Body Dysmorphic Symptoms in Youth with Obsessive-Compulsive Disorder: Prevalence, Clinical Correlates, and Cognitive Behavioral Therapy Outcome

Þórhildur Ólafsdóttir [1]
Bernhard Weidle [2]
Tord Ivarsson [2]
Davíð Højgaard [3]
Karin Melin [4]
Judith Becker Nissen [3]
Nor Christian Torp [5 6]
Per Hove Thomsen [2, 3]
Gudmundur Skarphedinsson [1]

[1] Faculty of Psychology, University of Iceland. Phone +354 5255573
Postal address: Saemundargata 12, 102 Reykjavik, Iceland

[2] Regional Center for Child and Youth Mental Health, Norwegian University of Science and Technology and St. Olav's University Hospital, Department of Child and Adolescent Psychiatry, Trondheim, Norway

[3] Department of Child and Adolescent Psychiatry, Aarhus University Hospital Psychiatry, Aarhus, Denmark.

[4] Department of Child and Adolescent Psychiatry, Queen Silvia Children's Hospital, Sahlgrenska University Hospital, Gothenburg, Sweden

[5] Department of Child and Adolescent Psychiatry, Division of Mental Health and Addiction, Vestre Viken Hospital, Drammen, Norway.

[6] Division of Mental Health Services, Akershus University Hospital, Lørenskog, Norway

Abstract

The aims of the study were to estimate the prevalence of body dysmorphic (BDD) symptoms in a sample of children and adolescents with obsessive-compulsive disorder (OCD), possible clinical correlates and whether BDD symptoms predict poorer treatment outcomes after cognitive behavioral therapy (CBT). The study included 269 children and adolescents with OCD, aged 7–17 years, from Denmark, Sweden, and Norway, who were treated with 14 weekly sessions of manualized, exposure-based CBT. Twenty-one patients (7.8%) had BDD symptoms. BDD symptoms were associated with older age ($p = 0.003$) and a higher prevalence of comorbid anxiety disorders ($p = 0.025$). In addition, patients with BDD symptoms endorsed a greater number of OCD symptoms than did those without BDD symptoms. Having symptoms of BDD did not affect the CBT outcome on OCD. The results of the study suggest that CBT for OCD is equally effective for those with and without comorbid BDD symptoms.

Keywords: Body dysmorphic disorder; obsessive-compulsive disorder; children; adolescents; cognitive-behavioral treatment

Introduction

Obsessive-compulsive disorder (OCD) is a common chronic psychiatric disorder characterized by unwanted reoccurring thoughts (*obsessions*) and repetitive behavior (*compulsions*). Obsessions refer to thoughts, urges and/or mental images that cause fear, discomfort and anxiety. Compulsions, refer to behaviors that the individual feels necessary to perform to relieve the perceived threat associated with the mental images, thoughts or urges [1].

OCD childhood population surveys show a prevalence rate of about 1-3% [2-5] and comorbidity is common. Epidemiological studies have shown that up to 78–85% of young people with OCD have a comorbid psychiatric disorder that may interfere with their diagnosis, assessment and treatment [6, 7].

Body dysmorphic disorder (BDD) is a psychiatric disorder in which the affected individuals have distressing and intrusive thoughts about a perceived flaw or defect in their physical appearance. The defect is either not or only slightly perceivable by others. BDD is characterized by repetitive behaviors and mental acts as a response to the appearance concerns [8]. Repetitive behaviors include mirror checking, excessive grooming and reassurance seeking, while mental acts include comparing one's appearance with those of other people [8]. The most common preoccupations concern the skin, hair, nose, eyes, eyelids, mouth, lips, jaw, and chin [9].

Limited systematic research has examined the course and prognosis of BDD, especially in children and adolescents despite the relatively high prevalence rate among young adolescents (1.1% for 12–14 years) and the young age of onset (mean age 16 years) [10-12]. Schneider, et al. [10] found a 1.7% prevalence rate for BDD in a community sample of children and adolescents. Although milder symptoms developing in adolescence may dissipate over time, more moderate or severe symptoms usually follow a chronic course with increasing

comorbidity and impairment [9, 13]. Individuals with BDD often meet the diagnostic criteria for at least two other psychiatric disorders during their lifetime, most commonly mood and anxiety disorders, OC spectrum disorders, eating disorders, substance use disorders and personality disorders [14]. A recent study using a clinical sample of 172 patients with BDD, aged 7-19 years, shows a comorbidity rate of 72% [15]. Unsatisfactory attempts to correct one's appearance can lead to depression and suicidal tendencies [9]. While the clinical presentation of BDD regarding severity, comorbidity and level of impairment is similar between adults and adolescents [10], young people are more likely to have suicidal thoughts/attempts and poorer insight, with a recent study showing that over half (52%) report self-harming behavior, about one in tenth (11%) have made a suicide attempt. In a large and recent study [15] (N=172) of patients with BDD, 52% and 11% reported self-harm or suicide attempt respectively, and 52% had poor or absent insight. Furthermore, adults with BDD onset before 18 years of age are reported to have more comorbidity and higher suicidality than those with adult onset [10].

Overlap in clinical features

Both OCD and BDD fall under the *Obsessive compulsive and related disorders* (*OCRD*) category in DSM-5, as they both have similar symptoms across multiple domains but with different phenotypic properties [16]. Both are characterized by recurrent, time-consuming and intrusive thoughts that cause anxiety and distress. In both disorders, individuals engage in repetitive, time-consuming behaviors to reduce negative feelings [16]. Individuals with comorbid OCD-BDD also have a younger age of onset and a higher rate of comorbid anxiety and mood disorders, such as suicidal behaviors, eating disorders, skin picking disorder and

Tourette's syndrome to name a few. As a result, many comorbid OCD-BDD individuals are unemployed and have a lower socioeconomic status than those who do not have comorbid BDD {Conceicao Costa, 2012 #15}. Despite these and other similar features, little research has examined the connection, correlates and comorbidity between the two disorders, especially for pediatric OCD and BDD [17, 18], and limited studies are available on BDD symptoms in OCD {Conceicao Costa, 2012 #15}{Pascual-Vera, 2021 #65}

Treatment and treatment barriers

Cognitive behavioral therapy (CBT) is the recommended first-line treatment for OCD in children and adolescents [9, 19-22]. CBT is also the treatment of choice for adults with BDD [20, 23]. However, research examining treatment for children and adolescents with BDD is lacking despite its severity and early onset both for those with or without comorbid OCD [24]. Therefore, NICE guidelines recommend that for children and adolescents with BDD, the general principles of treatment for OCD may be relevant as long as the specific elements of BDD are kept in mind [20].

