



Beyond the surface: Understanding obsessive symptoms and body perceptions, from shape concerns to fear of blushing

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ABSTRACT

Introduction: Recent reclassifications have expanded the understanding of Obsessive-Compulsive Disorders (OCDs), now incorporated into a broader category known as Obsessive-Compulsive Disorder and Related Disorders (OCRDs). This study sought to assess obsessive-compulsive symptoms and body uneasiness among outpatients seeking treatment for Eating Disorders (ED). Additionally, we aimed to explore associations and potential mediation effects between obsessive-compulsive symptoms and body uneasiness. This investigation extended beyond concerns related solely to body shape and weight, encompassing fears associated with specific body components (such as facial features, abdominal region, and limbs) or functions (including sweating, blushing, emitting noises, and releasing odors).

Methods: Psychometric assessments included the Obsessive-Compulsive Inventory-Revised (OCI-R) and the Body Uneasiness Test (BUT). Statistical analyses involved bivariate correlations, linear regression, and mediation analysis to explore the associations and potential mediation effects between obsessive-compulsive symptoms and different manifestations of body uneasiness.

Results: The sample ($N = 210$) demonstrated substantial obsessive-compulsive symptoms and notable body discomfort. OCI-R scores positively correlated with various dimensions of body dissatisfaction, including shape, weight, and specific body components or functions. Linear regression revealed significant associations between OCI-R scores and overall body uneasiness (BUT-A) as well as concerns about body components or functions (BUT-B). Mediation analysis indicated that BUT-A mediated the relationship between obsessive-compulsive symptoms and BUT-B.

Conclusion: This study offers new insights into the comprehensive landscape of OCRDs. It specifically emphasizes the association between obsessive-compulsive symptoms and body uneasiness, embracing not only concerns about body shape and weight but also extending to body components and functions.

1. Introduction

Recent advancements in understanding Obsessive-Compulsive Disorders (OCDs) have prompted a reevaluation of their spectrum, evolving from the prevailing notion that the repetitiveness of compulsive behaviors was the sole core psychopathological aspect [1–3]. Instead, the focus has shifted to recognizing the function of compulsions in mitigating anxiety induced by obsessions [4,5]. Consequently, the Diagnostic and Statistical Manual of Mental Disorders – 5th edition (DSM-5) in 2013 [6] and the International Classification of Diseases – 11th version (ICD-11) in 2022 [7] reclassified OCDs into a broader category

known as Obsessive-Compulsive Disorder and Related Disorders (OCRDs).

OCRDs share notable epidemiological similarities with OCD, typically emerging during adolescence or early adulthood and exhibiting a chronic course marked by fluctuating symptoms [8–10]. These disorders involve a multifactorial etiopathogenesis, encompassing alterations in neural circuits (e.g., orbitofrontal circuits, amygdala, corpus caudatus, and globus pallidus), molecular mechanisms related to neurotransmitters (serotonin, dopamine, and glutamate), and learning theory models coupled with cognitive and affective dysfunction [2,11–14]. In the context of OCRDs, cognitive-behavioral therapy (CBT) emerges as the

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foremost and rigorously endorsed intervention, playing a fundamental role in the comprehensive management of OCRDs [15–17]. Moreover, various other treatments have been suggested, encompassing serotonergic antidepressants, second-generation antipsychotics, electroconvulsive therapy, transcranial magnetic stimulation, and the identification of the optimal target, or “sweet spot,” in the striatum for deep brain stimulation [15,18–21].

In the realm of OCRDs, a subset of disorders revolves around the management of external factors (e.g., hoarding disorders and obsessional jealousy), while the predominant share is marked by dysfunctional attitudes focused on the individual’s body. Among these, certain disorders manifest through obsessions and compulsions, including trichotillomania (persistent hair pulling), skin-picking disorder (recurrent integumental excoriation leading to skin lesions), and various body-focused repetitive behaviors such as nail biting, lip biting, and cheek chewing [6,22,23].

