Beliefs about control and obsessive compulsive disorder:

A multidimensional approach

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ABSTRACT

Beliefs about control and obsessive compulsive disorder: A multidimensional approach

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Perceived control (PC), or the belief that one possesses control over desired outcomes, is a well-studied concept in psychology due to its associations with indices of well-being and psychopathology. Low PC has been associated with the development and maintenance of anxiety disorders, in part because it has been proposed to affect an individual's beliefs about his or her ability to control aspects of anxiety-related situations, including emotions, behaviours, objects and events. In the case of obsessive compulsive disorder (OCD), the importance of control constructs has been well and thoughtfully examined in relation to the controllability of thoughts, but there is a paucity of research examining control-related beliefs in other OCD-relevant domains. This research aimed to clarify the role of PC and its sub-components in OCD. The purpose of Study 1 was to evaluate variables mediating the relationship between PC and OCD symptoms as well as to discern which sub-components of PC predict OCD symptoms. Nonclinical and clinical participants completed a battery of questionnaires that included measures of OCD beliefs and symptoms, as well as scales assessing control-related beliefs, to determine the pathways through which PC and sub-components of control influence OCD beliefs and symptoms. The results demonstrated that the influence of PC over anxiety-related events on OCD symptoms is mediated by OCD-related beliefs including thought-action fusion, and that external locus of control orientations may explain the relationship between low PC and OCD symptoms. Results also demonstrated that low self-esteem is a robust

predictor of OC symptoms. In Study 2, an experimental paradigm was used to examine the effects of manipulating specific control beliefs, control-related self-efficacy and predicted controllability, on the persistence of cleaning behaviour. Undergraduate student participants were asked to engage in a cleaning task following manipulations of control-related beliefs to determine the effects of such beliefs on cleaning behaviour. Results demonstrated that overpredictions of controllability contributed to longer cleaning times, and that low control-related self-efficacy beliefs increased participants' desire to gain control over task outcome. Taken together, these results provide support that control-related beliefs are an important component of OCD phenomenology, and suggest that a multidimensional understanding of low PC, including elements of self- and world-controllability, should be incorporated into contemporary cognitive-behavioural models of OCD.

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CONTRIBUTIONS OF AUTHORS

The following thesis is comprised of two manuscripts:

Study 1 (Chapter 2)

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Study 2 (Chapter 4).

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I developed the general focus and generated the hypotheses for each study in this program of research in consultation with my research supervisor, Dr. Adam Radomsky. I was responsible for conducting all aspects of the research, which includes study design and methodology, participant recruitment, data collection, statistical analyses, training of students and volunteers who were involved in data collection, data entry, and inter-rater reliability (see below), as well as the interpretation of results and the preparation of manuscripts. Throughout the entire program of research, Dr. Radomsky provided ongoing consultation and feedback. Additionally, my dissertation committee members, Drs. Michel Dugas and Dina Giannopoulos provided feedback and approval of research methodology at a proposal meeting early in my program of research.

For Study 1, Stefanie Lavoie, the Senior Research Assistant in the Anxiety and Obsessive Compulsive Disorders Lab, formatted the online questionnaire package that provided the data for this study, and retrieved all participant data from the online

database. Multiple lab members, including graduate students, undergraduate students, and student volunteers were involved in the recruitment of nonclinical participants. For clinical participants, Stefanie Lavoie, Irena Milosevic, Ivana DiLeo, and I were each responsible for approximately 25% of recruitment and clinical interviews; the four of us conducted telephone screens and administered the diagnostic interviews for the clinical sample in this study.

For Study 2, Stefanie Lavoie again developed the online questionnaire form and retrieved the data, as well as contributing feedback on research methodology and assistance with piloting the research design. The recruitment of participants for this study was conducted as an overall lab effort. Kevin Barber and G. Michael Everett assisted with data collection and data entry, and Katie Gordon-Green was involved in data entry and coding.

For both studies, I was responsible for writing manuscript drafts, and made revisions to the documents based on suggestions made by Dr. Radomsky.

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CHAPTER 1

General Introduction

Obsessive-compulsive disorder (OCD) is characterized by intrusive thoughts, images or impulses (obsessions) and/or repetitive behaviour, rituals or mental acts (compulsions) (American Psychiatric Association [APA], 2000). The prevalence of OCD is estimated to be roughly 2.5% of the population based on community samples (APA, 2000), a significant percentage given its potentially debilitating effects on general functioning. While common characterizations of OCD often include notions of control or controllability of emotions, behaviours, and events or objects, until recently (Altin & Karanci, 2008; Gelfand & Radomsky, 2013; McLaren & Crowe, 2003; Moulding & Kyrios, 2007; Moulding, Kyrios, & Doron, 2007; Moulding, Doron, Kyrios, & Nedeljkovic, 2008; Moulding, Kyrios, Doron, & Nedeljkovic, 2009; Reuven-Magril, Dar, & Liberman, 2008; Zebb & Moore, 2003), theoretical models and empirical explorations of control in OCD have generally been limited to the control of thoughts (Clark & Purdon, 1995; Clark, Purdon, & Byers, 2000; Myers, Fisher, & Wells, 2008; Purdon, 2004; Obsessive Compulsive Cognitions Working Group [OCCWG], 1997, 2001; Purdon & Clark, 1994a, 1994b, 2002; Tolin, Woods, & Abramowitz, 2003). It was the aim of this project to better elucidate the role of control-related cognitions in the phenomenology of OCD.

It is surprising that constructs of control have not received more attention in the OCD literature. Low perceived control (PC) is considered a psychosocial diathesis as well as a maintaining factor in several anxiety disorders, including OCD (Barlow, 2002; Brown, White, Forsyth, & Barlow, 2004; Chorpita & Brown, 1998; Cloitre, Heimberg,

Leibowitz, & Gitow, 1992; Doron, Kyrios, Moulding, Nedeljkovic, & Bhar, 2007b; Hofmann, 2005; White, Brown, Somers, & Barlow, 2006; Zvolensky, Lejuez, & Eifert, 2000), and is a relevant factor in the prevention and treatment of anxiety-relevant psychopathology (Craske & Hazlett-Stevens, 2002; Rapee, Craske, Brown, & Barlow, 1996; Roemer & Orsillo, 2005, 2007). To address this gap, control beliefs will be discussed within the larger context of cognitive models of OCD, with the aim of integrating theoretical and empirical approaches to the study of control with relevant findings in the OCD literature.

As cognitive models of OCD (e.g., Clark, 2004; Rachman, 1997, 1998, 2002; Salkovskis, 1985, 1999; Salkovskis et al., 1995) propose that it is the misinterpretation of intrusive thoughts as personally significant that leads to increased anxiety and the urge to engage in compulsive behaviour, researchers have attempted to pinpoint maladaptive belief domains in OCD. Several beliefs have been identified, such as inflated responsibility, thought-action fusion, perfectionism, as well as the over-control of thoughts (e.g., Ladoucer, Rhéaume, & Aublet, 1997; OCCWG, 1997, 2005; Pleva & Wade, 2006; Rassin, Merckelbach, Muris, & Spaan, 1999; Salkovskis & Campbell, 1994). However, individuals with OCD are also thought to make repeated attempts to control emotions, behaviours, other people, as well as situations/objects (Ashbaugh, Gelfand, & Radomsky, 2006; Gelfand & Radomsky, 2013; Moulding & Kyrios, 2006; Reuven-Magril et al., 2008), and a low sense of control has been associated with OCD beliefs, behaviours, and symptoms in nonclinical and clinical samples (McLaren & Crowe, 2003; Moulding & Kyrios, 2006, 2007; Moulding et al., 2007, 2008, 2009; Reuven-Magril et al., 2008; Zebb & Moore, 2003). In a recently tested cognitive model

of OCD implicating multidimensional beliefs in ætiology and maintenance, the notion that maladaptive perceptions about self- and world-controllability influence OC symptom severity received preliminary support (Doron et al., 2007b).

Control has long been considered an important construct in psychological theory (e.g., White, 1959), and a key factor in psychological functioning (Skinner, 1996; Shapiro, Schwartz, & Astin, 1996) due to its robust relationship with overall physical and mental health (Bandura, 1989; Beck, 1976; Fiske & Taylor, 1991; Gurin & Brim, 1984; Lachman & Burack, 1993; Lefcourt, 1981, 1982, 1983; Rodin, 1986; Seligman, 1991; Strickland, 1989; Taylor & Brown, 1994; Thompson & Spacan, 1991). Control has been the subject of numerous investigations in clinical, social, and health psychology, in areas reaching from physical health to academic achievement (Shapiro & Astin, 1998). Control also plays an important role in fields related to psychology such as child studies (e.g., Skinner, Wellborn, & Connell, 1990), public health (e.g., Arcury, Quandt, & Russell, 2002; Frewer, Shepherd, & Sparks, 1994; Halpert & Connors, 1986) and medicine/nursing (e.g., Girard & Murray, 2010), as well as further afield, in computer science (e.g., Clalisir & Gurel, 2003; Green, Collins, & Hevner, 2004), marketing (e.g., Thong & Olsen, 2012), real estate (e.g., Rohe & Stegman, 1994), and politics (e.g., Poon, 2004).

That control is highly relevant to human behaviour is evident in the plethora of psychological models in which aspects of control play a central role, such as social learning theory (Bandura, 1977) and the model of learned helplessness (Seligman, 1975). Over 100 terms have been identified for control, such as locus of control (Rotter, 1966) and self-efficacy (Bandura, 1977), creating challenges for empirical research (Skinner,

1996). To bridge the distinct literatures of control and OCD, however, several approaches to definition and methodology have developed that are of particular relevance to the present study.

First, the subjective experience of control (i.e., perceived control; PC) is generally considered to be of greater importance to mental and physical health outcomes than any objective fact of controllability (Burger, 1989; Lazarus & Folkman, 1984; Skinner, 1996). Where objective control is defined as a contingency between a particular response and a particular outcome (Alloy & Abramson, 1979; Peterson & Stunkard, 1992; Peterson, Maier, & Seligman, 1993; Seligman, Rosellini, & Kozak, 1975), PC is broadly understood as the perception or belief that one possesses control over desired outcomes (Skinner, 1996), or "…the belief that one has at one's disposal a response that can influence the aversiveness of an event." (Thompson, 1981, p. 89). Low PC has been found to be more predictive of distress than low objective control (Endler, Macrodimistris, & Kocovski, 2000), and the perception of uncontrollability is thought to be a defining feature of anxious psychopathology (Ginsburg, Lambert, & Drake, 2004; Hofmann, 2005; Mineka, Watson, & Clark, 1998; Moulding & Kyrios, 2007; Schmidt & Lerew, 2002; Zvolensky, Lejuez, & Eifert, 2000). It has been associated with feelings of helplessness, anger, frustration, anxious thinking, and depressed mood (Ledrich & Gana, 2012; Mirowsky, 1995; Weisz, Sweeney, Proffitt, & Carr, 1993) as well as with substance dependence (Marlatt, 1983; Nagoshi, 1999), eating disorders (e.g., Dagleish, Tchantruia, Serpell, Hems, de Silva, & Treasure, 2001), depression (e.g., Brown & Seigel, 1988), and anxiety (e.g., Rapee, Craske, Brown, & Barlow, 1996). Indeed, individuals with OCD report a low sense of control over perceived threat and anxiety

(Zebb & Moore, 2003) as well as over stressful life events (McLaren & Crowe, 2003). And, low PC significantly adds to the prediction of OCD symptom severity when considered alongside faulty beliefs such as inflated responsibility (Altin & Karanci, 2008; Moulding et al., 2007) and/or thought-action fusion (See Chapter 2).

Second, perceived control has been conceptualized as a "…flexible *set of interrelated beliefs* that are organized around interpretations of prior interactions *in a specific domain*." (Skinner, 1995, p.4, emphasis added). Although historically PC was considered to be a unitary construct, current conceptualizations propose that it is a multidimensional variable (Skinner, 1996). For this reason, Skinner (1996) suggests that investigating multiple control beliefs in a single study is of critical importance to examinations of PC to respect its composite nature and because certain control beliefs may be more relevant than others in predicting selected outcomes and/or distinct behaviours. Moulding and Kyrios (2006) hypothesized that the sub-components of PC with direct relevance to OCD are locus of control (LOC; Rotter, 1966) and self-efficacy (Bandura, 1976, 1997) beliefs. Both constructs address PC with regard to reinforcement expectancies; where LOC targets outcome expectancy (i.e., perceived control over outcomes), self-efficacy refers to behavioural expectancy (i.e., perceived control over behaviour). External LOC orientations have been found to be related to higher OCD symptoms scores (Akbarikia & Gasparyan, 2012a, 2012b; Altin & Karanci, 2008; Kamel, Asaad, Haroun El Rasheed, Shaker, & Abulmagd, 2006) and to have an indirect relationship to OCD symptoms via beliefs thought to be specific to OCD (i.e., inflated responsibility; Altin & Karanci, 2008). Self-efficacy is considered to be an integral component of current conceptualizations of self-esteem (Tafarodi & Swann, 1995;

Tafarodi & Milne, 2002; Vohs & Heatherton, 2001), and research documenting the importance of certain low self-esteem beliefs (such as negative self-worth, self-ambivalence, and poor self-concept) to OCD has begun to accumulate (Bhar & Kyrios, 2007; Doron & Kyrios, 2005; Doron, Moulding, Kyrios, & Nedeljkovic, 2008; Ehntholt, Salkosvskis, & Rimes, 1999; Garcia-Soriano & Belloch, 2012).

With regard to the specificity of control beliefs, PC is most commonly measured in anxiety disorder research with the Anxiety Control Questionnaire-Revised (ACQ-R; Brown et al., 2004), which assesses PC over anxiety with regard to internal and external outcomes (i.e., LOC over anxiety). Anxiety-as-context was determined largely through research that distinguished between *primary* versus *secondary* control (Rothbaum, Weisz, & Snyder, 1982). Primary control refers to attempts to change the external world, and secondary control refers to control over internal processes. The ACQ-R can be considered a measure of secondary control as well as a domain-specific measure of LOC. Most studies investigating PC with regard to OCD (e.g., Altin & Karanci, 2008; Moulding & Kyrios, 2007; Moulding et al., 2007, 2008, 2009) have relied on the ACQ (Rapee et al., 1996) or the revised version (i.e., ACQ-R; Brown et al., 2004), as low PC over anxiety is thought to enhance anxious states due to a belief in the diminished capacity to influence threatening outcomes (Chorpita, 2001).

Another conceptual difficulty inherent in the concept of control is the "…problem of disentangling the effects of controllability from predictability…" (Seligman, 1975, p. 128). Control is often confounded with prediction in the research literature particularly because of how difficult it is to evaluate "sense of control" over an outcome separate from outcome expectancy (Carver et al., 2000). That is, where control implies

dependence on what the individual is capable of doing, prediction involves the expectation or anticipation that a particular outcome will occur. In anxious responding to aversive stimuli, both predictability and controllability of threatening events have been implicated (Rachman, 1994; Zvolensky et al., 2000). As fears in OCD are often conceptualized as regarding future (negative) consequences (Rachman, 2002), it is suggested that predicted controllability over such potential negative outcomes requires further investigation with regard to OCD symptomatology (Bocci & Gordon, 2007). There is limited research in this specific area to date, although there has been an association of OCD symptoms with overestimations of controllability and increased behavioural attempts to control a stimulus (Reuven-Magril et al., 2008).

Finally, it is thought that people are generally considered to seek and maintain a sense of control (i.e., desire for control; DC) and thus often are motivated to pursue a greater sense of control even when it is potentially maladaptive (Deci & Ryan, 2000; Zuckerman, Knee, Kieffler, Rawsthorne, & Bruce, 1996). Research on the mismatch between high DC and low PC has demonstrated its relation to OC beliefs, behaviours, and symptoms. That is, it has been proposed that individuals with OCD may have both a high desire to exert control as well as low self-appraisals of control, which may result in a tendency to become anxious and to seek strategies to re-gain an (illusory) sense of control and reduce anxiety (Moulding & Kyrios, 2006; Moulding et al., 2008; Reuven-Magril et al., 2008). Indeed, a control mismatch has been demonstrated whereby a concurrent discrepancy between high DC and low PC was associated with higher levels of OCD beliefs and symptoms (Moulding & Kyrios, 2007; Moulding et al., 2007, 2008).

Taken together, there are still many gaps in the literature regarding the notion of control in OCD. First, the multidimensionality of PC with regard to OCD has not been adequately addressed. For example, it is not known whether the current operational definition and measurement of PC with regard to OCD is appropriate and/or relevant. Although the ACQ-R (Brown et al., 2004) hints at the multidimensionality of PC, the question of which sub-components of PC are critically relevant to OC beliefs, behaviours, and symptoms has not been adequately investigated; it appears that LOC, self-esteem/self-efficacy, and predicted controllability are likely candidates. Furthermore, while recent research provides preliminary evidence of the relationships among PC, DC, and OCD-related beliefs, behaviours, and symptoms, it is still not understood how the multidimensionality of PC relates to OCD more broadly. Finally, this domain is lacking in empirical investigations, as well as studies that utilize clinical samples. Previous research has relied on cross-sectional questionnaire studies as well as analogue designs using vignettes and computer tasks, and only a handful of such investigations have examined PC in OCD populations.

In general, the purpose of the present research is to examine the roles that control-related cognitions and beliefs play in the maintenance and persistence of OCD symptomatology in both non-clinical and clinical populations. Study 1 will explore the measurement of PC in relation to OCD, specifically aiming to determine which domains of PC beliefs predict OC symptoms, and in particular how OCD-related beliefs mediate this relationship. The aim of Study 2 is to manipulate sub-components of PC in order to determine what aspects of PC influence OC-type behaviour (extended cleaning) in an experimental methodology. The work promises to add not only to our understanding of

the nature of control-related cognition in OCD, but also to support novel control-related OCD intervention strategies.

CHAPTER 2

Examining the influence of perceived control on obsessive compulsive symptoms: A Modeling Approach

Cognitive theories of obsessive compulsive disorder (OCD) propose that it is the misappraisal of intrusive thoughts based on dysfunctional beliefs that causes individuals to become anxious and engage in compulsive behaviour (e.g., Clark, 2004; Rachman, 1997, 1998, 2002; Salkovskis, 1985, 1999; Salkovskis et al., 1995). Although specific obsessive compulsive (OC) maladaptive beliefs have been identified (Obsessive Compulsive Cognition Working Group [OCCWG], 2005), not all individuals with OCD endorse clinically significant levels of these beliefs (Taylor et al, 2006). This suggests that other cognitive domains are likely involved in OC-phenomenology and symptom presentation. Perceived control (PC) is one such construct that has been linked to the development and maintenance of many anxiety disorders (Brown et al., 2004; Chorpita & Barlow, 1998; Cloitre et al., 1992; Hofmann, 2005; White et al., 2003; Zvolensky et al., 2000), including OCD (e.g., Moulding & Kyrios, 2006). While it has been demonstrated that control beliefs play a role in OC symptom presentation (e.g., Gelfand & Radomsky, 2013; Moulding et al., 2009), our understanding of both "how" and "why" they do is limited. Thus, the aim of the present study was twofold: 1) to replicate and extend previous findings through an investigation of potential mediators between PC and OC symptoms (i.e., "how"), and 2) to clarify the conceptualization of PC in OCD by examining proposed sub-components of PC in the prediction of such a mediated relationship (i.e., "why").

A sound empirical basis for the relationship between specific cognitions and OCD has been established (see Frost & Steketee, 2002, for a review) and provides evidence for cognitive models of OCD (e.g., Clark, 2004; Rachman, 1997; Salkovskis et al., 1995). In particular, evidence has accumulated to suggest that certain belief domains, such as those associated with inflated responsibility, the need to control thoughts, and perfectionism, play a maintaining role in OCD (e.g., Ladoucer et al., 1997; Pleva & Wade, 2006; Rassin et al., 1999, Salkovskis & Campbell, 1994). However, a large proportion of individuals with OCD do not endorse such beliefs (Calamari et al., 2006; Taylor et al., 2006), and targeting these beliefs in treatment has not resulted in significantly greater outcomes than behavior therapy alone (Purdon, 2007). As a result, much debate regarding the relative influence of these particular beliefs has arisen in recent years (Calamari et al., 2006; Cougle, Lee, & Salkovskis, 2007; Myers, Fisher, & Wells, 2008), leading to new questions and novel investigations about beliefs in OCD. Of particular relevance to the current study is the recent proposition that a higher-order belief domain, such as beliefs regarding PC, may be involved in the phenomenology of OCD (Moulding & Kyrios, 2006).

In anxiety disorders research, PC is often described as the amount of control an individual believes him/herself to have over anxiety-related events, and is commonly measured by the Revised Anxiety Control Questionnaire (ACQ-R; Brown et al., 2004). (That is, PC can also refer to the amount of influence an individual might believe him/herself to have over a number of different situations, emotions, thoughts or other stimuli; although in the context of anxiety disorders, PC usually refers to perceived influence over something that might have the potential to lead to some undesired

outcome and/or distress.) PC has been implicated as an important determinant in both the aetiology and maintenance of anxiety disorders (Brown et al., 2004; Cloitre et al., 1992; Hofmann, 2005; White et al., 2006; Zvolensky et al., 2000). For example, while the development of anxiety has been associated with a lack of control in childhood (Chorpita & Barlow, 1998), a diminished perception of control has been implicated in the maintenance of symptom severity in social phobia (e.g., Hofmann, 2005), panic disorder (e.g., White et al., 2003), compulsive gambling (Goodie, 2005), as well as OCD (Moulding et al., 2008).

The specificity of the impact of low PC on the maintenance of psychological symptoms in general has been demonstrated most robustly through its association with other variables, such as anxiety sensitivity (e.g., Gregor, Zvolensky, McLeish, Bernstein, & Morissette, 2008; Schmidt & Lerew, 2002), avoidance behaviour (e.g., White et al., 2006), catastrophic thinking (e.g., Hofmann, 2005; Meuret, Hofmann, & Rosenfield, 2010), and experiential avoidance (e.g., Forsyth, Parker, & Finlay, 2003). However, in OCD research, although the influence of low PC on OCD symptom severity has been related to a concurrent relationship with high desire for control (DC; Moulding & Kyrios, 2007; Moulding et al., 2008) and to be partially mediated by OCD beliefs (Moulding et al., 2009), low PC was also found to have a direct influence on the presence of OC symptoms in cross-sectional questionnaire (Moulding et al., 2009) and quasi-experimental (Moulding et al., 2007) research. Although it is possible that low PC is uniquely predictive of OCD, it is critical to examine other cognitions that might help to better explain this direct association, as well as determine what variables contribute to an individual's low sense of control in OCD in the first place.

Thought action fusion (TAF), or the belief that having a thought about a bad event makes the event more likely to occur and/or that having a thought is morally equivalent to acting on it, is one such variable that has been speculated to interact with OCD beliefs and clarify the relationship between PC and OCD (Bocci & Gordon, 2007; McLaren & Crowe, 2003; Moulding & Kyrios, 2006; Moulding et al., 2009; Zebb & Moore, 2003). TAF is described as an individual's belief that one's "unpleasant, unacceptable thoughts can influence the world" (p.87; Shafran & Rachman, 2004), and is thought to play a role in the misinterpretation of intrusive thoughts in OCD. TAF is conceptualized to be a specific form of magical thinking (Einstein & Menzies, 2004a, 2004b; West & Willner, 2011; Yorulmaz, Inozu, & Gültepe, 2011) that has been associated with OCD beliefs (e.g., Altin & Gençöz, 2011; Clark et al., 2000), behaviours (Bocci & Gordon, 2007; Marcks & Woods, 2007), and symptoms (Amir, Freshman, Ramsey, Neary & Brigidi, 2001; Berle & Stacevic, 2005; Shafran, Thordarson, & Rachman,1996; Rees, Draper, & Davis, 2010). It has been suggested that TAF contributes to the presence of OCD symptoms by providing an illusion of control when actual control is not possible (Bolton, Dearsly, Madronal-Luque, & Baron-Cohen, 2002; Moulding & Kyrios 2006; Moulding et al., 2009), which would in part explain the speculation that control-related beliefs play a role in the reinforcing nature of compulsive rituals (Reuven-Magril et al., 2008). Thus, although TAF-like beliefs have been found to be related to low PC over anxiety (Zebb & Moore, 2003), and that low PC influences thought control and other anxiety neutralizing strategies that have been linked to TAF and OCD symptoms (Bocci & Gordon, 2007; McLaren & Crowe, 2003), the mediating role of TAF in the relationship between PC and OCD has not to the best of my knowledge been examined.

