

OBSESSIVE-COMPULSIVE DISORDER AND PROPENSITY TO GUILT FEELINGS AND TO DISGUST

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Abstract

Objective: According to a large scientific literature, propensity to guilt feeling and to disgust plays an important role in pathogenesis and maintenance of OCD. However it is still not completely clear whether OC patients show greater guilt and disgust propensity, when compared to healthy subjects and other anxiety disorders, whether checkers and washers OCD subtypes show some differences in their guilt and disgust propensity, whether there is an association between guilt and disgust propensity and OC symptoms severity. The aim of the present research is to answer to these questions.

Method: We recruited 73 OCD patients (11 washers, 49 checkers, 13 both), 19 other-anxiety disorders patients and 87 non-clinical controls (NCC).

Results: Results confirmed that OCD patients were more prone to guilt feelings and disgust than both anxious and NCC. There were no differences between OC subtypes. Propensity to guilt feelings and to disgust was significantly correlated with OC symptom severity. Moreover, propensity to guilt feelings was significantly correlated to disgust propensity only in OCD group.

Conclusions: These findings are in line with results of other research suggesting that OCD patients suffer of deontological guilt, which is strictly connected to disgust.

Key words: guilt feelings, disgust propensity, obsessive-compulsive disorder, checking, washing compulsions

Declaration of interest: none

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Introduction

Recent cognitive models of obsessive-compulsive disorder (OCD) suggest that the goal of OC symptoms is the prevention or neutralization from the possibility of feeling guilty or being contaminated by disgusting substances (Salkovskis 1985; Rachman 1993, 2002, 2006; van Oppen and Arntz 1994; Salkovskis and Forrester 2002; Mancini and Gangemi 2004, 2011). For example, the goal of compulsive gas tap closure checking might be to prevent an explosion of which one would feel responsible of, thus allow to avoid guilt. The compulsive repetition of prayers and formulas, could, as well, be an attempt to neutralize blasphemous intrusive thoughts, to keep one's own conscience morally clean. On the other hand, washing compulsions seem to be an attempt to neutralize contamination by disgusting substances.

Responsibility and guilt in OC behaviours

Some studies (Lopatka and Rachman 1995, Shafran 1997) show that when experimentally decreasing

feelings of responsibility, thus preventing the possibility of being guilty, OCD patients report a decreased urge to carry out their rituals. Helping the patient, within therapy, to decrease his sense of responsibility connected to his specific symptomatology (Ladouceur et al. 1996, Vos et al. 2012) reduce symptoms' severity. Jónsson and colleagues (2011) found that OC beliefs related to inflated responsibility are predictive and mediate individual and group cognitive behavioral therapy outcome for OCD. These authors showed that changes in Inflated Responsibility (described by Salkovskis and Forrester (2002) as the belief that "one has pivotal power to provoke or to prevent subjectively crucial negative outcomes. The outcomes may be actual, that is real word, or moral") were significantly associated with OC symptoms severity decrease.

In the same way, when patients learn to accept the possibility of being guilty, obsessive symptoms' decrease, even when guilt acceptance does not directly refer to the patient's symptomatic domain (Cosentino et al. 2012).

The Inflated Responsibility, predict the development of OCD symptoms after controlling for pre-existing OCD symptoms, anxiety, and depression (Abramowitz

et al. 2006).

Induction of responsibility in normal individuals leads to an increase in OCD-like behaviors; especially when subjects are induced to think that they are not kept up with their own responsibility both in adults (Ladouceur et al. 1995, Ladouceur et al. 1997, Bouchard et al. 1999, Mancini et al. 2004) and in children (Reeves et al. 2010).

Induction of responsibility and fear of guilt, in a non symptomatic domain, leads to subjective OCD-like experiences and drives toward checking behaviors more in OCD patients, than in healthy controls and in non-OC anxious patients, also in OCD patients with a low score on the Checking subscale of the Padua Inventory (Arntz et al. 2007). These data support the hypothesis that overall OC patients, even if not within the checking subtype category, are specifically sensitive to feeling of responsibility and guilt.