On another note, specific OCRDs center around body-related concerns, such as Koro syndrome (characterized by intense concern over the genitals retracting into the body), Shubo-Kyofu syndrome (fear of a deformed body), or olfactory reference syndrome (characterized by a persistent preoccupation with a perceived body odor or breath, disproportionately magnified compared to the actual smell) [24–26]. The most prevalent and extensively studied symptomatic manifestation in this category is Body Dysmorphic Disorder (BDD), characterized by excessive and persistent concern about imperceptible or barely perceptible flaws in one’s appearance [27,28].

BDD gives rise to intrusive preoccupations accompanied by associated repetitive behaviors, compulsive control, and avoidance behaviors [29,30]. The development of BDD is thought to involve a complex interplay of biological predisposing factors, personality traits, and environmental stressors, particularly social and cultural influences [29]. The concept of body image, encapsulating an individual’s thoughts and feelings about their own body, is susceptible to cultural influences that shape societal ideals of beauty and aesthetics [31,32]. A perceived negative body image can lead to mental distress and, in some cases, result in psychiatric conditions such as BDD or Eating Disorders (EDs) [33,34].

Several studies consistently report a significant prevalence of obsessive-compulsive symptoms among individuals diagnosed with EDs, with a particular emphasis on anorexia nervosa [35–40]. These symptoms have been associated with poorer treatment outcomes [35]. Commonalities between EDs and obsessive-compulsive symptoms include age of onset, illness progression, ritualistic behaviors, and thought-action fusion [41,42]. Furthermore, shared mechanisms potentially accounting for the comorbidity between EDs and OCD include genetic and neurobiological factors, anxiety, repetitive negative thought patterns, perfectionism, intolerance of uncertainty, and impulsivity [42,43].

The primary objective of the present study was to measure obsessive-compulsive symptoms and body uneasiness in a sample of outpatients seeking treatment for ED. Additionally, our secondary aim was to investigate associations and potential mediation effects between obsessive-compulsive symptoms and various manifestations of body uneasiness. This encompasses not just concerns linked to body shape and weight but also extends to the examination of fears associated with body functioning, such as sweating, blushing, emitting noises, and releasing odors.

2. Methods

2.1. Study design and participants

An exploratory, observational, cross-sectional study was carried out between May 2022 and December 2022 by collecting data from patients assessed at the Unit of Clinical Psychiatry, Study and Care Unit for ED, Department of Biomedical and Neuromotor Sciences/DIBINEM,

University of Bologna, Italy. At the time of the assessment, all outpatients were asked to voluntarily provide written consent to use their clinical information for research purposes. Using the information from their medical records, we selected participants using the following inclusion criteria: (a) having been referred for an intake at the Unit of Clinical Psychiatry, Study and Care Unit for ED, and completed the comprehensive assessment process, (b) age > 18 years at the time of assessment, (c) good understanding of the Italian language, and (d) consent to participate in the study and written informed consent to use their data for research purposes.

The research conducted at the Complex Operational Unit “SPDC Maggiore,” dedicated to the study and care of ED, aligns closely with the regional guidelines stipulated in “Dossier No. 240/2014 - Regional Program for ED - Contributions 2009-2012.” The study was approved by the local Institutional Review Board (IRB) and conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and according to the guidelines for Good Clinical Practice (GCP). The Research Protocol with the identification number 0013160 was officially approved on January 31, 2019.

2.2. Procedures and measures

We retrospectively collected sociodemographic information, clinical data, and the scores of two psychometric questionnaires: Body Uneasiness Test (BUT) and Obsessive Compulsive Inventory-Revised (OCI-R) [44,45]. The BUT is a self-administered questionnaire specifically designed to explore several areas in clinical and non-clinical populations: body shape and/or weight dissatisfaction, avoidance, compulsive control behaviors, detachment and estrangement feelings towards one’s own body, specific worries about particular body parts, shapes or functions. The BUT consists of two parts: BUT-A (34 items) and BUT-B (37 items). The BUT-A measures the global severity index and the following five subscales: weight phobia, body image concerns, avoidance, compulsive self-monitoring, and depersonalization. Higher scores indicate greater body uneasiness, which is clinically significant when BUT-A scores have a value higher than 1.2 [45]. The BUT-B looks at specific worries about particular body parts or functions, assessing two global measures (i.e., positive symptom distress index and positive symptom total) and subscales related to a preoccupation with somatic facial features (I and II), the shape of the abdomen, chest, legs, and arms (III, IV, and V), and physiological body functions (VIII). BUT-B positive symptom distress index value is represented by the average rating of the number of symptoms rated higher than zero. Higher scores indicate greater body uneasiness [45]. To facilitate clarity in the presentation, we will use the acronym “BUT-A score” to refer to the global severity index score of the BUT-A scale and “BUT-B score” to indicate the positive symptom distress index score of the BUT-B scale.