Another proposition that might help to explain the relationship between low PC and OCD involves how PC over anxiety is defined in the extant literature. The concept of PC is commonly described as an atheoretical, composite variable (Skinner, 1996) that has roots in multiple theories such as the social cognitive (e.g., Bandura, 1976) and learned helplessness (e.g., Seligman, 1975) models. As a result, PC is often broadly categorized as involving notions of either *competence* or *contingency* (Skinner, 1996). Consistent with this classification, self-esteem constructs (SE) and locus of control (LOC) beliefs have been employed in OCD research as measurable judgments of competence and contingency that contribute to PC (Moulding & Kyrios, 2006). Recent research has demonstrated that both SE (Doron, Sar-El, & Mikulincer, 2012; Doron & Kyrios, 2005; Ehntholt et al., 1999; Garcia-Soriano & Belloch, 2012) and LOC (Akbarikia & Gasparyan, 2012a, 2012b; Altin & Karanci, 2008; Kamel et al., 2006) likely have specific relevance to OCD phenomenology.

SE is a global construct, often measured by the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965), and describes an individual's personal evaluation of self-worth and self-efficacy (Franks & Marolla, 1976; Richardson, Ratner, & Zumbo, 2009; Tafarodi & Swann, 1995). Low SE has been linked conceptually with PC in that an individual's sense of control is based on one's sense of confidence in his or her capacity for control (Bandura, 1997). Individuals with OCD have been found to endorse low levels of self-esteem (Ehntholt et al., 1999), and recent research has begun to emerge highlighting the role of self-beliefs in OCD (e.g., Doron et al., 2008), such as self-ambivalence (Bhar & Kyrios, 2007), negative self-evaluation (Doron & Kyrios, 2005), and self-worth (Garcia-Soriano & Belloch, 2012). Given the recent accumulation of

support for the relationship between beliefs about the self and the development and maintenance of OCD, a closer inspection of the relationship of SE to OCD symptoms in the context of PC is warranted.

LOC, or the internal versus external control of reinforcement, describes a generalized expectancy that events are either under personal control (internal) or that events are contingent upon the control of others, determined by chance, or completely unpredictable (external; Rotter, 1990). LOC is often measured with Rotter Locus of Control Scale (RLOCS; Rotter, 1966), and one's LOC orientation is thought to determine the perception of an outcome as controllable (internal LOC) versus uncontrollable (external LOC). As an important distinction in the definition and measurement of PC is that of context, or domain-specificity, the original Anxiety Control Questionnaire (ACQ; Rapee et al., 1996) and the revised ACQ (ACQ-R; Brown et al., 2004) were largely developed as a means of measuring LOC in the context of anxiety. External LOC orientations have been associated with psychopathology (e.g., Hale & Cochran, 1987), anxiety disorders (Brodbeck & Michelson, 1987; Hoehn-Saric & McLeod, 1985; Kennedy, Lynch, & Schwab, 1998) and higher OCD symptom scores (Akbarikia & Gasparyan, 2012a, 2012b; Altin & Karanci, 2008; Kamel et al., 2006). However, while an external LOC orientation does not uniquely predict OCD (Altin & Karanci, 2008), when considered alongside OCD beliefs, external LOC and inflated responsibility for example have been shown to interact to predict higher symptom scores than responsibility alone (Altin & Karanci, 2008). This might also be the case with regards to the combined influence of external LOC and TAF on OCD symptoms, especially given that a relationship between external LOC and TAF-like beliefs (e.g., magical thinking,

superstition, belief in the paranormal) has been demonstrated (Allen & Lester, 1994; Dag, 1999; Tobacyk, Nagot, & Miller, 1988). Magical thinking about the fusion of thoughts and actions might be a way for individuals to cope with the limitations of their belief in the externality of control forces at work, and may interact in such a way as to predict OCD symptom scores.

The aim of the present study is two-fold, and path models were developed to test the hypotheses corresponding to the two objectives. The first objective was to test the primary hypothesis that low PC, as measured by the ACQ-R (Brown et al., 2004) directly predicts OCD symptoms measured by the Vancouver Obsessional Compulsive Inventory (VOCI; Thordarson et al., 2004) as well as through the mediating roles of TAF, as measured by the Thought Action Fusion Scale (TAFS; Shafran et al., 1996), and OCD beliefs as measured by the OBQ-44 (OCCWG, 2005). Given the established relationship in the extant literature between low PC and high desire for control (DC) in predicting OCD beliefs and symptoms (e.g., Moulding et al., 2009), DC was included in the proposed models. Thus, the proposed Model 1 (see Figure 2.1) was developed to test the following hypotheses:

1. PC will be negatively associated with DC and OCD beliefs, and positively associated with TAF beliefs
2. OCD beliefs will be positively associated with OCD symptoms
3. TAF and OCD beliefs will both significantly mediate the relationship between PC and OCD symptoms.
4. OCD beliefs will significantly mediate the effect between DC and OCD symptoms.

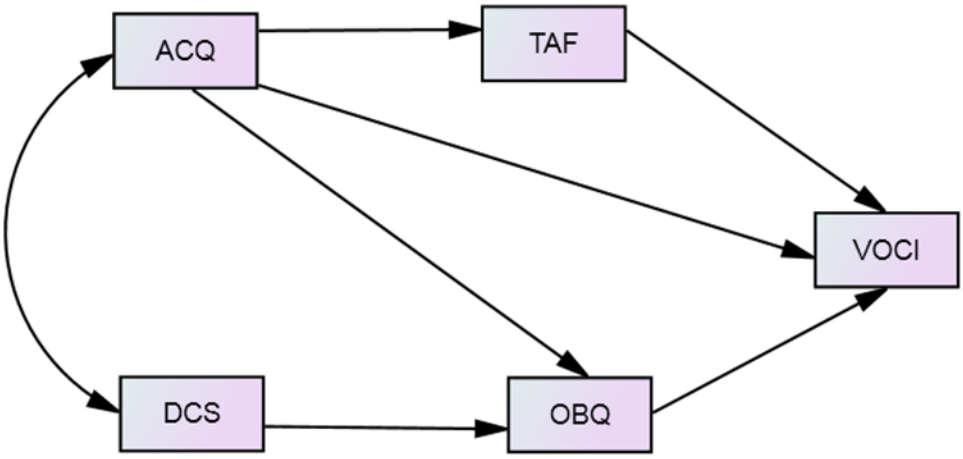

Figure 2.1. Hypothesized Model 1 for the relationship between control-beliefs, TAF, OC-specific beliefs, and OC symptoms. ACQ = Anxiety Control Questionnaire-Revised; DCS = Desirability for Control Scale; TAF = Thought-action fusion; OBQ = Obsessive Beliefs Questionnaire-44; VOCI = Vancouver Obsessional Compulsive Inventory.

The second aim was to examine the relative contribution of components of PC, SE as measured by the RSES (Rosenberg, 1965) and LOC as measured by the RLOC, (Rotter, 1966) in predicting OCD beliefs, TAF, and OCD symptoms. The corresponding hypotheses of Model 2 (see Figure 2.2) are:

1. SE will be negatively associated with DC and OCD beliefs
2. LOC will be positively associated with DC, TAF, OCD beliefs, and OCD symptoms
3. TAF will be positively associated with OCD symptoms
4. TAF and OCD symptoms will both significantly mediate the relationship between LOC and OCD symptoms.
5. OCD beliefs will significantly mediate the relationship between DC and OCD symptoms.

Method

Participants

The present study included two groups of participants: $n_1 = 550$ undergraduate participants (nonclinical group), and $n_2 = 30$ individuals whose symptoms met criteria for OCD according to the *Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition* (DSM-IV; APA, 2000) (clinical group). Clinical participants were assessed using the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown, Di Nardo, & Barlow, 1994; see below for description).

Student sample. Undergraduate participants were Concordia University students who were recruited via classroom visits and an internet-based participant pool offered through the Department of Psychology (See Appendix A). As compensation for their

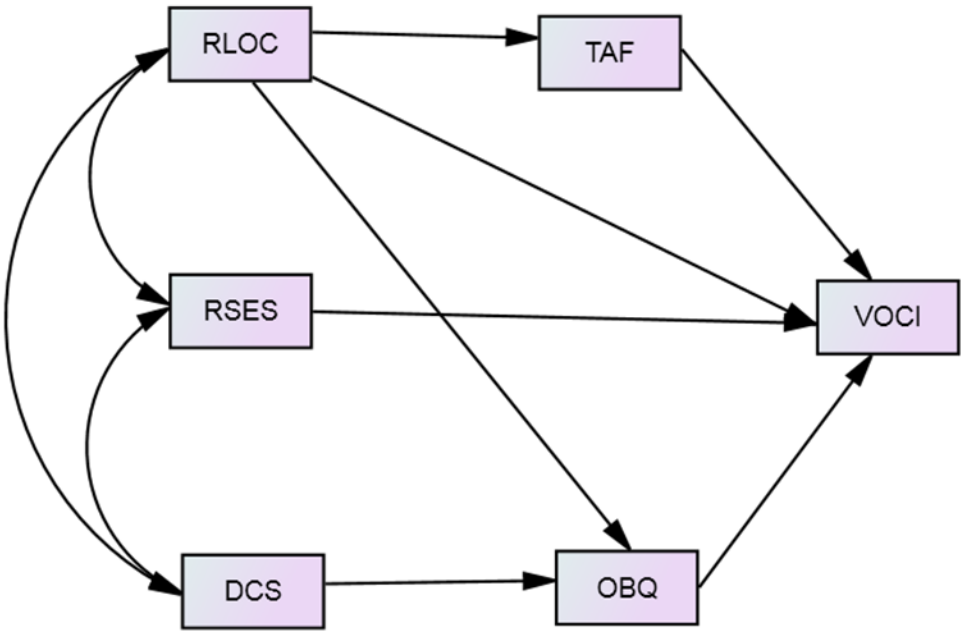

Figure 2.2. Hypothesized Model 2 for the relationship between control-beliefs, TAF, OC-specific beliefs, and OC symptoms. RLOC = Rotter Locus of Control; RSES = Rosenberg Self-Esteem Scale; DCS = Desirability for Control Scale; TAF = Thought-action fusion; OBQ = Obsessive Beliefs Questionnaire-44; VOCI = Vancouver Obsessional Compulsive Inventory.

time, student participants received course credit or entry into a draw for cash prizes. Data were collected from a total of 550 individuals; however, 8 participants were excluded from analyses due to technical difficulties with the online questionnaire, 31 participants were excluded as univariate outliers, and 7 participants were excluded as multivariate outliers (see Results section, Data Screening for details).

The final nonclinical sample included 504 student participants. Their mean age was 23.08 (*SD* = 5.35, range 17 - 59) years. The majority (85.3%) were women, and they reported a mean of 2.52 (*SD* = 1.64) years of university education. Most identified their ethnic background as being of European descent (71.8%) however others reported themselves to be Asian (7.1%), African Canadian/American (5.2%), Middle Eastern (5.6%), multi-ethnic (3.2%), Indian (2.8%), Hispanic (2.8%) and other (1.6%). Their scores on the Beck Anxiety Inventory (BAI; Beck & Steer, 1990), Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996), and the VOCI (Thordarson et al., 2004) were representative of a non-clinical sample (see Table 2.1 for means and standard deviations).

Clinical sample. Clinical participants were recruited through advertisements in local newspapers, and by contacting members of a clinical participant registry who indicated interest in participating in research (see Appendix B). Fifty six individuals were screened using a brief telephone interview adapted from the ADIS-IV (Brown et al., 1994). Individuals were excluded from the study if they met diagnostic criteria for either Bipolar or Psychotic Disorders, current alcohol and/or substance dependence, or if OCD was not the primary anxiety disorder diagnosis. Those individuals who met the appropriate diagnostic criteria (n = 34; 60.71%) were invited to the laboratory to

Table 2.1
Participant Characteristics in Nonclinical Sample and Clinical Sample

Characteristic	Nonclinical Sample	Clinical Sample[a]
n	504	29
Age, *M (SD)*	23.08 (5.35)	38.14 (11.61)
Gender, %		
Women	85.3	51.7
Men	14.7	48.3
Years in University, *M (SD)*	2.52 (1.64)	2.1(11.61)
Ethnicity[b], %		
European	71.8	65.5
African Canadian	5.2	3.4
Asian	7.1	20.7
Indian	2.8	-
Hispanic	2.8	10.3
Middle Eastern	5.6	-
Multi-Ethnic	3.2	-
Other	1.6	-
BAI, *M (SD)*	8.59 (5.35)	18.03 (14.7)
BDI-II, *M (SD)*	8.11 (7.07)	14.62 (14.13)
VOCI, *M (SD)*	28.85 (25.58)	81.66 (39.68)
Y-BOCS, *M (SD)*	-	25.07 (6.77)
Current Psychiatric Disorder[c], %	7.5	100

Note. BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory; VOCI = Vancouver Obsessional Compulsive Inventory; Y-BOCS = Yale Brown Obsessive Compulsive Scale.

complete the ADIS-IV. Following the diagnostic interview, 30 individuals qualified to participate in the study. Due to technical problems with the online questionnaire, 1 participant was excluded due to missing data; therefore, 29 participants were included in data analyses. Clinical participants were offered financial compensation for their time.

The final clinical sample included 29 participants. These participants ranged in age from 22 to 64 (M = 38.14, SD = 11.61) years and 51.7% were women. They reported a mean of 2.1 (SD = 11.61) years of university education. The majority identified their ethnic identification as being of European descent (65.5%), with the rest identifying as Asian (20.7%), Hispanic (10.3%), and African Canadian/American (3.4%). Their scores on the BAI (Beck & Steer, 1990), BDI-II (Beck et al., 1996), the VOCI (Thordarson et al., 2004), and the Yale Brown Obsessive Compulsive Scale (Y-BOCS; Goodman et al., 1989) were representative of a clinical sample (see Table 2.1 for means and standard deviations), and all participants in this sample had a principal/primary OCD diagnosis. The majority (72.4%) of participants had a comorbid disorder and the mean number of comorbid diagnoses was 1.38 (SD = 1.18), with the most frequently occurring comorbidities being Social Anxiety Disorder (41.4%) and Generalized Anxiety Disorder (31%). Inter-rater reliability was excellent (κ = .95), calculated across principal and additional diagnoses for a subset (20%) of interviews.

Compared to student participants, clinical participants were older $t(570) = 13.49$, $p < .001$, $d = 1.6$. Clinical participants were also more likely to be male, $\chi^2(1) = 22.45$, $p < .001$. Additionally, clinical participants had significantly higher scores on the BAI, $t(570) = 6.21$, $p < .001$, $d = .8$, the BDI-II, $t(570) = 4.48$, $p < .001$, $d = .6$, and on the VOCI, $t(570) = 10.43$, $p < .001$, $d = 1.8$.

Measures *(See Appendix C for OCD-related scales, Appendix D for measures of general anxious and depressive symptomatology, Appendix E for control-related scales)*

Anxiety Disorders Interview Schedule for DSM-IV (**ADIS-IV**; Brown et al., 1994). This semi-structured diagnostic interview was used to assess participants' diagnostic status. It assesses a variety of current and lifetime symptoms associated with anxiety and related (e.g., mood, somatoform, substance abuse, psychotic) disorders, according to DSM-IV (APA, 2000) criteria. The ADIS-IV has been widely used in both clinical and research contexts and has been demonstrated to possess good test-retest reliability (Di Nardo, Moras, Barlow, Rapee, & Brown, 1993). The ADIS-IV has been found to possess less than adequate to excellent inter-rater reliability, when assessing depression (κ = .68) and OCD (κ =.85), respectively (Brown, DiNardo, Lehman, & Campbell, 2001).

Anxiety Control Questionnaire- Revised (**ACQ-R**; Brown et al., 2004). The original ACQ (Rapee et al., 1996) was designed to measure PC over emotional reactions and PC over external threats specific to anxiety disorders. The ACQ-R is a 15-item, self-report measure consisting of 3 factors: control of emotion, control of threat, and control of response to stress. The total scale score represents a higher-order construct of PC over anxiety. The original ACQ was found to possess strong internal consistency, test-retest reliability, as well as good convergent and divergent reliability (Rapee et al., 1996). The ACQ-R was revised based on additional studies in a large clinical sample (Brown et al., 2004), and has demonstrated good internal consistency with both clinically anxious (α = .85; Brown et al., 2004) and nonclinical (α = .87; Moulding & Kyrios, 2007) participants.

It demonstrated good to excellent internal consistency in the nonclinical (α = .85) and clinical (α = .95) samples, respectively.

Beck Anxiety Inventory (**BAI**; Beck & Steer, 1990) and **Beck Depression Inventory-II** (**BDI-II**; Beck et al., 1996). The BAI and BDI-II are widely used and well-validated 21-item self-report instruments for the assessment of state anxiety and depression, respectively. The BAI exhibits good internal consistency (Creamer, Foran, & Bell, 1995; Fydich, Dowdall, & Chambless, 1992), modest test-retest reliability (Creamer et al., 1995; Fydich et al., 1992), and excellent divergent validity in comparison with other measures of anxiety (Creamer et al., 1995; Fydich et al., 1992). The BDI-II demonstrates high internal consistency and good test-retest reliability, as well as good convergent and divergent validity (Beck et al., 1996; Steer & Clark, 1997). The two measures had good to excellent internal consistency in both the non-clinical sample (BAI α = .89; BDI-II α = .89) and the clinical sample (BAI α = .96; BDI-II α = .96).

Desirability of Control Scale (**DCS**; Burger & Cooper, 1979*)*. The DCS is a 20-item self-report measure designed to measure individual differences in the motivation to control the events in one's life. The DCS contains some generally worded items (e.g., I try to avoid situations where someone else tells me what to do) as well as items that refer to particular areas of life (e.g., I enjoy political participation because I want to have as much of a say in running the government as possible). The DCS exhibits good internal consistency (α = .80) as well as good convergent, divergent and construct validity, and adequate test-retest reliability (Burger & Cooper, 1979: McCutcheon, 2000). It demonstrated adequate to good internal consistency in the nonclinical (α = 82.) and clinical (α = .71) samples, respectively.

Obsessive Beliefs Questionnaire-44 (**OBQ-44**; OCCWG, 2005). This 44-item scale is a revision of the OBQ-87 (OCCWG, 1997), and is designed to assess beliefs and appraisals related to obsessional thinking. The OBQ-44 includes three subscales that represent separate cognitive constructs hypothesized to be relevant to OCD: 1) responsibility and threat estimation, 2) perfectionism and intolerance of uncertainty, and 3) importance and control of thoughts. Items are rated on a scale of 1-7, with higher ratings indicating greater agreement with each belief. The OBQ-44 shows excellent internal consistency, and in an OCD sample, correlated strongly with measures of checking and fears of contamination. The internal consistency within the nonclinical (α = .94) and clinical (α = .97) samples was excellent.

Rosenberg Self-Esteem Scale (**RSES**; Rosenberg, 1965). The RSES is a 10-item self-report scale evaluating attitudes of general self-worth. This scale is a widely used instrument of global SE, and is considered to be one of, if not the most accepted scale for measuring global self-worth. The RSES has demonstrated acceptable test-retest reliability and good internal consistency (α = .95; Fleming & Courtney, 1982), and it is also considered to be the convergent validity criterion when new SE measures are developed (Robins, Hendin, & Trzesniewki, 2001). Internal consistency was good in the present study for both the nonclinical (α = .87) and clinical (α = .88) samples.

Rotter Locus of Control Scale ***(*****RLOCS**; Rotter, 1966*).* This 29-item self-report scale measures the extent of a person's internal or external reinforcement beliefs. That is, this scale assesses the extent to which individuals believe that they can control events that affect them; individuals low on the RLOCS are thought to believe that important things occur in their lives because of their own effort or abilities, while those who score high

expect things occur due to forces outside of their control. The scale has high reliability, good discriminant validity, and a stable factorial structure (Marsh & Richards, 1986, 1987). Internal consistency in the present study was adequate in both the nonclinical (α = .72) and clinical (α = .74) samples.

Thought Action Fusion Scale (**TAFS**; Shafran et al., 1996). The TAFS is a 19-item self-report measure of beliefs about the importance of thoughts, and each item is rated on a scale from 0 (disagree stongly) to 4 (agree strongly). It contains three subscales: moral (e.g., having a blasphemous thought is almost as sinful to me as a blasphemous action), likelihood-other (e.g., if I think of a relative/friend losing their job, this increases the risk that they will lose their job), and likelihood-self (e.g., if I think of myself having an accident, it increases the risk that I will have an accident). The TAFS has demonstrated strong internal consistency for all subscales in the normative data (α between .75 and .96; Shafran et al., 1996). It demonstrated excellent internal consistency in both the nonclinical (α = .93) and clinical (α = .96) samples.

Vancouver Obsessional Compulsive Inventory (**VOCI**; Thordarson et al., 2004). The VOCI is a 55-item self-report instrument designed to measure a broad range of OCD symptoms. There are six component subscales assessing various symptoms and features that have been found to be associated with OCD: checking; contamination; hoarding; indecisiveness; just right; and obsessions. Respondents rate each item on a scale of 0-4, with higher scores representing higher symptom severity. The VOCI possesses good inter-item reliability in student, community, OCD, and clinical control populations, (α = .96, 90, .94, and .98 respectively), as well as high test-retest reliability in clinical (Thordarson et al., 2004) and student (Radomsky et al., 2006) populations.

The scale has also been shown to have excellent convergent and divergent validity (Radomsky et al., 2006; Thordarson et al., 2004). The internal consistency within the nonclinical (α = .95) and clinical (α = .95) samples was excellent.

Yale-Brown Obsessive-Compulsive Scale (**Y-BOCS**; Goodman et al., 1989). This 10-item clinician-administered scale measures the severity of individuals' obsessive-compulsive symptomatology. The Y-BOCS consists of two subscales which assess the frequency and severity of obsessions and compulsions, and the subscale scores are summed to derive a total Y-BOCS score. The Y-BOCS has been shown to possess excellent inter-rater reliability (all intro-class correlations > 0.85 for total Y-BOCS score and for each item), as well as good convergent and divergent validity (Goodman et al., 1989). The internal consistency within the current clinical sample was adequate (α = .75).

Procedure

Student participants completed the study online after contacting the principal researcher via email or telephone to obtain the web address for the study portal. Once they logged into the portal, they were required to complete the study in a single session, which was approximately 1.5 hours long. Clinical participants who met eligibility criteria via the telephone screen were invited to attend an individual test session in the laboratory. There, they were administered the ADIS-IV (Brown et al., 1994), and if they were determined to have a principal diagnosis of obsessive compulsive disorder, the participant was deemed eligible for participation in the study and was administered the Y-BOCS (Goodman et al., 1989) to assess symptom severity prior to completion of the online questionnaires in a laboratory testing room.

During the online session, participants first read instructions on how to properly complete the online forms, followed by a battery of measures, which included a demographics survey, the BAI, BDI-II, ACQ-R, DCS, OBQ-44, RLOCQ, RSES, TAF, and the VOCI. There were two orders in which the questionnaire forms were presented, and participants were randomly selected to complete one of the two possible questionnaire forms. The debriefing form and a written word of thanks for their participation appeared online after submission of the final page of the questionnaire package (see Appendix F for consent and debriefing forms). Results using an online collection of questionnaire data has been demonstrated to be comparable to pencil-and-paper results for measures evaluating depressive symptoms (Schulenberg & Yrtzenka, 2001) and OCD (Coles, Cook, & Blake, 2007).