OCD patients and control subjects with OCD-like symptoms tend to score higher on measures of responsibility and guilt (Steketee et al. 1991; Freeston et al. 1992, 1993, Frost et al. 1994; Rhéaume et al. 1995b; Ladouceur et al. 1995; Rhéaume et al. 1995a; Rachman et al. 1995; Shafraan et al. 1996; Steketee et al. 1998; Wilson and Chambless 1999; Menzies et al. 2000; Salkovskis et al. 2000). This association seems to be specific for OCD, especially for checkers, and does not characterize other anxiety disorders (Salkovskis et al. 2000, Foa et al. 2001, Foa et al. 2002).

Beliefs about responsibility have been found to share consistent relations with OCD symptom severity (Wheaton et al. 2010, Viar et al. 2011).

Not Just Right Experience (NJRE) is “the feeling that things are not the way they should be” (Coles et al. 2003), and it is more frequent and intense in OC patients than in other patients and in non-clinical controls (Sica et al. 2012) and, moreover, some order and symmetry rituals are aimed at decreasing such negative feeling (Coles and Horng 2006). Mancini and colleagues (2008) found that the induction of guilt feelings in non-clinical subjects, implies an increase in NJRE, suggesting that NJRE is more intense and frequent in OC patients because they are more prone to guilt feelings.

Moreover, “Neuroimaging studies have demonstrated that guilt induction in NCC increased brain activity in areas proximal to regions of interest identified in OCD research subjects” (Shapiro and Stewart 2011).

However, some previous findings seem to contradict these results from at least three standpoints.

First, levels of responsibility seem to be inconsistently related to OCD symptoms (Calleo et al. 2010, Myers et al. 2008, Tolin et al. 2008, Fergus and Wu 2010, Fergus and Wu 2011).

Second, some studies show that guilt and responsibility proneness are not specific to OCD, but they are also involved in Major Depressive Disorder (Bybee et al. 1996, Fuchs 2002, Belloch et al. 2010), in PTSD (Wilson et al. 2006, Hathaway et al. 2010, Viar et al. 2011), and in other anxious patients (Tolin et al. 2006b).

Third, it still remains unclear whether guilt and responsibility proneness are specific to the checkers OCD subtype. In fact, some authors found a positive association between guilt and inflated responsibility and OC symptoms also in OCD patients with washing symptoms (Menzies et al. 2000, OCCWG 2005, Coles and Horng 2006, Sica et al. 2006, Tolin et al. 2008, Taylor et al. 2010). In fact, beliefs pertaining to inflated responsibility and to the overestimation of the likelihood of threat predicted the contamination related with OCD (Wheaton et al. 2010).

The majority of these studies, showing controversial results, used the Responsibility/Threat Estimation subscale of the Obsessive Belief Questionnaire (OBQ). This instrument includes 16 items dealing with concerns related to harm prevention (towards oneself or others), inaction consequences, and responsibility for bad things happening. Because this subscale is highly related to both responsibility and threat, we guess that it could be scarcely suitable to measure guilt propensity in OCD population.

In summary, the hypothesis that OCD pathology is characterized by an excessive propensity to guilt and responsibility is supported by many, but not by all studies.

Specifically considering the role of guilt in OCD, at least three questions remain still unclear:

- Do OCD patients show greater guilt propensity, when compared both to healthy subjects and other anxiety disorders patients?
- Do checkers and washers OCD subtypes show some differences in their guilt propensity?
- Is there an association between guilt propensity and OC symptoms severity?

