

MENTAL CONTAMINATION IN OCD: ITS ROLE IN THE RELATIONSHIP BETWEEN DISGUST PROPENSITY AND FEAR OF CONTAMINATION

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Abstract

Objective: Traditionally, fear of contamination research in OCD has involved physical contamination, where the sense of dirt arises from contact with clear and tangible contaminants (e.g., germs, dirt and harmful substances). More recently, however, it has been postulated that feelings of dirtiness and contamination can also arise in the absence of contact with a physical pollutant (termed mental contamination). However, to our knowledge, there are no studies that examined the relationship between mental contamination, disgust propensity and fear of contamination.

The aims of this study were: 1) to investigate the presence of mental contamination in a sample of OCD patients; 2) to explore the association between mental contamination, disgust propensity and fear of contamination in a sample of OCD patients, controlling for anxiety and depression; 3) to analyze the role of mental contamination as a mediator in the relationship between disgust propensity and contamination-related symptoms.

Method: 83 OCD patients completed a series of self-report questionnaires that included mental contamination (VOCI-MC), disgust propensity (DPQ), OCD symptoms (DOCS), anxiety (BAI) and depression (BDI-II).

Results: Significant correlations were found between disgust propensity, mental contamination and fear of contamination, controlling for anxiety and depressive symptoms. Mediation analysis indicated that mental contamination played a role as mediator in the relationship between disgust propensity and fear of contamination.

Conclusions: Our study provided preliminary evidence that disgust propensity play a role in arising mental contamination feelings, which is strongly related to fear of contamination. Clinical implication are discussed.

Key words: obsessive-compulsive disorder, mental contamination, fear of contamination, disgust propensity

Declaration of interest: none

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Introduction

The fear of contamination has been defined as “an intense and persisting feeling of having been polluted or infected or endangered as a result of contact, direct or indirect, with a person/place/object that is perceived to be soiled, impure, infectious or harmful” (Rachman 2004, p. 1229). Obsessive-compulsive disorder (OCD) patients with fear of contamination generally wash excessively in order to feel that they or someone else is clean and/or safe. The fear of contamination features approximately half of all cases of obsessive-compulsive disorder (Rachman and Hodgson 1980, Rasmussen and Eisen 1992).

Rachman (1994) introduced the concept of mental pollution as a source of dirtiness contributing to fear of contamination. He defined mental pollution as “a sense of internal un-cleanness which can and usually does arise and persist regardless of the presence or absence of external, observable dirt” (Rachman 1994, p. 311).

The “internal sense of dirtiness” stemming from mental contamination is experienced as being similar to ordinary “external” dirtiness (Rachman 1994). However, mental contamination also has a number of distinctive qualities: it can be induced by psychological processes that do not involve direct contact, such as by a thought, a visual image, a critical remark. It can also be revived by memories. Because the internal dirtiness of mental contamination is phenomenologically similar to the more common, even daily, feelings of dirtiness, affected people experience an urge to clean themselves, their surroundings, or their polluted possessions. Unfortunately, these attempts at conventional cleaning are rarely successful, except perhaps transiently. The feelings of internal dirtiness are relatively immune to external cleaning, and are more persistent, puzzling and frustrating (Rachman 1994).

Mental contamination is a transdiagnostic experience which seems to be common in sexual assault victims or after other traumatic experiences (de Silva and

Marks 1999, Fairbrother and Rachman 2004, Gershuny et al. 2003). Previous work in the area of mental contamination has demonstrated that a sexual assault experience as well as the deliberate recall of the assault (as opposed to deliberate recall of a pleasant memory) are sufficient conditions to evoke both subjective reports of mental contamination in the form of feelings of dirtiness and urges to wash, and, importantly, actual washing behaviour (Fairbrother and Rachman 2004).

