

RUNNING HEAD: MENTAL CONTAMINATION IN OCD

Mental Contamination in Obsessive-Compulsive Disorder**Abstract**

It was recently proposed that feelings of contamination can arise in the absence of physical contact with a contaminant. Currently, there are limited data regarding this construct of 'mental contamination' although it is hypothesised to be relevant to Obsessive-Compulsive Disorder (OCD) where compulsive washing in response to contamination fear is a common presentation (Rachman, 2006). This research examined the presence of mental contamination in OCD. Participants ($N = 177$) with obsessive-compulsive symptoms completed questionnaires to assess mental contamination, OCD symptoms and Thought-Action Fusion (TAF). Findings indicated that 46% of participants experienced mental contamination, and severity was associated with severity of OCD symptoms and TAF. Mental contamination in the absence of contact contamination was reported by 10.2% of participants. Similar findings were reported in a sub-sample of participants who had received a formal diagnosis of OCD ($N = 54$). These findings suggest that mental contamination is a distinct construct that overlaps with, but is separate from, contact contamination, and provide preliminary empirical support for the construct.

Keywords: Mental Contamination, Obsessive-Compulsive Disorder, Compulsive Washing, Thought-Action Fusion

Highlights

- We examined mental contamination in people with OCD symptoms.
- 46% experienced feeling dirty in the absence of physical contact with a contaminant.
- Mental contamination was associated with OCD symptoms and Thought-Action Fusion.
- Mental contamination overlapped with, but was distinct from, contact contamination.

1. Introduction

Rachman's (2004, 2006) theory of the fear of contamination postulates that feelings of dirtiness and contamination can arise following physical contact with a contaminant (contact contamination) but also in the absence of contact with a physical pollutant (mental contamination). Mental contamination is thought to occur in a number of forms and is associated with emotional and/or physical violations, such as degradation, betrayal, abuse. Mental contamination can also arise after experiencing repugnant unwanted intrusive thoughts, memories and mental images. According to the theory, contact and mental contamination regularly co-occur, but the relationship is asymmetric; many people with mental contamination report symptoms of contact contamination, but few people with contact contamination present with accompanying mental contamination (Rachman, 2006). Their co-occurrence is likely due to the fact that mental and contact contamination share a number of overlapping features, such as feelings of discomfort and dread, and the resulting urges to wash, clean and avoid re-contamination.

Mental contamination is relevant to a number of psychological disorders including Obsessive-Compulsive Disorder (OCD), Post-Traumatic Stress Disorder (PTSD) and specific phobia. It is conceptually related to PTSD due to its association with physical violation, and to specific phobia due to the similarities in emotional and behavioural reactions (e.g. strong feelings of disgust) evoked by contamination fear and other phobias (e.g. Rachman & Hodgson, 1980; Rachman, 2006). Mental contamination generates strong urges to wash in order to remove the feelings of dirtiness and pollution, and hence has particular relevance to OCD, in which compulsive cleaning driven by a fear of contamination is reported by around 38 % of patients (Foa et al., 1995; Calamari et al., 2004). Mental contamination is also hypothesised to be related to checking compulsions and repetitive reassurance seeking.

To date, the evidence for the presence of mental contamination in anxiety disorders is based on case studies of patients with OCD and/or PTSD. These clinical observations indicate that feelings of dirtiness, contamination and pollution can arise in the absence of physical contact with a contaminant (e.g. Eysenck & Rachman, 1965; de Silva & Marks, 1999; Gershuny et al., 2003; Rachman, 2006; Volz & Heyman, 2007). Furthermore, preliminary findings suggest that mental contamination may be present in a proportion of PTSD sufferers, especially when the trauma involves a physical violation. For example, Fairbrother and Rachman (2004) reported that 20 out of 50 female victims of sexual assault

demonstrated significant levels of mental contamination. Almost 2/3^{rds} of the sample reported feeling morally tainted, internally dirty and polluted, and these feelings could be re-evoked by recalling memories and mental images of the assault. These feelings of mental contamination triggered excessive washing that was reported to be ineffective. Just over half (51%) had a long or hot shower, 9% carried out extra washing of genitals and 6% used special cleaning products, but 34% of the sample still felt contaminated even after washing. Case studies can be persuasive, but systematic investigations of the presence of mental contamination are needed in order to verify the phenomenon.

Many researchers view OCD and other anxiety disorders on a continuum, and symptoms similar to those reported by clinical populations found in healthy populations (Olatunji, Williams, Haslam, Abramowitz & Tolin, 2008). Indeed, the cognitive approach to OCD is predicated on unwanted intrusive thoughts being a normal phenomenon (cite a book not by Rachman, ideally by Abramowitz). Despite some controversy (reference the paper saying normal/abnormal are not the same in BRAT a few years ago), it is reasonable to consider that mental and contact contamination fears, like other forms of anxiety, have multiple dimensions (cite Abramowitz stuff) and are on a continuum rather; this indicates that mental contamination can be studied in non-clinical populations. Psychometric analyses of contamination fear within healthy populations have shown that mental contamination is related to OCD symptomatology and to Thought-Action Fusion (TAF) a cognitive bias commonly seen in OCD (Shafran, Thordarson & Rachman, 1996). TAF is 'the belief that thinking about an unacceptable or disturbing event makes it more likely to happen, and the belief that having an unacceptable thought is the moral equivalent of carrying out the unacceptable or disturbing action' (Shafran et al., 1996; page 379). TAF is thought to contribute to the maintenance of mental contamination by raising estimations of the probability and severity of potential harm, increasing feelings of harm, guilt and responsibility, and contributing to the inference that danger and contamination is present (Rachman, 2006).

