

## ARE INFLATED RESPONSIBILITY BELIEFS SPECIFIC TO OCD? META-ANALYSIS OF THE RELATIONS OF RESPONSIBILITY TO OCD, ANXIETY DISORDERS, AND DEPRESSION SYMPTOMS

Andrea Pozza, Davide Dèttore

### Abstract

**Objective:** Cognitive models assumed that responsibility beliefs are a vulnerability and maintenance cognitive factor specific to OCD symptoms. Several studies have been conducted on the specificity of responsibility to OCD relative to anxiety disorders (AD) or depression (DEP). Evidence to date appeared inconsistent, and a meta-analysis on this issue does not exist yet.

Using meta-analytic techniques the current study summarized cross-sectional data to examine: (a) whether stronger responsibility beliefs are related to OCD compared to AD or DEP symptoms in clinical and non-clinical samples; (b) whether OCD patients have stronger responsibility beliefs than AD patients; (c) potential moderators of the relation of responsibility to OCD symptoms.

**Method:** Online databases were searched. Cross-sectional studies were included if they (a) assessed responsibility with validated tools, (b) assessed OCD, AD or DEP symptoms in clinical or non-clinical samples, (c) reported correlations or between-groups data (OCD vs. AD or DEP patients) on responsibility. Fifty-eight studies ( $n = 15678$ ) were included in random-effect meta-analyses.

**Results:** Effect size on relation of responsibility beliefs to OCD symptoms was medium. Responsibility was more strongly associated with OCD [ $r = 0.43$ ,  $p = .0001$ ] than DEP symptoms [ $r = 0.33$ ,  $p = .0001$ ] but equally associated with OCD and AD symptoms [ $Q = 7.30$ ,  $p > .01$ ], despite a stronger relation was found for OCD at a trend level.

A medium effect size on responsibility favoring OCD over AD patients was found [ $d = 0.66$ ,  $p < .01$ ].

Responsibility was more strongly associated with OCD symptoms in adult [ $Q = 6.24$ ,  $p < .01$ ] than in children/adolescent samples, and more strongly associated with OCD symptoms in non-Western [ $Q = 6.29$ ,  $p < .01$ ] than in Western samples. When analyses were restricted to responsibility measures created by the Obsessive Compulsive Cognitions Working Group, responsibility was not significantly more related to OCD [ $r = 0.42$ ,  $p = .0001$ ] than AD [ $r = 0.33$ ,  $p = .0001$ ] or DEP [ $r = 0.34$ ,  $p = .0001$ ].

**Conclusions:** Current findings did not seem to confirm definitively the specificity of responsibility to OCD. Responsibility could be a transdiagnostic factor for psychopathology. Implications for case-formulation and treatment are discussed. Causal inferences on the role of responsibility in OCD development cannot be made due to the cross-sectional nature of studies. Further prospective studies are needed. Further research with experimental designs should address whether changes in responsibility beliefs mediate OCD symptom changes during cognitive behaviour therapy targeting the responsibility domain.

**Key words:** obsessive-compulsive disorder, inflated responsibility beliefs, cognitive specificity, meta-analysis, anxiety disorders, depression

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**Declaration of interest:** none

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## 1. Introduction

### 1.1. The inflated responsibility model of Obsessive-Compulsive Disorder (OCD)

The leading cognitive models of Obsessive-Compulsive Disorder (OCD) assume that obsessional

thinking has its origins in unwanted intrusive thoughts, images, and impulses, that are experienced by the majority of individuals (Salkovskis 1989). The difference between a normal intrusive thought and an obsession would not lie in its occurrence, content, or even uncontrollability, but it is the manner in which the intrusive thought is appraised that would determine its

pathological significance, depending on a person's prior experience and the context of the thought (Salkovskis et al. 1995).

Contemporary cognitive models of OCD symptoms are based on Beck's cognitive specificity hypothesis (Beck 1976, Clark and Beck 1989), which proposes that particular types of psychopathology arise from particular types of dysfunctional beliefs. For example, social anxiety disorder is thought to arise from beliefs about rejection or ridicule by others (eg, "It's terrible to be rejected") (Beck and Perkins 2001).

Obsessive-compulsive symptoms might develop from dysfunctional beliefs concerning normally occurring intrusive thoughts, which may become distressing if they are interpreted in terms of personal responsibility (Rachman 1997, Salkovskis 1985, 1999). Specifically, Salkovskis (1998, p.40) defined inflated responsibility as "the belief that one has power which is pivotal to bring about or prevent subjectively crucial negative outcomes. These outcomes may be actual, that is, having consequences in the real world, and/or at a moral level". Appraisals of inflated responsibility for harm would be specific to OCD, since what distinguishes obsessions from other forms of anxiety or depression thinking might be their association with appraisals of responsibility (Salkovskis 1998). It could be hypothesized that if a thought results only in harm or danger appraisals, then the emotional response will be anxiety, whereas appraisals of loss will be associated with depression (Salkovskis 1998).

According to the cognitive models, inflated responsibility beliefs might play a role as a vulnerability and maintenance cognitive factor specific to OCD symptoms (Salkovskis et al. 2000). Salkovskis (1985) suggested that inflated responsibility beliefs do persist due to a negative reinforcement process but also through the fact that they prevent the individual to verify that his/her beliefs are not realistic. Enduring inflated responsibility beliefs would be learned over long periods of time or as a result of unusual or critical events (Salkovskis and Freeston 2001) and would be maintained by various intrapsychic and interpersonal mechanisms, including interpersonal vicious cycles (Saliani et al. 2011). Different pathways might lead to the development of maladaptive responsibility beliefs in persons predisposed to OCD, including the reinforcement of a generalized sense of responsibility for preventing threat, exposure to rigid and extreme codes of conducts and duty, or incidents involving action or inaction that significantly contributed to serious misfortune to self or others (Salkovskis et al. 1999).