In order to test this phenomenon in a laboratory setting some authors devised a paradigm called *dirty kiss scenario* involving non-clinical subjects in an imagined non-consensual sexual experience (Fairbrother et al. 2005, Herba and Rachman 2007, Radomsky and Elliott 2009, Elliott and Radomsky 2009). In the first of this series of experiments Fairbrother et al. (2005) asked their (female) participants to imagine that they were the unwilling recipients of a kiss. The imaginal scenario produced feelings of 'internal dirtiness' and negative emotions. A number of the participants subsequently engaged in washing behaviour. In a replication of this experiment, Herba and Rachman (2007) reported that 27 out of 100 participants gargled, rinsed or washed their hands in order to reduce their feelings of dirtiness. In the experiment by Elliott and Radomsky (2009) eight out of 70 participants washed to relieve themselves of the unpleasant physical sensations evoked by the imagined non-consensual event. Further, it has been shown that participants' interpretations or appraisals of the imagined situation, and of the perpetrator in the imagined situations, are significant and robust predictors of mental contamination (Radomsky and Elliott 2009).

Although there is growing attention about the role of mental contamination in OCD, until recently the studies about the association between mental contamination and obsessions, contamination, and washing symptoms have been based on non-clinical samples (Cogle et al. 2008).

A recent study investigated the presence of mental contamination in a clinical sample of OCD patients. Results showed that 10% of OCD patients with fear of contamination reported mental contamination in the absence of contact contamination and 36% of these patients experience both mental and contact contamination (Coughtrey et al. 2012).

Fear of contamination has been posited to be associated with experiences of disgust. In particular, disgust propensity, an individual's tendency to experience disgust, contributes to the aetiology and phenomenology of contamination-related OCD symptoms (David et al. 2009, Olatunji et al. 2006, Olatunji et al. 2004, Olatunji et al. 2005, Schienle et al. 2003, Woody and Tolin, 2002, Phillips et al. 1998, Power and Dalgleish 1997). A number of correlational studies have found positive and significant relationships between measures of disgust propensity and washing rituals of OCD (Olatunji et al. 2005, Tolin et al. 2006, Cogle et al. 2007, David et al. 2009, Olatunji 2010, Olatunji et al. 2004, Olatunji et al. 2005, Sawchuk et al. 2000, Schienle et al. 2003). Moreover, in a non clinical sample, the disgust propensity has been found to be a predictor of washing and checking behaviors (Mancini et al. 2001, Olatunji et al. 2004, Nicholson and Barnes-Holmes 2012), and the results suggest that this construct could have an important role as support factor of OCD symptoms (Olatunji and Sawchuk 2005). Consistently a study, using structural equation modelling, showed the presence of a linear relationship between high disgust propensity and fear of contamination in OCD (Moretz and McKay 2008).

Although disgust in the context of OCD have

received increasing attention, the role that disgust propensity actually plays in the experience of mental contamination remains unexplored.

The aim of our study is to analyze the relationship between mental contamination and disgust propensity and the role of these constructs in contamination-related OCD symptoms.

Aims and hypotheses

The aims of this study were:

1. to investigate the presence of mental contamination in a sample of OCD patients;
2. to explore the association between mental contamination, disgust propensity and fear of contamination in OCD patients, controlling for anxiety and depression;
3. to explore the mediational role of mental contamination in the relationship between disgust propensity and fear of contamination.

Method

1. Participants

Participants were required to have received a current diagnosis of OCD from a mental health professional, such as a psychiatrist or a clinical psychologist using a structured interview such as the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown et al. 1994), and this disorder had to be the primary diagnosis. Exclusion criteria were an age under 18 or over 65 years old, IQ below 90 and psychosis. Participants were recruited from patients who referred to our Institute for a psychological interview.

In total, 83 people with OC symptoms were recruited and completed the study (46 males and 37 females), with a mean age of 32.6 years (SD=9.6). Almost three fourth of all participants (N=61) was not married, and 90% of the sample had at least a medium level of education (greater or equal to 12-13 years of education).

2. Procedure

Participants were initially provided with information regarding the study and completed a consent form. They then provided demographic information and completed the questionnaire measures, presented in a counterbalanced order. Participants were informed that participating in the study would not interfere with any current treatment they may have been receiving. Participants were asked to complete a series of self-report questionnaires that assess mental contamination, OCD symptoms, disgust propensity, anxiety and depression.

