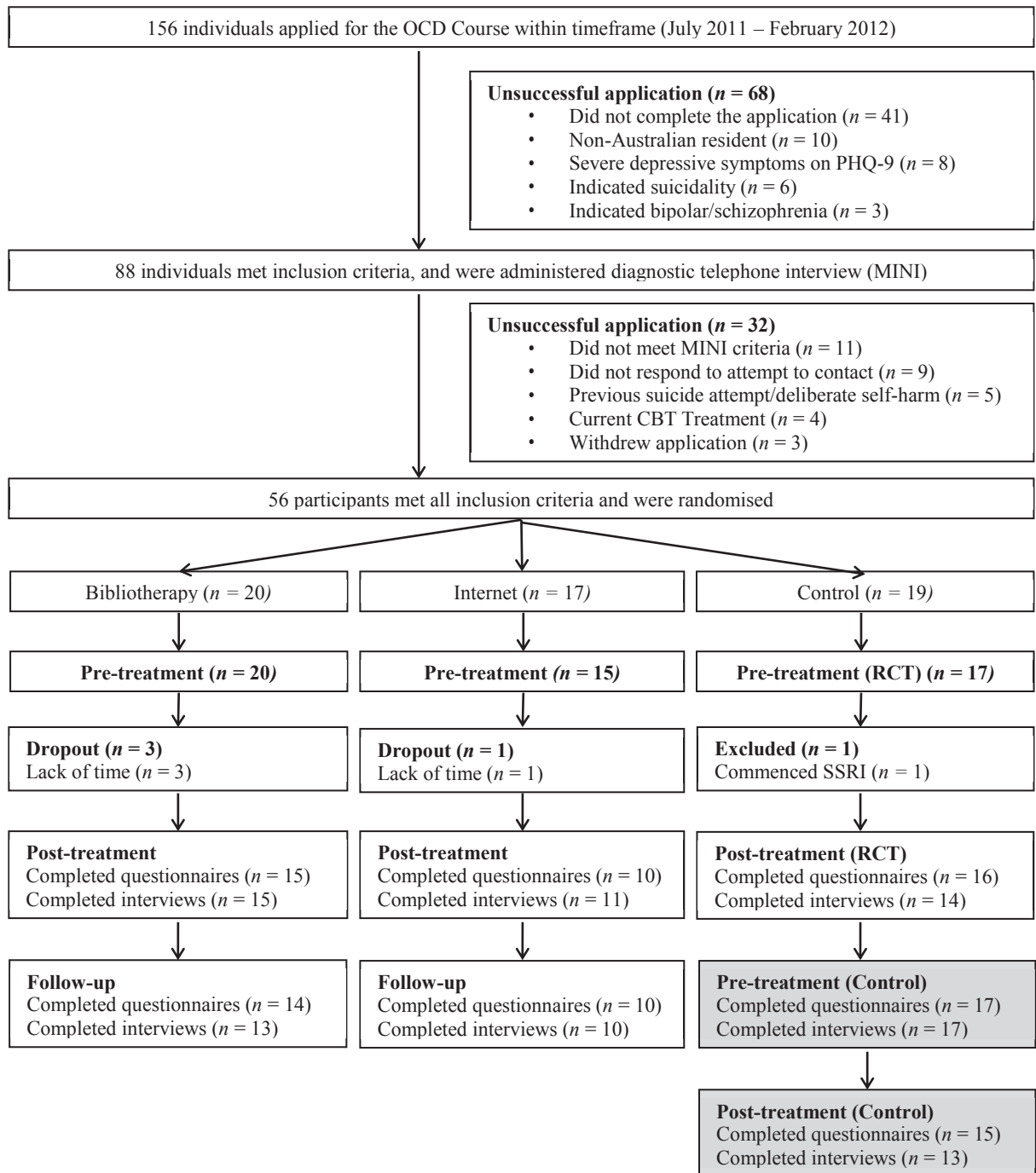


Figure 4.1 Participant flow.

Note: MINI: Mini International Neuropsychiatric Interview. PHQ-9: Patient Health Questionnaire-9 item. CBT: Cognitive Behavioural Therapy.

Inclusion and exclusion criteria were the same as described in Study II. Applicants who met the inclusion criteria were administered the MINI Version 5.0.0 ^[368] and the YBOCS ^[369] during a telephone interview to confirm they met DSM-IV criteria ^[5] for OCD. The study was

approved by local Human Research Ethics Committees and registered with ANZCTR (ACTRN12611000116921).

4.2.5 Outcome Measures

The outcome measures used in the current study were largely the same as those in Study II. The clinician-administered YBOCS was still the primary outcome measure. However, the OBQ was not administered in this study due to its length (44 items) and was omitted to reduce burden on participants. In addition, the Dimensional Obsessive-Compulsive Disorder Scale (DOCS) ^[420] replaced the OCI-R. Thus the secondary outcome measures in the current study were the DOCS, PHQ-9, GAD-7 and SDS.

The DOCS is a relatively new 20-item self-report scale that measures the four most recently empirically validated dimensions of OCD including: 1) Contamination obsessions and washing and cleaning compulsions; 2) obsessions about responsibility for causing harm/making mistakes and checking compulsions; 3) obsessions about order/symmetry and ordering/arranging compulsions, and; 4) repugnant obsessional thoughts and repeating or mental compulsive rituals. Scores on the DOCS range from 0-80 for the total score, and 0-20 on each of the subscales. In the results below, the participants score on their predominant subscale was used as the DOCS outcome measure (range = 0-20), rather than the total score. In the event that participants scored equally on more than one subscale at pre-treatment the post-treatment score was calculated from the mean of the subscale scores, a method used in previous studies ^[420]. The reliability of the DOCS is excellent with a reported Cronbach's alpha of 0.90 for the total score and 0.94-0.96 for the subscales ^[420].

The internal consistencies (Cronbach's alpha) in the current study for the measures were high: YBOCS, 0.79; DOCS, 0.90; SDS, 0.91; PHQ-9, 0.85, and GAD-7, 0.90. Questionnaires were administered online at pre-treatment and post-treatment for all groups. Participants in the active treatment conditions also completed these questionnaires at 3-month follow-up. The YBOCS and the MINI were administered via telephone at pre-treatment and post-treatment for all groups, and again at 3-month follow-up for the two treatment groups. At post-treatment and 3-month follow-up participants were sent an email asking them to log in and complete the questionnaires. Two further email prompts were sent if questionnaires were not returned. Participants were then phoned to complete the telephone interview on two occasions. If questionnaires remained outstanding at this point the participant was considered a *dropout*. Three-month follow-up data was not available for the Control Group after they received treatment, as this data was still being collected at the time this thesis was submitted.

4.2.6 Intervention

The treatment protocol (*The OCD Course*) used in the current study differed to the protocol described in the previous study as the materials described in the first study were no longer available after the Candidate transferred tertiary institutions midway through PhD candidature, following a change in institution of her Primary Supervisor. In addition, because the Bibliotherapy Group would not normally have access to emails, the automatic emails used in Study II were not included in this study.

The OCD Course was written and developed by the Candidate over a 3-month period, using a different educational approach to that used in the earlier OCD Program, and included improvements based on participant feedback from the first study. Key differences between the first and second treatment protocols included the reduction in the number of Lessons from 8

to 5, and a stronger didactic style of presenting content. Participant feedback from Study II and results from other iCBT research at the eCentreClinic indicated that briefer iCBT interventions were as effective and more acceptable than longer versions ^[421], hence the Course was reduced from 8 Lessons to 5 Lessons, in order to reduce burden on participants. Finally, to make the active treatments more equivalent the discussion forum and secure online messaging service were not used in the current study.

In the earlier treatment protocol participants read about the treatment experiences of fictional ‘previous participants’, and these participants described how they applied key treatment skills. In *The OCD Course*, a stronger didactic style is used which involves the presentation of material in a more traditional text-based form, although this text is presented as if spoken by an expert therapist. Case-enhanced learning examples are still used to demonstrate how people apply the core skills, but there is less emphasis on narrative. Each lesson took approximately 30 hours to develop, and the additional text-based resources and guides took approximately 10 hours each to develop. The Lessons had a Flesch-Kincaid grade reading level of 6.3 on average (range 5.8-7.5).

Lesson 1 of *The OCD Course* provides education about the symptoms of OCD, how they are developed and maintained, and describes the rationale for the treatment approach used in the Course. Each lesson thereafter discusses ERP, and Lessons 2 to 4 each describe 2 of the 6 cognitive biases described by the OCCWG ^[147] and cognitive-behavioural techniques to address them. Lesson 5 comprises information about relapse prevention. Participants were asked to complete the 5 Lessons in 8 weeks. An overview of the lesson structure is included in Table 4.1.

Table 4.1

Lesson and Summary Contents, Release Schedule, and Forum Topics Throughout the eCentreClinic OCD Course

Lesson	Days to complete lesson	Primary content/theme	Lesson summary / homework tasks	Additional resources
1	3	Psychoeducation about the prevalence of OCD, symptom presentation and treatment rationale	Exercises aimed to facilitate understanding of symptoms and symptom cycles.	Information on who to contact in a mental health emergency and information about panic attacks and strong physical reactions.
2	11	Introduction to ERP and description of cognitive techniques to target <i>the overestimation of threat</i> and <i>overestimation of responsibility</i>	Exercises aimed at the construction of an exposure hierarchy and to practice cognitive techniques aimed at reducing the <i>overestimation of threat</i> (cognitive restructuring and the probability of catastrophe task), and overestimation of responsibility (responsibility pie chart)	Information on creating exposure hierarchies (with specific examples of items addressing common concerns) and information for family and friends.
3	14	Continuation of ERP and description of cognitive skills to target the <i>need to control thoughts and over-importance of thoughts</i>	Exercises aimed to encourage people to continue climbing their exposure hierarchies and to practice cognitive techniques aimed at reducing the <i>need to control thoughts</i> (corrective information on the normalcy of intrusive thoughts) and <i>over-importance of thoughts</i> (behavioural experiments).	Information on the normalcy of intrusive thoughts and information on overcoming magical beliefs
4	14	Continuation of ERP and description of cognitive skills to target <i>perfectionism</i> and <i>intolerance to uncertainty</i> .	Exercises aimed to encourage people to continue climbing their exposure hierarchies and to practice cognitive techniques aimed at reducing <i>perfectionism</i> and <i>intolerance to uncertainty</i> (cost-benefit analysis)	Information on how to use the skills from the OCD Course to tackle depression
5	14	Education regarding lapses and relapse and relapse prevention	Exercises aimed at understanding differences between lapses and relapses and to facilitate the creation and use of a relapse prevention plan.	Nil

4.2.7 Procedure

Participants in the treatment groups received an email on the start date of the Course welcoming them to the Course, providing instructions on how to use the software, and providing login details. The participants received access to the exact same materials, except the iCBT Group accessed these via the internet, while the Bibliotherapy Group received their materials in coloured paper copy format, which was sent to participants in the postal mail.

Participants were provided with a recommended timetable and instructed to read one lesson each week and attempt homework tasks. In the Bibliotherapy Group, each Lesson was individually packaged and the recommended date for reading the Lesson written on the front of the envelope. In the Internet Group, participants were unable to access subsequent Lessons until they had read previous Lessons and Lessons were released according to the same recommended timetable given to the Bibliotherapy Group. Participants were briefly telephoned twice a week by the therapist (once per week during the treatment phase for the Control Group) to discuss the homework tasks and the frequency and duration of every contact with participants was recorded. This frequency of contact has been utilised in other face-to-face treatment studies ^[237, 394]. Participants were not assisted in constructing their exposure hierarchy in this Study, but were provided with examples of hierarchies addressing fears common to OCD. Participants were asked to practice their homework tasks, which consisted of practicing their exposure tasks and relevant cognitive techniques for at least one hour per day.



Figure 4.2a Example of the content of the eCentreClinic OCD Course: Introductory slide of the Course explaining the research and introducing the Candidate (therapist) and supervisory team

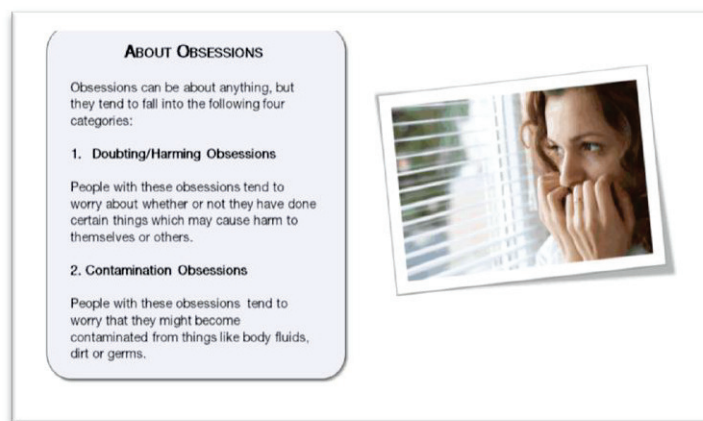


Figure 4.2b Example of the content of the eCentreClinic OCD Course: Explanation of how obsessions are described to participants.



Figure 4.2c Example of the content of the eCentreClinic OCD Course: Introduction to three fictional characters that help to explain the symptoms and skills.

On the day after participants in the treatment groups completed the 8 week Course participants in the Control Group received an email welcoming them to the Course, providing instructions on how to use the software and login details. Control Group participants were provided with access to the same treatment protocol that was used with the iCBT Group, and they were instructed to read one lesson each week and attempt homework tasks. To test the effect of reduced therapist contact participants in the treatment groups were telephoned only once each week by the Candidate and the frequency and duration of every contact with participants was recorded. Participants were also asked to practice their homework tasks, which consisted of practicing their exposure tasks and relevant cognitive techniques for at least one hour per day.

