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Intolerance of Uncertainty Mediates the Effect of Responsibility Beliefs on Compulsive
Checking.

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Abstract

Both responsibility beliefs and intolerance of uncertainty have been implicated in compulsive checking behavior. Despite this, the exact relationship of these two variables with compulsive checking behavior is yet to be determined. Using a mixed sample of individuals consisting of compulsive checkers as well as non-clinical participants, we assessed the validity of a mediation model in which the relationship between responsibility beliefs and compulsive checking was mediated by intolerance of uncertainty. Although both responsibility beliefs and intolerance of uncertainty were correlated with the frequency of compulsive checking, the relationship between responsibility and checking was fully mediated by intolerance of uncertainty. Implications for the understanding of the relationship between these constructs, as well for conceptualisation of clinical checking problems are discussed.

KEYWORDS: Obsessive Compulsive Disorder, Compulsive Checking, Responsibility, Intolerance of Uncertainty.

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1.0 Introduction

Obsessive Compulsive Disorder (OCD) is an anxiety disorder characterised by persistent thoughts, impulses or images (obsessions) that cause marked anxiety or distress, and actions such as repetitive behaviour and/or mental acts (compulsions) that are used to suppress the obsessions and provide relief from the distress brought on by them (American Psychiatric Association, 2000; Szechtman & Woody, 2004). OCD is a prevalent and costly condition (Leon, Portera, & Weissman, 1995; Weismann et al., 1994) that causes significant functional impairment (de Silva, 2003), and reduced quality of life (Koran, Thienemann, & Davenport, 1996; Skoog & Skoog, 1999). Research has shown that checking compulsions are the most common compulsion among individuals with OCD (Rachman, 2003), observed in more than 80% of clinical presentations (Ball, Baer, & Otto, 1996; Rasmussen & Tsuang, 1986; Summerfeldt, Antony, Downie, Richter, & Swinson, 1997).

Despite increasing research interest (Boschen, 2008), and although treatments with demonstrated efficacy for OCD such as cognitive behaviour therapy and antidepressants are now established, many patients remain inadequately treated (Boschen, Drummond, & Pillay, 2008; Fisher & Wells, 2005; Jacobson, Roberts, Berns, & McGlinchey, 1999; Mataix-Cols & Marks, 2006). Research findings (e.g., Fisher & Wells, 2005; Jacobson et al., 1999) have demonstrated that although the majority of patients make advances over the course of treatment, a large proportion are left with significant residual symptoms, while some show no improvement at all by the end of treatment (Fisher & Wells, 2005; Boschen et al., 2008). As such, there remains considerable room for improvements in the understanding and treatment of this disorder (Abramowitz, Khandker, Nelson, Deacon, & Rygwall, 2006).

While a range of etiological theories of OCD have been proposed, there is a need for greater understanding of psychopathological processes and more extensive empirical evaluation (Frost & Steketee, 2002; Jakes, 1996). Among the more promising lines of research in this area are the cognitive behavioural models of OCD (Frost & Steketee, 2002). The relative influence of individual belief-domains on the pathogenesis of OCD is, however, an ongoing debate (Calamari et al., 2006; Cogle, Lee, & Salkovskis, 2007; Myers, Fisher, & Wells, 2008). Whereas some models (e.g., Wells, 1997, 2000; Wells & Matthews, 1994) focus on meta-cognitive beliefs such as the power and importance of thoughts and the need to perform rituals to control thoughts and avert perceived danger, others (e.g., Salkovskis, 1985; Salkovskis et al., 2000) centre around the importance of responsibility appraisals.

Based on the latter approach, Rachman (2002) developed a detailed theoretical formulation of compulsive checking, including hypothesised consequences and perpetuating factors. Rachman suggests that OC checkers' repetitive behaviour may in part be due to an inflated sense of responsibility to prevent future harm. It is proposed that normal intrusive thoughts, images, and impulses lead to disturbance when they are particularly salient for the individual, and are associated with negative automatic thoughts and discomfort about being responsible for danger or harm to others or the self. Accordingly, it is suggested that checking rituals are attempts to neutralise the discomfort of perceived responsibility. Paradoxically however, these attempts to ensure safety seemingly produce adverse affects that turn the checking behaviour into a self-perpetuating mechanism (Rachman, 2002, 2003; van den Hout & Kindt, 2003b; Boschen & Vuksanovic, 2007).