All participants were treated in accordance with the Ethical Principles of Psychologists and Code of Conduct (American Psychological Association 2002).

3. Materials

- **Vancouver obsessional compulsive inventory – Mental contamination scale (VOCI-MC;** Rachman 2006). This 27 item scale assesses aspects of mental contamination. Participants rate each item (e.g., 'I often feel dirty under my skin')

on a five-point scale from 0 (“not at all”) to 4 (“very much”). The original VOICI-MC has shown good psychometric properties (Coughtrey 2010, Rachman 2006). The scale has been translated into Italian and validated; it has shown good internal consistency ($.85 \leq \alpha \leq .95$), test-retest reliability ($r = .88$) (Melli et al. in preparation), and construct validity.

- **Disgust Propensity Questionnaire (DPQ)** (Melli et al. 2012). This 33 item scale has been recently developed to improve the assessment of the individual propensity to disgust in the Italian population. Statement choices are scored on a 5 point Likert scale from 0 (“not at all”) to 4 (“very much”), and total score of the scale may range between 0 and 132. This new questionnaire has been found to have good internal consistency ($\alpha = .95$), test-retest reliability ($r = .87$), and construct validity (Melli et al. 2012).
- **Dimensional Obsessive-Compulsive Scale (DOCS)** (Abramowitz et al. 2010). The DOCS is a 20 items scale that assesses the OC main symptom dimension (contamination obsessions and washing/cleaning compulsions; obsessions about responsibility for causing harm and checking compulsions; obsessions about order and symmetry and ordering/arranging compulsions; repugnant obsessional thoughts and mental compulsive rituals or other covert neutralizing strategies). Within each symptom dimension, items - rated on a scale ranging from 0 (no symptom) to 4 (extreme symptoms) - assess five parameters of severity over the past month. Scales were found to be highly reliable, both in terms of internal consistency ($.83 \leq \alpha \leq .96$) and of stability over time ($.55 \leq r \leq .68$) (Abramowitz et al. 2010). The Italian version of the DOCS (Melli et al. in preparation) has shown good internal consistency ($\alpha > .80$ in all scales), temporal stability (ICCs $> .75$ in all scales), and construct validity.
- **Beck anxiety inventory (BAI)** (Beck and Steer, 1990) This is a 21-item self-report inventory that assesses the severity of state anxiety. Statement choices are scored from 0 (“not at all”) to 3 (“severely”) and total score of the scale may range between 0 and 63. The original version has shown good psychometric properties (Beck and Steer 1990), and the Italian version of the BAI has been found to have good internal consistency ($\alpha > .80$), test-retest reliability ($r > .62$) and construct validity (Sica et al. 2006, Sica and Ghisi 2007).
- **Beck depression inventory – II (BDI-II)** (Beck et al. 1996). This 21 item self-report instrument is used to assess depressive symptoms over the past two weeks. Statement choices are scored from 0 (absent) to 3 (severe) and can total from 0 to 63. The BDI-II has shown good psychometric properties (Beck et al. 1996). The Italian version of the BDI-II (Sica et al. 2006, Sica and Ghisi 2007) has shown adequate internal consistency (α in the range $.80-.87$), test-retest reliability ($r = .76$) and construct validity.

4. Statistical Methods

Descriptive statistics were used to characterize the sample with regard to demographic variables such as gender, age, marital status and level of education. Means, standard deviations, range were calculated for each study measure (Disgust Propensity, VOICI-

MC and DOCS fear of contamination subscale), while depressive and anxious measures were used as confounding. The association between different measures was explored using Spearman’s *rho*. Partial correlations were used when adjusting for the effects of anxiety and depression. Following Cohen’s (1988) classification, large correlations will be defined as $.50$ or greater, moderate correlations between $.30$ and $.49$, and small correlations from $.10$ to $.29$.

Logistic regression was used to examine the contribution of each measure to scoring above the cut-off score for DOCS fear of contamination subscale. Scores of more than two standard deviations above the non-clinical norm (i.e., 9 or greater for females and 7 or greater for males) are considered to indicate the presence of clinically relevant fear of contamination. As independent variables, self-report scores (Disgust Propensity Questionnaire and VOICI-MC, as well as confounding BDI-II and BAI) were transformed into categories of tertiles. The choice of tertiles had the aim of leaving more degrees of freedom to the different variables not requiring that the effect was linear.