4.2.8 Therapist

The Candidate, a Clinical Psychologist with 4 years experience working with people with OCD, provided all clinical contact with participants (telephone calls, emails, and diagnostic interviews) and collated all the data. Examples of the lesson content are provided in Figure 4.2. Figure 4.2a shows the introductory slide of the Course introducing the Candidate (therapist), the research and the supervisory team. Figure 4.2b provides an example of how the symptoms of OCD are described to participants and Figure 4.2c introduces the three fictional characters who help to explain how they applied the skills from the Course to improve their own symptoms of OCD.

4.2.9 Statistical Methods

All analyses of post-treatment and follow-up scores on outcome measures and estimates of clinically significant change were conducted using an ITT model where missing data was addressed by carrying forward the first available data (baseline-observation-carried-forward

model; BOCF). ITT is a conservative and robust model that has been recommended for internet-based intervention research where attrition may result in selection bias ^[395]. Group differences in demographic data and pre-treatment measures were analysed with one-way ANOVAs followed by *t*-tests with Bonferroni corrected *p*-values and *chi*-square tests.

Pre-treatment to post-treatment changes were analysed using univariate analysis of covariance (ANCOVAs) as ANCOVAs are recommended as a robust and reliable statistical strategy for analysing the results of RCTs ^[422, 423]. Effect sizes using Cohen's *d* were calculated for within-group and between-group differences, based on pooled standard deviations and 95% confidence intervals were calculated. Independent sample *t*-tests were used to compare iCBT and Bibliotherapy Groups on measures of treatment satisfaction and symptom improvement from post-treatment to follow-up. Pre-treatment to post-treatment changes in scores on outcome measures for the Control Group were analysed using paired-sample *t*-tests. All analyses were performed using SPSS Version 19 (IBM Inc, USA).

As in Study II, three criteria of clinical significance were employed at post-treatment and 3 month follow-up. First, changes in the prevalence of OCD were calculated based on the results of the MINI interviews. Second, an estimate of clinically significant change was made using the criteria applied in a recent meta-analysis where the percentage of clients reaching a recovered status were identified (i.e., post-treatment or follow-up score ≤ 14 and a 10-point or greater reduction on the YBOCS) ^[200]. Third, percentage reduction in symptoms on the YBOCS was calculated from pre-treatment to post-treatment and pre-treatment to 3-month follow-up in order to facilitate comparisons with existing studies, however it is acknowledged that this criterion has limited validity as a measure of clinical significance ^[397]. The frequency of adverse events were also recorded, and these were defined as a clinically significant

deterioration in symptoms based on the classification suggested by Fisher and Wells ^[200] (greater than 10-point increase on the YBOCS from pre-treatment to post-treatment) or other event leading to reported exacerbation of symptoms.

4.3 Results – Randomised Controlled Trial

4.3.1 Adherence and Attrition

Post-treatment questionnaires were completed by 15/20 (75%) participants in the Bibliotherapy Group, 10/15 (67%) in the iCBT Group, and 16/17 (94%) in the Control Group. Follow-up questionnaires were completed by 14/20 (70%) participants in the Bibliotherapy Group and 10/15 (66%) in the iCBT Group. Number of Lessons completed was self-reported at post-treatment and is only available for those who completed post treatment questionnaires. Ten out of 15 participants (67%) in the Bibliotherapy Group and 6/10 (60%) of participants in the iCBT Group completed the 5 Lessons within the 8 weeks of the program. The average number of completed Lessons was 4.33 ($SD = 1.11$) in the Bibliotherapy Group and 4.30 ($SD = 1.06$) in the iCBT Group, which was not significantly different ($t_{23} = -0.08, p = 0.941$).

Post-treatment telephone administered interviews (YBOCS and MINI) were completed with 15/20 (75%) participants in the Bibliotherapy Group, 11/15 (73%) in the iCBT Group, and 14/17 (82%) in the Control Group. Follow-up telephone interviews were completed with 13/20 (65%) participants in the Bibliotherapy Group and 10/15 (67%) in the iCBT Group. Those who completed post-treatment questionnaires ($n = 41$) were compared with those who did not complete questionnaires ($n = 11$) on pre-treatment severity (pre-treatment YBOCS total score) and demographic characteristics. There were no significant differences between the groups on pre-treatment severity ($t_{50} = -0.67, p = 0.507$), gender ($\chi^2(1, N = 52) = 0.38, p = 0.845$), marital status ($\chi^2(2, N = 52) = 2.96, p = 0.228$), education ($\chi^2(2, N = 52) = 0.32, p =$

0.851), employment (χ^2 (2, N = 52) = 0.65, p = 0.722), current medication use (χ^2 (1, N = 52) = 1.53, p = 0.217) or number of disorders at baseline (t_{50} = 0.180, p = 0.858). The differences between the groups for age approached significance (t_{50} = 2.00, p = 0.051), with those who dropped out of treatment being younger (M = 32.18, SD = 11.38) than those who didn't (M = 39.32, SD = 10.25). It should be noted that for the categorical measures multiple cells had expected counts less than five and thus the assumptions for chi-square analysis were not met. For this reason these results should be treated with caution.

Table 4.2

Characteristics of the Bibliotherapy, Treatment, and Control Groups for the Total Sample

Variable	Bibliotherapy Group (n = 20)		Internet Group (n = 15)		Control Group (n = 17)		Significance Statistics
	n	%	n	%	n	%	
Gender							
Male	6	30.0	1	6.7	6	35.3	χ^2 (2, N = 52) = 3.92, p = 0.141 ^a
Female	14	70.0	14	93.3	11	64.7	
Age							
Mean (SD)	35.55	(9.68)	39.93	(12.57)	38.58	(10.51)	$F_{(2,49)} = 0.77, p = 0.470$
Range	23-59		20-68		18-53		
Marital Status							
Single/Never married	10	50.0	5	33.3	7	41.2	χ^2 (4, N = 52) = 0.99, p = 0.912 ^a
Married/Defacto	9	45.0	9	60.0	9	52.9	
Separated/Divorced/Widowed	1	5.0	1	6.7	1	5.9	
Education							
High School	5	25.0	3	20.0	3	17.6	χ^2 (4, N = 52) = 2.07, p = 0.723 ^a
Other Certificate	6	30.0	3	20.0	7	41.2	
Tertiary	9	45.0	9	60.0	7	41.2	
Employment							
Full-time	14	70.0	7	46.7	7	41.2	χ^2 (4, N = 52) = 3.90, p = 0.420 ^a
Part-time	4	20.0	4	26.7	6	35.3	
Unemployed	2	10.0	4	26.7	4	23.5	
Previous Treatment (% Yes)	17	85.0	12	80.0	15	88.2	χ^2 (2, N = 52) = 0.42, p = 0.811 ^a
Taking SSRI (% Yes)	10	50.0	9	60.0	13	76.5	χ^2 (2, N = 52) = 2.74, p = 0.254
YBOCS Severity							
Mild	3	15.0	0	0.0	3	17.6	χ^2 (6, N = 52) = 8.35, p = 0.214 ^a
Moderate	9	45.0	9	60.0	9	52.9	
Severe	8	40.0	4	26.7	5	29.4	
Extremely Severe	0	0.0	2	13.3	0	0.0	
Comorbidities							
Major Depressive Disorder	7	35.0	5	33.3	8	47.1	χ^2 (2, N = 52) = 0.80, p = 0.671
Social Phobia	9	45.0	2	13.3	3	17.6	χ^2 (2, N = 52) = 5.47, p = 0.065 ^a
Generalised Anxiety Disorder	6	30.0	5	33.3	10	58.8	χ^2 (2, N = 52) = 3.61, p = 0.165
Panic Disorder	2	10.0	1	6.7	5	29.4	χ^2 (2, N = 52) = 3.89, p = 0.143 ^a
Post-Traumatic Stress Disorder	3	15.0	1	6.7	2	11.8	χ^2 (2, N = 52) = 0.58, p = 0.747 ^a
Number of Disorders at Baseline^b							
Mean (SD)	2.35	(1.31)	1.93	(.80)	2.64	(1.06)	$F_{(2,49)} = 1.68, p = 0.196$
Range	1-5		1-3		1-5		

Note: ^a indicated that more than 20% of the cells had expected counts less than 5 and should be interpreted with caution. ^b Number of disorders at baseline includes OCD as well as other anxiety disorders and depression. Total possible range is from 1-5. SSRI: Selective Serotonin Reuptake Inhibitor. YBOCS: Yale Brown Obsessive Compulsive Scale.

4.3.2 Outcome Measures

Pre-treatment, post-treatment, and 3-month follow-up scores for the three groups for the primary and secondary outcome measures, and effect sizes with 95% confidence intervals are included as Table 4.3. Univariate ANOVAs on pre-treatment YBOCS, DOCS, SDS, PHQ9 and GAD-7 revealed that there were no significant differences between the three groups on outcome measures at pre-treatment: YBOCS, $F_{(2,49)} = 0.93, p = 0.403$; DOCS, $F_{(2,49)} = 0.68, p = 0.510$; SDS, $F_{(2,49)} = 0.03, p = 0.967$; GAD-7, $F_{(2,49)} = 0.59, p = 0.559$; PHQ 9, $F_{(2,49)} = 0.52, p = 0.597$.

Univariate ANCOVAs controlling for pre-treatment scores revealed a significant difference between the groups at post-treatment on the YBOCS ($F_{(2,48)} = 9.42, p = 0.000$). Planned post-hoc contrasts were conducted to assess differences between the groups. These contrasts demonstrated that both treatment groups were superior to the Control Group (Bibliotherapy, $p = 0.002$; iCBT, $p = 0.001$), with no difference between treatment groups ($p = 1.000$). On the GAD-7, univariate ANCOVAs controlling for pre-treatment scores revealed a significant difference between the groups ($F_{(2,48)} = 3.92, p = 0.027$) and post hoc analyses indicated there were there was a significant difference between the Control Group and the Bibliotherapy Group ($p = 0.046$), no significant differences between the Control Group and the iCBT Group ($p = 0.074$), or between the treatment groups ($p = 1.000$). Additional univariate ANCOVAs, controlling for relevant pre-treatment scores revealed no significant differences between the groups at post-treatment on the DOCS, $F_{(2,48)} = 2.49, p = 0.093$; SDS, $F_{(2,48)} = 1.04, p = 0.362$; or PHQ-9, $F_{(2,48)} = 0.90, p = 0.412$.

Paired sample *t*-tests were used to assess change in symptoms from post-treatment to follow-up. There were no significant changes from post-treatment to follow-up for any of the

measures for the Bibliotherapy Group (YBOCS, $t_{19} = -1.31$, $p = 0.207$; DOCS, $t_{19} = -0.35$, $p = 0.729$; SDS, $t_{19} = -0.35$, $p = 0.734$; GAD-7, $t_{19} = -0.75$, $p = 0.460$; PHQ-9, $t_{19} = -0.40$, $p = 0.693$) or the iCBT Group (YBOCS, $t_{14} = -1.90$, $p = 0.078$; DOCS, $t_{14} = 0.04$, $p = 0.970$; SDS, $t_{14} = -1.02$, $p = 0.324$; GAD-7, $t_{14} = -1.16$, $p = 0.267$; PHQ-9, $t_{14} = -1.00$, $p = 0.334$). Independent sample t-tests indicated that there was no significant difference between the Bibliotherapy Group and iCBT Group on any of the measures at 3-month follow up (YBOCS, $t_{33} = 0.51$, $p = 0.615$; DOCS, $t_{33} = -0.05$, $p = 0.964$; SDS, $t_{33} = 0.29$, $p = 0.773$; GAD-7, $t_{33} = -0.42$, $p = 0.680$; PHQ-9, $t_{33} = -0.40$, $p = 0.695$).

4.3.3 Effect Sizes

Large pre-treatment to post-treatment within-group effect sizes were found for the Bibliotherapy Group on the YBOCS (1.19) and DOCS (0.82), a medium effect size was found on the GAD-7 (0.67), and small effect sizes were found on the SDS (0.43) and PHQ-9 (0.45). Similar results were seen in the iCBT Group with a large pre-post-treatment within-group effect size observed on the YBOCS (1.09), medium effect sizes for the DOCS (0.78) and GAD-7 (0.57), and small effect sizes on the SDS (0.39) and PHQ9 (0.41). For the Control Group, all effect sizes were nil to small (0.07-0.35).

From pre-treatment to follow-up within-group effect sizes for the Bibliotherapy Group remained large for the YBOCS (0.89), however, scores on the DOCS reduced to the moderate range (0.72). The effect size for the GAD-7 reduced, but remained in the moderate range (0.51). Effect sizes for all other measures were in the small range (0.36-0.38). For the iCBT Group moderate within-group effect sizes were found on the YBOCS (0.79) and DOCS (0.78), and small effect size on the GAD-7 (0.35) and SDS (0.21). There was no effect on the

PHQ-9 (0.17). Between-group effect sizes between the two active treatment groups on the YBOCS were 0.08 at post-treatment and 0.18 at follow-up.