Although BDD shares many features with OCD, there is a fundamental difference in how individuals perceive their disorder, which could interfere with treatment outcome. Obsessive thoughts in OCD are *ego-dystonic* [13] and individuals with OCD therefore usually realize the exaggerated and unrealistic character of their intrusive thoughts [9, 13, 25]. However, in BDD, the preoccupation with appearance is perceived in a more *ego-syntonic* fashion [13], usually with very limited insight into the exaggerated nature of the perception. Many also have self-reference ideas, causing them to believe that other people are frequently noticing their appearance flaw [18]. It is therefore common for individuals with BDD to seek

cosmetic treatment instead of psychotherapy [26]. This low insight has an undeniably negative effect on psychotherapy, leading to a lack of motivation for and compliance with treatment [27]. Conversely, individuals with OCD usually have more insight into their disorders, leading them to seek treatment [27, 28].

About 10% of young people with OCD have been found to have poor insight [28]. Poor insight is often correlated with younger age, increased OCD severity, impairment, family accommodation, lower intellectual and adaptive functioning and more severe depressive symptoms [28]. Studies on the association of poor insight and treatment effects, in children with OCD, are few and have mixed results. One randomized trial showed that poor or absent insight was associated with reduced response across different treatment groups such as CBT, SSRI and their combination [29]. However, in a recent international mega-analysis, insight did not have a significant impact on CBT [28]. Adult studies have found that insight is poorer in BDD than in OCD, with 27–60% of BDD patients having delusional beliefs compared with only 2% of OCD patients [12, 30]. Furthermore, poor insight in BDD is associated with higher suicidality [31]. It is therefore crucial to assess a young person's level of insight when considering models for treatment.

The current study

The aims of the present study were to (1) estimate the prevalence of comorbid BDD symptoms in a sample of pediatric OCD outpatients, (2) investigate differences in demographic and clinical presentation, including OCD symptom severity between patients with and without BDD symptoms and (3) explore whether comorbid BDD symptoms are associated with poorer treatment outcomes of manualized CBT for OCD.

We hypothesized that children and adolescents with OCD and BDD symptoms have lower insight in their OCD symptoms than the group without BDD symptoms. Furthermore, we expected more severe OCD symptoms in the BDD symptom group and higher comorbidity with depression and anxiety. Finally, we expected children and adolescents with BDD symptoms to have poorer outcomes after OCD treatment than the non-BDD group.

Method

Participants

A total of 269 children and adolescents aged 7 to 17 years, recruited from Denmark, Sweden and Norway between September 2008 and June 2012, were included in the Nordic Long-Term OCD Treatment Study (NordLOTS) [32]. Included patients were referred from community health centers, general practitioners, or when parents contacted the clinics directly, resulting in a representative sample of pediatric patients seeking treatment for OCD. Inclusion criteria were an OCD diagnosis based on the DSM-IV criteria confirmed by the Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS-PL) and a Children's Yale-Brown Obsessive-Compulsive Scale (CY-BOCS) total severity score ≥16. Exclusion criteria, kept to a minimum, included previous treatment with CBT or effective doses of selective serotonin reuptake inhibitors (SSRIs) within six months before the start of the study, and the presence of another psychiatric disorder with higher treatment priority. The study rationale and inclusion procedures for the NordLOTS are described in detail elsewhere [33, 34].

Informed consent was obtained from all participants and their parents, and the trial was approved by the Norwegian, Swedish, and Danish Committees for Medical and Health Research Ethics and the Medical Products Agencies.

Measures

OCD Severity

The CY-BOCS is a semi-structured interview used in the present study by an independent evaluator to assess OCD severity and symptom presentation. The scale comprises two parts. The first part is a 74-item symptom checklist assessing a broad range of current and past obsessions and compulsions. The second part, a severity scale, consists of 10 questions (five concerning obsessions and five concerning compulsions) that measures severity on a five-point scale, with a total score ranging from 0 to 40 [35].

BDD symptoms/body dysmorphic obsession

The CY-BOCS symptom checklist includes one item on body dysmorphic symptoms which was used to classify the groups in this study. The item is a part of the somatic obsessions category, and it probes whether the person has “excessive concern with body part or aspect of appearance (e.g., worries that your face, ears, nose, eyes, or other part of your body is hideously ugly)”. The item is identical to the core features of the DSM-5 BDD symptom description [8]. However, BDD-related compulsions were not assessed in this study.

Insight

Insight was measured with an item on the CY-BOCS (item 11) based on a Likert scale ranging from 0 = “good insight” to 4 = “poor insight” [36]. We also used categorically cut-offs of good/high insight (scores of 0, 1, or 2) and poor/absent insight (scores of 3 or 4) as used in previous studies {Storch, 2014 #50} {Storch, 2008 #64}

A score of <16 on the CY-BOCS was used to define a treatment response. This score was originally chosen as it represents mild severity or less and has been used in several previous studies [35].

The CY-BOCS has demonstrated reliability and validity in samples of children with OCD. In the NordLOTS, the intra-class correlation coefficients (ICCs) of inter-rater agreement were as follows: obsessions *ICC* = 0.94 (95% *CI* 0.85–0.97), compulsions *ICC* = 0.87 (95% *CI* 0.67–0.93) and total score *ICC* = 0.92 (95% *CI* 0.78–0.97) [33].

K-SADS-PL:

The K-SADS-PL is a diagnostic, semi-structured interview designed to assess a broad range of child and adolescent mental disorders according to the DSM-IV criteria. The interview comprises an introductory interview, a screening interview and a diagnostic part. Symptoms are scored as “not present,” “possible,” “in remission” and “certain.” The K-SADS-PL showed good inter-rater reliability (98%), good 1–5-week test–retest kappa (0.80) for all included anxiety diagnoses and good convergent and divergent validity [37-41]. This study used present diagnoses classified as “certain.” In DSM-IV BDD was categorized as somatoform disorder, and the DSM-IV K-SADS-PL does not cover BDD.

