



The role of gender, fear of self and disgust propensity in mental contamination: A model test using mental contamination induction

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Abstract

Mental contamination (MC) is an internal feeling of dirtiness without having any direct contact with a contaminated object/person. Evoking feelings of pollution and a strong urge to wash, MC is related to obsessive-compulsive disorder (OCD). The study examined the associations between individual vulnerability factors such as gender, disgust propensity (DP), fear of self (FOS), and MC using a self-report study (Study 1) and a laboratory induction study (Study 2). In the first study (Study 1), 312 undergraduate students were asked to complete a set of questionnaires to assess their FOS, DP, MC, and fear of contact contamination. In the second study (Study 2), after completing the same questionnaires, 65 female and 46 male undergraduate students listened to a scenario describing a non-consensual kiss and completed the MC report. The results of Study 1 and Study 2 indicated that mental contamination mediated the association between gender, FOS and DP, and contact contamination. The female participants reported higher degrees of mental contamination than the male participants. The model testing indicated that the indirect effects of FOS and DP on the urge to wash, which was mediated by Vancouver Obsessive Compulsive Inventory-Mental Contamination Scale (VOCI-MC) scores, feelings of MC, and negative emotions were statistically significant. The study underlines the importance of gender, FOS, and DP in MC-related factors. Feelings of MC induced by non-consensual kiss scenarios mediated the relationship between individual vulnerability factors and fear of contamination.

Keywords Fear of self · Disgust propensity · Gender · OCD · Mental contamination

Fear of contamination is characterized by excessive concerns and obsessions about being polluted or getting harm from a polluted object or a person as a result of direct/indirect contact (Rachman, 2004). Fear of contamination is the most common symptom of Obsessive-Compulsive Disorder (OCD) (Foa et al., 1995) and exists in approximately 50% of OCD cases (Herba & Rachman, 2007). Moreover, most OCD patients suffer from repetitive and time-consuming ritualistic compulsions such as washing and cleaning to reduce feelings of dirtiness (Lee et al., 2013). Rachman (1994) described the concept of mental contamination as an internal feeling of dirtiness without having any direct contact with a contaminated object or a person. The symptoms of mental contamination emerge through psychological violations such as betrayal, shameful acts, unpleasant memories, sexual assaults, and moral

criticism. Mental contamination is closely related to contact contamination and they often tend to co-occur (Coughtrey et al., 2012). Studies have indicated that 56–61% of participants with contamination fears had both contact and mental contamination (Coughtrey et al., 2012). Despite the overlapping features, internal feelings of dirtiness and its relationship with moral elements are among the distinctive features of mental contamination (Rachman, 1994).

Since the sources of mental contamination are mainly related to moral values (Rachman, 2004), mental contamination studies were first conducted using female survivors of sexual assaults. The studies revealed that the memories of the assault evoked a strong sense of dirtiness and an urge to wash even years after the assault (Badour et al., 2013; Fairbrother & Rachman, 2004; Ishikawa et al., 2015). The presence of an internal feeling of dirtiness due to recalling an unpleasant memory has led to the study of mental contamination in laboratory settings using imaginary non-consensual kiss scenarios. These studies implemented the consensual and non-consensual scenario technique developed by Fairbrother et al. (2005) and their results have indicated that women felt an increased sense of dirtiness, negative emotions such as

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disgust, anxiety, guilt, anger, and a strong urge to wash in the “dirty kiss” condition compared to the consensual kiss condition (Elliott & Radomsky, 2012; Fairbrother et al., 2005). These studies have shown that a significant number of participants drank water, washed their mouths or their hands, and engaged in some form of neutralization behaviors to reduce the feelings of dirtiness and anxiety after the non-consensual kiss scenario (Bilekli & Inozu, 2018; Fairbrother et al., 2005; Rachman et al., 2012). Studies on contamination-related OCD have shown that females experienced higher levels of contamination fears and washing compulsions compared to males, but males reported higher levels of sexual and religious obsessions and related compulsions than females (Bogetto et al., 1999; Clark & Inozu, 2014; Karadağ et al., 2006; Torresan et al., 2013; Tükel et al., 2004). Despite the supporting evidence for gender differences in some symptom types of OCD, a limited number of studies have investigated the mental contamination phenomena in males. These studies have revealed that men also experienced mental contamination symptoms after imagining being the perpetrator of a non-consensual kiss scenario (Kennedy & Simonds, 2017; Rachman et al., 2012). In previous studies, women and men were not included in the same research design, which prevented the examination of gender differences in mental contamination. However, examining whether being a woman and gender roles assigned to women are vulnerability factors for mental contamination symptoms is important.

A series of recent studies on mental contamination have revealed the cognitive and emotional vulnerability factors that can put someone at a greater risk of experiencing more resistant and persistent mental contamination (e.g., Bilekli & Inozu, 2018; Fairbrother & Rachman, 2004; Herba & Rachman, 2007). Disgust proneness is one of the constructs that has been linked to the etiology and maintenance of contamination fear and has two main components, namely, disgust propensity (DP) and disgust sensitivity (DS). The former refers to a general tendency to experience disgust (van Overveld et al., 2010) while the latter reflects the degree of negativity associated with the experience of disgust (Fergus & Valentiner, 2009; Goetz et al., 2013). Although traditional conceptualizations of contamination-based OCD (Rachman, 2004) have emphasized the role of excessive fear and anxiety as the key emotional experiences in this OCD subtype, disgust may also contribute to the etiology and phenomenology of contamination and washing symptoms (Phillips et al., 1998; see also for detailed review, Ludvik et al., 2015). A large body of research emphasized the direct relationship between DP and contact contamination (Olatunji, 2010; Olatunji et al., 2004; Tolin et al., 2006) and the moderator role of DS in the association between DP and outcomes (Cisler et al., 2009; Travis & Fergus, 2015). Consistent with contact contamination (e.g., Goetz et al., 2013; Olatunji et al.,