4.3.4 Clinical Significance

All participants who did not complete post-treatment YBOCS interviews were assumed to still meet criteria for OCD. Using this ITT design 6/20 participants (30%) in the Bibliotherapy Group and 4/15 (27%) in the iCBT Group no longer met diagnostic criteria for OCD diagnosis at post-treatment. All participants who completed post-treatment interviews (14/14) in the Control Group (100%) met criteria for OCD at post-treatment. At 3-month follow-up 7/20 (35%) of the Bibliotherapy Group and 3/15 (20%) in the iCBT Group no longer met criteria for OCD. There was no significant difference between the level of recovery between the two active groups at post treatment ($\chi^2(1, N = 35) = 0.05, p = 0.829$) or 3-month follow-up ($\chi^2(1, N = 35) = 0.95, p = 0.331$), however, because some cells had a count less than 5 these chi-square results should be interpreted with caution.

At post-treatment the percentage of participants who scored in the recovered range on the YBOCS was 6/20 (30%) for the Bibliotherapy Group, 4/15 (40%) for the iCBT Group and 0/17 (0%) for the Control Group. There was no significant difference between the two active treatment groups ($\chi^2(1, N = 35) = 0.05, p = 0.829$) in number of recovered participants. At 3-month follow up the percentage of participants scoring in the recovered range was 5/20 (25%) for the Bibliotherapy Group and 5/15 (33%) for the iCBT Group, again, there was no significant difference between the groups ($\chi^2(1, N = 35) = 0.292, p = 0.589$). Again, some cells had an expected count of less than 5, thus these chi-square results should be interpreted with caution.

Table 4.3

Means, Standard Deviations and Effect Sizes (Cohen's d) for Each Group

Measure and Group	Mean (SD)		Effect Sizes (95% CI)		Follow-up		Effect Sizes (95% CI)	
	Pre-treatment	Post-treatment	Within Group	Bibliotherapy vs. Internet	vs. Control	Mean (SD)	Within Group	Bibliotherapy vs. Internet
YBOCS								
Bibliotherapy (<i>n</i> = 20)	21.80 (5.18)	15.20 (5.85)	1.19 (0.50-1.84)	0.08 (-0.59-0.75)	1.00 (0.30-1.66)	16.55 (6.50)	0.89 (0.23-1.52)	0.18 (-0.50-0.85)
Internet (<i>n</i> = 15)	23.53 (4.91)	15.80 (8.74)	1.09 (0.30-1.83)		0.68 (-0.04-1.39)	17.87 (8.84)	0.79 (0.03-1.51)	
Control (<i>n</i> = 17)	21.06 (5.61)	20.59 (4.76)	0.09 (-0.58-0.76)					
DOCS								
Bibliotherapy (<i>n</i> = 20)	12.40 (4.19)	8.93 (4.23)	0.82 (0.16-1.45)	0.00 (-0.67-0.67)	0.37 (-0.29-1.01)	9.30 (4.45)	0.72 (0.06-1.34)	0.02 (-0.65-0.69)
Internet (<i>n</i> = 15)	12.07 (3.03)	8.93 (4.83)	0.78 (0.02-1.50)		0.35 (-0.36-1.04)	9.23 (4.20)	0.78 (0.01-1.50)	
Control (<i>n</i> = 17)	11.88 (3.20)	10.53 (4.46)	0.35 (-0.34-1.02)					
SDS								
Bibliotherapy (<i>n</i> = 20)	15.85 (7.36)	12.40 (8.54)	0.43 (-0.20-1.05)	0.02 (-0.65-0.69)	0.35 (-0.31-0.99)	12.65 (9.26)	0.38 (-0.25-1.00)	0.11 (-0.56-0.78)
Internet (<i>n</i> = 15)	15.93 (8.50)	12.20 (9.55)	0.41 (-0.32-1.12)		0.35 (-0.36-1.04)	13.80 (11.16)	0.21 (-0.51-0.93)	
Control (<i>n</i> = 17)	16.47 (7.43)	15.24 (7.73)	0.16 (-0.54-0.88)					
PHQ-9								
Bibliotherapy (<i>n</i> = 20)	12.15 (5.69)	9.50 (6.13)	0.45 (-0.19-1.07)	0.32 (-0.37-0.98)	0.12 (-0.53-0.77)	9.80 (7.19)	0.36 (-0.27-0.98)	0.14 (-0.54-0.80)
Internet (<i>n</i> = 15)	10.00 (6.20)	7.53 (6.40)	0.39 (-0.34-1.10)		0.43 (-0.28-1.13)	8.80 (7.69)	0.17 (-0.55-0.88)	
Control (<i>n</i> = 17)	11.06 (6.72)	10.24 (6.08)	0.13 (-0.55-0.80)					
GAD-7								
Bibliotherapy (<i>n</i> = 20)	12.10 (5.67)	8.40 (5.42)	0.67 (0.02-1.29)	0.29 (-0.39-0.96)	0.56 (-0.11-1.21)	8.90 (6.84)	0.51 (-0.13-1.13)	0.14 (-0.53-0.81)
Internet (<i>n</i> = 15)	10.13 (5.97)	6.80 (5.65)	0.57 (-0.17-1.29)		0.82 (0.08-1.52)	7.93 (6.75)	0.35 (-0.38-1.06)	
Control (<i>n</i> = 17)	12.00 (5.76)	11.59 (5.99)	0.07 (-0.60-0.74)					

Note. YBOCS: Yale Brown Obsessive Compulsive Scale. DOCS: Dimensional Obsessive Compulsive Scale. SDS: Sheehan Disability Scale. PHQ-9: Patient Health Questionnaire (9 item). GAD-7: Generalised Anxiety Disorder Scale (7-item). Baseline-observation-carried-forward (BOCF) model was used where data was not available. Effect sizes (Cohen's *d*) were calculated based on pooled standard deviations. CI: Confidence intervals.

In terms of the third criteria of clinical significance, that is percentage reduction on the YBOCS, those who did not complete post-treatment or follow up interviews were assumed to have a 0% decrease in symptoms. Using this model at post-treatment the mean reduction of symptoms on the YBOCS was 29% in the Bibliotherapy Group, 35% in the iCBT Group and -0.1% in the Control Group. There was significant difference amongst the groups ($F_{(2,49)} = 11.72, p = 0.000$), and whilst planned contrasts revealed a significant difference between the Bibliotherapy Group and Control Group ($p = 0.001$) and between the iCBT Group and the Control Group ($p = 0.000$), there was no significant difference between the two active groups ($p = 1.000$). At 3-month follow-up the overall percentage reduction decreased in both groups to 24% in the Bibliotherapy Group and 25% in the iCBT Group, there was no significant differences between the groups ($t_{33} = .120, p = 0.905$).

4.3.5 Treatment Satisfaction

Responses to the treatment satisfaction questions are only available for those who provided post-treatment data. The majority of participants reported a high level of satisfaction with the overall program. In the Bibliotherapy Group 15/20 (75%) completed the treatment satisfaction questionnaires. Six out of fifteen participants (40%) were *extremely satisfied*, 5/15 (33%) were *satisfied*, 3/15 (20%) were *neutral*, 1/15 (7%) was *dissatisfied* and 0/15 (0%) were *extremely dissatisfied* with the Course. In the iCBT Group 10/15 (67%) completed the treatment satisfaction questionnaires and 1/10 (10%) were *extremely satisfied*, 6/10 (60%) were *satisfied*, 3/10 (30%) were *neutral*, 0/10 (0%) were *dissatisfied* or *extremely dissatisfied*. There was no significant difference between groups in terms of mean level of satisfaction ($t_{22} = -0.50, p = 0.624$).

When asked to provide a rating from 1 (low agreement) to 10 (high agreement), participants rated the treatment as *easy to understand* (Bibliotherapy, $M = 7.07$, $SD = 3.13$; iCBT $M = 6.60$, $SD = 2.83$) and as *containing helpful techniques* (Bibliotherapy, $M = 7.33$, $SD = 2.32$; iCBT $M = 7.20$, $SD = 1.39$). There were no significant differences between the groups on ratings for either of these variables ($t_{23} = -0.38$, $p = 0.708$ and $t_{23} = -0.16$, $p = 0.872$ respectively). Fourteen out of the 15 participants (93%) in the Bibliotherapy Group and 10/10 (100%) in the iCBT Group stated that they would *recommend this program to a friend with OCD*, which was not significantly different across the groups ($\chi^2 (1, N = 25) = 0.69$, $p = 0.405$).

4.3.6 Time Spent/Contact Events per Participant

During the course, the clinician made a total of 517 telephone calls to participants in the treatment groups, with no difference in the number of calls made to participants in the Bibliotherapy Group ($M = 14.40$, $SD = 3.58$) compared to those in the iCBT Group ($M = 15.05$, $SD = 3.93$) ($t_{33} = -0.503$, $p = 0.618$). Calls were made approximately twice per week, and when calls were unanswered the clinician left a message asking the participant to return the call. An email was also sent to participants informing them that the clinician had attempted contact and inviting them to contact the clinician if required. During the course participants did not receive any automatic email reminders, however, the clinician sent on average 2.80 ($SD = 2.83$) emails to each participant in the iCBT Group and 2.60 ($SD = 2.91$) emails to each participant in the Bibliotherapy Group when a phone call was not answered. The mean total therapist time per participant was 102.73 minutes ($SD = 50.52$ mins) in the Bibliotherapy Group and 88.63 minutes ($SD = 46.41$ mins) in the iCBT Group, which was not statistically different ($t_{24} = -0.73$, $p = 0.474$).

4.3.7 Adverse Events

No participants in either treatment group met criteria for a significant deterioration in symptoms. No other adverse events were reported during or after the trial.

4.4 Results – Control Group

The results for the Control Group, who had less regular therapist contact, are described below. These results also employed an ITT model of analysis using the BOCF method. As indicated, follow-up data was not available at the time this thesis was submitted, but will be reported in a subsequent paper.

4.4.1 Adherence and Attrition

Seventeen participants were randomly allocated to the Control Group. One participant was excluded from this group during the RCT due to commencing an SSRI while awaiting treatment, leaving 16 participants for analysis in the RCT. When the Control Group commenced treatment this participant had been stable on the SRRI for at least 4 weeks and was therefore eligible to participate and was included in the analysis. Therefore 17 participants were eligible for analysis in the open trial.

Fifty-nine percent (10/17) of Control Group participants completed the 5 Lessons within the 8 weeks of the Course. Completion was defined as the percentage of participants who had read all 5 lessons within the specific course duration of 8 weeks. The average number of completed Lessons was 4.00 ($SD = 1.37$) and the average number of logins was 19.65 ($SD = 11.62$). Pre-treatment clinician-administered YBOCS results were only available for 15/17 participants, although the remaining two participants did complete the online pre-treatment questionnaires, and were thus eligible to begin treatment. The other 15 Control Group participants completed

the online pre-treatment questionnaires and the clinician-administered YBOCS. Post-treatment questionnaires were collected from 15/17 (88%) participants and post-treatment interviews were conducted with 13/17 (76%) participants. Those who completed post-treatment questionnaires were not compared to those who did not complete the questionnaires due to small sample size.

Table 4.4

Within Group Effect Sizes for Primary and Secondary Outcome Measures for the Control Group (Cohen's d)

	Mean (SD)		Effect Sizes (95% CI)
	Pre-treatment	Post-treatment	Pre-Post
Primary			
<i>YBOCS</i> (<i>n</i> = 15)	19.87 (5.63)	14.33 (7.32)	0.85 (0.08-1.57)
Secondary			
<i>DOCS</i> (<i>n</i> = 17)	10.82 (3.81)	6.97 (4.16)	0.97 (0.23-1.65)
<i>SDS</i> (<i>n</i> = 17)	13.94 (7.48)	9.24 (7.77)	0.62 (-0.09-1.29)
<i>PHQ9</i> (<i>n</i> = 17)	9.35 (6.23)	7.65 (6.60)	0.26 (-0.42-0.93)
<i>GAD7</i> (<i>n</i> = 17)	11.12 (6.26)	7.88 (6.22)	0.52 (-0.18-1.19)

Note. YBOCS: Yale Brown Obsessive Compulsive Scale. DOCS: Dimensional Obsessive Compulsive Scale. SDS: Sheehan Disability Scale. PHQ-9: Patient Health Questionnaire (9 item). GAD-7: Generalised Anxiety Disorder Scale (7-item). Standard deviations are shown in parentheses. YBOCS data was available for 15 participants at pre-treatment. YBOCS data was obtained from 13/15 participants at post-treatment. Self-report questionnaire data was available from 14/17 participants at post treatment. The baseline observation carried forward method was used where data was missing.

4.4.2 Outcome Measures

Paired-sample *t*-tests were used to compare pre-treatment and post-treatment scores.

Significant reductions were found on the YBOCS ($t_{14} = 5.73, p = 0.000$), DOCS ($t_{16} = 4.53, p = 0.000$), SDS ($t_{16} = 3.37, p = 0.004$), PHQ-9 ($t_{16} = 2.26, p = 0.038$), and GAD-7 ($t_{16} = 3.04, p = 0.008$).

4.4.3 Effect Sizes

Pre-treatment and post-treatment scores for the primary and secondary outcome measures, and effect sizes with 95% confidence intervals are included in Table 4.4. Large pre-post within-group effect sizes were found on the YBOCS (0.85) and DOCS (0.97). Moderate effects were found for the SDS (0.52) and GAD-7 (0.62) and a small effect size was found for the PHQ9 (0.35).

4.4.4 Clinical Significance

Those who did not complete the post-treatment interview were coded as meeting criteria for OCD. Using this conservative criteria 7/17 (41%) of participants no longer met diagnostic criteria for OCD diagnosis at post-treatment. The percentage of individuals scoring in the recovered range on the YBOCS was 1/15 (7%) at post-treatment and the mean percentage reduction on the YBOCS was 28%.

