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General personality dimensions, impairment, and treatment response in obsessive-compulsive disorder

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Abstract

General personality dimensions are associated with clinical severity and treatment response in individuals with depression and many anxiety disorders, but little is known about these relationships in individuals with obsessive-compulsive disorder (OCD). Individuals in the current study included 705 adults with OCD who had participated in family and genetic studies of the disorder. Participants self-completed the NEO Personality Inventory (NEO PI-R) or NEO Five-Factor Inventory-3 (NEO-FFI-3). Relationships between personality scores, and subjective

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impairment and OCD treatment response, were evaluated. The odds of subjective impairment increased with (unit increase in) the neuroticism score (odds ratio, OR=1.03; 95% CI=1.01–1.04; p<0.01), and decreased with extraversion score (OR= 0.98; 95% CI=0.96–0.99; p<0.01). The odds of reporting a good response to serotonin/selective serotonin reuptake inhibitors (OR=1.02; 95% CI=1.01–1.04; p<0.01) or cognitive behavioral therapy (OR=1.03; 95% CI=1.01–1.05; p<0.01) increased with extraversion score. The magnitude of these relationships did not change appreciably, after adjusting for other clinical features related to one or more of the personality dimensions. The findings suggest that neuroticism and extraversion are associated with subjective impairment, and that extraversion is associated with self-reported treatment response, in individuals with OCD.

Keywords

obsessive-compulsive disorder; OCD; personality; NEO; impairment

Introduction

Obsessive-compulsive disorder (OCD) is a neuropsychiatric condition characterized by distressing and disabling obsessions and compulsions (DSM-5).[1] Clinicians have long been aware that impairing personality traits occur frequently in patients with OCD, especially obsessive-compulsive personality traits and disorder.[2–5] Several studies have shown that, among OCD-affected adults, obsessive-compulsive personality disorder is associated with OCD severity, comorbidity with other disorders, functional impairment, and poor treatment outcomes.[6–8]

More recent studies have investigated general personality dimensions in OCD, mostly evaluating the Five-Factor model of personality.[9] For example, in the Johns Hopkins OCD Family Study, OCD probands (index cases) had higher neuroticism and lower extraversion scores than non-OCD probands.[10] In the Baltimore Epidemiological Catchment Area study, OCD cases had higher scores on neuroticism and openness than comparison participants without depression or anxiety disorders.[11] Tackett and colleagues found that OCD cases had higher scores on neuroticism and openness, and lower scores on extraversion and conscientiousness, compared to a community sample.[12] In contrast, Rector et al. (2002) found that patients with OCD had lower scores on neuroticism, and higher scores on extraversion, agreeableness, and conscientiousness, than did patients with major depression.[13]

NEO personality dimensions, especially neuroticism, have been found to be associated with clinical severity and treatment response in individuals with depression and anxiety disorders.[14–18] However, few studies have investigated the relationship between general personality dimensions and clinical features in OCD-affected individuals. In 56 OCD patients, Rector and colleagues found that lower scores on two openness facets, openness to ideas and openness to actions, were related to greater severity of OCD symptoms.[19] In a prospective study of 296 OCD patients, neuroticism was a strong predictor of remission during the follow-up period.[20] Apart from these studies, however, little has been reported on the

relationship between general personality dimensions, severity, and treatment response in OCD. Therefore, in the current study, we investigated these relationships in a relatively large sample of individuals with OCD.

Method

Participants

The 705 individuals included in the current analyses were adults, age 18–75, who were OCD-affected probands (index cases) participating in one of three family/genetic studies of OCD and who completed the Revised NEO Personality Inventory (NEO PI-R).[9] As described previously,[21] the Johns Hopkins OCD Family Study selected OCD probands from specialty OCD treatment centers in the Baltimore/Washington region.[22] The OCD Collaborative Genetics Study (OCGS) recruited families with affected-sibling pairs,[23] while the OCD Collaborative Genetic Association Study (OCGAS) targeted recruitment on trios (i.e., an OCD-affected proband and both parents), but also included pedigrees with a proband and affected sibling, as well as families with multiple-affected individuals, when these were available.[24] The latter two studies, conducted as a collaboration among seven academic sites, recruited participants from outpatient and inpatient clinics, referrals from clinicians in the community, web sites, media advertisements, self-help groups, and annual conventions of the International Obsessive-Compulsive Foundation.