The Obsessive-Compulsive Inventory-Revised (OCI-R) is a self-administered questionnaire consisting of 18 5-likert (from 0 to 4) items that assess obsessive-compulsive symptoms. It consists of six subscales (three items each), including washing, checking, obsessing, ordering, mental neutralization, and hoarding. The OCI-R can also be separated into two measures: one for OCD (that includes washing, checking, obsessing, ordering, and neutralizing as subscales) and one for hoarding disorder, as defined by DSM-5 [6]. As for the interpretation of the results of OCI-R, we proceeded according to the instructions of the scale authors, as well as the main updates that have occurred over time [44,46,47]. For the OCD component of the OCI-R, the score can range between 0 and 60, with higher scores indicative of more severe OCD symptoms. A cut-off score of 12 is used to determine the likelihood of an OCD diagnosis. The OCD component of the OCI-R also reports the score in a range between 0 and 12 across the five reported subscales. To facilitate clarity in the presentation, we will use the acronym “OCI-R score” to refer to the total score of the OCI-R scale.

2.3. Statistical analyses

Data analysis was conducted using IBM Statistical Package for the Social Sciences (SPSS) Statistics software, specifically Version 26.0, developed by IBM Corp, located in Armonk, New York. During the descriptive phase, categorical variables were analyzed by determining frequencies (*n*) and percentages (%). Continuous variables were assessed for skewness, kurtosis, and adherence to a normal distribution using the Shapiro-Wilk test. Mean and Standard Deviation (*SD*) were utilized to summarize the central tendency and variability, respectively, for continuously distributed variables. Subsequently, we conducted a mean comparison, specifically employing the Kruskal-Wallis analysis, to evaluate and compare the manifestation of obsessive symptoms across ED diagnoses.

To examine the potential links between obsessive-compulsive symptoms, assessed through the OCI-R questionnaire, and body uneasiness, evaluated using the BUT questionnaire, our study utilized bivariate Kendall's Tau correlations and linear regression analyses. Considering that the BUT typically demonstrates gender and age effects, we conducted multiple linear regressions controlling for these variables to adjust our analyses [45]. Recognizing the literature's indication that obsessive-compulsive symptoms often strongly manifest in body image concerns [35–40], as evidenced by BUT-A scores, we aimed to explore their potential mediating impact on specific worries related to body parts or functions, as reflected in BUT-B scores. Consequently, using the add-on PROCESS for SPSS macro version 3.5.3, we conducted a mediation analysis to assess both the direct and indirect influences of OCI-R scores on BUT-B scores while considering the potential mediating role of BUT-A scores. The pre-defined threshold for statistical significance was set at a *p*-value <0.05 in accordance with standard conventions in academic research.

3. Results

3.1. Sample sociodemographic and clinical characteristics

Table 1 provides a comprehensive overview of the sociodemographic and clinical characteristics observed within our study sample. In our analysis of the sociodemographic characteristics within our sample of 210 individuals, a wide age spectrum was observed among the

Table 1
Sample (*N* = 210) sociodemographic and clinical characteristics.