More recently, the Obsessive Compulsive Cognitions Working Group (OCCWG 1997, 2003, 2005; Taylor 2002) has been created, an international group of researchers studying cognitive factors involved in the aetiology and maintenance of OCD symptoms. The research group (eg, OCCWG 1997) has identified cognitive domains specific to OCD, including inflated responsibility beliefs, and has developed specific measures to assess such domains for research and clinical practice. For example, the group developed the Obsessive Beliefs Questionnaire-87 (OBQ-87, OCCWG 2003) and the Interpretations of Intrusions Inventory (III, OCCWG 2003), an 87- and a 31-item self-report measures respectively, based on good psychometric properties assessing rationally-derived dysfunctional cognitive domains believed to be specific to OCD vulnerability and maintenance, including inflated sense of responsibility.

In conclusion, the investigation of the role of responsibility in OCD symptoms has become a relevant field of research in the last two decades, and the development of psychometrically sound instruments to

assess responsibility allowed to improve the knowledge on the vulnerability and maintenance of the disorder (Taylor et al. 2002).

## *1.2. Evidence on the specificity of inflated responsibility beliefs to OCD*

The specificity of inflated responsibility to OCD would be demonstrated if patients with OCD endorse responsibility beliefs more strongly than do patients with anxiety disorders or other forms of psychopathology (Clark 2004, Julien et al. 2007). If it were not the case, the model would not explain why individuals would have developed OCD symptoms rather than symptoms of anxiety disorders or other psychological conditions (Julien et al. 2007).

From the development of the cognitive models and the research work of the OCCWG, a large amount of studies has been conducted to date investigating whether inflated responsibility beliefs are specific to OCD (Taylor et al. 2010). In effect, some studies have suggested that patients with primary OCD endorse more strongly responsibility beliefs relative to healthy individuals or patients with other forms of psychopathology, including anxiety disorders or depression (eg, Julien et al. 2008, Wilson and Chambless, 1999). The relation of responsibility to OCD has been also supported by correlational research conducted on non-clinical samples of adults (eg, Cisler et al. 2010) and children or adolescents (eg, Mather and Cartwright-Hatton 2004). However, other studies produced conflicting findings, showing that responsibility was not a cognitive domain specific to OCD (eg, Tolin et al. 2006).

Cross-sectional investigations on the specificity of responsibility might have some implications for case formulation and treatment of OCD. In effect, this seems to have relevance since evidence on the relationship between inflated responsibility beliefs and outcome after cognitive behavioural therapy (CBT) appears still poor. For example, research to date suggested that the introduction of cognitive restructuring specifically targeting inflated responsibility did not seem to improve the efficacy of exposure with response prevention (ERP) alone, although cognitive techniques alone seem to be equally effective to ERP alone (Olatunji et al. 2013). Consistently, inflated responsibility beliefs have been recently found to be a predictor of negative outcome after CBT for OCD (eg, Adams et al. 2012, Coradeschi et al. 2012). Moreover, some studies have suggested a positive association between changes on the responsibility domain and treatment response after CBT (eg, Emmelkamp et al. 2002, Haraguchi et al. 2011). However, such studies had some limitations including limited sample sizes. In addition, it should be considered that to date no process study based on repeated measurements investigated whether responsibility beliefs changes mediate symptom changes after CBT (Longmore and Worrell 2007).

In conclusion, an approach concentrating on the specific beliefs and meanings that drive psychological factors involved in the maintenance of OCD, could also be central to advances made in the treatment of the disorder (Salkovskis 1996).

## *1.3. Rationale for the current study*

Evidence suggesting that OCD symptoms can occur without responsibility beliefs would be difficult to reconcile with the leading cognitive models of the disorder (Julien et al. 2007, Starcevic et al. 2006). Despite

the great deal of data from cross-sectional studies on the relations of inflated responsibility across OCD, anxiety disorders, and depression symptoms, evidence supporting the models appears still inconsistent (eg, Tolin et al. 2006), and a meta-analysis has not been conducted yet.

#### 1.4. Objectives and hypotheses

Using meta-analytic techniques, the current study summarized the available evidence from cross-sectional studies to:

- (a) examine the relation of responsibility to OCD relative to anxiety disorders or depression at a symptom level in both clinical and non-clinical samples. Specifically, consistent with the cognitive models of OCD (Salkovskis 1985), we hypothesized that inflated responsibility beliefs were more strongly related to OCD compared to anxiety disorders or depression symptoms;
- (b) examine the relation of responsibility to OCD relative to anxiety disorders at a diagnostic level in clinical samples. Specifically, we hypothesized that patients with primary OCD endorse more severe responsibility beliefs relative to healthy controls or patients with primary anxiety disorders;
- (c) examine whether the specificity of responsibility to OCD might be moderated by the generational cohort (comparing on responsibility adult versus children/adolescents samples) and by the country (comparing on responsibility Western versus non-Western samples).

## 2. Method

### 2.1. Protocol of the meta-analysis

Objectives and methods of the current meta-analysis were specified in advance and reported in a protocol, which can be requested to the corresponding author (AP).

### 2.2 Eligibility criteria of the studies

The criteria considered for inclusion of the studies involved characteristics related to the *Types of studies and designs*, *Types of participants*, and *Types of outcomes*.

*Types of studies and designs.* Studies using cross-sectional designs (both correlational or case-control studies) were included. Studies were included if they had been reported in English, Italian, Spanish, French or German. No restriction on publication date was applied.

*Types of participants.* Studies were included if they had been conducted exclusively on clinical, non-clinical samples or on both the types of samples. With regard to the non-clinical samples, studies were included if they used individuals recruited from the general population, undergraduate samples, screened individuals or matched controls. The rationale for including also studies conducted on non-clinical samples was the similarity of clinical and non-clinical OCD phenomena (Gibbs 1996, Rachman and De Silva, 1978). Indeed, consistent evidence showed that obsessions and compulsions of insufficient severity to warrant a diagnosis of OCD are common in the general population (Gibbs 1996, Berry and Laskey 2012). Compared to obsessions and compulsions in people with OCD, non-clinical OCD symptoms tend to be less frequent, shorter in duration, and associated with less impairing distress. However, non-clinical OCD symptoms have similar form and content to obsessions and compulsions observed in patients OCD (Berry and

Laskey 2012). For example, both clinical and nonclinical OCD symptoms commonly consist of washing compulsions, checking rituals, and personally repugnant aggressive, sexual, or blasphemous obsessions (Gibbs 1996). Thus, empirical evaluations on cognitive vulnerability factors of OCD have been conducted on clinical and non-clinical samples, and this was the rationale for which both studies on clinical and non-clinical individuals were included in the current meta-analysis.