Using self-report measures, Cogle and colleagues (2008) found that a measure of mental contamination was significantly positively associated with symptoms of OCD in healthy students, even when depressive symptoms and levels of guilt were controlled for. Similar findings have been reported using the mental contamination subscale of the Vancouver Obsessive Compulsive Inventory (VOCI; Thordarson et al., 2004; Rachman,

2006). Radomsky and colleagues (submitted) found that in a sample of 142 students, scores on the mental contamination subscale of the VOI were highly correlated with contamination sensitivity, TAF, contamination specific TAF, anxiety and disgust, even when depression was controlled for. Taken together, these findings suggest that mental contamination is related to OCD symptoms and to TAF in healthy populations.

Fears of contact and mental contamination are conceptually and empirically differentiated on some self-report measures of OCD symptoms in non-clinical samples (Rachman, 2006). In addition, experimental work in healthy samples has indicated that there is a relationship between physical and moral purity. For example, Zhong and Liljenquist (2006) found that when healthy participants were asked to recall unethical memories or copy out immoral stories, they were more likely to complete word fragments to form washing related words, more likely to rate cleaning products as more desirable than general household objects and chose antibacterial handwipes over pencils when offered a choice of free gift. Similarly, Schnall, Benton and Harvey (2008) demonstrated that physical cleaning reduced the severity of participants' negative moral judgements. Furthermore, experimental work has indicated that it is possible to evoke feelings of mental contamination and washing behaviours in healthy students by asking them to image either receiving or perpetrating a non-consensual kiss (Fairbrother, Newth & Rachman, 2005; Herba & Rachman, 2007; Radomsky & Elliot, 2009; Rachman, Radomsky, Elliot & Zysk, 2012). Research has shown that imagining a consensual kiss with a man described as immoral was enough to evoke feelings of mental contamination in health participants (Elliot & Radomsky, 2009) and that appraisal variables uniquely predict feelings of mental contamination (Radomsky & Elliot, 2009).

If mental contamination is a clinically relevant phenomenon in its own right, separate from contact contamination and general negative affect, then its presence may require a different treatment intervention (Jacobi, Herba & Rachman, 2005; Rachman, 2006). However, at present there are limited data pertaining to the presence of mental contamination in clinical populations. Therefore, the aim of the studies reported here were to investigate the presence of mental contamination in people with significant obsessive-compulsive problems and establish whether it is distinct from contact contamination and general negative affect. Study 1 was a preliminary study that explored these relationships in a large sample of people

with high obsessive-compulsive (OC) symptoms. These relationships are then examined in more detail in a sub-sample of participants with a formal diagnosis of OCD in Study 2.

2. Study 1

2.1. Aims & Hypotheses

The primary aim of this study was to establish the proportion of people with obsessive-compulsive (OC) symptoms who experience mental contamination, using a measure of mental contamination (VOCI-MC; Rachman, 2006, see Study 2 for details). In order to receive a formal diagnosis of OCD, a patient must be diagnosed by a mental health professional using a structured interview such as the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown, DiNardo & Barlow, 1994). All participants reported that they had been told they had OCD by a medical practitioner or other health professional, but as it was not possible to determine that they had received a formal diagnosis of OCD using a structured interview, participants in this study are referred to as people with high OC symptoms.

Based on the findings from previous work exploring mental contamination in healthy populations, it was hypothesised that:

1. Mental contamination would be present in a subset of people with high OC symptoms;
2. Mental contamination would be related to, but separate from contact contamination; and
3. Mental contamination would be related to other OC symptoms and TAF.

2.2. Method

2.2.1 Participants. Participants were required to have received a diagnosis of OCD from their General Practitioner or from a mental health professional such as a psychiatrist, clinical psychologist or counselor, and be aged 18-65 years in order to participate. Eleven participants were excluded from the study as they did not report that they had received a diagnosis of OCD; an additional 32 participants were excluded because they did not fully complete all the measures in the study. In total, 177 people with high OC symptoms completed the study (130 females and 47 males) with a mean age of 34.40 years ($SD =$

11.43). Eighty participants (45.2 %) reported that they were currently receiving treatment. Of the 63 participants who provided details regarding their treatment, 76 % were receiving cognitive-behavioural therapy (CBT), medication or a combination of the two.

Participants were recruited from local support groups ($n = 127$), a database of past referrals for treatment for OCD ($n = 32$), and from clients who were current receiving treatment at a local clinic ($n = 18$). For further details on recruitment methods, see Study 2.

2.2.2. Procedure. Participants completed a questionnaire measure of mental contamination (VOCI-MC; Rachman, 2006); OC symptoms (OCI-R; Foa et al., 2002) and TAF (Shafran et al., 1999) - see Study 2 for further details. Participants either completed hard copies of the questionnaires via a postal survey (33.9%) or electronic versions online (66.1%). Regardless of the mode of delivery, participants received the same information in a similar format. Participants were given detailed information regarding the study and were informed that their participation would not interfere with any current treatment they may have been receiving. All participants completed a consent form and provided demographic information including a brief description of their diagnoses, current difficulties and treatment history. Participants then completed the VOCI-MC, OCI-R and TAF, presented in a counterbalanced order. This study received approval from the local National Health Service ethics committee.

2.3. Results

There were no significant differences in the mean scale scores of participants who completed the questionnaires electronically compared to those who completed a postal survey, or as a function of recruitment strategy (all p 's < .05).