Variable	Answer	<i>n</i>	%
Average age (years old ± <i>SD</i>)	28.20 ± 11.35		
Nationality	Italian	200	95.2
	Other	10	4.8
Gender	Female	179	85.2
	Male	29	13.8
	Others	2	1.0
Eating Disorder	AN-R	47	22.4
	AN-BP	27	12.9
	AN-A	4	1.9
	BN	47	22.4
	BED	32	15.2
	NES	1	0.5
	ARFID	3	1.4
	RD	1	0.5
	OSFED	14	6.7
	Absence of ED	30	14.3
	Missing	4	1.9
Obsessive-Compulsive Disorder	Presence of OCD	128	61
	Absence of OCD	82	39

Legend. AN-R, Anorexia Nervosa Restricting Type; AN-BP, Anorexia Nervosa Binge-Eating/Purging Type; AN-A, Atypical Anorexia Nervosa; BED, Binge Eating Disorder; BN, Bulimia Nervosa; NES, Night Eating Syndrome; OCD, Obsessive-Compulsive Disorder; OSFED, Other Specified Feeding or Eating Disorder; RD, Rumination Disorder; *SD*, Standard Deviation.

participants, ranging from 18 to 71 years. The mean age of the participants was calculated to be 28.20 years, with an *SD* of 11.35 years. Concerning nationality, the substantial majority of participants, specifically 95.2% (*n* = 200), self-identified as Italian, while a minority of 4.8% (*n* = 10) represented other nationalities. Females constituted the majority of the sample, comprising 85.2% (*n* = 179) of the total sample size, whereas males accounted for 13.8% (*n* = 29) of the participants. A marginal fraction of respondents, approximately 1% (*n* = 2), identified themselves as “Other.”

In terms of EDs, there were varied prevalence rates across specific subtypes, with Anorexia Nervosa Restricting Type (AN-R) at 22.4% (*n* = 47), Anorexia Nervosa Binge-Eating/Purging Type (AN-BP) at 12.9% (*n* = 27), Bulimia Nervosa (BN) at 22.4% (*n* = 47), and Binge Eating Disorder (BED) at 15.2% (*n* = 32), among others. Notably, 14.3% (*n* = 30) of the sample did not receive a formal ED diagnosis despite presenting sub-threshold symptoms that warranted referral to the clinic.

3.2. Obsessive symptoms and body uneasiness in the sample

Table 2 provides a comprehensive overview of the descriptive statistics for the psychometric assessment scales in our sample. The OCI-R score displayed a wide range of scores, ranging from the lowest score of 0 to the highest score of 60, indicating relevant variation in the severity of obsessive-compulsive symptoms among the participants. The mean OCI-R score was 16.25, signifying mild-moderate levels of obsessive-compulsive symptoms within the sample, while the *SD* of 11.79 emphasized the considerable diversity in response patterns and symptom intensity levels. Given that a cut-off score of 12 on the OCI-R is

Table 2
Sample psychometric characteristics regarding obsessive symptoms and body dissatisfaction.

Scale	Average Score ± <i>SD</i>	Min - Max Values
OCI-R		
Total score	16.25 ± 11.79	0–60
Obsessing	5.08 ± 3.88	0–12
Washing	1.50 ± 2.55	0–12
Ordering	3.60 ± 3.47	0–12
Checking	2.19 ± 2.37	0–12
Neutralizing	0.98 ± 1.90	0–12
BUT-A		
Global Severity Index (GSI)	2.60 ± 1.06	0.15–4.58
Weight Phobia (subscale WP)	3.15 ± 1.22	0.00–5.00
Body Image Concerns (subscale BIC)	2.98 ± 1.24	0.00–5.00
Avoidance (subscale A)	1.89 ± 1.23	0.00–4.83
Compulsive Self-Monitoring (subscale CSM)	2.31 ± 1.35	0.00–4.80
Depersonalization (subscale D)	2.25 ± 1.20	0.00–5.00
BUT-B		
Positive Symptom Distress Index (PSDI)	2.74 ± 0.78	0.90–4.78
Positive Symptom Total (PST)	19.45 ± 8.22	0.00–37.00
Eyebrows, Eyes, Nose, Lips, Mouth, Teeth (subscale I)	1.05 ± 0.92	0.00–4.00
Head and Face Shapes, Forehead, Ears, Neck, Chin (subscale II)	0.91 ± 0.88	0.00–5.00
Stomach, Abdomen, Hips, Thighs, Knees (subscale III)	2.75 ± 1.37	0.00–5.00
Height, Hands, Legs, Ankles, Feet (subscale IV)	1.57 ± 1.06	0.00–5.00
Shoulders, Arms, Chest, Breasts, Genitals (subscale V)	1.67 ± 1.16	0.00–5.00
Moustache, Beard, Hairs (subscale VI)	0.82 ± 1.10	0.00–5.00
Skin, Hair (subscale VII)	1.52 ± 1.29	0.00–5.00
Sweating, Blushing, Noises, Odors, Buttocks (subscale VIII)	1.61 ± 1.19	0.00–5.00