4.4.5 Treatment Satisfaction

Fourteen of the 17 participants (82%) completed the treatment satisfaction questions at post-treatment. Three out of 14 participants (21%) were *extremely satisfied*, 8/14 (57%) were *satisfied*, 2/14 (14%) were *neutral/dissatisfied* and 1/14 (7%) was *extremely dissatisfied*. When asked to provide a rating from 1 (low agreement) to 10 (high agreement), participants rated the treatment as *easy to understand* ($M = 7.42$, $SD = 1.98$) and as containing helpful techniques ($M = 7.29$, $SD = 2.84$). Thirteen out of the fourteen participants (93%) stated that they would *recommend this program to a friend with OCD*.

4.4.6 Time Spent/Contact Events per Participant

During the program, the clinician made a total of 7.71 telephone calls to participants ($SD = 1.90$ per participant). Calls were made once per week and when calls were unanswered the

clinician left a message asking the participant to return the call. An email was also sent to participants informing them that the clinician had attempted to contact them. During the program, participants did not receive any automated email reminders, however, the clinician sent on average 3.88 ($SD = 2.76$) emails per participant informing them they had tried to call. The mean total therapist time per participant was 57.06 minutes ($SD = 47.70$ min) including sending and reading emails and telephoning participants.

4.4.7 Adverse Events

No participants in the sample (0/17; 0%) met criteria for a significant deterioration in symptoms. No other adverse events were reported during or after the trial.

4.5 Discussion

The aims of this study were threefold: 1) To examine the relative benefits of two forms of remote treatment compared to a wait list control group; 2) to examine the relative acceptability of each form of treatment, and; 3) to examine the effect of reduced therapist contact using the control group. Overall the hypotheses were supported. Results from this study, while subject to several important limitations described below, are consistent with emerging literature indicating that OCD can be successfully treated remotely, either by bibliotherapy or by the internet, and that once weekly contact with a therapist may still result in clinically significant outcomes, however, more frequent contact appears to result in improved outcomes.

The bibliotherapy arm of this study resulted in a large pre-treatment to post-treatment within-group effect size (1.19) on the YBOCS, which reduced at follow-up, but remained in the large range (0.89). The magnitude of the pre-post effect size is similar or greater than those

reported in self-guided remote treatment protocols for bibliotherapy ^[241, 343, 344]. For example, Moritz, Jelinek, Hauschildt and Naber ^[343] reported that an unguided CBT bibliotherapy workbook resulted in significant pre-post treatment reductions in symptoms on the YBOCS, with a moderate between-group effect size of 0.63 when compared with a wait-list control group. A similar within-group effect size was reported by Tolin et al. ^[241] (0.65) following an unguided cBT bibliotherapy intervention. It is likely that the lower effect sizes seen in these studies reflects the unguided nature of the trials, and is consistent with literature indicating that unguided studies produce lower effect sizes than guided studies ^[305, 338, 408].

The pre-post treatment effect size on the YBOCS in the iCBT arm of the study was also large (1.09) but reduced by follow-up to the moderate range (0.79). The pre-post treatment effect size for this intervention is lower than that seen in Study II (1.53) and also lower than reported in other iCBT studies for OCD (1.55 and 1.56) ^[334, 335]. The magnitude of the effect size in the present study is still consistent with meta-analyses of IPT for anxiety and depression more generally, which report effect sizes of 0.61 to 0.88 ^[303, 305, 364], and also appears higher than effect sizes obtained by unguided iCBT for OCD ^[407] provided by a publicly available website. The pre-post effect size on the YBOCS in the iCBT arm of the study is also generally consistent with face-to-face studies using a ITT model of analysis (0.92 ^[260]-2.63 ^[230]), albeit at the lower end.

There are several possible reasons for the lower effect size on the YBOCS seen in the iCBT group in this study compared to Study II. First, the removal of a minimum cut-score on the YBOCS appears to have increased standard deviations and, therefore, lowered effect sizes. This effect is likely to have been compounded by the higher dropout rate in this study (25% in the Bibliotherapy Group, 33% in the iCBT Group from pre-post) compared to Study II (5%).

For example, if pre-post treatment effect size were calculated based only on those who completed post-treatment questionnaires the effect sizes for the iCBT Group would increase from 1.09 to 3.42 and for the Bibliotherapy Group from 1.19 to 1.58.

Second, the reduced effect size in this study compared with previous studies may also reflect differences in characteristics of the sample including use of medications and treatment history, which may have reduced the possible magnitude of benefits from treatment. For example, although the proportion of participants taking an SSRI did not significantly differ between the Bibliotherapy and iCBT Groups (50% and 60% respectively), the proportion of participants in this study who were medicated was greater than in Study II (27%). Similarly, in the two Swedish iCBT studies, which obtained a similar effect size to Study II, the number of individuals medicated on SSRIs was low (16-17%) [334, 335]. Moreover, the rate of previous treatment for OCD was higher in participants in the present study (95%), compared with the two Swedish iCBT studies (61% and 66%, respectively). The combination of an increased proportion of medicated participants and participants with previous treatment histories for OCD may have made it less likely that clinically significant changes would be observed.

Third, the differences in the intervention materials and procedures used in Study II and Study III may also have affected outcomes. The intervention used in this study (*The OCD Course*) was different to that used in the feasibility study (Study II; *The OCD Program*) as the original materials were no longer available when the Candidate transferred between universities. Whilst the techniques described across the interventions were identical, and both were authored by the Candidate, the reduction in the number of Lessons from 8 to 5, as well as more subtle differences in content may have influenced results. Results from other iCBT studies indicates a relationship between therapeutic contact and outcomes, but it is not clear

how this relates to therapeutic content, as some recent studies indicate that similar outcomes were obtained from an iCBT intervention that was reduced from an 8 to 5 Lesson Course ^[406, 421].

Two procedural differences that may have affected outcomes included the absence of automated emails in Study III, and the omission of guidance in Study III about construction of an exposure hierarchy. Firstly, participants in Study II obtained regular automated emails which notified and reminded participants about materials, and provided encouragement. In order to make the iCBT arm equivalent to the bibliotherapy arm these emails were not used in Study III. Recent research at the eCentreClinic has demonstrated the importance of automated emails in improving adherence to treatment and outcomes in a transdiagnostic program for anxiety and depression ^[424]. Thus, the effects seen in both treatment groups may have been improved if automatic reminders were used.

Secondly, in Study II, participants were assisted in creating their exposure hierarchy during the third week of the program, which was then emailed to them by the therapist. In the current study participants were encouraged to construct their own hierarchy and were not specifically guided on how to do this. Participants were, however, provided with written instructions and multiple examples of hierarchies addressing common symptoms in order to facilitate the development of an exposure hierarchy. It is possible that these instructions may not have been sufficient for the participant to construct a hierarchy and as a result participants may have not completed an important part of the treatment, or alternatively constructed a hierarchy with insufficient steps and subsequently attempted to perform exposure tasks that were too difficult. This may have reduced motivation, engagement, and adherence.

Overall, there are a number of possible reasons for the lower effect sizes observed in the present study compared to previous studies. Notwithstanding this, the results from the current study provide further preliminary evidence to suggest that both iCBT and bibliotherapy can be used in the remote treatment of OCD. Results from the study indicate that both treatments result in large effect sizes, even when using a conservative method of data analysis. Importantly, there do not appear to be any differences in the efficacy of either of the remote treatment types.

The second aim of this study was to investigate the relative acceptability of the two remote treatment options. Relatively high levels of acceptability were also found for both the treatment groups, with 73% in the Bibliotherapy Group and 70% in the iCBT Group reporting they were either '*satisfied*' or '*extremely satisfied*' with the Course. Whilst the reported level of overall satisfaction is acceptable, it is lower than that seen in Study II. However, despite the lower satisfaction rating, 100% of the participants in the iCBT Group indicated that they would *recommend the program to a friend with OCD*, compared with 93% in the Bibliotherapy Group, indicating that overall, the intervention was acceptable to participants in both groups.

To our knowledge this is the first study comparing two forms of remote treatment for OCD. Whilst the results indicate that the two treatment conditions resulted in significantly better outcomes than the control group, there were relatively few significant differences between the treatment groups in efficacy and acceptability. In addition, using conservative measures of clinical significance, as suggested in a recent meta-analysis, similar numbers of participants were found to meet recovered status (i.e., 30% in the bibliotherapy condition and 40% in the Internet condition) compared with previous face-to-face studies ($M = 45\%$; range: 17-74%)

[200] and did not differ significantly across the groups. These results provide preliminary evidence to indicate that either bibliotherapy or internet-delivered CBT may be used as a remote treatment option, with similar outcomes. These findings are consistent with recent evidence from a study of insomnia treatment which found that internet and bibliotherapy administered interventions resulted in equivalent outcomes [419].

The third aim of the present study was to evaluate the efficacy and acceptability of *The OCD Course* with the control group who received weekly, rather than twice weekly clinician contact. Based on previous studies with other anxiety disorders it was expected that despite the reduced contact, control group participants would show significant improvements on symptom measures of OCD and on secondary measures, although it was expected that outcomes would be lower than those reported in studies where contact had been more intensive. It was also expected that participants would rate the program as acceptable despite having reduced contact with the clinician. Overall the Control Group received a mean of 57 minutes of contact compared to 77 minutes in Study II and 103 minutes for the Bibliotherapy Group and 89 minutes in the iCBT Group in Study III.

This hypothesis was partially supported, with results from the Control Group demonstrating statistically significant changes on both the primary and secondary outcome measures from pre-treatment to post-treatment, but limited clinically significant change. The pre-post treatment within-group effect size for Control Group on the YBOCS was large (0.85) and on the secondary outcome measures the effect sizes ranged from small on the PHQ-9 (0.35) to large on the DOCS (0.97). However, assuming that those who did not complete the MINI interview continued to meet criteria for OCD, only 1/15 (7%) of participants no longer met

DSM-IV diagnostic criteria for OCD at post-treatment, which is considerably lower than the results from the two treatment groups, who received additional contact.

There are several possible reasons why the within-group effect size on the YBOCS obtained by the Control Group (0.85) was lower than those reported in previous iCBT treatments (1.55, 1.56^[334, 335]) and previous studies described in this thesis (1.09-1.53). It is possible that the reduced clinician contact resulted in less engagement in the Course. This reduced engagement is evident from the differences in reported time spent practicing the skills, which was significantly different between the control group ($M = 31.23$ mins, $SD = 21.88$) and the active treatment groups from the RCT ($M = 56.25$ mins, $SD = 48.99$). However, it did not appear that the reduced clinician contact resulted in less engagement with the Course materials as participants in the control group logged in to the program slightly more frequently ($M = 19.65$, $SD = 11.62$ logins) than the iCBT participants in the RCT ($M = 17.90$, $SD = 7.43$ logins). Other possible reasons for the reduced effect have been discussed above and may include the higher rate of medication use in this group (77%), higher rate of previous treatment in this group (88%), and differences in course materials and prompts used.

Despite the reduced contact received by the control group relatively high levels of acceptability of the Course were found in this group. Seventy-eight percent of participants reported being either *extremely satisfied* or *very satisfied* with the Course and 93% stated that they would recommend the Course to a friend with OCD. These results indicate that clinician contact once a week is equally as acceptable to participants as twice-weekly contact.

It is possible however that the perception of support, rather than actual contact time may also be important variable in relation to the efficacy and acceptability in iCBT studies for OCD. For example, it may be necessary to provide support only when requested, rather than

assuming that all participants require the same amount of support. This may be particularly relevant in OCD where stigma is a considerable barrier for individuals entering treatment ^[289-292]. Similarly, support may only be required at critical times in the program (e.g. when developing exposure hierarchies) rather than at weekly intervals. However, these hypotheses require further investigation in an OCD population.

4.6 Limitations

The main limitation of this study is the small sample size in each of the groups. While this study was planned as a feasibility study, and it was recognised that the study was underpowered during the design stage, the subsequent difficulties with recruitment were not anticipated, and reduced the power of this study further. These difficulties were unexpected given the outcomes from the acceptability study (Study I) which indicated that iCBT treatment is highly acceptable to individuals with OCD.

There are at least two possible reasons for the recruitment difficulties. First, despite considerable promotions, this study was conducted at a newly constructed online research clinic, and which was still building web traffic during the commencement of the study. Second, 60% of those who provided informed consent to participate but were subsequently ineligible failed to complete the demographic application, indicating that applicants may have been reluctant to provide identifiable information about their symptoms. This suggests that, whilst participants find iCBT acceptable, they may prefer an anonymous service. Whilst further research is required around this hypothesis, open access iCBT treatment would overcome this barrier, such as those described by Klein, Meyer, Austin and Kyrios ^[407].

An additional limitation of the study is potential bias associated with having the Candidate (the therapist) responsible for administering the YBOCS. As discussed previously, whilst blind administration of the YBOCS would have been preferable it was not possible, as the University requires that the Candidate conducts all the work in relation to their research project. As indicated in Study II, data from several of the self-report questionnaires indicated improvement with treatment, providing converging evidence that, despite the potential threat to validity the results from the YBOCS were also valid.

Another important limitation is the relatively low rates of completion of questionnaires, compared to Study II. This low rate of completion of post-treatment questionnaires affected the overall effect size, as the BOCF method was used which replaced missing data with the pre-treatment score. Missing data could have been accounted for using other statistical procedures such as the Last Observation Carried Forward (LOCF) method, an imputation model, or mixed linear models. However, in the interests of deriving conservative estimates of benefit, the BOCF method was chosen over the LOCF method and imputation models. In addition, ANCOVAs were used over mixed linear models as there were insufficient data points for mixed linear models as questionnaires were only administered at pre-treatment, post-treatment and follow-up. ANCOVAs are recommended as a robust and reliable statistical strategy for analysing the results of RCTs ^[422, 423].

