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**Amitai Abramovitch, Guy Doron, Dar
Sar-El & Erin Altenburger**

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Subtle Threats to Moral Self-Perceptions Trigger Obsessive–Compulsive Related Cognitions

Amitai Abramovitch · Guy Doron · Dar Sar-El ·
Erin Altenburger

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Abstract Obsessive–compulsive (OC) symptoms are often associated with cognitive biases and can cause significant distress and impairment in daily functioning. In this study, we examine whether threat to moral self-perceptions can trigger cognitive biases linked with obsessive–compulsive disorder (OCD). Participants were 124 non-clinical adults randomized to four conditions (negative-morality, negative-sports, positive-morality, and positive-sports) of the Subtle Priming Computerized Task. To examine the influence of subtle priming of morality-related information on OCD-related cognitive biases, participants completed the Obsessive Beliefs Questionnaire-20 (OBQ-20). Participants also completed the obsessive–compulsive inventory-revised, the Depression Anxiety Stress Scale and the Single-Item Self-Esteem Scale as baseline measures. Results revealed that subtle suggestions of incompetence in the morality self-domain were associated with stronger activation of OCD-related cognitive biases as measured by the OBQ-20. These effects were specific to negative information about the morality self-domain. Findings were not related to pre-existing variations in OC symptom levels, self-esteem, stress, anxiety, or depression. We suggest that self-sensitivities in the morality self-domain may be

linked with the activation of cognitive biases related to OCD. Future research should explore these self-sensitivities in a clinical sample to further substantiate this phenomenon.

Keywords OCD · Self-perceptions · Morality · Cognitions

Introduction

Obsessive–compulsive disorder (OCD) is a debilitating condition that commonly involves morality-related themes such as perceived violation of moral standards, inflated responsibility, guilt, and scrupulosity (e.g., Abramowitz et al. 2002; Berman et al. 2010; Rachman 1997; Shafran et al. 1996). According to cognitive theories of OCD, dysfunctional cognitive biases play a crucial role in escalating commonly occurring intrusive thoughts into obsessions (Frost and Steketee 2002; Rachman 1998; Salkovskis 1985). Recently, sensitivity in the morality self-domain and threat to one's perceptions of moral purity have been linked with OCD-related phenomenology (Doron et al. 2012b; Elliott and Radomsky 2009). Moreover, brain imaging studies and experimental research have linked OCD-related phenomena with morality sensitivity (Doron et al. 2012a; Harrison et al. 2012; Zhong and Liljenquist 2006). In the current experimental study, we examine the hypothesis that threat to the morality self-domain triggers cognitive biases associated with OCD symptoms.

According to cognitive-behavioral theories of OCD, most individuals experience intrusive thoughts similar in form and content to obsessions, albeit less intense, less distressing, and of shorter duration (Rachman and de Silva 1978; Salkovskis and Harrison 1984). Individuals with

A. Abramovitch
Department of Psychiatry, Harvard Medical School,
Boston, MA, USA

A. Abramovitch (✉) · E. Altenburger
Department of Psychiatry, Massachusetts General Hospital,
Boston, MA, USA
e-mail: aabramovitch@partners.org

G. Doron · D. Sar-El
School of Psychology, Interdisciplinary Center (IDC),
Herzliya, Israel

OCD are more likely to interpret the occurrence and/or content of normal intrusions as having catastrophic consequences to the self or to others, increasing both distress and neutralizing behaviors (e.g., checking and thought suppression; Rachman 1997, 1998; Salkovskis 1985). These strategies aimed at preventing intrusive thoughts are counter-productive, increasing both the salience of intrusive thoughts and related anxiety and distress.

Studies with clinical and non-clinical cohorts have repeatedly implicated maladaptive cognitive biases in the misinterpretations of intrusive thoughts (Frost and Steketee 2002). These cognitive biases include heightened perceptions of threat, perfectionism, intolerance of uncertainty, beliefs in the importance of thoughts, and the need to control thoughts (Freeston et al. 1996; Frost and Steketee 2002; Purdon 2001). Cognitive interventions for treating OCD usually target these maladaptive beliefs and appraisals (Rachman 1998; Salkovskis and Warwick 1985; van Oppen and Emmelkamp 2000; Whittal and McLean 1999).