2.3.1. The presence of mental contamination and the relationship between mental and contact contamination. The mean scores on the questionnaire measures are shown in Table 1. Based on the clinical scores on the OCI-R reported in Foa et al. (2002) and in Abramowitz and Deacon (2006), the mean total score of 36.19 ($SD = 15.49$) on the OCI-R indicated that the sample had moderate to severe OC symptoms. Using the total score cut-off of the OCI-R, 82.9% of the sample had clinically elevated OC symptoms; this rose to 86.5% when the cut-off of the obsessions sub-scale was used (Foa et al., 2002). A mean total score

of 34.30 ($SD = 19.44$) on TAF is similar to the clinical norms reported in Shafran et al. (1996).

---INSERT TABLE 1 HERE---

It is likely that mental contamination is a dimensional construct, with low levels present in the normal population. At present 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 (Rachman, personal communication, June 23rd 2009; Radomsky et al., submitted). Of the 177 participants who completed the VOICI-MC, 46.3% scored 40 or above, indicating the presence of clinically relevant mental contamination, and 51.4% scored greater than six on the OCI-R washing subscale, indicating the presence of contact contamination (Foa et al., 2002). Of the total sample, 10.2% reported mental contamination in the absence of clinically relevant contact contamination, 15.3% reported contact contamination in the absence of clinically relevant mental contamination, 36.1% experienced both mental and contact contamination and 38.5% did not report contamination fears, see Figure 1. Specifically, for the participants who had contamination fear ($n = 116$), 61.21% had both mental and contact contamination, 15.52% had mental contamination only, and 23.27% had contact contamination only.

---INSERT FIGURE 1 ABOUT HERE---

2.3.2. The relationship between mental contamination, OC symptoms and TAF.

The relationship between mental contamination, OC symptoms and TAF was examined using Bonferroni corrected Pearson's r correlations, with alpha set at .005 to account for multiple comparisons. Scores on the VOICI-MC were significantly correlated with total scores on the OCI-R, each of the six subscales, and with TAF, see Table 1.

3. Study 2

As far as is known, Study 1 is the first to systematically investigate the nature of mental contamination in OCD by studying a large sample of people with high OC symptoms, recruited from a number of diverse sources. Most importantly, it provides an estimate of the number of people with high OC symptoms for whom mental contamination is likely to be a

clinically relevant feature (46.3%). However, a major limitation of Study 1 was the lack of formal diagnoses of patients' symptoms as the diagnosis of OCD did not involve completion of a standard interview such as the ADIS-IV (Brown et al., 1994). As the role of depression or anxiety in mental contamination was not studied, it was necessary to establish the independence of mental contamination from depression or general negative affect.

3.1. Aims and Hypotheses

The aim of Study 2 was to address the limitations of Study 1, by examining the nature of mental contamination in a subset of participants who had received a formal diagnosis of OCD. Based on Rachman's (2006) theory of mental contamination and the findings of Study 1, it was predicted that in a subsample of participants from Study 1 who had received a formal diagnosis of OCD, it would emerge that:

- 1) Contact contamination is more common than mental contamination;
- 2) Mental contamination is related to, but separable from contact contamination;
- 3) Mental contamination is associated with other OCD symptoms, general sensitivity to contamination, TAF and contamination specific TAF; and
- 4) Mental contamination is associated with, but distinct from negative affect and general anxiety.

3.2. Method

3.2.1. Participants. Participants from Study 1 who had indicated that they would be interested in taking part in further research ($N = 106$) were contacted and invited to participate. A total of 54 (50.94%) completed Study 2 (35 females and 19 males) with a mean age of 33.39 years ($SD = 10.89$). There were no significant differences between participants who did respond and those who did not in terms of VOCI-MC, OCI-R and TAF scores, age or gender, p 's $> .05$. Formal diagnosis of OCD was obtained using the ADIS-IV (Brown et al., 1994) administered by the first author for 21 participants; the remaining 33 had previously been diagnosed with OCD using a structured interview by a mental health professional. There were no differences between participants who were diagnosed with the ADIS-IV and those diagnosed using a structured interview by a mental health professional in terms of age, gender or severity of symptoms. The majority of the sample (89.7%) were currently receiving treatment, of which 76.9% were receiving CBT and/or medication.

Participants were recruited from a number of sources:

3.2.1.1. Past referrals. Patients with OCD referred for treatment to local community mental health teams within the past five years were identified. Information was available for 4,551 referrals, of which 393 had been referred for OCD (8.64%). For ethical reasons, the associated clinician was consulted prior to contacting each patient to ensure they would be suitable to participate. Reasons for exclusion included: OCD was not the primary concern/focus of treatment; patient had moved away/no contact details were available; patient had declined treatment; patient had specifically stated they did not wish to receive any further psychological or research input; patient deceased; and/or that the clinician felt that the patient would be particularly distressed to be contacted regarding their obsessional difficulties. Thirty-two of the 226 patients consented to participate in Study 1 and 2 participated in Study 2.

3.2.1.2. Patients currently in treatment. Nine clinicians from local community mental health teams agreed to give the questionnaire measures to all new OCD referrals. Each clinician was contacted approximately once every two weeks to obtain questionnaire scores. Eighteen patients recruited by this method participated in Study 1 and 16 participated in Study 2.

3.2.1.3. Support groups. Information about the research was distributed to a number of local OCD support groups and electronic links to online surveys were placed on two national OCD charity websites. An additional 127 participants with OC symptoms were recruited in this manner for Study 1 and 36 participated in Study 2, of which 38.58 % were currently receiving treatment.