Child Obsessive-Compulsive Impact Scale – Revised (COIS-R):

The COIS-R is a 33-item self-report questionnaire designed to assess the psychosocial functioning of children and adolescents at home, in school and in social settings as well as how OCD affects such functioning. Parent and child rating versions are available. Scale items are scored on a four-point Likert scale (0 = “not at all,” 1 = “just a little,” 2 = “pretty much,”

and 3 = “very much”). The scale has moderate to high internal consistency of α = 0.92–0.94 for the parent version and α = 0.78–0.92 for the child versions [42, 43].

Child Behaviour Checklist (CBCL):

The CBCL is used to evaluate child behavioral and emotional problems as well as academic functioning and social competence. The scale, rated by parents, has 113 items on a three-point scale (0 = “not true,” 1 = “somewhat or sometimes true,” and 2 = “very or often true”). It has been shown to have good psychometric properties across different populations, mean test–retest reliability between 0.95–1.00 and internal consistency from α = 0.78 to α = 0.97 [44].

The Mood and Feelings Questionnaire (MFQ):

The MFQ is a parent and child rated questionnaire used to assess symptoms of depression based on the DSM-III-R. The scale comprises 13 items, scored from 0 to 26 [45]. The assessment has sound psychometric properties, and the scale’s total score has demonstrated internal consistency of α = 0.75 to α = 0.90 [46, 47].

Autism Spectrum Screening Questionnaire (ASSQ):

The ASSQ is a questionnaire for parents to rate the presence of autism symptoms, consisting of 27 items rated on a three-point scale (0 = “no,” 1 = “somewhat,” and 2 = “yes”). The scale’s total score ranges from 0 to 54 and has an internal consistency of α = 0.86 [48]. The instrument has been proven a reliable and valid tool for screening in both clinical and general

populations [49, 50]. Good internal consistency has been found for the versions in different languages this study used [51].

Screen for Child-Anxiety-Related Emotional Disorders (SCARED):

The SCARED is a 41-item inventory rated on a three-point Likert-type scale. It is a parent and child rated questionnaire used to measure symptoms of anxiety based on the DSM-IV, scored from 0 to 82. Its total score has demonstrated an internal consistency of $\alpha = 0.92$ for both the child- and the parent-rated versions [52, 53].

Treatment

The treatment protocol included 75 minutes weekly sessions of exposure-based CBT for 14 weeks. In eight sessions, individual therapy was given to the child for 45 minutes, while the remaining time was used with the parents, either alone or with the child. Depending on the child's age or preference, parents could also join for the whole session. In the remaining six sessions, child and parents were together for the full session. BDD symptoms were treated as other OCD symptoms using exposure and response prevention to address them. Therapists in the study were child and adolescent psychiatrists, clinical psychologists or certified psychotherapists with at least five years of clinical experience [32] . Assessments with the CY-BOCS and K-SADS-PL were conducted by appropriately trained independent evaluators [33]. Parent rating scales were scored by either one or both parents together. Therapy adherence and fidelity were found to be excellent. The sample and treatment procedure have been described in detail elsewhere [33].

Statistical analysis

We split the sample into two groups based on the presence of BDD symptoms from the CY-BOCS checklist. Differences in age and OCD severity between the groups were estimated using independent sample t tests. We used the Mann–Whitney U test to compare non-normally distributed data. Group differences in comorbid diagnoses, gender, and CBT completers were evaluated using Chi-square tests.

A linear mixed-effect model (LME) was used to estimate group differences in CBT outcome [54]. CY-BOCS score (measured at baseline, week 7, and week 14), were set as the dependent variable over continuous time, with weeks from baseline, the presence or absence of BDD symptoms, and interaction of BDD symptoms with time as fixed effects. The model included a random intercept and linear slope.

All analyses were conducted using SPSS version 26, except for the LME model, which was fit using the PROC MIXED procedure within the SAS Statistical Software, version 9.4. All tests were two-tailed, and $p < 0.05$ was considered to indicate statistical significance.

Results

A total of 21 (7.8%) patients reported body dysmorphic obsessions on the CY-BOCS symptom checklist. Table 1 shows the baseline demographics, clinical characteristics and group differences. Patients with BDD symptoms were significantly older than those without (t = 2.994, p = 0,003). Surprisingly, there was no difference between the level of insight in the two groups. Anxiety disorders were more common in the BDD group than in the non-BDD group (X^2 = 5.039, p = 0.025**)**. There were no other significant differences between the groups, except a trend toward a higher frequency of tic disorders in the group with OCD and BDD symptom (X^2 = 3.414, p = 0.065).

Table 1. Baseline demographic, clinical characteristics and group differences.

Characteristics	**OCD with BDD symptoms (*n*= 21)**	**OCD without BDD (*n*=247)**	**Group difference**
Age, *M (SD)*	14.52 (2.1)	12.62 (2..7)	*t*= 2.994 ***p*= 0.003**
Gender, male (%)	10 (47.6%)	121 (49%)	X^2= 0.015, *p*= 0.904
CBT completers	17 (81%)	226 (91.5%)	X^2= 2.545, *p*= 0.111
Age of OCD onset, *M (SD)*	12.17 (3.2)	11.58 (3..0)	X^2= 12.88, p= 0.456
Baseline OCD severity, *M (SD)*	24.29 (5.0)	24.63 (5.1)	*t*= -0.295, *p*= 0.738
Baseline severity for obsessions, *M (SD)*	12.24 (2.6)	12.29 (2.8)	*t*= -0.650, *p*= 0.948
Baseline severity for compulsions, *M (SD)*	12.5 (2.8)	12.36 (2.7)	*t*= -0.493, *p*= 0.964
Insight (CY-BOCS), M (SD)	1.29 (0.9)	1.11 (1.0)	*U*= 2247.0, *p*= 0.327
Good/high insight	13 (61.9%)	166 (68%)	X^2= 0.331, *p*= 0.565
COIS-R Parent, *M (SD)*	21.0 (15.2)	26.12 (18.9)	*U*= 1574.5, *p*= 0.328
COIS-R Child, *M (SD)*	20.30 (11.2)	19.88 (14.6)	*U*= 2172.0, *p*= 0.594
CBCL Internalizing, *M (SD)*	13.82 (6.8)	15.28 (9.0)	*U*= 2087.0, *p*= 0.635
CBCL Externalizing, *M (SD)*	8.83 (10.2)	8.91 (7.7)	*U*= 2047.5, *p*= 0.524
MFQ Parent, *M (SD)*	4.84 (4.7)	6.72 (5..6)	*U*= 1778.5, *p*= 0.146
MFQ Child, *M (SD)*	6.65 (4.5)	6.42 (4.2)	*U*= 2248.5, *p*= 0.681
ASSQ Total, *M (SD)*	7.33 (7.0)	7.21 (7.0)	*U*= 2474.0, *p*= 0.990
SCARED Parent, *M (SD)*	18.71 (12.0)	20.75 (13.5)	*U*= 2284.0, *p*= 0.614
SCARED Child, *M (SD)*	23.61 (12.9)	23.61 (11.0)	*U*= 2111.5, *p*= 0.326
Co-morbid disorders (KSADS-PL), *n (%)*			
Depressive disorders	1 (4.8%)	9 (3.6%)	X^2= 0.065, *p*= 0.798
Anxiety disorders	8 (38.1%)	44 (17.9)	X^2= 5.039, ***p*= 0.025**
Tic disorders	7 (33%)	42 (17%)	X^2= 3.414, *p*= 0.065
ODD/CD	1 (4.8%)	9 (3.7%)	X^2= 0.065, *p*= 0.798
ADHD	2 (9.5%)	19 (7.7%)	X^2= 0.087, *p*= 0.769