Self-perceptions have been implicated in the development and maintenance of OCD (Aardema and O'Connor 2007; Bhar and Kyrios 2007; Clark and Purdon 1993; Rowa et al. 2005). Appraisals of intrusive experiences as personally significant or inconsistent with one's sense of self and values have been suggested to promote their transformation into obsessions (Purdon and Clark 1999; Rachman 1997, 1998). Doron and Kyrios (2005) proposed that thoughts or events (e.g., immoral thoughts) that challenge highly valued self-domains (e.g., morality) may threaten a person's self-worth. These result in the activation of cognitions and behavioral tendencies aimed at counteracting the threat and compensating for the perceived deficits (Doron, Sar-El, Mikulincer et al. 2012).

Recent studies have maintained the role of maladaptive self-perceptions in OC phenomena. For instance, Ferrier and Brewin (2005) found that individuals who suffer from OCD are more likely to infer negative moral self-perceptions from their intrusive thoughts compared to individuals with other anxiety disorders or to healthy controls. Further, Doron and colleagues found that individuals with OCD reported higher levels of sensitivity in the self-domains of morality and job competence compared to individuals with other anxiety disorders (Doron et al. 2008). Consistent with these findings, a recent functional magnetic resonance imaging (fMRI) study showed that in response to a moral dilemma, OCD patients, as compared to controls, showed increased activation of the medial orbitofrontal cortex (OFC), the left dorsolateral prefrontal cortex and the middle temporal gyrus. The authors concluded that the most robust difference in activation was found in the OFC (a region considered to play a central role in the psychophysiology of OCD) suggesting disorder-specific moral

sensitivity. This is consistent with current neurobiological models of OCD implicating the OFC in the pathophysiology of OCD (Harrison et al. 2012).

More recently, experimental studies using the Subtle Priming Computerized Task (SPCT) showed that subtle threat to the morality self-domain heightened the urge to act and likelihood of acting in response to contamination-related scenarios in a non-clinical sample (Doron et al. 2012a). These effects were specific to self-relevant cues, negative undertone, and the morality domain. Findings suggested that these effects were not related to pre-existing variations in self-esteem, stress, anxiety, or depression, or to mood fluctuations following the task (Doron et al. 2012a). However, to date no experimental study has examined the relationship between personally-relevant, negative information targeting the morality self-domain and the activation of OC-related cognitive biases.

The aim of the present study was to assess whether subtle threats to the morality self-domain led to the activation of OC-related cognitive biases. We used the SPCT and exposed non-clinical participants to positive or negative information about the morality self-domain versus an OCD-irrelevant self-domain (i.e., sports; Doron et al. 2007; 2012a). We used a 2×2 factorial design for self-domain (morality, sports) and feedback of self-relevant information (positive, negative) with OCD-related beliefs as the dependent variable. We hypothesized that in comparison to an OCD-irrelevant self-domain (i.e. sports) the subtle priming of self-perceptions in the morality domain would activate obsessive-compulsive related beliefs beyond potential confounding variables (i.e., base-line obsessive-compulsive symptoms, depression, anxiety, stress and self-esteem levels).

Method

Participants

One hundred and twenty-four Israeli participants (95 women and 29 men) ranging in age from 17 to 68 years ($Mdn = 29$) were recruited via *Midgam.com*, a large secure online survey platform. Participants signed an online informed consent in accordance with the Institutional Review Board standards.

Measures

Computer Competence Questionnaire

To ascertain whether differences in participant responses to our computerized task would be unduly influenced by participant computer experience, participants completed

the computer competence questionnaire (Doron et al. 2012a). Participants rated five questions concerning their daily computer use (e.g., “how would you rate your general computer competence?”, “rate the extent to which your work involves computers”). A total computer competence score was computed by averaging the items ($\alpha = .70$).

Depression Anxiety Stress Scales (DASS-21)

The 21-item DASS (Lovibond and Lovibond 1995) is a short self-report instrument designed to assess severity of depression, anxiety and stress. Participants rate the seven items of each subscale on a four-point Likert scale ranging from 0 (*never*) to 3 (*most of the time*). In the current study, Cronbach's α coefficients were relatively high for the depression, anxiety and stress subscales (.90, .79, and .91, respectively).

