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Insight impairment in body image disorders: Delusionality and overvalued ideas in anorexia nervosa versus body dysmorphic disorder

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Abstract

The two body image disorders anorexia nervosa (AN) and body dysmorphic disorder (BDD) share many similarities. Delusionality in BDD has recently gained increased attention, as the new DSM-5 criteria for BDD include an insight specifier. However, delusionalilty in AN has rarely been examined. We evaluated the delusionality of appearance-related beliefs in AN ($n = 19$) versus BDD ($n = 22$) via structured interview. Participants also completed measures of disorder-specific psychopathology and body image. Compared to those with AN, individuals with BDD exhibited significantly greater delusionality on a dimensional scale ($p = 0.0014$, $d = 1.07$), and were more likely to meet dichotomous criteria for delusional beliefs ($p = 0.021$, V = 0.36). In AN, delusionality was associated specifically with shape concerns and drive for thinness; in BDD, delusionality was related to the severity of BDD symptoms (all $p < 0.05$). Delusionality of appearance beliefs is present in individuals with AN, but is less pronounced than in BDD. Nevertheless, as high delusionality might predict poor treatment outcome in AN, treatment strategies that were originally developed to address delusionality in BDD might be modified for AN.

Keywords: insight, delusionality, ideas/delusions of reference, overvalued ideas; anorexia nervosa; body dysmorphic disorder

1. Introduction

Both anorexia nervosa (AN) and body dysmorphic disorder (BDD) are characterized by severe body image concerns (Hrabosky et al., 2009), which, in turn are associated with other behaviors characteristic of the respective disorder such as fixing (dieting, purging [AN] vs. applying make-up, surgical procedures [BDD]), checking (the mirror or by pinching oneself), and avoidance (wearing wide clothing, not going to the beach or not leaving the house) (for an overview see Buhlmann and Winter, 2011; Kachani et al., 2013). While individuals with BDD may have appearance concerns with regard to their face, skin or other specific body areas, individuals with AN typically think that they or parts of their body are too fat despite being dangerously underweight. The level of delusionality of these appearance-related beliefs in BDD has been shown to positively predict symptom severity and suicidal ideation (Phillips et al., 2005). Therefore, the DSM-5 Obsessive-Compulsive and Related Disorders Work Group added an insight specifier to characterize the delusionality of such beliefs in BDD (Phillips et al., 2012). Recent research indicates that appearance beliefs in AN are often delusional as well (Konstantakopoulos et al., 2012). No previous study has directly compared the degree of delusionality in BDD versus AN. Such comparisons might help to better understand similarities and differences between the two disorders. This in turn might inform classification, treatment, and research.

Insight seems to be a key aspect of various disorders, i.e., AN (Konstantakopoulos et al., 2012), psychosis (McCormack et al., 2013), and BDD (Phillips and Hollander, 2008). Insight is thought to be a dimensional (rather than categorical) construct, ranging from more general insight into having a disorder at all, to a more disorder-specific belief (e.g., body image beliefs in AN and BDD).

Delusionality of body image beliefs can also be viewed dimensionally—ranging from completely delusional, to having overvalued ideas, to being completely insightful.

The specific types of delusionality observed in each psychiatric disorder may be outward manifestations of more general deficits in theory of mind (ToM), emotion recognition, or metacognitive functioning. A recent literature review confirmed deficits in emotion regulation and other cognitive abilities, in particular executive functions, in both disorders (Hartmann et al. 2013), and ToM deficits in AN. ToM studies in BDD have not yet been conducted. In addition, research showed that metacognitive abilities (i.e., the person's awareness of her/his cognitive abilities) might be a moderator between poor cognitive abilities and insight (Arbel et al., in press). Again, comparable studies in BDD are lacking."

In BDD, about one third of individuals report delusional beliefs, and are thus convinced that their perception of their appearance flaws is accurate (Phillips and Hollander, 2008). Up to 73% of individuals with BDD also show ideas/delusions of reference; that is, they are certain that people take special notice of them because of these perceived flaws (Phillips et al., 1993). In DSM-IV-TR, delusional BDD was either diagnosed as a delusional disorder of the somatic type or as a comorbid diagnosis of both BDD and delusional disorder (APA, 2000). However, studies suggest that delusional and non-delusional variants of BDD differ in degree rather than in kind, and share more similarities than differences with regard to demographics, phenomenology, course, comorbidity, and treatment response (McElroy et al., 1994; Phillips et al., 1994; Mancuso et al., 2010). Indeed, available data suggest that the delusional variant may simply be associated with greater BDD-symptom severity and impairment (Phillips et al., 1993; Phillips et al., 1994; Phillips et al., 2006; Mancuso et al., 2010). Therefore, as Phillips and colleagues (2010)

proposed, DSM-5 BDD now includes an insight specifier that characterizes accompanying appearance beliefs on a continuum of good insight to delusionality (APA, 2013).