With regard to the clinical samples, studies were included if they were conducted on patients who had a primary diagnosis of OCD, any primary anxiety disorder or primary depressive disorders (major depressive disorders, recurrent depression or dysthymic disorder). The diagnoses had to have been made by a mental health professional through a structured or unstructured clinical interview according to a standardized classification system, such as the Structured Clinical Interview for the DSM-IV-TR Axis I Disorders (eg, SCID-I, First et al. 1995). If *all* the patients in the studies had a specific type of comorbidity (eg, all the sample patients had OCD and an additional diagnosis of Major Depressive Disorder), such studies were excluded. The rationale for this strategy was to improve the internal validity of the meta-analysis since studies on patients with OCD and a certain comorbidity might represent only a specific type of patients with OCD. However, if *some* of the patients in the study sample had comorbid disorders (eg, some patients in the study sample had comorbid mood disorders), such studies were not excluded. Indeed, as suggested by some authors (Brown and Barlow 2009), such an approach could improve external validity since patients with comorbid mood or anxiety disorders would be more representative of populations of referrals in primary and secondary care settings. For example, Major Depressive Disorder has been consistently found the most prevalent concurrent condition among patients with OCD (Torres et al. 2006), with a life-time prevalence of approximately 50% (Crino and Andrews 1996). Studies were included if they had been conducted on outpatients or inpatients, and if they assessed patients with a diagnosis of mild to severe OCD. In addition, studies were included if they used patients on pharmacological treatments. The rationale for these three inclusion criteria were to increase external validity of the meta-analysis with aim to represent patients with OCD across different settings and with different levels of OCD symptom severity. Moreover, despite controlling for concurrent pharmacological treatments might improve the internal validity of the meta-analysis, it is likely to decrease its external validity as several patients with OCD are on medication at the time of seeking psychological help (Hollon and Wampold 2009). Studies conducted on compulsive hoarding were excluded since this condition is supposed to be a separate diagnosis in the DSM-5 (Mataix-Cols et al. 2010). Comorbid medical diseases were not excluded.

No age restrictions were applied since the meta-analysis was conducted on children/adolescent and adult samples.

*Types of outcomes.* Studies were included if they used self-report measures to assess responsibility beliefs, validated and translated according to international standards (Behling and Law 2000). Both measures of inflated responsibility developed by the OCCWG (eg, OCCWG 2003, 2005) and measures developed by other research groups, such the Responsibility Attitudes Scale (Salkovskis et al. 2000), were included. Either studies using the Obsessive Beliefs Questionnaire-87 (OBQ-87, Taylor et al. 2002) and studies using the Obsessive Beliefs Questionnaire-44 (OBQ-44, OCCWG 2005) were included.



### 2.3. Information sources and search procedure

Several search strategies were used in order to identify studies for inclusion.

**Electronic search.** Studies were retrieved through on-line systematic literature searches, in which the key word “Obsessive-Compulsive Disorder” or key words indicative of anxiety disorders or depression (“anxiety disorders”, “generalized anxiety disorder”, “social phobia”, “panic disorder”, “depression”, “major depressive disorder”, “mood disorder”) were combined with key words and text words indicative of “Responsibility” (“inflated responsibility”, “beliefs”, “cognitions”, “intrusions”, Obsessive Beliefs Questionnaire-87, Obsessive Beliefs Questionnaire-44, Interpretation of Intrusions Inventory, Responsibility Attitudes Scale, Responsibility Interpretation Questionnaire).

To select studies that could meet the selection criteria, the following databases were consulted: PsycINFO (January 1966-December 2013), PubMed (January 1966-December 2013), and Science Direct (January 1966-December 2013).

**Corresponding authors.** To request any further paper, either published or unpublished, some corresponding authors of the included studies were contacted.

**Handsearching.** Conference proceedings were hand-searched for some international associations on cognitive behaviour therapy.

### 2.5. Study selection

During the first two stages (rejection at title and at abstract), the titles and the abstracts of the papers identified through the systematic search, were read independently by the two reviewers (AP and DD). Where there was no agreement on inclusion at these two stages, the paper was retained. Subsequently, the full text of the papers passing this screen was read independently by two of the reviewers. Despite no formal assessment of agreement was performed, any between-assessors discrepancy on studies inclusion at this stage was resolved through discussion meetings.

### 2.5. Meta-analysis

#### 2.5.1. Summary measures

The variables that were coded for each study included correlations between responsibility measures and each syndrome as well as the sample size for each correlation. In addition, reliability coefficients (alpha) for responsibility and syndrome measures were recorded when reported in order to correct for measurement unreliability. Between-groups (i.e., mean difference type) effect sizes were included along with r-type effect sizes. Mean difference-type effect sizes were converted to r-type effect sizes using either Cohen's *d* or the reported *M* (*SD*) through formulas provided in Ray and Shadish (1996). *ES* of 0.80 or more were assumed to be large, 0.50 moderate, and 0.20 small (Cohen 1988). According to Hedges (1981), Hedges' correction for small sample bias was applied to all *ES*.

#### 2.5.2. Synthesis of results

Data were independently extracted by the two reviewers (AP and DD). Any disagreement was discussed through discussion meetings. With regard to the calculation of the r-type effect sizes, data were extracted from

correlations between responsibility measures and OCD, anxiety disorder, and depression symptoms. In addition, with regard to the comparison between OCD groups and comparators (anxiety disorder or control groups), data were extracted calculating most *ES* from means, standard deviations and group sizes of the OCD groups or of the comparator groups. When this information was not available, we used conversion methods suggested by Ray and Shadish (1996). As noticeable heterogeneity was expected across the included studies, *ES* were computed using a random effects model. Random effects models assume that the included studies are drawn from populations of studies that systematically differ from each other. According to these models, the *ES* derived from included studies differ not only because of the random error within studies (as in the fixed effects model) but also because of true variation in *ES* from one study to the other (Borenstein et al. 2009).

