

Obsessive-compulsive disorder and its relationship with disgust vulnerability and conscientiousness

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Abstract

Background: The aim of this study was to analyze the relationship between Obsessive-Compulsive Disorder (OCD) symptoms, disgust vulnerability, and the Five Factor Model (FFM) of personality. **Method:** The sample consisted of 100 adult patients with OCD as a primary diagnosis and 246 with other anxiety disorders (OADs), who responded to OCD, disgust vulnerability, anxiety, depression and personality questionnaires. To perform parametric statistical calculations, all questionnaire scores were transformed from raw ordinal-scale scores to Rasch measures, with interval properties. **Results:** OCD patients scored significantly higher than OAD patients on DPSS-R Disgust Sensitivity and DPSS-R Disgust Propensity, with a large effect size observed on Disgust Propensity. Furthermore, strong correlations were observed between DPSS-R Propensity to Disgust model scores and DOCS Contamination model scores. Finally, NEO FFI Conscientiousness trait was significantly higher in OCD patients.

Keywords: Dimensional Obsessive Compulsive Scale, disgust sensitivity, disgust propensity, five factor model, Rasch model.

Resumen

El trastorno obsesivo-compulsivo y su relación con la vulnerabilidad al asco y la minuciosidad. **Antecedentes:** el objetivo del estudio fue analizar la relación entre los síntomas asociados al trastorno obsesivo-compulsivo (TOC), la vulnerabilidad al asco y el modelo de los cinco factores de personalidad. **Método:** la muestra estuvo compuesta por 100 adultos con TOC y 246 con otro trastorno de ansiedad (OTA) que respondieron a diferentes cuestionarios sobre TOC, propensión y sensibilidad al asco, ansiedad, depresión y personalidad. Previamente a realizar los análisis estadísticos paramétricos, todas las puntuaciones directas se transformaron en medidas Rasch, con propiedades de escala de intervalo. **Resultados:** los pacientes TOC puntuaron significativamente más alto en sensibilidad y propensión al asco que los pacientes del grupo OTA, y esta diferencia fue mayor para la propensión al asco. Se observaron correlaciones altas entre las puntuaciones en propensión al asco y contaminación de la DOCS en ambos grupos. Finalmente, las puntuaciones en minuciosidad del test NEO FFI fueron significativamente más altas en el grupo TOC que en el OTA.

Palabras clave: escala dimensional obsesivo-compulsiva, sensibilidad al asco, propensión al asco, modelo de los cinco factores, modelo de Rasch.

Obsessive-compulsive disorder (OCD) is characterized by the presence of intrusive unwanted thoughts, images, or impulses (obsessions) along with repetitive behaviors or mental acts (compulsions) designed to reduce the distress caused by the obsessions (American Psychiatric Association [APA], 2013). The *Diagnostic and Statistical Manual of Mental Disorders, 5th edition* (DSM-5; APA, 2013) has described the emotional responses associated with obsessive-compulsive (OC) symptoms as anxiety and/or nonspecific distress but it has not provided a nuanced description of these responses, despite evidence that they are important in the evaluation and treatment of OCD (Inchausti & Delgado, 2012). Fear and anxiety have traditionally been considered the main emotional responses in this disorder but recent findings suggest that there may be other emotions involved in the

heterogeneity of OC symptoms. For instance, disgust appears to be involved in contamination-related OC symptoms (e.g., Cisler, Olatunji, & Lohr, 2009).

Many clinical classifications of OC symptoms have been proposed (see McKay et al., 2004). Recent research suggests that obsessions, compulsions, and avoidance strategies reflect the individual's highly idiosyncratic concerns, and structural analyses indicate that OC symptoms are dimensional and tend to co-occur (e.g., Mataix-Cols, Rosario-Campos, & Leckman, 2005; McKay et al., 2004). The most consistently replicated OC symptom dimensions include (a) contamination obsessions and washing/cleaning compulsions; (b) obsessions about responsibility for causing harm or making mistakes and checking compulsions; (c) obsessions about order and symmetry and ordering/arranging compulsions; and (d) repugnant obsessive thoughts concerning gender, religion, and violence along with mental compulsive rituals and other covert neutralizing strategies (e.g., thought replacement) (Abramowitz et al., 2010). One of the instruments developed to measure the severity of these four dimensions of OC symptoms is the Dimensional Obsessive-Compulsive Scale (DOCS; Abramowitz et al., 2010). Although this measurement

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instrument appears to overcome some of the limitations in the routine measurement of OC symptoms, it does not consider the affective facet of the disorder. Thus, non-OCD measures that have focused on affective aspects, such as disgust vulnerability (Deacon & Olatunji, 2007), could be useful in the measurement of contamination-related OC symptoms.