2011), previous research has shown that disgust, especially DP, was associated with mental contamination as well (Badour et al., 2014; Bilekli & Inozu, 2018; Fairbrother & Rachman, 2004; Fong & Sündermann, 2020; Inozu et al., 2021). Research indicated that feelings of disgust induced by a “dirty kiss” paradigm exacerbated mental contamination as well as cleaning behaviors and DP predicted feelings of dirtiness more significantly compared to DS, which had a moderator role in the relationship between DP and state mental contamination (Fong & Sündermann, 2020; Lorona & Fergus, 2018; Travis & Fergus, 2015). In addition, mental contamination has been shown to mediate the relationship between DP and contamination-related OCD symptoms (Lorona & Fergus, 2018; Melli et al., 2014). These results suggested DP as a more significant predictor of mental contamination and showed that a stronger sense of mental contamination may mediate the relationship between the tendency to experience disgust and contamination-related OCD symptoms.

Cognitive models of OCD indicated the importance of misinterpreting intrusive thoughts based on dysfunctional beliefs (e.g., interpreting an intrusion as having a special meaning about one’s personality; Clark, 2004; Rachman, 1998). These models posit that the ego-dystonic nature of intrusive thoughts can constitute a threat to self-view and therefore, people tend to label their personality characteristics as bad, undesirable, dark, and inconsistent with their moral values (Clark, 2004; Purdon & Clark, 1999; Rachman, 1998). In addition, Doron & Kyrios, 2005; Doron et al., 2007) stated that catastrophic misinterpretations tended to occur in sensitive and highly valued self-domains where the person lacks confidence, which may, in turn, contribute to the sensitivity to intrusions. Cognitive models’ recognition of the role of the self and self-themes as vulnerability factors in OCD have led to the growth of the notions of fear of self and feared self-perceptions in prominence. Aardema and Wong (2020) defined the fear of self as worries and concerns about having an imagined set of qualities, currently or in the future. Aardema and O’Connor (2007) suggested that the fear of self (or distrust of self) may be a vulnerability and maintaining factor for obsessions. Consistently, research showed that people with OCD are more likely to form negative conclusions about themselves (e.g., being bad, immoral, insane) and more likely to believe their unwanted thoughts are originated from undesired parts of their dark personality compared to people with other anxiety disorders (Ferrier & Brewin, 2005; Nikodijevic et al., 2015). Studies also revealed that feared self-perceptions significantly predicted OCD symptoms, specifically contamination fear (Nikodijevic et al., 2015). In a recent treatment study, reduced fear of self was associated with the reductions in contamination symptoms (Aardema et al., 2018). Krause et al. (2020) conducted a study to clarify the relationship between fear of contamination and fear of self

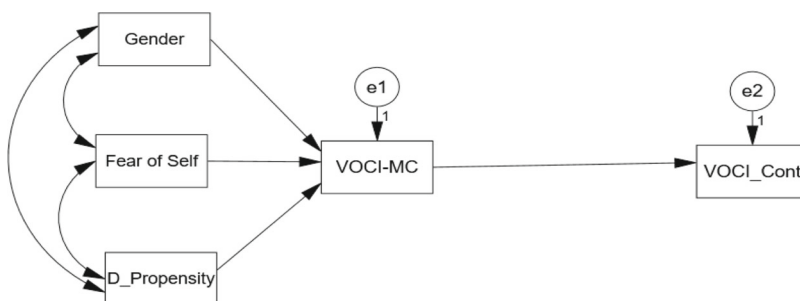
and found that mental contamination mediated the relationship between the two constructs (Krause et al., 2020). It appears that a feared self, an individual’s concerns of who she/he might be or become, and perceptions of inner defectiveness can lead to internal feelings of dirtiness and that strong feelings can, in turn, lead to contamination symptoms such as washing behaviors. Therefore, symptoms of contact contamination (e.g., excessive washing) can be conceptualized as attempts to regulate feelings of mental contamination. According to the cognitive models of OCD and recent empirical findings, the fear of self can be a significant vulnerability factor that is directly associated with mental contamination.

Previous research has suggested DP and the fear of self as vulnerability factors in the development of contact contamination symptoms (Aardema et al., 2019; Olatunji, 2010; Olatunji et al., 2004). Recent evidence indicated that mental contamination might be an important mechanism in the association between these vulnerability factors and contact contamination (Aardema et al., 2018; Krause et al., 2020). Rather than a direct relationship between DP and contact contamination symptoms, feelings of disgust might exacerbate feelings of inner dirtiness, which can drive people to engage in compulsive washing (Radomsky et al., 2018). Considering mental contamination

