

AVERSIVE INTRUSIVE THOUGHTS AS CONTRIBUTORS TO INFLATED RESPONSIBILITY,
INTOLERANCE OF UNCERTAINTY, AND THOUGHT-ACTION FUSION

Graham C. L. Davey, Frances Meeten, Georgina Barnes and Suzanne R. Dash

Abstract

Three constructs considered to be important primary beliefs in the pathogenesis of OCD are inflated responsibility, intolerance of uncertainty and thought-action fusion. While there is evidence suggesting that these beliefs/appraisals can influence OCD symptoms, we conducted two experiments to determine whether manipulating aversive intrusive thoughts would conversely affect measures of these constructs. Using procedures in which nonclinical samples were asked to mentally rehearse either OCD-relevant aversive statements or neutral statements, Experiment 1 found that participants rehearsing aversive statements generated higher scores on measures of responsibility and thought-action fusion than a control condition. Experiment 2 found that rehearsing aversive statements raised scores on measures of responsibility, intolerance of uncertainty and thought-action fusion, but only when rehearsal was self-referent. Rehearsing aversive statements significantly increased measures of negative mood, and mediational analyses suggested that the present findings could be explained either by increases in some measures of negative mood mediating the observed increases in appraisal ratings or alternatively, increases in some appraisal ratings increasing negative mood. These findings indicate that experiencing frequent, uncontrollable aversive intrusive thoughts of an egodystonic nature may activate OCD-relevant appraisal processes representing causal factors for symptoms, and directly tackling these thoughts in psychological interventions may be a significant contributor to alleviating anxiety symptoms.

Key words: OCD, intrusive thoughts, appraisal processes, responsibility, intolerance of uncertainty, thought-action fusion

Declaration of interest: none

Graham C. L. Davey¹, Frances Meeten¹, Georgina Barnes¹ & Suzanne R. Dash¹

¹School of Psychology, University of Sussex, Brighton, UK

Corresponding author

Graham C L Davey, Ph.D.,

School of Psychology, University of Sussex, Brighton BN1 9QH (UK)

Phone: +44 1273 678485

E-mail: grahamda@sussex.ac.uk

1. Introduction

Obsessive thoughts are one of the defining features of OCD diagnosis in which “recurrent and persistent thoughts, impulses, or images are experienced... as intrusive and inappropriate and cause marked anxiety or distress” (DSM-IV-TR 2000). However, intrusive and obsessive thoughts are commonly found in both nonclinical and clinical populations, and endorsement rates for obsessive intrusive thoughts in nonclinical populations have ranged from 74% to 99% (Belloch, Morillo, Lucero, Cabedo & Carrio 2004; Langlois, Freeston, & Ladouceur 2000; Purdon & Clark 1993), implying that obsessive intrusive thoughts may lie on a continuum spanning both clinical and nonclinical populations (Clark & Rhyno 2005; Rachman & de Silva 1978).

Over the past 20 years or so, cognitive models of OCD have attempted to develop constructs that capture thought patterns and beliefs associated with symptoms such as obsessions. Some of the more influential of these constructs include inflated responsibility (Salkovskis 1985; Rachman 2002), intolerance of uncertainty

(Birrell, Meares, Wilkinson & Freeston 2011; Steketee, Frost & Cohen 1998), and thought-action fusion (Shafran & Rachman 2004). These three constructs were considered as important primary beliefs and appraisals involved in the pathogenesis of obsessions and compulsions by the Obsessive Compulsive Cognitions Working Group (OCCWG 2001, 2003), and are sub-scales (Responsibility, Tolerance for Uncertainty, Importance of Thoughts) in the OBQ-87 cognitive-behavioural measure of OCD developed by that Group. *Inflated responsibility* (IR) is defined as the belief that one has the power to bring about or prevent subjectively crucial negative outcomes (Rachman 1998; Salkovskis 1985); *Intolerance of uncertainty* (IU) is defined as a “dispositional characteristic that arises from a set of negative beliefs about uncertainty and its connotations and consequences” (Birrell et al. 2011, p. 1200) and is underpinned by beliefs such as ‘uncertainty is dangerous/intolerable’ (Koerner & Dugas 2006); *Thought action fusion* (TAF) is defined as a set of cognitive distortions involving erroneous and maladaptive beliefs about the relationship between mental events and overt behavior, and specifically that

thinking unacceptable thoughts (e.g. having sex with a parent; thinking about one's house burning down) are either moral equivalents of performing unacceptable behaviour or will increase the probability of that event happening (Berle & Starcevic 2005; Shafran et al. 1996). These three appraisal processes were also chosen for study because of their central relevance in a number of influential theories of the acquisition and maintenance of OCD symptoms (Salkovskis 1985; Rachman 1997, 2002; Safran & Rachman 2004; Steketee, Frost & Cohen 1998; Solem, Myers, Fisher, Vogel & Wells 2010).

The three appraisal processes described above have been found to predict the frequency and distress associated with obsessive thoughts (Barrera & Norton 2011; Belloch et al. 2004; Belloch, Morillo & Garcia-Soriano 2007; Rowa & Purdon 2005). Insight into clinical constructs such as IR, IU and TAF has been provided by experimental psychopathology studies that have attempted to manipulate these constructs under controlled conditions and observe the effect of this on symptom levels. Where symptoms change in a predicted way dependent on manipulation of the construct, some form of causal relationship between construct and symptom can be inferred, and some support for the psychological processes theoretically implied in the construct is indicated. For example, studies manipulating IR have found corresponding direct effects on checking behaviour, urges to neutralize and discomfort and doubting (Arntz, Voncken & Goosen 2007; Bouchard, Rhéaume & Ladouceur 1999; Ladouceur, Rhéaume & Aublet 1997; Ladouceur, Rhéaume, Freeston, Aublet et al. 1995; Lopatka & Rachman 1995; MacDonald & Davey 2005; Mancini, D'Olimpio & Cieri 2004; Shafran 1997). Experimental manipulations of IU have almost entirely investigated its effects on measures of worrying rather than obsessions or compulsions (Grenier & Ladouceur 2004; Ladouceur, Gosselin & Dugas 2000; Rosen & Knauper 2009), but these studies do suggest that manipulating IU can have predicted effects on anxiety-related measures. Finally, experimental interventions that have either directly manipulated TAF beliefs or manipulated the significance of intrusive thoughts have found that reductions in TAF beliefs have beneficial effects on experienced negative affect and the desire to perform neutralizing activities (Clerkin & Teachman 2011; Rassin et al. 1999; Zucker et al. 2002).

In contrast to these studies investigating the effect of construct-relevant manipulations on OCD symptom frequency, we here describe the results of two studies designed to investigate the effects of mentally rehearsing obsessive thoughts on measures of OCD-relevant appraisal processes in a non-clinical population. Both experiments manipulated the degree to which participants mentally rehearsed aversive thoughts of the kind often reported by individuals with a diagnosis of OCD (e.g. "I will push someone under a bus or train") and we examined the effect of this on the three measures of clinical constructs described earlier, namely IR, IU, and TAF. These effects were compared with a control condition in which participants were asked to rehearse mainly neutral statements (e.g. "I will buy a drink from a shop"). Experiment 2 also manipulated the degree to which the mentally rehearsed thoughts were viewed as self-referent or non-self-referent. If regular intrusive thoughts are themselves a direct risk factor for OCD, then it was predicted that participants exposed to mental rehearsal of aversive obsessive statements would score higher than controls on post-experimental measures of appraisals associated with OCD. There

are a number of examples in the anxiety literature of bidirectionality between symptoms and their associated clinical constructs or mental states. For example, while experimental manipulation of 'doubting' causes increased compulsive behaviour such as checking (Tallis 1995), experimentally facilitating checking behaviour also increases 'doubting' (van den Hout & Kindt 2003; Tolin et al. 2001; Coles, Radomsky & Horng 2006; Ben & Kessler 2009; Radomsky & Alcolado 2010; Dek et al. 2010; Boschen & Vuksanovic 2007). Similarly, experimentally inducing negative mood facilitates reports of inflated beliefs about responsibility, but experimentally raising inflated responsibility beliefs increases self-reported negative mood (Britton 2011). In the case of GAD and its cardinal diagnostic symptom of worry - fear, anxiety and negative mood increase the tendency to worry (Buhr & Dugas 2009; Johnston & Davey 1997), but experimentally induced periods of worry also raise levels of anxiety (McLaughlin, Borkovec & Sibrava 2007). The present experiments represent an extension of these studies to examine whether OCD-relevant symptoms influence constructs and mental processes often considered to be contributors to symptoms.