Disgust and OC behaviours

OCD patients with washing symptoms often refer that the feeling or the idea that something dangerous (i.e., for their health, like germs and viruses) or disgusting might contaminate them drives them to their washing compulsions. This led many authors (Rachman 2004, Tolin et al. 2006a) to hypothesize that OCD patients are particularly sensitive to feelings of disgust. In the last years many studies, using both self-report questionnaires (Muris et al. 2000, Mancini et al. 2001, Charash and McKay 2002, Woody and Tolin 2002, Schienle et al. 2003, Thorpe et al. 2003, Cisler et al. 2009, Cisler et al. 2010, Olatunji et al. 2010) and behavioral (avoidance) tasks (Tsao and McKay 2004, Deacon and Olatunji 2007, Olatunji et al. 2007a) have focused on the role of propensity to disgust in OCD patients, investigating whether disgust proneness is specific to these patients, and, expressly, to the washing subtype. Most of these studies showed that the propensity to experience disgust is indeed associated with OCD symptoms.

For instance, compared to NCC and GAD patients, OCD participants were found to be more strongly endorsed disgust propensity (Olatunji et al. 2011) and Olatunji (2010) found that changes in disgust predicted changes in OCD contamination-based symptoms across a 12-week period of intensive treatment, controlling for age, gender, depressive symptoms and negative affect. This relationship was specific for disgust propensity (i.e., a heightened frequency and intensity of disgust experiences), and not for other variables. However, an exaggerated propensity toward disgust has also been observed in small animal phobia (Mulken et al. 1996), in other specific phobias (Olatunji et al. 2007a, Olatunji et al. 2007b), in spider fear (Mulken et al. 1996, de Jong and Merckelbach 1998, Thorpe and Salkovskis 1998, Olatunji et al. 2007c, Olatunji and Deacon 2008), and in blood-injection injury phobia (de Jong and Merckelbach 1998, Olatunji et al. 2006, Olatunji et al. 2007c). Moreover, Muris and colleagues (1999) found that the association between disgust levels and OCD symptoms among children lost its significance when controlling for trait anxiety and Woody and Tolin (2002) found that disgust levels among adult OCD

patients were not significantly higher than those of patients with social phobia.

Further, is disgust propensity specific for washers or does it play a role also in the checking OCD subtype?

It seems that disgust propensity is more intense for contamination obsessions and washing compulsions (Muris et al. 2000, Olatunji et al. 2004, Tolin et al. 2006a), even when controlling for anxiety and depression (Thorpe et al. 2003, Olatunji et al. 2007c, Moretz and McKay 2008).

However, some authors (Mancini et al. 2001, Schienle et al. 2003, Thorpe et al. 2003, Berle et al. 2012) showed that disgust propensity predicts also checking symptoms.

So, to conclude, some doubts remain unsolved:

- Do OCD patients show greater disgust/guilt propensity, when compared to other than OCD anxiety disorders and to NCC?
- Do checkers and washers OCD subtypes show some differences in their disgust/guilt propensity?
- Is there an association between disgust/guilt propensity and OC symptoms severity?

The aim of this study is to clarify the three main questions regarding relationship between OCD, guilt and disgust.

Methods

Participants

We recruited 92 patients and 87 non-clinical controls (NCC). From the patients group, 73 had diagnosis of OCD and 19 of other-anxiety disorders (AD). OCD sample was sub-divided into different groups, according to specific symptomatology. One group included patients with a washer subtype symptomatology (N=11), another group of OCD patients (N=49) showed check- symptoms, and the last group included both washer and checker symptoms (N=13). Age of the OCD sample ranged from 16 to 53 years, with an average of 31.61 years (s.d. = 8.4). 42% of the sample were males. Patients suffering from other-than OCD anxiety disorder satisfied the DSM IV criteria for panic disorder (PD, N=15), general anxiety disorder (GAD, N=2) and social phobia (SP, N=2). AD patients ranged from 23 to 57 years, with an average age of 36.16 years (s.d.=9.5). Around 39% of the AD sample was males. Overall, patients' disease duration was about 10 years and all of them were recruited from a private center of cognitive psychotherapy in Rome. All patients underwent The Structured Clinical Interview for the DSM IV (SCID-IV; First et al. 1996) administered by a trained clinical psychologist. Exclusion criteria for all groups were a diagnosis of bipolar disorder, substance abuse, pervasive developmental disorders, mental retardation, or current or past central nervous system diseases. Further exclusion criterion for OCD patients was history or current GAD diagnosis. Non-clinical controls were recruited from different specialization schools in Italy and from general population. Their age ranged from 20 to 59 years (mean age=32.64, s.d.=6.95) and 33% of the sample were males. Groups were not significantly ($F(2,163)=2.46$; $p=.09$) different on years of education (OCD=16.5, AD=16.8 NCC=17.02).