The *I*<sup>2</sup> statistic was computed in order to test for homogeneity of *ES*. This statistic is an indicator of heterogeneity of *ES* in percentages. A value of 25% or less indicates low heterogeneity, 50% moderate, and over 75% high (Higgins et al. 2003). Heterogeneity was also analyzed using the *Q*-statistic (Hedges and Olkin, 1985). A significant *Q* indicates that the variability across the *ES* is greater than if it would have resulted from subject-level sampling error alone (Lipsey and Wilson 2001).

For all analyses, alpha was set to 0.01.

#### 2.5.3. Publication bias

The likelihood of publication bias was analyzed using the fail-safe *N* method (Rosenthal 1991). This method consists in calculating the number (*N*) of unpublished studies required to reduce the overall *ES* to a non-significant level assuming that the *ES* of such studies are equal to zero. As recommended by Rosenthal (1991), this value was computed according to the following formula:  $N = k(kZ - 2.706)/2.706$  where *k* is the number of studies included in the meta-analysis and *Z* is the mean derived from *k* studies.

Subsequently, the Egger test (Sterne and Egger 2005) was applied to examine a publication bias effect. The Egger test is an unweighted regression based on the precision of each study as the independent variable<sup>1</sup> and the Effect Size divided by its standard error as the dependent variable. A non-statistically result of the *t*-test for the null hypothesis of an intercept equal to zero, allows to discard publication bias (Sterne and Egger 2005).

The current meta-analysis was performed using the software Comprehensive Meta-Analysis version 2.0.

## 3. Results

### 3.1. Study selection

The electronic search and the search through additional sources produced 231 records after duplicates removed. Of those studies, 113 were excluded as they were on irrelevant constructs. Thus, 118 studies were screened at full-text for inclusion. Of those studies, 38 were excluded as they did not use measures on responsibility beliefs. Eight studies were excluded as they did not use validated measures of responsibility beliefs. Six studies were excluded as they were based on prospective designs. Eight studies were excluded as they examined the relation of responsibility to OCD dimensions.

<sup>1</sup> Precision is defined as the inverse of the standard error of each Effect Size.

After this selection, fifty-eight studies were included ( $n=15678$ ) in the current meta-analysis by consensus of the two independent assessors. The PRISMA flow chart of the selection process is provided in **figure 1**.

### 3.2. Study characteristics

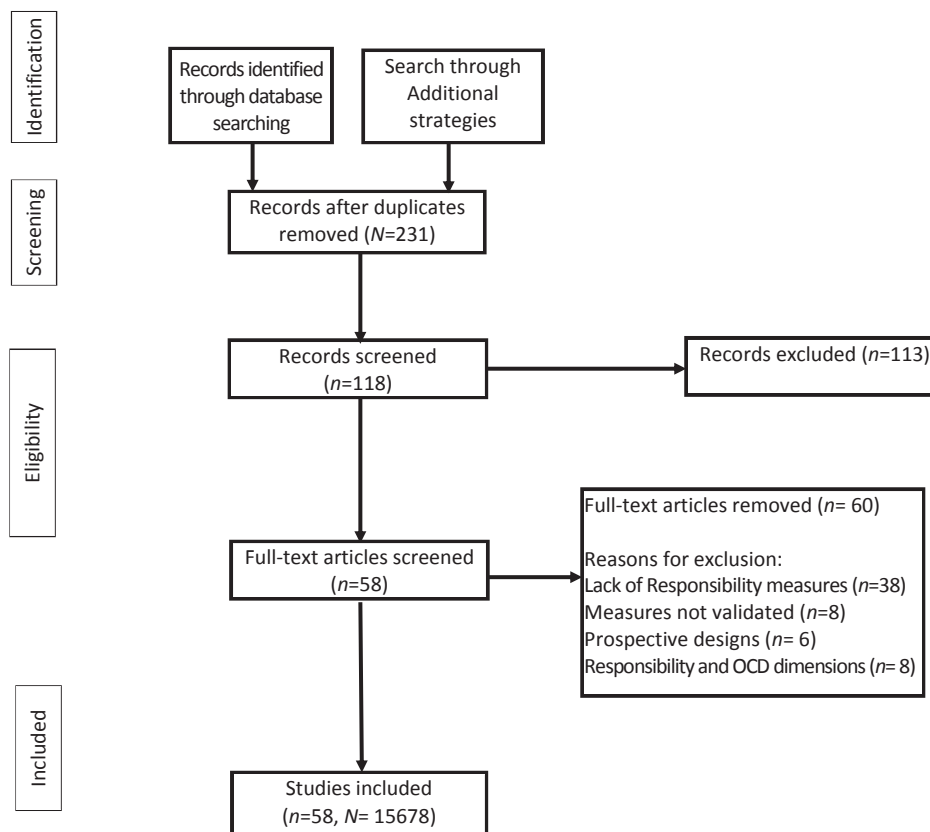
All the included studies had been published in journals. Forty-five studies included clinical samples. Of those, thirty studies included samples with patients with a primary OCD diagnosis, fifteen studies included samples with patients with primary anxiety disorders, one study included patients with a primary diagnosis of a primary depressive disorder. Forty-six studies included non-clinical samples. Of those, twenty-nine studies were conducted on undergraduate students, sixteen studies on community participants, and one study on screened

participants. Fifty-one studies were conducted on adult samples, nine studies on adolescent or children samples. Forty-eight studies were conducted on Western samples, ten studies were conducted on Non-Western samples. Among those studies conducted on non-Western samples, seven were conducted on Turkish samples (Altin and Gencoz 2011, Altin and Karanci 2008, Bahceci et al. 2013, Yorulmaz et al. 2010, Yorulmaz et al. 2008, Yorulmaz et al. 2006, Yorulmaz et al. 2004), and three in Iranian samples [Ghassemzadeh et al. 2005, Izadi et al. 2012, Rahat and Rahimi 2012].

Mean age across the included studies was 26.93 years ( $SD=9.60$ , range=9.64-41.90). Mean percentage of females was 62.60 ( $SD=11.49$ , range=34.78-84.00). Publication date ranged from 1995 to 2013.