2. Experiment 1

Because obsessive thoughts are commonly found in both nonclinical and clinical populations (Belloch et al. 2004; Purdon & Clark 1993), this raises the question of at what point such thoughts become distressing, and what factors act to maintain obsessive thought related distress in individuals with OCD (Berry & Laskey 2012). One factor that triggers distress is the theme of the thought. Nonclinical populations rate thoughts about harm, accidents, unacceptable sex, and contamination as most upsetting (Belloch et al. 2004; Rowa & Purdon 2005;) and these also tend to be the types of obsessive thought content regularly endorsed by clinical populations (Garcia-Soriano, Belloch, Morillo & Clark 2011; Rachman & de Silva 1978). A further factor facilitating thought-related distress is the apparent autogenous¹ or uncontrollable nature of the thought (Lee & Kwon 2003; Lee, Kwon, Kwon & Telch 2005), and autogenous thoughts are more frequently reported by patients with a diagnosis of OCD (Julien, O'Connor & Aardema 2009). In particular, factors deemed to be important in bestowing distress on obsessive intrusive thoughts are the appraisal processes discussed in the introduction. The constructs of IR, IU, and TAF have been found to predict the frequency and distress associated with obsessive thoughts (Barrera & Norton 2011; Belloch et al. 2004; Belloch et al. 2007; Rowa & Purdon 2005).

Although the literature indicates that appraisals relevant to the clinical constructs of IR, IU and TAF appear to be determinants of distress associated with frequency of OCD-related symptoms, it is less clear how merely experiencing obsessive intrusive thoughts might influence these appraisal processes. Experiment 1 was designed to manipulate the experience of obsessive intrusive thoughts and to determine the effect of this experience on measures of IR, IU and TAF. If appraisal processes relevant to OCD are themselves emergent properties of experiencing obsessive intrusive thoughts, we predicted that participants experiencing the high level of aversive obsessive statements would score higher on measures of OCD-related constructs such as IR, IU and TAF. In addition, to explore the role of negative affect

¹ A thought that seems to come 'out of the blue'

in any relationship between experimental group and appraisal measures, mediation analyses were performed with experimental group as the independent variable and either sad or anxious mood as mediators of IR, IU and TAF scores, or alternatively IR, IU and TAF scores as mediators of negative mood.

2.1 Method

2.1.2 Participants

The participants were 60 undergraduates and staff (43 women) from the University of Sussex. Ages ranged from 18-36 years ($M = 21.31$ $SD = 4.08$). All were volunteers and received a small sum of money as remuneration for their time. All participants were fluent or native English speakers to ensure understanding of task instructions.

2.1.3 Assessments

2.1.3.1 PRE-MANIPULATION BASELINE ASSESSMENTS

2.1.3.1.1 The Maudsley Obsessional-Compulsive Inventory (MOCI)

The MOCI (Hodgson & Rachman 1977) is a 30-item self-report instrument that measures obsessive-compulsive symptoms. Hodgson and Rachman (1978) reported Cronbach alpha coefficients of .7–.8, for the subscales, indicating good reliability and validity. In the current study for the MOCI total score, $\alpha = .72$.

2.1.3.1.2 The Hospital Anxiety & Depression Scale (HADS)

The HADS (Zigmond & Snaith 1983) is a 14 item self-report instrument measuring trait levels of anxiety and depression. Crawford, Henry, Crombie and Taylor (2001) reported Cronbach alphas of .82, .77 and .86 for the anxiety, depression and total subscales respectively. In the current sample for the depression and anxiety subscales and the HADS total score, $\alpha = .56$, .75, and .71 respectively.

2.1.3.1.3 Clark-Beck Obsessive Compulsive Inventory (CBOCI)

The CBOCI (Clark & Beck 2002) is a 25 item self-report instrument used to determine levels of obsessive-compulsive tendencies. Clark, Antony, Beck, Swinson and Steer (2005) reported Cronbach alphas (both scales) of .93 and .86 for a clinical and student population respectively. In the current sample for the obsession and compulsion subscale and the total scale, $\alpha = .72$, .71, .81 respectively.

2.1.3.1.4 Visual Analogue Scale (VAS) Mood Measures

Participants mark a cross along a 100mm line ranging from 0 (not at all sad, anxious, distressed, happy, or aroused.) to 100 (extremely sad/happy, etc.). VAS have demonstrated both validity and reliability in college students (Stern, Aruda, Hooper, Wolfner, & Morey 1997) and the general population (Nyenhuis, Stern, Yamamoto, Luchetta, & Arruda 1997).

2.1.3.2 OUTCOME MEASURES

2.1.3.2.1 The Responsibility Attitude Scale (RAS)

The RAS (Salkovskis et al. 2000) is a 26-item self-report scale measuring beliefs about responsibility. The RAS has good reliability and validity. Salkovskis et al. (2000) reported a Cronbach coefficient alpha of .92 and a test-retest reliability coefficient, over a period of three weeks, of .94. In the present study, for the whole sample, high obsession, and low obsession groups, $\alpha = .90$, .90, and .87 respectively.

2.1.3.2.2 The Intolerance of Uncertainty Scale (IUS)

The IUS (Freeston, Rhéaume, Letarte, Dugas, & Ladouceur 1994) is a 27-item self-report scale measuring reactions to ambiguous situations, implications of uncertainty, and attempts to control the future. Buhr & Dugas (2002) reported a Cronbach coefficient alpha of .94 and a test-retest reliability coefficient of .74 over a period of 5 weeks. In the present study, for the whole sample, high obsession, and low obsession groups, $\alpha = .92$, .93, .92 respectively.

2.1.3.2.3 Thought Fusion Instrument (TFI)

The TFI (Wells, Gwilliam & Cartwright-Hatton 2001) is a 14 item self-report scale which measures metacognitive beliefs about the meaning, danger, and consequences of intrusive thoughts. The TFI items constitute a single factor and the instrument has acceptable reliability. The authors reported a Cronbach alpha of .89 for the scale. In the present study, for the whole sample, high obsession, and low obsession groups, $\alpha = .83$, .85, .73 respectively.

2.1.3.2.4 VAS Construct Measures

Because validated measures of IR, IU and TAF have scales which may not be sensitive enough to register changes resulting from proximal experimental manipulations, four items were selected from the RAS, the IUS, and the TFI and converted into 100-point VAS scales where participants were asked to rate the extent with which they agreed with the statements. The items chosen reflect the core features of each of these constructs, and the four items for each scale were summed to create a composite VAS score for each construct. The items chosen for the RAS scale reflect the four 'factors' of responsibility described by Salkovskis et al. (2000). The four IUS items were based on the central tenets of IU as proposed by Buhr & Dugas (2002). The four TFI items were based on the core features of thought-action fusion described by Wells (1997). These VAS measures were administered directly after the experimental manipulations and have good sensitivity to short-term experimental manipulations (e.g. Grant et al. 1999; Reips & Funke 2008). The validity of each composite measure was assessed by analyzing correlations between the composite score and scores on the full measure, and by directly comparing the effects of the experimental manipulations on post-experimental scores for the full measures. VAS construct measures were used in addition to the longer full measures as they were considered to be more sensitive snapshot measures of typically stable constructs.

2.1.4 Procedure

Stage 1: *Questionnaire completion*. Participants were given an information sheet briefly outlining the experimental procedure. Participants completed a consent form, then the MOCI, HADS and CBOCI to control for trait levels of obsessive/compulsive tendencies and anxiety/depression.

Stage 2: *Mood measure 1*. Participants rated their current levels of sadness, anxiety, happiness and arousal on the VAS.

