DEVELOPMENT AND VALIDATION OF THE SELF-DIRECTED MORAL DISGUST SCALE IN A LARGE ITALIAN NON-CLINICAL SAMPLE

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Abstract

Objective: Mental contamination (MC) has been described as an internal experience of dirtiness that can arise and persist in the absence of contact with observable physical contaminants. Recent research suggested that perceiving the self as disgusting, as a result of internalizing the disgust experienced during a sexual assault, was predictive of MC and that MC typically includes elements or judgements related to morality/immorality. We then hypothesized that a self-directed form of moral disgust may play a critical role in MC. Unfortunately, no validated measure specifically assesses this construct. We developed a new measure – the Self-Directed Moral Disgust Scale (SD-MDS) – aimed at assessing this construct, and validated it by testing its factorial structure, reliability and construct validity in a large Italian non-clinical sample.

Method: For this study, 604 volunteers (54% females) were recruited from the general population (mean age: 38.28, SD: 14.67). The 32-item SD-MDS, the Three Domains of Disgust Scale, the Disgust Propensity Questionnaire, and the Depression Anxiety Stress Scales-21 were administered.

Results: Scale refinement through exploratory factor analysis and item analysis led to the final 20-item version of the scale. It showed a unidimensional structure – all of the items substantially (i.e., $\geq .54$) loaded on the first factor, which explained 43% of the variance – excellent internal consistency and construct validity.

Conclusions: We provided preliminary evidence that the SD-MDS is a unidimensional reliable scale that assesses the self-directed form of moral disgust. Future studies should investigate its psychometric properties in clinical samples and test the hypothesized associations with MC measures.

Key words: moral disgust, self-disgust, mental contamination, psychometrics, assessment

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Introduction

Disgust has been conceptualized as a basic emotion with an associated negative valence that facilitates a rejection or revulsion response that is implemented in order to distance oneself from a potential contaminant and prevent disease (Davey 1994, Olatunji and Sawchuk 2005, Rozin et al. 2008). The emerging function of disgust developed as a protective mechanism related to food rejection but since then, additional functions evolved to preserve organisms from other types of stimuli. The most recent model proposed by Tybur et al. (2009, 2013) was conceived within an evolutionary framework. The authors proposed three evolutionarily adaptive domains of disgust propensity, including: 1) pathogen disgust (e.g., aversion towards pathogens that may increase the chance of getting ill); 2) sexual disgust (e.g., aversion of sexual partners and behaviors that would jeopardize one's long-term reproductive success); and 3) moral disgust (e.g., aversion towards individuals who transgress moral norms, threatening the integrity of critical social networks and social structures) (Tybur et al. 2009, 2013; Powell et al. 2014, 2015).

Disgust has shown a great potential for being transferred to objects, as well as to other individuals and, in some instances, to the self. Each of the three disgust subtypes, in its higher order forms, might extend to the self (or features of the self) as the subject of disgust, and evolve to self-directed disgust. For example, like pathogen disgust serving to reject invisible physical contagious agents from contamination of the body, a similar mechanism may exist to reject ideational contagion from contamination of the self. However, there are at least three differences between physical and ideational contamination: 1) the contaminant in physical contamination is a visible or invisible trace or substance, while in ideational contamination, it is a person, an act or a thought; 2) physical contamination threatens the integrity/health of the body, while ideational contamination seems to originate from perceived

violations of the embodied self and, therefore, is aimed to threaten the integrity/health of the core self; 3) since a threat to the core self may lead to perceived damage to a part of the self, ideational contamination may set the stage for developing self-disgust as a way to distance and safeguard the integrity of the ideal self (e.g., as being a strong person) from the actual parts of the self (e.g., a person that could not avoid a rape) that are perceived as damaged (de Jong and Borg 2015).

Furthermore, intrinsic mating quality and genetic compatibility may elicit sexual disgust towards potential sex partners as an evolved solution to the adaptive problem of avoiding biologically costly mates and sexual behaviors. A mate's intrinsic quality is expressed by features regarding objective physical attractiveness (e.g., body symmetry, facial attractiveness, body shape), regardless of genetic compatibility. Instead, genetic compatibility is referred to as a potential partner's genetic similarity to oneself – rather than intrinsically low genetic quality – which is regulated by factors such as major histocompatibility complex (Jan Ejsmond et al. 2014) and genetic similarity (e.g., siblings, parents, offspring). Both mates' intrinsic qualities and genetic compatibility can reduce reproductive success, and observing such physical features (e.g., bodily deformations, extreme obesity) in a potential sex partner may elicit sexual disgust, and also self-disgust in the recipient of the disgust response.