3.2.2. Materials.

3.2.2.1. 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 VOCI-MC has high internal consistency (Cronbach’s $\alpha = .96$; Rachman, 2006; Coughtrey, 2010). Using data from Study 1, the internal consistency of the scale was Cronbach’s $\alpha = .94$.

3.2.2.2. Obsessional Compulsive Inventory Short Version (OCI-R; Foa et al., 2002). This is a shortened version of the original OCI, designed to assess OCD symptomatology and severity. It contains 18 items, e.g. ‘I wash my hands often and longer than necessary’ that participants rate on a five-point scale from 0 = *not at all* to 4 = *extremely*. The OCI-R has six subscales relating to washing, checking, ordering, obsessions, hoarding and counting/neutralising obsessions and compulsions. The OCI-R is a psychometrically sound measure with reported internal consistency, test-retest reliability and discriminant validity (Foa et al., 2002). The individual subscales also have reported internal consistency (Cronbach’s α coefficients range from .57 - .89; Huppert et al., 2007).

3.2.2.3. Thought-Action Fusion Scale (TAF; Shafran et al., 1996). This 19 item instrument is used to assess TAF. Participants rate statements e.g. ‘If I wish harm on someone, it is almost as bad as doing harm’ on a five-point scale from 0 = *strongly disagree* to 4 = *strongly agree*.’ The TAF scale contains items pertaining to moral TAF, and items related to harm to self and harm to others, and has good internal consistency (Cronbach’s α = .92; Shafran et al., 1996).

In addition to the measures described in Study 1, participants were also asked to complete the following questionnaires to further explore the relationship between mental contamination and other OCD symptoms:

3.2.2.4. Thought-Action Fusion – Mental Contamination Scale (TAF-MC; Rachman, 2006). This 10 item instrument assesses beliefs about TAF relating to contagion. Participants rate each item e.g. ‘If I have a thought about getting contaminated, it increases the risk of actually becoming contaminated’ on a five-point scale from 0 = *strongly disagree* to 4 = *strongly agree*. The TAF-MC scale has reported internal consistency (Cronbach’s α = .92; Rachman, 2006). The TAF-MC was included to examine whether the relationship between TAF and mental contamination was specific to TAF relating to contagion.

3.2.2.5. Sensitivity to Contamination Scale (S-CTN; Rachman, 2006). This 24 item self-report instrument is used to assess sensitivity to contamination. Participants rate the extent to which they agree with statements e.g. ‘it scares me when my skin feels all prickly’ on a five point scale from 0 = *strongly disagree* to 4 = *strongly agree*. The S-CTN has reported high internal consistency (α = .92; Rachman, 2006). This measure was included to examine whether mental contamination was related to a general sensitivity to contamination.

3.2.2.6. Personal Significance Scale (PSS; Rachman, 2006). This 26 item self-report instrument is used to assess the significance a person places on their intrusive thoughts and images. Participants are asked to rate 23 statements e.g. ‘do you feel responsible for these thoughts?’ on a nine-point scale from 0 = *not at all* to 8 = *definitely*. The PSS is reported to have good internal consistency ($\alpha = .90$) and convergent and discriminant validity (Whittal, Woody, McLean, Rachman & Robichaud, 2010).

3.2.2.7. Beck Anxiety Inventory (BAI; Beck & Steer, 1990). This 21 item instrument is used as measure of clinical symptoms of anxiety and has high internal consistency ($\alpha = .92$; Beck & Steer, 1990).

3.2.2.8. Beck Depression Inventory (BDI-II; Beck, Steer & Brown, 1996). This 21 item self-report instrument is used to measure depressive symptoms over the past two weeks. The BDI-II has high internal consistency ($\alpha = .90$; Beck, Steer, Ball & Ranieri, 1996) and one week test-retest reliability ($r = .93$; Beck, Steer & Brown, 1996).

3.2.3. Procedure. Participants either completed hard copies of the questionnaires via a postal survey (29.6%) or electronic versions online (70.4%). Regardless of the mode of delivery, participants received the same information in a similar format. 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. This study received approval from the local NHS ethics committee.

3.3. Results

There were no significant differences in the mean scale scores of participants who completed the questionnaires electronically compared to those who completed a postal survey, or as a function of recruitment strategy (all p 's < .05).

3.3.1. The presence of mental contamination and the relationship between mental and contact contamination. The mean scores on the questionnaire measures are shown in Table 2. Based on the clinical scores on the OCI-R reported in Foa et al. (2002) and in Abramowitz and Deacon (2006), the mean total score on the OCI-R indicated that the sample

had moderate to severe OCD symptoms. Using the total score cut-off of the OCI-R, 87.1% of the sample had clinically elevated OC symptoms; this rose to 89% when the cut-off of the obsessions sub-scale was used (Foa et al., 2002). The mean total score on TAF is similar to the clinical norms reported in Shafran et al. (1996) and the scores on the BDI-II and BAI are indicative of moderate levels of depression and anxiety (Beck & Steer, 1990; Beck et al., 1996).

---INSERT TABLE 2 HERE---

Of the 54 participants who completed the VOICI-MC, 44.4% scored 40 or greater, indicating the presence of mental contamination. The presence of contact contamination concerns was indicated by scores greater than six on the washing subscale on the OCI-R (based on Foa et al., 2002). 56.25% of the participants (n=32) who had any contamination fear, reported both mental and contact contamination, 18.75% had mental contamination only, and 25% had contact contamination only. Out of the total sample, 40.7% did not report contamination fears, see Figure 2.