Personality traits may be a key mediator of individual differences in OC symptom subtype, symptom severity, time-course, and treatment responses for OCD (e.g., Alonso et al., 2008). Dimensional personality perspectives have shown to be a useful approach to describe personality functioning and may reveal meaningful relationships between personality and OCD. The dimensional model of personality that has received the most attention in recent years is the Five Factor Model (FFM), which has become the reference taxonomy for the study of general and clinical personality (e.g., Gore & Widiger, 2013). The terms commonly used to describe the personality traits that underpin the FFM are Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (OCEAN; Costa & McCrae, 1992). Some research has also found that the FFM traits may be a key mediator in the utilization, time course, and effectiveness of various treatments of mental disorders (Hopwood et al., 2008). Determining whether these traits are related to the clinical variables described above could be important to further understanding of OCD.

The study both of emotions and personality traits has been difficult due to conceptual and methodological drawbacks, including the failure to consider the clinical heterogeneity of OCD and the existing OC measurement instruments. The Rasch model (Rasch, 1960) overcomes some of the Classical Test Theory (CTT) methodological weaknesses (Wright & Stone, 1979). This model focuses on individual item and person performance rather than on group statistics, expressing item calibrations and person measures on a common linear scale. Contrary to CTT, person measures are independent of the items attempted, and item locations are independent of the sample employed (Wilson, 2005). The linearity of the scale allows parametric statistical calculations to be performed. The advantages of the Rasch model have been highlighted in recent papers (e.g., Inchausti, Prieto, & Delgado, 2014; Loschiavo et al., 2013; Prieto & Delgado, 2003; Simblet & Bateman, 2011) but, to date, it has not been used in OCD (Inchausti & Delgado, 2012).

The main aim of this study was to explore the relationships between OC symptoms and disgust sensitivity, disgust propensity, and the FFM personality traits in a large clinical sample, using Rasch scores. The instruments used in this research are Likert scales: the participant must answer on ordinal categories. Thus, to estimate person and item measures on an interval variable, the Rating Scale Model (RSM) was used. The RSM, being a Rasch-type model, has optimal metric properties and it is useful to empirically analyze the quality of response categories (Linacre, 2002). We expected to extend previous research that suggests that disgust vulnerability and conscientiousness may be important in the assessment of OCD.

Method

Participants

The total study sample consisted of 346 adults, including 100 patients (56 males) with OCD and 246 (67 males) with Other

Anxiety Disorders (OADs). The mean age was 37.03 ($SD = 11.09$) in the OCD group and 36.30 ($SD = 13.66$) in the OAD group. Participants were recruited from Mental Health Services of Badajoz (MHSB, Spain) and met DSM-IV-TR criteria (APA, 2000) for OCD (OCD group) or OAD (OADs group) as a primary diagnosis. Prior to admission to the study, patients were diagnosed by a Psychiatrist or Clinical Psychologist using the Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Patient Edition with Psychotic Screen (SCID-I/P W/ PSY SCREEN; First, Spitzer, Gibbon, & Williams, 2002). Participants with presence of psychotic symptoms, diagnosis of bipolar disorder, substance abuse, attention deficit and hyperactivity disorder, personality disorders or intellectual disability associated with anxiety disorders were excluded. Data from five participants were removed due to doubts concerning their diagnoses. In addition, data were discarded from a further three people who had not responded to more than 20% of the items (Cohen & Cohen, 1983) and from one person who did not give informed consent.

The main and secondary diagnoses by gender in both groups of patients are shown in Table 1. In the OCD group, forty participants had some comorbid disorder, mood disorders being the most frequent ($n = 12$). Sixty-eight participants (68%) were receiving psychiatric medication at the time of data collection. In the OADs group, social phobia was the most frequent primary diagnosis in males ($n = 47$) and panic disorder with agoraphobia in females ($n = 57$). In this group, 134 participants (54.5%) received psychiatric medication.