Single-Item Self-Esteem Scale (SISE)

The SISE (Robins et al. 2001) was used to assess baseline self-esteem. Participants are asked to rate the extent to which the sentence “I have a high self-esteem” was self-descriptive on a 9-point Likert scale, ranging from 1 (*not very true for me*) to 9 (*very true for me*). The SISE has high test-retest reliability and strong criterion validity (Robins et al. 2001).

Obsessive-Compulsive Inventory Revised (OCI-R)

Preexisting obsessive-compulsive symptom tendencies were assessed by the 18-item OCI-R (Foa et al. 2002). The OCI-R assesses OCD symptoms across six factors: washing, checking/doubting, obsessing, mental neutralizing, ordering, and hoarding. Previous data suggests that the OCI-R possesses good internal consistency for the total score across clinical and non-clinical samples (Foa et al. 2002; Hajcak et al. 2004). In the current study, reliability analysis indicated high internal consistency for the total score (Cronbach's $\alpha = .90$).

Obsessive Beliefs Questionnaire (OBQ-20)

The OBQ-20 (Moulding et al. 2011) is a short version of the OBQ-44 (Steketee 2005) that taps OCD-related beliefs. It is divided into four subscales including: threat, responsibility, importance of thoughts, and perfectionism (Moulding et al. 2011). Participants rated the extent to which each item was self-descriptive (for this study, we added the word ‘presently’ in order to assess the impact of the manipulation). This scale uses a 7-point Likert scale ranging from 1 (*disagree very much*) to 7 (*agree very much*), where higher scores indicate more severe OCD

related beliefs. The OBQ-20 possesses good psychometric properties across its four domains, with Cronbach's α coefficients ranging from .77 to .83 in non-clinical samples (Moulding et al. 2011). In the current sample, Cronbach's α coefficients ranged from .74 to .81 for all four subscales.

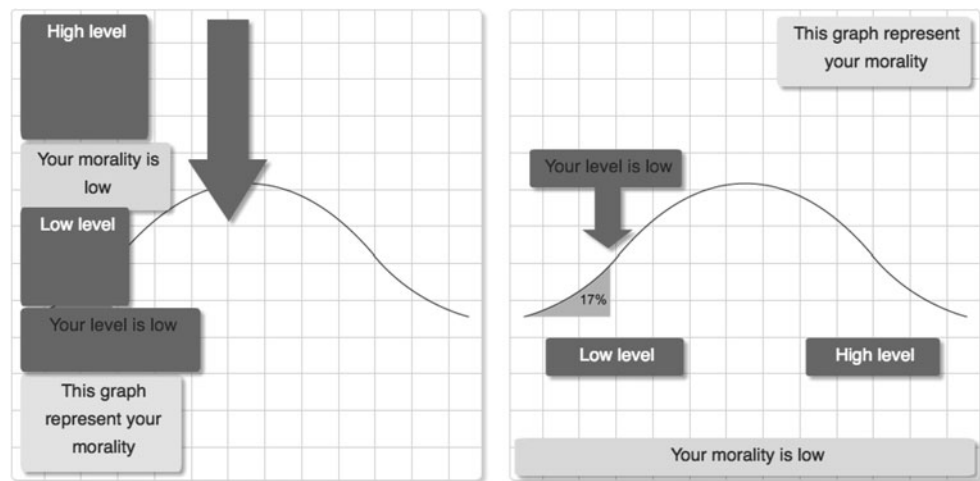
Subtle Priming Computerized Task (SPCT)