Statistical plan

Data screening procedures were followed to determine the presence of univariate and/or multivariate outliers, and to evaluate the univariate and/or multivariate normality of the samples. Statistical Package for the Social Sciences (SPSS) version 20 was used to calculate descriptive statistics and carry out correlational analyses to assess associations between variables of interest. Thereafter, path models were evaluated with Analysis of Moments Structure (AMOS) version 20 software. Path models were developed and refined to determine predictors of OCD symptoms (assessed by the VOCI) in the nonclinical sample. In the event that the hypothesized models did not result in well-fitting models in the nonclinical sample, model trimming recommendations (such as adding paths as suggested by modification indices or removing non-significant paths) were utilized only if a theoretical or empirical basis for such changes could be provided. The

retained models were then tested in the clinical sample to determine if the pattern of relationships observed in the nonclinical sample was also present in the clinical sample. Bootstrapping procedures were conducted using AMOS and the Preacher and Hayes (2008) macro in SPSS to determine the total, direct and indirect effects of all variables of interest, and to evaluate the specificity of mediation effects. All path analytic and bootstrapping procedures are explained below.

Path Analysis

The proposed path analysis models containing PC beliefs, OCD-relevant beliefs and symptoms were tested in a structural equation modelling program (AMOS 20; PASW Statistics, Chicago) using the maximum-likelihood method of parameter estimation. This method allows for simultaneous examination of multiple direct and indirect predicted paths and provides global indices of the fit between the theoretical model and the data (Holmbeck, 1997). Path analysisis is a method of testing causal patterns among a set of observed variables with the aim of providing estimates of the magnitude and significance of the hypothesized causal connections among a set of variables (Kline, 2005; Martinussen, 2010; Stage, Carter, & Nora, 2004).

Structural equation modeling relies on several statistical tests to determine the adequacy of model fit to the data. Researchers have suggested utlitizing multiple goodness-of-fit indices (Bentler & Bonett, 1980), as no single indicator has been demonstrated as superior. Thus, four indices were selected *a priori* to assess the fit of the model to the data.

First, the chi-square test indicates the amount of difference between expected and observed covariance matrices. Smaller values of the overall model chi-square (χ^2)

indicate goodness-of-fit ($p > 0.05$), which suggests that the null hypothesis is not rejected and that the model fits the data. In other words, a significant chi-square indicates a lack of satisfactory model fit, with smaller (χ^2) values indicating better fitting models. The chi-square statistic however is highly sensitive to sample size, and favours neither extremely large samples nor small ones. A poor fitting model based on a small sample may result in a nonsignificant chi-square, and a good fit based on a large sample may result in a significant chi-square. Therefore, as the ratio of chi-square to its degrees of freedom (χ^2/df) is thought to reduce the sensitivity of χ^2 to sample size, this statistic is also reported, with values <3.0 indicating good fit (Kline, 2005). Third, the Bentler comparative fit index (CFI) assesses incremental improvement in fit compared to an independence or null model, and it is equal to the discrepancy function adjusted for sample size. CFI values range from 0 to 1 with a larger value indicating better model fit, and acceptable model fit is indicated by a value >0.90 (Hu & Bentler, 1999). Fourth, the Steiger-Lind root mean squre error of approximation (RMSEA) and its 90% confidence interval (CI) provides a correction for model complexity, based on analysis of the residual (error). Small values are desired, and values greater than or equal to ≥ 0.10 indicate poor fit. The 90% CI of the RMSEA should not generally include 0.10 (Hu & Bentler, 1999).

Once a model was identified as having an adequate fit with the data, bootstrapping procedures were performed to identify total, direct, and indirect effects between the variables of interest, and to determine the significance of specific mediation effects. Bootstrapping involves re-sampling random subsets of the data to derive a non-parametric estimation of the sampling distribution of the products of the paths between

the independent variables (e.g., PC [Model 1] and SE and LOC [Model 2]) and the proposed mediators (e.g., TAF, OCD beliefs) as well as between the proposed mediators and the dependent variable (e.g., OCD symptom scores). Bootstrapping provides more powerful tests of mediation as compared to more traditional methods based on causal steps approaches to determine the significance of indirect effects (e.g., Baron & Kenny, 1986), which is also particularly useful in smaller samples (Mallinckrodt, Abraham, Wei, & Russell, 2006).

Although the bias-corrected bootstrap conducted in AMOS identifies the presence of indirect effects, AMOS does not compute the specificity of indirect effects when multiple mediators are involved (i.e., TAF and OBQ in the present study). Consequently, if total indirect effects were observed in the path analyses conducted in AMOS, the specificity of the indirect effects was further evaluated using the Preacher and Hayes (2008) SPSS macro for bootstrapping (Mallinckrodt et al., 2006; Shrout & Bolger, 2002). This procedure generates 5,000 bootstrap samples from the original dataset (nonclinical n = 504; clinical n = 29) by random sampling with replacement. Total indirect effects computed in AMOS are presented with standardized path coefficients, p values, and bias-corrected confidence intervals. Specific indirect effects using the Preacher and Hayes (2008) procedure are presented with unstandardized path coefficients, standard errors, and confidence intervals based on the bias-corrected bootstrap. Both total and specific indirect effects are significant when there is no zero value in the 95% bias-corrected bootstrap confidence interval (Mallinckrodt et al., 2006; Preacher & Hayes, 2004; Shrout & Bolger, 2002).

Sample Size

Structural equation modeling is usually considered a large sample technique, and the sample size required is thought to be dependent on model complexity, estimation method used, and the distributional characteristics of observed variables (Kline, 2005). Kline (2005) recommends a minimum of 10 cases for every parameter that is estimated and suggests that 20 cases for every estimated parameter is optimal. As the hypothesized Model 1 and 2 had 20 parameters and the second had 26 parameters, respectively, the nonclinical sample (n = 504) fits well within Kline's (2005) recommendations. However, as the clinical sample (n = 29) falls short of traditional path analysis sample size requirements, and to prevent possible issues in analysis due to small sample size, I followed MacKinnon, Lockwood, and Williams' (2004) recommendations. They suggest using the nonparametric bootstrapping method with 5000 resamples which derives a 95% confidence interval in order to permit valid and reliable conclusions in instances where sample sizes are small (MacKinnon et al., 2004). It should be noted however that the stringent recommendations regarding sample size in structural equation modeling has been criticized as simplistic and possibly overly conservative as SEM models have been shown to perform well even with small samples (Iacobucci, 2010).

Results

Data Screening

SPSS 20 software was used to conduct preliminary analyses on the total scores on the ACQ, DCS, RLOCQ, RSES, OBQ, TAFS, and VOCI scales to identify outliers and to assess assumptions of univariate normality in the nonclinical and clinical samples. Multivariate normality in both samples was assessed with AMOS 20 software. Although the online forms required participants to respond to all questions presented to them before

they could move on to the next page, there were some technical difficulties in the early stages of data collection, and eight participants from the non-clinical group and one participant from the clincial group were excluded from analyses due to incomplete forms.

Mahalanobis distance was calculated for total scores on the ACQ, DCS, RLOCQ, RSES, OBQ, TAFS, and VOCI scales and a chi-square cutoff of $p < .001$ was implemented to identify multivariate outliers. Seven multivariate outliers were identified and eliminated from the non-clinical dataset. There were no multivariate outliers in the clinical dataset. Total scores on the aforementioned scales were then converted to z-scores to identify univariate outliers. Standard scores greater than +/- 3.29 ($p < .001$) two-tailed (Tabachnick & Fidell, 2001) were excluded, which included 31 cases in the non-clinical dataset and no cases in the clinical dataset.

Following the elimination of outliers, the distribution of total scores on the aforementioned scales was assessed for skewness and kurtosis, using a criterion *z* score of + or – 3.3 ($p <0.01$; Tabachnick & Fidell, 2001). Standardized scores indicated that skew and kurtosis were nonsignificant for most scales in the nonclinical dataset, and for all scales in the clinical dataset. In the nonclinical dataset, there was significant positive skew for the VOCI z(skew) = 10.91 and the TAFS z(skew) = 6.23, and these variables were therefore square-root transformed to increase normality, square-VOCI z(skew) = 1.60, square-root TAF z(skew) = -1.36. Following transformations, all scores used in the analyses were normally distributed.

Multivariate normality for the total scale scores was assessed in AMOS 20 with Mardia's coefficient of kurtosis (Mardia, 1970), which yielded a value of 1.86 (normalized estimate = 2.49) for the non-clinical sample, and .85 (normalized estimate =

.274) for the clinical sample. The maximum likelihood robust estimator was used to evaluate the path coefficients and to test their standard errors to resolve any concerns regarding any minimal multivariate kurtosis.

Correlational Analysis

Pearson correlations were calculated in SPSS 20 to assess associations between variables of interest. Table 2.2 presents the means and standard deviations for the ACQ, DCS, OBQ-44, RLOC, RSES, TAFS, and the VOCI, and Table 2.3 presents the inter-correlations between these variables. Although many of the variables are correlated, bivariate correlations among all variables are less than the value of .85; therefore, the correlations do not violate the path analytic assumption of multicollinearity (Kline, 2005; Weston & Gore, 2006).

As DC was not correlated with the mediator variables (i.e., TAF and OBQ) in either sample (see Table 3), mediation analyses were not conducted with this variable in the path analysis models (see Path Analysis section below). However, the paths of the proposed model were hypothesized as such due in large part to the research of Moulding and collegues (e.g., 2006, 2007, 2008, 2009) which demonstrated the importance of the concurrent relationship of DC and PC in regards to OCD symptom presentation. Due to the importance of this variable in previous research, DC was retained in all models tested (as an exogenous variable) and did not alter model fit, despite the absence of a relationship with key model variables.

Path Analysis

Path analyses were conducted to predict OCD symptom scores in the nonclinical and clinical samples. Model 1 investigated the mediating role of TAF in the relationship

Table 2.2

Mean total scores and internal consistency of model measures in nonclinical and clinical samples

	Nonclinical sample *(N=504)*		Clinical sample *(N=29)*	
Measure	Total score *M (SD)*	α	Total score *M (SD)*	α
ACQ	36.73 (8.61)	.85	31.17 (10.61)	.89
DC	98.82 (13.89)	.80	99.41 (12.19)	.71
OBQ-44	132.18 (39.06)	.94	168.03 (52.88)	.97
RLOC	12.14 (4.21)	.72	12.59 (4.47)	.74
RSES	21.12 (5.21)	.87	17.07 (5.54)	.88
TAF	15.17 (13.01)	.93	19.31 (16.79)	.96
VOCI	28.85 (25.58)	.95	81.66 (39.68)	.95

Note. ACQ = Anxiety Control Questionnaire; DC = Desire for Control Scale; OBQ-44 = Obsessional Beliefs Questionnaire-44; RLOC = Rotter Locus of Control Scale; RSES = Rosenberg Self-Esteem Scale; TAF = Thought-Action Fusion Scale; VOCI = Vancouver Obsessional Compulsive Inventory.

Table 2.3

Inter-correlations between total scale scores of model variables in nonclinical and clinical samples

	Measures	ACQ	DC	OBQ-44	RLOC	RSES	TAF
Nonclinical Sample *(N=504)*	DC	.04					
	OBQ-44	-.06	.40				
	RLOC	-.26**	-.01	.11*			
	RSES	.40**	.09*	.03	-.12**		
	TAF	-.17**	-.01	.33**	.10*	-.01	
	VOCI	-.41**	.01	.02	.11*	-.29**	.26**
Clinical Sample *(N=29)*	DC	.34[a]					
	OBQ-44	-.65**	-.21				
	RLOC	-.60**	-.19	.63**			
	RSES	.75**	.31	-.70**	-.60**		
	TAF	-.40*	-.17	.50**	-.33[a]	-.15	
	VOCI	-.68**	-.33[a]	.71**	.56**	-.80**	.31

Note. ACQ = Anxiety Control Questionnaire; DC = Desire for Control Scale; OBQ-44 = Obsessive Beliefs Questionnaire; RLOC = Rotter's Locus of Control Scale; RSES = Rosenberg's Self-Esteem Scale; TAF = Thought-Action Fusion Scale; VOCI = Vancouver Obsessional Compulsive Inventory.

*$p < .05$, **$p < .001$, $a < .09$.

of PC to OCD symptoms. Model 2 evaluated the role of components of PC (SE and LOC) in the prediction of OCD symptoms. Hypothesized models 1 and 2, as shown in Figure 1 and 2, were both based on theory and previous empirical research. Given that certain variables were not normally distributed (see Data Screening), I used the robust maximum likelihood robust estimator method available in AMOS 20 to evaluate the path coefficients and to test their standard errors. The following variables (as represented by total scale scores) were included in Model 1: ACQ, DC, TAF, OBQ, VOCI. The following variables (as represented by total scale scores) were included in Model 2: RLOC, RSES, ACQ, DC, TAF, OBQ, VOCI.

Model 1: The effect of PC and TAF on OCD beliefs and symptoms

The proposed model included the following paths, with ACQ total scores as the exogenous variable of interest. Based on theory and empirical research, low ACQ scores were expected to be related to high DC scores and to indirectly predict high VOCI scores through the mediating effects of both high TAF and OBQ. Both TAF and OBQ were predicted to have a positive direct effect on VOCI. High DC scores were expected to indirectly predict high VOCI scores via high OBQ scores. See Figure 2.1 for hypothesized Model 1.

Model 1: Nonclinical sample

Examination of model statistics indicated that the hypothesized Model 1 provided a poor fit to the nonclinical data, χ^2 (3) = 62.58, $p < .001$; χ^2/df = 20.86; CFI = .72; RMSEA = .2, CI_{90} = [.16, .24]. Modification indices indicated that the addition of a path from TAF to OBQ would improve model fit. Given that the TAF scale is considered a measure of a specific set of beliefs frequently found in an OCD population, and that

certain OCD beliefs evaluated by the OBQ (specifically inflated responsibility) play a role in the relationship between TAF and OCD symptoms (e.g., Altin & Gençöz, 2011; Rachman, 1993; Rachman, Thordarson, Shafran, & Woody,1995; Rassin et al., 1999; Shafran et al., 1996), a path between TAF and OBQ was added. When this path was included the respecified model provided an excellent fit to the data, χ^2 (2) = .29, p = .86; χ^2/df = .15; CFI = 1; RMSEA < .01, CI_{90} = [.00, .05]. Examination of the paths of respecfied Model 1 indicated that low ACQ directly predicted high scores on TAF and VOCI, but there was no demonstrated effect on OBQ. TAF demonstrated a statistically significant positive direct effect on OBQ and VOCI. Contrary to expectations, the ACQ did not significantly predict scores on the OBQ, nor was there a significant effect of the OBQ on VOCI scores. Also contrary to expectations, there was a positive correlation between ACQ and DC, and DC did not predict scores on the OBQ. Standardized and unstandardized regression weights are shown in Table 2.4. Figure 2.3 depicts the final Model 1 for the nonclinical sample with standardized estimates, covariances and regression coefficients (R^2s) of the outcome variable.

Model 1: Total and specific indirect effects in the nonclinical sample

Examination of the total indirect effects indicated that there was a significant indirect effect of ACQ on the OBQ via TAF (β = -.06, p < .001; bias-corrected 95% CI: -.102, -.033). Bootstrapped estimates of the mediating role of TAF in the relationship between low ACQ and high VOCI revealed a significant negative indirect effect of ACQ on VOCI scores via TAF (β = -.04, p < .001; bias-corrected 95% CI: -.063, -.015). However, as the OBQ did not demonstrate a significant relationship with either the predictor variable (ACQ) or the outcome variable (VOCI), it was not necessary to use the

Table 2.4

Path coefficients, SE, critical ratios, and probabilities for PC and DC predicting TAF and OC Beliefs and Symptoms in the Nonclinical Sample (n = 504) in final Model 1

Paths	ß	*b*	*SE*	Z	*P*
ACQ→TAF	-.186	-.044	.010	-4.239	<.001**
ACQ→OBQ	.007	.111	.193	.173	.86
ACQ→VOCI	-.411	-.120	.012	-10.363	<.001**
TAF→OBQ	.347	6.650	.817	8.143	<.001**
TAF→ VOCI	.208	.257	.052	4.927	<.001**
OBQ → VOCI	-.060	-.004	.003	-1.437	.150
PC↔DC	.042	5.009	5.327	.940	.347
DC→OBQ	.040	.111	.118	.944	.345

Note. TAF and VOCI are square-root transformed. ACQ = Anxiety Control Questionnaire-Revised; DC = Desire for Control Scale; OBQ = Obsessive Beliefs Questionnaire-44; TAF = Thought-Action Fusion Scale; VOCI = Vancouver Obsessional Compulsive Inventory.

*$p < .05$, **$p < .001$

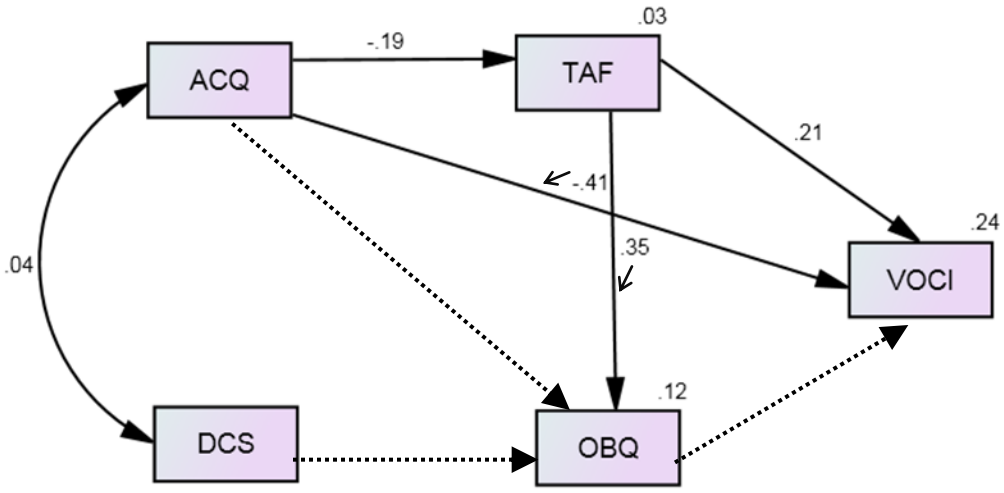

Figure 2.3. Final Model 1 results for nonclinical sample with standardized estimates (beside arrows) and regression coefficients (upper right-hand corner of box). ACQ = Anxiety Control Questionnaire-Revised; DCS = Desirability for Control Scale; TAF = Thought-action fusion; OBQ = Obsessive Beliefs Questionnaire-44; VOCI = Vancouver Obsessional Compulsive Inventory.

Non-significant paths indicated by a dotted line; all other paths significant at $p < .001$. Residual error terms not shown.

Preacher and Hayes (2008) macro to determine the specificity of indirect effects associated with multiple mediators.

Model 1: Clinical sample

Examination of model statistics indicated that the hypothesized Model 1a provided an excellent fit to the clinical data, χ^2 (2) = 1.009, p = .604.; χ^2/df = .505; CFI = 1; RMSEA < .001, CI_{90} = [.00, .307]. Examination of the paths of respecfied Model 1 indicated that low ACQ directly predicted high scores on TAF, OBQ, and the VOCI. TAF demonstrated a significant positive direct effect on OBQ, but did not predict VOCI scores. The OBQ significantly predicted VOCI scores in a positive direction. There was no relationship observed between ACQ and DC, and as in the nonclinical sample, there was no significant direct effect of DC on the OBQ. Standardized and unstandardized regression weights are shown in Table 2.5. See Figure 2.4 for respecified Model 1 in the clinical sample with standardized estimates, covariances, and regression coefficients (R^2s) of the outcome variable.

Model 1: Total and specific indirect effects in the clinical sample

Examination of bootstrapped estimates of indirect effects indicated that a total indirect effect of the ACQ on VOCI scores via both mediators (β = -.30, p < .06; bias-corrected 95% CI: -.561, .004) was marginally significant. As it is possible to have significant indirect effects in the presence of a nonsignificant total indirect effect (e.g., due to a suppression effect; see MacKinnon, Krull, & Lockwood, 2000), the specific indirect effects associated with the two mediators (TAF and OBQ) were subsequently investigated. The mediation effect from ACQ to VOCI through OBQ was significant (b = -1.262, *SE* = .51, bias-corrected 95% CI: -2.529, -.440) however TAF did not

Table 2.5

Path coefficients, SE, critical ratios, and probabilities for PC and DC predicting TAF and OC Beliefs and Symptoms in the Clinical Sample (n = 29) in final Model 1

Paths	ß	*b*	*SE*	Z	*P*
ACQ→TAF	-.403	-.637	.274	-2.330	.020*
ACQ→OBQ	-.540	-2.693	.776	-3.472	<.001**
ACQ→VOCI	-.381	-1.426	.594	-2.402	.016*
TAF→OBQ	.290	.914	.465	1.967	.049*
TAF→ VOCI	-.111	-.261	.331	-.789	.430
OBQ → VOCI	.522	.391	.126	3.102	.002*
PC↔DC	.347	43.342	25.00	1.734	.083[a]
DC→OBQ	.029	.126	.594	-2.402	.840

Note. ACQ = Anxiety Control Questionnaire-Revised; DC = Desire for Control Scale; OBQ = Obsessive Beliefs Questionnaire-44; TAF = Thought-Action Fusion Scale; VOCI = Vancouver Obsessional Compulsive Inventory.

*$p < .05$, **$p < .001$, a < .09

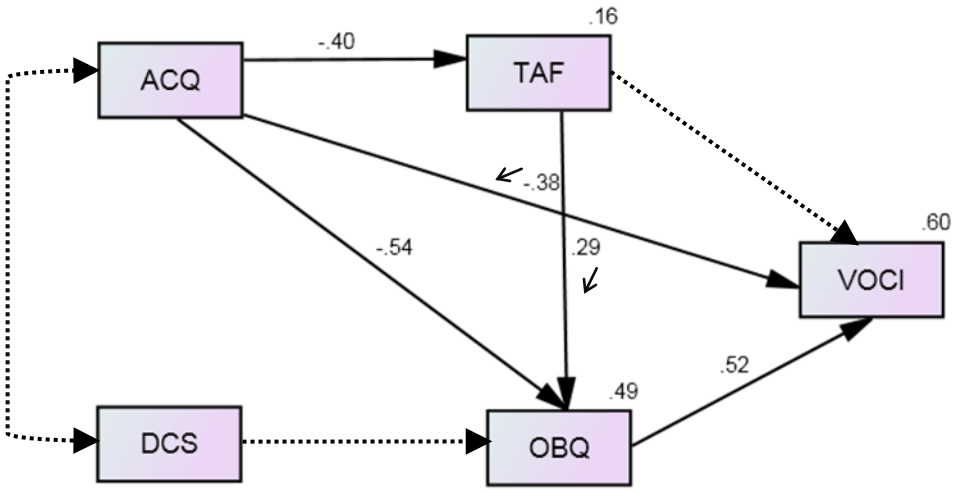

Figure 2.4. Final Model 1 results for clinical sample with standardized estimates (beside arrows) and regression coefficients (upper right-hand corner of box). ACQ = Anxiety Control Questionnaire-Revised; DCS = Desirability for Control Scale; TAF = Thought-action fusion; OBQ = Obsessive Beliefs Questionnaire-44; VOCI = Vancouver Obsessional Compulsive Inventory.

Non-significant paths indicated by a dotted line; all other paths significant at $p \leq .05$.

Residual error terms not shown.

demonstrate a similar significant mediation effect between ACQ and VOCI, (b = .1665, *SE* = .29, bias-corrected 95% CI: -.2625, 1.0122). Additional bootstrap analyses revealed a total indirect effect of ACQ to predict OBQ scores via TAF (β = -.12, $p < .05$; bias-corrected 95% CI: -.338, .004), and there was a marginally significant trend for TAF to indirectly predict VOCI scores via OBQ (β = .15, $p < .08$; bias-corrected 95% CI: -.011, .415).