Table 1 Frequency of participants by group, gender and DSM-IV-TR diagnoses				
	Group			
	OCD ($n = 100$)		OAD ($n = 246$)	
	Males ($n = 56$)	Females ($n = 44$)	Males ($n = 67$)	Females ($n = 179$)
Primary diagnosis				
– OCD	56	44	–	–
– Panic disorder without agoraphobia	–	–	3	12
– Panic disorder with agoraphobia	–	–	8	57
– Agoraphobia	–	–	0	15
– Generalized anxiety	–	–	0	56
– Specific phobia	–	–	4	4
– Social phobia	–	–	47	6
– Post-traumatic stress disorder	–	–	5	0
– Nonspecific anxiety disorders	–	–	0	29
Secondary diagnosis				
– None	41	19	53	61
– Mood disorders	5	7	0	35
– Panic disorder without agoraphobia	0	1	2	1
– Panic disorder with agoraphobia	0	7	1	0
– Agoraphobia	0	0	8	34
– Sleep disorders	2	2	3	9
– Eating disorders	3	2	0	9
– Somatization disorders	0	0	0	30
– Generalized anxiety disorder	1	6	0	0
– Specific phobia	4	0	0	0

Note: OCD = obsessive-compulsive disorder; OAD = other anxiety disorders

Instruments

The following measures were used in this study:

The Spanish DOCS (Fullana, López-Sola, & Pertusa, 2010). This 20-item self-report questionnaire assesses the four most replicated OC symptom dimensions (i.e., contamination, responsibility for harm, injury or bad luck, unacceptable thoughts, and symmetry) according to five parameters. The five parameters are: (a) time occupied by obsessions and compulsions, (b) avoidance behavior, (c) associated distress, (d) functional interference, and (e) difficulty disregarding obsessions and refraining from compulsions. Each item is rated on a scale from 0 (*no symptoms*) to 4 (*extreme symptoms*). This instrument allows four partial scores to be obtained by summing the 5-items of each symptom subscale described below (higher scores indicate greater severity of symptoms) and a total score to be calculated by summing the 20-items (OCD total severity). A recent study has demonstrated that the Spanish DOCS has similar psychometric properties to those obtained with the original English DOCS (López-Sola et al., 2014). The total score of the DOCS has adequately discriminated between patients with and without OCD in the original English version (Abramowitz et al., 2010) and in the Spanish version (López-Sola et al., 2014). The Rasch model reliability index was .93 for the total DOCS scores, and by subscale they were .96 for Contamination, .97 for Responsibility, .84 for Unacceptable Thoughts and .98 for Symmetry.

The Obsessive-Compulsive Inventory-Revised (OCI-R); Foa et al., 2002). The OCD and OAD groups completed this widely used 18-item self-administered questionnaire to assess distress associated with OC symptoms. The OCI-R assesses six dimensions of symptoms (Washing, Checking, Obsessing, Ordering, Neutralizing and Hoarding) using a 5-point Likert scale. The Spanish version of the OCI-R has good internal consistency, test-retest reliability, and convergent validity, and a similar factor structure to the original version (Fullana et al., 2005; Malpica, Ruiz, Godoy, & Gavino, 2009). The model reliability index of the OCI-R scores for this study was .90.

The Yale-Brown Obsessive-Compulsive Scale-Self Report Version (Y-BOCS-SR); Steketee, Frost, & Bogart, 1996). This study used the self-report Spanish version of the Y-BOCS (Sal y Rosas et al., 2002). It consists of 10 items that assess the severity of OC symptoms, based on a list of 58 obsessions, compulsions, and avoidance behaviors. Each item is scored on a 5-point Likert scale from 0 (*absence of symptoms*) to 4 (*extreme symptoms*). The model reliability index of the scores was .92.

Beck Anxiety Inventory (BAI); Beck, Epstein, Brown, & Steer, 1988). This 21-item self-report scale was used to assess the physiological and cognitive symptoms of general anxiety (e.g., sweating, fear of losing control) independently of depressive symptoms. Respondents indicate the degree to which they have been bothered by each symptom during the past week. The Spanish version of the BAI has shown good psychometric properties (Sanz & Navarro, 2003). The model reliability index of the BAI scores was .87.