Self-disgust is triggered by the implied low-mating quality attributed to the self since the person appraises himself/herself as being repulsive to others. This type of self-disgust may also be triggered by more implicit social signals, like discovering that one's own partner has repeatedly cheated on him/her, since the person who has been betrayed may consider himself or herself as no longer possessing sufficient mating qualities (de Jong and Borg 2015). After being rejected, self-disgust may arise to protect the ideal core self (e.g., as being a valued sex mate) from the perceived damaged part of the actual self (e.g., a betrayed person; Rachman 2010).

Finally, just as witnessing others' transgressions may elicit moral disgust in observers to coordinate condemnation of transgressors, transgression of one's own norms may elicit disgust directed at the self, both as internal arising self-disgust and as a recipient of external disgust originating from witnesses of transgressions. Indeed, Zhong and Liljenquist (2006) explored what they called the "Macbeth effect" and showed that a threat to one's moral purity increased the need to cleanse oneself, alleviating threats to one's moral self-image; however, the authors did not examine the possibility that washing could serve to alleviate self-directed disgust and, in particular, self-directed moral disgust, as in an effort to wash away one's internal "dirt" (McKay and Lo Presti 2015). Therefore, the moral subtype of self-disgust may arise to confine and condemn the actual self that committed transgressions from the ideal self who embraces moral values. In addition, compromised morality has been shown to be associated with obsessive-compulsive disorder (OCD) since moral concerns are alleviated in OCD patients to a greater extent than those of matched controls following opportunities to wash (Reuven et al. 2014).

Hence, the higher order form of moral disgust extended to the self may allow for the emergence of the more ideational form of contamination, for which Rachman coined the term mental contamination (MC). Rachman (1994, 2004, 2006) defined MC concerns as an internal sense of dirtiness that can emerge and persist after direct or indirect contact with a perceived contaminant of human origin (e.g., people perceived to be immoral, impure, contaminated, of low mating quality, or harmful), even in the absence of contact

with an actual physical contaminant. There is evidence supporting the notion that MC can be either triggered (Fairbrother et al. 2005, Herba and Rachman 2007, Elliott and Radomsky 2009, Radomsky and Elliott 2009) or re-evoked (Fairbrother and Rachman 2004, Badour et al. 2013) by mental images, immoral thoughts, memories and specific interpersonal interactions (e.g., criticisms, insults, betrayals; Rachman 2010, Coughtrey et al. 2012).

Rachman (2004, 2006) hypothesized that sexual assaults were likely to result in MC and basic research has often linked sexuality and appraisals of disgust/self-disgust and contamination, and morality/immorality (de Jong and Borg 2015). Accordingly, Fairbrother and Rachman (2004), in a sample of 50 adult women who suffered sexual assault, found that 70% of women reported urges to wash following an assault and 77% reported that their internal feelings of dirtiness triggered washing urges. In addition, the correlational results that Badour et al. (2013b) reported demonstrated that increases in state feelings of dirtiness correlated with concurrent increases in state disgust, but not increases in state anxiety, while Badour et al. (2013a) argued that internalizing disgust experienced during a traumatic event, in the form of peritraumatic self-directed disgust, may be particularly relevant to MC. In accordance with this, Badour et al. (2014) showed that peritraumatic self-directed disgust, but not peritraumatic perpetrator-directed disgust or fear, was a significant predictor of MC and was specific to contamination-related OCD (Badour et al. 2012). Consistently, other recent studies (Carraresi et al. 2013; Melli et al. 2014, 2017a), using clinical samples, demonstrated that MC plays a mediating role in the relationship between disgust propensity and contamination-related OCD symptoms, highlighting the role of disgust in MC.

However, MC typically also includes elements or judgements related to morality/immorality (Coughtrey et al. 2012, Elliott and Radomsky 2009, 2012) and is able to persist after washing or cleansing rituals (Fairbrother and Rachman 2004, Coughtrey et al. 2012). In addition, unlike physical contamination, elicitors are mainly unique to the individual (e.g., memories, thoughts) and contaminating properties are believed to be contained within the self and thus are not easily transmitted to others. Indeed, sensations of internal dirtiness arising from MC are difficult to locate and often individuals report feeling contaminated "inside their bodies" or "under their skin" (Coughtrey et al. 2012).