Stage 3: *Obsessive thought procedure*. Participants were randomly assigned to an experimental (28 obsessive statements) ($n = 30$) or control (4 obsessive and 24 neutral statements) ($n = 30$) condition. The obsessive statements were largely taken from a study of abnormal and normal obsessions by Rachman & DeSilva (1978), and all were representative of the kinds of obsessive intrusive thoughts experienced by individuals with a diagnosis of OCD (cf. Berry & Laskey 2012). Examples include; 'I will harm someone I love' and 'I will push someone under a bus or train'. The neutral statements were generated by changing words from comparable obsessive statements to make them neutral. Examples include; 'I will have my usual breakfast' and 'I will meet someone I know'. All participants were asked to imagine the statements were thoughts that they were having, thus rendering the statements self-referent. The statements were administered via a PowerPoint presentation on a computer screen at 15 seconds per slide. Each participant was given a sheet of paper and instructed to write down the sentences they read verbatim, to ensure they read and processed the statement.

Stage 4: *Mood measure 2*. Participants rated their current levels of distress and mood (sad etc.), on VAS scales ranging from 0-100.

Stage 5: *Composite measures of OCD relevant constructs*. Participants completed the series of VAS

2.2 Results

Baseline measure analysis

Participants were randomly allocated to the high or the low obsession group. Independent *t*-tests were performed on each baseline measure (HADS depression and anxiety subscales, CBOCI obsession and compulsion subscales, the MOCI total score, and baseline mood measures; see **table 1** for means and standard deviations) there were no significant differences between any of the groups on these measures (all $ps > .05$, except the HADS depression scores, with the high obsession group having significantly higher scores than the low, $t(58) = 2.34$, $p = .02$, $r = .29$). Thus, in order to control for any differences between the groups at baseline, mediation analyses were performed with baseline measures as mediators on each construct. Multiple mediation analysis was conducted using Preacher and Hayes' (2008) SPSS macro. Analyses indicated that none of the baseline measures (MOCI total, CBOCI obsession and compulsion subscales and HADS anxiety and depression subscales) significantly mediated the relationship between obsession group and outcome measures³.

Experimental outcome measures

MOOD AND DISTRESS

An independent sample *t*-test examined post obsessive thought procedure VAS mood and distress ratings for the high and low obsession groups (see **table 2** for means). The high obsession group was significantly more distressed, $t(58) = 3.68$, $p = .001$, $r = .44$, more sad, $t(58) = 3.45$, $p = .001$, $r = .41$, and less happy, $t(58) = 3.10$, $p = .003$, $r = .38$, than the low obsession group. There was no significant difference in levels of anxiety $t(58) = 1.71$, $p = .09$, $r = .22$, or arousal, $t(58) = 0.97$, $p = .34$, $r = .13$.

Table 1. Experiment 1 means for baseline measures and mood visual analogue scales (VAS; with standard deviations in parentheses)

Measure	Obsession group ($N = 30$)	Neutral group ($N = 30$)
MOCI total score	7.87 (3.97)	7.30 (4.14)
CBOCI obsession	11.5 (4.34)	9.57 (4.43)
CBOCI compulsion	7.27 (4.62)	6.40 (3.71)
HADS anxiety	7.50 (3.18)	6.97 (3.02)
HADS depression	3.83 (2.15)	2.57 (2.05)
VAS sadness	20.27 (19.06)	16.21 (16.38)
VAS anxiety	23.13 (24.28)	29.24 (24.41)
VAS happiness	64.47 (18.97)	65.45 (17.46)
VAS arousal	46.13 (28.54)	53.93 (21.50)

measuring constructs relating to OCD (IR, IU, TAF) ranging from 0 (e.g. not at all responsible) to 100 (e.g. extremely responsible).

Stage 6: *Full construct scales*. Participants completed the full questionnaires for IR (RAS) IU (IUS) and TAF (TFI).

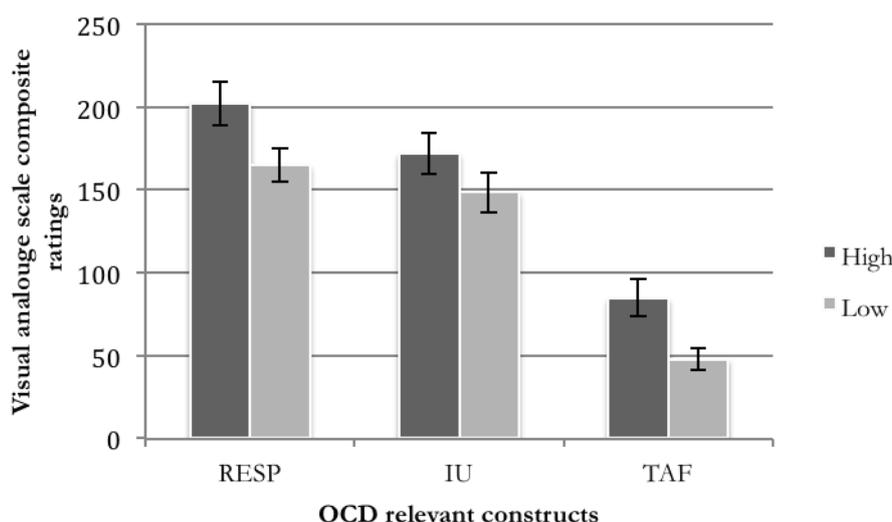
Stage 7: Debrief and thanks

² In the following statistical tests, unless indicated, the assumptions of homogeneity of variance and sphericity have been met and tests are two-tailed. Effect sizes are reported using Pearson's correlation coefficient r , or partial eta squared, η_p^2 . Using Cohen's (1988) criteria, a small effect size is reflected by an r of .1, medium by .3, and large by .5. Using partial eta squared, a small effect size is reflected by a measure of .01, medium by .06, and large by .14 (Stevens 2002).

³ Coefficients are not presented as no significant mediations were found.

Table 2. Experiment 1 means for post induction (PI) mood and distress and disturbance visual analogue scales (VAS; with standard deviations in parentheses)

MEASURE	High obsession group (N=30)	Low obsession group (N=30)
PI Sadness	39.23 (23.23)	19.97 (19.96)
PI Anxiety	42.40 (26.78)	31.07 (24.48)
PI Happiness	41.50 (24.54)	60.10 (22.00)
PI Arousal	51.50 (26.08)	57.77 (23.78)
PI Distress	47.57 (27.37)	24.57 (20.61)

Figure 1. Experiment 1 error bar graph showing mean composite ratings of constructs by the high obsession and low obsession experimental groups on composite ratings of responsibility (RESP), IU (IU) and, TAF (TAF)

COMPOSITE MEASURES⁴

Independent t-tests were performed on composite measures of OCD referent constructs (IR, IU, and TAF); see **figure 1** for mean composite ratings. Participants in the high obsession group scored significantly higher than the low obsession group on the composite measures of IR (RESP), $t(58) = 2.24$, $p = .03$, $r = .28$, and TAF, $t(58) = 2.79$, $p = .007$, $r = .34$. Mean IU ratings were higher in the high than the low obsession group, but this difference was not statistically significant ($p = .19$).

QUESTIONNAIRE MEASURES

Independent t-tests were performed on the full questionnaire measures of the OCD relevant constructs; see **figure 2** for mean scores. The high obsession group scored significantly higher than the low obsession group on the RAS, $t(58) = 2.48$, $p = .02$, $r = .31$ and the TFI, $t(58) = 2.24$, $p = .03$, $r = .28$. There was no difference between the groups on the IUS ($p = .98$). Scores on the RAS in the high obsession group ($M = 4.28$, $SD = 0.82$) are comparable to obsessional and

anxious clinical samples, which have norm mean and standard deviations of 4.69 (1.01) and 4.00 (0.92) respectively with control participants norms at 3.48 (1.01) (Salkovskis et al. 2000). TFI scores in the obsession group ($M = 226.64$, $SD = 171.89$) were higher than control norms ($M = 125.81$, $SD = 148.18$), but not as high as clinical population norms ($M = 316.13$, $SD = 274.04$) (Solem, Myers, Fisher, Vogel, & Wells 2010). The IUS scores in both groups are slightly higher than student population norms, where means and standard deviations are 54.78 (17.44) (Buhr & Dugas 2002).