4.7 Future Research

While the present results provide preliminary evidence for the efficacy of both bibliotherapy and iCBT for OCD, an important and outstanding question concerns the reasons for the poorer results obtained in this RCT compared to the open trial (Study II). If it were possible, a comparison between the longer and original *OCD Program* with *The OCD Course* used in the

present trial would help determine the reasons for this difference. Unfortunately, as indicated, the original OCD Program was no longer available to the Candidate.

Future research could also aim to replicate the present design with a larger sample. This would require large scale recruitment promotions, as well as possible changes to the design to allow anonymous applications and participation. While this latter change would require ethical approval, it may help to reduce an important barrier to participation. Should a sufficient number of participants be attracted, it would then be possible to conduct more sensitive and robust comparisons of the treatment conditions, using superiority or non-inferiority designs ^[425, 426].

A third area for future research concerns determining whether there are reliable predictors of outcome in remote treatments. At present, no such predictors have been consistently found in either iCBT ^[409, 410] or face-to-face treatments ^[35, 227, 271-288] for OCD. Identification of such predictors would assist in informing consumers about suitable treatment options, and will help avoid prescriptions of treatments which are unlikely to be effective, and will thus help to avoid treatment failure.

4.8 Conclusions

While the small sample size limits the conclusions that can be drawn from this study, these results extend the previous findings reported in this thesis by providing preliminary evidence for the efficacy of the two most common remote treatment approaches, iCBT and bibliotherapy. Significant clinical outcomes were also obtained with reduced therapist contact, although effect sizes are smaller and the number of participants no longer meeting criteria for caseness is much smaller, indicating a possible dose-response relationship, as indicated by

previous research ^[408]. It is also not known, however, if certain groups of individuals with OCD respond more favourably to these interventions than others and an investigation of predictors of outcome is needed.

CHAPTER FIVE

Study IV: A Preliminary Investigation of Predictors of Outcome and Dropout in Remote Treatment for Obsessive-Compulsive Disorder

5.1 Introduction

Evidence is emerging for the acceptability and efficacy of remote treatments for OCD, when delivered either by iCBT ^[334, 335, 407] or bibliotherapy ^[241, 343, 344], however, not all participants respond equally to treatment and some do not complete treatment. Reliably identifiable characteristics that can predict poor outcome or dropout would help to develop algorithms that can be used to advise consumers on suitable treatment options based on empirically determined profiles. A large number of potential predictors have been studied in both the face-to-face and remote treatment literature in attempt to understand who is likely to benefit from CBT treatment of OCD. Results of these studies are summarised below.

5.1.1 Predictors Based on Demographic Characteristics

Some ^[277, 427], but not all ^[271, 273, 280] studies have reported that an earlier age of onset predicts a poor response to treatment in OCD. Similarly, some studies have found that those who sought treatment earlier are more likely to have a better outcome in treatment ^[283, 427, 428], while others have not found this relationship ^[271, 273, 284], and one study has found the opposite indicating that those who delayed treatment obtained better results ^[279]. Several studies have also reported that male gender is a poor prognostic indicator of treatment outcome ^[284, 429], however, this finding may reflect that those with younger onset tend to be male ^[17, 20, 430], and

younger onset has been linked to more severe symptoms ^[20, 431] which, in turn, is linked with poorer outcome ^[40, 277, 285, 288, 432, 433].

Marital and occupational status have also been found to be related to outcome in some studies ^[35, 272, 273, 434], but not in others ^[434]. For example Steketee, Eisen, Dyck, Warshaw and Rasmussen ^[35] found that in a sample of 100 patients with OCD, those who were married were twice as likely to reach remission than those who were unmarried. However, a study conducted by Boschen, Drummond, Pillay and Morton ^[434] found that marital status was a predictor of outcome in a group that received inpatient treatment, but not in a group that received outpatient treatment for OCD. There is also some research indicating that those who live within a stressful environment or have significant interpersonal stressors have less promising outcomes during treatment ^[287, 435], but this finding requires replication.

5.1.2 Predictors Based on Symptom Severity

The results of studies exploring the relationship between severity of symptoms at pre-treatment and outcomes have also been equivocal. The majority of studies have reported that severity is related to poorer outcomes in face-to-face studies ^[227, 277, 282, 285, 429, 432, 436], with one study reporting a 12% reduction in the likelihood of remission at post-treatment for each additional point on the YBOCS at pre-treatment ^[277]. However, other studies have found no relationship between symptom severity and outcome ^[271, 275], and others have found that higher pre-treatment severity of symptoms predicts better outcome ^[280, 283]. These inconsistent findings may be partially accounted for by statistical artefacts including possible floor effects for less severe symptoms and regression to the mean for severe symptoms. There is also some evidence to suggest that those with lower pre-treatment scores may be more likely to discontinue treatment (i.e. not complete the full treatment protocol) ^[437] due to less investment

in treatment due to lower level of symptoms, further confounding outcomes. However, overall, the majority of the research on symptom severity indicates that the severity of pre-treatment OCD symptoms may be a reliable predictor of treatment outcome.

5.1.3 Predictors Based on Symptom Presentation

Outcome based on type of symptom presentation has also been studied. The most consistent finding in this area is that hoarding symptoms are linked with a poor outcome in CBT treatments ^[40, 277, 285, 288, 432, 433], however these symptoms are no longer considered to be associated with OCD ^[12, 47, 48]. Less consistent results have been found in studies exploring outcomes based on OCD symptom domains. For example, some studies indicate that washing and checking symptoms respond poorly to treatment ^[272, 429], whilst other have indicated that those with inappropriate sexual or blasphemous thoughts respond less well to treatment ^[271, 285, 288]. Improvements in the reliability of measures that discriminate between these symptoms subtypes, such as the recently developed DOCS, may help to advance studies exploring the relationship between symptom domain and outcomes in the future.

Several studies have examined the effect of the reason driving compulsive behaviours as a predictor of treatment response ^[272, 431]. There is some evidence that individuals who complete compulsions to avoid harm are more likely to respond than those who complete the compulsive behaviours to feel ‘right’ or ‘complete’ ^[278]. For example Foa, Abramowitz, Franklin and Kozak ^[278], found that those who reported feared outcomes showed a larger decrease (67%) in symptoms than those who didn’t (45%). Similarly a recent report found that those with autogenous obsessions obtain better outcomes than those with reactive obsessions ^[438]. In this study Belloch, Cabedo, Carrio and Larsson ^[438] reported that a greater amount of those with autogenous obsession (73%) achieved recovery status (post-treatment

YBOCS ≤ 12 and at least a 6-point reduction in symptoms) than those with reactive obsessions (33%). Understanding predictors based on reason for compulsions and type of obsession may be a promising step forward in understanding the differential response to treatment in OCD.

5.1.4 Predictors Based on Comorbidity Profiles

The Axis I disorder with the most evidence supporting a relationship to treatment outcome is depression, although the results of these studies are equivocal. Some studies have reported that high levels of co-morbid depression at the time of treatment results in poorer outcomes in OCD treatment ^[35, 274, 428, 439], and other studies reveal no association between depression and outcome ^[280, 285]. However, these results appear to vary based on the severity of depression, with those studies describing higher levels of depression at pre-treatment tending to find a relationship with outcome.

The presence of co-morbid anxiety disorders have also been studied, with results indicating that the presence of GAD ^[279] or PD ^[279, 440] is related to poor outcome in individual treatment, and the presence of SP is found to be related to poor outcome in group treatment of OCD ^[284]. Studies also indicate that those with GAD or PD tend to dropout of treatment at a higher rate than those without these comorbidities ^[284]. Other studies however, have found no relationship between co-morbid anxiety disorders and outcome in OCD treatment ^[35]. In summary, while the results of studies exploring the effect of predictors based on comorbidity profiles are also mixed, it appears likely that those with certain comorbidity profiles, particularly depression, may be less likely to respond to treatment.

5.1.5 Predictors Based on Compliance Characteristics

Non-compliance with homework assignments is one of the most consistent predictors of symptom improvement ^[275, 436, 440], even after controlling for psychiatric comorbidities and symptom severity ^[440]. De Araujo, Ito and Marks ^[275] found that early compliance with exposure in the first week of treatment was one of the most reliable predictors of outcome at post-treatment and Abramowitz, Franklin, Zoellner and Dibernardo ^[440] found that treatment compliance accounts for 64% of the variance in treatment outcome. While treatment compliance appears to be a promising predictor of outcome, data are confined to a small number of studies and analyses are limited by a lack of reliable measures of treatment compliance.

5.1.6 Predictors of Outcome in Remote Studies

Several studies have specifically explored the predictors of outcome in OCD treatment in remote studies and these results have tended to reflect results from the face-to-face literature. For example, Mataix-Cols, Marks, Greist, Kobak and Baer ^[285] reported that those in the BT STEPS studies were less likely to respond to treatment if they had unacceptable thoughts of a religious or aggressive nature. In addition, a study of bibliotherapy treatment for OCD found that higher pre-treatment symptom levels were associated with better outcome at post-treatment ^[343].

Several studies have also examined predictors of outcome in iCBT and bibliotherapy in other disorders. For example, Spek et al. ^[409] found that in a group of people with sub-threshold depressive symptoms a better outcome was seen in those participants with higher initial pre-treatment depression severity, being female and lower levels of neuroticism. However, apparently inconsistent results were found in a CCBT program for depression which found

that those with lower initial pre-treatment scores responded better ^[410] and that outcomes were better predicted by employment and levels of general psychopathology ^[410]. Another study found that referral source was also related to outcome, with those referred from their GP obtaining better outcomes than those who self-referred or were referred from a psychiatric setting ^[441].

In summary, there is considerable inconsistency in the results of studies exploring predictors of treatment outcome for OCD, and only a small number of studies have explored these specifically in the remote treatment area. The inconsistencies found in previous predictor studies may be related to the heterogeneity in design and statistical methods used across studies, as well as the small sample sizes that characterise the literature in this area. The aim of this study was to conduct preliminary and exploratory examinations to determine whether any predictors of outcome and dropout can be identified from the results obtained in the outcome studies reported in this thesis.

5.2 Method

5.2.1 Design

The present study pooled the results from Study II and III to investigate whether predictors of outcome or dropout can be identified in the remote treatment of OCD.

5.2.2 Hypotheses

Based on previous research six potential predictor variables were examined in relationship to treatment outcome. It was expected that pre-treatment severity of OCD symptoms, the type of obsession, reason for compulsion, presence of pre-treatment MDD, number of pre-treatment diagnoses, and level treatment compliance would be significant predictors of outcome. For the

examination of treatment dropout, defined as those who did not complete post-treatment questionnaires, five potential predictors were examined. It was expected that pre-treatment severity, the type of obsession, reason for compulsion, presence of pre-treatment MDD and number of pre-treatment diagnoses would be significant predictors of dropout. Treatment compliance factors were not assessed in relation to dropout because this variable was measured at post-treatment and thus data is not available for people who dropped out of treatment.

Table 5.1

Demographic Information for Total Sample

Demographic Variable		N/Mean(SD)	%
Age (<i>n</i> = 74)	Mean	37.15 (10.86)	
	Range	18-68	
Gender (<i>n</i> = 74)	Female	51	68.9
	Male	23	31.1
Occupational Status (<i>n</i> = 74)	Employed	52	70.3
	Unemployed	16	21.6
	Student	6	8.1
Marital Status (<i>n</i> = 74)	Single/Never Married	32	43.2
	Married/De-facto	35	47.3
	Divorced/Widowed	7	9.5
Current Medication (<i>n</i> = 72)	(% yes)	38	52.8
Pre-treatment YBOCS score (<i>n</i> = 71)		21.46 (5.20)	
YBOCS Symptom Severity (<i>n</i> = 74)	Mild	8	10.8
	Moderate	43	58.1
	Severe	20	27.0
	Extremely Severe	3	4.1
Type of Obsession (<i>n</i> = 53)	Autogenous	17	32.1
	Reactive	36	67.9
Reason for Compulsion (<i>n</i> = 53)	Harm Avoidance	41	77.4
	Incompleteness	12	22.6
Comorbidity (<i>n</i> = 74)	MDD	23	31.1
	PD	8	10.8
	PTSD	8	10.8
	GAD	30	40.5
	SP	22	29.7
Total Pre-treatment Diagnoses (<i>n</i> = 74)		2.23 (1.09)	
Treatment Compliance (<i>n</i> = 56)	Completed all Lessons	39	69.6
	Completed some Lessons	17	30.4

Note. YBOCS: Yale Brown Obsessive Compulsive Scale. MDD: Major depressive disorder. PD: Panic disorder. PTSD: Post-traumatic stress disorder. GAD: Generalised anxiety disorder. SP: Social phobia.

5.2.3 Participants

Data from participants in Study II ($n = 21$) and Study III ($n = 53$) was pooled to investigate the predictors of interest. Demographic information for the combined sample is provided in Table 5.1.

5.2.4 Predictor Variables

The predictor variables of symptom improvement were identified based on previous literature and included pre-treatment severity, type of obsession, reason for compulsion, pre-treatment MDD, number of pre-treatment diagnoses, and compliance to treatment. Pre-treatment symptom severity was determined by the pre-treatment total score on the YBOCS. A diagnosis of MDD was based on the results of the pre-treatment MINI interview. Similarly, number of diagnoses was based on number of anxiety and depressive disorders met on the MINI (including OCD). Compliance with treatment was based on how many lessons were completed by the participant (some versus all Lessons). Data on symptom severity, MDD diagnosis, number of diagnoses, and compliance with treatment are available for all participants. Participants were also allocated into their primary obsessional type; autogenous or reactive, and primary reason for compulsions; harm avoidance or incompleteness, based on responses at the initial clinical interview. Data for obsession type and reason for compulsive behaviour are only available for those in Study III.