---INSERT FIGURE 2 HERE---

3.3.2. The association between mental contamination and other forms of psychopathology. The relationship between mental contamination and other forms of psychopathology was examined using Pearson's r correlations, with alpha set at $p < .005$ to account for multiple tests. Significant positive correlations were obtained between mental contamination and OCD symptoms, sensitivity to contamination, contamination specific TAF and depressive symptoms. With an adjusted alpha level, mental contamination was not significantly correlated with TAF, generalised anxiety as measured by the BAI, or the PSS.

3.3.3. The relationship between mental contamination and negative affect. To examine the relationship between mental contamination and psychopathology whilst controlling for negative affect, partial correlations were conducted controlling for BDI-II score. All correlations remained significant, p 's $< .005$ (adjusted alpha), indicating that the relationship between mental contamination and psychopathology was not accounted for by depressive symptoms.

An independent samples *t*-test indicated that there were no significant differences between people with and without mental contamination in terms of scores on the BDI-II, $p > .05$. Of the 24 people with mental contamination, 12.50% had minimal depression (as indicated by a score of < 13 on the BDI-II), 4.17% had mild depression (scores between 14-19), 58.33% had moderate depression (scores between 20-28) and 25% had scores > 29 indicative of severe depression (Beck et al., 1996).

4. General Discussion

The results indicate that mental contamination is a common problem in people with obsessive compulsive disorders, and adds to the growing body of evidence for the existence of the phenomenon (e.g. Rachman, 2006; Cogle et al., 2008; Radomsky et al., submitted). In Study 1, 46.3% of people with high OC symptoms reported mental contamination fear, suggesting that they had some experience of contamination in the absence of physical contact. Similarly, the findings of Study 2 indicated that in a subset of participants from Study 1 who had received a formal diagnosis of OCD, 44.4% experienced feelings of contamination in the absence of physical contact with a contaminant. The results suggest that mental contamination is a familiar problem for people with OCD that may well have been overlooked, and support Rachman's (2006) musing that mental contamination 'has a long past, but a short history' (p.2). Indeed, the term 'pollution of the mind' was introduced by John Bunyan in the fifteenth century to explain his reaction to intrusive blasphemous thoughts, but was ignored until relatively recently (Bunyan, 1947; Rachman, 2006).

The theory of contamination proposes that contact contamination is more common than mental contamination, and that mental and contact contamination fears are overlapping but distinct constructs (Rachman, 2006). In Study 1, 10.2% of participants reported mental contamination in the absence of clinically relevant contact contamination, 15.3% reported contact contamination in the absence of clinically relevant mental contamination, and 36.1% experienced both mental and contact contamination. Similarly, in Study 2, 11.1% participants experienced mental contamination in the absence of clinically relevant contact contamination, and 14.8% experienced contact contamination in the absence of clinically relevant mental contamination. Together, these findings are in support of the hypothesis that mental contamination is related to contact contamination, but is a separate construct (Rachman, 2006). However, the results did not support the hypothesis that contact contamination is more common than mental contamination. In fact, the percentages of

participants experiencing mental contamination were remarkably high. This may be because a) mental contamination is more common than previously thought, but more difficult to pick up in clinical assessments; or b) because of a response bias to the questionnaire towards people with contamination concerns, leading to an inflated rate of people with mental contamination. Further research with a larger sample and people with a broader range of OCD symptoms is needed to confirm these results.

In both studies, scores on the VOICI-MC were significantly positively correlated with scores on the OCI-R, suggesting that feelings of mental contamination were associated with increased OCD symptom severity. However, the causality of this relationship cannot be determined. It is possible that symptoms of mental contamination lead to increased OCD symptoms, or alternatively that patients with more severe OCD are more susceptible to experiencing feelings of mental contamination. Further research is needed to explore this issue.

In Study 1, mental contamination was positively correlated with a measure of TAF, a bias thought to contribute to the maintenance of mental contamination (Rachman, 2006). This mirrors the findings in healthy populations (Cogle et al., 2008; Radomsky et al., submitted). However, while mental contamination was positively correlated with sensitivity to contamination and contamination related TAF in Study 2, the relationship between mental contamination and TAF did not reach significance. This may in part be due to the small sample size in this study and also a result of using an alpha correction for multiple analyses, which in some cases may be overly stringent (Benjamini, Drai, Elmer, Kafkafi & Golani, 2001). Therefore the relationship between mental contamination and TAF warrants further investigation.

Mental contamination was not associated with general anxiety, and although positive correlations between mental contamination and depressive symptoms were found, this did not influence the relationship between mental contamination, OCD symptoms and TAF. Furthermore, there were no significant differences in depression scores between people with and without mental contamination, and 12.5% of people with mental contamination had minimal depression (as indicated by scores <13 on the BDI-II). These findings indicate that whilst mental contamination fear is associated with low mood, it is separate construct from general negative affect. As obsessions are related to mood state (Ricciardi & McNally, 1995), it remains possible that mental contamination is related to depression. Further

research is needed to investigate whether the relationship between mental contamination and depression is due to the theoretical links between contamination inducing thoughts and low mood.

4.1. Limitations

A major limitation of this research is that participants were self-selected and therefore the sample may not be representative. Additionally, participants in Study 2 were recruited from those who participated from Study 1. Therefore, these findings require replication with a larger and new clinical sample, recruited from consecutive referrals or the general population to ensure that contamination concerns are not over-represented. All participants should be formally diagnosed using the same standardised interview.