The idea that appraisals of responsibility play an important role in compulsive checking behaviour is supported by a considerable body of psychometric and experimental evidence drawn from both clinical and non-clinical populations (e.g., Arntz, Voncken, & Goosen, 2007; Boschen & Vuksanovic, 2007; Lopatka & Rachman, 1995; Moritz et al.,

2007; Moulding, Kyrios, & Doron, 2007; Rachman, Thordarson, Shafran, & Woody, 1995; Salkovskis, 1985). However, Wells (1997) argues that the observed influence of responsibility appraisals on OC symptoms is only a derivative of meta-cognitions that in isolation has little or no explanatory effect. In support of Wells' argument, several studies (e.g., Gwilliam, Wells, & Cartwright-Hatton, 2004; Myers et al., 2008; Myers & Wells, 2005; Tolin, Woods, & Abamowitz, 2003) have shown that while meta-cognitions uniquely predict OC symptoms, responsibility beliefs fail to do so when other belief domains are controlled for.

Historically, individuals presenting with OCD have also been described as both extremely doubtful, and as having decision-making difficulties (de Silva, 2003). This idea is supported by a growing body of converging evidence that associates OCD symptoms with an elevated experience of doubt in the individual's memory (e.g., Coles, Radomsky, & Horng, 2006 ; Dar, 2004; MacDonald, Anthony, MacLeod, & Richter, 1997; Radomsky, Gilchrist, & Dussault, 2006; Radomsky, Rachman, & David, 2001; Tolin et al., 2001; Tuna, Tekcan, & Topcuoglu, 2005; van den Hout & Kindt, 2003b, 2004). Moreover, it is generally agreed that compulsive checking actually augments doubt in normal as well as clinical populations (e.g., Boschen & Vuksanovic, 2007; Coles et al., 2006 ; Radomsky et al., 2006; van den Hout & Kindt, 2003a). Research has also suggested that negative appraisal and low tolerance to the experience of doubt are central constituents of OCD symptomatology (Carr, 1974; Guidano & Liotti, 1983; Kozak, Foa, & McCarthy, 1987; Rasmussen & Eisen, 1989). More recent studies have shown that this is particularly the case with compulsive checkers (Buhr & Dugas, 2006; de Silva, 2003; Holaway, Heimberg, & Coles, 2006; Rachman, 2003). The experience of doubt and indecision as an adverse condition has generally been referred to as *Intolerance of Uncertainty* (IOU; Buhr & Dugas, 2006; Frost & Steketee, 2002; Holaway et al., 2006).

Steketee, Frost, and Cohen (1998) found IOU to be the only construct (compared to responsibility, control, threat estimation, tolerance for anxiety, and coping) that could effectively predict OCD symptoms after controlling for mood and worry. In a later study, Tolin, Abramowitz, Brigidi, and Foa (2003) administered the Intolerance of Uncertainty Scale to 55 clinical patients with OCD (43 of whom had checking compulsions) and 14 non-anxious controls. They found that compulsive checkers displayed greater IOU than both OCD non-checkers and non-anxious controls (the latter two groups did not differ from each other). Moreover, both repeating and checking rituals were associated with IOU.

Both the cognitive (e.g., Rachman, 2002; Salkovskis et al., 2000) and meta-cognitive (e.g., Wells, 1997, 2000) models of compulsive checking assert that the appraisal of obsessive thoughts is essential to the development of compulsive symptoms. However, they differ in regards to the content of such appraisals. Whereas an inflated sense of responsibility to prevent harm is central to the cognitive model (Rachman, 2002; Salkovskis et al., 2000), the meta-cognitive model suggests that responsibility beliefs are a side-effect of meta-cognitions rather than a unique contributor to OCD symptoms (Gwilliam et al., 2004; Wells, 1997). As discussed previously, both these models have been supported through empirical investigations demonstrating strong relationships between responsibility appraisals, doubt-related constructs, and compulsive checking.