Procedure and instruments

The questionnaires were administered individually. The subjects were guaranteed privacy, anonymity, and

the use of data for statistical purposes only. Participants were requested to fill in the following measures in a balanced order:

Beck Depression Inventory

The BDI (Beck et al. 1996) is a 21-item questionnaire where subjects rate themselves (on a scale from 0 to 3) according to the extent to which they exhibit cognitive, affective, somatic, and vegetative symptoms of depression. The BDI has been used in both clinical and non-clinical samples. Beck and colleagues (1996) established in a meta-analytic review the psychometric properties of the BDI, showing that the BDI is a reliable and valid measure of depression.

State Trait Anxiety Inventory - Form Y

The STAI (Spielberg 1983) consists of two scales of 20 items, aiming at measuring state and trait anxiety. The STAI State subscale asks respondents to rate how they feel 'right now . . . at this moment' using a 4-point scale (1 = Not at all, 4 = Very much so) in response to a series of self-descriptive statements. The Trait subscale asks to rate how they "generally" feel using a 4-point scale (1 = Almost never, 4 = Almost always) in response to the 20 self-descriptive statements. Factor analytic validation of the state/trait distinction has been demonstrated, and the psychometric properties are well documented (Spielberg 1983).

Disgust Scale

The Disgust Scale (DS, Haidt et al. 1994) consists of 32 items measuring attitudes toward seven domains of disgust elicitors: Food, Animals, Body products, Sex, Envelope Violations, Death, and Hygiene, and a further subscale referring to the domain of Magical Thinking (Haidt et al. 1994). The DS gives a total score, from 0 (minimal disgust sensitivity) to 32 (maximal disgust sensitivity).

Guilt Inventory

The Guilt Inventory (GI, Jones et al. 2000, Kugler and Jones 1992) is a self-report scale asking to responders to rate their agreement to 45-item on a 5-point Likert-type scale (from a 1 = Strongly disagree to 5 =Strongly agree). It was designed to assess the following domains: state-guilt, defined as "present guilty feelings based on current or recent transgressions"; trait-guilt, defined as "a continuing sense of guilt beyond immediate circumstances"; moral standards, defined as "subscription to a code of moral principles without reference either to specific behaviors or overly specific beliefs". The GI has good reliability and validity (Kugler and Jones 1992).

Padua Inventory - Revised version

The Padua Inventory - Revised Version (PI-R, van Oppen et al. 1995) consists of 41 items. Each item is rated on a 5-point scale according to the degree of disturbance caused by the thought or behaviour (0="not at all", 4="very much"). The PI-R gives a global score, from 0 to 164, indicating the presence of obsessive-compulsive features, and five sub-scale scores:

- (a) Impulses: for example, violent impulses directed

against animals and objects, unaccountable urge to kill oneself and others; fear of losing control over antisocial or sexual urges. Scored between 0 and 28.

(b) Washing: for example, stereotyped cleaning activity, severe preoccupation with dirt, unrealistic fear of contamination, etc. Scored between 0 and 40.

(c) Checking: for example, checking whether doors have been closed, gas and other taps turned off, etc. over and over. Scored between 0 and 28.

(d) Rumination: for example, reduced capacity to remove undesirable thoughts, difficulty in making simple decisions, uncertainty concerning one's responsibility in the case of incidents, rumination over unlikely hazards, etc. Scores between 0 and 44.

(e) Precision: for example, feeling yourself obliged to follow a particular order in doing something, counting letters, money, numbers for no reason, etc. Scored between 0 and 24.

The PI-R factorial structure is invariant across various clinical samples (i.e. obsessive-compulsive, panic disorder and social phobic patients) and normal subjects (van Oppen et al. 1995).