Model 2: The influence of SE and LOC on OCD beliefs, TAF, and OCD symptoms

The proposed Model 2 included the following paths, and total scores on the RLOC and the RSES were the exogenous variables of interest. Based on theory and empirical research, SE was expected to directly predict VOCI scores. LOC was hypothesized to predict OCD symptom scores via both TAF and the OBQ. Both TAF and OBQ were predicted to have a direct effect on VOCI. DC was expected to indirectly predict VOCI scores via the OBQ. LOC was hypothesized to predict OCD symptom scores via both TAF and the OBQ. Both TAF and OBQ were predicted to have a direct effect on VOCI. See Figure 2.2 for hypothesized Model 2.

Model 2: Nonclinical sample

Examination of model statistics indicated that the proposed Model 2 provided a poor fit to the nonclinical data, χ^2 (5) = 63.191, $p < .001$; χ^2/df = 12.638; CFI = .655; RMSEA = .152, CI_{90} = [.120, .187]. Again, modification indices indicated that the addition of a path from TAF to OBQ would improve model fit, which, as discussed previously, is supported by the literature (e.g., Altin & Gençöz, 2011; Rachman, 1993; Rachman et al.,1995; Rassin et al., 1999; Shafran et al., 1996). When this path was included, the respecified model provided an excellent fit to the data, χ^2 (4) = .1.633, p =

.803; χ^2/df = ..408; CFI = 1; RMSEA < .01, CI_{90} = [.00, .042]. Examination of the paths of respecfied Model 2 indicated that RSES had a positive direct effect on VOCI. RLOC also had a direct effect on TAF, OBQ, and VOCI. TAF had a direct effect on the OBQ and VOCI. There was a negative correlation between RLOC and RSES, and a positive correlation between RSES and DC, but no relationship between RLOC and DC. The OBQ however did not demonstrate a significant direct effect on the VOCI, and again there was no effect of DC on OBQ. Standardized and unstandardized regression weights are shown in Table 2.6. Figure 2.5 depicts respecified Model 2 for the nonclinical sample with standardized estimates, covariances, and regression coefficients (R^2s) of the outcome variable.

Model 2: Total and specific indirect effects in the nonclinical sample

Although the RLOC did not demonstrate a total indirect effect on VOCI (β = .02, $p < .172$; bias-corrected 95% CI: -.008, -.044), the absence of such an effect does not preclude the presence of specific indirect effects, as previously mentioned. Bootstrapped estimates did demonstrate a significant specific indirect effect of RLOC to predict VOCI scores via TAF (b = .0143, *SE* = .0082; bias-corrected 95% CI: .0020, .0328). Mediation analyses on the role of OBQ in the relationship between RLOC and VOCI revealed a nonsignificant specific indirect effect (b = -.0048, *SE* = .0038; bias-corrected 95% CI: -.0155, .0002). However, bootstrapped estimates revealed a marginal mediating effect of TAF on the relationship between RLOC and OBQ (β = -.04, $p < .06$; bias-corrected 95% CI: -.001, .062).

Model 2: Clinical sample

Table 2.6

Path coefficients, SE, critical ratios, and probabilities for RLOC, RSES, and DC predicting TAF and OC Beliefs and Symptoms in the Nonclinical Sample (n = 504) in final Model 2

Paths	*ß*	*b*	*SE*	Z	*P*
DCS↔RLOC	-.002	-.108	2.603	-.041	.97
RSES↔DCS	.089	6.435	3.235	1.989	.05*
RSES↔RLOC	-.117	-2.553	.983	-2.597	.01*
RLOC→TAF	.085	.041	.021	1.922	.05*
RLOC→OBQ	.079	.731	.388	1.884	.05*
DC→OBQ	.040	.112	.117	.959	.34
TAF→OBQ	.338	6.495	.803	8.092	<.001**
RLOC→ VOCI	.063	.038	.024	1.544	.12
RSES → VOCI	-.313	-.151	.020	-7.681	<.001**
OBQ→VOCI	-.057	-.004	.003	-1.311	.347
TAF→VOCI	.273	.337	.053	6.331	<.001**

Note. TAF and VOCI are square-root transformed. ACQ = Anxiety Control Questionnaire-Revised; DC = Desire for Control Scale; OBQ = Obsessive Beliefs Questionnaire-44; RLOC = Rotter Locus of Control Scale; RSES = Rosenberg Self-Esteem Scale; TAF = Thought-Action Fusion Scale; VOCI = Vancouver Obsessional Compulsive Inventory.

*$p < .05$, **$p < .001$

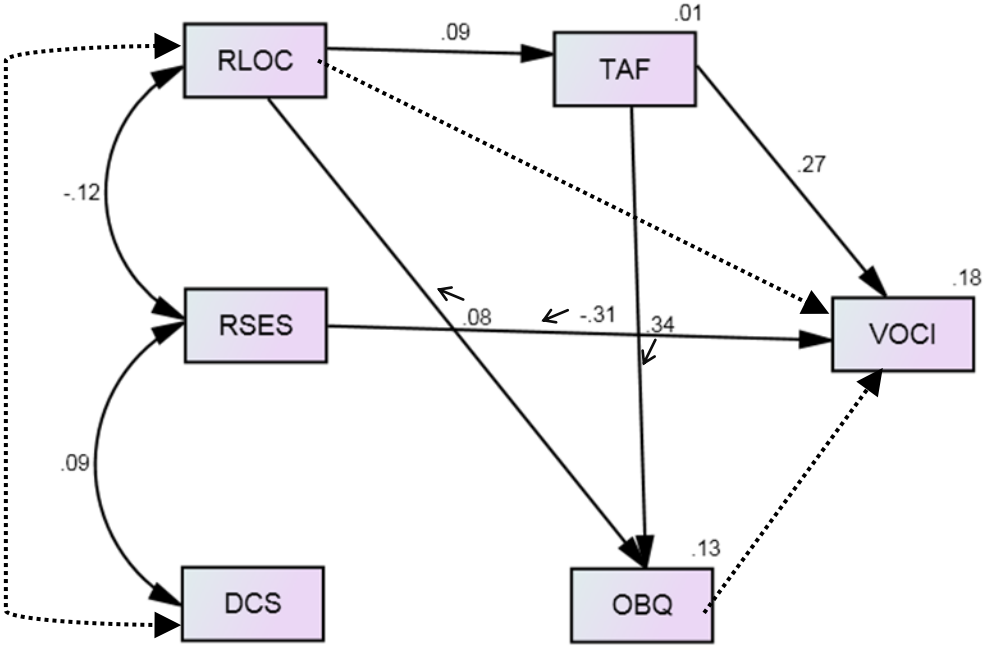

Figure 2.5. Final Model 2 results for nonclinical sample with standardized estimates (beside arrows) and regression coefficients (upper right-hand corner of box). RLOC = Rotter Locus of Control; RSES = Rosenberg Self-Esteem Scale; DCS = Desirability for Control Scale; TAF = Thought-action fusion; OBQ = Obsessive Beliefs Questionnaire-44; VOCI = Vancouver Obsessional Compulsive Inventory.

Non-significant paths indicated by a dotted line; all other paths significant at $p \leq .05$.

Residual error terms not shown.

Examination of model statistics indicated that the respecified Model 2 provided a poor-to-adequate fit to the clinical data, χ^2 (2) = 13.18, $p < .008$.; $\chi^2/df = 3.45$; CFI = .84; RMSEA = .296, CI_{90} = [.136, .474]. Examination of the paths of respecfied Model 2 in the clinical sample indicated that RSES had a direct positive effect on VOCI, while RLOC had a direct positive effect on OBQ, but not on TAF or VOCI. TAF had a direct effect on OBQ but not on VOCI, whereas OBQ had a direct effect on VOCI. There was a negative correlation between RLOC and RSES, but no relationship between RLOC and DC or between RSES and DC. There was no significant effect on DC on the OBQ. Standardized and unstandardized regression weights are shown in Table 2.7. See Figure 2.6 for respecified Model 2 in the clinical sample with standardized estimates, covariances and regression coefficients (R^2s) of the outcome variable.

Model 2: Total and specific indirect effects in the clinical sample

Examination of bootstrapped estimates of indirect effects revealed a marginal total indirect effect of RLOC on VOCI scores via both mediators (β = -.30, $p < .07$; bias-corrected 95% CI: -.250, 5.380). Bootstrap procedures were employed to further determine the presence and specificity of the indirect effects of OBQ and TAF in the relationship between RLOC and VOCI. Bootstrapped estimates revealed a significant mediation effect of OBQ (b = 3.30, *SE* = 1.436; bias-corrected 95% CI: 1.1443, 6.899), but no significant mediating effect of TAF (b = -.1359, *SE* = .5047; bias-corrected 95% CI: -1.5031, .6566). As in the nonclinical sample, estimates revealed a marginal mediating effect of TAF on the relationship between RLOC and OBQ (β = .11, $p < .06$; bias-corrected 95% CI: -.003, .313).

Table 2.7

Path coefficients, SE, critical ratios, and probabilities for RLOC, RSES, and DC predicting TAF and OC Beliefs and Symptoms in the Clinical Sample (n = 29) in final Model 2

Paths	*ß*	*b*	*SE*	Z	*P*
DCS↔RLOC	-.187	-9.829	10.116	-.972	.33
RSES↔DCS	.305	19.868	12.878	1.543	.12
RSES↔RLOC	-.598	-14.282	5.258	-2.716	.01*
RLOC→TAF	.325	1.219	.672	1.816	.07
RLOC→OBQ	.514	6.075	1.700	3.574	<.001**
DC→OBQ	-.244	.590	-.413	.68	.016*
TAF→OBQ	.328	1.030	.445	2.312	.02*
RLOC→ VOCI	.081	.686	1.558	.440	.66
RSES → VOCI	-.444	-3.039	1.058	-2.872	.004*
OBQ→VOCI	.363	.260	.125	2.081	.04*
TAF→VOCI	.044	.100	.322	.311	.76

Note. ACQ = Anxiety Control Questionnaire-Revised; DC = Desire for Control Scale; OBQ = Obsessive Beliefs Questionnaire-44; RLOC = Rotter Locus of Control Scale; RSES = Rosenberg Self-Esteem Scale; TAF = Thought-Action Fusion Scale; VOCI = Vancouver Obsessional Compulsive Inventory.

*$p < .05$, **$p < .001$

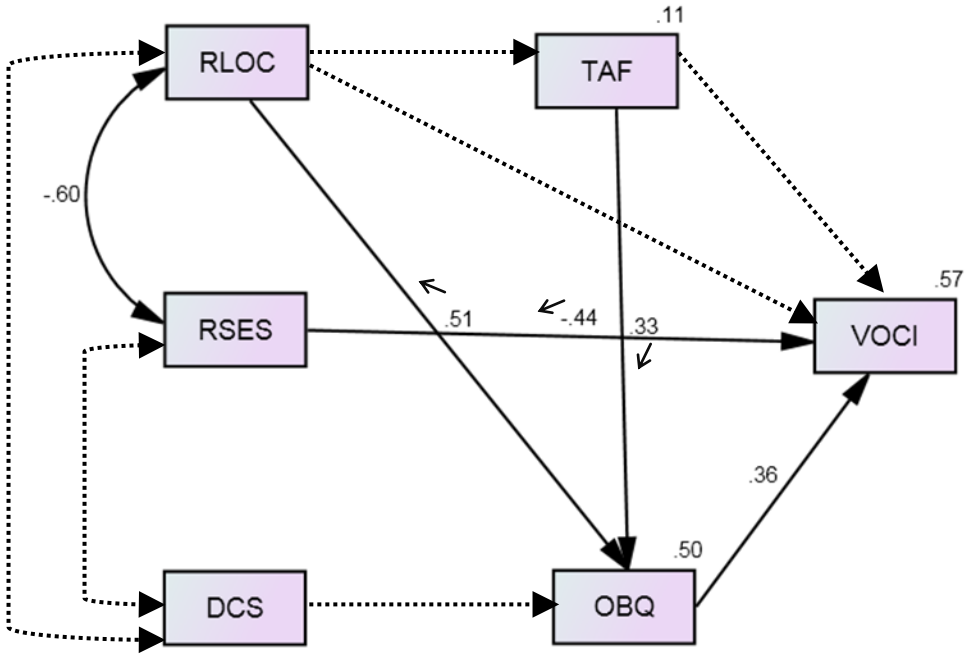

Figure 2.6. Final Model 2 results for clinical sample with standardized estimates (beside arrows) and regression coefficients (upper right-hand corner of box). RLOC = Rotter Locus of Control; RSES = Rosenberg Self-Esteem Scale; DCS = Desirability for Control Scale; TAF = Thought-action fusion; OBQ = Obsessive Beliefs Questionnaire-44; VOCI = Vancouver Obsessional Compulsive Inventory.

Non-significant paths indicated by a dotted line; all other paths significant at $p \leq .04$.

Residual error terms not shown.

Discussion

In order to examine and clarify the role of PC in relation to obsessive compulsive symptomatology, the aim of the present study was two-fold. The first objective was to replicate and extend previous findings (Moulding et al., 2009) on the effect of PC on OCD symptoms; specifically, to examine the mediating effect of TAF on the relationship between PC and OCD symptoms. As expected, and consistent with previous findings, results in both the nonclinical and clinical samples demonstrated that a low sense of control over anxiety as measured by the ACQ-R both directly and indirectly predicted OCD symptoms. Mediation analyses revealed that different OC-related beliefs mediated the relationship between PC and OCD symptoms in the two samples. In the nonclinical sample, as expected, PC indirectly predicted OCD symptoms via TAF, whereas in the clinical sample, OBQ scores (and not TAF scores) significantly mediated the relationship between low PC and high OCD symptom scores. Contrary to expectations, DC did not demonstrate significant relationships with any of the other path variables in either sample.

The second objective of the present study was to clarify the present conceptualization (and measurement) of PC in OCD through an examination of the influence of hypothesized components of PC (LOC and SE) in the prediction of TAF, OCD beliefs, and symptoms. As predicted, low SE beliefs were directly related to higher OCD symptoms in both samples. As above, mediation analyses revealed that different beliefs mediated the relationship between high (external) LOC and high OCD symptoms. That is, where in the nonclinical sample TAF beliefs mediated the relationship between LOC and OC symptoms, LOC indirectly predicted OC symptoms via OCD-specific

beliefs in the clinical sample. Furthermore, as demonstrated in the first model, results of Model 2 did not support the hypothesis that DC would indirectly predict OCD symptoms via OCD beliefs. In the case of Model 2 in the clinical sample however is critical to note that the results must be interpreted with caution as the model demonstrated a poor-to-adequate fit with the data; results are therefore discussed as a means to compare and contrast the differences between nonclinical and clinical samples, and inform future research from a descriptive perspective only.

Are multiple mediators involved in the relationship between PC and OCD?

The observed difference in both models between the nonclinical and clinical samples in terms of significant mediators (TAF in nonclinical sample; OCD beliefs in clinical sample) suggests not only that the influence of low PC over anxiety and high LOC on OC symptoms is mediated by different variables in the nonclinical and clinical populations, but that the relationship of beliefs to symptoms in each sample similarly differs. This is consistent with research showing that although TAF and OC beliefs have both been found to be of particular relevance to OCD (e.g., Freeston, Rhéaume, & Ladouceur, 1996; Shafran et al., 1996), the way they relate to symptoms is somewhat different. Where the OBQ-44 has demonstrated some degree of specificity to OCD (OCCWG, 2005; see also Tolin, Worhunsky, & Maltby, 2006 for example of contrasting findings), TAF has also has been found to be present in depression (Abramowitz, Franklin, Schwartz, & Furr, 2003; Shafran et al., 1996), other anxiety disorders (Hazlett-Stevens, Zucker, & Craske, 2002) as well as in nonclinical samples (Zucker, Craske, Barrios, & Holguin, 2002). TAF appraisals are proposed to have a potentially causal role in the increase of certain OCD beliefs (inflated responsibility; Freeston et al., 1996;

Shafran et al., 1996), in that TAF may promote obsessive thinking by inflating the significance of intrusive thoughts (Clark et al., 2000; Rassin et al., 1999). The relationship of TAF with OCD symptoms in the student sample may be indicative that a nonclinical population would be more likely to endorse beliefs consistent with a vulnerability for OCD (i.e., TAF) than those related to increased symptom severity (i.e., OCD beliefs). While it is possible that sample characteristics might have been responsible for the discrepancy between the nonclinical and clinical samples, these results suggest that there may be some specificity to the relevance of TAF and OC beliefs to nonclinical versus clinical samples.

How do hypothesized components of PC influence OCD symptom scores?

In Model 1, the direct and indirect effects of PC over anxiety (Model 1) on OCD symptoms in both the nonclinical and clinical samples lends support to the notion that the ACQ-R taps into multiple constructs underlying PC, and that at least one of these constructs appears to be directly related to OCD symptomatology. While it was thought that the inclusion of TAF as an additional mediator might help explain the direct effect between PC and OCD, this finding suggests that the direct influence of PC on the presence of OCD symptom scores is either more robust than previously thought, or that the composite nature of PC is naturally exposed in the prediction of OCD. The results of Model 2 provide clues to explain the latter point, in that the direct (SE) and indirect (LOC) effects on OCD symptom scores in Model 2, were a mirror image of the split effect of PC in OCD in Model 1 discussed above. As the conceptual composition of the factorial structure of the ACQ-R was not under examination in the present study, the present results cannot address whether SE and LOC are indeed components of PC as

assessed by the ACQ-R. However, working from the perspective of the examination of the predictive capacity of hypothesized components of PC (Moulding & Kyrios, 2006), the results of Model 2 suggest that SE and LOC contribute differentially to the prediction of OCD.

Clearly, the direct effect of SE on OCD symptoms in Model 2 suggests that self-esteem beliefs are an important contributor to OCD symptomatology, a result that is consistent with previous research on the importance of negative and ambivalent self-beliefs in the development and maintenance of OCD (Bhar & Kyrios, 2007; Doron & Kyrios, 2005; Doron, Kyrios, & Moulding, 2007a; Doron et al., 2008; Ehntholt et al., 1999; Garcia-Soriano & Belloch, 2012**)**. In the context of control-related beliefs, it can be speculated that low SE is representative of a belief in a low sense of confidence in one's ability to control internal and external events. In future studies, it may be helpful to assess self-efficacy, rather than global SE, as a more specific indicator of the self-beliefs involved in one's sense of control. Furthermore, as depression is a common comorbidity in an OCD population (Crino & Andrews, 1996), and low SE is a strong vulnerability factor in the development of depression (Sowislo & Orth, 2012), it is possible that the direct effect of SE to OCD symptoms represents an index of general distress. Depression was not controlled for in the proposed models, as it is thought that doing so undermines the ability to observe a relationship between OCD-related beliefs and symptoms due to the distress associated with endorsement of such beliefs (Taylor et al., 2010). Similarly, under the same line of reasoning, controlling for depression might also have erased the possibility of observing the effect of SE beliefs on OCD symptoms.

The indirect effect of LOC on OCD symptoms replicates previous research with regard to the observed association between high LOC scores (external LOC orientation) and OCD (Akbarikia & Gasparyan, 2012a, 2012b; Altin & Karanci, 2008; Kamel et al., 2006). This result highlights the importance of considering the predictive impact of LOC (and by extension, PC) through its effect on OCD-related beliefs, and is therefore consistent with previous research on the importance of assessing mediating variables when examining PC and/or its proposed component parts. That the presence of OCD symptoms in the clinical sample is associated with an external LOC through OCD beliefs suggests a paradoxical endorsement of beliefs in the controllability of outcomes as dependent on external factors combined with beliefs that imply personal culpability for outcomes (i.e., inflated responsibility, perfectionism, over-control of thoughts). It can be speculated that this discrepancy between beliefs is yet another source for the pathological doubt historically associated with OCD, a mismatch that may strengthen self-ambivalence and further reinforce the repetitive nature of compulsive behaviour. Future research might address whether such discrepancies between beliefs are involved in the maintanance of OCD behaviour.

Finally, it is important to address the fact that DC was minimally associated with other control-related variables, and not implicated as having any impact on OCD symptom scores overall. Earlier studies have evaluated the influence of PC on OCD in the context of what has been referred to as a "control mismatch", wherein the discrepancy between high DC and low PC, rather than either one of these variables alone, has been associated with OCD beliefs, behaviours, and symptoms (Moulding & Kyrios, 2007; Moulding et al., 2007, 2008, 2009). As the measurement of DC has been inconsistent in

such research has resulted in consistent observation of the "control mismatch", a domain-general instrument was chosen for the present study (DCS: Burger, 1992; Burger & Cooper, 1979). Some previous studies have utilized the DCS (Moulding & Kyrios, 2007; Moulding et al., 2008), whereas in other investigations, a domain-specific measure (Moulding et al., 2009) or visual analogue rating scale of DC (Moulding et al., 2007) was designed to meet the specifications of each study's methodology. It is possible that a domain-specific measure of DC would have resulted in a replication of previous results, however no such assessment tool has been validated in peer-reviewed work to date. While research on the "control mismatch" in OCD provided supporting evidence for the purpose of the present study, the objective here was to examine the specific influence of PC on OCD. Future research should include an anxiety-specific measure of DC in order to examine the replicability of the present results in the context of the "control mismatch."

Taken together, the results of the two models highlight one final issue in regards to the conceptualization and assessment of PC in relation to OCD. As mentioned above, the results of Model 1 support the notion that PC as it relates to OCD is multidimensional in nature, in that there were both direct as well as indirect pathways from ACQ-R scores to OC symptom scores. This provides evidence that the ACQ-R taps into multiple constructs underlying PC, and that these constructs are differentially related to OC symptomatology. In Model 2, the conceptual multidimensionality of PC is explored, and results suggest that both hypothesized components of PC have an influence on the presence of OCD symptoms. However, while researchers (e.g., Moulding & Kyrios, 2006) have suggested that conceptually both SE and LOC beliefs are involved in PC over

anxiety, the use of the ACQ-R as a measurable representative of this operational definition has not been examined to date, and was not the focus of the present study.

With regard to existing cognitive theories of OCD, the results of the present study provide further support for the inclusion of control-related beliefs in curent conceptualizations of OCD. In addition to the established belief domains associated with OCD (OCCWG, 2005), it appears that a higher-order belief domain involving PC occurs in the experience of individuals with OCD. Broadly, this suggests that a clear incorporation of PC is warranted in cognitive theories of OCD due to its phenomenological relevance to the endorsement of OCD–related beliefs. This will require clearer operational definitions of PC and its associated constructs as well as determine the best meaure(s) by which to evaluate it. It also appears that revision to current theories might include addressing the meta-cognitive aspects of low SE with regard to the impact of the self-assessment of low confidence in one's ability to control specific events on OCD behaviour. Finally, revisions to cognitive models of OCD might benefit from addressing the influence on the misappraisal of intrusive thoughts by discrepancies in beliefs between an external LOC and high OCD beliefs.

In addition to the limitations on the findings mentioned above, it is important to mention that the results of the present study may be limited due to use of a nonclinical sample as the basis for establishing model fit of the hypothesized models. The established practice of testing nonclinical samples in OCD research however is based on findings that obsessions (Rachman & de Silva, 1978) and compulsions (Muris, Harald, & Clavan, 1997) both occur in nonclinical samples, as well as resemble clinically significant OCD symptoms found in clinical samples (Gibbs, 1996). Under this rationale, and given the

relative ease with which a large sample of nonclinical participants can be collected versus a clinical sample, it was thought to be more efficacious to evaluate model properties using the largest sample possible. And the poor-to-adequate fit of Model 2 in the clinical dataset suggests that although small samples are beginning to be seen as acceptable for path analysis in structural equation modeling methods (Iacobucci, 2010), it is possible that the clinical sample size was responsible for the low goodness-of-fit.