In order to advance OCD conceptualisation, research, and treatment practice, it is also important to move beyond the basic question of whether “variable *X* predicts or causes variable *Y*”. Questions such as “how or why does an inflated sense of responsibility and doubt predict or cause checking behaviour?” remain largely unanswered (de Silva, 2003; Frazier, Tix, & Barron, 2004; Frost & Steketee, 2002). Some clarity to these issues may be achieved by investigating potential mediator effects (Frazier et al., 2004), where a predictor

influences an outcome variable through its action on an third mediator variable (Baron & Kenny, 1986).

If compulsive checkers experience an inflated sense of responsibility, and additionally find doubt particularly aversive and less tolerable, it is reasonable to assume that such individuals would be particularly prone to engage in compulsive rituals as a means to restore certainty and reduce perceived responsibility for harm (Tolin, Abramowitz et al., 2003). Thus, the aim of the present study is to assess whether intolerance of uncertainty mediates the relationship between responsibility appraisals and compulsive checking. Similar results have been found by previous authors. Pleva & Wade (2006), for example demonstrated that perfectionism partially mediated the impact of responsibility beliefs on obsessive compulsive symptoms, as measured by the Maudsley Obsessive Compulsive Inventory (MOCI). As mentioned above, other authors such as Gwillian et al. (2004) have also reported that responsibility perceptions did not make significant contributions to OCD symptoms once meta-cognitive variables are controlled.

We hypothesised that the relationship between responsibility attitudes and the frequency of compulsive checking behaviour would be significant, as found by previous authors. We also, however, predicted that this relationship would be fully mediated by an individual's intolerance of uncertainty. Such a mediated relationship would suggest that an individual's sense of responsibility would only be associated with checking behaviour in the case that they found the experience of doubt and uncertainty intolerable.

2.0 Method

2.1 Participants

One hundred and sixty three participants were enlisted from the southeast region of Queensland, Australia: a clinical sample comprised of 21 individuals presenting with OCD symptoms (6 females, 14 males, 1 unrecorded; age range = 16 to 62 years [$M = 35.40$, $SD =$

15.46]), while a normative group consisted of 143 undergraduate psychology students (110 females, 33 males; age range = 16 to 47 years [$M = 20.31$, $SD = 5.40$]). Undergraduate students were awarded partial course credit for their participation. The clinical sample was recruited from local OCD support groups, a private psychology practice, and the university student body. Participation was voluntary, and did not impact any past, present or future treatment or education arrangements.

2.2 Measures

2.2.1 Obsessive-Compulsive Inventory (OCI; Foa, Kozak, Salkovskis, Coles, & Amir, 1998). OC checking frequency was assessed with the Checking Frequency subscale of the OCI. The OCI is a 42-item self-report measure designed to assess obsessional thoughts and behaviours in both clinical and non-clinical populations. Full scale and subscales have shown good internal consistency with reported Chronbach's alpha coefficients ranging from .86 to .95 (Foa et al.). The internal consistency for the full scale and the subscales for the current study ranged from .94 to .97. The scale has also demonstrated good convergent, content, and discriminant validity (Foa et al.).

2.2.2 Responsibility Attitude Scale. (RAS; Salkovskis et al., 2000). Responsibility appraisals were assessed using the RAS. The RAS is a 26-item questionnaire designed to assess general beliefs about responsibility. Reported reliability and internal consistency of the scale are good with test-retest reliability of .94 and Cronbach's alpha of .90. The internal consistency of the RAS in the current study was .93. The RAS has also demonstrated good concurrent and criterion validity (Salkovskis et al.).