The studies reported here relied on the use of questionnaire measures to explore symptoms of mental and contact contamination. Further research is needed to explore the psychometric properties of the VOICI-MC and to examine whether contact and mental contamination items load onto separate factors. It will also be necessary to further explore at what level symptoms of mental contamination become problematic and debilitating. Future research would also benefit from the use of semi-structured interviews in addition to questionnaire measures to explore the presence of symptoms of mental and contact contamination in people with OCD.

Additionally, these studies did not examine the presence of mental contamination in other anxiety disorders. Further research into the presence of mental contamination in OCD would benefit from including an anxiety disorder control group and from considering other relevant clinical phenomenon such as disgust.

4.2. Conclusions

To date, these studies are the first to provide evidence that mental contamination fears can arise in the absence of physical contact with a perceived contaminant. This is an important step in establishing mental contamination as a distinct phenomenon. Further research is needed to explore the variables which influence whether a patient presents with mental contamination, contact contamination or mixed contamination fear, and to investigate the overlapping features of mental and contact contamination. In the longer term, studies

should be carried out to determine whether mental contamination occurs in other forms of anxiety disorders, and other forms of psychopathology.

5. Acknowledgements

This research was supported by a University of Reading Pump Priming Fund awarded to Professor Roz Shafran and Simon Enright. The work reported here formed part of a Ph.D. dissertation submitted to the University of Reading, May 2010. The authors are indebted to Simon Enright and Berkshire Healthcare Foundation NHS Trust for their support in this research, and are grateful to Louise Onslow for her assistance in recruiting participants.

6. References

- Abramowitz, J.S., & Deacon, B.J. (2006). Psychometric properties and construct validity of the obsessive-compulsive inventory-revised: Replication and extension with a clinical sample.
- Beck, J.S., & Steer, R.A. (1990). *Beck anxiety inventory manual*. San Antonio, TX: Psychological Corporation.
- Beck, J.S., Steer, R.A., & Brown, G.K. (1996). *Manual for the Beck depression inventory-II*. San Antonio, TX: Psychological Corporation.
- Beck, J.S., Steer, R.A., Ball, R., & Ranieri, W.F. (1996). Comparison of Beck depression inventories I and II in psychiatric outpatients. *Journal of Personality Assessment*, 67, 588-597.
- Benjamini, Y., Drai, D., Elmer, G., Kafkafi, N., Golani, I. (2001). Controlling the false discovery rate in behaviour genetics research. *Behavioural Brain Research*, 125, 279-284.
- Brown, T.A., DiNardo, P. & Barlow, D.H. (1994). *Anxiety disorders interview schedule adult version (ADIS-IV): Client interview schedule*. Oxford: Oxford University Press.
- Bunyan, J. (1947). *An anthology*. Edited by A. Stanley. London: Eyre & Spottiswoode.

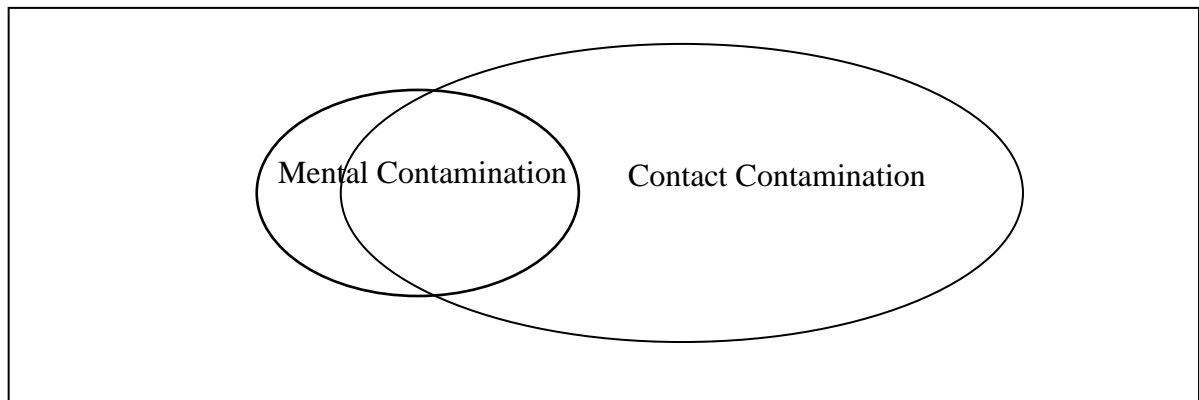
- Calamari, J.E., Weigartz, P.S., Riemann, B.C., Cohen, R.J., Greer, A., Jacobi, D.M., Jahn, S.C., & Carmin, C. (2004). Obsessive-compulsive disorder subtypes: An attempted replication and extension of a symptom based taxonomy. *Behaviour Research and Therapy*, *42*, 647-70.
- Cougle, J.R., Lee, H.J., Horowitz, J.D., Wolitzky-Taylor, K.B., & Telch, M.J. (2008). An exploration of the relationship between mental pollution and OCD symptoms. *Journal of Behaviour Therapy and Experimental Psychiatry*, *39*, 340-353.
- Coughtrey, A.E. (2010). Exploring the fear of contamination: Mental contamination in OCD. PhD thesis. University of Reading, UK.
- de Silva, P., & Marks, M. (1999). The role of traumatic experiences in the genesis of OCD. *Behaviour Research and Therapy*, *37*, 941-951.
- Elliot, C.M., & Radomsky, A.S. (2009). Analyses of mental contamination part 1: experimental manipulations of morality. *Behaviour Research and Therapy*, *47*, 995-1003.
- Eysenck, H.J., & Rachman, S.J. (1965). *Causes and cures of neurosis*. London: Routledge & Kegan Paul.
- Fairbrother, N., Newth, S., & Rachman, S.J. (2005). Mental pollution: Feelings of dirtiness without physical contact. *Behaviour Research and Therapy*, *43*, 121-130.
- Fairbrother, N., & Rachman, S.J. (2004). Feelings of mental pollution subsequent to sexual assault. *Behaviour Research and Therapy*, *42*, 173-190.
- Foa, E.B., Kozak, M.J., Goodman, W.K., Hollander, E., Jenike, M.A., & Rasmussen, S.A. (1995). DSM-IV Field trial: Obsessive-compulsive disorder. *American Journal of Psychiatry*, *152*, 90-96.
- Foa, E.B., Huppert, J.D., Leiberg, S., Langner, R., Kichic, R., Hajcak, G., & Salkovskis, P.M. (2002). The obsessive-compulsive inventory: Development and validation of a short version. *Psychological Assessment*, *14*, 485-496.