5.2.5 Statistical Methods

Consistent with previous studies of predictors of treatment outcome in OCD, symptom improvement was defined as the percentage reduction in symptoms from pre-treatment to post-treatment on the YBOCS ^[272, 283]. To calculate whether the variables of interest predicted symptom improvement a forced entry multiple regression was performed. Participants were

classified as a dropout if they did not complete their post-treatment questionnaires. To assess whether any of the variables predicted dropout a forced entry binary logistic regression was performed. It is acknowledged that the study was underpowered for the number of predictors used in the regressions ^[442], however, these analyses were conducted for exploratory purposes, and with awareness of the increased risk of Type II errors. Forced entry analyses were used for both regressions because of the inconsistent previous literature. Thus it was not assumed that one particular predictor was more important than another. All analyses were performed on SPSS Version 19 (IBM Inc, USA).

5.3 Results

5.3.1 Symptom Improvement

A forced entry multiple regression was performed to understand the relationship between the identified predictors and symptom improvement (percentage reduction in YBOCS scores from pre-treatment to post-treatment). This regression was not significant ($F_{(6,27)} = 2.05$, $p = 0.093$) and approximately 31% of the variance was explained using the predictors ($R^2 = 0.313$). The unstandardised regression coefficient (B), unstandardised standard error (SE) (as well as the 95% confidence interval), standardised regression coefficient (β) and p -values are reported in Table 5.2 which indicates that none of these predictors added a significant unique contribution to the regression. The compliance variable approached significance, indicating that percentage improvement may be related to the number of Lessons completed in the Course.

Table 5.2

Unstandardised Regression Coefficient (B), Unstandardised Standard Error (SE), Standardised Regression Coefficient (β) and p-values for each of the Predictor Variables in Relation to Treatment Outcome

Variable	B	SE	Lower	Upper	β	p-value
Pre-treatment Severity	-1.071	0.714	-2.536	0.393	-0.292	0.145
Type of Obsession	-8.711	7.350	-23.791	6.369	-0.225	0.246
Reason for Compulsion	1.340	7.129	-13.287	15.968	0.031	0.852
Pre-treatment MDD	-2.760	7.702	-18.563	13.043	-0.070	0.723
Completed All Lessons	12.497	7.037	-1.942	26.935	0.316	0.087
Number of Diagnoses	-1.453	3.254	-8.130	5.223	-0.087	0.659

Note. MDD: Major Depressive Disorder.

Table 5.3

Unstandardised Regression Coefficient (B), Unstandardised Standard Error (SE), Odds Ratio and 95% lower and upper Confidence Intervals and p-values for each of the Predictor Variables in Relation to Treatment Dropout

Variable	B	SE	Odds Ratio	Lower	Upper	p-value
Pre-Treatment Severity	0.050	0.071	1.051	0.914	1.209	0.485
Type of Obsession	0.290	0.789	1.336	0.284	6.276	0.714
Reason for Compulsion	0.709	0.877	2.031	0.364	11.334	0.419
Pre-treatment MDD	-1.254	0.859	0.285	0.053	1.536	0.144
Number of Diagnoses	-0.418	0.381	0.658	0.312	1.389	0.273

Note. MDD: Major Depressive Disorder.

5.3.2 Dropout

A forced entry binary logistic regression was performed to explore the relationship between the identified predictors and likelihood of dropout. This model was also not statistically significant ($\chi^2(5, N = 74) = 3.868, p = 0.569$). The unstandardised regression coefficient (B),

unstandardised standard error (*SE*), *p*-values, odds ratio (and 95% CI of odds ratio) are reported in Table 5.3 which indicates that none of these predictors added a significant unique contribution to the model. The overall variance accounted for by the model was approximately 7% using the Cox and Snell R^2 and 11% using the Nagelkerke R^2 .

5.4 Discussion

The aim of this study was to investigate factors that may relate to outcome or dropout in remote treatment for OCD. Whilst several variables have been studied previously in both the remote treatment literature ^[285, 409, 410], and the face-to-face treatment literature ^[274, 285, 288, 440], very few reliable predictors of outcome have emerged to date. Results from this study are consistent with this research, and found no reliable predictors of outcome or dropout. As mentioned previously however, the study was underpowered, inflating the possibility of Type II error. Using the sample size calculations outlined in Tabachnick and Fidell ^[442], ($N \geq 50 + 8m$), an adequate sample to run the analyses is $n = 98$ for the outcome regression and $n = 80$ for the dropout regression, which was well under the sample size available in the current study.

Overall, the results of this study are inconsistent with the large body of literature that indicates that those with more severe symptoms perform less well to treatment ^[227, 277, 282, 284, 285, 429, 432, 436]. However there are other studies that have not found this relationship ^[271, 275]. The majority of participants in the study (56%) had moderate severity of symptoms, with a smaller number of participants scoring on the severe (28%) or extremely severe (4%) range on the YBOCS. It is possible that this lack of sufficient range in scores, coupled with the small sample size meant that such an effect was not detected. Alternatively, it is also possible that the treatment was beneficial for people with a wide range of severity of symptoms, as they were able to take the treatment at their own pace, which is one potential advantage over face-

to-face treatment more generally and may explain a possible difference in response to treatment.

Previously reported findings indicating that those with autogenous obsessions respond better to treatment than those with reactive obsessions ^[438] was not supported, nor did the results support previous findings indicating that those who perform compulsions to avoid harm perform better in treatment than those who perform compulsions based on a sense of incompleteness ^[278]. Consistent with Steketee, Eisen, Dyck, Warshaw and Rasmussen ^[35] there was no relationship between outcome and pre-treatment comorbidities. Again, these findings should be treated with caution and require replication with a larger sample size, as the null findings may have been an artefact of the inflated Type II error rate.

Another consistently reported finding in the literature that was not supported by the current study was the relationship between compliance and outcome ^[275, 436, 440]. However, the compliance variable approached significance, indicating that percentage improvement may be related to the number of Lessons completed in the Course, and additional power resulting from a larger sample size may have resulted in a significant finding on this variable. Whilst there is no commonly used measure of compliance in treatment outcome studies, understanding compliance in remote treatments is especially difficult as the reduced therapist contact makes it more difficult to assess compliance compared to face-to-face treatment. The variables used to quantify compliance in this study were whether the participant completed all of the Lessons or not, however other measures of compliance, such as time spent practicing the skills, or the number of times the participants logs into the program may be a more reliable indicator of compliance. This data was unfortunately only collected for Study III, thus was not analysed, due to already low sample size. As suggested by other authors, it is

potentially more beneficial to obtain weekly rating scores of compliance ^[440], especially in the early weeks of the treatment, to further assess this variable, rather than measuring it at post-treatment.

5.5 Limitations

The primary limitation of this study is the small sample size, which limits the validity of the analyses. Had the recruitment quota for Study III been filled the current study would have been sufficiently powered. The study was completed despite these limitations and the aims were modified to reflect the exploratory nature of the predictors of interest. The small sample size may inflate the possibility of Type II error, and thus replication with a larger sample size is important. It is possible that other predictors may emerge with a larger data set that is sufficiently powered to detect differences.

5.6 Further Research

Further research into predictors of outcome in both face-to-face and remote treatment studies are needed to determine who may or may not benefit from treatment for OCD. The results of some earlier studies, while important, now have limited predictive validity given that several variables, including hoarding symptoms, and some previously widely used outcome measures are no longer included in conceptualisations or measurement of OCD. In addition it is likely that there are variables not yet studied in the literature, which may have an impact on outcome. In addition, outcome in remote treatment may be different to face-to-face treatment and this requires further investigation. As more remote treatment studies emerge, so too will further potential predictors of interest that may play a role in understanding treatment outcome and dropout.

It is also important to recognise that many of the predictors used in this and previous studies are based on characteristics of the individual. Process variables and variables concerned with the characteristics of the intervention may also be involved in predicting outcome and dropout in remote treatments. For example the content of the program, such as text vs. a combination of text and pictures, the length of the program, the type of prompts or reminders used, the type of delivery of the intervention or type of guidance may also be predictive of outcome and dropout in remote treatment studies.

5.7 Conclusion

The results of this study revealed no reliable predictors of outcome or dropout in remote treatment for OCD. These results are consistent with the wider literature of face-to-face treatment of OCD and iCBT studies which have identified few reliable predictors of treatment outcome generally. However as mentioned above these results should be treated with caution, due to the small sample size. Replication with a larger sample is warranted. Identifying predictors of response to treatment and dropout will facilitate the development of algorithms to help guide people with OCD to obtain optimum treatments, and are an important focus for future research.

CHAPTER 6

General Discussion

6.1 General Summary

OCD is a chronic and disabling condition that results in considerable impairment in functioning across several domains ^[4, 17, 27]. Effective psychological treatments exist for OCD ^[170, 199-201]. Unfortunately, many individuals experience difficulty accessing evidence-based treatments ^[20, 289-292]. Remote treatments for anxiety disorders, particularly internet and bibliotherapy-administered treatments have attracted considerable attention from researchers in recent years as a way of improving access to treatment. At the time of planning the studies for this thesis there were a small number of studies that had examined the efficacy of bibliotherapy in treatment of OCD but no studies had reported the efficacy of iCBT for OCD. In the hope of improving access to evidence-based psychological treatment for individuals with OCD, the aim of this thesis was to evaluate the acceptability and efficacy of bibliotherapy and iCBT for OCD. These evaluations were conducted across four studies, including one survey examining the acceptability of internet-administered treatment, two treatment outcome studies evaluating two methods of remote treatment, and a final study examining predictors of outcome and discontinuation of treatment.

The primary aim of Study I, which was conducted using an online survey methodology (Chapter 2), was to investigate whether internet-administered treatment was acceptable to individuals with OCD. Understanding the acceptability of these remote treatments is important as it is likely to affect the development and potential implementation of such interventions. The secondary aim of Study I was to compare the characteristics of respondents

to the internet survey with two existing samples of individuals with OCD, including clients from a specialist outpatient anxiety clinic and a sample of respondents to a national epidemiological study. It was expected, based on similar studies ^[312, 320, 349, 350], that internet-administered treatment for OCD would be highly acceptable, and that survey respondents would be demographically similar and have symptom severity similar to individuals with OCD symptoms more generally.

One hundred and twenty eight participants completed the online survey and the results indicated that respondents considered internet-administered treatment to be highly acceptable, with 98% of respondents indicating that they would *definitely*, *possibly*, or *maybe* try internet-administered treatment for OCD if they were to seek treatment for their symptoms. Importantly, respondents to the internet survey showed a similar demographic profile as those in a representative national survey, but had more severe levels of disability than the comparator groups. Additionally, scores on the YBOCS-SR and OCI-R were similar to those reported in treatment outcome studies more generally, suggesting that these participants had clinically significant symptoms. The results from Study I were the first to document the acceptability of internet-administered treatment for OCD and provided preliminary data to support the development of an iCBT treatment protocol for OCD.

Study II was designed as a feasibility study at a time when there were no published studies examining internet-administered treatments for OCD. The secondary aim was to extend the results of Study I by examining the acceptability of iCBT treatment post intervention. Based on similar studies conducted with other anxiety disorders, it was expected that the iCBT treatment would result in a significant reduction in OCD symptoms and that participants would find the program acceptable. Twenty-two participants took part in this open trial and

treatment was provided over 8 weeks via the internet, with brief, twice weekly telephone contact from a Clinical Psychologist. Large to moderate within-group effect sizes were obtained on the primary and secondary outcome measures with only 77 minutes of therapist time required on average per participant over the eight weeks. Study II also extended the findings of the previous acceptability study, with participants who completed the program reporting that it was an acceptable mode of treatment delivery. The main limitation of the study was the open trial design, which did not allow for control of spontaneous remission of symptoms.

To address this limitation of Study II, Study III aimed to replicate and extend on Study II, using a randomised controlled design. The aim of this study was to explore the relative efficacy and acceptability of two types of remote treatments for OCD: bibliotherapy and iCBT compared to a waitlist control group. This study also aimed to examine the effect of reduced therapist contact on outcomes during remote treatment, using the control group from the RCT. At the design stage it was acknowledged that Study III was not powered to adequately test differences between the two treatments, but it was hoped that the study would inform the design of subsequent studies in this area.

Fifty-six participants took part in Study III and results were consistent with the hypotheses. Both the iCBT and Bibliotherapy Groups obtained large pre-post-treatment within-group effect sizes on the primary outcome measure, although these effect sizes decreased at follow-up, whilst the Control Group obtained nil to small effect sizes. Whilst underpowered, the study provides preliminary evidence indicating that the two active treatments result in similar outcomes, and are similarly acceptable to participants. Demonstrating similar outcomes across these remote treatments is important for consumers, as they may have preference for one type

of remote treatment. Moreover, having two available remote treatments increases choice and potentially further reduces barriers to treatment for individuals with OCD.

The control group subsequently obtained access to the iCBT intervention, and received contact once per week across the 8 weeks of the study, which was half the frequency of contact experienced by the treatment groups. It was expected, based on the results of a study with PD ^[329], that participants would obtain similar benefits to those in the previous study. In this phase of Study III an average of 57 minutes of therapist time was provided across the 8 weeks of the treatment, and effect sizes were still large on the YBOCS (0.85), indicating that participants may obtain good clinical benefits with smaller amounts of therapist time than previously thought necessary. However, consistent with reports indicating a dose-response relationship ^[408], more frequent contact in iCBT for OCD does appear to improve outcome.