Clinically, the results of the present study point to the functional relevance of control-related beliefs with regards to OCD beliefs, behaviours, and symptoms. Assessing and challenging an individual's sense of control over anxiety-related events early in treatment would help clinicians determine the overvalued nature not only of the faulty misappraisals, but of the neurtralization strategies employed. Targeting such faulty beliefs may lead to earlier positive treatment response in that individuals will have already started to challenge the general notions that lead to misappraisal, but also serve to address the automaticity of the neutralization approach following the occurrence of an obsession. This could take the form of challenging the discrepancy between having control over events/outcomes that are associated with anxiety and an individual's sense of control over the self. Behavioural experiments could also be designed to target beliefs about the lack of relationship between feeling a low sense of control and any impact on actual outcomes. Working specifically to reframe beliefs regarding the loss of control would also help to target faulty cognitions regarding control. As cognitive-behavioural treatment evolves, understanding that an external LOC may be a stable personal characteristic that is discrepant with OCD beliefs may be another area to target in cognitive restructuring and behavioural experiment interventions. It is important to assess

LOC in order to determine the impact of a discrepancy between LOC and existing OCD beliefs on the presence of OCD symptoms. Finally, despite the fact that low SE is a psychosocial diathesis for a multitude of psychological disorders, it appears that poor self-worth may have a strong maintaining role in the persistence of OCD symptoms. As SE is rarely assessed in the context of a treatment-seeking individual with OCD, it may in fact serve as an interfering factor in treatment response and remain undetected. Targeting low self-esteem in relation to OCD symptoms in relation to PC will help individuals to better understand the impact of low confidence to control events on the maintenance of OCD symptoms. Indeed, brief, targeted cognitive behavioural interventions for low SE in general (McManus, Waite, & Shafran, 2009; Morton, Roach, Reid, & Hallam-Stewart, 2012; Waite, McManus, & Shafran, 2012) may enhance the effectiveness of CBT approaches for specific disorders, including OCD.

Summary

The aim of the present study was to comprehensively examine the role of PC beliefs in OCD. The first objective was to investigate what variables might be involved in the relationship between PC and OCD, with a specific focus on the mediating role of TAF. The second objective was to assess the pathways by which components of PC, specifically SE and LOC beliefs, influence OCD symptomatology. Path analysis was used to test hypothesized models for both objectives, and bootstrapping procedures permitted the examination of indirect effects. The results of Model 1 replicate and extend previous research (Moulding et al., 2009) in that low PC in OCD has both a direct influence on the presence of OCD symptoms, and is related to OCD symptoms through the mediating role of OCD-related beliefs, be they OCD beliefs or TAF. The results of

Model 2 suggest that while external LOC orientations influence OCD symptoms via OCD-related beliefs, low SE had a direct effect on OCD symptom presentation.

BRIDGE

Chapter 3

The aim of Study 1 was to use a cross-sectional design to measure the relationships between OCD beliefs, including TAF, and OCD symptoms with PC and associated control-related variables in nonclinical and clinical samples. This study aimed to examine the multidimensional composition and relation of PC to OCD symptom presentation by investigating the pathways through which multiple control-related variables predict OCD symptom scores as mediated by OCD-relevant beliefs. The limited literature examining control-related beliefs and OCD has primarily focused on the discrepancy between PC and DC in relation to OCD symptomatology (e.g., Moulding & Kyrios, 2009), and has largely been examined in nonclinical samples. Study 1 therefore offers a novel contribution to the current literature on control and OCD by investigating sub-components of PC in relation to OCD beliefs and symptoms, and allows for the demonstration of the PC/OCD relationship in clinical participants.

The results demonstrated that OCD beliefs mediated the relationship between PC over anxiety and OC symptoms in both nonclinical and clinical samples, and highlighted the multidimensional nature of PC as it functions in OCD. Specifically, external LOC orientations and low SE were found to be of differential but equal importance in OCD, such that external LOC beliefs demonstrated an indirect relationship with OC symptoms as mediated by OCD beliefs (including TAF), and that low SE beliefs directly predicted higher OCD symptom severity. Following from the results of Study 1 is the need for the relationship between sub-components of PC and OCD to be examined in an experimental manner.

The results of Study 1 suggest that beliefs about one's capacity to control an outcome (SE) as well as outcome expectancy (LOC) are critical components of PC with regard to OCD. Whereas the aspect of SE that is thought to be of direct relevance to OCD is low control-related self-efficacy (Moulding & Kyrios, 2006), overpredictions of outcome controllability have been related to higher OCD symptom behavior and symptom severity (Reuven-Magril et al., 2008) Finally, although the results of Study 1 do not replicate the relationship of DC with PC over anxiety as demonstrated in previous research (Moulding & Kyrios, 2007; Moulding et al., 2007, 2008, 2009), the control mismatch has been identified as a powerful phenomenon in individuals with OCD.

Therefore, the objectives of Study 2 were threefold: 1) to experimentally examine the concurrent effects of low control-related self-efficacy and overpredictions of controllability on the presence of repeated cleaning behaviour, 2) to observe the influence of both self-efficacy and LOC on DC ratings, and 3) to investigate the above within an ecologically-valid analogue research design.

Chapter 4

Beliefs about Control and the Persistence of Cleaning Behaviour: An Experimental Analysis

Research on perceived control (PC) and anxiety has demonstrated that low PC is an important factor in the aetiology and maintenance of anxiety disorders in general (Chorpita & Barlow, 1998), as well as in association with specific conditions (Brown et al., 2004; Cloitre et al., 1992; Hoffman, 2005; White et al., 2006; Zvolensky et al., 2000). For example, low PC has been implicated in the maintenance of symptom severity in social phobia (e.g., Hofmann, 2005), panic disorder (e.g., White et al., 2006), pathological gambling (Goodie, 2005), as well as obsessive-compulsive disorder (OCD; Moulding & Kyrios, 2006). In OCD, low PC is thought to contribute to the urge to engage in repetitive behaviour specifically when it co-occurs with a high desire for control (DC; Moulding et al., 2008; Moulding & Kyrios, 2006, 2007), such that compulsive behaviour is motivated by a desire to (re)establish a sense of control over anxiety-related outcomes (Reuven-Magril et al., 2008). While common characterizations of OCD have often included notions of control or controllability of emotion, behaviour, events and/or objects, theoretical models and empirical explorations of control in OCD have generally been limited to the control of thoughts (Purdon & Clark, 2002; OCCWG, 2005; Tolin et al., 2003). The present study therefore sought to examine and clarify the function of perceived control beliefs and desire for control in association with OCD-phenomenology.

Current cognitive models of OCD (e.g., Rachman, 1997, 1998, 2002; Salkovskis, 1985, 1999) suggest that individuals with OCD become anxious due to the misappraisal

of normal intrusive thoughts as overly significant, and engage in compulsive behaviour in direct response to those misappraisals, thus relieving anxiety by decreasing the perceived likelihood of future negative outcomes. Compulsive behaviour is thought to strengthen the frequency and intensity of intrusive thoughts by supporting, if not reinforcing the misappraisals, which in turn will lead to increased compulsive behaviour. Three belief domains have been found to be related to the misappraisal of intrusive thoughts in OCD: 1) inflated responsibility and threat estimation, 2) perfectionism and intolerance of uncertainty, and 3) importance and control of thoughts, and are assessed via the Obsessive Beliefs Questionnaire (OBQ-44; OCCWG, 2005). A significant proportion of individuals with OCD however appear not to report high levels of the aforementioned belief domains on the OBQ (Calamari et al., 2006; Taylor et al., 2006), which suggests that for some individuals, other belief domains may be particularly relevant to the misappraisal of intrusive thoughts in OCD. Investigations of control-related beliefs (Moulding & Kyrios, 2007; Moulding et al., 2008, 2009) demonstrate that beliefs about control may a viable addition to explain a greater amount of shared variance than is accounted for by existing belief domains.

There are two general approaches to the scientific study of control. First, it is thought that the subjective experience of control (i.e., PC) is of greater importance to mental and physical health outcomes than any objective fact of controllability (Lazarus & Folkman, 1984; Skinner, 1996). However, PC is considered a difficult concept to investigate methodologically, most likely because it presents a significant challenge in definition (Skinner, 1996). In OCD research, PC is thought to involve such constructs as self-efficacy (Moulding & Kyrios, 2006) and overestimations of control (Reuven-Magril

et al., 2008). Second, it is thought that people vary in the degree to which they desire to seek and maintain a sense of control and often behave in ways that promote this likelihood, even when it is potentially maladaptive (Deci & Ryan, 2000; Zuckerman et al., 1996). Research on PC, DC, and OCD has revealed that a "control mismatch" (i.e., high DC/low PC) is related to OCD-symptoms, beliefs, and behaviour, wherein the discrepancy between the control appraisals is thought to be an important factor in maintaining the urge to engage in repeated behaviour (Moulding & Kyrios, 2007; Moulding et al., 2008, 2009). The present research is concerned with clarifying the role of PC in OCD phenomenology in the context of the "control mismatch" of PC and DC.

The relationship between between control-related self-efficacy (CSE) appraisals and OCD-beliefs and symptoms in both non-clinical and clinical samples has been examined by Moulding and colleagues (2007, 2008). Participants read hypothetical scenarios of an OCD-relevant event (a dripping tap) in which both level of threat (high/low) and responsibility (high/low) were manipulated, and were asked to assess their level of PC and DC, as well as responsibility, threat, affect, and (desire to take) action. In both studies, DC was found to increase with threat and responsibility, and that together high DC and low PC were associated with OCD-phenomenology (e.g., negative affect, the propensity to act in relation to threat) over and above such cognitions as inflated responsibility. Levels of PC and sense of control appraisals were consistently low in the high OCD (2007) and OCD (2008) groups. This result suggests that a (low) sense of CSE, when combined with an increasing desire for control, may result in increased OCD symptoms (Moulding & Kyrios, 2007). The findings suggest that in spite of the association of low PC with responsibility and threat beliefs found in earlier OCD research

(Moulding & Kyrios, 2007), responsibility, threat, and control cognitions appear to be distinct from each other and may not vary together in a phenomenological manner. A low sense of control may thus be characteristic of individuals with OCD, and possibly comprised of CSE cognitions differentiable from other OCD-beliefs.

Reuven-Magril and colleagues (2008) investigated the relationship between OCD symptoms and the overestimation of control. Using an illusion-of-control paradigm, participants were presented with preprogrammed visual stimuli, and were told that they could shorten the presentation time of each item by pressing the right combination of keys (i.e., that the stimuli were controllable). False positive feedback on participants' control attempts (to enhance the overestimation of control) was given through gradual decreases of stimulus presentation time; ratings of control estimations were taken at three time points during the task. Results revealed that individuals with high OCD tendencies had higher estimations of control, increased behavioural attempts to control, as well as a more restricted range of control behaviours. This finding suggests that predictions of controllability (PRC) are involved in increasing the urge to engage in compulsive behaviour, and allows for the speculation that overstimations of control may be involved in heightening PC following repetitive behaviour. Manipulating PRC beliefs permits further testing of the influence of overestimations of control on OCD-type behaviour, and targets the notion of predictability that is inherent in the construct of the overestimation of control.

In light of the burgeoning interest in the relationship between control beliefs and OCD, and despite a growing number of psychometric findings, there is a general paucity of experimental research examining the influence or effects PC-related beliefs on OCD-

type behaviour. This first aim of the study was to examine the influence of manipulations of OCD-specific control-related cognitions, PRC and CSE, on cleaning time and DC ratings. It was predicted that higher cleaning times and higher DC ratings would be observed in the high PRC/low CSE condition. The second aim of the study was to examine the influence of control-related cognitions and DC on cleaning time. It was hypothesized that manipulations of PRC and CSE would each be positively associated with cleaning time, and that these relationships would be moderated by DC. That is, DC ratings were speculated to influence the strength of the relationship between PRC/CSE manipulations and cleaning times.

Method

Participants

One hundred seventy-four volunteer undergraduate students from the Department of Psychology at Concordia University in Montréal, Canada, participated in this study (see Appendix G for recruitment advertisement). Participants' mean age was 24.01 (*SD* = 14.32) years, and 76.6% of participants were female. Participants were compensated for their time with either course credit or entry in a draw for a cash prize. Participants' scores on relevant self-report symptom measures (see below) are displayed in Table 4.1.

Measures (see Appendix C OBQ-44, VOCI; Appendix D for BAI-II, BDI-II; Appendix E for control-related measures)

Beck Anxiety Inventory (BAI; Beck & Steer, 1990) and **Beck Depression Inventory-II** (Beck et al., 1996). The BAI and BDI-II are widely used and well-validated 21-item self-report instruments for the assessment of state anxiety and depression, respectively. The BAI exhibits good internal consistency (Creamer et al., 1995; Fydich et

Table 4.1
Participants' scores on self-report measures.

	M (SD)				
			Condition		
	Low PRC / Low CSE (n = 42)	Low PRC / High CSE (n = 43)	High PRC / Low CSE (n = 43)	High PRC / High CSE (n = 46)	Total (n = 174)
BAI	11.10 (9.38)	7.95 (8.49)	10.51 (7.38)	12.93 (10.81)	10.66 (9.23)
BDI	10.62 (9.45)	6.65 (6.51)	8.98 (6.70)	10.72 (10.17)	9.26 (8.48)
OBQ	137.95 (36.97)	125.81 (40.6)	127 (32.96)	134.8 (38.17)	131.41 (37.32)
VOCI	36.62 (26.7)	29.72 (28.49)	29.81 (19.82)	39.17 (33.96)	33.91 (27.91)
VOCI clean	8.21 (7.18)	7.53 (9.54)	5.33 (5.89)	8.41 (8.55)	7.39 (7.95)

Note: BAI = Beck Anxiety Inventory, BDI = Beck Depression Inventory, OBQ = Obsessive Beliefs Questionnaire, VOCI = Vancouver Obsessional Compulsive Inventory, VOCI clean = cleaning subscale of the Vancouver Obsessional Compulsive Inventory, PRC = Predicted controllability condition, CSE = Control-related self-efficacy condition

al., 1992), modest test-retest reliability (Creamer et al., 1995; Fydich et al., 1992), and excellent divergent validity in comparison with other measures of anxiety (Creamer et al., 1995; Fydich et al., 1992). The internal consistency within the current sample was excellent (α = .90). The BDI-II demonstrates high internal consistency and good test-retest reliability, as well as good convergent and divergent validity (Beck et al., 1996; Steer & Clark, 1997). The internal consistency within the current sample was excellent (α = .92).

Obsessive Beliefs Questionnaire-44 (OBQ-44; OCCWG, 2005). This 44-item scale is a revision of the OBQ-87, and is designed to assess beliefs and appraisals related to obsessional thinking. The OBQ-44 shows excellent internal consistency, and in an OCD sample, the OBQ-44 correlated strongly with measures of checking and fears of contamination. The internal consistency within the current sample was excellent (α = .94).

Vancouver Obsessional Compulsive Inventory (VOCI; Thordarson et al., 2004). The VOCI is a 55-item self-report instrument designed to measure obsessive compulsive symptomatology. There are six component subscales assessing various symptoms and features that have been found to be associated with OCD: checking; contamination; hoarding; indecisiveness; just right; and obsessions. The VOCI possesses good inter-item reliability in student, community, OCD, and clinical control populations, as well as high test-retest reliability in clinical (Thordarson et al., 2004) and student (Radomsky et al., 2006) populations. The scale has also been shown to have excellent convergent and divergent validity (Radomsky et al., 2006; Thordarson et al., 2004). The internal consistency within the current sample was excellent (α = .95).

Subjective rating scale (e.g., Wolpe, 1958, 1990). Participants were asked to provide subjective ratings at a variety of time points during the experiment using a 0-100 scale. These types of rating scales are often used in clinical research and treatment (e.g., Wolpe, 1990) Participants were asked to rate their level of DC with the question "How much do you desire to reduce/remove the germs from the keyboard?" As an index of CSE, participants were asked "How much do you feel you were able to control the level of germs on the keyboard?"

Cleaning time. Participants were videotaped during the two timed cleaning tasks. Two researchers who were blind to participant condition viewed the recordings independently and transcribed participants' cleaning time (in seconds) onto coding sheets (see Appendix H). The coders were trained to record cleaning time and behaviour by coding 6 randomly selected videotapes, using guidelines created by the first author (see Appendix I). Coders were required to obtain a minimum of 95% inter-rater agreement with each other on all 6 recordings before they could begin coding for the study.

Study Design

This study employed a 2 (PRC condition) x 2 (CSE condition) between-participants design, in which predicted controllability of the cleanliness of a computer keyboard and CSE regarding contamination control were experimentally manipulated. There were four randomly assigned conditions and, in each, participants were exposed to one PRC manipulation and one CSE manipulation. DC ratings were collected following the CSE manipulation.The dependent variable was time spent cleaning the keyboard, which was video recorded for subsequent coding.

Procedure

Participants were informed that they were taking part in a study about hygiene, and were first asked to complete an online questionnaire package comprised of the BAI (Beck & Steer, 1990), the BDI-II (Beck et al., 1996), the OBQ-44 (OCCWG, 2005), and the VOCI (Thordarson et al., 2004). To manipulate PRC, partcipants were asked to read condition-specific (i.e., modified) versions of a newspaper article containing information on hygiene in the workplace ("Lifting the Lid on Computer Filth", 2004; see Appendix J). The high PRC group read that "…individuals can expect to be able to control germs *up to 97.5%*..." and the low PRC group read "…*up to 33.3%*..." (emphasis added). Participants were then give a three question multiple choice quiz within which was a question that asked by what percentage the spread of contamination can be reduced (see Appendix K). The four reponse options were: "it cannot be reduced", 33.3%, 97.5%, and 100%. Participants were then trained to "properly" clean a computer keyboard (see Appendix L) and subsequently asked to clean the keyboard according to the training protocol (Cleaning Time 1). As the CSE manipulation, participants were presented with one of two false data outputs regarding the status of keyboard contamination. In the high CSE condition, participants received feedback that they had successfully removed most of the contamination, while in the low CSE condition, participants received feedback that they had not successfully removed most of the contamination. Participants were asked to provide subjective CSE ratings following the feedback as a manipulation check.

Participants were told that there would be a few additional questionnaires to complete on the computer, and the experimenter removed the cleaned and assessed keyboard and replaced it with a second one that was visibly dirty. The experimenter left the room and indicated that if the participant so desired s/he could clean the keyboard

before finishing the last few online measures (Cleaning Time 2). When the experimenter returned after one minute, and if the participant indicated that they wished to continue cleaning, they were left to do so. Once the participants indicated that they had finished cleaning, participants were debriefed as to the objectives of the study and informed of the deception involved in the study. They were asked to provide consent to the use of their data given the deception used in the study (see Appendix M for consent and debriefing forms).

Results

Participant Characteristics

Participants in the four conditions did not differ with respect to age, $F(3, 170) = 1.13$, $p = .34$, partial $\eta^2 = .003$ nor did they differ in terms of their mean total scores on the VOCI, VOCI clean subscale, OBQ-44, the BAI, or the BDI-II, all $Fs(3, 173) \leq 2.25$, $ps \geq .09$, partial $\eta^2 s \leq .03$. A chi-squared analysis revealed that proportion of males to females did not differ significantly across the four conditions (χ^2 [1, N = 174] = 2.77, $p = .6$).

Missing Data

The data from 12 participants were removed due to technical difficulties regarding their video recordings. Analyses were conducted on the data from the remaining 174 participants.

Manipulation checks

To first determine if the experimental manipulations of PRC and CSE were successful, *t*-tests were employed using the manipulation check ratings. The PRC manipulation check revealed no significant differences between the two PRC groups in terms of correct responses to the manipulation check question, $t(173) = -1.02$, $p = .31$, d

= .1, as all but 1 participant (assigned to the low PRC condition) provided the correct answer relevant to their condition assignment. As predicted, participants in the low CSE condition rated their ability to control the germs on the keyboard as significantly poorer than participants in the high CSE condition, $t(173) = 11.22$, $p < .001$, $d = 1.7$ ($M = 39.86$ [$SD = 28.77$] vs. $M = 79.03$ [$SD = 15.76$]).

Coder reliability

In order to assess the coder reliability of cleaning time, cleaning time (in seconds) was compared between coders for 24% of the sample. Inter-rater agreement was excellent for cleaning time (99%) in the comparison sample.

Main analyses

For the hypothesis regarding cleaning time, two univariate ANOVAs were conducted on the data. For both ANOVAs, PRC and CSE were the between-participants factors. For the first ANOVA, cleaning time (in seconds) post-cleaning training (Time 1) was the dependent variable. For the second ANOVA, the optional final cleaning time (Time 2) was the dependent variable.

For the first ANOVA, results revealed no significant main effects nor an interaction between the conditions on cleaning time during Cleaning Time 1, Fs$(3, 171) \leq .41$, ps $\geq .33$, partial η^2s $\leq .004$. The second ANOVA (Cleaning Time 2) revealed that there was a significant main effect of PRC, $F(3, 171) = 4.06$, $p = .05$, partial $\eta^2 = .02$, with the high PRC condition demonstrating longer cleaning times ($M = 144.58$, $SD = 196.62$) than the low condition ($M = 95.01$, $SD = 120.21$) when collapsed across CSE conditions (see Figure 4.1). Contrary to expectations, there was no significant main effect

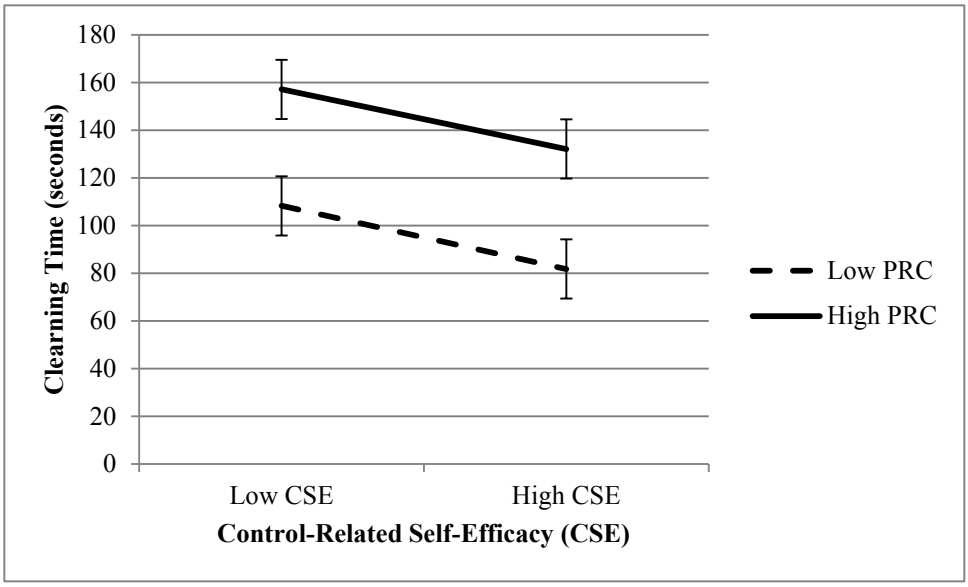

Figure 4.1. Cleaning time (seconds) at final cleaning period by PRC and CSE.

for CSE nor a significant interaction between the conditions, Fs(3, 171) ≤ 4.06, ps ≥ .29, partial η^2s ≤ .006 on cleaning time during Cleaning Time 2.

For the hypothesis regarding DC ratings, a univariate ANOVA was conducted. PRC and CSE were the between-participants factors, and pre-Cleaning Time 2 DC rating was the dependent variable. The ANOVA revealed that there was a significant main effect of CSE, $F(3, 171) = 33.65$, $p < .001$, partial $\eta^2 = .16$, with the low CSE condition demonstrating higher DC ratings ($M = 56.94$, $SD = 34.99$) than the high condition ($M = 26.42$, $SD = 34.24$) when collapsed across PRC conditions (see Figure 4.2). Contrary to expectations, there was no significant main effect for PRC nor a significant interaction between the conditions, Fs(3, 171) ≤ .67, p ≥ .42, partial η^2s ≤ .004 on DC ratings.