Therefore, considering the relevance of self-directed disgust and moral elements in MC, it would be of particular importance to be able to specifically assess self-directed moral disgust in order to investigate its relationship with MC. Unfortunately, current available disgust measures do not allow for a specific assessment of self-directed moral disgust. The Three Domains of Disgust Scale (TDDS; Tybur et al. 2009) is a 21-item scale with subscales for moral, pathogen and sexual disgust, each comprising seven items, with reported Cronbach's αs between .84 and .87. However, it does not assess for self-disgust. Overton et al. (2008) developed the Self-Disgust Scale (SDS), which is an 18-item measure with a two-factor structure assessing "Disgusting self", concerned with enduring, context-independent aspects of the self, and "Disgusting ways", concerned with behaviors. SDS has been found to be highly reliable in non-clinical samples, with excellent internal consistency (α= .91, Overton et al. 2008; α= .88, Simpson et al. 2010), but it does not allow for assessing the self-directed form of moral disgust.

Considering the aforementioned limits of the current available measures of moral and self-directed disgust and the importance of being able to specifically assess the self-

directed moral disgust in MC investigation, we developed a new tool, the Self-Directed Moral Disgust Scale (SD-MDS), aimed at assessing this specific construct, and validated it by testing its factorial structure, reliability and construct validity in a large Italian non-clinical sample.

Method

Participants

The sample consisted of 604 (54% Female) community volunteers (*M* = 38.28 years; *SD* = 14.67; range 16-78) who responded to advertisements requesting potential volunteers for psychological studies in Central Italy. In terms of education, 52.7% of the participants had a medium level of education (12-13 years, high school degree), 30.5% had a higher-level degree (16 or more years, bachelor's degree or Ph.D.) and the remaining 16.8% had a low level of education (8 or less years, primary or secondary school). Most were employed (51.2%), 28% were undergraduate university students, and the remaining 20.8% were housemakers, unemployed, or retired. Regarding marital status, 44.6% were single, while 49.8% were married or cohabiting, 4.6% were divorced, and 1% were widows or widowers.

Measures

Self-Directed Moral Disgust Scale (SD-MDS). A preliminary version of the SD-MDS was designed according to recommendations for scale development (Furr 2011), and consisted of 38 items generated by the authors of this paper on the basis of their expert knowledge and practical experience. All the items were worded to assess moral disgust directed to the self after transgressions of one's own moral rules, - e.g., "Refusing to give an old woman one's own seat on a public transport"; "Hoping that a classmate won't pass the exam that we've just failed"; or "Bumping another car with one's own car causing a visible damage and leaving pretending nothing happened". These initial items were then sent to a group of experts on clinical psychology, emotions, and psychometricians not otherwise involved in the study; they were asked to evaluate the relevance and representativeness of the draft items to the self-directed moral disgust construct and to suggest amendments which would improve the content and face validity of the items. Some individuals with OCD and anxiety disorder symptoms also provided feedback on the readability, comprehensibility and relevance of the items. Following the feedback 6 items were removed and others were amended to improve clarity, specificity and relevance. The final SD-MDS consisted of 32 items none of which was reverse scored. The scale instructions read as follows: "Disgust (or loathing) is an emotional state that people usually feel toward waste objects (e.g., garbage) or organic substances (e.g., urine or feces); however, this emotion can also be felt toward people (including themselves) who are showing immoral or reprehensible behaviors (e.g., taking advantage of a weak person). Please, read each statement carefully and assess how much disgust (loathing) toward yourself you would feel if it were you, in first person, to execute or think what is described in each of the listed situations, according to the following scale: 0 = not at all, 1 = a little, 2 = moderately, 3 = much and 4 = fully".