Much less is known about the delusionality of appearance beliefs in AN. Steinglass and colleagues (2007) identified 24% of individuals with AN as having delusional body image beliefs using the Brown Assessment of Beliefs Scale (BABS; Eisen et al., 1998), which measures both delusionality of appearance-related beliefs and ideas/delusions of reference. In a more recent study using the BABS, 29% of participants with AN reported delusional body image beliefs. Of note, only 6% of participants with binge/purge-type AN held delusional beliefs, compared to nearly half (46%) of those with restrictive-type AN (Steinglass et al., 2007; Konstantakopoulos et al., 2011). Furthermore, Steinglass and colleagues found with more general measures of AN severity such as body mass index (BMI), lowest lifetime BMI, and duration of illness. Similarly, one of Konstantakopoulos' studies found that delusionality was associated with body dissatisfaction, but not with BMI (Konstantakopoulos et al., 2012). In line with research in BDD, preliminary results also suggest that delusionality in AN occurs along a continuum ranging from fair or even excellent insight, to overvalued ideas (in which insight is poor, but not absent), to delusional (Konstantakopoulos et al., 2012). In DSM-IV-TR (APA, 2000), body image disturbance (criterion C) is characterized as "disturbance in which one's body, weight or shape is experienced", "undue influence of body weight and shape", or "denial of seriousness of the current low body weight" (p. 589). While the descriptors already represent a range of intensity of beliefs and conviction, different authors, based on literature reviews, have proposed a clear classification of appearance beliefs in AN as "with good insight", "with poor insight", and "with delusional (or psychotic)

features" (Phillips et al., 1995; Van Der Zwaard et al., 2006). However, DSM-5 AN does not include an insight specifier similar to that of DSM-5 BDD (APA, 2013).

One study investigating insight into appearance-related beliefs that were not further specified among individuals with eating disorders (Grant et al., 2002) revealed that a comorbid BDD diagnosis was associated with higher delusionality in AN. In contrast, a study by Ruffolo and colleagues (2006) comparing BDD with and without a lifetime comorbid eating disorder showed that an eating disorder comorbidity in BDD did not influence delusionality of bodily image beliefs, irrespective of focus of the belief. However, to our knowledge, no studies have directly compared delusionality, overvalued ideas, and ideas/delusions of reference in both body image disorders. Such direct comparisons could provide insight into the utility of a delusionality specifier in AN, as well as insight into new clinical and research directions (e.g., development and testing of new clinical strategies to reduce delusionality).

Our primary aims of the present study were to assess the extent of delusionality in AN and BDD and to determine and compare the number of individuals in the AN and BDD groups who could be classified as having delusional appearance beliefs. We also examined correlations of delusionality with clinical variables, body image measures, and disorder severity. Based on the extensive literature on delusionality in BDD in contrast to the relative dearth in AN, we hypothesized that individuals with BDD would have higher levels of delusionality and be more likely to report delusional or overvalued ideas. Additionally, we expected significant correlations between delusionality and measures of body image in both groups, overall disorder severity in BDD but not AN, and disorder specific symptoms in AN (i.e., drive for thinness).

2. Methods

2.1. Subjects

Participants were recruited through advertisements and flyers (AN: $n = 5$; BDD: $n = 7$). We also asked prospective patients who inquired about treatment options at the Eating Disorder Program ($n = 4$) at Massachusetts General Hospital (MGH) or the Obsessive- Compulsive Disorder (OCD) and Related Disorders Clinic at Massachusetts General Hospital ($n = 15$) if they were interested in participating. Finally, we recruited research participants from a residential treatment facility for eating disorders at McLean Hospital ($n = 10$).