[a] Independent samples *t*-test, [b] Pearson's Chi-square test, [c] Mann–Whitney U test, Significant outcome is marked with bold; OCD = Obsessive-Compulsive Disorder; M = Mean; SD = Standard Deviation; CY-BOCS = Children's Yale-Brown Obsessive-Compulsive Scale; COIS-R = The Child Obsessive-Compulsive Impact Scale; CBCL = Child Behavior Checklist; MFQ = The Moods and Feelings Questionnaire; ASSQ = Autism Spectrum Screening Questionnaire; SCARED = Screen for Child-Anxiety-Related Emotional Disorders; KSADS-PL = Kiddie Schedule for Affective Disorders and Schizophrenia; ODD = Oppositional Deviant Disorder; CD = Conduct Disorder; ADHD = Attention Deficit Hyperactivity Disorder.

Children with BDD symptoms had significant increased rate of symptoms on almost every OCD symptom category except for sexual and magical obsessions and counting compulsions compared with those without BDD symptoms (Table 2).

Table 2. Differences in OCD symptoms, n (%)

CY-BOCS symptom category	**OCD with BDD (*n*= 21)**	**OCD without BDD (*n*= 247)**	**Group difference (Chi-Square, *p*-value)**
Contamination Obsessions	20 (95.0%)	150 (60.7%)	X^2= 9.937, ***p*= 0.002**
Aggressive Obsessions	18 (85.7%)	134 (54%)	X^2= 7.907, ***p*= 0.005**
Sexual Obsessions	4 (19.0%)	27 (10.9%)	X^2= 1.265, *p*= 0.261
Magical Obsessions	11 (52.4%)	82 (33.1%)	X^2= 3.194, *p*= 0.074
Somatic Obsessions	21 (100%)	66 (26.6%)	X^2= 47.65, ***p*< 0.001**
Religious Obsessions	12 (57.1%)	51 (20.6%)	X^2= 14.443, ***p*< 0.001**
Symmetry Obsessions	12 (57.1%)	85 (34.3%)	X^2= 4.391, ***p*= 0.036**
Miscellaneous Obsessions	19 (90.5%)	144 (58.1%)	X^2= 8.518, ***p*= 0.004**
Washing Compulsions	21 (100%)	167 (67.3%)	X^2= 9.814, ***p*= 0.002**
Checking Compulsions	20 (95.2%)	146 (58.9%)	X^2= 10.837, ***p*= 0.001**
Repeating Compulsions	16 (76.2%)	120 (48.4%)	X^2= 5.987, ***p*= 0.014**
Counting Compulsions	10 (47.6%)	73 (29.4%)	X^2= 3.000, *p*= 0.083
Symmetry/Ordering Compulsions	13 (61.9%)	93 (37.5%)	X^2= 4.829, ***p*= 0.028**
Hoarding Compulsions	11 (52.4%)	49 (19.8%)	X^2= 11.890, ***p*= 0.001**
Magical Compulsions	14 (66.7%)	71 (28.6%)	X^2= 12.960, ***p*< 0.001**
Involve Others Compulsions	18 (85.7%)	152 (61.3%)	X^2= 4.966, ***p*= 0.026**
Mental Compulsions	16 (76.2%)	94 (37.9%)	X^2= 11.742, ***p*= 0.001**
Miscellaneous Compulsions	20 (95.2%)	153 (61.7%)	X^2= 9.492, ***p*= 0.002**

Significant outcome is marked with bold; OCD = Obsessive-Compulsive Disorder; CY-BOCS = Children's Yale-Brown Obsessive-Compulsive Scale

The estimated reduction from baseline to week 14 was 13.16 (SE = 0.60) for the non-BDD group and 13.77 (SE = 1.49) for the BDD group. The estimated week 14 CY-BOCS total score was 11.18 (SE = 0.40) for the non-BDD group and 10.57 (SE=1.44) for the BDD group. The linear mixed effect analysis did not show a significant difference in OCD severity at

posttreatment (p =.682), indicating that having BDD symptoms did not affect the CBT outcome (Fig. 1).