The SPCT (Doron et al. 2012a) is a computerized task designed to induce priming by subtly targeting a specific theme. Participants are asked to re-position 6 objects on the left half of the screen (5 textboxes and an arrow) such that their location and properties (thickness, width, and length) would be identical to a graph presented on the right half of the screen (see Fig. 1; For further description of the task please refer to Doron et al. 2012a). Participants were asked to complete the graphic task as quickly and exactly as possible. In this task, participants were assigned to one of four conditions: negative-morality ($n = 27$), negative-sports ($n = 28$), positive-morality ($n = 29$) and positive-sports ($n = 40$). In the negative-morality (Fig. 1) and negative-sports conditions, the right graph consisted of a bell-shaped curve indicating a below-average score (marked as the 17th percentile) and three colored textboxes with the words “Low level,” “High level” and “Your level is low”. Participants were asked to re-position the objects of the graph (i.e., textboxes and arrow) on the opposite side of the screen so a low or high score were emphasized in either of these domains depending on the condition. Participants adjusted the “Low level” and “High level” textboxes for size and placement on the two extremities of the X axis to create a continuum. For example, in the negative morality condition, the participants were presented with textboxes and an arrow on the left side of the screen and asked to recreate the graph shown on the right (see Fig. 1) so that the text box labeled “Your level is low” was placed over an arrow that points to the 17th percentile. This placement was right above the “Low level” textbox. This arrangement indicates that the morality level is low which corresponds to the title of the graph “This graph represents your morality level”. In the positive-morality and positive-sports conditions, the graph on the right side of the screen depicted an above-average score (marked in the 83rd percentile) within a normal curve distribution. On the opposite side of the screen, participants re-positioned the 6 objects of the graph such that a high score was emphasized in either the morality or sports domain.

Procedure

The study was administered online using the online platform <http://www.midgam.com>. Midgam.com has thousands of Israeli registered individuals that consented to be contacted regarding online studies. An email was sent to a

Fig. 1 Subtle Priming Computerized Task (SPCT): 'low morality' condition screenshot. In this task, participants are asked to re-position 6 objects (5 *textboxes* and an *arrow*; in the original task, objects are colored) such that their location and properties (thickness, width, and length) would be identical to a graph presented on the right side of the screen. The objects on the left side the screen are identical to the objects on right side of the screen, but have different properties and are all positioned at the *bottom-left* of the graph



random sample of registered individuals meeting the age restrictions of the current study. The email provided information about the opportunity to participate in a study assessing association between personality and performance on an online task. Participation would also include the completion of several questionnaires. All contacted participants agreed to participate.

Participants were requested to complete the study in one session and were reimbursed with the equivalent of 10 US dollars for their time. After signing an online informed consent, all participants completed the computer competency questionnaire, the DASS-21, the SISE and the OCI-R. They were then randomly assigned to one of four conditions (negative morality, negative sports, positive morality, and positive sports) for the SPCT. Notably, we used a simple non-restricted randomization procedure in which we did not pre-determine the number of participants for each condition. While this procedure usually yields unequal groups, it maximizes the potential of randomization (Schulz and Grimes 2002). Following the completion of the SPCT, participants completed the post-manipulation questionnaire (OBQ-20).

Statistical Analyses

Univariate analyses of variance (ANOVA) was used to compare the four condition groups on demographic and clinical variables. In order to test the main hypotheses, two way ANCOVA was used, controlling for computer competency and age as well as for the DASS, OCI-R and self-esteem scores. For all analyses, significance level was set to .05.

Results

In order to control for potential confounding variables between the four condition groups, we performed eight

ANOVA examining age, education level, computer competency, DASS scores, OCI-R total-score and the SISE score. Only computer competency and age differed significantly between the groups (Table 1). All between group analyses were therefore performed using a two-way ANCOVA for self-domain (morality, sports) and feedback (negative, positive), controlling for the DASS subscales, OCI-R total score and self-esteem as well as age and computer competency as covariates. Notably, while the groups did not differ on clinical variables, age and computer competency were used as covariates in order to control for their impact on the manipulation and its effect on OBQ scores.

The analysis of the OBQ-20 total-score revealed a significant main effect for feedback ($p < .002$, Cohen's $d = .58$) such that the two negative feedback groups scored significantly higher ($M = 3.10$, $SD = 1.03$) than the two positive feedback groups ($M = 2.56$, $SD = .82$; Table 3). A significant main effect for domain was found ($p = .004$, Cohen's $d = .52$) such that the two morality condition groups scored higher ($M = 3.06$, $SD = .95$) than the two sports condition groups ($M = 2.61$, $SD = .92$). These effects were qualified by a significant interaction effect between domain and feedback conditions ($p = .02$; see Fig. 2). Specifically, tests for simple main effects indicated that the negative morality group scored significantly higher than the positive morality group on the OBQ-20 total-score, $F(1, 51) = 12.660$, $p = .001$ (Table 2). In addition, the negative morality group scored significantly higher on OBQ-20 total-score than the negative sports group, $F(1, 51) = 8.316$, $p = .005$ (Table 2).