To be considered affected, participants had to meet DSM-IV[25] OCD criteria at any time in their lives. Probands with schizophrenia, severe mental retardation, Tourette Disorder, or OCD occurring exclusively in the context of depression were excluded. Individuals with transient tic disorder, or motor or vocal tics, were not excluded. Written, informed consent was obtained prior to the clinical interview, after study procedures had been fully explained. The protocol was approved by institutional review boards at each study site.

Measures and procedures

As described previously,[21] diagnostic assessments were conducted by psychiatrists or PhD-level clinical psychologists who interviewed participants directly using a semi-structured format for the evaluation of psychopathology. Final diagnoses were assigned by clinicians at each site and reviewed by a diagnostic committee of psychiatrists at the Johns Hopkins University coordinating site.

The Structured Clinical Interview for DSM-IV (SCID-IV)[26] was used for assessing major Axis I disorders other than OCD. A semi-structured assessment protocol was used for grooming disorders (pathologic nail biting, pathological skin picking, trichotillomania) and body dysmorphic disorder, as described previously.[27]

The OCD section of the assessment package was adapted from the Schedule for Affective Disorders and Schizophrenia for DSM-IV (SADS-LA-R)[28] for assessment of lifetime disorders and included detailed screening questions. The Yale Brown Obsessive Compulsive Scale (YBOCS) was used to assess the severity of OCD during the most severe lifetime episode, based on time occupied, functional interference, distress, resistance, and control associated with obsessions and compulsions,[29] and the Yale Brown Obsessive Compulsive

Scale Symptom Checklist (YBOS-CL) was used to evaluate the lifetime presence of specific OCD symptoms. Based on prior factor analyses, we derived five obsessive-compulsive symptom scales by counting the number of symptoms reported for each factor (symmetry/ordering; contamination/cleaning; checking; hoarding; and taboo thoughts.[30]

Relevant items from the Structured Instrument for the Diagnosis of DSM-IV Personality Disorders[31] were used for the assessment of criteria for schizotypal, avoidant, dependent, and obsessive-compulsive personality disorders; each trait was rated as "not present", "sub-threshold", "present", or "strongly present". Personality disorder dimensions were derived by counting the number of traits rated as present or strongly present, for each of the four personality disorders evaluated.

The examiners evaluated overall-lifetime impairment in social, occupational, home/martial, academic, and other areas and rated global impairment on a five-point scale: "none", "minimal", "moderate", "marked", or "extreme". For the current analyses, impairment was dichotomized into low (no, minimal, or moderate impairment) or high (marked or extreme impairment). Treatment response was evaluated by asking the participant his/her subjective response to specific serotonin or selective serotonin reuptake inhibitor (SRI/SSRI) medications, and/or to cognitive behavioral therapy (CBT), if these treatments had been received. Treatment response was rated on five-point scales, including "no response", "could not tolerate", "mild improvement", "moderate improvement", or "total remission". For the current analyses, treatment response was dichotomized into poor (no response, could not tolerate, or mild improvement) or good (moderate improvement or total remission).

Probands self-completed the Revised NEO Personality Inventory (NEO PI-R) [9] or NEO Five-Factor Inventory-3 (NEO-FFI-3)[32] to assess the five domains of normal personality according to the Five-Factor model: neuroticism, extraversion, openness, agreeableness, and conscientiousness. T-scores for the five domains were calculated according to the method of Costa and McCrae, which used different reference means and standard deviations for men and women. These distributions have a mean of 50 and standard deviation of 10 in the general population. T-scores ranging from 45 to 54 are considered "average". Scores less than 35 are considered "very low"; 35–44 are considered "low"; 55–64 are considered "high"; and those greater than 64 are considered "very high".[9]

Analysis of data

The focus of the analyses was on the associations between NEO personality dimensions, on the one hand, and impairment and OCD treatment response, on the other. The relationships between personality dimensions and other clinical features were assessed to identify potential confounding or mediating factors to include in adjusted analyses. The Pearson r correlation coefficient was used to evaluate relationships between the five NEO personality domains and continuous clinical features (age, age at onset of obsessive-compulsive symptoms, YBOCS severity score, obsessive-compulsive symptom scales, and personality disorder dimensions). The Student t-test was used to evaluate relationships between personality scores, gender, and lifetime history of comorbid Axis I disorders, and Hedges g was used to assess effect size.[33] Logistic regression was used to evaluate the magnitude of the association between personality scores and impairment, response to SRI/SSRI treatment,

and response to CBT, first unadjusted for, and then adjusting for, those demographic and clinical features that were related to one or more of the personality dimensions. All five NEO personality dimensions were simultaneously entered into these models, in order to assess the relationship of each personality dimension with impairment and treatment response, independent of the other personality dimensions. For neuroticism and extraversion, we also examined the proportion of individuals with impairment and treatment response, in categories defined by ranges of neuroticism and extraversion scores, as specified by Costa and McCrae.[9] A priori, given the exploratory nature of this study, all significance tests used a significance threshold of $p<0.05$, and were not corrected for multiple comparisons.