Legend. BUT-A, Body Uneasiness Test A; BUT-B, Body Uneasiness Test B; Min, Minimum; Max, Maximum; OCI-R, Obsessive-Compulsive Inventory-Revised; *SD*, Standard Deviation.

commonly used to assess the likelihood of an OCD diagnosis, we found that 61% ($n = 128$) of our sample met or exceeded this threshold, indicating a substantial proportion with potential OCD diagnoses. The Kruskal-Wallis analyses did not reveal statistically significant differences in the presence of obsessive-compulsive symptoms among various ED diagnoses.

Regarding body uneasiness, the BUT-A score exhibited a range from 0.15 to 4.58, with a mean value of 2.60 and an SD of 1.06. Moreover, the BUT-B score spanned from 0.90 to 4.78, with a mean value of 2.74 and an SD of 0.78. The average values obtained indicate the presence of clinically significant body discomfort in the sample.

3.3. Association between obsessive symptoms and body uneasiness

We found statistically significant positive correlations between OCI-R score and BUT-A score ($r = 0.374, p < 0.001$), BUT-A weight phobia ($r = 0.289, p < 0.001$), BUT-A body image concerns ($r = 0.296, p < 0.001$), BUT-A avoidance ($r = 0.361, p < 0.001$), BUT-A compulsive self-monitoring ($r = 0.315, p < 0.001$), and BUT-A depersonalization ($r = 0.376, p < 0.001$). Moreover, significant correlations were found between OCI-R and BUT-B positive symptom distress index ($r = 0.193, p < 0.001$), BUT-B positive symptom total ($r = 0.300, p < 0.001$), BUT-B I ($r = 0.218, p < 0.001$), BUT-B II ($r = 0.262, p < 0.001$), BUT-B III ($r = 0.246, p < 0.001$), BUT-B IV ($r = 0.288, p < 0.001$), BUT-B V ($r = 0.265, p < 0.001$), BUT-B VI ($r = 0.106, p < 0.05$), BUT-B VII ($r = 0.117, p < 0.05$), and BUT-B VIII ($r = 0.254, p < 0.001$).

Simple linear regression analyses revealed a significant association between OCI-R score and both BUT-A ($\beta = 0.042, SE = 0.006, t = 7.341, p < 0.001, F(1,201) = 53.884, R^2 = 0.208$) and BUT-B scores ($\beta = 0.013, SE = 0.005, t = 2.973, p < 0.05, F(1,200) = 8.841, R^2 = 0.038$) scales. Multiple linear regression analyses were then performed, controlling for age and gender, revealing significant associations between OCI-R score and both BUT-A ($\beta = 0.041, SE = 0.006, t = 7.430, p < 0.001, F(4, 197) = 19.538, R^2 = 0.284$) and BUT-B scores ($\beta = 0.015, SE = 0.004, t = 3.433, p = 0.001, F(4, 196) = 7.380, R^2 = 0.131$) scales. A subsequent multiple linear regression analysis was conducted, with OCI-R as the independent variable and BUT-B score as the dependent variable while adjusting for BUT-A score as a covariate. Interestingly, upon controlling for BUT-A, the association between the OCI-R score and the BUT-B score became nonsignificant. The details of these associations are provided in Table 3.

Finally, we conducted a mediation analysis to investigate the mechanisms underlying the association between the OCI-R score as the independent variable, the BUT-B score as the dependent variable, and the potential mediating role of the BUT-A score (Fig. 1). The initial step of the mediation analysis explored the relationship between OCI-R and BUT-A scores (the mediator). The results indicated a significant positive association (a path) with a coefficient (β) of 0.0408 ($p < 0.001, 95\% CI$

Table 3

Unadjusted and Adjusted Linear Regressions between obsessive symptoms (independent variable, expressed by OCI-R score) and body dissatisfaction (dependent variables, expressed by BUT-A and BUT-B scores).