MEDIATIONAL ANALYSES

To explore the role of negative affect in the relationship between experimental group and OCD relevant outcome measures, mediation analyses were performed with experimental group (high/low obsession) as the independent variable (IV), sad or anxious mood⁵ and then distress ratings post obsession induction as potential mediators, and OCD construct measures (where effects of experimental group had previously been found) as the outcome measure (see **figure 3** for explanatory diagram). The mediation model was tested using Preacher and Hayes' (2008)

⁴ The responsibility composite ratings significantly correlated with the full RAS ($r = .66$, $p < .001$). The IU composite rating significantly correlated with the full IUS ($r = .67$, $p < .001$), and the TAF composite significantly correlated with the full TFI ($r = .72$, $p < .001$).

⁵ Sadness and anxiety could not be examined within the same model due to significant correlations between the two variables.

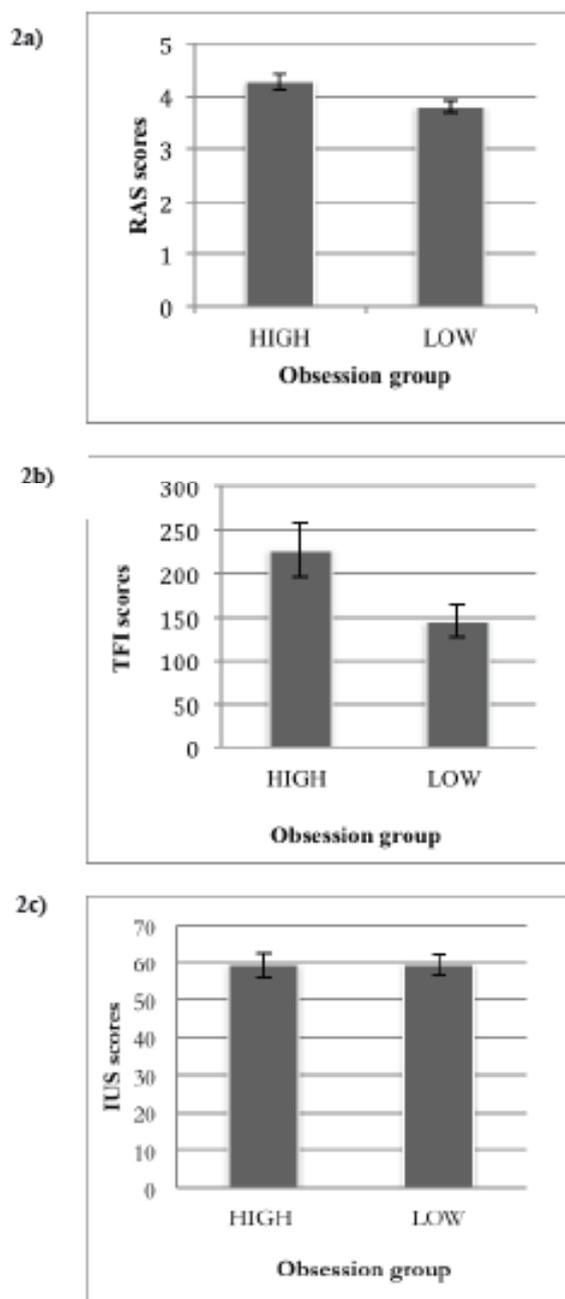


Figure 2. Experiment 1 error bar graphs showing mean questionnaire scores by the high obsession and low obsession experimental groups on a) the Responsibility Attitude Scale (RAS), b) the Thought Fusion Instrument (TFI) and c) the IU Scale (IUS)

macro. Looking at sad mood as a mediator of obsession group and responsibility composite, obsession group was significantly positively related to responsibility composite (the outcome, c weight = 37.17, $p = .03$) and to sadness ratings (the mediator, a weight = 19.27, $p = .001$). Sadness was significantly positively associated with responsibility when partialling out obsession group (b weight = 0.88, $p = .02$) and sadness was a significant positive mediator of obsession group and responsibility ($a \times b = 16.94$, 95% CI: [2.64, 43.79]). In summary, sadness ratings significantly mediated the relationship between obsession group and responsibility composite

ratings⁶. Sadness and anxiety were not mediators of any other outcome measures. Distress was not a significant mediator of experimental group and any of the outcome measures.

Consistent with the notion that the relationship between symptoms and constructs is not unidirectional, it is also likely that alternative mediation models than the one presented above can explain the relationship between symptoms, mood, and constructs. Based on this assumption and due to the fact that mediation models are not a test of causation, mediation analyses were also performed to explore the role of OCD relevant appraisals in the relationship between obsession group and negative mood (both sadness and anxiety; see **figure 4** for explanatory diagram). Multiple mediation analyses were not performed due to high collinearity between mediators. When each of the 3 OCD relevant constructs were assessed in separate mediation models, only responsibility (both composite and full questionnaire measures) was a significant mediator of the relationship between obsession group and sad mood ratings. For responsibility composite as a mediator, the experimental group was significantly positively related to sad mood (the outcome, c weight = 19.27, $p = .001$) and to responsibility composite ratings (a weight = 37.17, $p = .03$). Responsibility was significantly positively associated with sadness when partialling out obsession group (b weight = 0.1, $p = .02$) and responsibility was a significant positive mediator of obsession group and sadness ($a \times b = 3.72$, 95% CI: [0.19, 11.46]). A similar pattern was observed for the RAS questionnaire, it was a significant mediator between obsession group and sadness ($a \times b = 3.16$, 95% CI: [0.20, 8.63]). Similarly responsibility composite and RAS questionnaire scores were both significant mediators of the relationship between obsession group and anxiety scores (indirect effects were: $a \times b = 3.53$, 95% CI: [0.10, 10.95] and $a \times b = 4.64$, 95% CI: [0.96, 11.03] respectively).

In summary, mediational analyses suggested that the experimental effects resulting from obsession group could be the result either of negative mood (sadness) significantly mediating the relationship between obsession group and responsibility measures, or alternatively by responsibility measures mediating the effect of obsession group on negative mood.

2.3 Discussion

The results of **Experiment 1** indicate that the high obsessions manipulation resulted in significantly higher scores on both composite and full measures of the OCD referent constructs of IR and TAF (but not IU) when compared with the low obsessions manipulation. The high obsessions condition also resulted in significantly higher levels of self-reported sadness and distress, and lower levels of happiness.

These findings suggest that the appraisal processes represented by clinical constructs relevant to OCD may not just be predictors and causes of OCD symptoms such as clinically-relevant aversive obsessive thoughts (Barrera & Norton 2011; Belloch et al. 2004; Belloch et al. 2007; Rowa & Purdon 2005), but may also be emergent cognitive consequences of experiencing these obsessive intrusive thoughts.

Participants that experienced 28 obsessive statements

⁶ In line with recent literature (Rucker, Preacher, Tormala, & Petty 2011) the authors avoid the terms 'full' or 'partial' mediation, instead focusing on the size of the $a \times b$ indirect effect.