Results

Characteristics of the study sample

The study sample included 705 adults, 18 years of age and older, with DSM-IV OCD. Their ages ranged from 18–75, with a mean age of 37.3 years (SD=12.8). Women comprised 450 (64%), and men 255 (36%), of the sample. Most participants (56%) were college graduates, and another 28% had attended or were attending college. A total of 666 (94%) of the participants were white; 12 (1%) were Latino; 7 (1%) were African-American; and 20 (3%) were other or not specified. The mean age at onset of obsessive-compulsive symptoms was 9.4 years (SD=5.3), and the mean YBOCS severity score was 29.1 (SD=6.5). Compared to population norms, the mean neuroticism score was high (64; SD=12.6) and the mean extraversion score was low (45; SD=13.0) (Table 1).

Relationship between personality scores and clinical features

As shown in Table 2, neuroticism scores were inversely correlated with age at onset of obsessive-compulsive symptoms; positively correlated with OCD severity; positively correlated with all obsessive-compulsive symptoms dimensions other than symmetry/ordering; and positively correlated with the personality disorder dimensions. In contrast, extraversion scores were positively correlated with age at onset of obsessive-compulsive symptoms, and inversely related to age, YBOCS severity score, the hoarding dimension, and all four personality disorder dimensions. Openness was positively correlated with the number of taboo and hoarding traits, and inversely related to the dependent personality disorder dimension. Agreeableness was positively correlated with age, inversely related to the symmetry/ordering dimension, and inversely related to all four personality disorder dimensions. Conscientiousness was positively correlated with the symmetry/ordering dimension, inversely related to the taboo and hoarding dimensions, and inversely related to avoidant, dependent, and schizotypal personality disorder dimensions. Most of the correlations were small, with $r<0.30$ (Table 2).

As shown in Table 3, men had higher mean neuroticism, openness, and agreeableness scores than did women. Participants with a history of major depression had higher mean scores on neuroticism and openness, and lower scores on extraversion and conscientiousness, than those without. Similarly, those with a history of one or more anxiety disorders (generalized anxiety disorder, panic disorder, agoraphobia, social phobia, or specific phobia) had higher neuroticism scores, and lower extraversion and conscientious scores, than did those without.

Participants with the two DSM-IV somatoform disorders we assessed (hypochondriasis and body dysmorphic disorder) had a higher neuroticism score, and lower agreeableness and conscientiousness scores, than did those without. Participants with a grooming disorder (trichotillomania, pathological skin picking, or pathological nail biting) had higher neuroticism and lower conscientiousness scores. However, the effect sizes were small ($g<0.20$) or at most medium (0.30–0.50)[33] (Table 3).

Association between personality scores, impairment, and treatment response

Neuroticism was positively associated (odds ratio, OR=1.03; 95% CI=1.01–1.04; $p<0.001$), and extraversion was inversely associated (OR=0.98, 95% CI=0.97–0.99; $p<0.01$), with impairment. That is, the odds of impairment increased with unit increase in neuroticism score, and decreased with unit increase in extraversion score, adjusting for other personality dimensions. The magnitude of these relationships did not appreciably change after adjusting for demographic characteristics or other clinical features. Conscientiousness was inversely related to impairment in one of the models (Table 4).

As shown in Table 5, extraversion was associated with good response to SRI/SSRI treatment (OR=1.02, 95% CI=1.01–1.04; $p<0.01$), adjusting for other personality dimensions. The magnitude of this relationship was similar after adjusting for demographic characteristics and other clinical features. In addition, agreeableness was positively associated with SRI/SSRI treatment response in one of the models, and conscientiousness was inversely related to SRI/SSRI treatment response in another model.

As shown in Table 6, extraversion was associated with good response to CBT (OR=1.03, 95% CI=1.01–1.05; $p<0.01$), even after adjusting for demographic characteristics and other clinical features. In addition, agreeableness was positively associated with CBT in several of the models.