Descriptive characteristics of the included studies are presented in **table 1**.

**Figure 1.** PRISMA flowchart of the study selection process



### 3.3 Correlations between responsibility beliefs and OCD, anxiety disorders, and depression symptoms

Overall, 58 studies (119 effect sizes), based on cross-sectional or case-control designs, assessing the correlations between responsibility beliefs and OCD, anxiety disorders, and depression were included for this analysis ( $n=24520$ ). Responsibility beliefs resulted to be more strongly associated with OCD symptoms [ $r=0.43$ , 99% CI: 0.39-0.46,  $p=.0001$ ] than depression symptoms [ $r=0.33$ , 99% CI: 0.27-0.39,  $p=.0001$ ], but they resulted to be equally associated to OCD and anxiety disorder symptoms [ $Q=7.30$ ,  $p>.01$ ], despite a stronger relation was found for OCD at a trend level. No significant dif-

ference between anxiety disorders and depression with regard to the relation to Responsibility emerged [ $Q=5.82$ ,  $p>.01$ ].

Subsequently, analyses were restricted to studies using OCCWG responsibility measures. Results indicated that inflated responsibility beliefs were not more strongly associated with OCD [ $r=0.42$ , 99% CI: 0.36-0.46,  $p=.0001$ ] than anxiety disorders [ $r=0.33$ , 99% CI: 0.23-0.42,  $p=.0001$ ] and depression symptoms [ $r=0.34$ , 99% CI: 0.26-0.41,  $p=.0001$ ].

### 3.4. Moderator analyses

Inconsistency analyses for the association between

**Table 1.** Descriptive characteristics of the included studies ( $n = 58$ ).

	<i>M (SD)</i>	<i>Range</i>
Samples sizes	229.11 (293.77)	22-1907
Percentage of females	62.60 (11.49)	34.78-84.00
Age (years)	26.93 (9.60)	9.64-41.90
	<i>n<sup>a</sup> (%<sup>b</sup>)</i>	
<b>Clinical samples</b>		
Patients with primary OCD	30 (51.72)	
Patients with primary anxiety disorders	15 (25.86)	
Patients with primary depressive disorders	1 (1.72)	
<b>Non-clinical samples</b>		
Undergraduates	29 (50.00)	
Community individuals	16 (27.58)	
Screened individuals	1 (1.72)	
<b>Cohort</b>		
Adult samples	51 (85%)	
Adolescents/children samples	9 (15%)	
<b>Country</b>		
Western samples	48 (82.75)	
Non-Western samples	10 (17.25)	

Note.

<sup>a</sup>= Number of the included studies, <sup>b</sup>= Percentage calculated on the total number of the included studies.

responsibility measures and OCD symptoms showed large heterogeneity across the effect sizes of the studies [ $Q=505.32$ ,  $p=.0001$ ,  $I^2=86.14$ ]. These findings suggested the investigation on the role of moderators.

First, differences on responsibility were examined between adult samples and children/adolescent samples. This analysis included 71 effect sizes ( $n=15708$ ), and it indicated a significant difference between adult samples and children/adolescent samples on responsibility measures [ $Q=6.24$ ,  $p<.01$ ]. Responsibility beliefs were more strongly associated with OCD symptoms in adult samples [ $r=0.44$ , 99% CI: 0.41-0.48,  $p=.0001$ ] than in children/adolescent samples [ $r=0.32$ , 95% CI: 0.23-0.41,  $p=.0001$ ].

Subsequently, differences on responsibility were examined between Western samples and non-Western samples. This analysis included 71 effect sizes ( $n=15708$ ), and it indicated a significant difference between Western and non-Western samples on responsibility measures [ $Q=6.29$ ,  $p<.01$ ]. Responsibility beliefs were more strongly associated with OCD symptoms in non-Western samples [ $r=0.52$ , 95% CI: 0.44-0.59,  $p=.0001$ ] than in Western samples [ $r=0.40$ , 99% CI: 0.36-0.44,  $p=.0001$ ].

### 3.5. Comparison on responsibility beliefs measures between patients with OCD and healthy controls

This analysis included 22 studies with 28 effect sizes ( $n=4484$ ). Results showed a large  $ES$  [ $d=1.14$ ,  $SE=0.09$ , 99% CI: 0.95-1.33,  $p=0.0001$ ], suggesting that patients with OCD had significantly higher scores on responsibility measures relative to healthy controls. A large heterogeneity was found [ $I^2=84.64$ ,  $Q=143.26$ ,  $p=0.0001$ ].

The forest plot with study and mean  $ES$  comparing on responsibility measures patients with OCD and healthy controls is provided in **figure 2**.

Overall, these results did not seem to be attributable to the effect of a publication bias, since the Classic Fail Safe-N index suggested that it would require 4983 unpublished studies to bring the  $ES$  to a non-significant level, and the Egger test resulted non-significant [Intercept=0.68,  $t=0.50$ , 2-tailed  $p=0.61$ ].