To test the hypothesis that PRC, CSE, DC ratings, and their interactions would each uniquely predict time spent cleaning the keyboard at Cleaning Time 2, a hierarchical regression analysis was conducted. DC ratings and cleaning time data were centered prior to the analysis. PRC and CSE condition assignment were dummy coded and entered in the first step, and their product entered in the second step. In the third step, DC was entered, followed by the products of PRC and DC and CSE and DC in the fourth step. In the fifth and final step, the product of PRC, CSE, and DC was entered. Time 2 cleaning time (in seconds) was the criterion variable. When entered in the first step, PRC and CSE combined did not account for any significant variability. When examined separately, however PRC and CSE conditions were differentially related to time spent cleaning such that PRC was a significant predictor, $\beta = 49.58$, $p = .05$, whereas CSE was not a significant predictor, $\beta = .123$, $p = .99$ When entered in the second step, the interaction term did not account for any additional variability. In the third step, DC accounted for an

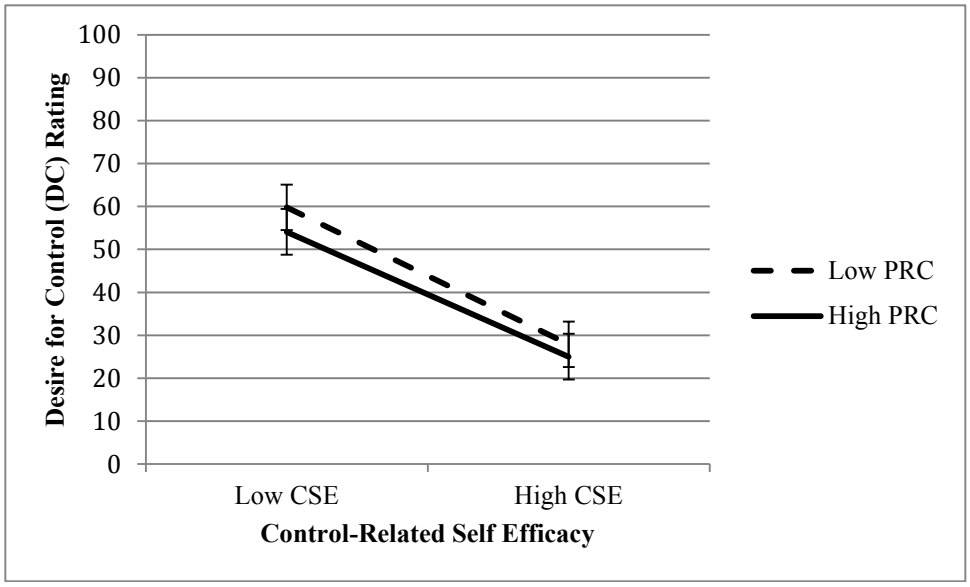

Figure 4.2. Participants' DC ratings (0-100) by CSE condition.

additional 7.9% of variability in time spent cleaning, $F\Delta(1, 170) = 15.02$, $p < .001$. The two interaction terms (PRC by DC, CSE by DC) entered in the fourth step accounted for an additional 10.4% of variability, $F\Delta(2, 168) = 11.16$, $p < .001$; both interaction terms were significant predictors. Finally, the three-way interaction entered in the final step did not account for any additional variance, $F\Delta(1, 167) = .86$, $p = .36$. Regression coefficients are presented in Table 4.2.

In order to understand the nature of the two interactions in the fourth step of the hierarchical regression (PRC and DC, CSE and DC), correlations were conducted between DC ratings and Time 2 cleaning times in the high and low PRC and CSE groups. In the low PRC group, ratings of DC were not related to time spent cleaning, $r = .05$, $p = .67$, whereas in the high PRC group, DC ratings were significantly related to cleaning times, $r = .40$, $p < .001$. In the low CSE group, ratings of DC were significantly related to time spent cleaning, $r = .44$, $p < .001$, whereas no such relationship was found in the high CSE group, $r = .04$, $p = .72$. Intercorrelations, means, and standard deviations of time spent cleaning (in seconds) in the high and low conditions of PRC and CSE as a function of DC rating are presented in Table 4.3.

Discussion

This study aimed to investigate the influence of control-related cogntions on the persistence of cleaning behaviour. It was predicted that manipulating predicted controllability and CSE beliefs would influence time spent cleaning and desire for control ratings, such that high PRC and low CSE would result in longer cleaning times and higher DC ratings. It was also hypothesized that the relationship of both control-related cogntions with DC ratings would predict longer cleaning times. As expected, the findings

Table 4.2

Summary of Hierarchical Regression Analysis for PRC, CSE and DC Predicting Time 2 Cleaning (in seconds)

Variable	$F\Delta$	$R^2\Delta$	β	t
Step 1	1.996	.023		
PRC			-.151	-1.998*
CSE			.000	.005
Step 2	1.113	.006		
PRC x CSE			.140	1.055
Step 3	15.018	.079**		
DC			.308	3.875**
Step 4	11.155	.105**		
PRC x DC			.323	3.094*
CSE x DC			-.361	-3.567**
Step 5	.859	.004		
PRC x CSE x DC			-.136	-.927

Note. PRC = Predicted controllability condition; CSE = Control-related self-efficacy condition; DC = Desire for control ratings (0-100).

**p <.05, **p <.001.*

Table 4.3.

Summary of Intercorrelations, Means, and Standard Deviations of Time 2 cleaning (in seconds) for High and Low Conditions of PRC and CSE as a function of DC rating

Variables	DC	Low PRC	High PRC	Low CSE	High CSE	*M*	*SD*
DC	--	.047	.40**	.44**	.72	43.85	38.65
Low PRC	.05	--	--	--	--	95.01	120.21
High PRC	.40**	--	--	--	--	144.58	196.62
Low CSE	.44**	--	--	--	--	119.86	189.76
High CSE	.72	--	--	--	--	120.57	138.04
M	43.85	95.01	144.58	119.86	120.57		
SD	38.65	120.21	196.62	189.76	138.04		

Note. PRC = Predicted controllability condition; CSE = Control-related self-efficacy condition; DC = Desire for control ratings (0-100).

**p <.05, **p <.001.*

revealed that PRC was directly related to time spent cleaning in that high PRC over a contamination threat led to longer cleaning times than low PRC. While the CSE manipulation did not influence cleaning times, CSE manipulations were directly related to differences in DC ratings. That is, while DC ratings just prior to the final cleaning task were significantly higher in the low CSE group in comparison to the high group, there were no significant differences in DC ratings in either the PRC condition alone, nor was there a significant interaction between PRC and CSE. Finally, as hypothesized, and consistent with research implicating both DC and PC in OCD-phenomenology (Moulding & Kyrios, 2007; Moulding et al., 2008, 2009), DC appraisals uniquely and in combination with PRC and CSE manipulations, significantly predicted time spent cleaning the keyboard. Correlational analyses revealed that DC was positively correlated with high PRC and with low CSE in the prediction of time spent cleaning. Overall, the results of the present study therefore demonstrate the importance of control-related cognitions in extended cleaning behaviour.

Specifically, the present research suggests that inflated beliefs about controllability may contribute to extended cleaning behaviour, and provides preliminary evidence that these beliefs may underlie the urge to engage in compulsive behaviour (as was demonstrated by Reuven-Magril et al., 2008) and possibly reinforce it. That is, such beliefs may promote repeated behaviour in that individuals who overestimate controllability may then seek, in the context of a personally significant contamination threat, to reduce the discrepancy between high expectations of control and outcome controllability with repetitive behaviour. Repeated cleaning behaviour may therefore be

in part an attempt to match inflated predictions of controllability with the expected outcome in order to relieve anxiety.

That low CSE had an influence on DC ratings but not on cleaning times serves to broaden the basis of support for two important considerations in studying control in general, as well as in relation to OCD. First, this result highlights the specific influence of CSE on levels of DC, and thus provides further evidence on the necessity of considering PC and DC together in investigations of control-related cognitions. Second, that CSE had an effect on DC ratings but not on cleaning times suggests that control-related self-efficacy is a necessary, but not sufficient, component of PC as it exists within the "control mismatch" in OCD. This finding thus supports the conceptualization of low PC in OCD as a composite variable (e.g., Moulding & Kryios, 2006; Skinner, 1996), and underscores the importance of unpacking the layers of control beliefs to determine the specific nature of faulty underlying control beliefs in OCD.

Results of the regression analysis extend the findings of previous research on control-related beliefs and OCD in that they provide evidence that both components of PC are related to cleaning time through the influence of DC. These results support the notion that control-related beliefs in OCD-behaviour are multifaceted in composition in that both overestimations of controllability and low CSE predicted longer extended cleaning behaviour in the presence of high DC. These findings also demonstrate evidence of a control mismatch in the prediction of cleaning time, in that low levels of CSE were related to longer cleaning when moderated by DC. While underlying inflated beliefs of controllability may lead to extended cleaning behaviour, the presence of high DC may increase the persistence of such behaviour. In fact, motives such as a high desire for

control have been found to affect judgements of control such that desire for an outcome may result in overestimating the chances of influencing an outcome (Thompson et al., 2004). DC was the only variable that, on its own, accounted for a significant proportion of the variance in the prediction of time spent cleaning. DC may well be the critical ingredient in the functioning of control mismatch in OCD. That both components of PC were stronger predictors of time spent cleaning when considered concurrently with DC speaks to the importance of assessing DC in OCD.

As proposed in cogntive theories of OCD (e.g., Rachman, 1998; Salkovskis, 1999), the misappraisal of intrusive thoughts as personally significant and anxiety provoking due to underlying faulty beliefs is thought to lead to compulsive behaviour. Although three belief domains have been identified by researchers as specifically relevant to OCD (OCCWG, 2005), these beliefs do not fully account for all negative interpretations of intrusions nor maladptive behavioural responses (i.e., compulsions). Newer cognitive approaches have proposed that incorporating beliefs about the self and the world would enhance our understanding of the phenomenology of OCD, and more specifically that discrepant world- and self-controllability beliefs are involved in the development of OCD (Doron et al., 2007a, 2007b). The results of the present study provide preliminary evidence of the importance of including self- and world-concepts into cognitive theories of OCD in that both high predictions of controllability (i.e., world-controllability) and low control-related self-esteem (i.e., self-controllability) beliefs appeared to be involved in changing levels of PC over time.

Limitations

Importantly, the findings need to be interpreted in the context of a number of limitations. First, while OCD-symptomatology and beliefs have commonly been found to be present in the general population (Gibbs, 1996; Muris et al., 1997; Rachman & de Silva, 1978), and although analogue research is common in examinations of OCD, it is possible that the current findings are an example of the differences between a clinical and non-clinical sample rather than indicative of the dimensional nature of OCD-phenomenology. However, cleaning behaviour was chosen as the main outcome variable because it is a normative behaviour and thus amenable to analogue research. Second, both overprediction of fear (Rachman, 1994) and over-estimations of controllability (Reuven-Magril et al., 2008) appear to be characteristic of individuals with OCD. In the present study, it is not possible to determine whether it was the *predictability* or the *controllability* of the hygiene information that was responsible for the observed changes in behaviour in the present study. This suggests that teasing apart the individual and interaction effects of predictability versus controllability is a methodological necessity in the overall investigation of perceived control beliefs that needs to be addressed in future research. Lastly, during data collection for this study, there was widespread global concern regarding an H1N1 (Influenza A) virus pandemic. It is possible that ceiling effects due to this crisis were responsible for the present findings, as observing cleaning behaviour in the presence of a genuine contamination threat may limit the generalizability of these results.

Directions for future research

Although control cognitions have been found to be most strongly related to fears of contamination/washing compulsions (Moulding et al., 2009), future research should

examine the relation of control beliefs to other repetitive behaviours as well as extend the findings by testing a clinical population. Additionally, testing an experimental pardigm wherein DC was manipulated along with components of PC would allow for improved understanding of the function of DC within the control mismatch in OCD. While the present study demonstrated that control appraisals may indeed be an important variable in OCD-phenomenology, it would be also be beneficial to determine in an experimental manner how such beliefs may interact with other OCD-relevant beliefs. It may be that an increased DC may heighten responsibility and threat appraisals in similar ways. Finally, it would be of interest to further examine the constructs involved in the conceptualization of PC from a psychometric perspective to determine whether they should be considered and measured as domain-specific or as more stable individual difference traits.

Clinical Implications

As cognitive therapy for OCD includes assessing and challenging faulty beliefs that underlie the occurrence of obsession and compulsions, addressing control-related beliefs along with other OCD-specific beliefs in the presence of OCD-symptoms and behaviours would allow for improved case conceptualization and individualized treatment. The notion of control has been noted to be a common manner in which OCD symptoms are explained by individuals in therapy (Moulding & Kryios, 2006), and incorporating questions of control and controllability into assessment would likely encourage collaboration and trust. More specifically, these results suggest that it may help individuals with OCD to determine what aspects of control and controllability contribute to their low sense of control. Finally, determining with a client how components of PC interact with a discrepant high DC may help them to understand how

urges to engage in repetitive behaviour may be yoked to self- and world-controllability beliefs. In general, helping clients to determine exactly what components of PC contribute to feelings of low control, and to what degree the need for control is excacerbating beliefs about control, could become a therapeutic target in the reduction of compulsive behaviours.

Summary

Low PC has long been associated in the research literature with various forms of anxiety, and yet has been nearly absent in cognitive theories of OCD. The current study was an investigation of manipulations of two components of PC and their influence on OCD-type cleaning behaviour; we believe that this was among one of the first studies to examine components of PC in an experimental manner. The results of the present study echo previous research on control-related beliefs and OCD (e.g., Moulding & Kyrios, 2007) in that it will be important to consider not only the concurrent relationship of both PC and DC, but also the underlying components of PC shown to be relevant to OCD. Taken together, it appears that both components of PC under investigation are likely involved in OCD behaviour, and it will thus be beneficial to consider PC in OCD behaviour as a multidimensional variable. These findings also allow for a broader understanding of the "control mismatch" in OCD, and that the role of DC should be considered in a comprehensive understanding of the function of control-related beliefs in OCD.

CHAPTER 5

General Discussion

There were several objectives to this program of research. The overall aim was to examine the relationship of perceptions of control to OCD symptom presentation in both a cross-sectional as well as an experimental manner. Control-related constructs have been shown to be highly relevant to OCD (McLaren & Crowe, 2003; Moulding & Kyrios, 2006, 2007; Moulding et al., 2007, 2008, 2009; Reuven-Magril et al., 2008; Zebb & Moore, 2003), the specifics of which have been largely unexamined due in large part to the conceptual and measurement complexities historically associated with control-related investigations. The studies herein were designed to determine which control-related beliefs are most relevant to OC beliefs and symptoms, as well as how control beliefs function with regard to OCD symptomatology. To address this broad objective as well as target what is a major gap in OCD research, two studies were designed to test hypotheses based on an integration of the distinct literatures of the conceptualization of control on the one hand and cognitive models of OCD on the other.

The aim of Study 1 was to explore the role of perceived control beliefs in the prediction of OCD-related beliefs and symptoms in nonclinical and clinical samples through path modeling. While previous research has demonstrated a relationship between low perceived control over anxiety and obsessive compulsive symptoms, the pathways from and through which control-related beliefs influence symptom presentation in OCD are not known. This investigation was an attempt to clarify and refine current knowledge on the impact of low PC on OCD beliefs, and by extension, OCD symptom severity, with respect to contemporary notions of PC as a composite variable. Path analyses were used

to evaluate a) the mediating effect of OCD beliefs, including TAF in the relationship between PC and OCD symptoms (Model 1), and b) the relationship of hypothesized sub-components of PC, SE and LOC beliefs, to OCD beliefs and symptoms (Model 2). Path models were first fit in the nonclinical sample, and retained models were then tested in the clinical sample; bootstrap procedures were implemented to identify the significance of specific indirect effects.

Results for Model 1 indicated that the effect of PC on OCD symptoms was partially mediated by OCD beliefs in the clinical sample and by TAF in the nonclinical sample. Results for Model 2 indicated that hypothesized sub-components of PC have differential effects on OCD symptoms. While SE had a direct negative effect on OCD symptoms in both samples, external (i.e., high) LOC predicted higher OCD symptoms via TAF in the nonclinical sample, and via OCD beliefs in the clinical sample. Although previous research had examined the direct and indirect relationships of PC to OCD beliefs and symptoms (e.g., Moulding et al., 2009), this study had the added advantage of including TAF as a possible mediator in the relationship between PC and OCD, as well as examining the relevance of two sub-components of PC to OCD symptom severity. Together, results suggest that SE is a direct contributor to the presentation of OCD symptoms, and that external LOC is indirectly related to OCD symptoms via OCD-related beliefs in the relationship between PC and OCD, although the specific beliefs differed between the nonclinical and clinical samples.

In Study 2, an experimental paradigm was used to investigate the influence of control-related beliefs associated with a decreased sense of control (low CSE and high PRC) on the persistence of cleaning behaviour and DC ratings. Low PC and

overestimations of controllability have each been related to OCD symptoms and behaviour (e.g., Moulding & Kyrios, 2007, 2008; Reuven-Magril et al., 2008), and OCD beliefs and symptoms are have also been associated with a discrepancy between low PC and a high DC, but the multidimensional nature of PC has not, to my knowledge, been investigated experimentally. A cleaning task was used to observe cleaning time (in seconds) in undergraduate participants (n = 174) under two conditions of each of predicted controllability (PRC; high versus low), and control-related self-efficacy (CSE; high versus low). DC ratings were taken prior to the cleaning task.

In general, results demonstrated that different control-beliefs have varying effects on OCD-like cleaning behaviour as well as the motivation to increase control (i.e., DC), in that PRC and CSE manipulations had differential effects on cleaning times and DC ratings, where significantly longer cleaning times were observed in the high (versus low) PRC condition, and in association with higher DC ratings reported in the low (versus high) CSE condition. Findings also underscore the importance of considering components of PC along with DC in OCD-phenomenology, in that regression analyses demonstrated that DC, PRC, and CSE each accounted for significant variance in observed cleaning times. The results of Study 2 are consistent with those from recent control-related research in OCD (e.g., Moulding & Kyrios, 2007), and extend previous work through the use of an experimental paradigm as well as examining the impact of specific sub-components of control beliefs on OCD-type behaviour.

Taken together, the collective results of Study 1 and Study 2 suggest several conclusions that speak primarily to the importance of considering the multidimensional nature of PC with regard to understanding and treating OCD. That is, specific sub-

components of PC appear to be a critical aspect of OCD phenomenology. First, SE beliefs, including CSE, are an important predictor and feature of OCD symptom presentation, and are of specific importance to the motivation or need to have control over outcomes that in turn, contribute to increased OCD-like behaviour and symptom severity. Second, it appears that individuals with OCD are more likely to endorse low PC over outcomes in general (external LOC) as well as within a specific context (PC over anxiety-relate outcomes), and that these beliefs will be heightened through over-endorsement of OCD-related beliefs. Third, the functional significance of control-related beliefs can be understood as relating to overpredictions of controllability as a direct contributor to increased obsessional behaviour, and allows for the inclusion of notions of predictability to be assessed within the context of control beliefs.

As cognitive behavioural models form the basis upon which evidence-based treatments are developed and utilized in order to maximize positive treatment outcome, it was a main goal of this study to target factors that will help fill both theoretical as well as clinically-relevant gaps. First, these results provide empirical support for the largely anecdotal proposition that control-related beliefs are highly relevant to the daily experience of an individual suffering with OCD. That is, the experience of living with OCD is commonly described in control-related terms (e.g., Moulding & Kyrios, 2006). As such, direct queries regarding control-related beliefs at the assessment stage would likely serve a normalizing function, help clients with OCD feel understood, and encourage collaborative case conceptualization and enhance treatment acceptability overall.

Second, a multidimensional assessment of control-related beliefs would allow for highly individualized treatment within evidence-based interventions for OCD. Clinicians might work with clients to determine what outcome they are trying to control when they engage in repetitive behaviour and to understand the contributions of poor self-esteem/self-efficacy and outcome expectancy on OCD symptoms. Behavioural experiments could be designed to test out, for example, the belief that engaging in repetitive behaviour improves an individual's ability to *actually* control an outcome or whether it only increases the *perception* that they have controlled the outcome. Or, clinicians could illustrate the relationship between the urge to control outcomes and sense of control by asking clients to rate how capable they are of controlling an outcome when they feel an increased urge to check, for instance, compared to how capable they are of controlling an outcome over which they do not have an urge to check. Determining the functional significance of control-related beliefs as they relate to anxiety-related events, control beliefs regarding the self, the world, and global outcome expectancy could also help to clarify the personal significance of other OCD-related beliefs and thus decrease the likelihood that intrusive thoughts will be misinterpreted catastrophically. Clinicians may want to help clients obtain evidence that they are more likely to feel less capable of controlling an outcome for which they feel, for example, overly responsible, than outcomes for which they do not feel responsible.

Finally, these findings indicate that general low SE is an important global concern that has specific relevance to OCD. Previous research has found that individuals with OCD endorse low levels of self-beliefs in multiple domains, including self-worth (Garcia-Soriano & Belloch, 2012), self-ambivalence (Bhar & Kyrios, 2007), negative

self-evaluation (Doron & Kyrios, 2005), and with regard to the present program of research, low self-efficacy. As individuals with OCD commonly endorse depressive symptomatology (Crino & Andrews, 1996), and that SE and self-worth are of primary importance to emotional distress (Sowislo & Orth, 2012), low SE and self-efficacy beliefs in general may appear as an obstacle to engagement in behavioural experiments and/or exposure exercises. Clinicians may find it helpful to assess SE and CSE at various points during treatment, and particularly if/when it occurs as a roadblock to improvements in treatment outcome, as targeting low SE is thought to enhance the effectiveness of CBT approaches for many disorders (McManus et al., 2009; Waite et al., 2012). Behavioural experiments designed to test beliefs in one's capacity and confidence to approach and increase sense of control over anxiety-related outcomes would also be of benefit to decrease inflated predictions of controllability while increasing treatment acceptability regarding exposure-type interventions.

There are several possible directions for future research that can be anticipated from the findings of the present research. First, future researchers may wish to include examinations of the multidimensional nature and complex construction of control-related cognition in OCD and other anxiety disorders. As control-related beliefs and low PC over anxiety-related outcomes is thought to be a contributing factor to the development and maintenance of most anxiety disorders, it will be critical to examine the relative importance of control-related beliefs and sub-components of control in multiple clinical samples. An examination comparing the pathways of sub-components of control beliefs to symptom severity in individuals meeting criteria for generalized anxiety disorder (GAD), for example, with a clinical OCD sample would allow for further clarification of

the specific role of control in OCD and/or shared features in control-related cognition across GAD and OCD. Second, the field would benefit from research seeking to integrate the construct of control with individual OCD beliefs and symptoms in the prediction of OCD. For example, examining inflated responsibility and perfectionism in the relationship of low PC and OCD would help to clarify whether low PC has greater relevance to the presence of specific OCD-related beliefs. Similarly, it would be beneficial to understand the impact of control-related beliefs on specific OCD symptom categories (e.g., are control-related beliefs more important to compulsive cleaning than they are to repugnant obsessions?). Finally, it would be of interest to test a clinical sample using an experimental design wherein control beliefs were manipulated, as well as studies that utilize a different outcome variable (i.e., checking instead of cleaning) as a means of observing the function of control beliefs to different OCD behaviours in an ecologically valid manner.

Conclusions

In summary, the aim of this program of research and the two studies herein was to shed light on the conceptualization and function of perceptions of control with regard to OCD symptomatology and phenomenology. Clinical and nonclinical participants completed a battery of measures evaluating specific and general control-related beliefs, as well as scales assessing OCD beliefs and symptoms, and an ecologically-valid experimental design was utilized to examine the direct influence of control-related beliefs on OCD-like cleaning behaviour. It was concluded that low PC in OCD appears to be composed of multiple control-related variables, specifically external LOC, low SE/CSE, and inflated outcome controllability beliefs. The effect of low PC on OCD symptom

severity is influenced in nonclinical and clinical samples by the mediating effect of OCD beliefs in general, with TAF playing a mediating role in nonclinical samples, and via OCD-specific beliefs in the clinical sample. The present research also provided novel evidence of the direct influence of overpredictions of controllability on OCD-type cleaning behaviour, and demonstrated that low control-related self-efficacy was of notable influence in increasing the desire to gain control over threatening outcomes. Future research seeking to contribute to the integration of control-related constructs in cognitive behavioural theories of OCD should focus on examining the relationship between the multidimensionality of control beliefs in other clinical samples, as well as with regard to individual OCD beliefs and behaviours.