The proportion of participants with marked or extreme impairment increased with categorical neuroticism scores, from 32% of those with low or very low scores (<45), to 38%, 50%, and 61%, of those with average, high, and very high scores, respectively (χ^2_1 trend = 25.9, $p<0.001$).

Impairment was inversely related to categorical extraversion scores, from 69% of participants with very low scores (<35), to 31% of those with very high scores (>64) (χ^2_1 trend = 27.5, $p<0.001$). A report of moderate improvement or remission with SRI treatment increased from 42% of participants with very low extraversion scores, to 65% of those with very high extraversion scores (χ^2_1 trend = 10.8, $p=0.001$), and a report of moderate improvement or remission with CBT treatment increased from 37% of participants with very low extraversion scores, to 74% of those with very high extraversion scores (χ^2_1 trend = 13.3, $p<0.001$) (Figure 1).

Discussion

NEO personality dimensions, especially neuroticism, have been found to be associated with clinical severity and treatment response in individuals with depression and anxiety disorders.

[15–19] However, little is known about the relationship between general personality dimensions and important clinical features in OCD. The current study is one of the few and, to our knowledge, the largest reported to date, of the relationship between general personality dimensions, impairment, and treatment response in OCD.

We found that the odds of examiner-rated severe or extreme impairment increased with neuroticism score, and decreased with extraversion score, in OCD-affected individuals. We also found that self-reported response to pharmacotherapy or cognitive behavioral treatment increased with extraversion scores in these individuals. Demographic characteristics (age and gender), OCD clinical features, personality disorders, and history of Axis I disorders were weakly or moderately related to personality dimensions, and adjusting for these variables in the statistical models did not appreciably alter the magnitude of the associations between personality, impairment, and treatment response. Although relatively modest, a 2–3% decrease in the odds of impairment, or a 2–3% increase in the odds of a good treatment response, per unit increase in extraversion score, as found in the study, translates into a 10–15% decrease in the odds of impairment, or a 10–15% increase in the odds of a good treatment response, per 5-unit increase in extraversion, comparing individuals with an extraversion score of 55 to those with an extraversion score of 50, for example. Moreover, there was a marked decrease in the proportion of participants with subjective impairment, and marked increase in the proportions of participants reporting a good response to SRI or CBT treatment, from the lowest to highest ranges of extraversion scores.

The current study had several strengths for investigating relationships between personality dimensions, impairment, and treatment response in OCD. The sample was relatively large, and participants were recruited from a variety of clinical and non-clinical sources at multiple study sites. Participants were thoroughly examined by clinicians and rigorously diagnosed. Furthermore, multivariate methods were used to estimate the relationships between personality, impairment, and treatment response, adjusting for potentially confounding or mediating clinical features.

However, several potential limitations of the study must be acknowledged. First, the OCGS and OCGAS studies over-selected probands with multiple relatives affected with OCD, and these cases, presumably with a more prominent genetic etiology, may be different than other OCD cases. Moreover, the relationship between personality and clinical outcome might be due to shared genetic factors, rather than due to direct causal relationships between them. Additional studies in non-familial cases are warranted. Second, over 90% of the study participants were white, limiting the generalizabity of the findings to other ethnic groups in the population; further studies in more representative samples are needed. Third, impairment and treatment response were based on the participants' subjective ratings, and the adequacy of treatment trials and patients' compliance with recommended treatment were not known; further, the extent to which personality may have influenced perception and reporting of impairment and treatment response is unclear. Fourth, although we adjusted in analyses for several demographic and clinical features associated with personality, we cannot rule out potential confounding by other factors that might be associated with personality, impairment, and treatment response in OCD, such as childhood adversities and adult traumatic experiences.[34,35] Moreover, we did not assess dimensions of "state" anxiety and

depression, which might impact impairment and treatment response, even in individuals without a history of anxiety and mood disorders.

Given the retrospective nature of this study, it cannot determine the direction of the relationship between personality, impairment, and treatment response. On the one hand, the Brown Longitudinal Obsessive Compulsive Study found a relationship between neuroticism and remission of OCD symptoms (however, because the NEO was administered only once, between years two and ten of follow-up, the direction of the relationship could not be determined with certainty).[20] On the other hand, although personality is thought to become relatively stable by young adulthood, OCD often has an early age of onset, before adolescence in many cases.[22] It has been proposed that having a depressive or anxiety disorder may cause lasting changes in personality,[36] and there is some evidence, from longitudinal studies, of effects of depression and anxiety disorders on personality features.[37,38] Further prospective studies are needed to determine the direction of the relationships between personality, impairment, and treatment response in OCD, as well as to explain them.