Three Domain of Disgust Scale (TDDS*;* Tybur et al. 2009). This 21-item self-report scale investigates DP on three subscales: physical disgust, sexual disgust and moral disgust. Participants are asked to rate each item on a six-point Likert scale from 0 ('not at all') to 6 ('extremely disgusting'). The original version of the scale showed a tri-factorial structure in different samples and good psychometric properties. The Italian version of the TDDS confirmed its tridimensional structure and showed a good internal consistency of all subscales (α ≥ .79), and a good construct validity (Poli et al., In preparation)

Disgust Propensity Questionnaire (DPQ; Melli et al. 2017b). This 9-item scale was recently developed to improve the assessment of individual DP in Italian samples, as the Italian version (Melli et al. 2013a) of the Disgust Scale-Revised (DS-R; Olatunji et al. 2007) - the best-known scale for the assessment of DP - has shown satisfactory, but not excellent psychometric properties, and some of the items of this scale are not appropriate to the Italian cultural context. Participants are asked to rate each item on a five-point Likert scale from 0 ('not at all') to 4 ('very much'). This questionnaire was found to have a one-factor structure, very good internal consistency (α in the range .85-.91), adequate test-retest reliability (ICC = .85) and construct validity.

Depression Anxiety Stress Scales-21 (DASS-21). The DASS (Lovibond and Lovibond 1995) is a self-report questionnaire listing negative emotional symptoms and is divided into three subscales measuring depression, anxiety and stress. In this study we used the short version of the DASS (Antony et al. 1998, Clara et al. 2001), which contains 21 items, 7 items for each scale. Participants rated how often a particular symptom was experienced in the past week. Ratings were made on a scale ranging from 1 ('did not apply to me at all') to 4 ('applied to me most of the time'). The original DAAS-21 has shown good psychometric properties, and its Italian version (Bottesi et al. 2015) has replicated the three-factor structure of the original version, and has shown good internal consistency (α in the range .74-.92), test-retest reliability (r in the range .64-.74), and construct validity.

Procedure

All participants volunteered to take part in the study after being presented with a detailed description of the procedure, and signed a written informed consent and were treated in accordance with the Ethical Principles of Psychologists and Code of Conduct (American Psychological Association 2010). The batteries took between 10 and 20 minutes to be completed. The scales were administered in counterbalanced fashion to control for order and sequence effects. No external incentives were offered for participating in this study.

Results

Item reduction, factor structure and reliability

First, principal component analysis (PCA) and item analysis were conducted to identify items for possible elimination due to weak psychometric properties. Following this item deletion procedure, PCA and item analysis were performed again to examine the factor structure and the reliability of the final solution. The issue of determining the number of factors to extract was determined by performing dimensionality analyses of SD-MDS items through Scree-plot inspection.

The Kaiser-Meyer-Olkin (KMO) measure of the sampling adequacy was very good (KMO = .95), indicating that the correlation matrix was suitable for factor analysis (Kaiser 1974). Bartlett's test of sphericity (Bartlett 1954) was significant, which also suggested that factor analysis was suitable. The Scree-plot inspection

suggested that eigenvalues began to level off after one factor (first five observed eigenvalues: 12.71, 1.94, 1.73, 1.25, 1.16), and PCA was then performed with the number of factors to extract set to 1. The first factor was able to account for 39.54% of the variance and every item saturated on it with a saturation value > .45.

Although factor structure was adequate and internal consistency (α = .95) was excellent, our aim was to create a measure with sound psychometric properties and short enough for clinical and research application; hence, pairs of items that had similar wording and were highly correlated (r > .55) were considered redundant and were removed, and items with the lowest factor loading (< .60) or the lower corrected item-total correlation (< .45) were removed too. The final scale consisted of 20 items.

A second PCA was conducted on the remaining items and the one-factor solution and all the items substantially (i.e., $\geq$ .64) loaded on the first factor, which explained the 43% of the variance. Cronbach's alpha indicated that reliability was excellent (α = .93). Corrected item-total correlations were never smaller than .50, and mean inter-item correlation was .40. In no case was the alpha-if-item-deleted higher than the computed alpha, suggesting that all items contribute to the internal consistency of the scales. Results of item and distribution analyses and of EFA are shown in **table 1**.

Table 1. *Item descriptive statistics, item analyses and factor loadings from the exploratory factor analysis of the SD-MDS (n = 604)*