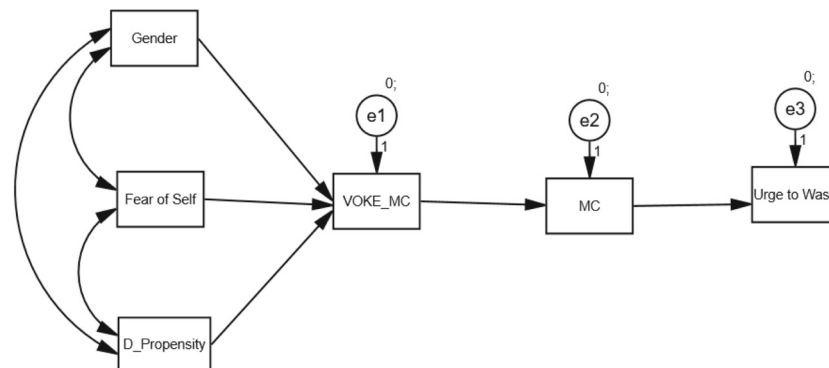
as the contamination from one’s thoughts, the fear of self can lead to strong feelings of mental contamination and mental contamination can, in turn, evoke a strong sense of dirtiness and an urge to wash. However, we have very limited knowledge of the complex relationships among different vulnerability factors, since there is no study examining different risk factors in the same research design. Therefore, with regard to the limitations of previous studies, the present study aimed to expand the findings of previous research by examining the association of the individual vulnerability factors (i.e., DP, the fear of self, and gender) with the feeling of mental contamination in two different studies. The main goal of the study was to evaluate the mediating role of mental contamination in the relationship between contact contamination symptoms and individual vulnerability factors (Fig. 1). In study 1, we aimed to test our proposed model in a large sample using self-report measures. We hypothesized that gender, DP, and the fear of self would be significantly associated with mental contamination and mental contamination would mediate the relationship between individual vulnerability factors and fear of contact contamination (Model A). In study 2, we aimed to expand our previous model by including negative emotions using a laboratory induction procedure involving non-consensual kiss scenarios. The main goal

Fig. 1 Models tested in study 1 and study 2. Note. The Proposed Model; D Propensity = Disgust Propensity and Sensitivity Scale-Disgust Propensity Subscale; VOI-MC = Vancouver Obsessive-Compulsive Inventory Mental Contamination Scale; VOI-Cont = Vancouver Obsessive-Compulsive Inventory Contamination Subscale; MC = The Feelings of Mental Contamination after Manipulation.

Model A



Model B



of Study 2 was to examine how pre-existing characteristics of participants (gender, DP, the fear of self, mental contamination) were associated with the urge to wash when mental contamination was evoked. We predicted that the relationship between individual vulnerability factors and the urge to wash was mediated by a laboratory-induced sense of mental contamination and internal/external negative emotions (Model B).

Study 1

Methods

Participants

The sample was composed of 450 undergraduate students from different universities in Turkey. The missing data of 100 participants who did not complete the online survey were removed from the data set. Thirty-eight participants who reported having a current psychiatric history were excluded from the study. The final sample consisted of 312 participants (183 females, 128 males). The mean age was 23.56 (SD = 0.49) for female participants and 23.55 (SD = 0.65) for male participants. As expected, the majority of the respondents were single (86.3%) while about 12.8% were married or cohabiting. Only 0.6% of them were divorced.

Instruments

Demographic Information Sheet (DIS) was developed for a former study by Bilekli and Inozu (2018). It was adapted from questions used in Inozu, Clark, and Karanci (2012a) and Inozu, Karanci, and Clark (2012b). Items assess socio-demographic information such as age, sex, relationship status, ethnicity, mental health problems and diagnosis, sexual abuse/trauma experiences, and religious affiliations.

Fear of Self Scale (FSS; Aardema et al., 2013) consists of 8-items to assess the misjudgments about the self that commonly exist in OCD patients. Sample items include “I question my character often” and “I need to be always careful not to do anything awful”. Items are rated on a 6-point Likert scale (1 = strongly disagree, 6 = strongly agree) with higher scores meaning higher levels of self-fear. Results revealed that the internal consistency was .93 for the original scale and retest reliability was between .89–.97 for the non-clinical sample (Melli et al., 2016). The scale is translated into Turkish by Akin et al. (2016) and the internal consistency was .82. In the self-report and experimental studies, the scale had an internal consistency of .81 and .80, respectively.

Disgust Propensity and Sensitivity Scale (DPSS; Fergus & Valentiner, 2009) consists of 16 items to assess two constructs of disgust. The disgust propensity (DP) subscale assesses the tendency to feel disgusted, and items on disgust sensitivity

(DS) assess the feeling of uneasiness while reducing disgust. Each item is rated based on a 5-point Likert Scale (1 = never, 5 = always). The two subscales have shown to have high internal consistency (α 's = .83 for the disgust propensity, .80 for the disgust sensitivity) as well as good convergent and divergent validity. The scale was translated into Turkish by Uysal et al. (2013). The results indicated that the Turkish DPSS has adequate psychometric properties that are comparable with the original version. The internal consistency was .83 for DP, .73 for DS. In the present study, only DP subscale was used and the results revealed satisfactory psychometric properties (.73 and .82 for the self-report and experimental studies).

Vancouver Obsessive - Compulsive Inventory – Mental Contamination Scale (VOCI-MC; Radomsky et al., 2014) consists of 20 items to assess the aspects of mental contamination. Each item is rated based on a 5-point Likert scale (0 = not at all, 4 = very much). The results revealed excellent internal consistency ranged between .93 and .97 with different samples, convergent validity was between .61 and .87 and retest reliability was .88. Inozu et al. (2016) translated the scale into Turkish and found that the Turkish version of the scale had satisfactory psychometric properties that are comparable to the original form. The internal consistency was .93 and the retest reliability was .79. Consistently, internal consistency was .93 in the experimental study and self-report study.

Vancouver Obsessive-Compulsive Inventory Contamination Subscale (VOCI-C; Thordarson et al., 2004) is a revised form of the Maudsley Obsessive-Compulsive Inventory developed by Hodgson and Rachman (1977). Vancouver Obsessive-Compulsive Inventory consists of 55 items scored on a 5-point Likert Scale (0 = not at all, 4 = very much). The Contamination Subscale aimed to examine the severity of contamination symptoms consists of 12 items. When the internal consistency coefficient of the scale was examined, it was seen that the Cronbach Alpha reliability coefficients were .94 for the total scale score and .92 for the Contamination Subscale. The Turkish validity and reliability study of the scale was conducted by Inozu and Yorulmaz (2013) and the internal consistency coefficient was .96 for the total scale and .89 for the Contamination Subscale. The scale was only used in the first part of the study and internal consistency was found as .88.