In order to analyze the role of mental contamination as a mediator in the relationship between disgust propensity and fear of contamination symptoms a mediation analysis was performed. This analysis attempts to identify and explain the mechanism or the underlying process to an observed relationship between the independent variable (disgust propensity) and the dependent variable (fear of contamination), by the inclusion of the proposed mediator (mental contamination), also controlling for potentially covariate variables (i.e., depression and anxiety measures).

The direct, indirect and total effects were tested for significance by bootstrapping, with correction of the distortion (Bias-Corrected) and acceleration (accelerated). The bootstrapping method is a non-parametric method based on resampling with replacement using 5,000 re-samples as an empirical approximation of the sampling distribution, and it is recommended to overcome potential problems caused by unmet assumptions (Preacher and Hayes 2008). This procedure permits to obtain estimates of the indirect effects and to test their significance by using a 95% confidence intervals. If zero is not in the interval, then the researcher can be confident that the indirect effect is different from zero.

Analyses were performed using STATA statistical software, release 11.1.

Results

As reported elsewhere (e.g., Coughtrey et al. 2012), there are limited data regarding when levels of mental contamination may be considered problematic. However, scores of more than two standard deviations above the non-clinical norm (i.e., 40 or greater) are considered to indicate the presence of clinically relevant mental contamination (Coughtrey et al. 2012, Radomsky et al. in preparation). Of the 83 OCD participants who completed the VOICI-MC, 12.0% scored 40 or above, indicating the presence of clinically relevant mental contamination and all of them scored greater than 2 SD’s above population mean at DOCS fear of contamination subscale.

Mean total scores, standard deviations and range for each study measure (Disgust Propensity, VOICI-MC and fear of contamination dimension of DOCS) and their associations are presented in **table 1**. As expected, they were significantly related to each other. The partial

Table 1. Means, standard deviations, range, partial correlations (adjusted for anxiety and depressive measures) between disgust propensity, mental contamination and fear of contamination and statistical significance in OCD sample (N=83)

	Means	SD	Range	1	2
1. Disgust propensity	64.3	27.3	6-127		
2. Mental contamination	19.8	16.8	0-72	.29*	
3. Fear of contamination	7.0	5.9	0-20	.35*	.60°

* p<.01
° p<.0001

correlations, controlling for anxiety and depressive symptoms, ranged from moderate to large in magnitude (.29 to .60), and they were significant (all p 's < .01).

Adjusted estimates of the effect of disgust propensity and mental contamination on fear of contamination are shown in **table 2**. The odds for scoring 2 SD's above population mean at DOCS fear of contamination subscale were about 20 times (OR=19.93, CI: 3.39 – 117.02) as high in OCD participants whose scores at

fear of contamination in OCD patients who scored at Disgust Propensity Questionnaire at 2nd tertile and 59% increment considering the third tertile in DPQ. None of these odds ratios reached statistical significance.

Mediation model was performed in order to explore the role of mental contamination as a mediator in the association between disgust propensity and fear of contamination. As shown in **table 3**, regression results revealed that the disgust propensity was significantly

Table 2. Logistic regression, dependent variable (score at DOCS fear of contamination subscale dichotomized on 2 SD's above population non-clinical norm) and independent variables (VOCI-MC and Disgust propensity) categorized on tertiles of their distributions. Odds-ratio (95% CI), adjusted for anxiety and depressive measure, and levels of statistical significance in OCD sample (N=83)

	Adjusted Odds-ratio (95% CI)	p
MENTAL CONTAMINATION		
2	19.93 (3.39-117.02)	.001
3	59.25 (8.53-411.38)	.000
DISGUST PROPENSITY		
2	0.41 (.10-1.70)	.219
3	1.59 (.39-6.49)	.518