Dependent Variable	Independent Variable	β	SE	95% CI		p
				LL	UL	
BUT-A (Adj)	OCI-R	0.041	0.006	0.030	0.052	0.000
BUT-B (Adj)	OCI-R	0.015	0.004	0.006	0.024	0.001
BUT-B (Adj)	OCI-R	-0.003	0.004	-0.011	0.005	0.401
	BUT-A	0.462	0.047	0.369	0.554	0.000

Legend. (Adj), Adjusted for age and gender; β , Non-standardized Regression Coefficient; BUT-A, Body Uneasiness Test A Global Severity Index (BUT-A GSI); BUT-B, Body Uneasiness Test B Positive Symptom Distress Index (BUT-B PSDI); LL, Lower Limit; p, Significance; OCI-R, Obsessive-Compulsive Inventory-Revised Total Score; SE, Standard Error; UL, Upper Limit; 95% CI, 95% Confidence Interval.

[0.0296, 0.0520]). This finding revealed that a higher OCI-R score was positively related to elevated levels of BUT-A score. Next, we investigated the relationship between BUT-A and BUT-B scores. The analysis revealed a significant positive association (b path), with a β of 0.4663 ($p < 0.001, 95\% CI [0.3747, 0.5578]$), indicating that a higher BUT-A score was associated with an increased BUT-B score. The direct effect of OCI-R score on BUT-B score, without considering the mediator (c path), was found to be not significant. The β for this direct effect was -0.0055 ($p = 0.1857, 95\% CI [-0.0137, 0.0027]$), indicating that the OCI-R score did not have a direct and substantial effect on the BUT-B score. The mediation analysis also assessed the indirect effect of OCI-R score on BUT-B score through BUT-A score (the ab product). The indirect effect was statistically significant (c' path), with a β of 0.0190 ($SE = 0.0036, 95\% CI [0.0127, 0.0269]$). This suggests that the relationship between the OCI-R score and the BUT-B score was mediated by the influence of the BUT-A score.

4. Discussion

This study aimed to explore obsessive-compulsive symptoms and body uneasiness in individuals seeking treatment at an ED Study and Care Unit. Our sample, consisting of 210 individuals, displayed a prevalence of females, reflecting the well-established higher prevalence of EDs in women [48,49]. Our findings revealed a moderate presence of obsessive-compulsive symptoms regardless of the diagnosis of an ED, alongside significant body discomfort within the sample. The study identified notable associations between obsessive-compulsive symptoms, assessed via OCI-R questionnaire, and diverse manifestations of body uneasiness measured by the BUT questionnaire. These associations extended beyond conventional concerns about body shape and weight, highlighting the intricate relationship between obsessive-compulsive features and broader concerns regarding one's body. The mediation analysis explored the relationship between the OCI-R score (independent variable), BUT-B score (dependent variable), and the potential mediating role of the BUT-A score. Results showed a significant positive association between OCI-R and BUT-A scores, indicating higher obsessive-compulsive symptoms were related to increased global body uneasiness. Additionally, a notable positive association was found between BUT-A and BUT-B scores, suggesting that concerns about weight or appearance were linked to fears regarding body components and functions. Interestingly, the direct effect of OCI-R on BUT-B score, without considering the mediator, was nonsignificant. However, the mediation analysis revealed a significant indirect effect, indicating that the association between OCI-R and BUT-B scores was mediated by the influence of the BUT-A score.

The reclassification of OCDs into a broader category known as OCRDs in both the DSM-5 and the ICD-11 has highlighted the diverse nature of these disorders [6,7]. The majority of these disorders revolve around concerns related to the body, such as BDD or olfactory reference syndrome [50,51]. In this evolving psychopathological context, our study focused on the association between obsessive-compulsive symptoms and body uneasiness, examining not only aspects related to body shapes, such as weight phobia or compulsive body monitoring, but also aspects related to specific concerns about certain body components or functions, such as facial or limb shape, sweating, blushing, emitting noises, releasing odors. Previous research investigated the complex interplay between obsessive-compulsive symptoms, body image concerns, and EDs [52-54]. The BDD, a prevalent OCRD, exemplifies this intricate relationship, involving excessive preoccupation with perceived flaws in appearance [27,51]. Neuroimaging studies have discovered connections between the brain structures associated with both OCD and BDD, particularly in the fronto-striatal circuits, involving regions like the orbitofrontal cortex and basal ganglia [55,56]. Furthermore, a recent comprehensive study delved into the genetic relationship between concerns related to obsessive-compulsive symptoms and body dysmorphia, revealing a noteworthy genetic connection between these two