- Gershuny, B., Baer, L., Radomsky, A., Wilson, K., & Jenike, M. (2003). Connections among symptoms of OCD and PTSD: A case series. *Behaviour Research and Therapy*, *41*, 1029-1042.
- Herba, J.K., & Rachman, S.J. (2007). Vulnerability to mental contamination. *Behaviour Research and Therapy*, *45*, 2804-2812.
- Huppert, J.D., Walther, M.R., Hajcak, G., Yadin, E., Foa, E.B., Simpson, H.B., & Liebowitz, M.R. (2007). The OCI-R: Validation of the subscales in a clinical sample. *Journal of Anxiety Disorders*, *21*, 394-406.
- Jacobi, D., Herba, J., & Rachman, S.J. (2005). Vancouver University Hospital: Anxiety Disorders Clinic, unpublished data.
- Olatunji, B.O., Williams, B.J., Haslam, N., Abramowitz, J.S., & Tolin, D.F. (2008). The latent structure of obsessive-compulsive symptoms: A taxometric study. *Depression and Anxiety*, *25*, 956-958.
- Rachman, S.J. (2004). Fear of contamination. *Behaviour Research and Therapy*, *42*, 1227-1255.
- Rachman, S.J. (2006). *The fear of contamination: Assessment and treatment*. Oxford: Oxford University Press.
- Rachman, S.J., & Hodgson, R.J. (1980). *Obsessions and compulsions*. Englewood Cliffs, NJ: Prentice-Hall.
- Rachman, S.J., Radomsky, A.S., Elliot, C.M., & Zysk, E. (2012). Mental contamination: The perpetrator effect. *Journal of Behaviour Therapy and Experimental Psychiatry*, *43*, 587-593.
- Radomsky, A.S., & Elliot, C.M. (2009). Analyses of mental contamination Part II: Individual Differences. *Behaviour Research and Therapy*, *47*, 1004-1011.
- Radomsky, A.S., Rachman, S.J., Elliot, C., & Shafran, R. (submitted). Mental contamination: Development of measures. Manuscript submitted for publication.

- Ricciardi, J., & McNally, R. (1995). Depressed mood is related to obsessions, but not to compulsions in OCD. *Journal of Anxiety Disorders, 9*, 249-256.
- Schnall, S., Benton, J., & Harvey, S. (2008). With a clean conscience: Cleanliness reduces the severity of moral judgements. *Psychological Science, 19*, 1219-1222.
- Shafran, R., Thordarson, D.S., & Rachman, S.J. (1996). Thought-action fusion in obsessive-compulsive disorder. *Journal of Anxiety Disorders, 10*, 379-391.
- Thordarson, D.S., Radomsky, A.S., Rachman, S.J., Shafran, R., Sawchuk, C.N., & Hakstian, A.R. (2004). The Vancouver obsessional compulsive inventory (VOCI). *Behaviour Research and Therapy, 42*, 1289-1314.
- Volz, C., & Heyman, I. (2007). Case series: Transformation obsession in young people with obsessive-compulsive disorder (OCD). *Journal of the American Academy of Child and Adolescent Psychiatry, 46*, 766-772.
- Whittal, M.L., Woody, S.R., McLean, P.D., Rachman, S.J., & Robichaud, M. (2010). Treatment of obsessions: A randomised controlled trial. *Behaviour Research and Therapy, 48*, 295-303.
- Zhong, C., & Liljenquist, K.A. (2006). Washing away your sins: Threatened morality and physical cleansing. *Science, 313*, 1451-1452.

Figure 1

The hypothesised relationship between mental and contact contamination (based on Rachman, 2006, p.13).



The observed relationship between mental and contact contamination, based on findings from Study 1 ($N = 177$).