2.2.3 Intolerance of Uncertainty Scale. (IUS; Freeston, Rheume, Letarte, Dugas, & Ladouceur, 1994). Intolerance of uncertainty was assessed with the IUS. The IUS is a 27-item self-report measure tapping into emotional, cognitive and behavioral reactions to ambiguous situations, implications of being uncertain, and attempts to control the future

(Freeston et al.). The IUS has demonstrated excellent internal consistency ($\alpha = .94$), good test–retest reliability, and convergent and divergent validity (Buhr & Dugas, 2002). The internal consistency of the IUS in the current study was .95.

2.3 Procedure

Participants were provided with questionnaire-batteries, with every second questionnaire package reverse ordered. Participants also supplied demographic information and provided informed consent before completing the questionnaire. Non-clinical participants completed the questionnaire in a quiet area under the supervision of either the researcher or academic staff member. Clinical participants were assessed by a postgraduate clinical psychology intern, under the supervision of an experienced clinical psychologist specialising in the treatment of OCD.

2.4 Initial Data Cleaning, Preparation and Statistical Analyses

There were no issues regarding the amount or distribution of missing data. The normality of the distributions for all variables was examined prior to the analyses, and where necessary, transformed variables were used to make distributions approach normality. Both the IUS total score and the OCI checking frequency scale were transformed using square root transformations. These transformed variables were used for all analyses.

The hypothesised mediation was assessed with a series of standard and hierarchical linear regressions following the method developed by Kenny and colleagues (Baron & Kenny, 1986; Frazier et al., 2004; Judd & Kenny, 1981) for testing mediation effects in psychological research. Responsibility (as measured by the RAS total score) served as the predictor, checking (as measured by the OCI frequency of checking subscale score) as the criterion, and intolerance of uncertainty (as measured by the IUS total score) as the mediator. The assumptions of linearity, homoscedasticity, independence of the residuals, and normality were met for each of these variables.

According to Kenny and colleagues (Baron & Kenny, 1986; Frazier et al., 2004; Judd & Kenny, 1981), there are four steps in establishing that a variable mediates the relation between a predictor variable and an outcome variable. The first step is to demonstrate a significant relation between the predictor and the outcome variable (Path c in Figure 1). The second step is to show that the predictor is related to the mediator (Path a in Figure 1). The third step is to show that the mediator is related to the outcome variable (Path b in Figure 1). The final step is to demonstrate a significant reduction in the strength of the relation between the predictor and the outcome variable when the mediator is added to the model (the difference between Path c and Path c' in Figure 1). *Complete mediation* is indicated if the relation between the predictor and the outcome variable is reduced to zero (i.e., the relation between the predictor and the outcome variable is no longer significant after controlling for the mediator). If the reduction is significant but still greater than zero (the relation between the predictor and the outcome variable is still significant after controlling for the mediator), *partial mediation* is indicated (Frazier et al., 2004). The significance of the reduction in the strength of the relationship between the predictor and the outcome variable in the current study was calculated using the Sobel formula provided by Baron and Kenny (1986). This is generally considered the most appropriate means of testing the significance of the reduction in the strength of the relationship between the predictor and the outcome variables (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002).

3.0 Results

Descriptive statistics are presented in Table 1. Linear regression analyses revealed that responsibility scores significantly predicted checking scores, (R^2 change = .076, $p < .001$; Step 1, Path c in Figure 1), that responsibility scores significantly predicted intolerance of uncertainty scores (R^2 change = .20, $p < .001$; Step 2, Path a in Figure 1), that intolerance of

uncertainty scores significantly predicted checking scores (R^2 change = .119, $p < .001$; Step 3, Path b in Figure 1) and finally, that the variance in checking scores accounted for by the responsibility scores was significantly reduced (from 7.6% to 1.8%) after controlling for intolerance of uncertainty (*Aroian statistic* = -3.66, $p < .0001$). Complete mediation was indicated as the relation between responsibility and checking was no longer significant after controlling for intolerance of uncertainty (R^2 change = .196, $p > .05$; Step 4, Path c' in Figure 1). The standardised regression coefficients obtained from these analyses are superimposed for each pathway in Figure 1. Table 2 presents a summary of the regression analyses conducted to assess the mediation.