It has been proposed that neuroticism and introversion increase conditionability and sensitivity to fearful stimuli,[39,40] which could increase impairment and reduce treatment effectiveness in individuals with OCD. Moreover, these traits might interfere with the development of interpersonal skills and social supports that could lessen impairment and improve treatment response.[41] Alternatively, there may be genetic, neural networks, or other biological domains that simultaneously impact personality, impairment, and treatment response in OCD.[42–45] Although future research is needed to address these issues, the findings of the current study suggest that general personality dimensions of neuroticism and extraversion may be associated with impairment in OCD, and that extraversion also may be associated with treatment response in patients with the disorder.

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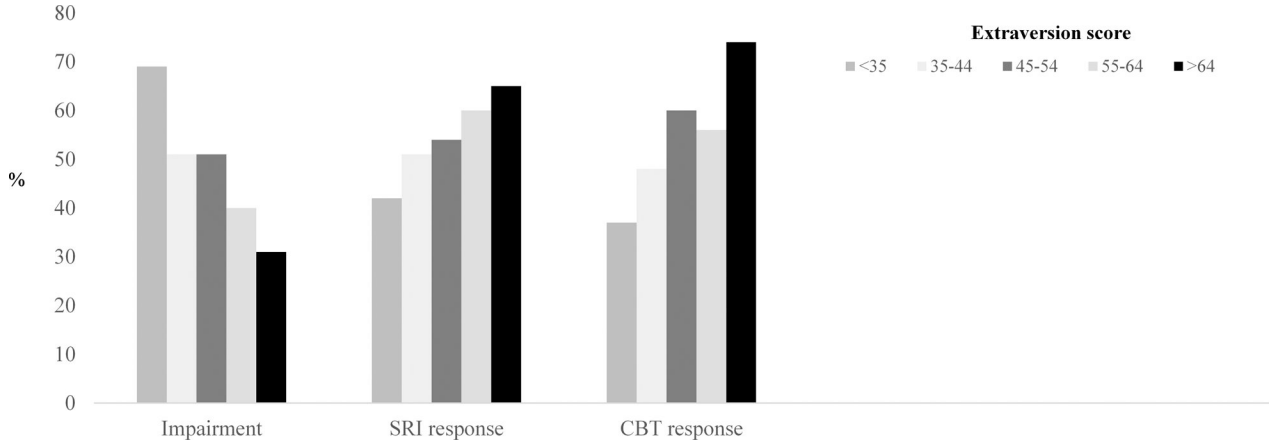

Figure 1:

Proportion with impairment (marked or extreme) and proportion responding to treatment (moderate improvement or remission), by extraversion score. SRI, serotonin or selective serotonin reuptake inhibitor; CBT, congnitive behavioral therapy. Signicance tests: Impairment (χ^2_1 trend = 27.5, p<0.001); SRI response (χ^2_1 trend = 10.8, p=0.001); CBT response (χ^2_1 trend = 13.3, p<0.001).

Table 1:

Characteristics of the study sample

	Number (%)
Sex	
Women	450 (64)
Men	255 (36)
Age	
18–29	245 (35)
30–39	159 (22)
40–49	161 (23)
50–75	140 (20)
Ethnicity	
White	666 (94)
Latino	12 (2)
African-American	7 (1)
Other or not specified	20 (3)
Education	
High school	112 (16)
Some college	196 (28)
College graduate	393 (56)
	Mean (SD)
Age, years	37.3 (12.8)
Age at onset of obsessive-compulsive symptoms, years	9.4 (5.3)
OCD (YBOCS)[a] severity score, worst episode	29.1 (6.5)
Personality score	
Neuroticism	63.9 (12.6)
Extraversion	44.6 (13.0)
Openness	52.2 (11.8)
Agreeableness	49.7 (12.7)
Conscientiousness	46.2 (13.3)

[a]Yale-Brown Obsessive-Compulsive Scale.