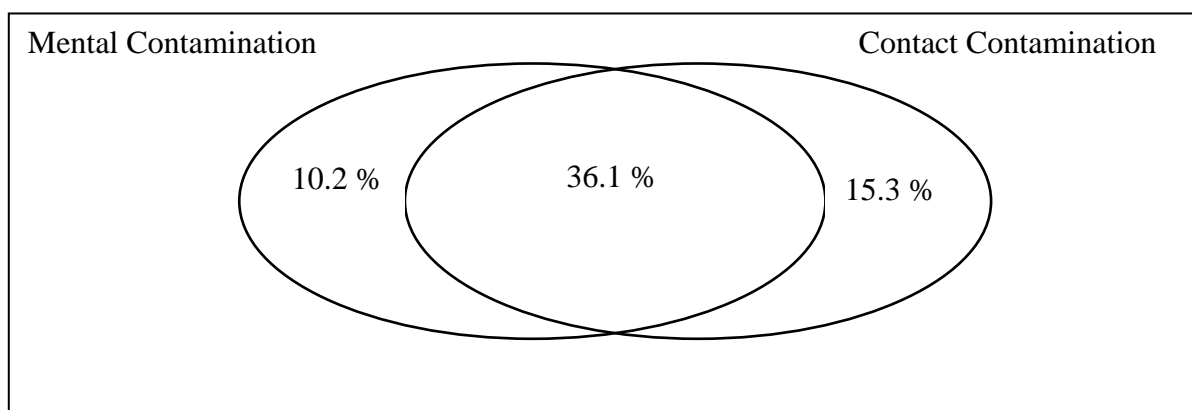


Figure 2

The relationship between mental and contact contamination, based on findings from Study 2 ($N = 54$).

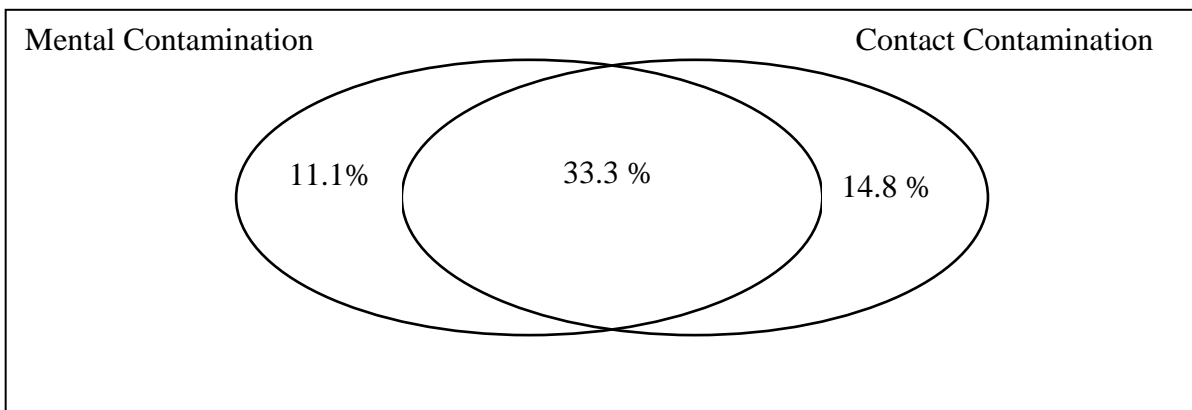


Table 1

The mean scores and correlations between the questionnaire measures and the VOICI-MC for Study 1 ($N = 177$).

	<i>M</i>	<i>SD</i>	Correlation with VOICI-MC
VOICI-MC	40.56	26.69	
TAF Total	34.30	19.44	$r = .36, p < .001$
TAF Moral	22.07	13.30	$r = .36, p < .001$
TAF Likelihood-Self	5.23	3.97	$r = .26, p < .001$
TAF Likelihood-Others	6.84	5.26	$r = .33, p < .001$
OCI-R Total	36.19	15.49	$r = .61, p < .001$
OCI-R Washing	7.09	4.07	$r = .70, p < .001$
OCI-R Checking	6.10	5.40	$r = .32, p < .001$
OCI-R Ordering	5.40	3.88	$r = .39, p < .001$
OCI-R Obsessions	8.31	3.47	$r = .42, p < .001$
OCI-R Hoarding	4.43	3.79	$r = .26, p < .001$
OCI-R Neutralising	4.83	4.12	$r = .37, p < .001$

Note. Adjusted alpha = .005. VOICI-MC = Vancouver Obsessional Compulsive Inventory – Mental Contamination Scale (Rachman, 2006). TAF = Thought-Action Fusion Scale (Shafran et al, 1996). OCI-R = Obsessional Compulsive Inventory Short Version (Foa et al., 2002).

Table 2

The mean scores and correlations between the questionnaire measures and the VOICI-MC.

	<i>M</i>	<i>SD</i>	Correlation with VOICI-MC
VOICI-MC	37.34	26.17	
S-CTN	44.10	15.85	$r = .56, p < .001$
PSS	89.44	32.46	$r = .22, p = .11, ns.$
BAI	23.17	12.62	$r = .28, p = .04, ns.$
BDI-II	24.41	8.87	$r = .47, p < .001$
CTN-TAF	16.33	9.14	$r = .49, p < .001$
TAF	32.41	20.31	$r = .29, p = .03, ns.$
OCI-R Total	36.30	13.67	$r = .48, p < .001$

Note. Adjusted alpha = .005. VOICI-MC = Vancouver Obsessional Compulsive Inventory – Mental Contamination Scale (Rachman, 2006). S-CTN = Sensitivity to Contamination Scale (Rachman, 2006). PSS = Personal Significance Scale (Rachman, 2006). BAI = Beck Anxiety Inventory (Beck & Steer, 1990). BDI-II = Beck Depression Inventory (Beck et al., 1996). CTN-TAF = Thought-Action Fusion – Mental Contamination Scale (Rachman, 2006). TAF = Thought-Action Fusion Scale (Shafran et al, 1996). OCI-R = Obsessional Compulsive Inventory Short Version (Foa et al., 2002).