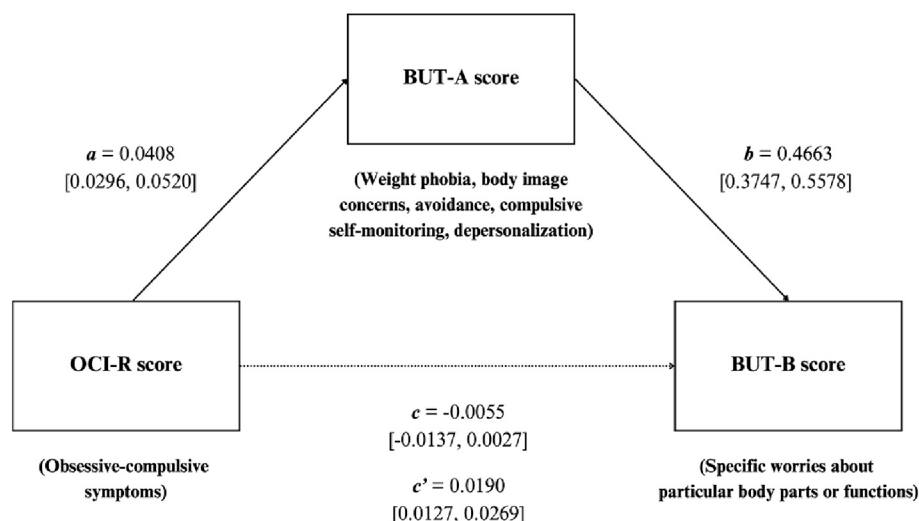


Fig. 1. Mediation analysis between OCI-R score as the independent variable, BUT-B score as the dependent variable, and BUT-A score as a mediator.

conditions [57]. It is important to note that both obsessive symptoms and body dissatisfaction are associated with EDs, indicating an overlap in the pathways of these disorders [33,38,40,58,59]. However, while these associations suggest shared risk factors for EDs, the nuances indicate unique manifestations, with obsessive-compulsive symptoms and body dissatisfaction serving as shared risk factors for EDs with distinct contributions and interactions.

By focusing on the link between obsessive thoughts and concerns related to physical components and physiological functions, we may enhance our understanding of bodily distress. This perspective emphasizes that worries can extend beyond specific congenital or acquired body parts, as well as beyond dissatisfaction typically centered on thinness or musculature [60–63]. This sheds light on how individuals can develop obsessions regarding the intricate functioning of their bodies, moving beyond a static assessment of anatomical features to explore the dynamic and sometimes involuntary aspects of physiological functions. For instance, fixations on sweating or flushing may indicate heightened self-awareness, with individuals becoming intensely concerned about how these functions are perceived by others. Similarly, worries about noises or smells may exacerbate social anxieties, impacting individuals' comfort in various social situations.

Recognizing the relationship between obsessiveness and dissatisfaction with body image and functions holds several clinical implications. It emphasizes the importance for health professionals to consider these aspects when assessing and treating individuals who display obsessive-compulsive traits or disorders, even if their symptoms do not strictly align with traditional diagnostic criteria. Considering the interconnection between obsessiveness and body image, it may be beneficial to adopt treatment approaches that address both aspects. Behavioral therapies, such as exposure and response prevention, commonly used in treating obsessive-compulsive disorders, could be modified to address concerns related to body image and functions [16,17]. By incorporating exposure techniques, individuals may gradually confront and normalize their reactions to body appearance and physiological functions, thereby fostering a healthier relationship with their bodies. Interventions focused on self-esteem could aid individuals in managing thoughts about their bodies [64–67]. Additionally, cultivating mindfulness and acceptance strategies may play a pivotal role in helping individuals navigate and manage their obsessive thoughts and concerns related to body shape and functioning.