Table 2:

Correlations between personality scores and clinical variables, Pearson r coefficient

	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Age	−0.05	−0.16**	−0.06	0.16**	−0.03
Age at onset of obsessive-compulsive symptoms	−0.15**	0.08*	−0.06	0.11	−0.02
OCD (YBOCS)[a] severity score, worst episode	0.16**	−0.11**	0.07	−0.01	−0.06
Taboo symptoms	0.16**	−0.02	0.12**	−0.01	−0.08*
Symmetry/ordering symptoms	0.01	−0.07	−0.01	−0.10**	0.13**
Hoarding symptoms	0.10**	−0.09*	0.12**	−0.03	−0.17**
Contamination/cleaning symptoms	0.08*	−0.06	−0.02	−0.06	0.02
Checking symptoms	0.13**	−0.05	0.01	0.02	−0.01
Avoidant traits	0.32**	−0.44**	−0.05	−0.11**	−0.16**
Dependent traits	0.32**	−0.22**	−0.11**	−0.11**	−0.17**
Obsessive-compulsive traits	0.21**	−0.15**	0.02	−0.20**	−0.02
Schizotypal traits	0.25**	−0.29**	−0.02	−0.21**	−0.17**

[a]Yale-Brown Obsessive-Compulsive Scale.

*$p < 0.05$

**$p < 0.01$.

Table 3:

Personality scores, by sex and by lifetime history of psychiatric disorders, mean (SD)

	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Sex					
Men (N=255)	66.6 (13.3) ***	45.0 (13.0)	54.4 (11.2) ***	51.2 (11.6) *	45.0 (12.8)
Women (N=450)	62.4 (12.0)	44.4 (13.0)	51.0 (11.9)	48.8 (13.3)	46.9 (13.6)
Hedges'g	*0.34*	*0.05*	*0.29*	*0.19*	*0.14*
Attention deficit hyperactivity disorder					
Yes (N=57)	67.5 (12.7) *	44.8 (13.1)	53.7 (12.0)	46.0 (13.5) *	42.3 (12.0) *
No (N=562)	63.3 (12.4)	44.3 (13.0)	51.7 (11.5)	50.0 (12.4)	46.9 (13.6)
Hedges' g	*0.34*	*0.04*	*0.17*	*0.32*	*0.34*
Tics					
Yes (N=103)	65.7 (12.9)	45.1 (13.8)	54.3 (11.1)	54.3 (11.1)	44.0 (13.7)
No (N=574)	63.7 (12.4)	44.5 (12.8)	52.0 (11.9)	52.0 (11.9)	46.7 (13.1)
Hedges' g	*0.16*	*0.05*	*0.20*	*0.20*	*0.21*
Recurrent major depression					
Yes (N=358)	66.8 (12.2) ***	43.6 (13.2) *	53.5 (11.6) **	49.2 (12.7)	44.7 (13.2) **
No (N=338)	60.9 (12.4)	45.9 (12.6)	51.0 (11.8)	50.3 (12.9)	47.9 (13.3)
Hedges' g	*0.48*	*0.18*	*0.21*	*0.09*	*0.24*
Anxiety disorder[a]					
Yes (N=429)	66.0 (12.3) ***	43.1 (13.1) ***	52.4 (12.1)	49.9 (13.4)	44.7 (13.3) ***
No (N=257)	60.2 (12.2)	47.2 (12.6)	51.6 (11.3)	49.7 (11.8)	49.0 (13.0)
Hedges' g	*0.47*	*0.32*	*0.07*	*0.02*	*0.33*
Somatoform disorder[b]					
Yes (N=90)	69.8 (12.6) ***	42.5 (12.8)	53.7 (12.8)	45.9 (16.6) **	41.4 (13.7) ***
No (N=597)	62.9 (12.3)	44.9 (13.0)	51.8 (11.6)	50.3 (12.1)	47.0 (13.2)
Hedges' g	*0.56*	*0.19*	*0.16*	*0.34*	*0.42*

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	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Grooming disorder[c]					
Yes (N=176)	66.3 (12.4)**	45.0 (13.6)	53.5 (12.8)	48.2 (13.3)	44.0 (13.1)*
No (N=512)	63.2 (12.5)	44.4 (12.9)	51.7 (11.2)	50.2 (12.6)	47.0 (13.3)
Hedges' g	*0.25*	*0.05*	*0.16*	*0.16*	*0.23*

[a]Generalized anxiety disorder (N=239), panic disorder (N=108), agoraphobia (N=115), social phobia (n=210), and/or specific phobia (N=160).

[b]Hypochondriasis (N=35) and/or body dysmorphic disorder (N=61).

[c]Trichotillomania (N=39), pathological skin picking (N=120), and/or pathological nail biting (N=57).

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$.