Item	*M*	*SD*	Range	SK	KU	r_{it}	α w/o	Loading
1. Mocking an obese person who is breathlessly running in order not to miss the bus	2.68	1.30	0-4	-.69	-.65	.59	.93	.64
2. Not giving up the seat to an elderly person on public transportation	2.93	1.03	0-4	-.86	.26	.65	.93	.70
3. Deep down rejoicing for the dismissal of a colleague who wanted to be promoted for the same position as you	2.42	1.25	0-4	-.39	-.83	.63	.93	.68
4. Making fun of someone's stutter by mimicking him/her when he/she is not there.	2.75	1.24	0-4	-.68	-.59	.63	.93	.68
5. Having two romantic relationships at the same time without the involved parties' knowledge.	2.93	1.24	0-4	-.96	-.15	.53	.93	.58
6. Flirting with a close friend's romantic partner while he/she is not there	3.07	1.11	0-4	-1.19	.72	.61	.93	.65
7. Hoping that a fellow student does not pass a test which you have just failed	2.47	1.21	0-4	-.40	-.78	.62	.93	.66
8. Borrowing money from a friend and pretending to forget about having to return it	3.26	1.01	0-4	-1.42	1.47	.65	.93	.70
9. Noticing that you have been given too much change at a supermarket's checkout and leaving without saying anything about it	2.05	1.33	0-4	-.05	-1.14	.57	.93	.61
10. Bumping your car into another car causing visible damage and walking away pretending that nothing happened	2.49	1.13	0-4	-.37	-.64	.64	.93	.67
11. Fantasizing about a sexual or love relationship with another person although you are already involved in a committed relationship	2.00	1.31	0-4	.11	-1.12	.51	.93	.56
12. Wishing that something bad would happen to your boss after he has unfairly or badly reprimanded you at work	2.43	1.21	0-4	-.42	-.76	.61	.93	.65
13. Leaving dirty litter in a green area after a picnic	3.07	1.01	0-4	-1.11	.92	.62	.93	.68
14. Stepping ahead of other people in line at a ticket counter	2.43	1.23	0-4	-.43	-.74	.61	.93	.66
15. Giving a friend an object that was received as a gift allowing him/her to believe that you bought it at an expensive price	2.29	1.17	0-4	-.24	-.71	.61	.93	.66
16. Leaving the coffee shop without paying what you ate/drank due to an oversight and not going back to pay after having noticed it.	2.57	1.22	0-4	-.49	-.72	.66	.93	.71
17. Feeling relief at the loss of an unwanted child due to a miscarriage	3.22	1.15	0-4	-1.46	1.23	.50	.93	.55
18. Noticing that an old lady is having trouble carrying some bags and intentionally ignoring her	3.17	.98	0-4	-1.31	1.59	.65	.93	.70
19. Inadvertently damaging a car that you borrowed from a friend and giving it back to him pretending that nothing happened	3.27	.94	0-4	-1.51	2.40	.67	.93	.71
20. Being happy about getting a job although you are aware that you are taking the place of a seriously ill colleague	2.69	1.17	0-4	-.61	-.52	.60	.93	.64
Total score	54.18	15.14	0-80					

Note: SD-MDS = Self-Directed Moral Disgust Scale; *M* = Mean; *SD* = Standard Deviation; SK = Skewness; KU = Kurtosis; r_{it} = corrected item-total correlation; α w/o = Cronbach's alpha-if-item-deleted.
The items have been translated into English through a mixed forward- and back-translation procedure. The scale is available for further validation studies free of charge from any of the authors.

Construct validity

The $Z_{contrast}$ test (Meng et al. 1992, Westen and Rosenthal 2003) was used to test the construct validity of the SD-MDS. It was expected that the correlation with the moral disgust subscale of the TDDS (convergent validity) was significantly higher than those with physical and sexual subscales of the TDDS, with proneness to physical disgust (DPQ), and with anxiety, depression and general distress as assessed by the DAAS-21 (discriminant validity). As expected, SD-MDS correlation with the moral disgust subscale of the TDDS ($r = .60$) was significantly ($Z_{contrast} = 14.63$, $p < .001$) higher than those with physical disgust ($r = .29$) and sexual disgust ($r = .38$) subscales of the TDDS, with DPQ ($r = .187$) and with anxiety ($r = -138$), depression ($r = -.133$) and general distress ($r = -152$) subscale of the DAAS-21. This finding supported the good construct validity of the SD-MDS.

This study has many limitations that should be considered. First, factor structure and psychometric properties of the scale were tested only in non-clinical participants recruited from the Italian general population; further studies should confirm its one-factor structure and adequate reliability and validity in clinical samples, although this would require large sample sizes to pursue.