Individuals aged 18 years or older who had a diagnosis of either AN or BDD according to DSM-IV-TR (APA, 2000) were eligible to participate. Only BDD patients with a score on the Yale-Brown Obsessive Compulsive Scale modified for BDD (Phillips et al., 1997) ≥ 20 (Deckersbach et al., 1998) were included in the study. Amenorrhea was not required for AN patients (Attia and Roberto, 2009), but the participant's weight needed to be below the 85th percentile according to the medium frame weight for height and gender on the 1959 Metropolitan Life Insurance Tables. We used the Eating Disorder Examination (see measures) to assess the diagnostic criteria for AN (Item "maintain low weight" = 1, Items "fear of weight gain" ≥ 4, and "importance of weight or shape" or "feeling fat" ≥ 4, all for the past 3 months). Exclusion criteria included a diagnosis of substance abuse or dependence, psychotic or bipolar disorder in the past three months, homicidality, current clinically significant suicidality, significant CBT treatment experience for either disorder (> 10 CBT sessions in the last 10 years), and self-identified English language difficulties.

Because the purpose of the study was to compare the two patient groups, we excluded individuals with comorbid AN and BDD.

Out of 77 potential participants (AN: $n = 33$, BDD: $n = 44$), 31 were deemed ineligible after the phone screening/initial contact at the residential facility (AN: $n = 16$; BDD: $n = 15$). Reasons for exlusion were: not meeting diagnostic criteria (weight criterion in AN: $n = 5$; severity of appearance concerns in BDD: $n = 7$), having too much CBT experience (AN: $n = 6$; BDD: $n = 5$), or meeting criteria for both disorders (AN: $n = 5$; BDD: $n = 3$). After the in person interviews, another three participants (AN: $n = 1$; BDD: $n = 2$) were excluded as they did not meet diagnostic criteria, and two participants from the AN group withdrew from the study mid-way through the assessments. Ultimately, 41 individuals (AN: $n = 19$, BDD: $n = 22$) took part in the study.

2.2. Procedures

After providing informed consent, participants were interviewed by a clinical psychologist and completed self-report measures in REDCap, an electronic data capturing system (Harris et al., 2009). The Partners Human Research Committee at Massachusetts General Hospital (MGH) approved the study protocol and the Institutional Review Board at McLean Hospital ceded review to MGH.

2.2.1. Clinical interviews

The *Structured Clinical Interview for DSM-IV* (SCID; First et al., 2002) is a semi-structured clinical interview used to diagnose Axis I disorders, which we used to confirm participants' AN or BDD and associated comorbidity. Inter-rater reliability in previous studies was satisfactory to good across diagnoses ($0.61 \leq r_{icc} \leq 0.83$; Lobbestael et al., 2011).

The *Brown Assessment of Beliefs Scale* (BABS; Eisen et al., 1998) is a 7-item semi-structured clinician-administered interview that assesses current delusional thinking, both categorically and dimensionally. The BABS first assesses the dominant belief about appearance/perceived flaws. Then, the clinician rates six items to assess insight into the veracity of the spontaneously reported appearance belief, as well as the corresponding level of delusion. An additional item (item 7) assessing ideas/delusions of reference ("Does it ever seem that people are talking about you or taking special notice of you because of (fill in belief)?" or "What about receiving special messages from your environment because of (fill in belief)?") is not included in the total score. For the AN group, ideas/delusions of reference were only scored if individuals believed to be talked about due to being overweight (but not due to being underweight, which was theoretically plausible and would therefore not be considered delusional). Example items read: "How convinced are you of these ideas/beliefs?", "What do you think other people (would) think of your beliefs?" Scoring for each item ranges from 0 (non-delusional or least pathological) to 4 (delusional or most pathological) with a total score ranging from 0 to 24. The BABS has been used in a wide range of disorders, including OCD and BDD (i.e., Eisen et al., 2004), schizophrenia (i.e., Jaafari et al., 2011), substance abuse (i.e., Grant et al., 2005), and eating disorders (i.e., Konstantakopoulos et al., 2012). In addition to calculating the total score, we determined the proportion of cases that had delusional beliefs (sum score > 18 and item 1 score = 4) or overvalued ideas ($13 \leq$ sum score < 17 and item 1 score = 3). Both cut-offs were based on sensitivity-specificity analyses in eating disorders by Konstantakopoulos et al. (2012) and BDD by Eisen et al. (1998). Overvalued ideas are defined according to DSM-IV as "unreasonable and sustained beliefs that are maintained with less than delusional intensity" (APA, 2000). We

evaluated inter-rater agreement between two raters in a randomly selected subsample of all participants' BABS total score ($n = 16$ [eight participants with AN and BDD, respectively]; 39%). The second rater listened to tape-recorded interviews of rater 1. The intra-class correlation coefficient was high for the total score (ICC = 0.85, 0.59-0.95 with 95% CI; Landis and Koch, 1977). There was good agreement between the two raters with respect to assignment to the delusionality category (delusional: 5 vs. 6 participants; overvalued ideas: 3 vs. 5 participants). Additionally, the internal consistency of the scale was good (Cronbach's $\alpha = 0.80$).