4.0 Discussion

We predicted that while responsibility attitudes would be correlated with frequency of self-reported checking behaviour, this relationship would be fully mediated by intolerance of uncertainty. Our findings in our sample supported this hypothesis. These results suggest that while beliefs about responsibility for harm may promote checking, they do so by making uncertainty a more aversive, uncomfortable experience. It is the aversive experience of doubt which then, in turn, leads to checking behaviour. For example, if an individual holds beliefs about their responsibility in ensuring all windows and doors to the family home are locked before retiring of an evening, then this will make any uncertainty about the status of the doors and windows particularly aversive. In turn, this exacerbated sensitivity to doubt would lead to an increased need to check (and recheck) the locks.

The finding that responsibility beliefs promote checking only through their impact on a mediating variable has been observed by previous authors. Pleva & Wade (2006), for example, reported that the effect of responsibility attitudes on obsessive compulsive symptoms was partially mediated by perfectionism. Gwilliam et al. (2004) also reported that

the relationship between responsibility beliefs and obsessive compulsive symptoms was accounted for by the mediation of meta-cognitive variables. Taken together, our findings add support to previous research which attests to the primacy of meta-cognitive beliefs in determining obsessive-compulsive symptoms.

Our results have implications for the treatment of obsessive compulsive disorder, particularly compulsive checking. Cognitive strategies aimed at restructuring responsibility beliefs are commonly used in the treatment of OCD. Our results suggest that cognitive therapy methods targeting a person's ability to manage and tolerate uncertainty are also likely to be useful. In cases where cognitive restructuring of responsibility beliefs is unsuccessful, the effects of these beliefs may be manageable through addressing intolerance of uncertainty. Where an individual maintains strong beliefs about responsibility for harm to themselves and others, this may not lead to checking behaviour where the person can accept a similar degree of uncertainty as non-compulsive individuals.

Our results also have implications for current theoretical models of compulsive checking behaviour. Responsibility, intolerance of uncertainty, memory confidence, and other cognitive and meta-cognitive constructs all form part of a complex constellation of cognitive phenomena that are considered important in the understanding of compulsive behaviour. Despite this, the relative importance, and interactions between these constructs remains poorly understood. Our results demonstrate that rather than each of these phenomena playing independent roles in the genesis of compulsive behaviour, some may act in series, with the ability of one domain to influence compulsions being controlled by its influence on another intervening variable. Furthermore, our results demonstrate the importance of considering mediated relationships between cognitive constructs and compulsive symptoms.

The reader should be mindful of several limitations in interpreting our results. Firstly, our findings are based exclusively on self-report measures, including retrospective reports of the perceived frequency of checking behaviour. Secondly, our sample consisted primarily of non-clinical participants. Future research would benefit from testing the current model and other mediation pathways with individuals with OCD.

In conclusion, our results add to a growing body of knowledge concerning the impact of different cognitive constructs in obsessive compulsive disorder. Sensitivity to doubt, or intolerance of uncertainty, appears to be an important construct, not only in understanding obsessive compulsive symptoms, but also in understanding the mechanism by which responsibility beliefs exert their influence.

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Table 1

Descriptive Statistics of Transformed Variables

Variable	Mean	Standard Deviation
OCI Total Frequency Score	0.82	0.31
OCI Total Distress Score	0.82	0.31
OCD Checking Frequency	0.77	0.39
RAS Total Score	4.23	1.05
IUS Total Score	7.31	1.13

Table 2

Summary of Regressions for Mediation Testing

Path	<i>B</i>	<i>SE B</i>	β
<i>Step 1</i>			
Path c	-0.10	0.03	-0.28**
<i>Step 2</i>			
Path a	-0.48	0.08	-0.44**
<i>Step 3</i>			
Path b	-0.12	0.03	0.35**
<i>Step 4</i>			
Path c'	-0.06	0.03	-0.15

Note. ** $p < 0.001$

Figure Caption

Figure 1. Diagram of mediated model. Standardized regression coefficients are superimposed for each path.