Procedure

This study was approved by the University Ethics Commission. The battery of self-report measures was administered to participants through [surveymonkey.com](https://www.surveymonkey.com), an online survey platform. The study was announced, accompanied by a link to the survey. Voluntary participants who accessed the survey first gave their consent and then fill out the questionnaires. Filling in the survey used in this study was approximately 20 min long.

Results

In the proposed structural model, the associations of gender, fear of self, DP with the contamination fear through the degree of mental contamination (VOCI-MC) were tested (Model 1). Goodness-of-fit statistics revealed that the initial model did not obtain an appropriate fit to the data ($\chi^2/df = 6.11$, GFI = .975, CFI = .94, NFI = .831; RMSEA = .128, AIC = 58.44). An examination of the results indicated that all paths were significant. The model modification indexes were checked to determine if there was an opportunity to improve the model. Modification indices suggested adding a direct path from DP to fear of contamination (MI = 6.121), which is very compatible with OCD theoretical background and previous studies indicating the direct relationship between DP and fear of contamination (e.g., Brady et al., 2010; Olatunji, 2010; Olatunji et al., 2004; Tolin et al., 2006). Therefore, a direct path from DP to fear of contamination was added to the model. The final model (Fig. 2) showed good fit to the data ($\chi^2/df = 1.927$, GFI = .994, CFI = .992, NFI = .984; RMSEA = .055, AIC = 41.78). The results indicated that gender, fear of self, and DP were significantly associated with VOCI-MC ($\beta = 0.09$, $p = 0.05$; $\beta = 0.43$, $p < 0.001$; $\beta = 0.32$, $p < 0.001$, respectively) that was in turn related to fear of contamination ($\beta = 0.36$, $p < 0.001$). Furthermore, the direct association of DP with fear of contamination was statistically significant ($\beta = 0.24$, $p < 0.001$). The model explained the %58 variances of the urge to wash. Furthermore, the test of significant indirect effects with Bootstrap showed that the relationship between gender, fear of self, DS, and DP with fear of contamination was significantly mediated through VOCI-MC %95 CI [0.004, 0.07], CI [0.10, 0.21], CI [0.01, 0.10], CI [0.05, 0.14] respectively.

Study 2

Methods

Participants

The participants were (68 females, 56 males) undergraduate students from Hacettepe University. Two participants were

excluded from the study due to having a psychiatric diagnosis. Participants were also screened for the presence of any sexual trauma history at the beginning of the study. The participants were asked whether they had any traumatic experiences in the last 3 months and, if so, the content of the experience. One female participant was excluded from the study after reporting experiencing sexual abuse in the last two months. The examination of the 3 questions about the scenario (“How easy was it to imagine the scenario in your mind?”, “How clear/vivid was the imagined scenario?”, “How realistic was the imagined scenario?”) revealed that 10 participants did not find the scenario to be realistic and had difficulty to imagine themselves to be in the described situation. These participants were excluded from the study and the final sample consisted of 111 participants of which 65 were females and 46 were males. The mean age was 19.43 (SD = 1.48) for female participants and 21.76 (SD = .41) for male participants. All participants were single. Participants received course credits for their participation. There were no missing data in Study 2 as the participants filled out the questionnaires in the laboratory environment.

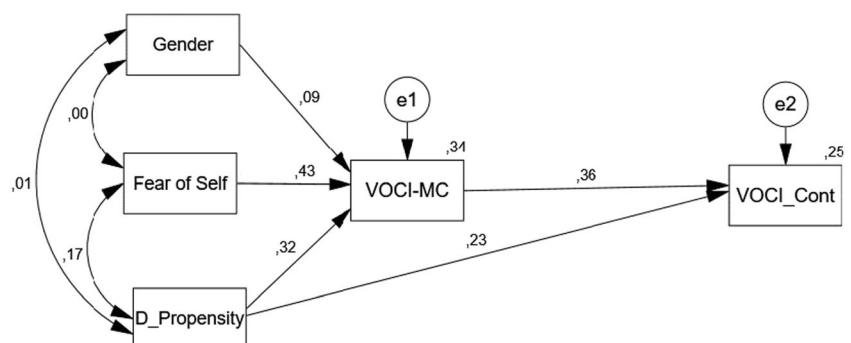
Instruments

The same questionnaire set as in Study 1 was used in this experiment. Additionally, after listening to Non-Consensual Kiss Scenario Recordings the participants were asked to complete the Baseline Rating Form and Mental Contamination Report.

Baseline Rating Form (Elliott & Radomsky, 2009) is used to assess the levels of feelings of dirtiness, internal negative emotions (shame, guilt, humiliation, sadness, cheapness, fear, and sleaziness), and external negative emotions (distress, anger, anxiety) as indicators of mental contamination. Internal negative emotions refer to feeling about the self, and external negative emotions refer to feelings about the perpetrator in the scenarios. The participants rated each item on a scale from 0 to 100 before the manipulation.

Mental Contamination Report (MCP; Elliott & Radomsky, 2009) is a 29-item self-report questionnaire that was developed to assess vividness of the imagination, desirableness/immorality of the kiss, degree of dirtiness, internal and

Fig. 2 Mediation model in study 1. Note. The Proposed Model; D_Propensity = Disgust Propensity; VOCI-MC = Vancouver Obsessive-Compulsive Inventory Mental Contamination Scale; VOCI-Cont = Vancouver Obsessive-Compulsive Inventory Contamination Subscale.



external negative emotions, and urge to wash after manipulation. Each item is based on a scale from 0 (not at all) to 100 (completely). This form was developed by Elliott and Radomsky (2009) and translated into Turkish by Bilekli and Inozu (2018).