Examination of each of the OBQ-20 subscales yielded a more complex pattern of results. Specifically, a significant main effect for feedback ($p = .02$, Cohen's $d = .41$) was found on the importance of thoughts subscale such that the negative feedback groups scored significantly higher ($M = 2.40$, $SD = 1.05$) than the positive feedback groups

Table 1 Demographic and clinical variables across experimental conditions

Measure	Positive sports (N = 40)		Negative sports (N = 28)		Positive morality (N = 29)		Negative morality (N = 27)		F (3, 119)	Sig (p)
	M	SD	M	SD	M	SD	M	SD		
Age	26.92	8.60	33.07	13.40	36.36	9.12	33.74	13.49	4.512	.005
Education level	3.00	1.06	3.21	.90	3.54	.79	3.07	1.00	.540	.656
Computer competency	7.25	1.02	7.16	1.07	6.96	1.24	6.12	1.28	6.023	.001
DASS-21 depression	.65	.61	.60	.51	.49	.66	.70	.57	.610	.610
DASS-21 anxiety	.35	.42	.42	.43	.20	.37	.28	.28	1.713	.168
DASS-21 stress	.95	.77	.94	.62	.82	.74	.96	.65	.240	.868
SISE	6.72	1.91	6.00	1.77	6.25	2.24	5.78	1.60	1.561	.203
OCI-R total score	1.89	.60	1.88	.57	1.78	.44	1.99	.62	.607	.611

DASS-21 depression anxiety and stress scale, SISE single-item self-esteem scale, OCI-R obsessive-compulsive inventory—revised

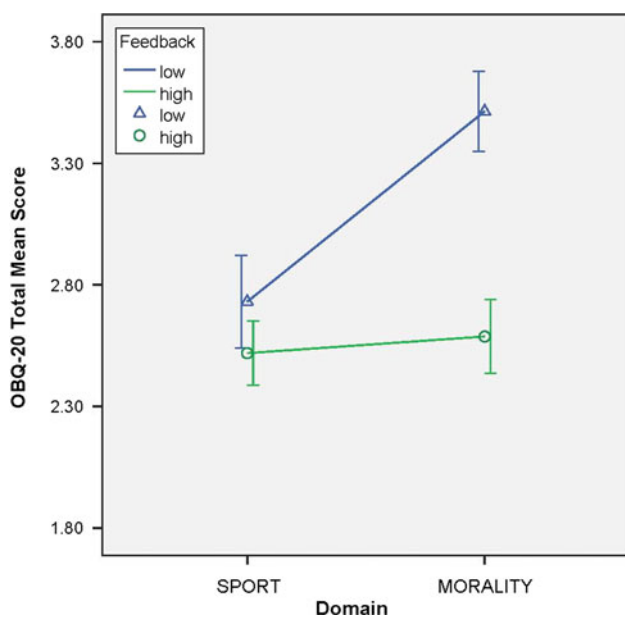


Fig. 2 Main and interaction effects on OBQ-20 total-score

($M = 1.98, SD = .94$). For this subscale, a significant main effect for self-domain was also found ($p = .001$, Cohen's $d = .64$) whereby the two morality groups had a significantly higher combined average ($M = 2.46, SD = 1.03$) in

comparison to the two sports groups ($M = 1.94, SD = .93$). As in the OBQ-20 total-score, these effects were qualified by a significant interaction effect between domain and feedback conditions ($p = .01$). Tests for simple main effects of the importance of thoughts subscale indicated that the negative morality group scored significantly higher than the positive morality group, $F(1, 51) = 8.323, p = .005$, and the negative morality group scored significantly higher than the negative sports group, $F(1, 51) = 10.189, p = .002$ (Table 2).