Second, the scale was developed and tested in Italian rather than in English. The English translation of the SD-MDS was carried out through a mixed forward- and back-translation procedure. Two of the authors and one bilingual Italian–English psychologist independently translated the items into English. After consensus among translators was achieved, another Italian–English researcher who was blind to the original version translated this preliminary version back into Italian. Discrepancies emerging from this back-translation were discussed in order to refine the

Table 2. *Pearson's correlations among the study measures (n = 604)*

Measure	1	2	3	4	5	6	7
1. SD-MDS	-						
2. TDDS-Pathogen	.29**						
3. TDDS-Sexual	.38**	.55**					
4. TDDS-Moral	.60**	.39**	.48**				
5. DPQ	.19**	.62**	.29**	.14**			
6. DASS-21-Depression	-.14**	.02	.04	-.13**	.09*		
7. DASS-21-Anxiety	-.13**	.14**	.13**	-.08	.14**	.65**	
8. DASS-21-Stress	-.15**	.06	.05	-.19**	.14**	.70**	.62**

Note: SD-MDS = Self-Directed Moral Disgust Scale; TDDS = Three Domain of Disgust Scale; DPQ = Disgust Propensity Questionnaire; DASS-21 = Depression Anxiety Stress Scales-21.
* $p < .05$
** $p < .01$

Discussion

Self-directed moral disgust is an important construct that may play a role in the etiopathogenesis of MC and washing rituals, but this relationship is understudied because of the lack of a measure that specifically assesses this kind of disgust. As such, the present study aimed to develop a measure – the Self-Directed Moral Disgust Scale (SD-MDS) – and to evaluate its psychometric properties, using a large community sample. Following the item reduction procedure, a final exploratory factor analysis revealed the unidimensionality of the scale, and all the items substantially loaded on the first factor, which explained 43% of the variance of the scale. The SD-MDS also showed excellent internal consistency, as Cronbach's alpha, corrected item-total correlations, mean inter-item correlation, and alpha-if-item-deleted indices were more than adequate.

Our results also provided evidence for the construct validity of the scale, since its total score was more strongly correlated with the convergent measure of the TDDS moral disgust subscale than with other subscales of the TDDS and with other discriminant measures assessing disgust propensity, anxiety, depression, and general distress. Though a strong correlation coefficient between SD-MDS and the moral disgust subscale of the TDDS was evident, it suggests that they are strongly related, but not completely overlapping constructs, and hence the emerging need to develop a specific measure for the self-directed form of moral disgust.

English version. We believe the scale will also prove appropriate in English settings, particularly given that we have found in multiple previous studies of OCD and more generally that psychopathology scales translate across Italian–English settings without significant alterations to their structure or content (e.g., Melli et al. 2013b, 2015, 2016). However, future studies are required to firmly establish the psychometric properties of any English language version of the scale.

Third, while the scale has a clear pattern of convergent and divergent validity and the known-group validity was good, at the time of devising this study other measures of self-directed moral disgust were not available. In addition, we did not include the SDS, which assesses self-directed disgust, as there is not a validated Italian version of this scale. Hence, additional studies utilizing other convergent measures would strengthen the claims made in this article.

Fourth, this study did not evaluate test–retest reliability in non-clinical individuals and non-treated patients and sensitivity to change in treated patients. Further research is warranted to establish whether it can reliably be used as a measure of therapeutic change and/or over longer periods of time. Finally, all of the participants were self-selected; therefore, the samples may not have been representative of the Italian general population and this may limit the generalizability of the findings.

In conclusion, while considering the limitations described above, this study provided evidence that our

newly developed scale, which aimed to measure self-directed moral disgust – the SD-MDS – had sound psychometric properties and could be confidently employed in clinical and research settings in which this construct is of interest, particularly to test the aforementioned hypothesis that it is related to MC symptoms.

Unfortunately, the Italian version of the Vancouver Obsessional Compulsive Inventory–Mental Contamination Scale (VOCI-MC; Melli et al. 2015, Radomsky et al. 2014) was not available when the current study has been designed (Melli et al.'s [2015] study has been carried out in parallel); as a consequence, we could not assess MC and explore its relationship with the SD-MDS. Hence, future research should investigate the hypothesized association between SD-MDS and VOCI-MC, both in non-clinical and clinical OCD samples, particularly in contamination-related OCD samples, as VOCI-MC successfully discriminated between individuals with OCD who reported contamination-related concerns and all other groups of participants (Melli et al. 2015). Although longitudinal data would be preferable in order to examine the nature of the relationships between the aforementioned variables, also cross-sectional studies using regression, moderation, and mediation analyses in representative samples might be helpful at suggesting hypotheses regarding the directionality of the relationships among these variables.

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