Non-Consensual Kiss Scenario Recordings. The non-consensual kiss script was closely based on the Rachman et al. (2012) which is successful to evoke mental contamination. However, changes are made to provide recordings appropriate for both gender groups as the victims of the non-consensual kiss. The audio is 5 mins long. Female/male participants are listening to an audio recording instructing them to imagine themselves in a charity event, organized by a student club. The aim of the event is to help elderly people in a community center. She/he is having a conversation with an aged man/woman who made a substantial financial commitment to the charity. She/he had heard lots of good things about him/her. During the conversation, the aged man/woman closes to her/him, she/he feels his/her breath on her/his face. The aged man/woman suddenly pushes her/his against a wall and starts forcibly kissing her/him. She/he is trying to push him/her away but the aged man/woman continues to kiss her/him, puts his/her tongue deep in her/his mouth. She/he feels like she/he is about to vomit.

Procedure

The experiment was conducted in a small room with two tables, two chairs, one computer with headphones for participants to listen to the audio recordings, plastic glasses, and clean water. Participants were invited to the experiment room with appointments. After participants were invited to the room, they were informed about the experiment regarding some people with trauma experience could find the study disturbing. Then, all participants were provided with consent forms that fully describe the studies and their potential risks and benefits. Each trial lasted around 30 min, and no participants declined to participate or withdrew from the study. Before the audio recordings, all of the participants were asked to complete a battery of questionnaires including the DIS, DPDS, FSS, and VOI-MC. Then they were asked to fill the *Baseline Rating Form* (time 1) to assess their pre-experimental mental contamination-related ratings (i.e., internal and external negative emotions, and feeling of dirtiness). Before starting the experiment, a brief instruction was given to participants describing the components of each session. They were asked to imagine themselves in the position of the man/woman described in the scenario as vividly as possible. After the recordings, participants were asked to complete MCR (time 2). Participants were then debriefed about the purpose of the study.

Results

Preliminary Analysis

Means, standard deviations, and correlations among all variables are presented in Table 1.

To investigate the gender differences in scores for the imagination of the scenario, a one-way ANOVA was performed on the 3 questions about the scenario (“How easy was it to imagine the scenario in your mind?”, “How clear/vivid was the imagined scenario?”, “How realistic was the imagined scenario?”). After Bonferroni correction, significant P value was $< .02$. The results indicated that there were no significant main effects of gender ($F[1, 110] = .67, p = .41$; $F[1, 110] = .22, p = .64$; $F[1, 110] = 2.92, p = .09$). Regardless of gender, the participants rated the vividness/clarity, easiness, and reality of the imagination in a similar manner.

The Influence of Gender on the Mental Contamination and Negative Emotions

Gender differences in mental contamination ratings were examined. A 2 (Gender) \times 2 (Time: Time 1, Time 2) repeated measures MANOVA was performed on feelings of dirtiness (MC) and internal/external negative emotions (INEs/ENEs). The results indicated that the main effect of time ($F[2108] = 141.61, p < .0001, \eta_p^2 = .72$) was significant. Analysis did reveal also a significant interaction of time \times gender ($F[2108] = 15.24, p < .0001, \eta_p^2 = .22$).

The significant main effect of time using Bonferroni correction indicated that the participants scored significantly higher on feelings of dirtiness (MC) and internal/external negative emotions at Time 2 ($M[Sd] = 51.78 [3.01]$) for MC; ($M[Sd] = 45.44 [2.11]$) for INEs/ENEs) than did Time 1 ($M[Sd] = 11.62 [1.80]$; $M[Sd] = 10.63 [1.30]$). The main effect of time indicated that the manipulation was successful.

The significant time by gender interaction using Bonferroni correction indicated that the interaction effect was marginally significant for MC ($F[1, 109] = 3.81, p = .05, \eta_p^2 = .03$), INEs/ENEs ($F[1, 119] = 30.41, p < .001, \eta_p^2 = .22$). At Time 2, the females reported significantly higher degree of MC ($M[Sd] = 59.22 [3.84]$), INEs/ENEs ($M[Sd] = 55.11 [2.71]$) than did males ($M[Sd] = 44.35 [4.61]$, $M[Sd] = 35.76 [3.23]$, respectively).

The Association of the Vulnerability Factors with Mental Contamination Related Ratings

In the proposed structural model, the associations of gender, fear of self, and DP with the urge to wash through the degree of mental contamination (VOI-MC), feelings of mental contamination, and internal/external negative emotions (after manipulation) were tested (Model 1) using Monte Carlo method.

Table 1 Means and Standard Deviations of the Study Variables along with Correlations

Study 1	1	2	3	4	5		
1- Gender							
2- DP	-.01	19.26 (3.35)					
3- VOICI-MC	-.09	.39**	34.08 (11.28)				
4- FSS	.00	.17**	.49**	25.06 (7.36)			–
5- VOICI- C	.00	.37**	.45**	.20**	29.94 (9.00)		
Study 2	1	2	3	4	5	6	7
1- Gender							
2- DP	-.03	18.66 (3.84)					
3- VOICI- MC	.11	.21*	12.03 (11.09)				
4- FSS	-.00	.05	.55**	24.55 (7.71)			
5- MC (Time 2)	-.23*	.22*	.34**	.28**	53.05 (31.40)		
6- INE/ENE (Time 2)	-.40**	.24*	.27**	.32**	.58**	47.09 (23.83)	
7- Urge to Wash (Time 2)	-.29**	.26**	.33**	.26**	.67**	.67**	58.34 (30.41)

Note: Means and standard deviations (in parentheses) are given on diagonal. DP: Disgust Propensity Subscale, VOICI-MC: Vancouver Obsessive-Compulsive Inventory – Mental Contamination Scale, VOICI-C: Vancouver Obsessive-Compulsive Inventory – Contamination Subscale, FSS: Fear of Self Scale, MC: Mental Contamination Score at Time 2, INE/ENE: Internal/External Negative Emotions at Time 2

*The difference is significant at the .05 level. **The difference is significant at the .01 level

The Monte Carlo method can be used in situations where bootstrapping is not feasible because of the small sample size that bootstrapping may randomly generate a constant variable (Preacher & Selig, 2012).