A main effect for feedback was also found on the overestimation of threat ($p = .001$, Cohen's $d = .60$) and perfectionism subscales ($p = .006$, Cohen's $d = .50$). Specifically, the two negative feedback groups had a significantly higher combined average ($M = 2.95, SD = 1.22$) than the positive feedback groups ($M = 2.25, SD = .99$) on the overestimation of threat subscale. Similarly, the negative feedback groups scored significantly higher ($M = 3.38, SD = 1.37$) than the positive feedback groups ($M = 2.72, SD = 1.09$) on the perfectionism subscale. No main effect for self-domain was found for these subscales. However, a marginal interaction effect between domain and feedback conditions for both overestimation of threat ($p = .07$) and perfectionism subscales ($p = .08$) was found, in which results were in a similar directions to other

Table 2 Obsessive Beliefs Questionnaire-20 means and standard deviations across experimental conditions

OBQ-20 scale	Positive sports (N = 40)		Negative sports (N = 28)		Positive morality (N = 29)		Negative morality (N = 27)	
	M	SD	M	SD	M	SD	M	SD
Total	2.52	.90	2.73	1.02	2.63	.79	3.50	.90
Overestimation of threat	2.26	1.29	2.65	1.09	2.22	1.05	3.27	1.29
Perfectionism	2.71	1.17	3.01	1.45	2.72	.92	3.79	1.17
Importance of thoughts	1.92	.97	1.96	.92	2.06	.94	2.87	.97
Responsibility	3.17	1.30	3.31	1.53	3.51	1.44	4.01	1.30

OBQ-20 the Obsessive Beliefs Questionnaire—20 items

Table 3 Obsessive Beliefs Questionnaire-20 main effects and interactions

OBQ-20 scale	Feedback		Domain		Interaction	
	<i>F</i> (1,119)	Sig <i>p</i>	<i>F</i> (1,119)	Sig <i>p</i>	<i>F</i> (1,119)	Sig <i>p</i>
Total	10.506	.002	8.446	.004	5.135	.025
Overestimation of threat	11.037	.001	1.615	.206	3.319	.071
Perfectionism	7.698	.006	2.822	.096	3.029	.084
Importance of thoughts	5.204	.024	12.634	.001	6.237	.014
Responsibility	2.024	.157	5.007	.027	.931	.336

Interaction = feedback × domain

OBQ-20 the Obsessive Beliefs Questionnaire—20 items

effects. Significant main effect for self-domain was found for the responsibility subscale ($p = .03$, Cohen's $d = .40$), whereby the two morality groups had a significantly higher combined average ($M = 3.78$, $SD = 1.41$) in comparison to the two sports groups ($M = 3.23$, $SD = 1.28$). However no significant main effect for feedback or interaction effects were found on the responsibility subscale (see Table 3).

Discussion

Our results suggest that priming negative self-perceptions in the morality self-domain activates cognitive biases that have been previously identified as important in the development and maintenance of OCD. Experimentally manipulating self-sensitivity by subtle priming of perceived morality incompetence increased the endorsement of cognitive biases as compared to threat to a moral-irrelevant self-domain (i.e., sports) or positive information about one's own morality. Further, these effects were not related to baseline OC symptom levels, dispositional self-esteem, stress, anxiety, or depression.

Our findings revealed that triggering negative moral self-perceptions increased the tendency to attribute importance to the occurrence of thoughts and their control and to a lesser extent to other OCD-related cognitions (e.g. overestimation of threat and perfectionism). Indeed, previous theorists have suggested that thoughts evaluated as immoral or inconsistent with one's sense of self lead to the use of stronger thought control strategies resulting in compulsive behaviors (Clark and Purdon 1993; OCCWG 1997; Rachman 1997; Steketee 2005).