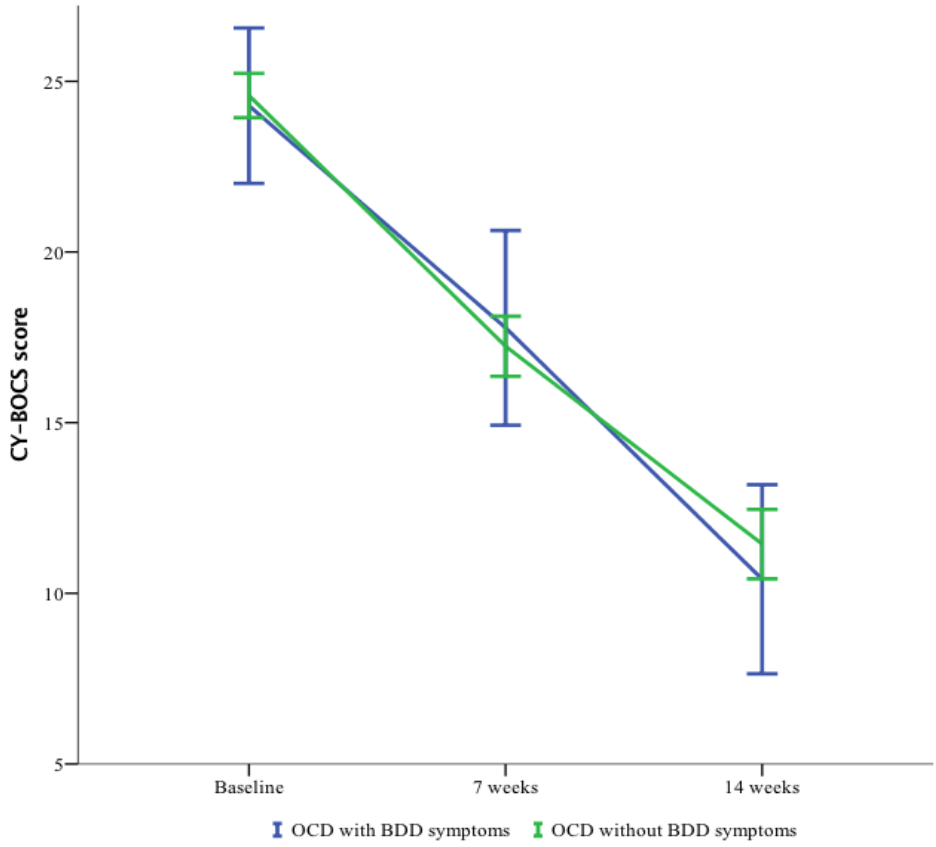

Fig. 1. Estimated reduction in CY-BOCS total score for groups with and without BDD symptoms during the 14 weeks of CBT

Discussion

The present study is the first study examining BDD symptoms in a pediatric OCD sample. A total of 21 (7.8%) individuals in our sample reported BDD symptoms. The prevalence of BDD has been reported as 2.4% in the general adult population [8] and 1.7% in a community sample of children and adolescents [10]. The 7.8% of individuals reporting BDD symptoms is in the lower range of previous studies of adult samples with primary OCD reporting comorbid BDD symptoms ranging from 3% to 37% [55-65].

We found notable group differences in certain demographic factors. Children with BDD symptoms tended to be older than those without BDD symptoms. This might be explained by post-pubertal young people being more preoccupied with physical appearance.

Children with BDD symptoms had more OC symptoms than children who did not have BDD symptoms, especially contamination obsessions (95% vs. 60% without BDD symptoms) and washing compulsions (100% vs. 58% without BDD symptoms). However, no differences were found between groups in sexual and magical obsessions or counting compulsions. These findings are consistent with those of [66].

Contrary to earlier findings and our first hypothesis, children with BDD symptoms did not show reduced levels of insight into their OCD symptoms compared to the group without BDD symptoms. One possible explanation could be the higher mean age in the group with BDD symptoms. Children tend to have lower insight than adolescents and adults [67, 68]. Thus, the insight into the OCD symptoms may improve when they get older and more mature. However, poor insight into the exaggerated nature of the preoccupation is a typical feature of BDD and growing insight with age is very unlikely. Alternatively, as a participant in this study, these young individuals, or their family, have sought treatment for their BDD symptoms and are willing and able to participate in therapy. This could indicate better insight compared to those individuals who do not seek and participate in treatment. Surprisingly, in the current sample, both groups had relatively high levels of insight. This is not in line with earlier findings from studies with adults indicating that individuals with OCD have better insight into their symptoms than individuals with BDD [12, 27]. There are several potential explanations: (1) Most importantly, the current study reports on the presence of BDD symptoms, but a diagnosis of BDD was not assessed thoroughly. As described in the methods section, the DSM-IV based K-SADS-PL interview did not cover the

diagnosis of BDD. In DSM-IV BDD was classified as somatoform disorder, while it is categorized in the group of Obsessive-Compulsive and Related Disorders in DSM 5 [8]. (2) In our study insight was measured with the CYBOCS item asking for general insight into OCD, and not specific for the BDD symptom. Therefore, the rater may have concluded with overall "good insight", while insight into the BDD symptom could have been masked. (3) Studies about BDD without OCD may comprise a different population and therefore, the studies are not directly comparable. (4) In addition, there is a possibility that the CY-BOCS BDD item measures other types of preoccupations with the body, than those typically characterizing BDD.

Our findings do not support our second hypothesis, that children with BDD symptoms exhibit poorer treatment outcomes than children with OCD only. In this sample, both groups responded equally well to CBT treatment. Which indicates that in the present study, BDD symptoms as measured by the CY-BOCS checklist, do not predict poorer treatment outcomes. However, as mentioned earlier, the children and adolescents in this sample did not have full diagnoses of BDD, only symptoms, which could explain these results. Furthermore, the treatment is designed to reduce OCD symptoms in general and not specifically BDD symptoms.

Concerning comorbid disorders, there was no difference in the presence of depression, ADHD, tic disorder and ODD/CD between both groups. However, anxiety disorders were more frequent in the BDD symptom group. Our sample had very few cases with depression (3.7%) [32] which could explain the null finding.

The strength of this study lies in its large and well-defined sample using a comprehensive assessment of both OCD and comorbidities. CBT treatment was manualized, and participants did not receive SSRI medication during CBT treatment.

An important limitation of this study is that we only assessed BDD symptoms by using the single item in the CY-BOCS checklist, and which only includes body dysmorphic obsessions and not compulsion. Therefore, we cannot distinguish between milder symptoms of BDD and severe clinical cases, making it difficult to evaluate whether reporting BDD symptoms is a part of young people's appearance concerns or pathology. In addition, we do not have any information on BDD compulsions. Our sample consisted of children and adolescents with OCD and therefore our results cannot extend to children with BDD symptoms without OCD. Finally, the homogeneity of the Scandinavian sample limits the generalizability of its results to more diverse populations.