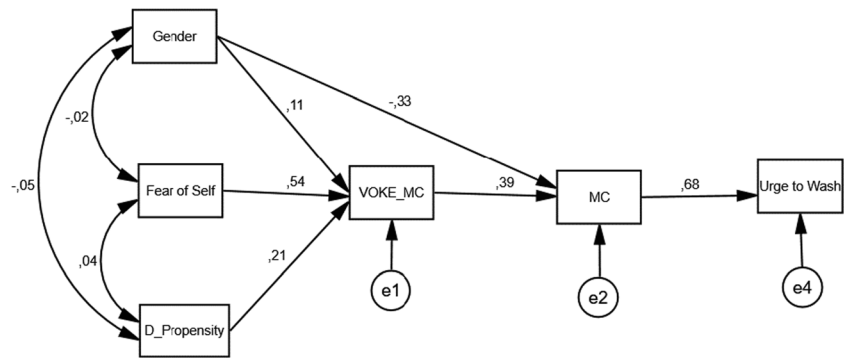
Goodness-of-fit statistics revealed that the initial model did not obtain an appropriate fit to the data ($\chi^2/df = 4.26$, CFI = .858, NFI = .830; RMSEA = .165, AIC = 69.832). An examination of the results indicated that the direct paths from gender to VOICI-MC were non-significant. However, we decided to leave it in to show the nonsignificant parameter estimate and to avoid biasing the effect of the other variables. The model modification indexes were checked to determine if there was an opportunity to improve the model. Modification indices of model 1 suggested adding a direct path from gender to feelings of mental contamination (MI = 15.237), which is very compatible with the results indicating significant gender differences in post-mental contamination ratings. Therefore, direct paths from gender to feelings of mental contamination resulted in good fit to the data ($\chi^2/df = 2.236$, CFI = .954, NFI = .924; RMSEA = .102, AIC = 55.419). The results indicated that gender was significantly related to feelings of mental contamination assessed after manipulation ($\beta = -21.63$, $p < 0.01$), but not VOICI-MC. Fear of self and DP were significantly associated with VOICI-MC ($\beta = 0.54$, $p < 0.01$; $\beta = 0.21$, $p < 0.5$, respectively) that was in turn related to feelings of mental contamination assessed after manipulation ($\beta = 0.39$, $p < 0.01$) which was also significantly associated with urge to wash ($\beta = 0.69$, $p < 0.001$). The model explained the %47 variances of the urge to wash (Fig. 3.)

Furthermore, the test of significant indirect effects with Bootstrap using the Monte Carlo method showed that the indirect effect of fear of self and DP on the urge to wash, mediated through VOICI-MC and feelings of mental contamination (after manipulation), was statically significant (95% CI [2.08, 7.71], 95% CI [0.50, 5.42] respectively). The results also revealed that the indirect path from gender to urge to wash, through feelings of mental contamination was statistically significant (95%CI [-21.48, -6.96], $p = .01$). For the final model, all significant indirect effects were presented in Table 2.

Discussion

Previous literature on mental contamination has suggested individual factors such as gender, feared self-perceptions, and cognitive biases as vulnerability factors for mental contamination (Rachman, 2004). The present study extended the findings of previous studies by examining how different factors (including gender, the fear of self, DP, and mental contamination degree) associated with each other to influence the degree of mental contamination and related ratings when they are triggered by a stressor (in this case, imagining non-consensual kissing). The results revealed that the association of gender, the fear of self, and DP with contamination fear was mediated by mental contamination (VOICI-MC). More importantly, self-report data were supported by a laboratory induction study (Study 2). The results indicated that gender (being female) can intensify the feelings of mental contamination and urge to wash. Moreover, the association of the fear of self and DP with the urge to wash was mediated by pre-existing mental

Fig. 3 Model tested in Study 2.
 Note. D_Propensity = Disgust Propensity; VOICI-MC = Vancouver Obsessive-Compulsive Inventory Mental Contamination Scale; MC = The Feelings of Mental Contamination after Manipulation. *** $p < .001$, * $p < .05$.



contamination (VOICI-MC) and post-experimental ratings of mental contamination.