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APPENDIX A

Participant recruitment (Study 1, Nonclinical sample)

Participants wanted for psychology experiment! (Concordia University, Loyola Campus)

Description:

The Fear and Anxiety Disorders Laboratory, supervised by Dr. A. Radomsky at Concordia University, Loyola campus, is currently recruiting participants for an online study ("Are you a control freak?"). By participating you will be helping to contribute to important psychological research.

For further information on the study please go to the following link http://psychology.concordia.ca/fac/radomsky/Research.htm and click on Control Freak study. By participating you will be entered in a draw in which you could win between 50 and 300 dollars! If you are interested or have any questions, please email me at l_gelfan@live.concordia.ca with the subject heading "Control Freak".

Thank you very much!

APPENDIX B

Study 1

Participant recruitment (Study 1, Clinical sample)

PARTICIPANTS WANTED FOR OCD RESEARCH

Do you have unwanted intrusive thoughts, images or impulses?

Do you repeat behaviours over and over again such as washing/cleaning, checking, counting, etc…?

Have you been diagnosed with obsessive compulsive disorder (OCD)?

If so, you may qualify for psychology research on OCD.

For more information, please contact Laurie at

514-848-2424 x.5965, or at l_gelfan@live.concordia.ca

This research is being conducted by Laurie Gelfand, M.A., Dr. A.S. Radomsky, Fear and Anxiety Disorders Laboratory, Psychology Department, Concordia University, April-May 2009

Advertisement: Online classified website

Do you experience:

- Recurrent intrusive thoughts, images or impulses that are unwanted and difficult to control?

AND/OR

- Repetitive behaviours, rituals or mental acts such as checking or cleaning things over and over again, or ordering and arranging things in order to feel less anxious or uncomfortable?

If you answered "yes" to these questions and you speak English on a daily basis, you may be eligible for a new research study at the Fear and Anxiety Disorders Laboratory at Concordia University.

Participation includes an interview and the completion of a series of questionnaires. Participants will be compensated for their time.

This research is being conducted by the Fear and Anxiety Disorders Laboratory in the Psychology Department at Concordia University under full ethical approval.

Please email for more info and include in the subject heading "OCD STUDY1"

Advertisement: Print classified ad

OCD RESEARCH

Do you currently have unwanted intrusive thoughts, images or impulses? Do you repeat behaviours over and over again such as: washing/cleaning, checking, counting, etc? Have you been diagnosed with Obsessive Compulsive Disorder (OCD)?

If you answered 'yes' to any of the above or you think you might have OCD and you speak English on a daily basis, you may be eligible for a new research study at the Fear and Anxiety Disorders Laboratory at Concordia University. Financial compensation will be offered.

For more information please contact Stella at the Fear and Anxiety Disorders Laboratory:

(514) 848-2424 x.2199, sm_parad@alcor.concordia.ca

APPENDIX C

OCD-related measures

VOCI

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

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

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

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

Obsessional Beliefs Questionnaire (OBQ-44)

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

For each of the statements, choose the number matching the answer that *best describes how you think.* Because people are different, there are no right or wrong answers.

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

Use the following scale:

1	2	3	4	5	6	7
disagree very much	disagree moderatel	disagree a little	neither agree nor disagree	agree a little	agree moderately	agree very much

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

6. I often think things around me are unsafe.	1	2	3	4	5	6	7
10. If I''m not absolutely sure of something, I'm bound to make a mistake	1	2	3	4	5	6	7
13. Things should be perfect according to my own standards.	1	2	3	4	5	6	7
19. In order to be a worthwhile person, I must be perfect at everything I do.	1	2	3	4	5	6	7
20. When I see any opportunity to do so, I must act to prevent bad things from happening.	1	2	3	4	5	6	7
23. Even if harm is very unlikely, I should try to prevent it at any cost.	1	2	3	4	5	6	7
24. For me, having bad urges is as bad as actually carrying them out.	1	2	3	4	5	6	7
27. If I don't act when I foresee danger, then I am to blame for any consequences.	1	2	3	4	5	6	7
28. If I can't do something perfectly, I shouldn't do it at all.	1	2	3	4	5	6	7
31. I must work to my full potential at all times.	1	2	3	4	5	6	7
32. It is essential for me to consider all possible outcomes of a situation.	1	2	3	4	5	6	7
33. Even minor mistakes mean a job is not complete.	1	2	3	4	5	6	7

1	2	3	4	5	6	7
disagree very much	disagree moderatel	disagree a little	neither agree nor disagree	agree a little	agree moderately	agree very much

34. If I have aggressive thoughts or impulses about my loved ones, this means I may secretly want to hurt them.	1	2	3	4	5	6	7
35. I must be certain of my decisions.	1	2	3	4	5	6	7
38. In all kinds of daily situations, failing to prevent harm is just as bad as deliberately causing harm.	1	2	3	4	5	6	7
39. Avoiding serious problems (for example, illness or accidents) requires constant effort on my part.	1	2	3	4	5	6	7
41. For me, not preventing harm is as bad as causing harm.	1	2	3	4	5	6	7
42. I should be upset if I make a mistake.	1	2	3	4	5	6	7
43. I should make sure others are protected from any negative consequences of my decisions or actions	1	2	3	4	5	6	7
45. For me, things are not right if they are not perfect.	1	2	3	4	5	6	7
46. Having nasty thoughts means I am a terrible person.	1	2	3	4	5	6	7
50. If I do not take extra precautions, I am more likely than others to have or cause a serious disaster.	1	2	3	4	5	6	7
53. In order to feel safe, I have to be as prepared as possible for anything that could go wrong.	1	2	3	4	5	6	7
55. I should not have bizarre or disgusting thoughts.	1	2	3	4	5	6	7
56. For me, making a mistake is as bad as failing completely.	1	2	3	4	5	6	7
57. It is essential for everything to be clear cut, even in minor matters.	1	2	3	4	5	6	7
58. Having a blasphemous thought is as sinful as committing a sacrilegious act.	1	2	3	4	5	6	7
59. I should be able to rid my mind of unwanted thoughts.	1	2	3	4	5	6	7
61. I am more likely than other people to accidentally cause harm to myself or to others.	1	2	3	4	5	6	7

1	2	3	4	5	6	7
disagree very much	disagree moderatel	disagree a little	neither agree nor disagree	agree a little	agree moderately	agree very much

64. Having bad thoughts means I am weird or abnormal.	1	2	3	4	5	6	7
65. I must be the best at things that are important to me.	1	2	3	4	5	6	7
66. Having an unwanted sexual thought or image means I really want to do it.	1	2	3	4	5	6	7
67. If my actions could have even a small effect on a potential misfortune, I am responsible for the outcome.	1	2	3	4	5	6	7
68. Even when I am careful, I often think that bad things will happen.	1	2	3	4	5	6	7
69. Having intrusive thoughts means I'm out of control.	1	2	3	4	5	6	7
72. Harmful events will happen unless I am very careful.	1	2	3	4	5	6	7
74. I must keep working at something until it's done exactly right.	1	2	3	4	5	6	7
76. Having violent thoughts means I will lose control and become violent .	1	2	3	4	5	6	7
77. To me, failing to prevent a disaster is as bad as causing it.	1	2	3	4	5	6	7
78. If I don’t do a job perfectly, people won’t respect me.	1	2	3	4	5	6	7
79. Even ordinary experiences in my life are full of risk.	1	2	3	4	5	6	7
83. Having a bad thought is morally no different than doing a bad deed.	1	2	3	4	5	6	7
84. No matter what I do, it won’t be good enough.	1	2	3	4	5	6	7
86. If I don't control my thoughts, I'll be punished.	1	2	3	4	5	6	7

TAF

Do you *disagree* or *agree* with the following statements?	Disagree Strongly	Disagree	Neutral	Agree	Agree Strongly
1. Thinking of making an extremely critical remark to a friend is almost as unacceptable to me as actually saying it……	0	1	2	3	4
2. If I think of a relative/friend losing their job, this increases the risk that they will lose their job……	0	1	2	3	4
3. Having a blasphemous thought is almost as sinful to me as a blasphemous action……	0	1	2	3	4
4. Thinking about swearing at someone else is almost as unacceptable to me as actually swearing……	0	1	2	3	4
5. If I think of a relative/friend being in a car accident, this increases the risk that he/she will have a car accident……	0	1	2	3	4
6. When I have a nasty thought about someone else, it is almost as bad as carrying out a nasty action…….	0	1	2	3	4
7. If I think of a friend/relative being injured in a fall, this increases the risk that he/she will have a fall and be injured…….	0	1	2	3	4
8. Having violent thoughts is almost as unacceptable to me as violent acts……	0	1	2	3	4
9. If I think of a relative/friend falling ill this increases the risk that he/she will fall ill……	0	1	2	3	4
10. When I think about making an obscene remark or gesture in church, it is almost as sinful as actually doing it……	0	1	2	3	4

11. If I wish harm on someone, it is almost as bad as doing harm…….	0	1	2	3	4
12. If I think of myself being injured in a fall, this increases the risk that I will have a fall and be injured……..…… ..…	0	1	2	3	4
13. If I think about making an obscene gesture to someone else, it is almost as bad as doing it…… …….	0	1	2	3	4
14. If I think of myself being in a car accident, this increases the risk that I will have a car accident…… …….	0	1	2	3	4
15. When I think unkindly about a friend, it is almost as disloyal as doing an unkind act…… …….	0	1	2	3	4
16. If I think of myself falling ill, this increases the risk that I will fall ill….	0	1	2	3	4
17. If I have a jealous thought, it is almost the same as making a jealous remark…… …….....	0	1	2	3	4
18. Thinking of cheating in a personal relationship is almost as immoral to me as actually cheating…… ……..	0	1	2	3	4
19. Having obscene thoughts in a church is unacceptable to me……..…	0	1	2	3	4

(Shafran, Thordarson & Rachman, 1996)

(Y-BOCS)

OBSESSIVE THOUGHTS

Review the obsessions you checked on the Y-BOCS Symptom Checklist to help you answer the first five questions. Please think about the last seven days (including today), and check one answer for each question.

1. How much of your time was occupied by obsessive thoughts? How frequently do the obsessive thoughts occur?

___ 0 = None- *If you checked this answer, also check 0 for questions 2,3,4 and 5, and proceed to question*

___ 1 = Less than 1 hour per day, or occasional intrusions (occur no more than 8 times a day)

___ 2 = 1to 3 hours per day, or frequent intrusions (occur more than 8 times a day, but most hours of the day are free of obsessions)

___ 3 = More than 3 hours per day and up to 8 hours per day, or very frequent intrusions (occur more than 8 times a day and during most hours of the day)

___ 4 = More than 8 hours per day, or near constant intrusions (too numerous to count, and an hour rarely passes without several obsessions occurring)

2. How much did your obsessive thoughts interfere with your social or work functioning? (If you are currently not working, please think about how much the obsessions interfered with your everyday activities.) (*In answering this question, please consider whether there was anything that you didn't do, or that you did less, because of the obsessions.)*

___ 0 = No interference

___ 1 = Mild, slight interference with social or occupational activities, but overall performance not impaired

___2 = Moderate, definite interference with social or occupational activities, but still manageable

___ 3 = Severe interference, causes substantial impairment in social or occupational performance

___ 4 = Extreme, incapacitating interference

3. How much distress did your obsessive thoughts cause you?

___ 0 = none

___ 1 = Mild, infrequent, and not too disturbing distress

___ 2 = Moderate, frequent, and disturbing distress, but still manageable

___ 3 = Severe, very frequent, and very disturbing distress

___ 4 = Extreme, near- constant, and disabling distress

4. How much of an effort did you make to resist the obsessive thoughts? How often did you try to disregard or turn your attention away from those thoughts as they entered your mind? (*Here we are not interested in how successful you were in controlling your thoughts but only in how <u>much</u> or how <u>often</u> you tried to do so.)*

___ 0 = I made an effort to always resist (or the obsessions are so minimal that there is no need to actively resist them)

___ 1 = I tried to resist most of the time (i.e., more than half the time I tried to resist)

___ 2 = I made some effort to resist

___ 3 = I allowed all obsessions to fill my mind without attempting to control them, but I did so with some reluctance

___ 4 = I completely and willingly gave in to all obsessions

5. How much control did you have over your obsessive thoughts? How successful were you in stopping or diverting your obsessive thinking? (If you rarely tried to resist, in order to answer this question, please think about those rare occasions on which you <u>did</u> <u>try</u> to stop the obsessions.) (*Note: Do not include here obsessions stopped by doing <u>compulsions</u>.)*

___ 0 = Complete control

___ 1 = Much control; usually I could stop or divert obsessions with some effort and concentration

___ 2 = Moderate control; sometimes I could stop or divert obsessions

___ 3 = Little control; I was rarely successful in stopping obsessions and could only divert attention with great difficulty

___ 4 = No control; I was rarely able to even momentarily ignore the obsessions

COMPULSIONS

Review the compulsions you checked on the Y-BOCS Symptom Checklist to help you answer the next five questions. Please think about the last seven days (including today), and check one answer for each question.

6. How much time did you spend performing compulsive behavior? How frequently did you perform compulsions? (If your rituals involved daily living activities, please consider how much longer it took you to complete routine activities because of your rituals.)

___0 = None. *If you checked this answer, then also check 0 for questions 7, 8, 9, and 10, then answer 11 & 12.*

___1 = Less than 1 hour per day was spent performing compulsions, or occasional performance of compulsive behaviors (no more than 8 times a day)

___ 2 = 1 to 3 hours per day was spent performing compulsions, or frequent performance of compulsive behaviors (more than 8 times a day, but most hours were free of compulsions)

___3 = More than 3 hours and up to 8 hours per day were spent performing compulsions, or very frequent performance of compulsive behaviors (more than 8 times a day and during most hours of the day)

___ 4 = More than 8 hours per day were spent performing compulsions, or near-constant performance of compulsive behaviors (too numerous to count, and an hour rarely passed without several compulsions being performed)

7. How much did your compulsive behaviors interfere with your social or work functioning? (If you are not currently working, please think about your everyday activities.)

___ 0 = No interference

___ 1 = Mild, slight interference with social or occupational activities, but overall performance not impaired

___ 2 = Moderate, definite interference with social or occupational performance, but still manageable

___ 3 = Severe interference, substantial impairment in social or occupational performance.

___ 4 = Extreme, incapacitating interference

8. How would you have felt if prevented from performing your compulsion(s)? How anxious would you have become?

___ 0 = Not at all anxious

___ 1 = Only slightly anxious if compulsions prevented

___ 2 = Anxiety would mount but remain manageable if compulsions prevented

___ 3 = Prominent and very disturbing increase in anxiety if compulsions interrupted

___ 4 = Extreme, incapacitating anxiety from any intervention aimed at reducing the compulsions

9. How much of an effort did you make to resist the compulsions? Or how often did you try to stop the compulsions? (Rate only how <u>often</u> or how <u>much</u> you tried to resist your compulsions, <u>not</u> how successful you actually were in stopping them.)

___ 0 = I made an effort to always resist (or the symptoms were so minimal that there was no need to activity resist them)

___ 1 = I tried to resist most of the time (i.e., more than half the time)

___ 2 = I made some effort to resist

___ 3 = I yielded to almost all compulsions without attempting to control them, but I did so with some reluctance

___ 4 = I completely and willingly yielded to all compulsions

10. How much control did you have over the compulsive behavior? How successful were you in stopping the ritual(s)?

(If you rarely tried to resist, please think about those rare occasions in which you <u>did try</u> to stop the compulsions, in order to answer the question.)

___ 0 = I had complete control

___ 1 = Usually I could stop compulsions or rituals with some effort and willpower

___ 2 = Sometimes I could stop compulsive behavior, but only with difficulty

___ 3 = I could only delay the compulsive behavior, but eventually it had to be carried out to completion

___ 4 = I was rarely able to even momentarily delay performing the compulsive behavior

11. Do you think your obsessions or compulsions are reasonable? Would there be anything besides anxiety to worry about if you resisted them? Do you think something would really happen?

___ 0 = I think my obsessions or compulsions are unreasonable or excessive

___ 1 = I think my obsessions or compulsions are unreasonable or excessive, but I'm not completely convinced that they aren't necessary

___ 2 = I think my obsessions or compulsions may be unreasonable or excessive

___ 3 = I don't think my obsessions or compulsions are unreasonable or excessive

___ 4 = I am sure my obsessions or compulsions are reasonable, no matter what anyone says

12. Have you been avoiding doing anything, going anyplace, or being with anyone because of your obsessional thoughts or because you were afraid you would perform compulsions?

___ 0 = I haven't been avoiding anything

___ 1 = I have been avoiding a few unimportant things

___ 2 = I have been avoiding some important things

___ 3 = I have been avoiding many important things

___ 4 = I have been avoiding doing almost everything

APPENDIX D

General anxiety and depression measures

B.A.I.

Below is a list of common symptoms of anxiety. Please read each item in the list carefully. Indicate how much you have been bothered by each symptom during the PAST WEEK, INCLUDING TODAY by placing an X in the corresponding space in the column next to each symptom.

		Not at all	**Mildly. It did not bother me much**	**Moderately. It was very unpleasant but I could stand it**	**Severely I could barely stand it**
1	Numbness or tingling				
2	Feeling hot				
3	Wobbliness in legs				
4	Unable to relax				
5	Fear of worst happening				
6	Dizzy or lightheaded				
7	Heart pounding or racing				
8	Unsteady				
9	Terrified				
10	Nervous				
11	Feelings of choking				
12	Hands trembling				
13	Shaky				
14	Fear of losing control				
15	Difficulty breathing				
16	Fear of dying				
17	Scared				
18	Indigestion or discomfort in abdomen				
19	Faint				
20	Face flushed				
21	Sweating (not due to heat)				

BDI-II

1) Sadness

0 I do not feel sad.

1 I feel sad much of the time.

2 I am sad all the time.

3 I am so sad or unhappy that I can't stand it.

2) Pessimism

0 I am not discouraged about my future.

1 I feel more discouraged about my future than I used to be.

2 I do not expect things to work out for me.

3 I feel my future is hopeless and will only get worse.

3) Past Failure

0 I do not feel like a failure.

1 I have failed more than I should have.

2 As I look back, I see a lot of failures.

3 I feel I am a total failure as a person.

4) Loss of Pleasure

0 I get as much pleasure as I ever did from the things I enjoy.

1 I don't enjoy things as much as I used to.

2 I get very little pleasure from the things I used to enjoy.

3 I can't get any pleasure from the things I used to enjoy.

7) Self-Dislike

0 I feel the same about myself as ever.

1 I have lost confidence in myself.

2 I am disappointed in myself.

3 I dislike myself.

8) Self-Criticalness

0 I don't criticize or blame myself more than usual.

1 I am more critical of myself than I used to be.

2 I criticize myself for all the faults.

3 I blame myself for everything bad that happens.

9) Suicidal Thoughts or Wishes

0 I don't have any thoughts of killing myself.

1 I have thoughts of killing myself, but I would not c out.

2 I would like to kill myself.

3 I would kill myself if I had the chance.

10) Crying

0 I don't cry any more than I used to.

1 I cry more now than I used to.

2 I cry over every little thing.

3 I feel like crying but I can't.

5) Guilty Feelings

0 I don't feel particularly guilty.

1 I feel guilty over many things I have done or should have done.

2 I feel quite guilty most of the time.

3 I feel guilty all the time.

6) Punishment Feelings

0 I don't feel I am being punished.

1 I feel I may be punished.

2 I expect to be punished.

3 I feel I am being punished.

13) Indecisiveness

0 I make decisions about as well as ever.

1 I find it more difficult to make decisions than usual.

2 I have much greater difficulty in making decisions than I used to.

3 I have trouble making any decision.

14) Worthlessness

0 I do not feel I am worthless.

1 I don't consider myself as worthwhile and useful as I used to.

2 I feel more worthless as compared to other

11) Agitation

0 I am no more restless or wound up than usual.

1 I feel more restless or wound up than usual.

2 I am so restless or agitated that it's hard to stay sti

3 I am so restless or agitated that I have to keep mov doing something.

12) Loss of Interest

0 I have not lost interest in people or activities.

1 I am less interested in other people or things than b

2 I have lost most of my interest in other people or t

3 It's hard to get interested in anything.

18) Changes in Appetite

0 I have not experienced any changes in my appetit

1a My appetite is somewhat less than usual.

1b My appetite is somewhat greater than usual.

2a My appetite is much less than usual.

2b My appetite is much greater than usual.

3a I have no appetite at all.

3a I crave food all the time.

19) Concentration Difficulty

0 I can concentrate as well as usual.

1 I can't concentrate as well as usual.

2 It's hard to keep my mind on anything for very lo

3 I find I can't concentrate on anything.

people.

3 I feel utterly worthless.

15) Loss of Energy

0 I have as much energy as ever.

1 I have less energy than I used to have.

2 I don't have enough energy to do very much.

3 I don't have enough energy to do anything.

16) Changes in Sleeping Pattern

0 I have not experienced any changes in my sleeping pattern.

1a I sleep somewhat more than usual.

1b I sleep somewhat less than usual.

2a I sleep a lot more than usual.

2b I sleep a lot less than usual.

3a I sleep most of the day.

3b I wake up 1-2 hours early and can't get back to sleep.

17) Irritability

0 I am no more irritable than usual.

1 I am more irritable than usual.

2 I am much more irritable than usual.

3 I am irritable all the time.

20) Tiredness or Fatigue

0 I am no more tired or fatigued than usual.

1 I get more tired or fatigued more easily than usual

2 I am too tired or fatigued to do a lot of the things

I am too tired or fatigued to do most of the things

3

21) Loss of Interest in Sex

0 I have not noticed any recent change in my interes

1 I am less interested in sex than I used to be.

2 I am much less interested in sex now.

3 I have lost interest in sex completely.

APPENDIX E

Control-related measures

ACQ

ID#: ____

Listed below are a number of statements describing a set of beliefs. Please read each statement carefully and, on the 0-5 scale below, indicate how much you think *each* statement is typical of *you*.

0 ---------- 1 ---------- 2 ---------- 3 ---------- 4 ---------- 5

Strongly disagree	Moderately disagree	Slightly disagree	Slightly agree	Moderately agree	Strongly agree

---

1. How well I cope with difficult situations depends on whether I have outside help _____

2. When I am put under stress, I am likely to lose control. _____

3. When I am frightened by something, there is generally nothing I can do. _____

4. Whether I can successfully escape a frightening situation is always a matter of chance with me. _____

5. I can usually put worrisome thoughts out of my mind easily. _____

6. I am able to control my level of anxiety. _____

7. There is little I can do to change frightening events. _____

8. The extent to which a difficult situation resolves itself has nothing to do with my actions.

_____

9. If something is going to hurt me, it will happen no matter what I do.

_____

10. I can usually relax when I want. _____

11. When I am under stress, I am not always sure how I will react. _____

12. Most events that make me anxious are outside of my control. _____

13. I am unconcerned if I become anxious in a difficult situation, because I am confident in my ability to cope with my symptoms. _____

14. I usually find it hard to deal with difficult problems. _____

15. When I am anxious, I find it hard to focus on anything other than my anxiety.

_____

DC

Below you will find a series of statements. Please read each statement carefully and respond to it by circling the phrase that expresses the extent to which you believe the statement applies to you.