Summary

About 8% of children and adolescents with OCD included in the NordLOTS had symptoms of BDD. Those with BDD symptoms were older, had higher frequency of comorbid anxiety disorders and a greater number of OC symptoms than those without BDD symptoms. However, the exact rates of BDD in pediatric OCD is not known. More elaborate screening and assessment of BDD in pediatric OCD is important. In contrast to previous studies, the presence of BDD symptoms did not affect insight in OCD symptoms, and the treatment response to CBT was similar for OCD patients with and without BDD symptoms. The present study suggests that OCD can be treated successfully with CBT in the presence of BDD symptoms.

Author contributions

All authors have contributed to the article according to the Vancouver guidelines for authorship. All authors have approved the final version to be published.

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Declarations

Conflict of interest

The authors declare that they have no conflicts of interest.

Ethics approval

The study has been approved by the appropriate ethics committees in Denmark, Norway and Sweden. This paper does not contain information that discloses the identity of participants of this study.

Consent to participate

Informed consent was obtained from all the participants in the study and their parents.

Consent for publication

All authors have given consent to publication.

References

1. Mattheisen M, Samuels JF, Wang Y, Greenberg BD, Fyer AJ, McCracken JT, Geller DA, Murphy DL, Knowles JA, Grados MA, Riddle MA, Rasmussen SA, McLaughlin NC, Nurmi EL, Askland KD, Qin HD, Cullen BA, Piacentini J, Pauls DL, Bienvenu OJ, Stewart SE, Liang KY, Goes FS, Maher B, Pulver AE, Shugart YY, Valle D, Lange C, Nestadt G (2014) Genome-wide association study in obsessive-compulsive disorder: results from the OCGAS. Molecular Psychiatry 20:337

2. Flament MF, Whitaker A, Rapoport JL, Davies M, Berg CZ, Kalikow K, Sceery W, Shaffer D (1988) Obsessive compulsive disorder in adolescence: an epidemiological study. Journal of the American Academy of Child and Adolescent Psychiatry 27:764-771

3. Rapoport JL, Inoff-Germain G, Weissman MM, Greenwald S, Narrow WE, Jensen PS, Lahey BB, Canino G (2000) Childhood obsessive-compulsive disorder in the NIMH MECA study: parent versus child identification of cases. Methods for the Epidemiology of Child and Adolescent Mental Disorders. Journal of Anxiety Disorders 14:535-548

4. Ruscio AM, Stein DJ, Chiu WT, Kessler RC (2010) The epidemiology of obsessive-compulsive disorder in the National Comorbidity Survey Replication. Molecular Psychiatry 15:53-63

5. Valleni-Basile LA, Garrison CZ, Jackson KL, Waller JL, McKeown RE, Addy CL, Cuffe SP (1994) Frequency of obsessive-compulsive disorder in a community sample of young adolescents. Journal of the American Academy of Child and Adolescent Psychiatry 33:782-791

6. Ivarsson T, Melin K, Wallin L (2008) Categorical and dimensional aspects of co-morbidity in obsessive-compulsive disorder (OCD). European Child & Adolescent Psychiatry 17:20-31

7. Geller D, Biederman J, Faraone SV, Frazier J, Coffey BJ, Kim G, Bellordre CA (2000) Clinical correlates of obsessive compulsive disorder in children and adolescents referred to specialized and non-specialized clinical settings. Depress Anxiety 11:163-168

8. American Psychiatric Association (2013) Diagnostic and statistical manual of mental disorders DSM-5. In:American Psychiatric Association

9. National Collaborating Centre for Mental Health (2006) Obsessive-Compulsive Disorder: Core Interventions in the Treatment of Obsessive-Compulsive Disorder and Body Dysmorphic Disorder. .340

10. Schneider SC, Turner CM, Mond J, Hudson JL (2016) Prevalence and correlates of body dysmorphic disorder in a community sample of adolescents. Australian & New Zealand Journal of Psychiatry 51:595-603

11. Schneider SC, Baillie AJ, Mond J, Turner CM, Hudson JL (2018) The classification of body dysmorphic disorder symptoms in male and female adolescents. Journal of Affective Disorders 225:429-437

12. Bjornsson AS, Didie ER, Phillips KA (2010) Body dysmorphic disorder. Dialogues in clinical neuroscience 12:221-232

13. Frare F, Perugi G, Ruffalo G, Toni C (2004) Obsessive-compulsive disorder and body dysmorphic disorder: a comparison of clinical features. European Psychiatry 19:292-298

14. Bellino S, Zizza M, Paradiso E, Rivarossa A, Fulcheri M, Bogetto F (2006) Dysmorphic concern symptoms and personality disorders: a clinical investigation in patients seeking cosmetic surgery. Psychiatry research 144:73-78

15. Rautio D, Jassi A, Krebs G, Andrén P, Monzani B, Gumpert M, Lewis A, Peile L, Sevilla-Cermeño L, Jansson-Fröjmark M, Lundgren T, Hillborg M, Silverberg-Morse M, Clark B, Fernández de la Cruz L, Mataix-Cols D (2020) Clinical characteristics of 172 children and adolescents with body dysmorphic disorder. European Child & Adolescent Psychiatry

16. Hart AS, Phillips KA (2013) Symmetry Concerns as a Symptom of Body Dysmorphic Disorder. Journal of obsessive-compulsive and related disorders 2:292-298

17. Phillips KA, Dwight MM, McElroy SL (1998) Efficacy and safety of fluvoxamine in body dysmorphic disorder. J Clin Psychiatry 59:165-171

18. Phillips KA, Pinto A, Menard W, Eisen JL, Mancebo M, Rasmussen SA (2007) Obsessive-compulsive disorder versus body dysmorphic disorder: a comparison study of two possibly related disorders. Depression and anxiety 24:399-409

19. Castle D, Beilharz F, Phillips KA, Brakoulias V, Drummond LM, Hollander E, Ioannidis K, Pallanti S, Chamberlain SR, Rossell SL, Veale D, Wilhelm S, Van Ameringen M, Dell'Osso B, Menchon JM, Fineberg NA (2021) Body dysmorphic disorder: a treatment synthesis and consensus on behalf of the International College of Obsessive-Compulsive Spectrum Disorders and the Obsessive Compulsive and Related Disorders Network of the European College of Neuropsychopharmacology. International Clinical Psychopharmacology 36