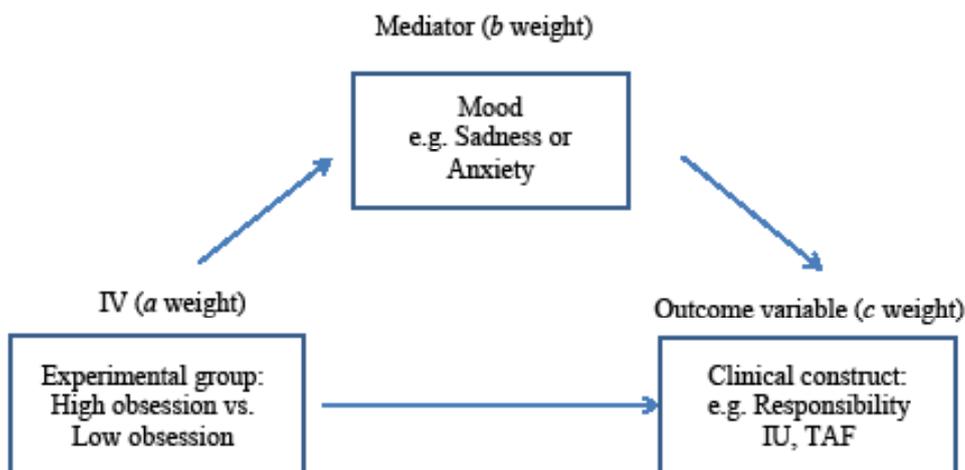


Figure 3. Mediation model examining the relationship between experimental group, mood, and clinical construct ratings

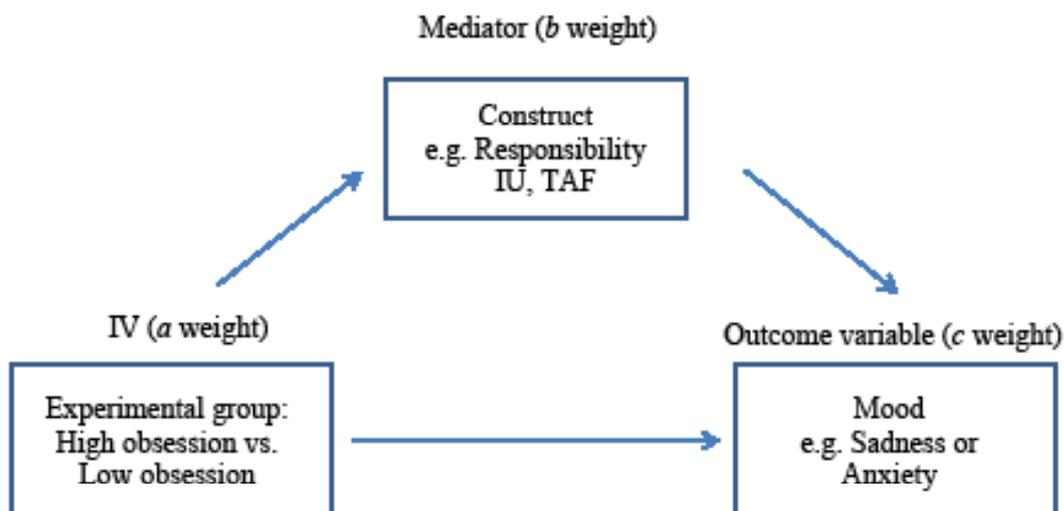


Figure 4. Mediation model examining the relationship between experimental group, clinical construct ratings, and mood

during the manipulation scored significantly higher on measures of responsibility, thought-action fusion, sadness, unhappiness, and distress than those who experienced only 4 obsessive statements, suggesting that frequency of occurrence of obsessive intrusive thoughts is an important direct determinant of changes in both mood and appraisal processes. Mediation analyses indicated that in the case of responsibility appraisals the effect of obsession group could be generated either through negative mood mediating appraisal measure or through changes in appraisal levels facilitating negative mood. Further studies will be required to differentiate between these two pathways.

The conditions under which participants experienced the high obsessions procedures were analogous to the conditions under which many individuals with a diagnosis of OCD may acquire their symptoms. Exposure to the statements was essentially uncontrollable, mimicking both the autogenous nature of obsessive thoughts in OCD (Belloch et al. 2007) and the lack of control over obsessive intrusive thoughts often reported by clinical populations (Purdon & Clark 1993; Rachman 1981). The statements were selected to represent the kinds of themes that both nonclinical and

clinical populations find most upsetting (Clark, Purdon & Byers 2000; Rowa & Purdon 2005). However, while participants in Experiment 1 were required to imagine that the obsessive statements they read were their own thoughts, it may not have been the self-referent nature of this activity that caused inflation of appraisal measures, but that reading the obsessive statements may have acted to semantically prime high levels of scoring to the questions on the various appraisal measures. For example, statements about harm appear during the experimental manipulation, but also appear in items in both the RAS and TFI. In order to more directly assess the role of the self-referent nature of the obsessive statements on appraisal measures, Experiment 2 attempts to replicate the findings of Experiment 1 but controlling for the self-referent or external-referent nature of the obsessive statement.

Experiment 2

Experiment 2 used an identical procedure to that described in Experiment 1 except that participants in the high and low obsessions conditions were each split into two further groups – a self-referent group who were asked to imagine it was themselves who were having

the thought, and a non-self-referent group who were asked to imagine someone else having the thought.

If it is the self-referent nature of the thought that is important in facilitating OCD-relevant appraisal processes, then we would predict that the high obsessions/self-referent group should score higher on post-manipulation appraisal measures than the remaining groups. This design will also determine whether mere exposure to a high frequency of obsessive statements is a cause of increased appraisal ratings. As in Experiment 1, the data was also subjected to a meditational analysis looking at two possible models. In the first model experimental group was the independent variable and either sad or anxious mood were mediators of IR, IU and TAF scores (see **figure 3**), or alternatively IR, IU and TAF scores were examined as mediators of the relationship between experimental group and negative mood (as demonstrated in **figure 4**).

Method

Participants

The participants were 60 undergraduates and staff (36 women) from the University of Sussex; all were fluent or native English speakers. Ages ranged from 18-34 years ($M = 21.3$, $SD = 2.09$). All volunteers were offered entry into a prize draw. None of the participants in Experiment 2 had taken part in Experiment 1.

Materials

The pre- and post-manipulation assessments and the experimental PowerPoint presentations were identical to those described in Experiment 1. For the MOCI (Hodgson & Rachman 1977), Cronbach's alpha for the present sample was .84. For the HADS (Zigmond & Snaith 1983), Cronbach's alpha for the anxiety and depression subscale, and the total scale was .81, .84, and .82 respectively. On the CBOCI (Clark & Beck 2002) Cronbach's alpha for the obsession, compulsion, and total scale were .85, .83, and .91 respectively.

Procedure

The procedure was identical to that described in Experiment 1, but with one addition. In Stage 3, half the participants were asked to imagine the statements are thoughts that they are having, thus rendering them self-referent (as Experiment 1) and half the participants are asked to imagine it is celebrity footballer David Beckham having these thoughts, thus rendering the statements non self-referent.

Results

Baseline measure analysis

One participant scored 2 or more standard deviations

Table 3. Experiment 2 means for baseline measures and mood visual analogue scales (VAS; with standard deviations in parentheses)

Measure	Obsession self referent (N=14)	Obsession non-self referent (N=15)	Neutral self referent (N=15)	Neutral non-self referent (N=15)
MOCI total score	6.92(6.28)	6.20(3.03)	5.33(3.18)	4.80(3.90)
CBOCI obsession	5.64(4.73)	6.60(5.23)	4.20(3.30)	7.20(5.28)
CBOCI compulsion	4.36(5.37)	3.87(3.29)	2.60(2.13)	5.33(4.47)
HADS anxiety	6.43(3.16)	4.47(3.94)	3.87(2.59)	4.93(3.36)
HADS depression	1.79(1.97)	0.73(0.80)	1.93(2.20)	1.47(1.36)
VAS sadness	15.93(14.10)	17.53(16.78)	20.53(19.33)	10.80(8.52)
VAS anxiety	25.12(23.75)	24.53(21.65)	25.47(21.87)	13.86(11.81)
VAS happiness	77.29(13.65)	70.73(15.58)	68.47(17.64)	72.46(10.62)
VAS arousal	58.07(27.88)	45.73(18.24)	48.27(24.47)	50.02(24.10)

Table 4. Experiment 2 means for post induction mood and distress and disturbance visual analogue scales (VAS; with standard deviations in parentheses)

Measure	Obsession self referent (N=14)	Obsession non-self referent (N=15)	Neutral self referent (N=15)	Neutral non-self referent (N=15)
VAS sadness	30.93(22.64)	30.93(18.69)	20.13(20.10)	14.00(10.17)
VAS anxiety	34.04(21.12)	31.40(18.79)	25.00(21.39)	17.67(12.55)
VAS happiness	66.86(12.55)	61.93(19.36)	64.80(16.91)	66.87(12.17)
VAS arousal	57.93(20.53)	49.20(18.16)	41.93(20.17)	50.67(18.50)
VAS distress	27.79(15.87)	26.13(14.79)	7.53(6.52)	8.20(10.17)

from the mean on more than 3 baseline measures, and was removed from the analysis (Field 2009).