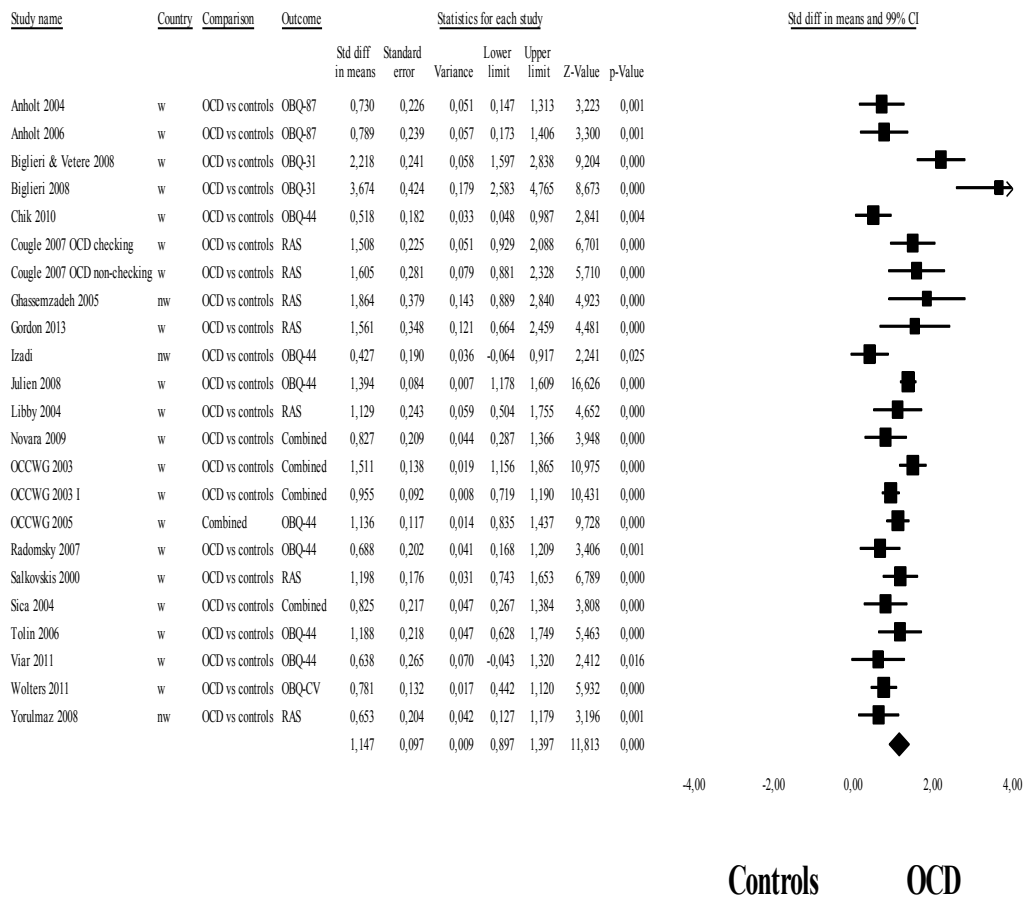
Subsequently, in order to increase internal validity of the results, the analyses were restricted to studies using pure measures of responsibility beliefs, not covering also items on threat overestimation (i.e. studies using the OBQ-87, the Interpretations of Intrusions Inventory, and the Responsibility Attitudes Scale). Results with 10 studies (12 effect sizes,  $n=1806$ ) indicated a large  $ES$  favouring patients with OCD relative to controls [ $d=1.15$ ,  $SE=0.10$ , 99% CI: 0.94-1.35,  $p=0.0001$ ].

The funnel plot of effect sizes comparing on responsibility beliefs patients with OCD versus patients with anxiety disorders is presented in **figure 3**.

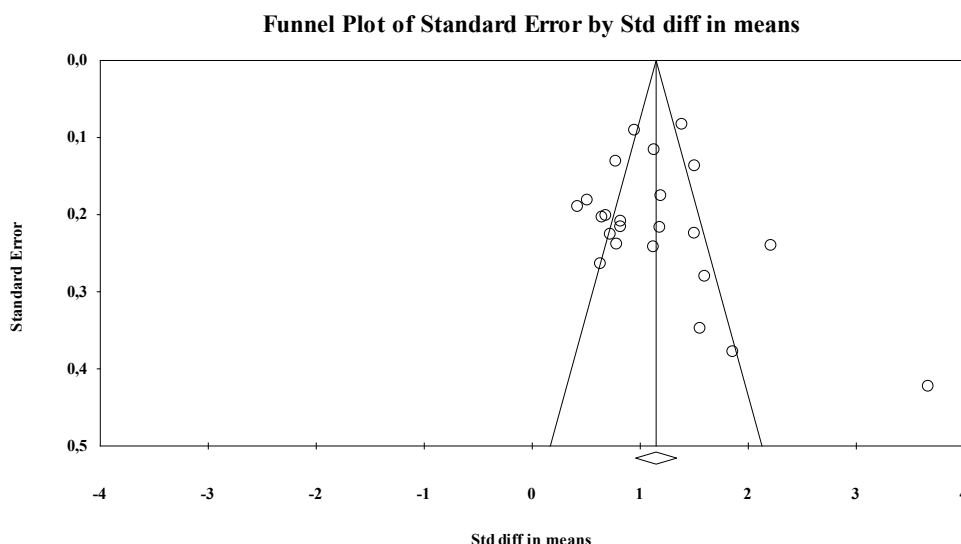
### 3.6. Comparison on responsibility beliefs measures between patients with OCD and patients with anxiety disorders

This analysis included 16 studies with 20 effect sizes ( $n=2079$ ). Results showed a moderate  $ES$  [ $d=0.66$ ,  $SE=0.10$ , 99% CI: 0.45-0.86,  $p=0.0001$ ], suggesting that patients with primary OCD had significantly higher scores on responsibility measures relative to patients with primary anxiety disorders. Medium heterogeneity was found [ $I^2=60.79$ ,  $Q_{(16)}=73.68$ ,  $p=0.0001$ ]. The forest plot with study and mean  $ES$  comparing on responsibility measures patients with OCD and responsibility beliefs