20. National Institute for Heath and Clinical Excellence (2005) Obsessive compulsive disorder (OCD) and body dysmorphic disorder (BDD). In: Excellence NIfHaC (ed)National Institute for Health and Clinical Excellence, London, p National Institute for Health and Clinical Excellence

21. Socialstyrelsen (2017) Nationella riktlinjer för vård vid depression och ångestsyndrom – Stöd för styrning och ledning (The Swedish Clinical Guidlines for anxiety- and effective disorders: Support for managment and administration. Socialstyrelsen, Stockholm

22. Sundhedsstyrelsen (2016) NKR: behandling af obsessiv-kompulsiv tilstand (OCD). Sundhedsstyrelsen, København

23. Harrison A, Fernández de la Cruz L, Enander J, Radua J, Mataix-Cols D (2016) Cognitive-behavioral therapy for body dysmorphic disorder: A systematic review and meta-analysis of randomized controlled trials. Clinical Psychology Review 48:43-51

24. Greenberg JL, Mothi SS, Wilhelm S (2016) Cognitive-Behavioral Therapy for Adolescent Body Dysmorphic Disorder: A Pilot Study. Behav Ther 47:213-224

25. Belloch A, Roncero M, Perpina C (2012) Ego-Syntonicity and Ego-Dystonicity Associated with Upsetting Intrusive Cognitions. Journal of Psychopathology and Behavioral Assessment 34:94-106

26. Castle DJ, Rossell S, Kyrios M (2006) Body dysmorphic disorder. Psychiatric Clinics 29:521-538

27. Summerfeldt LJ (2006) Incompleteness, ordering and arranging. Cognitive behavior therapy for OCD: Beyond the basics:187-208

28. Selles RR, Højgaard DRMA, Ivarsson T, Thomsen PH, McBride N, Storch EA, Geller D, Wilhelm S, Farrell LJ, Waters AM, Mathieu S, Lebowitz E, Elgie M, Soreni N, Stewart SE (2018) Symptom Insight in Pediatric Obsessive-Compulsive Disorder: Outcomes of an International Aggregated Cross-Sectional Sample. Journal of the American Academy of Child & Adolescent Psychiatry 57:615-619.e615

29. Garcia AM, Sapyta JJ, Moore PS, Freeman JB, Franklin ME, March JS, Foa EB (2010) Predictors and moderators of treatment outcome in the Pediatric Obsessive Compulsive Treatment Study (POTS I). Journal of the American Academy of Child & Adolescent Psychiatry 49:1024-1033

30. Phillips KA, Pinto A, Hart AS, Coles ME, Eisen JL, Menard W, Rasmussen SA (2012) A comparison of insight in body dysmorphic disorder and obsessive-compulsive disorder. Journal of psychiatric research 46:1293-1299

31. Hartmann AS, Buhlmann U (2017) Body Dysmorphic Disorder. In: Goldstein S, DeVries M (eds) Handbook of DSM-5 Disorders in Children and Adolescents. Springer International Publishing, Cham, p 233-248

32. Torp NC, Dahl K, Skarphedinsson G, Thomsen PH, Valderhaug R, Weidle B, Melin KH, Hybel K, Nissen JB, Lenhard F, Wentzel-Larsen T, Franklin ME, Ivarsson T (2015) Effectiveness of cognitive behavior treatment for pediatric obsessive-compulsive disorder: Acute outcomes from the Nordic Long-term OCD Treatment Study (NordLOTS). Behaviour Research and Therapy 64:15-23

33. Thomsen PH, Torp NC, Dahl K, Christensen K, Englyst I, Melin KH, Nissen JB, Hybel KA, Valderhaug R, Weidle B, Skarphedinsson G, von Bahr PL, Ivarsson T (2013) The Nordic long-term OCD treatment study (NordLOTS): rationale, design, and methods. Child and Adolescent Psychiatry and Mental Health 7:41

34. Ivarsson T, Thomsen PH, Dahl K, Valderhaug R, Weidle B, Nissen JB, Englyst I, Christensen K, Torp NC, Melin K (2010) The Rationale and Some Features of the Nordic Long-Term OCD Treatment Study (NordLOTS) in Childhood and Adolescence. Child & Youth Care Forum 39:91-99

35. Scahill L, Riddle MA, McSwiggin-Hardin M, Ort SI, King RA, Goodman WK, Cicchetti D, Leckman JF (1997) Children's Yale-Brown Obsessive Compulsive Scale: Reliability and Validity. Journal of the American Academy of Child & Adolescent Psychiatry 36:844-852

36. Boileau B (2011) A review of obsessive-compulsive disorder in children and adolescents. Dialogues Clin Neurosci 13:401-411

37. Kaufman J, Birmaher B, Brent D, Rao UMA, Flynn C, Moreci P, Williamson D, Ryan N (1997) Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL): Initial Reliability and Validity Data. Journal of the American Academy of Child & Adolescent Psychiatry 36:980-988

38. Lauth B, Arnkelsson GB, Magnússon P, Skarphéðinsson GÁ, Ferrari P, Pétursson H (2010) Validity of K-SADS-PL (Schedule for Affective Disorders and Schizophrenia for School-Age Children—Present and Lifetime Version) depression diagnoses in an adolescent clinical population. Nordic Journal of Psychiatry 64:409-420

39. Villabø MA, Oerbeck B, Skirbekk B, Hansen BH, Kristensen H (2016) Convergent and divergent validity of K-SADS-PL anxiety and attention deficit hyperactivity disorder diagnoses in a clinical sample of school-aged children. Nordic Journal of Psychiatry 70:358-364

40. Kragh K, Husby M, Melin K, Weidle B, Torp NC, Højgaard DRMA, Hybel KA, Nissen JB, Thomsen PH, Skarphedinsson G (2019) Convergent and divergent validity of the schedule for affective disorders and schizophrenia for school-age children – present and lifetime version diagnoses in a sample of children and adolescents with obsessive–compulsive disorder. Nordic Journal of Psychiatry 73:111-117

41. Jarbin H, Andersson M, Råstam M, Ivarsson T (2017) Predictive validity of the K-SADS-PL 2009 version in school-aged and adolescent outpatients. Nordic Journal of Psychiatry 71:270-276

42. Piacentini J, Peris TS, Bergman RL, Chang S, Jaffer M (2007) BRIEF REPORT: Functional Impairment in Childhood OCD: Development and Psychometrics Properties of the Child Obsessive-Compulsive Impact Scale-Revised (COIS-R). Journal of Clinical Child & Adolescent Psychology 36:645-653