Data analyses

First of all, descriptive statistics were calculated (mean, standard deviation, minimum and maximum)

and disgust, after controlling for the possible effect of anxiety and depression.

Moreover, we ran a 4-step hierarchic regression on the OCD group. Demographic measures (age and gender) were entered first, at the second step we inserted state and trait anxiety and depression, at the third step guilt-trait was introduced, and, finally in the fourth step, disgust was entered as possible explanatory variables.

Results

M/ANOVAs showed that the three subgroups of OCD patients (washers, checkers and mixed group) did not differ in trait and state anxiety ($\Lambda=.97$, $F(4,98)=.42$, $p=.79$; $\eta^2=.017$), in levels of depression ($F(2,70)=.02$, $p=.98$; $\eta^2=.001$), of guilt ($\Lambda=.96$, $F(6,136)=.38$, $p=.88$; $\eta^2=.017$) and of disgust ($F(2,70)=1.6$, $p=.21$; $\eta^2=.04$). According to these results, even if showing 2 different kinds of symptoms, we considered OCD subgroup as a homogenous group.

ANCOVA on the DS score in OCD and NCC, showed no significant effects of trait anxiety and depression. Furthermore, OCD patients showed significantly higher disgust total scores ($F(1,158)=13.4$, $p=.001$; $\eta^2=.08$).

Single sample t test showed that OCD patients were significantly more prone to disgust than patients with other AD ($t(18)=-2.7$, $p=.015$).

Table 1. Reports mean scores and standard errors in each test, for the NCC sample, for the AD and the three OCD subgroups

		NCC	AD	OCD		
				Checkers	Washers	Mixed
STAI-Y	State	36.4 (1.7)	44.9 (3.7)	37.7 (2.7)	34.4 (5.2)	37.4 (4.8)
	Trait	37.5 (1.1)	49.6 (2.4)	54.2 (2.1)	54.9 (4.3)	51.9 (3.8)
BDI		5.6 (.9)	12.9 (2.1)	14.4 (1.6)	14.0 (3.0)	12.5 (2.8)
PI-R	Total score	16.1 (1.9)	23.0 (4.0)	53.8 (2.9)	58.9 (5.6)	60.3 (5.1)
GUILT	State	26.8 (.5)	31.2 (1.2)	34.2 (.9)	33.9 (1.7)	34.1 (1.5)
	Trait	50.7 (.9)	52.2 (1.9)	63.2 (1.4)	63.3 (2.6)	62.8 (2.4)
	Moral Standard	44.7 (.6)	45.7 (1.4)	52.9 (1)	51.6 (1.9)	50.4 (1.7)
DS		17.1 (.6)	17.6 (1.2)	20.0 (.8)	20.5 (1.6)	21.7 (1.5)

for groups of participants. Furthermore, we controlled for levels of anxiety and depression in the 3 OCD subgroups (i.e., washers, checkers and mixed group, that is with both checking and washing symptoms), using the STAI-Trait and the BDI. To check whether the OCD subgroups would show any difference in the intensity of guilt and disgust propensity, ANOVAs were conducted among the three OCD groups, using the GI and DS scores.

Afterwards, we run an ANCOVA on the DS scores and a MANCOVA on the 3 guilt subscales scores with groups (OCD vs. NCC) as between factor, after controlling for the effect of anxiety and depression.

Furthermore, additional single sample t tests were ran on the AD group, with the mean score of OCD group as referring score, both on GI and DS scores.