The *Eating Disorder Examination* (EDE Edition 16.0D; Fairburn et al., 2008) is a semi-structured interview that assesses the presence and severity of eating disorder symptoms on four scales (eating concern, weight concern, shape concern, and restraint) and diagnostic features such as binge eating, excessive exercise, and purging. In the present study, we used the total score and the shape concern subscale, the latter measuring feelings of fatness and importance of shape. Both scores showed good to excellent internal consistency (Cronbach's $\alpha = 0.94$ [total score] and 0.87 [shape concern]). Previous studies showed good inter-rater reliability ($\rho = 0.72$ [total score; Grilo et al., 2004] and $\rho = 0.85$ and $r = 0.90 - 0.99$ [shape concern; Grilo et al., 2004; Berg et al., 2012]). Items about binge eating, vomiting, laxative and diuretic use were used to discriminate between restrictive and binge/purge AN subtypes.

The *Yale Brown Obsessive Compulsive Scale Modified for Body Dysmorphic Disorder* (BDD-YBOCS; Phillips et al., 1997) is a 12-item semi-structured clinician–rated instrument designed to rate severity of BDD in a sum score. In participants with AN, the rating focused on AN symptom severity. Ratings of shape and weight concerns were therefore also included in the total score. In the present study it had

satisfactory internal consistency (Cronbach's α = 0.68), and previous studies have shown excellent inter-rater reliability (r_{icc} = 0.99; Phillips et al., 1997).

2.2.2. Self-report measures

The *Beliefs about Appearance Scale* (BAAS; Spangler and Stice, 2001) is a 20-item self-report scale that assesses beliefs about the perceived importance of appearance for relationships, achievement, self-view, and feelings. The internal consistency of the sum score was excellent in the present study (Cronbach's α = 0.96).

The *Body Image Disturbance Questionnaire* (BIDQ; Cash et al., 2004) is derived from modifications of the Body Dysmorphic Disorder Questionnaire. This 7-item self-report measure assesses appearance-related concerns and preoccupation. The total score showed excellent internal consistency in the current study (Cronbach's α = 0.93).

The *Eating Disorder Inventory (EDI) Drive for Thinness Subscale* (Garner et al., 1983) measures an excessive concern with dieting, preoccupation with weight, and fear of weight gain. It showed excellent internal consistency in the present sample (Cronbach's α = 0.93).

2.2.3. Data analysis

We evaluated differences between AN and BDD in demographic and clinical characteristics as well as degree of delusionality, and between groups of participants from different recruitment avenues (flyers, outpatient intakes, residential intakes) in preliminary analyses via student's t-test for independent samples for parametric data, Mann-Whitney-U test for non-parametric data, and Chi Square statistics for categorical data. Whenever we identified group differences in medication status

and/or psychological treatment experience, we included one or both as covariate(s) in an analysis of covariance of the group difference in delusionality and ideas/delusions of reference between the two groups. We computed correlations between delusionality and disorder-specific symptoms using Pearson's product-moment correlations. We then transformed the correlation coefficients using Fisher's Z transformation and tested them for group differences (Preacher, 2002). We calculated effect sizes of group differences as Cohen's d ($d > 0.2$ = small effect, $d > 0.5$ = medium effect, $d > 0.8$ = large effect), and of correlations as well as group differences in non-parametric data as Cohen's r ($r > 0.1$, small effect; $r > 0.3$ medium effect; $r > 0.5$, large effect; Cohen, 1992) and Cramer's V for categorical data ($V > 0.1$, small effect; $V > 0.3$ medium effect; $V > 0.5$, large effect; Cramér, 1999).