Participants were randomly allocated to experimental groups. Prior to commencing the experimental task there were no significant differences between the four conditions on HADS measures of anxiety, $F(3,55) = 1.58, p = .21, \eta_p^2 = .08$ and depression, $F(3,55) = 1.65, p = .19, \eta_p^2 = .08$. No difference on the CBOCI obsession, $F(3,55) = 1.16, p = .33, \eta_p^2 = .06$, or compulsion $F(3,55) = 1.22, p = .31, \eta_p^2 = .06$ scales, no difference on the MOCI total score, $F(3,55) = .71, p = .55, \eta_p^2 = .04$, and no difference on any of the baseline mood measures (all $ps > .05$). See **table 3** for baseline means and standard deviations.

Experimental outcomes

Mood and distress

A 2 (high vs. low obsession) \times 2 (self referent vs. non self referent) independent ANOVA was performed on post-induction mood ratings and distress ratings (see **table 4**). There was a significant main effect of obsession group on sadness ratings, $F(1,55) = 8.35, p = .006, \eta_p^2 = .13$, those in the obsession group reported higher sadness ratings than the low obsession group. There was no main effect of self-reference and no interaction effect ($ps > .05$). On anxiety ratings there was a significant main effect of obsession group, $F(1,55) = 5.45, p = .02, \eta_p^2 = .09$, with higher ratings by the high obsession group. There was no main effect of self-reference and no interaction effect ($ps > .05$). There was no significant main effect of obsession group or self-reference group, or an interaction effect on happiness and arousal ratings ($ps > .05$). There was a significant main effect of obsession group on distress ratings, $F(1,55) = 35.25, p < .001, \eta_p^2 = .39$, with higher ratings in the high obsession group. There was no main effect of self-reference nor a significant interaction effect ($ps > .05$).

Composite measures⁷

A 2 (high vs. low obsession) \times 2 (self referent vs. non self referent) independent ANOVA was performed on OCD referent composite measures (see **figure 5**). For the IR (RESP) composite there was no significant main effect of obsession group, $F(1,55) = 2.98, p = .09, \eta_p^2 = .05$ and no significant main effect of self-reference, nor a significant interaction effect ($ps > .05$). For the IU composite there was a significant main effect of obsession group, $F(1,55) = 8.22, p = .004, \eta_p^2 = .13$; the high obsession group had higher IU ratings. There was no significant main effect of self-reference ($p > .05$) and a significant obsession \times reference interaction, $F(1,55) = 3.94, p = .05, \eta_p^2 = .07$. On the TAF measure there was a significant main effect of obsession group, $F(1,55) = 4.32, p = .04, \eta_p^2 = .07$, with higher TAF ratings in the high obsession group. There was a marginally significant main effect of self-reference, $F(1,55) = 3.83, p = .06, \eta_p^2 = .07$ (higher TAF ratings in the self-referent group) and no significant interaction effect ($p = .09$).

To examine the hypothesis that the high obsession/self referent group would score higher on OCD

⁷ As expected, the responsibility composite and the RAS scale were significantly correlated ($r = .72, p < .001$). The IU composite and IUS were significantly correlated ($r = .70, p < .001$). Finally the TAF composite and TFI were significantly correlated ($r = .37, p = .004$).

appraisal measures than the other experimental groups, planned contrasts were performed to follow-up each 2 \times 2 ANOVA. Contrast 1 examined the high obsession self referent (HO/SR) group vs. all other experimental groups, contrast 2 examined the high obsession non self referent (HO/NSR) vs. the two low obsession groups, and contrast 3 compared performance by the two low obsession groups (LO/SR vs. LO/NSR). For each outcome measure the same pattern of results was observed. There was a significant difference between the HO/SR group and all other experimental groups (IR composite: $t(55) = 2.32, p = .02, r = .30$, IU composite: $t(55) = 3.68, p = .001, r = .44$, TAF composite: $t(55) = 3.26, p = .002, r = .40$), no significant difference between the HO/NSR group and the low obsession groups (all $ps > .05$), and no difference between the LO/SR and LO/NSR groups (all $ps > .05$).

Questionnaire measures

As above, two-way independent ANOVAs were performed to assess the main effects and interaction effect of the obsession (high vs. low) and relevance (self vs. non-self referent) groups on questionnaires measuring the OCD and anxiety referent constructs (see **figure 6**). Looking first at the RAS (equal variances not assumed; Cronbach's alpha for the present sample by condition was HO/SR = .96, HO/NSR = .71, LO/SR = .92, LO/NSR = .64 and for the whole sample alpha was .84), there was no significant main effect of obsession group or self-relevance group ($ps > .05$) but a significant interaction effect, $F(1,55) = 9.12, p = .004, \eta_p^2 = .14$. For the IUS (equal variances not assumed; Cronbach's alpha for the present sample by condition was HO/SR = .95, HO/NSR = .82, LO/SR = .84, LO/NSR = .20 and for the whole sample was .65) there was a significant main effect of obsession group, $F(1,55) = 7.18, p = .01, \eta_p^2 = .16$ (the high obsession group gave significantly higher obsession ratings than the low), but no significant main effect of self-reference and no significant interaction effect ($ps > .05$). On the TFI (Cronbach's alpha for the present sample by condition were HO/SR = .75, HO/NSR = .82, LO/SR = .94, LO/NSR = .86 and for the whole sample was .85) there was no significant main effect of obsession group or self-reference group ($ps > .05$). There was a marginally significant interaction effect, $F(1,55) = 3.51, p = .06, \eta_p^2 = .06$.

As above, planned contrasts were used to explore the difference in performance between each experimental group. There was a significant difference between the HO/SR group and all other experimental groups on all three questionnaire measures (RAS: $t(55) = 2.60, p = .02, r = .33$, IUS: $t(55) = 2.59, p = .02, r = .33, r = .44$, TFI: $t(55) = 2.53, p = .01, r = .32$), no significant difference between the HO/NSR group and the low obsession groups ($ps > .05$) and no difference between the LO/SR and LO/NSR groups ($ps > .05$).

Scores on the RAS by the HO/SR group ($M = 3.90, SD = 1.05$) are comparable to obsessional and anxious clinical samples. Norms for these populations had mean and standard deviations of 4.69 (1.01) and 4.00 (0.92) respectively and control participants had a mean of 3.48 (1.01) (Salkovskis et al. 2000). TFI scores in the HO/SR ($M = 229.29, SD = 141.28$) are higher than control norms and standard deviations ($M = 125.81, SD = 148.18$), but not as high as a clinical population ($M = 316.13, SD = 274.04$) (Solem, Meyers, Fisher, Vogel, & Wells 2010). The IUS scores in the HO/SR group ($M = 64.07, SD = 20.53$) are comparable to a clinical population where norms of means and standard

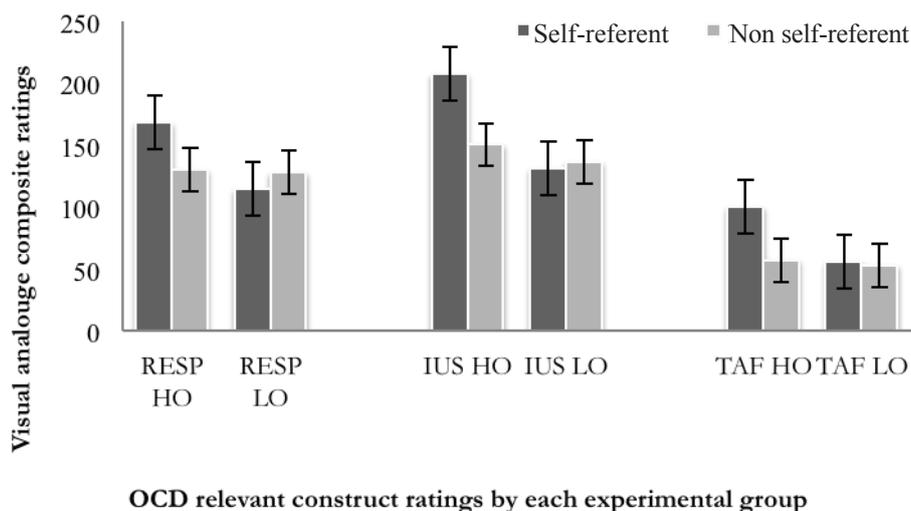


Figure 5. Experiment 2 error bar graph showing mean composite ratings of constructs of responsibility (RESP), IU (IUS), and TAF (TAF) by participants in the high obsession (HO) self referent/non self referent or low obsession (LO) self referent/non self referent experimental groups

deviations are 63.30 (14.8) and norms of a student population are 54.78 (17.44) (Buhr & Dugas 2002).