Beck Depression Inventory-II (BDI-II); Beck, Steer, & Brown, 1996). This 21-item instrument assesses the severity of affective, cognitive, motivational, vegetative, and psychomotor components of depression in adults. The OCD and OAD groups completed the Spanish version of this instrument (Sanz, Navarro, & Vázquez, 2003). The model reliability index of the BDI-II scores was .84.

The Disgust Propensity and Sensitivity Scale-Revised (DPSS-R); van Overveld et al., 2006). This 16-item measure was administered to OCD and OAD groups to assess the general tendency to respond with the emotion of disgust (Disgust Propensity) and the overestimation of the negative impact of experiencing disgust (Disgust Sensitivity). Subjects rate their agreement with each item on a scale ranging from 1 ("never") to 5 ("always"). The Spanish version of the DPSS-R has shown adequate psychometric properties (Sandin, Chorot, Olmedo, & Valiente, 2008). Model reliabilities were .89 for the disgust sensitivity subscale, and .86 for the disgust propensity subscale.

NEO Five Factor Inventory (NEO FFI), Costa, & McCrae, 1992). This 60-item measure assesses the FFM domains of personality (Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness). Each item consists of a statement rated on a Likert scale, where responses can range from strongly disagree to strongly agree. The Spanish version of the instrument (Costa & McCrae, 1999) was administered to the OCD and OAD groups. Rasch model reliabilities were .82 for Openness, .83 for Conscientiousness, .90 for Extraversion, .55 for Agreeableness, and .69 for Neuroticism.

Procedure

The participants who were finally selected were interviewed individually. Each participant was first informed about the objectives and conditions of the study and asked to sign a consent form and complete anonymous questionnaires. They received no type of incentive for taking part in the study. The measurement instruments were always completed under the supervision of a researcher. This study is part of a broader research initiative on early detection and intervention in the context of psychiatric disorders in adulthood and the analysis of psychopathological and personality variables. This research aims to enhance the effectiveness of mental health treatments in the Spanish National Health Service. This study was approved by the Research and Ethics Committees at MHSB.

Data analysis

Responses to questionnaires were gathered (item by item) and analyzed by means of the Rasch Model using Winsteps software (Linacre, 2013; Linacre & Wright, 2000). Additionally, data was collected on each participant's demographics (age, gender, marital status, education level and employment status), primary and secondary psychiatric diagnosis (if present), and current treatment (with or without psychiatric medication). Rasch analyses included the analysis of (1) the rating scale functioning of all the questionnaires with the Rating Scale Model (Linacre, 2002), (2) the psychometric properties of the scores, and (3) differential item functioning (or DIF) associated with gender, treatment (with or without medication) and principal diagnosis (OCD or OAD). DIF analyses were conducted in order to probe the generalized validity of the scores and it was considered to be present if items showed differential functioning under both Rasch's (significant difference and more than half a *logit* between the difficulty parameters by groups) and Mantel-Haenszel's (MH) perspectives (type C DIF: delta MH value is greater than 1.5 and is significant).

Contrasts of scores and Pearson correlations were calculated using Rasch person measures, which satisfy the theoretical assumptions needed to conduct parametric statistical analyses. Pearson correlations were calculated using SPSS-21 software.

Results

Symptom characteristics by group

The initial analyses revealed that the rating scale of all the questionnaires functioned acceptably and the scores had adequate psychometric properties according to Linacre's (2002) criteria. No DIF was observed in any item both according to Rasch and MH's perspectives.

Table 2 presents model means, the average of model Standard Errors of Measurement (SEM), and Rasch-Welch's *t* contrasts between groups on all scales and subscales. It also includes estimations of effect size (Cohen's *d*). As can be seen in Table 2, there were significant differences in model mean scores between both groups in all scales and subscales ($p < .001$) except in the OCI-R Hoarding subscale, where no significant differences between groups were found ($p > .40$). The Y-BOCS-SR model scores revealed major differences ($d = 3.78$). For subscales, the largest differences between groups were found in OCI-R Washing ($d = 2.19$), DOCS Contamination ($d = 1.85$), and DOCS Unacceptable Thoughts ($d = 1.43$). The smallest differences were observed in OCI-R Ordering ($d = .90$) and OCI-R Checking ($d = .67$).