**Figure 2.** Study and mean effect sizes comparing on responsibility beliefs patients with OCD versus healthy controls



**Figure 3.** Funnel plot of effect sizes comparing on responsibility beliefs patients with OCD versus healthy controls



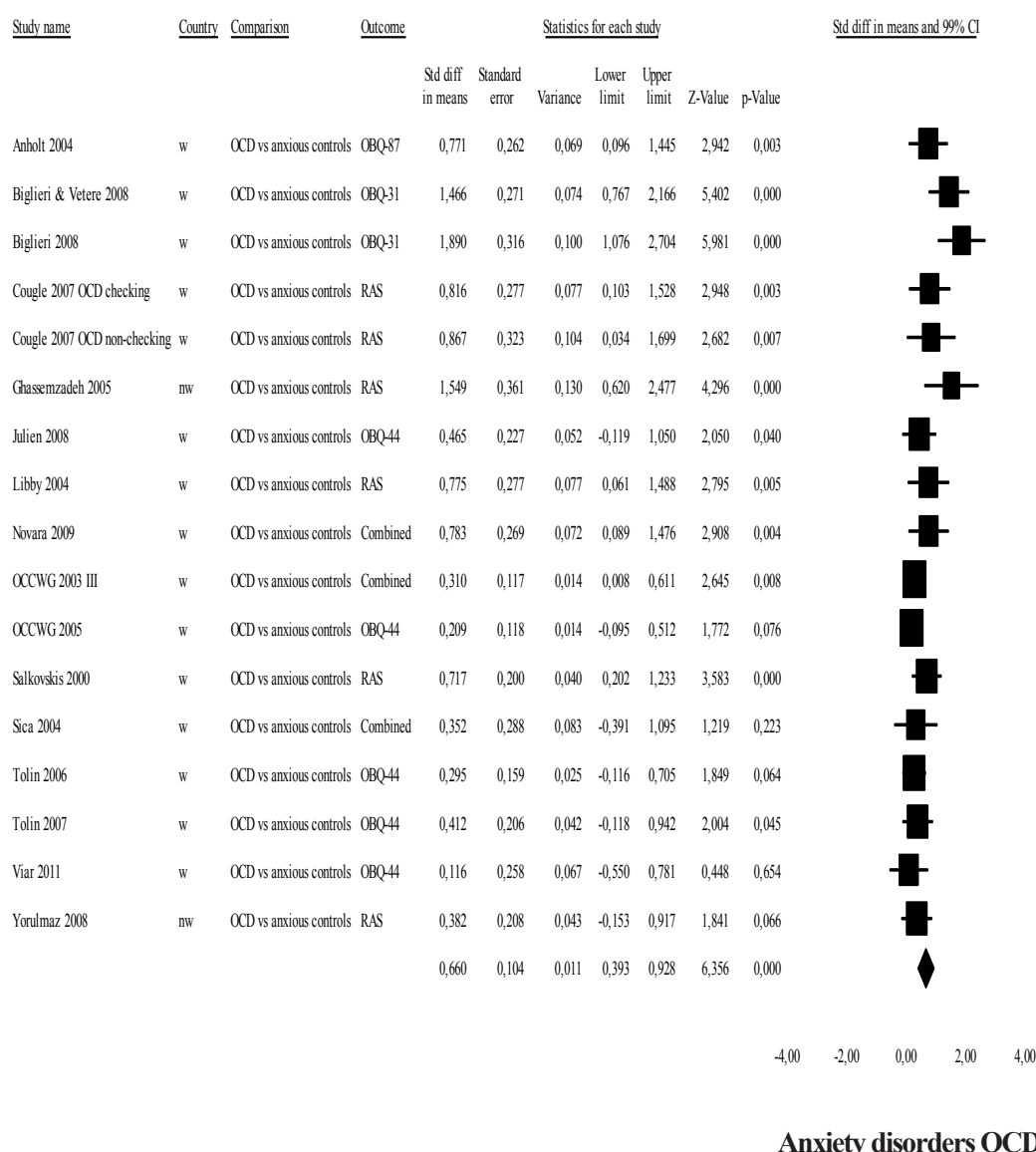
measures is provided in **figure 4**.

Despite the Classic Fail Safe-N index suggested that it would require 567 unpublished studies to bring the *ES* to a non-significant level, the Egger test resulted significant [Intercept= 3.98,  $t= 4.10$ , 2-tailed  $p= 0.001$ ], suggesting that these results might be attributable to the effect of a publication bias. Subsequently, when the analyses were restricted to studies using pure measures

of responsibility beliefs (8 studies, 9 effect sizes,  $n= 900$ ), a moderate *ES* was found favouring patients with OCD relative to patients with anxiety disorders [ $d=0.65$  SE= 0.11, 99% CI: 0.42-0.88,  $p= 0.0001$ ].

The funnel plot of effect sizes comparing on responsibility beliefs patients with OCD versus patients with anxiety disorders is presented in **figure 5**.

**Figure 4.** Study and mean effect sizes comparing on responsibility beliefs patients with OCD versus patients with anxiety disorders



## 4. Discussion and conclusions

### 4.1. Synthesis of findings

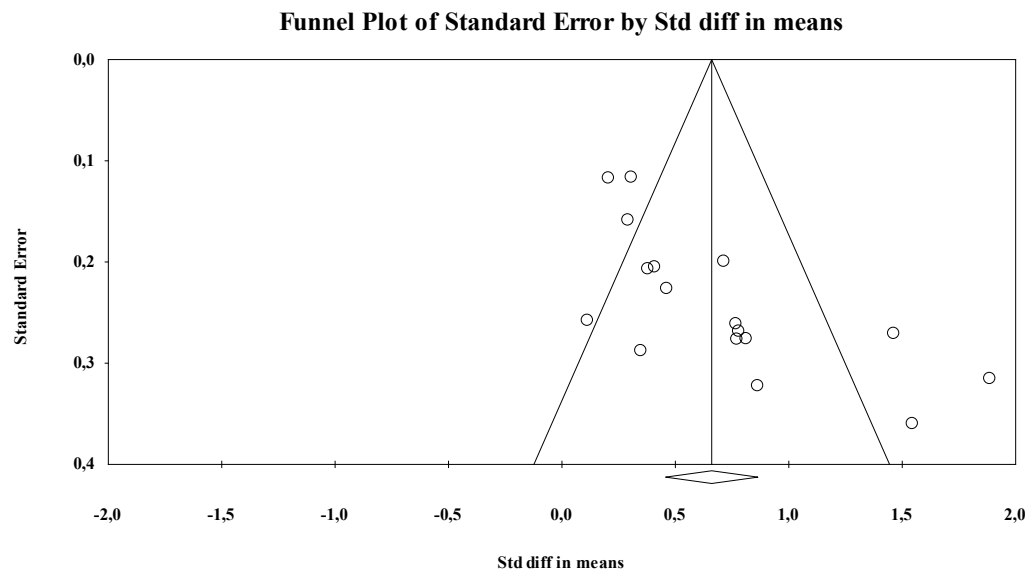
The leading cognitive models of OCD assumed that inflated responsibility beliefs play as a vulnerability and maintenance factor for obsessional thinking (Salkovskis 1985). Despite the increasing amount of research testing for those assumptions, a meta-analysis on this topic does not exist to date. Thus, the current study summarized the available evidence from cross-sectional studies investigating the specificity of inflated responsibility beliefs to OCD relative to anxiety disorders and depression symptoms. Specifically, the relation of responsibility to OCD was investigated at a dimensional level including correlational cross-sectional studies, which examined the correlations between OCD symptoms and anxiety disorders or depression symptoms in both clinical and non-clinical samples. In addition, the relation of responsibility to OCD was examined at a diagnostic level also including case-control cross-sectional studies where pa-

tients with primary OCD were compared on responsibility outcomes to patients with primary anxiety disorders or healthy controls. Studying responsibility in both clinical and non-clinical samples seems to have relevance to inform clinical practice, as OCD phenomena tend to have similar patterns in both patients with OCD and in the general population (eg, Berry and Laskey 2012).