Mediational analyses

First, to explore the role of negative affect (sadness and anxiety ratings post induction) in the relationship between experimental group and OCD relevant outcome measures, mediation analyses were performed using Hayes and Preacher’s (2011) Mediate macro. The independent variables (IVs) of obsession (high vs. low) and relevance (non/self referent) were entered into the model and examined with either sad mood or anxious mood and then distress⁸ as the mediator on outcome measures where effects of the IVs on outcome measures

had already been found. Hayes and Preacher’s 2011 macro is suitable for testing mediation with multiple independent variables.

Sad and anxious mood were not significant mediators in any of the relationships between the referent (self vs. non-self referent) IV and outcome variables. Consequently, the IV of self-reference was removed from the model and the analysis re-run with obsession group (high vs. low) as the IV (coefficients in **table 5**). Looking at the responsibility composite measure, sadness significantly mediated the relationship between obsession group and IR composite. The same pattern of results were also found for anxiety ratings and anxiety but not sadness ratings were found to significantly mediate the relationship between obsession group and the RAS.

Table 5. Unstandardized coefficients when examining whether mood mediates the relationship between experimental group and OCD relevant constructs

Independent variable (IV)	Mediating variable (M)	Dependent variable (DV)	Effect of IV in M (a)	Effect of M on DV (b)	Direct effects (c')	Indirect effects (a × b)	Total effects (c)
Obsession (HO/ LO)	Sad ratings	Responsibility composite	13.86**	1.22**	10.34	16.87 ^a	27.22
Obsession (HO/ LO)	Anxiety ratings	Responsibility composite	11.36*	1.56***	9.48	17.73 ^a	27.22
Obsession (HO/ LO)	Anxiety	RAS	11.36**	.02*	.16	.18 ^a	.35
Obsession (HO/ LO)	Sad ratings	IUS	13.86**	.24*	7.18	3.39 ^a	10.56*
Obsession (HO/ LO)	Anxiety	IUS	11.36*	.23*	7.94	2.62 ^a	10.56*
Obsession (HO/ LO)	Sad ratings	TAF composite	13.86**	.74*	13.29	10.24 ^a	23.53
Obsession (HO/ LO)	Anxiety ratings	TAF composite	11.36*	.82*	14.24	9.29 ^a	23.53

*p <.05, **p <.01 ***p <.001, ^a Confidence intervals do not include zero

⁸All in separate models due to collinearity between variables.

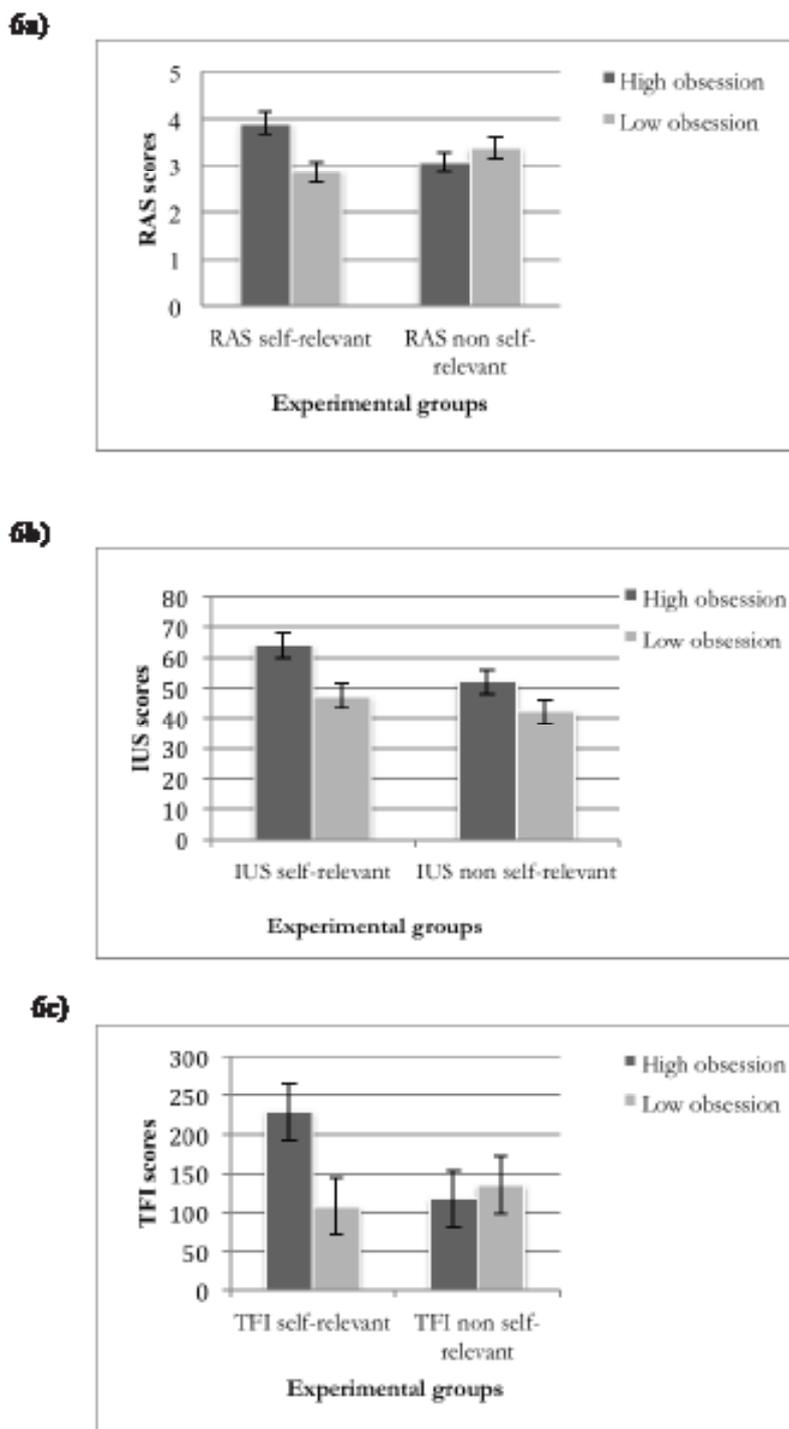


Figure 6. Experiment 2 error bar graphs showing mean questionnaire scores by experimental groups on a) the Responsibility Attitude Scale (RAS), b) the IU Scale (IUS), and c) the Thought Fusion Instrument (TFI)

The relationship between obsession group and IU composite scales was neither mediated by sadness nor anxiety ratings. However, the relationship between obsession group and the full IUS and the TAF composite was significantly mediated by both sadness and anxiety.

As in study 1, alternative mediation analyses were also performed to explore the role of OCD relevant appraisals in the relationship between obsession group and negative mood (both sadness and anxiety). The independent variables (IVs) of obsession (high vs. low) and relevance (non/self-referent) were entered

into the model and each of the 3 OCD relevant constructs were assessed in separate mediation models (both composite and full questionnaire measures, see **table 6**). Significant mediations were observed where the IU full scale significantly mediated the relationship between obsession group (but not self-referent group) and anxiety ratings. TAF composite measure also significantly mediated the relationship between obsession group (but not self-referent group) and sadness and the TAF composite significantly mediated the relationship between obsession group and self-referent group indirect effect and anxiety ratings.