Disgust vulnerability and OC symptoms

As can be seen in Table 2, the DPSS-R model scores indicated significant differences between groups in DPSS-R Disgust Propensity and DPSS-R Disgust Sensitivity ($p < .001$); that is, OCD patients scored significantly higher in Disgust Sensitivity and

Table 2 Symptom characteristics by group				
	OCD <i>M</i> (SEM)	OAD <i>M</i> (SEM)	<i>t</i>	<i>d</i>
DOCS Total	.32 (.11)	-1.57 (.07)	14.86*	1.83
Contamination	1.98 (.55)	-5.97 (.17)	13.75*	1.85
Responsibility	-1.09 (.65)	-4.58 (.21)	5.09*	.75
Unacceptable thoughts	2.33 (.52)	-4.59 (.26)	11.86*	1.43
Symmetry	.41 (.72)	-5.88 (.25)	8.27*	1.19
Y-BOCS-SR	5.59 (.36)	-4.47 (.12)	26.68*	3.78
OCI-R Total	.71 (.15)	-7.78 (.05)	9.26*	1.41
Washing	1.84 (.38)	-.16 (.17)	18.49*	2.19
Checking	.75 (.39)	-.51 (.23)	4.59*	.67
Obsessing	1.66 (.28)	-.61 (.25)	6.14*	1.32
Ordering	.78 (.45)	-.42 (.34)	3.80*	.90
Neutralizing	1.56 (.41)	-.15 (.24)	7.13*	1.19
Hoarding	-.68 (.40)	-.59 (.31)	1.08	.09
BAI	-.41 (.15)	.29 (.08)	-4.22*	-.56
BDI-II	-1.34 (.17)	-.39 (.06)	-5.41*	-.55
DPSS-R Total	1.57 (.17)	-.23 (.05)	10.24*	1.65
Disgust propensity	2.54 (.32)	-.86 (.13)	17.84*	2.12
Disgust sensitivity	1.13 (.57)	-.67 (.26)	10.71*	1.10

Note: OCD = obsessive-compulsive disorder; OAD = other anxiety disorders; DOCS = Dimensional Obsessive Compulsive Scale; Y-BOCS-SR = Yale-Brown Obsessive Compulsive Scale-Self Report; OCI-R = Obsessive Compulsive Inventory-Revised; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; DPSS-R = Disgust Propensity and Sensitivity Scale-Revised; * $p < .001$; M = Rasch Mean; SEM = Standard Error of Measurement' average; *t* = Rasch-Welch's *t* contrast; *d* = Cohen's *d* effect size

Disgust Propensity than OAD patients, and these differences were larger on DPSS-R Disgust Propensity ($d = 2.12$). Table 3 presents correlations between DPSS-R Disgust Propensity and Sensitivity and DOCS subscale model scores by group. The results revealed major relationships between both DPSS-R subscales and DOCS Contamination model scores in the OCD group, specifically in Disgust Propensity (.84), and to a lesser extent in the OAD group ($rs < .67$). Finally, significant correlations between both DPSS-R subscales and DOCS Symmetry were also observed in the OCD group, especially in Disgust Propensity ($rs > .59$).

The FFM personality traits and OC symptoms

Table 4 presents model means, the average of model SEM, Rasch-Welch's *t* contrasts and Cohen's *d* effect sizes by group on the NEO FFI dimensions. As can be seen, there were no significant differences between groups in the Neuroticism, Extraversion, Agreeableness and Openness dimensions ($p > .005$). However, OCD patients scored significantly higher on the Conscientiousness trait than the OAD group ($p < .001$). This result corroborates that there may be higher levels of sense of responsibility in OCD patients. Table 5 shows Pearson correlations between NEO FFI dimension model scores and DOCS subscale model scores by group. In the OCD group, a strong positive correlation between NEO FFI Conscientiousness model scores and all DOCS subscales was observed, especially with Unacceptable Thoughts (.66) and Responsibility (.64). That is, higher levels of Conscientiousness were related to higher model scores on both DOCS subscales. In the OAD group, significant positive correlations were found

Table 3 Pearson correlations between disgust propensity and disgust sensitivity Rasch scores and Dimensional Obsessive-Compulsive Scale (DOCS) subscale Rasch scores by group				
DOCS subscale	OCD		OAD	
	DPSS-R-P	DPSS-R-S	DPSS-R-P	DPSS-R-S
Contamination	.84*	.76*	.67*	.48*
Responsibility	.16	.12	.47*	.48*
Unacceptable thoughts	.14	.25	.24	.18
Symmetry	.67*	.59*	.54*	.18