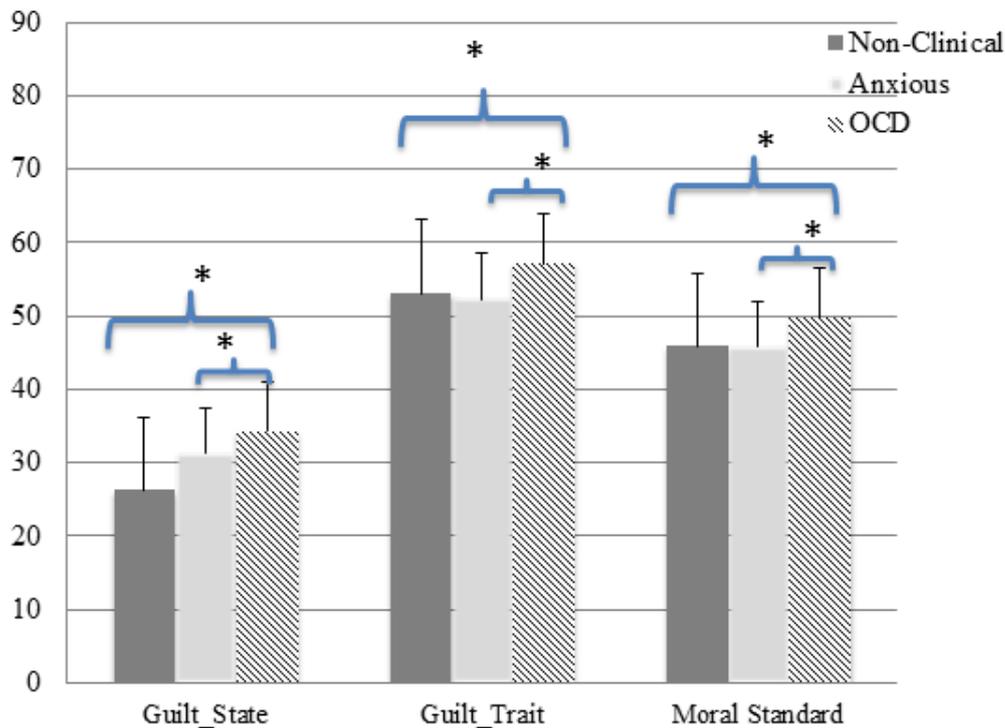
Correlation and Partial correlation analyses were separately ran on NCC and OCD groups, in order to investigate the associations between: 1) guilt and the PI-R subscales and total scores, 2) disgust and the PI-R subscales and total scores, and 3) guilt scores

MANCOVA on guilt scores, controlling for the effect of trait anxiety and depression levels, showed a covariate effect for trait anxiety ($\Lambda=.9$, $F(3,134)=4.96$, $p=.003$; $\eta^2=.10$) and a non significant effect for depression ($\Lambda=.96$, $F(3,134)=1.7$, $p=.16$; $\eta^2=.04$). When considering the role of trait anxiety, OCD patients (figure 1) were significantly more sensitive to guilt than NCC ($\Lambda=.92$; $F(3,134)=3.57$, $p=.016$; $\eta^2=.07$), in guilt-state ($F(1,136)=8.5$, $p=.004$; $\eta^2=.06$), guilt-trait ($F(1,136)=5.2$, $p=.02$; $\eta^2=.04$) and in the moral standard subscales ($F(1,136)=6.3$, $p=.013$; $\eta^2=.04$).

When considering the difference on the GI between the two clinical groups, t Student test showed that OCD patients had significantly higher guilt feelings (figure 1) than other AD patients (state: $t(18)=-4.8$, $p<.001$; trait: $t(18)=-6.3$, $p<.001$; moral standard: $t(18)=-5.1$, $p<.001$).

Correlation analyses showed a significant association between OCD severity and both guilt and disgust. In particular, coefficients on OCD group (table

Figure 1. Means (and standard errors) of the three subscales of the Guilt Inventory in the NCC, AD and OCD groups



2) showed high positive significant associations among PI-R total and subscales scores and Disgust scale score. It is interesting to observe that this pattern still remained significant for the OCD group, when controlling for the possible effect of trait anxiety and depression. Furthermore, the correlation between the DS and the GI showed a significant positive association, but only in the OCD patients. This association remained significant also when controlling for anxiety and depression.

Results from hierarchical regression showed that the total score of the PI-R was explained by guilt trait in the third step, even after partialling for anxiety and depression (table 3). When, instead, considering both guilt and disgust as possible predictors of symptoms' severity, guilt wasn't anymore significant. These results suggest that disgust plays a role in mediating the association between OCD symptoms' severity and guilt

trait, and that this association might be better explained by a specific kind of guilt, not assessed through the GI, which is more related to disgust.