The final study in this thesis attempted to identify predictors of response and dropout from remote treatment, using data collected across both treatment outcome studies (Study II and III). The predictors used were based on those that had been examined in face-to-face treatment studies of OCD ^[35, 227, 271-288]. Consistent with the wider literature in this area, Study IV failed to identify any reliable predictors of outcome or dropout. However, these results need to be interpreted cautiously due to limited sample size and the increased likelihood of Type II errors. Predictors of outcome that were not measured in this study, including Axis II comorbidity, interpersonal stressors, self-efficacy, compliance with homework, poor distress tolerance and poor motivation for treatment may prove to have more predictive value, and could be explored in future research.

The studies reported in this thesis contribute to the emerging evidence that OCD can be treated remotely and, at this stage, there appear to be limited predictors of outcome to suggest

that certain individuals are unsuitable for such treatments. The clinical outcomes of the studies described in this thesis also compare favourably with outcomes described in the existing remote and face-to-face treatment outcome literature, which is discussed below.

6.2 Comparison of Results with Existing Literature

6.2.1 Comparisons with Remote Treatments

Comparisons with BT STEPS

Studies of the BT STEPS program, one of the first remote treatment protocols studied in OCD, produced promising results, with within-group effect sizes on the YBOCS that ranged from 0.33 for an unguided program to 0.85 when participants were contacted by a clinician^[302]. Dropout rates were high in the unguided studies, ranging from 52% to 66%, but lower in the guided study (14%)^[299, 300, 302]. The results of the studies from this thesis are comparable to those reported from the guided BT STEPS program, and consistently larger than the unguided program, suggesting that currently, at least weekly clinician guidance is important in the delivery of remote treatments for OCD.

Comparisons with Existing iCBT for OCD Studies

The results from the studies in this thesis are consistent with the emerging data on iCBT approaches to OCD more generally. In the two Swedish studies published to date, within-group effect sizes of 1.55 and 1.56 and a 40-50% reduction in symptoms on the YBOCS were reported^[334, 335]. Non-completion of the program in both these programs was low, with less than 10% of participants not completing the program^[334, 335]. These studies made a considerable contribution to the literature, demonstrating the feasibility of treating OCD via the internet. Study II of the present thesis represents a partial replication of the first Swedish study, and with similarly strict inclusion criteria obtained a similar effect size (1.53). Study III

of the present thesis extended these findings by including participants with a broader range of scores on the YBOCS, and this study obtained reduced effect sizes (0.85-1.19). However, effect sizes were still large, providing preliminary evidence that OCD can be treated remotely, even in people with less severe symptoms and with less intensive contact than used previously.

The results of this thesis are also consistent with results of studies of iCBT for internalising disorders. For example, effect sizes of meta-analyses of iCBT and IPT for depression and anxiety range from 0.61 to 0.88 ^[303, 305, 364]. The effect sizes reported within the current thesis fall at least within this range, indicating that OCD can also be treated online with similar outcomes to those seen in the wider remote treatment literature.

Comparisons with Bibliotherapy Studies

The decrease in the YBOCS symptoms of 35% in the bibliotherapy arm of Study III compares favourably with previous studies of bibliotherapy for OCD, which have reported an average decrease of 24% (range = 17% to 31%) ^[241, 343, 344]. However, previous studies have been unguided rather than guided and the guided nature of the bibliotherapy arm in Study III is most likely responsible for the improved outcomes over previous studies. This finding is consistent with the literature demonstrating higher effect sizes in guided studies compared with unguided studies ^[305, 338], but, notwithstanding this, the results from the bibliotherapy arm of Study III indicate that greater use of this form of treatment in the remote treatment of OCD is warranted.

Whilst the results from Study III yielded improved outcomes over previous workbook-based bibliotherapy studies for OCD, the results are consistent with results from bibliotherapy

studies of other disorders. For example, one meta-analysis of studies utilising guided and unguided bibliotherapy for anxiety found an overall effect size of 0.91 ^[338]. The results from the bibliotherapy study in this thesis produced an effect size of 1.19, suggesting that bibliotherapy in OCD is at least as effective as it is in other disorders, although this finding needs to be replicated with a larger sample.

6.2.2 Comparisons with Face-to-Face Treatments

The results of Study II and III indicated that participants with OCD can be treated remotely, with an average of 84 minutes of clinician contact (range 57-103 mins) required per person across 8 weeks of treatment. This is a considerable reduction from the amount of clinician time typically required in face-to-face studies, which varies from 8 hours ^[269] to 40 hours ^[179, 261, 265]. One meta-analysis indicated that, on average, 22 hours is spent in the treatment of OCD ^[170]. Despite the reduced amount of clinician time these studies produced large effect sizes ranging from 0.85 to 1.53 on the YBOCS from pre-post treatment. These results indicate that remote treatments may assist in not only in improving access to treatment amongst people with OCD, but may also increase the ability of clinicians to simultaneously work with a larger number of patients.

The studies described in this thesis used a conservative method of data analysis; the BOCF method. The majority of the face-to-face studies in OCD, however, use a completer model of analysis, which may inflate effect sizes ^[395]. For those studies utilising the completer model of analysis the range of effect sizes on the YBOCS is large (0.97 ^[229] - 4.15 ^[225]); however, when a ITT model is used the range decreases from (0.92 ^[260] - 2.63 ^[230]). Thus, the effect sizes found in Studies II and III are generally consistent with face-to-face studies that use a similar method of analysis, albeit at the lower end of the range. They are also consistent with the

results of meta-analytic studies of face-to-face treatment including those reported by Rosa-Alcázar, Sánchez-Meca, Gómez-Conesa and Marín-Martínez ^[219], Eddy, Dutra, Bradley and Westen ^[170] and Abramowitz ^[199], who reported within-group effect sizes of 1.13, 1.48, and 1.18, respectively. These results indicate that remote treatment can potentially be used as an alternative to face-to-face treatment for those who are unable to access treatment, or those who would prefer to manage their own symptoms. However, it is likely that these remote treatments will become part of a larger stepped-care approach to OCD, which is more cost-effective for mental health providers ^[417,418]. The use of these remote treatments in a stepped-care model for OCD is discussed below.

6.3 Implications for Current Theoretical Models

The theoretical model, which the studies in this thesis were based upon, was the CBT model developed by the OCCWG. The OCCWG propose that 6 main cognitive biases are involved in the development and maintenance of OCD symptoms including *inflated responsibility, over-importance of thoughts, excessive concern about the importance of controlling ones thoughts, overestimation of threat, intolerance to uncertainty and perfectionism* ^[147]. Two remote OCD treatment protocols were developed to complete the studies described in this thesis and both contained cognitive-behavioural techniques addressing each of these cognitive biases. In addition, they also contained a strong focus on ERP techniques, which to date is the technique with the largest evidence base in OCD.

The results from the studies in this thesis provide indirect evidence for the OCCWG model of OCD. For instance, in Study II large effect sizes on the OBQ, which purportedly measures these biases, were observed, along with large effect sizes on the YBOCS. In addition reductions on the OBQ were significantly correlated with reduction on the YBOCS ($r = 0.49$,

$p = 0.030$). However, it is acknowledged that conclusions about the validity of the specific cognitive biases in the etiology and maintenance of OCD cannot be made, as these biases were not assessed in the control group of the RCT and it is possible that the changes in the scores on the OBQ, may be an artifact of some other variable unrelated to the treatment provided. The OBQ was not administered in the RCT (Study III) because of its length (44 items) and this may be an important study for future research in order to further understand the role of these biases on the etiology and maintenance of OCD symptoms.

6.4 Cost-Effectiveness of Remote Treatment

The cost of OCD treatment is substantial. In Australia, the direct cost to the government for an individual to consult a Clinical Psychologist for treatment of OCD is A\$122.50 per session, whilst direct costs to the client can vary from A\$0 for a bulk billing service to A\$218 for a service that charges the full fee suggested by the Australian Psychological Society. This results in a cost of approximately A\$1470 to the government, over a standard 12-week treatment, whilst costs to the individual can be significantly higher, especially when common indirect costs, including those associated with travel and travel time, are considered.

Whilst formal cost-effectiveness analyses have not been reported, remote treatments are likely to be more cost-effective than traditional face-to-face treatments. For example, one study examining the cost-effectiveness of a stepped-care model for OCD, where clients initially started with bibliotherapy and then, if required, stepped up their care to a face-to-face treatment, demonstrated significant cost savings ^[417]. Importantly, in this study, the total costs in the stepped-care condition were approximately half of those in the traditional care condition. Additionally, data from AnxietyOnline (www.anxietyonline.org.au), an open access online treatment clinic in Australia, reported a cost saving of A\$6.7million when

clients completed assessment ($n = 7140$) and treatment ($n = 2563$) online for anxiety disorders (including OCD) rather than utilising face-to-face services. The clinical efficacy and cost effectiveness of remote treatments indicate that they have considerable potential as models of treatment delivery, particularly as an initial step in stepped-care models.

6.5 Implications for Treatment Delivery and Stepped-Care Models

The basic premise of stepped-care models is that clients should be provided with the least restrictive and most cost-effective treatment before more expensive and restrictive treatments. Stepped-care models have been shown to be clinically effective in the treatment of several disorders including OCD ^[344, 417, 418], bulimia nervosa ^[443] and obesity ^[444]. Stepped-care models have also been shown to produce considerable cost benefits over traditional face-to-face treatment in OCD samples ^[417].

A number of stepped-care treatments have been proposed for OCD ^[137, 445, 446]. However, a limitation of these models is that they do not take into account geographical and other barriers that impede an individual's ability to access traditional treatments. Thus, many individuals are not able to step up to more intensive levels of care as implied in traditional stepped-care model (such as face-to-face outpatient or inpatient services) if they have not benefitted from a remote low intensity treatment. This limitation could be alleviated by providing both low and high intensity *remote* treatment in a stepped-care model.

Low intensity interventions are defined as those that 'reduce the amount of time the practitioner is in contact with individual patients' (pg. 8) ^[447]. Thus, the studies in this thesis are best described as low intensity remote treatments, due to the small amount of therapist contact required. These studies could be used as a first step in a remote stepped-care model.

There is also preliminary evidence emerging to suggest that high intensity remote treatments, such as treatment over the telephone or videoconferencing in real time with a therapist, can also be provided for individuals with OCD [293-297, 448, 449] and such treatments may be suitable for those that do not respond to a low intensity treatment. Whilst literature is emerging to demonstrate that stepped-care treatment for OCD is both efficacious and cost-effective [417, 418], an entirely remote stepped-care treatment is yet to be investigated. However, there are a number of barriers to the implementation of low intensity and remote treatments, which are discussed below.

6.6 Barriers to Dissemination of Remote Treatments

Notwithstanding their potential to improve access to evidence-based treatments, potential barriers to the wide-scale dissemination of remote treatments include clinician attitudes and pragmatic barriers.

6.6.1 Clinician Attitudes

The results of the studies described in this thesis indicate that remote treatments for OCD are efficacious and acceptable to consumers. However, surveys indicate that clinicians do not appear to be as accepting, posing an important potential barrier in the wide-scale implementation of these treatments. For example, in a Norwegian survey, 64% of Psychologists believed that therapy over the internet can only be successful when applied as an adjunct to face-to-face treatments, rather than as a stand-alone treatment [346]. Additionally, acceptance of remote treatments seems to be associated with therapist's theoretical orientation, with those who are psychodynamically oriented less accepting of remote treatments than those from a cognitive-behavioural background [346].

One reason for Psychologists' low level of acceptance of remote treatments is the perception that the therapeutic alliance is not as strong in remote treatment as it is in traditional face-to-face treatment. Several studies indicate that this is not the case, however ^[402, 450, 451], and at least one study has indicated that the therapeutic alliance in internet-administered treatments is just as high as it is in face-to-face treatment ^[452]. There is also a perception amongst professionals that remote treatments are likely to be less effective than face-to-face treatments. Keeley, Williams and Shapiro ^[453] found that approximately 70% of respondents to a survey thought that self-help treatments would not be as effective as face-to-face treatment ^[453]. However, the literature indicates that, when these remote treatments are guided by a therapist, they are as effective as treatment administered face-to-face ^[304, 306-308]. In combination, these studies would seem to suggest that education of clinicians may be an important step forward in improving dissemination of remote treatments.

6.6.2 Functional Barriers

There are a limited number of clinics worldwide providing remote treatments over the internet and, while increasing in number, there are several practical barriers associated with online research and treatment. One of these barriers is cost. For example, with estimated start-up costs of over A\$1.5 million dollars ^[407] developing an internet platform that can support iCBT programs is expensive. However, once the platform is operational, costs reduce over time. An additional issue is that the development of iCBT interventions requires not only clinical expertise, but also the expertise of computer programmer and IT staff that are not normally found in a psychological research team thus multidisciplinary research and clinical teams are required.

6.6.3 Summary

There is now strong evidence to suggest that remote treatment of OCD can be as effective as face-to-face treatment. Professional bodies, which aim to disseminate evidence-based interventions, and government bodies, which provide services and funding, may need to advocate the use of these treatments before professionals are more accepting of them. An additional important step forward in overcoming the abovementioned functional barriers could be the provision of start-up grants from funding bodies to facilitate more research and clinical teams to become involved in this emerging field.