Note: DPSS-R-P = disgust propensity subscale; DPSS-R-S = disgust sensitivity subscale; * $p < .001$ (Bonferroni corrected, calculated within each diagnostic group). Boldface type reflects expected correlations between corresponding subscales

Table 4 Rasch scores on NEO-FFI personality dimensions by group				
NEO FFI Dimension	OCD <i>M</i> (SEM)	OAD <i>M</i> (SEM)	<i>t</i>	<i>d</i>
Neuroticism	1.25 (.10)	1.07 (.04)	1.63	.02
Extraversion	-1.73 (.20)	-1.45 (.08)	-1.80	-.39
Agreeableness	.57 (.05)	.53 (.03)	.58	.07
Conscientiousness	.56 (.08)	-.37 (.04)	10.54*	1.49
Openness	-.27 (.09)	-.48 (.05)	2.09	.49

Note: OCD = obsessive-compulsive disorder; OAD = other anxiety disorders; NEO FFI = NEO Five-Factor Inventory; * $p < .001$; M = Rasch Mean; SEM = Standard Error of Measurement' average; *t* = Rasch-Welch's *t* contrast; *d* = Cohen's *d* effect size

between the NEO FFI Neuroticism dimension and scores on DOCS Responsibility and Unacceptable Thoughts ($r_s > .62$). Finally, the NEO FFI Extraversion dimension correlated negatively with all DOCS subscales in the OCD group; i.e., lower Extraversion trait scores were associated with higher DOCS subscale model scores ($p < .001$).

Discussion

Dimensions of OCD symptoms

The stronger correlations between DOCS Contamination and Symmetry model scores and the OCI-R Neutralizing model scores found in this study and others (e.g., López-Sola et al., 2014) may suggest the existence of a common latent variable related to disgust vulnerability. It may be that DOCS Contamination and Symmetry items underlie an emotional dimension of disgust (Chapman et al., 2009). For example, contamination-related OC symptoms (i.e., thinking or feeling that one is dirty or following a careful routine in the bathroom to avoid staining) could relate to the need for order and symmetry (i.e., things must be "good" or I must always act "correctly") or the need to counteract these feelings and ideas because they generate emotional responses of disgust. Indeed, Gottesman and Gould (2003) have emphasized the importance of attending to other transdiagnostic variables, such as vulnerability to disgust (Olatunji, Tart, Ciesielski, McGrath, & Smits, 2011), to better understand comorbid symptoms. For example, the fact that, in this study, levels of anxiety in OCD patients were significantly lower than those in OAD patients suggests that anxiety may not be the predominant symptom in OCD, in line with recent findings (e.g., Leckman Denys, Simpson et al., 2010), and highlights the need for more attention to other emotional responses, such as disgust. This study also found that the only subscale in which no significant differences between both groups were observed was in OCI-R Hoarding symptoms, suggesting that these symptoms were not associated exclusively with OCD, and supporting previous evidence that these subtypes of symptoms may be related to a distinct disorder (e.g., Mataix-Cols et al., 2010).

Disgust vulnerability and OC symptoms

OCD patients were both more sensitive and more prone to experience disgust than OAD patients. The relationship with disgust was stronger for contamination-related symptoms in both groups and for ordering and symmetry in OCD group. This suggests that disgust is particularly important in the development and/or maintenance of these subtypes of symptoms. A disgust latent variable could explain the high comorbidity found between contamination and symmetry symptoms. Moreover, our findings corroborate recent research results suggesting that the tendency to experience disgust plays a greater role than sensitivity to disgust in the development and maintenance of OCD symptoms, but both may act as separate indicators of disgust vulnerability (e.g., Cisler, Olatunji, & Lohr, 2009; Olatunji et al., 2010; Olatunji, Tart, Ciesielski, McGrath, & Smits, 2011). This could have important implications for OCD treatment. For instance, it has been found that significant changes in disgust propensity levels and negative affect jointly predict the reduction of certain OCD symptoms (Olatunji, Tart, Ciesielski, McGrath, & Smits, 2011). This suggests that disgust propensity may have a mediating effect on improvement of OCD symptoms using exposure and response prevention (e.g., Olatunji, 2010). It may also support the existence of a latent emotional transdiagnostic variable that explains the relationship between different OCD symptoms. However, these results are limited by the fact that this study has not measured other mediating factors, such as anxiety sensitivity, the emotional self-regulation capacity, or the overestimation of threat (Deacon & Olatunji, 2007; Olatunji et al., 2011).