No significant interaction effect was found for responsibility. This result is consistent with research showing that while responsibility is an important clinical aspect of OCD, it is less strongly correlated with OC-symptom scales and

does not add a significant unique variance to the prediction of symptoms over-and-above the other subscales (Moulding et al. 2011). Notably, Jones and Menzies (1997) suggested that this subscale is not as central a belief as are general threat cognitions. Our findings are consistent with cognitive theory and research, which has often implicated dysfunctional self-perceptions in the etiology and maintenance of OC-phenomena (Clark and Purdon 1993; Rachman 1997, 1998; Salkovskis 1985), particularly in the moral domain (Doron et al. 2012b). Accordingly, several authors have already argued that the appraisal of an intrusive thought as inconsistent with one's sense of self (i.e., as ego-dystonic) contributes to the formation of obsessions (Bhar and Kyrios 2007; Clark and Purdon 1993; Purdon and Clark 1999; Rachman 1997). Similarly, Doron and Kyrios (2005) proposed that thoughts or events challenging perceptions of competence in OCD-relevant self-domains (e.g., morality) may threaten a person's self-worth. In turn, this can activate attempts to repair the damage and compensate for the perceived deficits leading to obsessive thinking and neutralizing behaviors (Doron et al. 2008, 2009).

Limitations

Although consistent with our theoretical models, the present study has several limitations. First, the experiment was conducted with a non-clinical sample. However, given the dimensional approach regarding OCD-related beliefs and symptoms (Haslam et al. 2005), the phenomenon, of perceived incompetence in the morality domain and subsequent activation of cognitive biases, is thought to exist in the general population in varying degrees. In addition, whereas our manipulation of threat to the morality self-domain has good face validity, there is still a possibility that the manipulation activated more global constructs (e.g., general anxiety). However, in a previous study (Doron et al. 2012a); subsequent to completion of the SPCT task, participants completed the Positive and Negative Affect Schedule (PANAS; Watson et al. Watson et al. 1988). Results revealed that the difference between conditions remained significant after controlling for post-task variation in affect. The study also showed that the SPCT led to heightened OC-related behavioral tendencies that were specific to self-relevant (versus other-relevant), negative (versus positive) information about the morality domain (versus a morality irrelevant domain) and were not related to pre-existing variations in self-esteem, stress, anxiety or depression (Doron et al. 2012a). Together, these findings addressed several alternative explanations for the effect of the manipulation and strengthen the probability that for the morality conditions, the SPCT does target the morality self-domain. Future research on

the association between morality and OCD-related beliefs and cognitions should include clinical samples.

Furthermore, as in previous studies (Doron et al. 2012a), we focused mainly on the comparison between morality and sports self-domains, the latter selected as an OCD-irrelevant self-domain (Doron et al. 2007). Future research would benefit from examining the specificity of self-sensitivities in other self-domains (e.g., intimate relationships) and their associations with relevant obsessive–compulsive symptoms.

Another possible limitation may stem from the fact that we did not administer the OBQ prior to administration of the SPCT. However, we used an unrestricted randomization procedure (without controlling for subsample sizes) in order to maximize the probability of equal baseline measures between the groups. With regards to the OBQ, a second potential limitation may include the modification made to the OBQ's instructions (i.e. addition of the word "presently") to ascertain current level of agreement with each statement. The OBQ itself may be conceptualized as a measure of trait-like tendencies. However, in their validation studies, the Obsessive Compulsive Cognitions Working Group concluded that they were unable to assert whether the OBQ is more of an immediate state-like or trait-like instrument (OCCWG 2003). Moreover, our study aimed to assess whether subtle threats to the morality self-domain would trigger or exacerbate cognitions associated with OCD phenomenology; thus, higher OBQ scores indicate greater levels of agreement with obsessive–compulsive related statements.

Conclusion

Despite these limitations, our findings may have important implications for our understanding and treatment of OCD. Specifically, our findings are consistent and complimentary with findings suggesting threat to the morality self-domain triggers obsessive–compulsive related dysfunctional beliefs. These in turn can exacerbate obsessive–compulsive related behavioral tendencies as well as cognitive biases (Doron et al. 2012a). Thus, our findings imply that moral self-perception could be a factor related to the development of obsessions and compulsions. Various kinds of therapies have been suggested for treating OCD, such as behavioral, cognitive and existential therapy, none of which have considered the role of the morality self-domain in the maintenance of the disorder (For a review see Miller and Hedges 2008). Although much more research is needed, we speculate that it may be beneficial to also focus on the morality self-domain in the assessment and treatment of obsessive compulsive symptoms (Doron and Moulding 2009).

Conflict of interest All authors report no biomedical, financial or other conflict of interest with regards to the present manuscript.

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