43. Skarphedinsson G, Melin KH, Valderhaug R, Wentzel-Larsen T, Højgaard DRMA, Thomsen PH, Ivarsson T (2015) Evaluation of the factor structure of the Child Obsessive–Compulsive Impact Scale – Revised (COIS-R) in Scandinavia with confirmatory factor analysis. Journal of Obsessive-Compulsive and Related Disorders 7:65-72

44. Achenbach TM, Rescorla LA (2001) Manual for the ASEBA School-Age Forms & Profiles. University of Vermont, Research Center for Children, Youth, and Families, Burlington, VT

45. Ancold A, Stephen C (1995) Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents. International Journal of Methods in Psychiatric Research 5:237-249

46. Messer SC, Angold A, Costello EJ, Loeber R (1995) Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents: Factor composition and structure across development. International journal of methods in psychiatric research

47. Wood A, Kroll L, Moore A, Harrington R (1995) Properties of the Mood and Feelings Questionnaire in Adolescent Psychiatric Outpatients: A Research Note. Journal of Child Psychology and Psychiatry 36:327-334

48. Ehlers S, Gillberg C (1993) The Epidemiology of Asperger Syndrome. Journal of Child Psychology and Psychiatry 34:1327-1350

49. Posserud M-B, Lundervold AJ, Gillberg C (2006) Autistic features in a total population of 7–9-year-old children assessed by the ASSQ (Autism Spectrum Screening Questionnaire). Journal of Child Psychology and Psychiatry 47:167-175

50. Ehlers S, Gillberg C, Wing L (1999) A Screening Questionnaire for Asperger Syndrome and Other High-Functioning Autism Spectrum Disorders in School Age Children. Journal of Autism and Developmental Disorders 29:129-141

51. Arildskov TW, Højgaard DRMA, Skarphedinsson G, Thomsen PH, Ivarsson T, Weidle B, Melin KH, Hybel KA (2016) Subclinical autism spectrum symptoms in pediatric obsessive–compulsive disorder. European Child & Adolescent Psychiatry 25:711-723

52. Birmaher B, Brent DA, Chiappetta L, Bridge J, Monga S, Baugher M (1999) Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. J Am Acad Child Adolesc Psychiatry 38:1230-1236

53. Ivarsson T, Skarphedinsson G, Andersson M, Jarbin H (2018) The Validity of the Screen for Child Anxiety Related Emotional Disorders Revised (SCARED-R) Scale and Sub-Scales in Swedish Youth. Child Psychiatry Hum Dev 49:234-243

54. Fitzmaurice GM, Laird NM, Ware JH (2011) Applied Longitudinal Analysis. John Wiley & Sons, Hoboken, NJ

55. Hollander E, Cohen Lisa J, Simeon D (1993) Body Dysmorphic Disorder. Psychiatric Annals 23:359-364

56. Bienvenu OJ, Samuels JF, Riddle MA, Hoehn-Saric R, Liang K-Y, Cullen BAM, Grados MA, Nestadt G (2000) The relationship of obsessive–compulsive disorder to possible spectrum disorders: results from a family study. Biological Psychiatry 48:287-293

57. Phillips KA, McElroy SL, Hudson JI, Pope HG, Jr. (1995) Body dysmorphic disorder: an obsessive-compulsive spectrum disorder, a form of affective spectrum disorder, or both? J Clin Psychiatry 56 Suppl 4:41-51; discussion 52

58. Brawman-Mintzer O, Lydiard RB, Phillips KA, Morton A, Czepowicz V, Emmanuel N, Villareal G, Johnson M, Ballenger JC (1995) Body dysmorphic disorder in patients

with anxiety disorders and major depression: a comorbidity study. Am J Psychiatry 152:1665-1667

59. Simeon D, Hollander E, Stein DJ, Cohen L, Aronowitz B (1995) Body dysmorphic disorder in the DSM-IV field trial for obsessive-compulsive disorder. Am J Psychiatry 152:1207-1209

60. Lochner C, Stein DJ (2010) Obsessive-compulsive spectrum disorders in obsessive-compulsive disorder and other anxiety disorders. Psychopathology 43:389-396

61. Jaisoorya TS, Reddy YCJ, Srinath S (2003) The relationship of obsessive-compulsive disorder to putative spectrum disorders: results from an Indian study. Comprehensive Psychiatry 44:317-323

62. du Toit PL, van Kradenburg J, Niehaus D, Stein DJ (2001) Comparison of obsessive-compulsive disorder patients with and without comorbid putative obsessive-compulsive spectrum disorders using a structured clinical interview. Compr Psychiatry 42:291-300

63. Otto MW, Wilhelm S, Cohen LS, Harlow BL (2001) Prevalence of body dysmorphic disorder in a community sample of women. Am J Psychiatry 158:2061-2063

64. Diniz JB, Rosario-Campos MC, Shavitt RG, Curi M, Hounie AG, Brotto SA, Miguel EC (2004) Impact of age at onset and duration of illness on the expression of comorbidities in obsessive-compulsive disorder. J Clin Psychiatry 65:22-27

65. Stewart SE, Stack DE, Wilhelm S (2008) Severe obsessive-compulsive disorder with and without body dysmorphic disorder: clinical correlates and implications. Ann Clin Psychiatry 20:33-38

66. Conceicao Costa DL, Chagas Assuncao M, Arzeno Ferrao Y, Archetti Conrado L, Hajaj Gonzalez C, Franklin Fontenelle L, Fossaluza V, Constantino Miguel E, Rodrigues Torres A, Gedanke Shavitt R (2012) Body dysmorphic disorder in patients with obsessive-compulsive disorder: prevalence and clinical correlates. Depress Anxiety 29:966-975

67. Lewin AB, Bergman RL, Peris TS, Chang S, McCracken JT, Piacentini J (2010) Correlates of insight among youth with obsessive-compulsive disorder. J Child Psychol Psychiatry 51:603-611

68. Storch EA, De Nadai AS, Jacob ML, Lewin AB, Muroff J, Eisen J, Abramowitz JS, Geller DA, Murphy TK (2014) Phenomenology and correlates of insight in pediatric obsessive-compulsive disorder. Compr Psychiatry 55:613-620