Previous research has shown that non-consensual kiss scenarios induced mental contamination for female victims (Bilekli & Inozu, 2018; Elliott & Radomsky, 2009; Fairbrother & Rachman, 2004) and male perpetrators (Rachman, 2004). Consistent with the findings, this study was successful in evoking mental contamination symptoms for females and males using similar dirty-kiss scenarios. The results primarily revealed gender differences in the feelings of mental contamination and related ratings: Female participants experienced more intense feelings of dirtiness, internal/external negative emotions, and a stronger urge to wash than males after the non-consensual kiss scenario. The gender differences are attributable to cultural norms about female sexuality, which stem from the suppression and prohibition of women’s sexual desires and behaviors (Kaya & Aslan, 2013). The gender roles associating women’s sexual acts with shame, sin, and dirtiness could have played a role in women’s stronger feelings of mental contamination and higher negative emotions after being exposed to the scenarios. Interestingly, the results of Study 1 indicated no direct impact of gender on self-report mental contamination while Study 2 revealed that female participants experienced higher levels of mental contamination than male participants when mental contamination was triggered using a sexual assault scenario. Thus, triggering women’s sense of mental contamination in a dirty kiss scenario could have been easier as

women are more frequently sexually abused and more likely to experience feelings of internal dirtiness, shame, and guilt due to the abuse. The gender difference in experiencing mental contamination in the study can also be explained by referring to the influence of religion on sexuality. The traditional view of sexuality in Islam gives privilege to male sexuality over female sexuality. Different from men’s sexual desire, women’s sexual desire is feared and its expression is generally not allowed. Veiling, segregation, and limiting women’s movement in the public arena may curb women’s sexual potency, and fathers, brothers, families, society, and the state may govern women’s moral conduct (Accad, 2000). Compared to other Muslim countries, Turkey is more secular and women have more rights and freedom (Evrensel, 2013). The participants of the present study are university students and do not fully represent all segments of women in the community. However, basic doctrines of religion may still affect and reflect on their attitudes, beliefs, and emotions toward themselves, others, and the world. Therefore, follow-up studies on samples with diverse racial/ethnic cultural backgrounds are needed to clarify the influence of cultural norms on the gender difference in mental contamination.

The present study also evaluated the role of vulnerability factors in mental contamination and related symptoms. The results revealed that the fear of self was significantly associated both with pre-existing mental contamination and post-induction ratings of mental contamination. More importantly,

Table 2 The standardized beta coefficient and confidence interval values of indirect effects defined in tested model

Paths	Estimate	95%CI Lower	95%CI Upper	P
Gender → VOICI- MC → MC	2.66	-0.89	7.52	.115
Gender → MC → Urge to Wash	-14.18	-21.48	-6.96	.012
Gender → VOICI- MC → MC → Urge to Wash	1.75	-0.49	5.49	.099
Fear of self → VOICI-MC → MC	7.21	3.46	10.29	.016
Fear of self → VOICI-MC → MC → Urge to Wash	4.73	2.08	7.71	.012
DP → VOICI-MC → MC	4.01	0.80	8.36	.007
DP → VOICI-MC → MC → Urge to Wash	2.63	0.50	5.42	.007

Note: MC The Feelings of Mental Contamination after Manipulation, VOICI-MC Vancouver Obsessive-Compulsive Inventory Mental Contamination Scale, DP Disgust Propensity

the self-report study indicated that pre-existing mental contamination mediated the association between the fear of self and contamination fear. The laboratory induction study further supported this finding. The fear of self was significantly associated with pre-existing mental contamination, which mediated the association of the fear of self with post-experimental ratings of mental contamination including feelings of dirtiness and the urge to wash. Our results suggest that a higher degree of fear of self can create a suitable environment for the development of more intense mental contamination, which, in turn, can result in higher degrees of mental contamination and related ratings when triggered. Consistently, in their recent study, Krause et al. (2020) found that feared self-perceptions were significantly associated with contact contamination, mental contamination, and obsessive beliefs. Mental contamination also mediated the relationship between the fear of self and contact contamination. The present study expanded the findings of their questionnaire study using an experimental induction method that enables a more specific and sensitive assessment of mental contamination.

Similar to the role of the fear of self, DP was found to be related to the severity of mental contamination, and mental contamination mediated the relationship between DP and fear of contamination. Our results were consistent with previous research indicating the mediating role of mental contamination between DP and fear of contamination (Carrarese et al., 2013; Melli et al., 2014). Recent experimental evidence also indicated that “dirty kiss” scenarios were able to elevate disgust levels (Bilekli & Inozu, 2018) and disgust induction using the “dirty kiss” paradigm resulted in increased feelings of dirtiness and mental contamination (Fong & Sündermann, 2020). Consistent with the cognitive theory of mental contamination (Radomsky et al., 2018), which suggests that mental contamination stems from negative self-appraisals and misinterpretations of a psychological or physical violation, recent research has shown that feelings of disgust led to emotional reasoning in an MC paradigm (I feel disgusted, therefore, I must be dirty). The results of a study carried out by Fong and Sündermann (2020) revealed that feelings of disgust occurring in mental contamination might be misinterpreted as signs of contamination and being dirty. Therefore, disgust can be a trigger of feelings of dirtiness, and being easily disgusted can be a significant predictor of mental contamination. Feelings of disgust can be regarded as evidence of internal (mental contamination) and external dirtiness (contact contamination), and, in turn, exacerbate the feelings of disgust, thus creating a vicious cycle. The present study supported previous research by pointing out the propensity to experience disgust as a significant individual vulnerability factor for mental contamination as well as for fear of contamination and cleaning behaviors. Our results revealed that DP significantly predicted trait mental contamination and post-experimental ratings of mental contamination in addition to exacerbating

negative emotions and the urge to wash after listening to a “dirty kiss” scenario.