6.7 Limitations

The studies in this thesis aimed to evaluate the acceptability and efficacy of remote treatments for OCD. Whilst encouraging results were obtained, there were several limitations to the studies, including the following:

6.7.1 Sample Sizes

Whilst the sample obtained for Study I and II were adequate, the sample sizes for the RCT (Study III) and predictors study (Study IV) were low. The aim of Study III was to extend upon previous findings using a controlled design, but also to explore the relative clinical efficacy and acceptability of two forms of remote treatment for OCD, before a larger scale trial. Although significant differences were found between the treatment and control groups on the primary outcome measure, difficulties in recruitment resulted in further loss of statistical power. This precluded comprehensive testing of the relative benefits of bibliotherapy and iCBT, and limits the conclusions that can be drawn from this study. However, the findings of Study III provide preliminary data that can be used to design a larger and more powerful test of the relative benefits of these two types of remote treatment.

Similarly, the smaller sample size in Study III meant that the predictors study (Study IV) was also underpowered. This study aimed to identify potential predictors of outcome and dropout in remote treatment. Consistent with previous studies, this study found no reliable predictors, although this result may reflect Type II errors due to insufficient sample size.

The difficulty in recruitment is surprising considering the results from Study I, which indicated that iCBT treatment was highly acceptable to individuals with OCD. The large proportion of applicants who did not complete applications indicates that, although individuals with OCD may find iCBT treatment appealing, they may prefer participation to be anonymous. Importantly, considerable effort was made to promote the studies in this thesis, including liaising with large non-government organisations, producing media releases, advertising in local newspapers, and sending more than 500 colour flyers and emails promoting the study to General Practitioners, Psychiatrists, and specialist anxiety clinics across Australia. Moreover, recruitment was left open for the studies for as long as possible (8 months) in order to allow for maximum number of participants. Unfortunately, uptake remained low despite these efforts. Recruitment may have been hindered by the abovementioned negative clinician attitudes towards iCBT ^[346] and, whilst information about the study was broadly disseminated, it is possible that professionals are reluctant to pass on the information due to the perception that the treatment would be ineffective.

6.7.2 Sample Characteristics

A potential limitation of the studies in this thesis was that participants comprised individuals who were self-referred, which may introduce bias and limit the generalisability of results to non-research clinics. However, results from Study I indicate that those who seek treatment online are similar to those with OCD in terms of demographic characteristics and symptom

severity. Other studies have also indicated that individuals who commence online treatments for other anxiety and depressive disorders are not dissimilar to those presenting for treatment at a specialist anxiety disorder clinics ^[355]. Importantly, recent reports indicate that iCBT treatments for other disorders can be effectively disseminated in primary care clinics ^[454-457], and psychiatric clinics ^[320, 324, 458], although, to date, these studies have not included individuals with OCD. Further research is therefore required to ascertain whether remote treatments for OCD can also be used in routine clinical practice outside of research clinics.

6.7.3 Diagnostic Interview and Online Administration of Self-Report Outcome Questionnaires

The choice of diagnostic interview, the MINI, and the use of online administered self-report questionnaires represent additional potential limitations to the studies in this thesis. Whilst the MINI is a widely used diagnostic interview in both face-to-face ^[459-463] and iCBT ^[329, 399, 406, 464] outcome studies, its psychometric properties in an OCD sample has not been well established ^[368]. However, the use of additional clinical measures, including the YBOCS, and the concordant findings across measures, reduces the likelihood of threats to validity due to choice of diagnostic interview.

The use of self-report outcome measures and their online administration may represent another limitation, as many of the questionnaires were not developed for online administration. Nonetheless, scores on several OCD measures have been found to correspond when administered online or in paper and pencil version ^[361] and this finding has been replicated for outcome questionnaires commonly used in other disorders including SP ^[362] and PD ^[363]. This suggests that online administration is unlikely to result in any significant differences from paper and pencil administration.

6.7.4 Blinding

Blinding was not used for the telephone administration of the YBOCS, which may have introduced bias. Whilst future studies investigating iCBT for OCD should ideally use blinded interviewers, this was not possible in the present studies due to the requirement of Macquarie University for Doctoral Degree candidates to do all the work associated with their theses. However, data from the self-report questionnaires provide converging evidence regarding the overall reduction in symptoms, indicating the potential threat to validity was minimal.

In summary, whilst there were a number of limitations to the studies in this thesis, the overall results show promising data and add to the emerging literature regarding the efficacy and acceptability of remote treatments for OCD. A number of questions remain unanswered, however, and are discussed below.

6.8 Future Research

There are several important and outstanding research questions that require attention in order to advance our understanding of OCD and, in particular, remote treatment of this disorder.

6.8.1 Variations to Characteristics of Interventions

Notwithstanding important recent contributions to the literature, there remain several outstanding questions regarding what makes remote treatment effective and whether we can improve outcomes and/or compliance by varying characteristics of the interventions. For example, whilst remote treatments are able to reduce many of the barriers to treatment, some individuals may still decline guided iCBT programs due to concerns about stigma. Thus, an important question is whether providing publically accessible (open access) iCBT treatments,

which participants can access without having to register their personal details, is acceptable and efficacious?

A second area of future research involves the role of prompts and reminders in facilitating outcome and compliance in remote treatment for OCD. Based on previous research in other anxiety disorders and depression ^[424], the use of regular prompts and reminders appears to improve outcomes and reduce dropout rates in unguided treatment. Importantly, as mentioned previously, the lack of prompts and reminders used in Study III may partially explain why the effect sizes in this study were reduced over the initial feasibility study (Study II). Whilst a limited amount of research exists at the moment, this area has not been investigated in the remote OCD literature. Thus, an important area of research may be whether the use of prompts or reminders, and whether the type of prompts and reminders (such as emails or SMS), have any impact on outcome and compliance in the remote treatment of OCD? Understanding the impact of prompts and reminders has important implications for the development of future guided and self-guided remote treatments in this population.

A third outstanding question for future research relates to the role of the clinician in treatment and, in particular, in homework tasks. In the studies conducted in this thesis, homework tasks were suggested but not reviewed by the clinician. In contrast, the clinician has reviewed and provided feedback on homework tasks in other iCBT studies for OCD ^[334, 335]. Whilst reviewing homework in such a way is likely to add to the amount of clinician time required, it may also have a beneficial impact on engagement and adherence rates, and thus may lead to improved outcomes. However, the marking of homework may also be perceived by participants in a negative fashion. Thus, its impact on client satisfaction and acceptability needs to be considered. Investigating this particular issue may therefore help to determine

whether reviewing homework is in fact beneficial, which has important implications for the administration of future remote treatments as well as for the amount of clinician time required.

Finally, the length and format of the intervention are additional variables that require further investigation. For example, the studies described in this thesis used an 8-week program to treat symptom of OCD, whilst other remote treatment programs have used a 10-week program [334, 335]. It is possible that a longer treatment period may result in additional benefits, however, longer treatment periods may also increase burden on participants, who may then prematurely withdraw from treatment. Thus, varying the treatment length and observing the effect on outcome in a randomised controlled design is an important area of future investigation in remote studies.

6.8.2 Transdiagnostic Programs

Studies utilising nationally representative samples estimate that between 62-90% of individuals with OCD have a comorbid Axis I condition and multiple comorbidities are common in this group [16, 17, 28]. Given the high comorbidity, another important direction of research is whether OCD symptoms can be treated in the context of a transdiagnostic approach, which teaches the individual how to overcome internalising symptoms more generally. Transdiagnostic programs have been shown to be effective in the treatment of MDD, SP, GAD, PD [366, 406, 421, 465] and thus it is possible that OCD can also be treated within a similar program. Further research is required and may have implications for improved outcomes in OCD treatment, especially those with a comorbid depressive disorder. Additionally, if transdiagnostic programs are effective in reducing OCD and comorbid

conditions in the one program, it is likely to increase the overall cost-effectiveness of providing psychological treatments.

6.8.3 Stepped-Care Programs

Whilst stepped-care programs are advocated in the literature ^[137, 445, 446], a major limitation of traditional stepped-care models is that they do not address the barriers that impede an individual's ability to access treatment. A potential way to overcome this limitation is to provide entirely remote stepped-care treatment. Low intensity remote treatment, such as those described in this thesis could potentially be a first step in treatment, followed by higher intensity remote treatment via telephone or videoconferencing with a live therapist, which has previously been shown to be efficacious ^[293-297, 448, 449]. Remote stepped-care treatments offer potential advantages for consumers, services providers, and funding bodies, including cost-effective treatment options, and flexible, responsive, and accessible service provision matched to the needs of consumers. For these reasons, the evaluation of remote stepped-care is an important area for future research.

6.8.4 Comparative Studies of Dominant Treatment Models

As discussed previously, there are three dominant approaches to the treatment of OCD. Whilst they all include cognitive and behavioural treatment techniques, they can be divided into those that emphasise behavioural treatments (cBT), cognitive treatments (CbT), and both cognitive and behavioural treatment techniques (CBT). Whilst evidence clearly indicates that cBT and CBT interventions (those containing elements of ERP) are effective interventions in the treatment of OCD, it is unclear whether cognitive interventions provide any additional benefit over the behavioural treatments, or whether cognitive treatments alone can be used as an alternative to treatments that emphasise ERP. Specific comparisons of the three dominant

treatment approaches are required and will have important implications for disseminating evidence-based techniques in terms of both the training of clinical psychologists and improved treatment outcomes for individuals with OCD.

6.8.5 Exploring Heterogeneity in the Diagnosis of Obsessive-Compulsive Disorder

OCD remains a heterogeneous disorder encompassing a number of different symptom presentations. Data has recently emerged demonstrating that some symptoms that were traditionally understood as being indicative of OCD are unrelated, such as hoarding behaviours ^[48, 466]. Similarly, it is possible that other symptoms that we currently consider to be part of OCD may also be unrelated and further research on this topic is required. For example, DSM-IV-TR allows for a diagnosis of OCD based on the presence of *either* obsessions or compulsions ^[5]. More recently, however, studies have shown that individuals with OCD have both symptom types ^[6] and the relationship between these symptom types is the hallmark of OCD presentations. Clients who follow this anxiety-harm avoidance sequence often engage in compulsions in an attempt to avoid a perceived threat, whilst others engage in compulsive behaviour to reduce a sense of incompleteness or to feel ‘right’ ^[51]. There is evidence emerging to suggest that those who engage in compulsions due to a sense of incompleteness do not improve as much in treatment as those who engage in compulsions in order to reduce anxiety ^[278]. This differential response suggests an alternative treatment and diagnosis may be required.

Similarly, data is also emerging to suggest that there is an identifiable dichotomy in the type of obsession present in OCD. For example, Lee and Kwon ^[49] have identified two separate obsessions constructs; autogenous and reactive obsessions. Importantly, there is some evidence to suggest that there is a differential response to treatment between these types of

obsessions ^[438], again suggesting that an alternative treatment and diagnosis may be more appropriate than providing the same diagnosis and treatment for both types of obsessions.

Finally, most individuals present with fear as the predominant emotional reaction to obsessions, whereas others present with disgust ^[53, 54]. Emerging evidence indicates that disgust does not respond as well as fear to exposure-based treatment ^[467], however, these results have not been replicated. Although further research is required to evaluate this area, it is possible that those who have a primary disgust response may report different outcomes and require a different treatment than those with fear as the primary response.

Further research into these factors will ascertain whether these characteristics result in different responses to treatment, and whether an alternative intervention and perhaps diagnostic label may be more appropriate for some individuals who are currently diagnosed with OCD. Reducing the heterogeneity of OCD in this way has important implications for not only the diagnosis of OCD, but may also assist in the development of more suitable and homogenous manualised treatments, which may improve outcomes for this disorder.

6.9 Conclusions

OCD is a chronic and disabling condition, which causes considerable impairment in functioning to the individual as well as significant costs to society. Whilst effective treatments exist, there are several barriers to accessing these treatments including stigma, geographical remoteness, and lack of access to trained clinicians. Remote treatments are a potential and powerful tool that may reduce these barriers. They may also serve an important role as a component in stepped-care models of treatment. At the time of designing the studies for this

thesis there were no studies investigating the efficacy of iCBT for OCD and the majority of studies exploring remote treatments for OCD reported evaluations of unguided bibliotherapy.

The primary aim of this thesis was to develop and evaluate guided remote treatments for OCD in order to reduce barriers to care for individuals with OCD, especially those unable to access face-to-face treatment due to geographical remoteness. This is an important area of research in Australia, because one third of our population lives outside of capital cities ^[468] and access to evidence-based treatment is extremely limited for people with OCD ^[4]. The results from Study I demonstrated that internet-administered treatments are an acceptable treatment option for individuals with OCD. Study II provided preliminary evidence for the feasibility, efficacy, and acceptability of iCBT for OCD. Study III extended these results in a randomised controlled design and tentatively indicated that both iCBT and bibliotherapy treatments are efficacious compared to waitlist control, with no significant difference in outcomes or acceptability between the two active treatments. Study III also revealed that large effect sizes could be obtained with as little as 60 minutes of clinician time across 8 weeks of treatment. Study IV failed to identify reliable predictors of outcome in remote treatments for OCD.

Whilst the results of these studies demonstrate that remote treatment for OCD is acceptable and efficacious, there are considerable and important outstanding questions. Firstly, replication of these results with larger sample sizes is important. In addition, tangible benefits may accrue from research exploring the effect of variations to the design characteristics of remote interventions on clinical outcomes, the feasibility of remote stepped-care protocols, comparative tests of the dominant approaches to treatments, and further research into the diagnosis of OCD. This research is likely to improve the efficacy of remote treatment

programs for OCD and may facilitate wide-scale implementation of best-practice remote treatment.

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