Discussion

The aim of this study was to answer the following questions:

- Do checkers and washers OCD subtypes show some differences in their guilt and disgust propensity?
- Do OC patients show greater guilt and disgust propensity, when compared both to non clinical control participants and other anxiety disorders patients?
- Is there an association between guilt, disgust propensity, and OC symptoms severity?

Table 2. Correlation coefficients (Pearson) among disgust scale and guilt scale (three subscales) and PI-R total and subscales in the OCD and NCC groups. Values in brackets report r-coefficients partialled for trait anxiety (STAI-Y) and depression (BDI). Only significant scores are shown ($p < .05$)

			<i>Impulses</i>	<i>Washing</i>	<i>Checking</i>	<i>Rumination</i>	<i>Precision</i>	<i>PI-Total</i>	<i>DS</i>
<i>DS</i>	<i>OCD</i>	-	.53 (.38)	.26 (.31)	.39 (.33)	.35 (.44)	.52 (.40)	1	
	<i>NCC</i>	-	.28 (.27)	-	-	-	-	1	
<i>GI State</i>	<i>OCD</i>	-	-	-.28	.68 (.43)	.25	.52	.30	
	<i>NCC</i>	-	-	-	-	-	-	-	
<i>GI Trait</i>	<i>OCD</i>	-	.39	.32	.57 (.43)	.27	.59 (.37)	.49 (.45)	
	<i>NCC</i>	-	-	.31	-	-	.30	-	
<i>GI MS</i>	<i>OCD</i>	-	-	-	.32	-	.34	.24	
	<i>NCC</i>	-	-	.26	-	-	.22	-	

Table 3. Results from hierarchical multiple regression analyses performed on PI-R total scores in OCD patients, after controlling for age and gender (step #1), anxiety and depression (step #2), guilt (step #3) and disgust (step #4). * $P < 0.05$, ** $P < 0.01$

		PI – R Tot			
Step #1		Step #3		Step #4	
R ² (adjusted)	.01	R ² (adjusted)	.55*	R ² (adjusted)	.58*
β for Age	.09	β for Age	.26*		
β for Gender	.12	β for Gender	-.15	β for Age	-.25*
Step #2				β for Gender	-.20
R ² (adjusted)	.50*	β for State Anxiety	-.25	β for State Anxiety	-.21
β for State Anxiety	.02	β for Trait Anxiety	.43*	β for Trait Anxiety	.45*
β for Trait Anxiety	.45*	β for Depression	.44*	β for Depression	.37*
		β for Trait Guilt	.28*	β for Trait Guilt	.15
β for Depression	.56*			β for Disgust	.24*
Multiple R	.80				
F (df = 7,45)	11.2**				

The results of this study suggest the following.

All the investigated OCD symptomatology, including washers, checkers and mixed group, seem to have an inflated propensity either to guilt feelings, either to disgust. Therefore, checkers and washers seem to manifest similar propensity to guilt and disgust. To get a better understanding of these results, we have to consider that most of our patients with the washing manifestations had a past history of checking symptoms, and vice versa. Patients with washing symptoms might be driven by three different types of goals. First, they might be motivated by the avoidance of contamination by disgusting, but not dangerous, substances. For instance, one of our OCD patients felt the urge to wash himself after having defecated or urinated, but this was not to avoid potential illness or contamination, rather, his main purpose was to avoid the feeling of disgust toward himself. In fact, he reported that these disgust feelings were very similar to the feelings of guilt he felt after sexual sins. Second, OCD patients may avoid or neutralize moral contamination, i.e. moral disgust (Rachman 2006), which is associated with guilt feelings. Third, OCD patients may fear that being contaminated might be dangerous for one's own or others' health. Therefore not preventing or neutralizing contamination could imply not being up to their own responsibilities, and, then, being guilty. These reports suggest why OCD washers might, like checkers do, show an exaggerated propensity toward guilty feelings.