Table 4:

Relationship between personality scores and marked or extreme impairment, multivariable logistic regression models[a], odds ratio (95% CI)

	Model 1	Model 2	Model 3	Model 4
Neuroticism	1.03 (1.01–1.04) **	1.02 (1.00–1.04) *	1.03 (1.01–1.05) *	1.03 (1.01–1.05) **
Extraversion	0.98 (0.96–0.99) **	0.97 (0.96–0.99) **	0.97 (0.95–0.99) ***	0.98 (0.97–0.99) *
Openness	1.01 (0.99–1.02)	1.00 (0.99–1.02)	1.00 (0.98–1.02)	1.01 (0.99–1.02)
Agreeableness	1.00 (0.99–1.02)	1.00 (0.98–1.01)	1.01 (0.99–1.02)	1.01 (0.99–1.02)
Conscientiousness	0.99 (0.97–1.01)	0.98 (0.97–1.00) *	0.99 (0.98–1.01)	0.99 (0.97–1.00)
Age	1.00 (0.99–1.01)			
Gender	0.74 (0.52–1.04)			
Taboo obsessions		1.08 (1.01–1.16) *		
Contamination/cleaning symptoms		1.04 (0.98–1.11)		
Checking symptoms		1.04 (0.91–1.18)		
Symmetry/ordering symptoms		0.80 (0.65–1.01)		
Hoarding symptoms		0.73 (0.59–0.91) **		
OCD (YBOCS) severity score		1.13 (1.10–1.17) ***		
ADHD[b]			1.15 (0.74–2.85)	
Tics			1.44 (0.83–2.50)	
Major depression, recurrent			1.83 (1.25–2.66) **	
Anxiety disorder[c]			1.05 (0.71–1.56)	
Somatoform disorder[d]			2.28 (1.22–4.25) *	
Grooming disorder[e]			0.40 (0.25–0.62) ***	
Schizotypal traits				1.22 (1.02–1.47) *
Avoidant traits				1.03 (0.92–1.15)
Dependent traits				0.91 (0.81–1.03)
Obsessive-compulsive traits				1.04 (0.95–1.13)

[a]Model 1 includes NEO personality scores, age, and gender. Model 2 includes NEO personality scores, types of obsessions and compulsions, and OCD severity score. Model 3 includes NEO personality scores and Axis I disorders. Model 4 includes NEO personality scores and personality disorder traits.

[b]Attention deficit hyperactivity disorder.

[c]Panic disorder, agoraphobia, social phobia, specific phobia, and/or generalized anxiety disorder.

[d]Hypochondriasis and/or body dysmorphic disorder [a].

[e]Trichotillomania, pathological skin picking, and/or pathological nail biting.

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$.

Table 5:

Relationship between personality scores and SRI/SSRI[a] treatment response (moderate improvement or total remission), multivariable logistic regression models[b], odds ratio (95% CI)

	Model 1	Model 2	Model 3	Model 4	Model 5
Neuroticism	1.00 (0.98–1.01)	0.99 (0.98–1.01)	0.99 (0.98–1.01)	1.00 (0.98–1.02)	0.99 (0.98–1.01)
Extraversion	1.02 (1.01–1.04) **	1.02 (1.00–1.03) *	1.02 (1.01–1.04) *	1.02 (1.00–1.03) *	1.02 (1.01–1.04) **
Openness	1.01 (0.99–1.02)	1.01 (0.99–1.02)	1.00 (0.99–1.02)	1.01 (0.99–1.02)	1.01 (0.99–1.02)
Agreeableness	1.02 (1.00–1.03) *	1.01 (1.00–1.03)	1.02 (1.00–1.03)	1.01 (1.00–1.02)	1.01 (1.00–1.03)
Conscientiousness	0.99 (0.98–1.00)	0.99 (0.98–1.01)	0.98 (0.97–1.00) *	0.99 (0.98–1.01)	0.99 (0.98–1.01)
Age	0.98 (0.97–0.99) *				
Gender	1.10 (0.77–1.57)				
Taboo obsessions		1.06 (0.99–1.14)			
Contamination/cleaning symptoms		1.03 (0.97–1.10)			
Checking symptoms		1.14 (1.01–1.30) *			
Symmetry/ordering symptoms		0.74 (0.60–0.91) **			
Hoarding symptoms		1.05 (0.85–1.29)			
OCD (YBOCS) severity score		0.98 (0.95–1.01)			
ADHD[c]			1.28 (0.66–2.49)		
Tics			1.65 (0.95–2.86)		
Major depression, recurrent			1.21 (0.83–1.76)		
Anxiety disorder[d]			0.87 (0.59–1.29		
Somatoform disorder[e]			0.89 (0.49–1.63)		
Grooming disorder[f]			0.87 (0.57–1.34)		
Schizotypal traits				1.05 (0.88–1.24)	
Avoidant traits				0.95 (0.84–1.06)	
Dependent traits				0.96 (0.85–1.08)	
Obsessive-compulsive traits				0.90 (0.82–0.98) *	