This study examined the relationship of individual vulnerability factors with mental contamination and fear of contamination using a laboratory induction procedure and greatly contributed to the field of mental contamination. Our findings provided evidence for the association of individual vulnerability factors such as gender, DP, the fear of self, and mental contamination with the urge to wash when mental contamination was provoked by the “dirt kiss” paradigm. Our study is the first laboratory induction study examining the gender differences in the feelings of mental contamination due to the inclusion of a non-consensual kiss scenario in which both females and males were the victims. In addition, this is the first study evaluating the relationship between the fear of self and mental contamination in a laboratory setting. Furthermore, this study has several clinical implications for the treatment of mental contamination and contamination-related OCD. In the light of our findings, clinicians should consider gender differences in mental contamination that occurs in response to sexual assault and moral violations. More inclusive treatments and different interventions targeting the effects of mental contamination can be necessary for males and females. Clinicians can evaluate individual vulnerability factors such as the fear of self and propensity to feel disgusted as important contributing factors to mental contamination and related symptoms and benefit from understanding and challenging individuals’ fear of self and feelings of disgust in the treatment of mental contamination. In addition to the focus on observable washing behaviors and feelings of internal dirtiness, clinicians can address the fear of self and negative self-perceptions as well as feelings of disgust and misappraisals of disgust to improve the treatment of mental contamination and contamination-related OCD. Furthermore, a large body of evidence has associated mental contamination with posttraumatic stress following a sexual trauma in addition to OCD (Badour et al., 2013; Fairbrother & Rachman, 2004; Olatunji et al., 2008). Our findings on the vulnerability factors in mental contamination might be related to post-traumatic stress disorder (PTSD) after sexual abuse or trauma. Consistent with previous findings revealing that traumatic sexual assaults lead to greater mental contamination (Adams et al., 2014; Ishikawa et al., 2015), feelings of disgust, and urge to wash (Badour et al., 2013), our findings suggested that even the manipulation of imagining a sexual assault triggered intense feelings of mental contamination as well as urge to wash, especially in females. Moreover, our study revealed that gender, DP, and fear of self exacerbated the feelings of mental contamination, which is related to PTSD. In light of the findings, addressing the role of disgust and fear of self as well as mental contamination in intervention and treatment programs developed for women who have experienced sexual trauma is important.

Despite its contributions, the study has some limitations. First, the participants were assigned to gender groups based on

their biological sexes. The recordings of the “dirty kiss” scenarios were arranged based on the heteronormative perspective where a female was the victim of non-consensual kissing and the male was the perpetrator of the kiss. Gender identities and sexual orientations of the participants were not considered in the study. However, gender identity and sexual orientation could have influenced the reaction to a non-consensual kiss from the opposite gender. Therefore, further research should include gender identity and sexual orientation as variables that contribute to the feelings of mental contamination. The findings of the study were obtained using a non-consensual kiss scenario. Future studies can consider using different scenarios to investigate other forms of mental contamination such as betrayal or disclosure of secrets. In addition, the use of an analog sample of undergraduate students with low levels of OCD symptoms in limits the generalization of the findings to wider clinical populations. Future studies should include clinical samples with OCD diagnosis and mental contamination symptoms. Another important limitation of the study is its small sample size and a demographically restricted analog sample of undergraduate students. The sample size is an important issue for Structural Equation Models (SEM); however, there is no consensus on the issue in the literature. Some studies have regarded the use of SEM with a small sample size as appropriate (Hoyle, 1999; Hoyle & Kenny, 1999), but a sample size of 100–150 should be generally used (Anderson & Gerbing, 1988; Ding et al., 1995). Kline (2013) stated that 10 or 20 participants would be sufficient for each parameter used in the model. Although we first tested the proposed model using a large sample and only self-report questionnaire data to overcome this limitation and used the Monte Carlo method, the sample size in the laboratory induction study was slightly small to test the proposed model. Therefore, the findings should be interpreted with caution. In addition, recent research has pointed to the influence of a variety of other psychological factors (e.g., metacognitive beliefs and sense of personal responsibility) on mental contamination. Fergus et al. (2018) conducted a study with women who experienced sexual trauma and found a relationship between negative metacognitive beliefs (beliefs about uncontrollability and danger of thoughts) and the severity of mental contamination. Furthermore, Kennedy and Simonds (2017) found that reducing personal responsibility moderated several components of mental contamination (e.g., shame, dirtiness, urge to clean). The role of metacognition and sense of personal responsibility was not examined in this study since it was preliminary work to test basic models for the examination of the relationship between mental contamination and individual vulnerability factors. Future research should address the role of these psychological factors on the feelings of mental contamination.

Recent findings have revealed that cultural factors, specifically, religiosity, can influence mental contamination (Bilekli & Inozu, 2018). Bilekli and Inozu (2018) found that high

religiosity was associated with greater feelings of mental contamination and the urge to wash in a Muslim sample. The basic doctrines of Islam include rigid pre-defined behavioral rules and rituals to ensure purification of the heart and the body through religious worships and disapprove of pre-marital physical or sexual intimacy (e.g., “Nor come closer to illicit sexual intimacy for it is shameful and immoral, opening the door to other immorality,” Qur'an Īsrā 17:32 n.d.). Highly religious Muslim individuals who internalize the basic doctrines of Islam may be unduly alarmed about situations that may violate the state of cleanliness and purity. The importance of cleanliness of the heart and the body in Islam might make an individual believe that their immoral thoughts are unacceptable and they may misinterpret their thoughts as a sign of sin and inner dirtiness. More complicated models were not tested due to the small sample size; therefore, we strongly encourage future research to include religiosity when assessing how individual factors affect mental contamination.

In conclusion, the study examined the associations between individual vulnerability factors (gender, DP, the fear of self) and mental contamination using a self-report study (Study 1) and an experimental study (Study 2). The association of the fear of self and DP with the urge to wash was mediated by pre-existing mental contamination and post-experimental ratings of mental contamination, highlighting the interaction between individual vulnerability factors and mental contamination in contamination-related OCD symptoms. Understanding the role of the fear of self and disgust in mental contamination symptoms and contamination-related OCD can contribute to the treatment of persistent mental contamination.

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Code Availability Not applicable.

Declarations

Ethics Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration of ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study. Participants have voluntarily participated in the data collection process.

Conflict of Interest The authors declare that they have no conflict of interest relevant to the content of the article.

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