VOCI-MC were at the 2nd tertile. The effect is stronger considering the 3rd tertile (59.25 times) and both these odds were statistically significant (p <.001), adjusted for confounding variables. About 60% reduction of the relative risk to have scores above the threshold in

associated with the mental contamination (path *a*) and that the mental contamination was significantly associated with the fear of contamination (path *b*) as well. The total effect of the disgust propensity on fear of contamination (path *c*) is the effect we would find

Table 3. Mediation model for the effect of Disgust propensity on Fear of contamination through the mediation of Mental contamination in OCD sample (N=83)

Paths	Standardized Coefficients	SE	p-value
<i>a</i> - Direct effect of IV to Mediator (Disgust propensity to Mental contamination)	.17	.06	.006
<i>b</i> - Direct effect of Mediator to DV (Mental contamination to Fear of contamination)	.20	.03	<.001
<i>c</i> - Total effect of IV to DV (Disgust propensity to Fear of contamination)	.07	.02	.001
<i>c'</i> - Direct effect of IV to DV (Disgust propensity to Fear of contamination) after controlling for Mediator (Mental contamination)	.04	.02	.029
Bootstrap result for indirect effect	Boot	SE	BCa-CI 95%
<i>ab</i> - Indirect effect of IV (Disgust propensity) to DV (Fear of contamination) through proposed mediator (Mental contamination)	.03	.02	.006 - .066

Note: BCa-CI = Bias Corrected and accelerated Confidence Interval. Number of Bootstrap Resamples: 5,000.

if there was no mediator in our model, while path c' is the direct effect of disgust propensity to fear of contamination, controlling for mental contamination. All above effects are statistically significant ($p < .05$).

In order to measure the mediation, the estimates of the indirect effect were obtained. **Table 3** also displays the indirect (i.e., the amount of the mediation by means of mental contamination) relationship between disgust propensity and fear of contamination. As the bootstrap 95% CI does not contain 0, hence, the indirect effect was significantly different from zero.

A related measure of mediation is the proportion of the effect that is mediated, i.e. the indirect effect divided by the total effect. In our sample the proportion of the total effect that is mediated is .44, which is a respectable amount. This result could be interpreted that the 44% of the total effect of disgust propensity on fear of contamination is due to the indirect effect through mental contamination. Therefore mediation is present in this model, but the mediator (mental contamination) does not explain all of the association between disgust propensity and fear of contamination. Additionally, the mediation model above presented included the covariate variables (depression and anxiety measures) on fear of contamination. Thus, findings support a model in which mental contamination partially mediated the relationship between disgust propensity and fear of contamination.

Discussion and conclusions

Mental contamination is an understudied presentation of OCD symptoms in which the person experiences a feeling of internal dirtiness, often accompanied by ritualistic washing. This type of fear of contamination, in contrast to contact contamination, can arise also without a physical contact with the source (Rachman 1994, 2004, 2006).

Feelings of disgust are usually experienced alongside feelings of mental contamination (Fairbrother et al. 2005, Herba and Rachman 2007, Elliott and Radomsky 2009, Rachman et al. 2011, Radomsky and Elliott 2009). However, there are many situations in which an individual may feel disgusted but not feel mentally contaminated (e.g., handling dog faeces) (Fairbrother and Rachman 2004). Studies about disgust propensity (i.e. individual's tendency to experience disgust) have found a significant association with contamination-related symptoms (David et al. 2009, Olatunji et al. 2006, Olatunji et al. 2004, Olatunji et al. 2005, Schienle et al. 2003, Woody and Tolin, 2002, Phillips et al. 1998, Power and Dalgleish 1997), moreover it has been found that disgust propensity may be a predictor of washing and checking behaviors (Mancini et al. 2001, Olatunji et al. 2004, Nicholson and Barnes-Holmes 2012).

Because of the lack of evidence about the relationship between mental contamination and disgust propensity in clinical samples, the aim of our study was to investigate the presence of mental contamination in a sample of OCD patients and to explore the association between mental contamination, disgust propensity and fear of contamination, controlling for anxiety and depression, in a sample OCD patients. The prevalence of mental contamination in our sample was 12.0%, which is much lower than the 46.3% reported by Coughtrey et al. (2012). It is possible that the threshold for clinically relevant mental contamination on the VOICI-MC does not apply across cultures and may be set too high for this sample. Further research on the validity of the VOICI-MC in Italian samples is needed. Moreover

this result may be due to the differences between the samples of these studies which are not comparable and they might include different percentage of patients with various subtypes of OCD symptoms.