	Model 1	Model 2	Model 3	Model 4	Model 5
Impairment					1.26 (0.88–1.79)

[a] Serotonin reuptake and/or selective serotonin reuptake inhibitors.

[b] Model 1 includes NEO personality scores, age, and gender. Model 2 includes NEO personality scores, types of obsessions and compulsions, and OCD severity score. Model 3 includes NEO personality scores and Axis I disorders. Model 4 includes NEO personality scores and personality disorder traits. Model 5 includes NEO personality scores and impairment.

[c] Attention deficit hyperactivity disorder.

[d] Panic disorder, agoraphobia, social phobia, specific phobia, and/or generalized anxiety disorder.

[e] Hypochondriasis and/or body dysmorphic disorder.

[f] Trichotillomania, pathological skin picking, and/or pathological nail biting.

* $p < 0.05$

** $p < 0.01$

Table 6:

Association between personality scores and cognitive behavioral therapy response (moderate improvement or total remission), multivariable logistic regression models[a], odds ratio (95% CI)

	Model 1	Model 2	Model 3	Model 4	Model 5
Neuroticism	0.99 (0.97–1.01)	0.99 (0.96–1.01)	0.98 (0.95–1.00)	1.00 (0.98–1.02)	0.99 (0.97–1.01)
Extraversion	1.03 (1.01–1.05)**	1.03 (1.01–1.05)**	1.04 (1.01–1.06)**	1.04 (1.01–1.06)**	1.03 (1.01–1.05)**
Openness	1.00 (0.98–1.02)	1.00 (0.98–1.02)	1.01 (0.99–1.04)	1.00 (0.98–1.02)	1.00 (0.98–1.02)
Agreeableness	1.02 (1.00–1.04)*	1.02 (1.00–1.04)*	1.02 (1.00–1.04)	1.02 (1.00–1.04)	1.03 (1.01–1.05)**
Conscientiousness	0.99 (0.97–1.01)	0.99 (0.97–1.01)	0.98 (0.96–1.01)	0.99 (0.97–1.01)	0.98 (0.97–1.00)
Age	0.99 (0.98–1.01)				
Gender	1.09 (0.70–1.72)				
Taboo obsessions		1.13 (1.04–1.23)**			
Contamination/cleaning symptoms		0.99 (0.92–1.08)			
Checking symptoms		1.08 (0.92–1.28)			
Symmetry/ordering symptoms		0.71 (0.54–0.94)*			
Hoarding symptoms		1.05 (0.80–1.38)			
OCD (YBOCS) severity score		0.96 (0.93–1.01)			
ADHD[b]			0.63 (0.24–1.61)		
Tics			1.14 (0.55–2.37)		
Major depression, recurrent			1.03 (0.61–1.74)		
Anxiety disorder[c]			1.81 (1.06–3.09)*		
Somatoform disorder[d]			1.03 (0.47–2.27)		
Grooming disorder[e]			1.06 (0.59–1.89)		
Schizotypal traits				1.05 (0.82–1.34)	
Avoidant traits				1.06 (0.91–1.25)	
Dependent traits				0.82 (0.70–0.96)*	
Obsessive-compulsive traits				0.95 (0.84–1.07)	

	Model 1	Model 2	Model 3	Model 4	Model 5
Impairment					0.84 (0.52–1.34)

[a] Model 1 includes NEO personality scores, age, and gender. Model 2 includes NEO personality scores, types of obsessions and compulsions, and OCD severity score. Model 3 includes NEO personality scores and Axis I disorders. Model 4 includes NEO personality scores and personality disorder traits. Model 5 includes NEO personality scores and impairment.

[b] Attention deficit hyperactivity disorder.

[c] Panic disorder, agoraphobia, social phobia, specific phobia, and/or generalized anxiety disorder.

[d] Hypochondriasis and/or body dysmorphic disorder.

[e] Trichotillomania, pathological skin picking, and/or pathological nail biting.

* $p < 0.05$

** $p < 0.01$