1. I prefer a job where I have a lot of control over what I do and when I do it.

Never Not usually Rarely Don't know Sometimes Usually Always

2. I enjoy political participation because I want to have as much of a say in running government as possible.

Never Not usually Rarely Don't know Sometimes Usually Always

3. I try to avoid situations where someone else tells me what to do.

Never Not usually Rarely Don't know Sometimes Usually Always

4. I would prefer to be a leader than a follower.

Never Not usually Rarely Don't know Sometimes Usually Always

5. I enjoy being able to influence the actions of others.

Never Not usually Rarely Don't know Sometimes Usually Always

6. I am careful to check everything on an automobile before I leave on a long trip.

Never Not usually Rarely Don't know Sometimes Usually Always

7. Others usually know what is best for me.

Never Not usually Rarely Don't know Sometimes Usually Always

8. I enjoy making my own decisions.

Never Not usually Rarely Don't know Sometimes Usually Always

9. I enjoy having control over my own destiny.

Never Not usually Rarely Don't know Sometimes Usually Always

10. I would rather someone else take over the leadership role when I'm involved in a group project.

Never Not usually Rarely Don't know Sometimes Usually Always

11. I consider myself to be generally more capable of handling situations than others are.

Never Not usually Rarely Don't know Sometimes Usually Always

12. I'd rather run my own business and make my own mistakes than listen to someone else's orders.

Never Not usually Rarely Don't know Sometimes Usually Always

13. I like to get a good description of what a job is all about before I begin.

Never Not usually Rarely Don't know Sometimes Usually Always

14. When I see a problem, I prefer to do something about it rather than sit by and let it continue.

Never Not usually Rarely Don't know Sometimes Usually Always

15. When it comes to orders, I would rather give them than receive them.

Never Not usually Rarely Don't know Sometimes Usually Always

16. I wish I could push many of life's daily decisions off on someone else.

Never Not usually Rarely Don't know Sometimes Usually Always

17. When driving, I try to avoid putting myself in a situation where I could be hurt by another person's mistake.

Never Not usually Rarely Don't know Sometimes Usually Always

18. I prefer to avoid situations where someone else has to tell me what it is that I should be doing.

Never Not usually Rarely Don't know Sometimes Usually Always

19. There are many situations in which I would prefer only one choice rather than having to make a decision.

Never Not usually Rarely Don't know Sometimes Usually Always

20. I like to wait and see if someone else is going to solve a problem so that I don't have to be bothered with it.

Never Not usually Rarely Don't know Sometimes Usually Always

RLOC (Rotter, 1966)

For each question, circle either “a” or “b” to indicate which of each statement you believe to be true, despite what you may wish to be true. There are no right or wrong answers. Answer all the questions.

1. a. Children get into trouble because their patents punish them too much.

   b. The trouble with most children nowadays is that their parents are too easy with them.

2. a. Many of the unhappy things in people's lives are partly due to bad luck.

   b. People's misfortunes result from the mistakes they make.

3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.

   b. There will always be wars, no matter how hard people try to prevent them.

4. a. In the long run people get the respect they deserve in this world.

   b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

5. a. The idea that teachers are unfair to students is nonsense.

   b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

6. a. Without the right breaks, one cannot be an effective leader.

   b. Capable people who fail to become leaders have not taken advantage of their opportunities.

7. a. No matter how hard you try, some people just don't like you.

b. People who can't get others to like them don't understand how to get along with others.

8. a. Heredity plays the major role in determining one's personality.

b. It is one's experiences in life which determine what they're like.

9. a. I have often found that what is going to happen will happen.

b. Trusting fate has never turned out as well for me as making a decision to take a definite course of action.

10. a. In the case of the well prepared student there is rarely, if ever, such a thing as an unfair test.

b. Many times, exam questions tend to be so unrelated to course work that studying in really useless.

11. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.

b. Getting a good job depends mainly on being in the right place at the right time.

12. a. The average citizen can have an influence in government decisions.

b. This world is run by the few people in power, and there is not much the little guy can do about it.

13. a. When I make plans, I am almost certain that I can make them work.

b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14. a. There are certain people who are just no good.

b. There is some good in everybody.

15. a. In my case getting what I want has little or nothing to do with luck.

b. Many times we might just as well decide what to do by flipping a coin.

16. a. Who gets to be the boss often depends on who was lucky enough to be In the right place first.

    b. Getting people to do the right thing depends upon ability - luck has little or nothing to do with it.

17. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.

    b. By taking an active part in political and social affairs the people can control world events.

18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.

    b. There really is no such thing as "luck."

19. a. One should always be willing to admit mistakes.

    b. It is usually best to cover up one's mistakes.

20. a. It is hard to know whether or not a person really likes you.

    b. How many friends you have depends upon how nice a person you are.

21. a. In the long run the bad things that happen to us are balanced by the good ones.

    b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22. a. With enough effort we can wipe out political corruption.

    b. It is difficult for people to have much control over the things politicians do in office.

23. a. Sometimes I can't understand how teachers arrive at the grades they give.

    b. There is a direct connection between how hard I study and the grades I get.

24. a. A good leader expects people to decide for themselves what they should do.

    b. A good leader makes it clear to everybody what their jobs are.

25. a. Many times I feel that I have little influence over the things that happen to me.

    b. It is impossible for me to believe that chance or luck plays an important role in my life.

26. a. People are lonely because they don't try to be friendly.

    b. There's not much use in trying too hard to please people, if they like you, they like you.

27. a. There is too much emphasis on athletics in high school.

    b. Team sports are an excellent way to build character.

28. a. What happens to me is my own doing.

    b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29. a. Most of the time I can't understand why politicians behave the way they do.

    b. In the long run the people are responsible for bad government on a national as well as on a local level.

RSES

1.	On the whole, I am satisfied with myself.	SA	A	D	SD
2.	At times, I think I am no good at all.	SA	A	D	SD
3.	I feel that I have a number of good qualities.	SA	A	D	SD
4.	I am able to do things as well as most other people.	SA	A	D	SD
5.	I feel I do not have much to be proud of.	SA	A	D	SD
6.	I certainly feel useless at times.	SA	A	D	SD
7.	I feel that I'm a person of worth, at least on an equal plane with others.	SA	A	D	SD
8.	I wish I could have more respect for myself.	SA	A	D	SD
9.	All in all, I am inclined to feel that I am a failure.	SA	A	D	SD
10.	I take a positive attitude toward myself.	SA	A	D	SD

APPENDIX F

Study 1 consent and debriefing forms

CONSENT FORM TO PARTICIPATE IN RESEARCH (Clinical)

This is to state that I agree to participate in a program of research being conducted by Dr. Adam S. Radomsky in the Psychology Department of Concordia University.

A. PURPOSE

I have been informed that the purpose of this study is to examine beliefs and thoughts related to different ways of understanding myself.

B. PROCEDURES

If you agree to participate in this study, you will first be asked to complete an interview in order to assess your emotional state here, in SP-215. The interview will consist of questions related to your overall mood, and will last approximately 1-2 hours. The interview will be audiotaped. Afterwards, you will be asked to complete one questionnaire package. The package should take approximately 60 minutes to complete. After you have finished filling out the questionnaires, we will explain the hypotheses of the study. You will be offered financial compensation of $40 for your time. Please note that participation in this experiment may lead to some feelings of anxiety and discomfort; however, you are reminded that you are free to withdraw at any time.

C. CONDITIONS OF PARTICIPATION

I understand that I am free to withdraw my consent and discontinue my participation in this study at any time, without any negative consequences whatsoever. I understand that all information obtained will be kept strictly confidential and will be stored under lock and key for a period of seven years after which they will be shredded. Access to this information will be made available only to restricted members of Dr. Radomsky's research teams. I understand that to ensure my confidentiality all data will be coded by number only and will be kept separate from my name. I understand that data from this study may be published, but that no identifying information will be released.

If you have any questions concerning the study, please feel free to ask the experimenter now. If other questions or concerns come up following the study, please feel free to contact our lab at (514) 848-2424, ext. 2199.

Adam S. Radomsky, Ph.D., Assistant Professor, Laurie Gelfand, M.A., Graduate Student

I HAVE CAREFULLY STUDIED THE ABOVE AND UNDERSTAND THIS AGREEMENT. I FREELY CONSENT AND VOLUNTARILY AGREE TO PARTICIPATE IN THIS STUDY.

NAME (please print) _____ DATE _____

SIGNATURE _____ WITNESS SIGNATURE _____

If at any time you have questions about your rights as a research participant, please contact Adela Reid, Research Ethics and Compliance Office, Concordia University, at 514-848-2424, ext. 7481 or by e-mail at Adela.Reid@concordia.ca

CONSENT FORM TO PARTICIPATE IN RESEARCH (Nonclinical)

This is to state that I agree to participate in a program of research being conducted by Dr. Adam S. Radomsky in the Psychology Department of Concordia University.

A. PURPOSE

I have been informed that the purpose of this study is to examine beliefs and thoughts related to different ways of understanding myself.

B. PROCEDURES

If you agree to participate in this study, you will be asked to complete one questionnaire package. The package should take approximately 30-60 minutes to complete, and will take place in SP-215. After you have finished filling out the questionnaires, any questions you may have about the experiment will be answered and we will fully explain the hypotheses of the study. For your participation, you will receive the opportunity to submit your name in a draw for cash prizes, OR course credit if you are part of the undergraduate participant pool at Concordia University.

C. CONDITIONS OF PARTICIPATION

I understand that I am free to withdraw my consent and discontinue my participation in this study at any time, without any negative consequences whatsoever. I understand that all information obtained will be kept strictly confidential and will be stored under lock and key for a period of seven years after which they will be shredded. Access to this information will be made available only to restricted members of Dr. Radomsky's research teams. I understand that to ensure my confidentiality all data will be coded by number only and will be kept separate from my name. I understand that data from this study may be published, but that no identifying information will be released.

If you have any questions concerning the study, please feel free to ask the experimenter now. If other questions or concerns come up following the study, please feel free to contact our lab at (514) 848-2424, ext. 2199.

Adam S. Radomsky, Ph.D., Assistant Professor, Laurie Gelfand, M.A., Graduate Student

I HAVE CAREFULLY STUDIED THE ABOVE AND UNDERSTAND THIS AGREEMENT. I FREELY CONSENT AND VOLUNTARILY AGREE TO PARTICIPATE IN THIS STUDY.

NAME (please print) _____ DATE _____

SIGNATURE _____ WITNESS SIGNATURE _____

If at any time you have questions about your rights as a research participant, please contact Adela Reid, Research Ethics and Compliance Office, Concordia University, at 514-848-2424, ext. 7481 or by e-mail at Adela.Reid@concordia.ca

Study 1 Debriefing

Thank you for your time and cooperation. This study aims to validate several measures of control-related thoughts and beliefs, and to determine the relationship of these beliefs with those that are prevalent in some individuals with obsessive-compulsive disorder (OCD). It has been found that while individuals with OCD have a high desire for control, they also exhibit a low perception of their own control (Moulding & Kyrios, 2007). Because increases in one's sense of control are generally considered to be an important indicator of well-being, we might assume then that it would be beneficial to help individuals with OCD bolster their perceived control. However, in that it has also been found that a belief in one's ability to control may not be adaptive under uncontrollable circumstances (Zuckerman et al., 2004), it is important to determine if individuals with OCD discriminate between a realistic and unrealistic sense of control. It is speculated that individuals with OCD feel driven to increase their low perception of control, without thought as to whether the outcome is controllable or not. And because persistence on tasks that are uncontrollable (or unsolvable) will likely result in failure, interventions that aim to globally increase perceived control without consideration of how the individuals assess controllability of the target may result in harmful effects. In order to validate some of the measures you completed today, we are testing both non-clinical student populations, as well as clinical individuals with OCD. Please note that even if you scored highly on several items, this does not mean that you have OCD.

If you have any questions or comments about this study, please contact Laurie Gelfand (l_gelfan@live.concordia.ca, 514-848-2424, x.5965) or Dr. Adam Radomsky (adam.radomsky@concordia.ca). If you are interested in the results of this study, you may contact Laurie Gelfand at the completion of the study. Note that only global results, not individual results, will be released.

Further readings:

Moulding, R., & Kyrios, M. (2007). Desire for control, sense of control and obsessive-

compulsive symptoms. *Cognitive Therapy and Research*. *31*, 759-772.

Moulding, R., & Kyrios, M. (2006). Anxiety disorders and control related beliefs: the exemplar

of obsessive-compulsive disorder (OCD). *Clinical Psychology Review, 26,* 573-583.

Zuckerman, M., Knee, C.R., Kieffer, S.C., & Gagne, M. (2004). What individuals believe they

can and cannot do: Explorations of realistic and unrealistic control beliefs. *Journal of*

Personality Assessment, 82, 215-232.

APPENDIX G

Study 2 participant recruitment advertisement

What's your hygiene IQ?

Participants needed for research study

How savvy are you about cleaning?

The Fear and Anxiety Disorders Laboratory at Concordia University is seeking individuals to participate in a psychology study evaluating knowledge about hygiene.

Participants will be compensated for with two (2) participation credits OR entry into a cash draw for prizes worth up to $300.

For more information or to book an appointment, contact Laurie at 514-848-2424 x.5965, or at l_gelfan@live.concordia.ca

This research is being conducted by Dr. A.S. Radomsky and Laurie Gelfand, M.A., Psychology Department, Concordia University, 2008

APPENDIX H

Coding form

Participant ID: _____ Time: _____ (2 or 3)

Cleaning behaviour	**Time start**	**Time end**	**Total (secs)**

TOTAL (secs): _____

Cleaning behaviour	**Total # of times engaged in CB**
Peering	
Blowing	
Touching	
Shaking	
Tipping over	
Air dusting	
Wet wiping	
Dry wiping	

TOTAL (CB): _____

APPENDIX I

CODING GUIDELINES

To identify the participant:

1. Look at date tested
2. Listen for ID number

To code T1:

a. Note time started cleaning when I leave the room
b. Note time stopped cleaning when participant dings the bell

To code T2:

a. Note each cleaning behaviour with:
    - What the behaviour was
    - When it started & when it stopped
b. Calculate total time spent cleaning in secs (use calculator)

If participant continues cleaning after experimenter has come back in room, this is T23 (Time 2 and T3):

a. Continue coding as per T2 instructions (use extra sheet if necessary to record cleaning behaviours)

APPENDIX J

BBC NEWS

Lifting the lid on computer filth

Office workers are exposed to more germs from their phones and keyboards than toilet seats, scientists reveal.

Work stations contain nearly 400 times as many microbes than lavatories, it is claimed. The reality of our grubby working environments is exposed in a study by the University of Arizona.

Office equipment should be regularly disinfected to prevent the spread of viruses and bacteria responsible for disease.

A desk is capable of supporting 10 million microbes and the average office contains 20,961 microbes per square inch, according to research.

By contrast, the average toilet seat contains 49 microbes per square inch, the survey showed.

The key offenders are telephones, which harbour up to 25, 127 microbes per square inch, keyboards 3,295 and computer mice 1.676.

Microbiologist Dr Charles Gerba, of the University of Arizona, who carried out the research, said: "When someone is infected with a cold or flu bug the surfaces they touch during the day become germ transfer points because some cold and flu viruses can survive on surfaces for up to 72 hours.

"An office can become an incubator."

Dr Gerba's study found bacteria levels increased drastically during the day, peaking after lunch.

Food spills, such as tea and biscuits, can support mini eco-systems, but cleaning of keyboards and phones is not always given high priority.

Dr Gerba said: "Without cleaning, a small area on your desk of phone can sustain millions of bacteria that could potentially cause illness."

The study found that where workers who were told to clean their desks with disinfecting wipes, bacterial levels were reduced by (**97.5%**) or (**33.3%**).

British microbiologist Professor Sally Bloomfield said the study reinforced the need for good hygiene practice at work.

She said it was impossible to turn our surroundings into sterile zones, but we can minimise the risk by using alcoholic wipes on office furniture like phones and keyboards.

APPENDIX K

How Many Germs Live On Your Keyboard?

Studies have shown that computer keyboards are some of the most germ-ridden devices you own, surpassing even doorknobs and toilet seats.

Take this short quiz to see how many germs call your keyboard home!

1. How often do you clean your keyboard?

a) Daily

b) Once a week

c) Once a month

d) A few times a year

e) Almost never

2. Do you spend the majority of your day with a lot of people?

a) Yes, I'm in an environment with hundreds of people, such as a mall, school or large office

b) I'm exposed to a medium-sized group of people (between 10 and 30)

c) I'm around a small group of people

d) I spend most days alone

3. How many times a day do you wash your hands? (showers count as well)

a) I rarely wash my hands

b) Once

c) 2x

d) 3-4x

e) 5-6x

f) 6 or more

4. When you sneeze, do you:

a) I sneeze into the floor

b) I sneeze into my hands and wipe them on whatever is convenient (shirt, pants, etc)

c) I sneeze into my hands but wash them afterward

d) I almost always have Kleenex on hand and I sneeze into that

5. How often do you eat meals at your computer?

a) Several times a day

b) Once per day

c) A few times a week

d) Once a week

e) Once or twice a month

f) Almost never

6. How often are you around children?

a) All the time

b) Sometimes

c) Rarely

d) Never

7. How many people use your computer in a single day?

a) Only me

b) Myself and one other person

c) Myself and 2-3 others

d) Myself and more than three people

8. How often are you around sick people?

a) Very often

b) Average amount

c) Rarely

9. How often do you clean your entire workspace?

a) Daily

b) Once a week

c) Once a month

d) A few times a year

e) Almost never

10. When you clean your keyboard, what do you use?

a) Damp towel

b) Damp towel with mild disinfectant or cleaner

c) Feather Duster

d) I stick it in the dishwasher

e) Vacuum Cleaner/Blower

11. Do you wash your hands after you use the restroom?

a) Yes

b) Most of the time

c) Some of the time

d) No

12. Do you have any pets?

a) Yes

b) No

c) No, but I spend time around them

13. Do you have seasonal allergies?

a) Yes

b) Sometimes

c) Rarely

14. Do you use antibacterial soap?

a) Yes

b) Sometimes

c) No

15. How do you typically travel to work/school/wherever every day?

a) I use public transportation (bus, subway, etc)

b) I drive a car

c) I ride a carpool, vanpool, taxi, or limousine

d) I walk or ride a bicycle

e) Other

**After participants submitted the results of the online survey, they were given the following information onscreen:

There are approximately 1,617,840 germs on your keyboard right now.

That's equivalent to the number of germs on 324 toilet seats.

Note: Because this is a communal computer, the number of germs on this keyboard is likely to be greater than the number calculated for your personal computer use.

APPENDIX L

How to clean your keyboard

A guide to cleaning and maintaining your keyboard

Computer keyboards can get dirty very easily, but to clean the surface of a keyboard is very straight forward.

In this guide we will show you how to clean your keyboard thoroughly and we will guide you through with the aid of photos and diagrams.

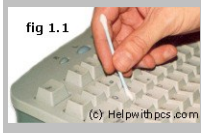
You will need:

- lint free cloth
- dry cloth or duster
- suitable cleaning fluid (isopropyl alcohol)
- cotton swabs
- Can of compressed air

First, shutdown your PC and remove the mains plug, unplug the keyboard (remember which socket) and hold it upside down to release any debris from in between the keys (pressing the keys is a good way to release it).

Using a can of compressed air, blow any debris from around and under the keys.

Now take one of the cotton swabs and put a couple of drops of the cleaning fluid on it, use the cotton bud to clean the sides of the keys as seen in **fig 1.1**.



After cleaning the sides of the keys take your lint free cloth and dampen it with your cleaning fluid (don't put the liquid directly on the keyboard), give the surface of the keyboard a good wipe over using the cloth to trace the contours of the keys (see **fig 1.2**).

When you have finished give the keyboard a wipe over with the dry cloth/duster, you should now have a nice clean keyboard.

APPENDIX M

Study 2 consent, debriefing, and deception consent forms

CONSENT FORM TO PARTICIPATE IN RESEARCH

This is to state that I agree to participate in a program of research being conducted by Laurie Gelfand, M.A., Doctoral Student, and Dr. Adam S. Radomsky, Ph.D., Associate Professor, in the Psychology Department of Concordia University.

A. PURPOSE

I have been informed that the purpose of this study is to examine knowledge about hygiene and hygiene practices.

B. PROCEDURES

If you agree to participate in this study, you will be asked to complete some questionnaires, read an article and take part in a cleaning task. Afterwards, you will be given feedback on your performance on the task, and you will be asked to complete more questionnaires. The cleaning task will be videotaped. The experiment should take approximately 60-90 minutes to complete, and will take place in SP-215. After you have finished filling out the questionnaires, any questions you may have about the experiment will be answered and we will fully explain the hypotheses of the study. For your participation, you will receive the opportunity to submit your name in a draw for cash prizes, OR course credit if you are part of the undergraduate participant pool at Concordia University.

C. CONDITIONS OF PARTICIPATION

I understand that I am free to withdraw my consent and discontinue my participation in this study at any time, without any negative consequences whatsoever. I understand that all information obtained will be kept strictly confidential and will be stored under lock and key for a period of seven years after which they will be shredded. Access to this information will be made available only to restricted members of Dr. Radomsky's research teams. I understand that to ensure my confidentiality all data will be coded by number only and will be kept separate from my name. I understand that data from this study may be published, but that no identifying information will be released.

If you have any questions concerning the study, please feel free to ask the experimenter now. If other questions or concerns come up following the study, please feel free to contact our lab at (514) 848-2424, ext. 2199.

Adam S. Radomsky, Ph.D., Assistant Professor, Laurie Gelfand, M.A., Graduate Student

I HAVE CAREFULLY STUDIED THE ABOVE AND UNDERSTAND THIS AGREEMENT. I FREELY CONSENT AND VOLUNTARILY AGREE TO PARTICIPATE IN THIS STUDY.

NAME (please print) _____ DATE _____

SIGNATURE _____ WITNESS SIGNATURE _____

If at any time you have questions about your rights as a research participant, please contact Adela Reid, Research Ethics and Compliance Office, Concordia University, at 514-848-2424, ext. 7481 or by e-mail at Adela.Reid@concordia.ca

Study 2 Debriefing

Thank you for your time and cooperation. The purpose of this experiment was to examine how different components of sense of control inhibit or provoke repeated washing. In this study, we were interested in examining the effects of self-esteem (or how well you were told you were able to control the germs) and predicted sense of control over the germs (or how possible it was to control the germs) on repeated washing behaviour.

Previous research has shown while individuals with OCD have a high desire for control, they also exhibit a low perception of their own control. This is called a control mismatch. However, other research on anxious responding to threatening information or events found that it was the prediction of a sense of control over the threat, and not sense of how well an individual is able to control the threat per se that is responsible for a low sense of control in the control mismatch. In this experiment, we were interested in finding out the different ways that self-esteem to control the germs and the prediction that the germs can be controlled are involved in repeated washing behaviour. Please note that even if you re-cleaned the objects, this does not mean that you have OCD.

If you have any questions or comments about this study, please contact Laurie Gelfand (l_gelfan@alcor.concordia.ca, 514-848-2424, x.5965) or Dr. Adam Radomsky (adam.radomsky@concordia.ca). If you are interested in the results of this study, you may contact Laurie Gelfand at the completion of the study. Note that only global results, not individual results, will be released.

Further readings:

Moulding, R., & Kyrios, M. (2007). Desire for control, sense of control and obsessive-compulsive symptoms. *Cognitive Therapy and Research*. *31*, 759-772.

Moulding, R., & Kyrios, M. (2006). Anxiety disorders and control related beliefs: the exemplar of obsessive-compulsive disorder (OCD). *Clinical Psychology Review, 26,* 573-583.

ID ___

CONSENT FORM TO PARTICIPATE IN RESEARCH

As you have just been informed, the use of deceptive information was essential in this study in order to determine how components of one's sense of control over a threat inhibits or provokes an urge to engage in repeated washing behaviour.

By signing below you indicate that you have been informed of this minor deception and allow us to include your results in our analyses.

Signature _____

Witness _____

Date _____

If you have any questions concerning this study, please feel free to ask the researcher or call the lab at 848-2424, ext. 5965.

A. Radomsky, Ph.D., Associate Professor

Laurie Gelfand, M.A., Graduate Student