Table 6. Unstandardized coefficients when examining whether OCD relevant appraisals mediate the relationship between experimental group and mood

Independent variable (IV)	Mediating variable (M)	Dependent variable (DV)	Effect of IV in M (a)	Effect of M on DV (b)	Direct effects (c')	Indirect effects (a × b)	Total effects (c)
Obsession (HO/LO)	IU full scale	Anxiety	2.85**	0.33*	8.20	4.00 ^a	12.20*
Obsession (HO/LO)	TAF composite	Sadness	28.50*	0.13**	11.40*	3.84 ^a	15.23**
Obsession (HO/LO)	TAF composite	Anxiety	28.50*	0.13**	8.50	3.71 ^a	12.20*
Self referent (SR/NSR)	TAF composite	Anxiety	27.10*	0.13**	0.80	3.52 ^a	4.43

* $p < .05$, ** $p < .01$, *** $p < .001$, ^aConfidence intervals do not include zero

Discussion

Experiment 2 found an effect of the high obsessions condition on IU and TAF, and in addition, participants in the high obsessions group who were asked to treat the statement as self-referent scored significantly higher on all construct measures (IR, IU and TAF) than participants who were asked to imagine the statement being thought by someone else. These latter findings suggest that the effects found in Experiment 2 could not be explained solely by semantic priming of statements on subsequent questionnaire items, but that the self-referent nature of the thought also significantly facilitates scores on OCD-relevant appraisal measures. This is additionally supported by the fact that participants in the high obsessions, non-self-referent condition did not score higher on any of the appraisal measures than both of the two neutral statements groups.

Mediation analyses also indicated that the effects of obsession group on outcome measures could either be the result of negative mood (sadness, anxiety) on appraisal measures (IR, IU and TAF), or changes in appraisal levels (IU, TAF) influencing mood measures (sadness, anxiety). However, neither mood measures nor appraisal measures significantly mediated the effects of self-referent vs. non-self-referent conditions, apart from TAF composite mediating the relationship between self-reference and anxiety.

General discussion

The two Experiments described in this paper indicate that exposure to a high frequency of aversive obsessive thoughts acts to increase scores on OCD-relevant construct measures, including measures of IR (Rachman 1998; Salkovskis 1985), IU (Birrell et al. 2011; Koerner & Dugas 2006), and TAF (Berle & Starcevic 2005; Shafran et al. 1996). These appraisal processes have been hypothesized to be central to the development of OCD and to elevate nonclinical intrusive thoughts to the level of clinically aversive ones (cf. OCCWG 2001, 2003; Berry & Laskey 2012), and the present results add to this analysis by indicating that such appraisals are processes that also emerge directly from the experience of obsessive intrusive thoughts. Whether the obsessive thought is also self-referent also had a significant effect on construct measures when compared with other experimental conditions. This indicates that such thoughts may pose a threat to the self through their egodystonic nature (Purdon, Cripps,

Faull, Joseph & Rowa 2007), and activate appraisals relevant to identifying and dealing with such threats.

The present studies deliberately used a nonclinical population to determine whether regularly experiencing a high frequency of aversive obsessive thoughts could itself be a risk factor for developing OCD-relevant appraisals. The findings suggest that this is the case, although the pathway through which these experiences lead to increases in OCD-relevant appraisal tendencies still needs further investigation. One consequence of this finding is that it may not be that individuals pre-clinically possess the dispositional characteristics leading to the deployment of OCD-referent appraisal processes that gives rise to OCD symptoms, but that the underlying lack of control over such thoughts is the primary risk factor that generates both OCD-referent appraisals and OCD symptoms. The present results do not contradict the general consensus in the literature that appraisal processes such as IR, IU and TAF are important contributors to the development of OCD symptoms (Berry & Laskey 2012), but indicate that such appraisals can be facilitated merely by the experience of uncontrollable aversive thoughts in a nonclinical sample.

The fact that experiencing a high frequency of aversive obsessive thoughts can result in both increases in measures of negative mood (including sadness and anxiety) and measures of OCD-relevant appraisals raises the issue of distinguishing between symptoms, cognitive appraisals and the experience of negative moods such as anxiety and sadness. This is especially the case given that the mediation analyses indicated a number of different, but equally possible pathways through which aversive obsessive thoughts might facilitate negative mood and appraisals. One critical issue here is whether our current conceptualizations of clinical constructs developed to help explain OCD confuse symptoms with the cognitive processes that are thought to contribute to symptoms. While there is experimental evidence that manipulating clinical constructs such as IR, IU and TAF can affect symptoms of OCD such as checking behaviour, urges to neutralize, doubting, anxiety, etc. (e.g. Arntz, Voncken & Goosen 2007; Bouchard, Rhéaume & Ladouceur 1999; Ladouceur, Rhéaume & Aublet 1997; Ladouceur, Rhéaume, Freeston, Aublet et al. 1995; Lopatka & Rachman 1995; MacDonald & Davey 2005; Mancini, D'Olimpio & Cieri 2004; Shafran 1997; Grenier & Ladouceur 2004; Ladouceur, Gosselin & Dugas 2000; Rosen & Knauper 2009; Clerkin & Teachman 2011; Rassin et al. 1999; Zucker et al. 2002), the present studies

also suggest that manipulating some OCD symptoms (in this case aversive obsessive thoughts) can influence construct-based measures. This bidirectionality might be expected if these clinical constructs encompass adaptive elements that help the individual to identify and manage threats, and these processes are activated by anxiety-generating events such as the experience of uncontrollable intrusive thoughts. However, having been developed in many cases from clinical experience, OCD-relevant clinical constructs may confuse in their definitions a range of cognitive processes that span both adaptive threat management processes and less adaptive responses to threat that generate anxiety and negative affect and are directly symptom relevant. As such, they may describe both symptoms of OCD and the underlying processes that contribute to those symptoms. For example, IR encompasses the adaptive belief that one has the power to prevent harm, but even low risk threats are then seen as essential to prevent and are anxiety generating (Salkovskis, 1985). IU embraces the adaptive desire for predictability but the less adaptive 'paralysis of cognition and action' in the face of uncertainty (Birrell et al. 2011). Similarly, while TAF can be considered an adaptive process when it translates acceptable adaptive cognitions into action, it becomes symptomatic when the individual believes that thinking unacceptable thoughts is the moral equivalent of performing unacceptable behaviour or will increase the probability of that event actually happening (Berle & Starcevic 2005; Shafran et al. 1996). Some recent attempts have been made to break down these constructs into their derivative elements, and this will certainly help us to understand where threat management processes end and symptoms begin (Berle & Starcevic 2005; Birrell et al. 2011; Coles & Schofield 2008; Rassin et al. 2001).

When considering the implications of the present findings for clinical practice, the effect of aversive intrusive thoughts on OCD-relevant appraisal processes implies that addressing the appraisal processes in clinical interventions may not be a *necessary* condition for recovery. If appraisal processes are activated by uncontrollable intrusive thoughts themselves, then direct targeting of the intrusive thoughts may be sufficient to alleviate anxiety symptoms. Nevertheless, interventions based on targeting OCD-relevant appraisal processes have been shown to provide effective treatments for aversive obsessive thoughts (Dugas et al. 2010; Ladouceur, Leger, Rhéaume & Dube 1996; Radomsky et al. 2010; Robichaud & Dugas 2006), and such interventions might be especially effective when OCD-relevant appraisal processes are ingrained or have been developed through early experiences.

Finally, a possible limitation of the present studies is the use of a method that provides an obvious initiating source for the aversive intrusive thoughts. Many aversive intrusive thoughts are autogenous and come 'out of the blue' (Lee & Kwon 2003), yet the aversive thoughts experienced in the present studies had a clear origin (the PowerPoint slides) and so might not be truly equivalent to the intrusive thoughts experienced by individuals suffering or developing OCD. Nevertheless, reactive intrusive thoughts (linked to a preceding stimulus) are also commonly reported in both nonclinical and clinical populations (Lee & Kwon 2003) and are often reported as a source of distress and threat (Lee, Kwon, Kwon & Telch 2005). As such the similarity between reactive intrusive thoughts and the present procedures provides some basis for the generalizability of the present results to clinical experience.

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