When considering intense disgust propensity in checkers OCD patients, one has to consider the so called Lady Macbeth effect: "A threat to one's moral purity induces the need to clean oneself. Physical cleaning alleviates the upsetting consequences of un-deontological behavior and reduces threats to one's moral self-image" (Zhong and Liljenquist 2006). Therefore, it seems not surprising that OCD patients

with checking symptoms show not only intense guilt feelings but high disgust propensity too.

One possible objection is that there are some other categories of patients, like MDD, PTSD or specific phobias, that show an exaggerated guilt and disgust propensity (Berle and Phillips 2006, Olatunji et al. 2007a, Olatunji et al. 2007b), even when not showing OC symptoms. This objection deserves a comment. Recently Reuven and colleagues (2013) showed that Lady Macbeth effect was particularly prominent among participants with OCD. This is coherent with our results, our OC patients had a high propensity either to guilt feelings either to disgust. As matter of fact, GI and DS were highly correlated in OCD group but not in the NCC group. It seems, then, that a high correlation between feeling of guilt and disgust may be a characteristic of OCD. But how can we explain this characteristic? We suggest that the strong correlation between guilt feelings and disgust, we observed in OCD, may depend on a specific kind of guilt feeling, namely deontological guilt feeling, that seems to be specific for OCD.

Some evidence seems to support this idea. For the sake of clarity: deontological guilt, arises when one violates an inner moral rule, while altruistic guilt arises if one does not behave altruistically (Mancini 2008). In non-clinical sample, recent fMRI data highlighted that deontological guilt induction, but not altruistic guilt one, is associated with insulae activation, and, it is commonly known, that this brain area is specifically involved in the experience of disgust (Basile et al. 2011). Some behavioral data, in non-clinical participants (D'Olimpio and Mancini 2012), suggest that the induction of deontological guilt, more than altruistic guilt, triggers towards cleaning behavior and, in turn, these behaviors reduce feelings of deontological, but not altruistic, guilt.

Further, in another study involving OC patients, an abnormal pattern of insula activation was observed in patients, when compared to healthy controls, when confronted with deontological, but not altruistic, guilt stimuli (Basile et al. 2013).

Results from another study (Mancini and Gangemi 2011) using the trolley dilemmas suggest a stronger propensity to respect inner moral norms, than altruism, in OCD patients, more than in other anxious patients or in a non-clinical group. Finally, Ottaviani and colleagues (2013) showed that moral disgust is interpreted as a metaphor in non-clinical subjects, while it induced the physiological reactions of disgust in subjects with high OC symptoms propensity.

The results we observed in this study, as well, seem to go in the same direction. Namely, inflated propensities to guilt and disgust feelings are associated with OC symptoms severity, thus suggesting their specific role in OCD pathology. Further, results from hierarchical regression showed that when considering both guilt and disgust as possible predictors of OC symptoms' severity, guilt was not significant anymore, thus suggesting that the type of guilt that explains OCD is specifically associated with disgust. Finally, as already mentioned, propensity to guilty feelings is correlated with propensity to disgust, only in OC patients, but not in healthy participants.

Conclusions

Taken all together, our data suggest that OC patients tend to score higher on guilt and disgust measures, than NCC and other-anxious patients. Moreover our results suggest that there could be a specific kind of guilt, or a specific feature of guilt involving deontological and moral aspects, that explains OCD symptomatology. As deontological guilt and disgust are strictly connected, we suggest that this association might explain why GI and DS are associated only in OCD, and not in NCC. As well, this might explain the why checkers and washers are both prone to guilt and to disgust. We can speculate that there could be a difference between depressed patients and OCD in terms of the kind of guilt they are prone to. In this view, a considerable amount of data (O'Connor et al. 1999, O'Connor et al. 2002, O'Connor et al. 2007) suggest that depressed patient are affected by interpersonal guilt, which seems very close to altruistic guilt. In the same line, preliminary data on other-anxiety disorders from our study could us to speculate that in specific phobia patients disgust should not be associated to guilt.

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