Fifty-eight cross-sectional published studies were included in the meta-analysis ( $n=15678$ ). Studies used clinical samples consisting of outpatients or inpatients with a primary OCD, anxiety disorders or depressive disorders. Non-clinical samples included undergraduates, unscreened participants recruited from the general population, and screened individuals. The majority of studies had been conducted in Western countries (80% of the total number of the included studies) and on adult individuals (85%).

Overall, results of the meta-analysis only partially supported assumptions proposed by the models of OCD (eg, Salkovskis 1985). In effect, findings indicated that a symptom level inflated responsibility beliefs were not



**Figure 5.** Funnel plot of effect sizes comparing on responsibility beliefs patients with OCD versus patients with anxiety disorders

specific to OCD, since they were more strongly associated with OCD relative to depression symptoms but not relative to anxiety disorders symptoms. In addition, when the analyses were restricted to responsibility measures developed by the OCCWG, correlations of responsibility with OCD symptoms were not stronger than those with depression or anxiety disorders symptoms. Thus, it could be hypothesized that inflated responsibility beliefs may be associated with symptoms of different forms of psychopathology other than OCD, specifically anxiety disorders. A possible explanation could be that responsibility beliefs play as a transdiagnostic cognitive factor for both OCD and anxiety disorders. Alternatively, the relation of responsibility to both OCD and anxiety disorders could be explained by a higher-order factor, such as the *negative affect*, a construct which has been shown to act as a common diathesis for emotional disorders (Brown and Barlow 2009). Consistently, such common diathesis might explain the relatively high rates of comorbidity between OCD and anxiety disorders observed by previous research (eg, Crino and Andrews 1996).

Interestingly, the current findings showed that the specificity of inflated responsibility beliefs could be stronger for adult individuals suffering from OCD symptoms rather than children and adolescents. Moreover, the responsibility construct appeared more specific to OCD symptoms for non-Western, particularly Iranian and Turkish individuals, than Western cultures. Therefore, in the context of clinical practice, the current findings suggested that cognitive interventions specifically addressing inflated responsibility beliefs could be a tailored therapeutic component for adults and non-Western people with OCD.

On the other hand, findings of the meta-analysis also partially supported cognitive models of OCD at a diagnostic level. Consistent with the models, comparisons between patients with OCD and healthy controls on responsibility beliefs outcomes indicated a large mean effect size favouring patients with OCD, showing that this group endorsed significantly more severe responsibility beliefs relative to healthy controls, and these findings did not appear to be attributable to a publication bias effect. In addition, these results were confirmed also when the analyses were restricted to studies using pure measures

of responsibility, such the OBQ-87.

The comparison between patients with OCD and patients with a primary anxiety disorder on responsibility outcomes showed a moderate mean effect size favouring the first group. However, for this result a high likelihood for a publication bias was found, suggesting the need for further studies addressing this hypothesis.

#### 4.2. Limitations and directions for research

The current findings should be considered in the context of some relevant limitations. First, only studies with cross-sectional designs were included due to the limited number of studies conducted according to prospective designs found in the literature. This limitation did not allow to draw conclusions on the causal relationship between inflated responsibility beliefs and development of OCD symptoms. Thus, further research based on prospective designs with long-term time-points of assessments is required to investigate whether stronger responsibility beliefs play as a predictor of OCD symptom onset. Similarly, to test for the specificity of responsibility would require that changes in responsibility beliefs mediate changes in OCD symptoms. However, to our knowledge a very small amount of studies tested for this hypothesis, thus preventing to conduct a meta-analysis. Therefore, future process studies examining outcome mediators are needed.

In addition, the small number of available studies also prevented to investigate whether the specificity of responsibility would vary as a function of OCD symptom dimensions. Accordingly, inconsistent findings have been provided on the relation of inflated responsibility to OCD dimensions, with some studies suggesting that responsibility beliefs might be specific to checking and doubting rather than cleaning compulsions (eg, Menzies et al. 2000), and other studies showing that they might be related to all the OCD dimensions (eg, Abramowitz 2010, Taylor et al. 2010). In addition, it should be noted that inflated responsibility might not be a stable personality trait, but instead may be more idiosyncratic and situationally determined than originally formulated (Rachman and Shafran 1998).

Another limitation concerns the fact that only published studies were included in the meta-analysis, despite an attempt to locate potential unpublished data was made by contacting some experts and corresponding authors of papers on this topic. In addition, although the current data suggested that inflated responsibility beliefs could be specific to OCD symptoms particularly among individuals living in non-Western countries, only studies conducted on Iranian and Turkish samples were located and included in the present study. This limitation could have reduced generalizability of findings to other non-Western countries. Thus, future studies on Asian samples are required.

Moreover, only one study examined differences on responsibility beliefs between patients with OCD and patients with primary depressive disorders, and this limitation did not allow to investigate the specificity of responsibility to OCD relative to depressive disorders at a diagnostic level.

No study was conducted on older people. Thus, future research is required to understand the specificity of responsibility in older adult samples.

Finally, in the current meta-analysis the relation of responsibility was not considered partialling out the effects of the general distress.

In conclusion, findings provided by the current study informed practice and extended previous knowledge on vulnerability and maintenance factors of OCD from both a dimensional and a diagnostic point of view, highlighting that inflated responsibility beliefs could not be a cognitive domain specific to OCD symptoms, thus not supporting cognitive models of the disorder.

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