We found significant correlations between disgust propensity and contamination related OC symptoms after controlling for anxiety and depressive symptoms. This is consistent with previous findings from both nonclinical and clinical samples (among others, Olatunji 2010, Nicholson and Barnes-Holmes 2012), and confirms that disgust propensity is an important affective process underlying fear of contamination.

Mental contamination was significantly correlated with disgust propensity and fear of contamination as well and these correlations varied respectively from moderate to large in magnitude. Moreover, OCD patients in the present study who endorsed higher scores at VOICI-MC (corresponding to 3rd tertile) were sixty times as likely to be classified with clinically significant fear of contamination than patients who scored at VOICI-MC in the 1st tertile and this difference did reach statistical significance.

Our findings also support a model in which mental contamination partially mediates the relationship between disgust propensity and fear of contamination, when controlling for confounding variables.

The current study provides initial support for the combined roles of disgust propensity and mental contamination in OCD symptoms, but additional research is needed to support this model. The first limitation of this research is that participants were self-selected, therefore the sample may not be representative. In addition, further research is needed to explore the psychometric properties of the VOICI-MC and to establish a clinical cut-off since we used a statistical criterion (more than two standard deviations above the non-clinical norm) as in previous studies (Coughtrey et al. 2012, Radomsky et al. in preparation). In addition, since we used a cut-off score that has been established in a different cultural context, the prevalence of mental contamination in our OCD sample may be incorrect estimate of this phenomenon in patients with OC symptoms.

Finally, while the mediational model suggested provides some hypotheses regarding the directionality of the relationships between these variables, the current study was cross-sectional and therefore unable to examine the timing of the interaction. Longitudinal data are needed to examine more precisely the nature of the relationships between the examined variables. Future research would benefit from examining the links between disgust sensitivity, mental contamination and OCD symptoms involving different clinical subtypes of OCD patients thus facilitate the identification of specific factors associated with particular kinds of OCD symptoms.

Despite these limitations, the present study identifies factors that would benefit from further evaluation and could have important implications for the treatment of contamination-related OCD symptoms.

Although psychological treatment for OCD, including Exposure and Response Prevention (ERP; Meyer 1966) and cognitive therapy (Salkovskis 1999, Rachman 1997) have been found to be effective in a number of randomized controlled trials (Foa et al. 2005, Cottraux et al. 2001, De Hann et al. 1997, Greist et al. 2002), there are some evidences about high drop-out rates (De Hann et al. 1997, Foa et al. 2005) and not statistically reliable reductions in symptomology (Abramowitz et al. 2009). These data may be explained by the fact that OCD contamination-related symptoms

connected with feelings of disgust, instead of anxiety or fear, are less responsive to the CBT techniques (Mason and Richardson 2010, Shapiro and Stewart 2011). In particular Mason and Richardson (2010) showed that, compared to fear, disgust demonstrates increased resistance to extinction, making ERP interventions potentially less effective. In order to explain this evidence of decreased effectiveness in OCD treatment, Rachman (2010) proposed that the treatment of mental contamination in OCD has to differ from standard OCD treatment and have more a cognitive focus to help patients to deal with their internal sense of dirtiness. Moreover it is well known that mental contamination has a connection with past traumatic experiences, such as victimization, humiliation, betrayal (Warnock-Parks et al. 2012, Rachman 2010), so this evidence suggests the need of approaches directed to the treatment of trauma (i.e. imagery rescripting or EMDR) in association with CBT techniques to improve the therapy of OCD patients with mental contamination.

The results of the present study have shown that mental contamination has an important role in contamination-related symptoms, in particular as a mediator, and that there is a significant association between mental contamination and disgust propensity in OCD patients with fear of contamination. These data supported the need of a specific assessment for the presence of mental contamination symptoms in clinical settings before developing treatment plans directed to OCD contamination-related symptoms.

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