FFM personality traits and OC symptoms spectrum

Regarding personality traits, the OCD group obtained significantly higher model scores versus OAD group in the NEO FFI Conscientiousness personality trait. Contrary results have been reported in previous studies that, surprisingly, found low levels of conscientiousness in patients with OCD (e.g., Samuels et al., 2000; Rector, Hood, Richter, & Bagby, 2002). However, the results of this study were in accordance to literature for other FFM traits: patients with OCD scored higher on neuroticism and lower on extraversion versus OAD group, but these differences were not significant. The finding for conscientiousness suggests that OCD patients also show higher desire for order, organization, thoroughness and liability, and these individual differences are not only related to disorder symptoms. It highlights difficulties in the differential diagnosis between OCD and Obsessive-Compulsive Personality Disorder (OCPD; Abramowitz, Wheaton, & Storch, 2008) and the greater tendency towards perfectionism and excessive self-imposed responsibility in people with OCD (e.g., OCCWG, 2005). Thus, the Five Factor Obsessive Compulsive Inventory (FFOCI; Samuel, Riddell, Lynam, Miller, & Widiger, 2012) has been developed to analyze whether OCPD can be understood as a maladaptive variant of the FFM Conscientiousness trait. For instance, Crego, Samuel, and Widiger (2015) have recently found the FFOCI to be a valid measure of maladaptive variants of FFM traits in OCPD patients, specifically identifying substantive differences in FFM Conscientiousness, Antagonism, and Introversion traits. Future research should test whether levels of FFM Conscientiousness act with the same intensity in OCD and OCPD and whether these levels are relevant in the differential diagnosis and in the

Table 5

Pearson correlations between NEO FFI personality dimension Rasch scores and Dimensional Obsessive-Compulsive Scale (DOCS) subscale Rasch scores by group

NEO FFI Dimension	DOCS subscale							
	Contamination		Responsibility		Unacceptable thoughts		Symmetry	
	OCD	OAD	OCD	OAD	OCD	OAD	OCD	OAD
Neuroticism	.11	.16	.62*	.11	.65*	-.04	.31*	.02
Extraversion	-.54*	.20*	-.13	.05	-.38*	-.17*	-.54*	.09
Agreeableness	-.15	.19*	-.09	-.01	.09	.27*	-.08	.40*
Conscientiousness	.62*	.01	.64*	.31*	.66*	.07*	.63*	.21
Openness	.15	-.14	.14	.04	.09	.18*	.27*	.12

Note: OCD = obsessive-compulsive disorder; OAD = other anxiety disorders; NEO FFI = NEO Five-Factor Inventory; * $p < .001$ (Bonferroni corrected, calculated within each diagnostic group). Boldface type reflects expected correlations between corresponding subscales

development and maintenance of symptoms. These results are also particularly important for treatment planning. Some research suggests that FFM traits may be a key mediator in the utilization, time-course, and effectiveness of various treatments of mental disorders (Hopwood et al., 2008). In that direction, Miller, Pilkonis and Mulvey (2006) found that FFM Openness to experience and Conscientiousness significantly predicted the number of therapy sessions needed, as well as treatment satisfaction and compliance. More research is needed to clarify these relationships and their implications for clinical practice.

Although the new dimensional measuring instrument of OCD, the DOCS scale, may represent an important advance in the clinical

assessment of OCD symptoms, the results of this research suggest that it does not capture the entire OCD experience. Specifically, the DOCS does not address the affective facet of the disorder, including disgust responses associated with contamination, ordering and symmetry OC symptoms, nor does it provide information about personality traits associated with the disorder, such as levels of conscientiousness. Both factors appear to be highly relevant to the evaluation of symptom severity, planning of clinical interventions, and testing measurement of treatment efficacy. This study suggests that, before building new OCD measures, it will be necessary to develop the definition of OCD further, particularly with respect to emotional and personality facets.

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