Furthermore, the integration of media culture into clinical considerations adds a layer of complexity to the relationship between obsessiveness and body image concerns. Media culture, with its pervasive influence and emphasis on visual content, often promotes idealized body

images through filters and curated representations [68–70]. This heightened exposure can significantly influence individuals' perceptions of themselves, potentially exacerbating obsessive-compulsive tendencies. Health professionals must remain vigilant regarding the potential impact of media culture on their patients' mental well-being [69]. Exposure to curated and often unrealistic representations may intensify obsessiveness and contribute to heightened dissatisfaction with one's body [71,72]. Therefore, it becomes increasingly imperative in contemporary clinical practice to address the influence of media culture and incorporate strategies to mitigate its impact, particularly in the comprehensive care of individuals with obsessive-compulsive traits or disorders.

This study presents several strengths and limitations. Foremost, it explores the impact of obsessive-compulsive symptoms on body uneasiness, delving beyond general body image concerns to encompass specific concerns about body components or functions (e.g., sweating, blushing, emitting noises, releasing odors). To our knowledge, this study stands as the first of its kind in this domain, marking a significant contribution to the literature on obsessive-compulsive disorders and body uneasiness. Furthermore, the study benefits from a robust sample size of over 200 individuals, enhancing the reliability and generalizability of the findings.

However, there are several limitations to consider. First, the study was conducted in a setting in Italy, which may limit the expansion of our findings to other populations and cultural contexts. Thus, to gain a better understanding, it would be beneficial to include a diverse range of participants and conduct cross-cultural comparisons that shed light on the cultural influences impacting the relationship between obsession and body image. Second, our data were collected from an outpatient unit focusing on EDs, potentially introducing bias as patients in such units often exhibit heightened concerns about their body image and may display obsessive behaviors associated with their disorder. Lastly, a notable limitation of our study is the uneven gender distribution, with females accounting for the majority (85.2%) of the sample, while only 1% identified as “other.” This underrepresentation of sexual minorities may restrict the generalizability of our findings, especially concerning gender-specific patterns of body uneasiness. Addressing these aspects in future research could contribute to a more comprehensive understanding of the relationships under scrutiny.

5. Conclusion

In conclusion, this study sheds light on the complex connections between obsessive symptoms and body uneasiness, offering fresh

insights into OCRDs. Our findings reveal a significant association between obsessive symptoms and diverse aspects of body uneasiness, spanning concerns about body shape, weight, and specific bodily components and functions. Mediation analysis underscores the role of overall body dissatisfaction in mediating the relationship between obsessive-compulsive symptoms and specific worries about bodily components or functions. This highlights the multifaceted nature of these variables and emphasizes the importance of considering broader dimensions of body image in clinical assessments. Moving forward, future research should aim to explore these symptomatic dimensions comprehensively, leveraging both clinical and general population samples. Additionally, further investigation into the influence of gender and culture on the manifestation and experience of obsessive symptoms and body uneasiness could provide valuable insights into potential variations across diverse demographic groups. Understanding these factors could inform more tailored interventions and treatments for individuals affected by OCRDs or EDs, ultimately improving clinical outcomes and enhancing the overall well-being of patients.

Ethics approval

This study complied with the Declaration of Helsinki and with the Italian privacy law, specifically the 'Code on the Protection of Personal Data (Legislative Decree 196/2003), updated with the new legislative decree (Legislative Decree 101/2018).' The statistical evaluation of collected data was carried out after complete anonymization. The study was approved by the local Institutional Review Board. The research protocol with the identification number 0013160 was officially approved on January 31, 2019.

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S. Tempia Valenta: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **G. Campanile:** Investigation, Methodology, Writing – original draft. **U. Albert:** Writing – review & editing. **F. Marcolini:** Investigation, Writing – original draft. **G. Faedi:** Investigation, Methodology. **D. De Ronchi:** Supervision. **A.R. Atti:** Conceptualization, Formal analysis, Writing – review & editing.

Declaration of competing interest

The authors have no relevant financial or nonfinancial interests to disclose.

Data availability

The dataset analyzed during the current study is available from the corresponding author upon request.

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