3. Results

3.1. Participant demographic and clinical characteristics

Participants with AN and BDD did not differ on any demographic characteristics (Table 1). With regard to AN, five participants (26.3%) were diagnosed with the restrictive and 14 participants with the binge/purge subtype (73.7%). As expected, AN participants presented with a lower BMI and a higher EDE total score. The AN group showed a marginally higher BDD-YBOCS score than the BDD group. A total of 16 participants with AN (84%) had current comorbid diagnoses, most frequently major depressive disorder ($n = 13$), social anxiety disorder ($n = 7$), obsessive-compulsive disorder ($n = 5$), and posttraumatic stress disorder ($n = 5$). Of those with BDD, 12 exhibited comorbidities (55%); mainly major depressive disorder ($n = 4$), social anxiety disorder ($n = 5$), specific phobia ($n = 7$), and obsessive-compulsive disorder ($n = 2$). The groups did not differ in the mean number

of comorbid diagnoses. Of the 19 participants with AN, 13 were taking medication (68%), while only eight of the 22 participants with BDD were taking medication (36%). As outlined in Table 1, participants with AN were more often prescribed selective serotonin or noradrenalin reuptake inhibitors (SRIs, SNRIs, and SNRIs) but not neuroleptic medication. The groups differed with regard to their experience with psychological treatment, with the AN group having received more therapy.

- Insert Table 1 here -

3.2. Preliminary analyses –subgroup differences between recruitment strategies

Participants with AN who were recruited in residential ($n = 10$) versus outpatient ($n = 9$) settings did not differ in BMI ($t(17) = 1.45$, $p = 0.17$), EDE total score ($t(17) = -0.63$, $p = 0.54$), illness duration ($t(17) = 2.21$; $p = 0.056$), number of comorbid diagnoses ($U = 29.50$, $Z = -1.29$, $p = 0.20$), or medication status with an SRI/NRI/SNRI or neuroleptic agent (χ^2 (df = 1) = 2.55, $p = 0.11$ and χ^2 (df = 1) = 0.69, $p = 0.41$). With regard to participants tested in outpatient settings, there were no differences between the groups recruited via flyers ($n = 5$) versus presentation to the outpatient clinic ($n = 4$): BMI ($U = 10.00$, $Z = 0.00$, $p = 1.00$), EDE total score ($U = 7.00$, $Z = -0.74$, $p = 0.46$), and illness duration ($U = 6.50$, $Z = -0.87$, $p = 0.39$).

Participants with BDD were recruited by being asked upon intake into outpatient care ($n = 15$) or through flyers ($n = 7$). These subgroups did not differ in the clinical variables BDD-YBOCS total score ($U = 43.50$, $Z = -0.64$, $p = 0.52$), illness duration ($U = 42.00$, $Z = -0.74$, $p = 0.46$), number of comorbid diagnoses ($U = 47.00$, $Z = -0.41$, $p = 0.68$), nor medication status ((S)SRI/NRI/SNRI; χ^2 (df = 1) = 1.26, $p = 0.26$; neuroleptic agent: χ^2 (df = 1) = 0.34, $p = 0.56$). In sum, we concluded

that subsamples of each group could be combined for the remaining statistical analyses.

3.3. Differences between AN and BDD in delusionality and overvalued ideas

All participants (*n* = 19) with AN first mentioned a belief about being too fat/heavy/overweight or not skinny enough. In BDD, as expected, areas of concern were more variable: While nine participants (40.9%) reported primary beliefs about their face (hair, nose, eyes, ears), six participants (27.3%) reported beliefs about their skin, two (9.1%) on other aspects of their body (posture and feet), and the remaining five participants (22.7%) mentioned that their current primary belief was related to their weight or shape, but also made clear that they have suffered from beliefs about defects in other areas in the months before.

The BDD group (*M* = 17.64, *SD* = 4.46) showed significantly higher delusionality of their primary body image beliefs than the AN group (*M* = 12.32, *SD* = 5.43; $t(39)$ = -3.45, *p* = 0.0014, *d* = 1.07), but the groups did not differ with regard to severity of ideas/delusions of reference (AN: *M* = 0.89, *SD* = 1.41; BDD: *M* = 1.09, *SD* = 1.54; $t(39)$ = 0.42, *p* = 0.68, *d* = 0.14). It is noteworthy that the range of the BABS total score in the group with AN was much wider than in the BDD group (range of 22 [0-22] as opposed to 14 [10-24]). Inclusion of medication status (with SSRIs as a covariate) did not change the significance of group difference in delusionality ($F(1,38)$ = 14.90, *p* = 0.00043). Also, there still was no significant group difference in ideas/delusions of reference ($F(1,38)$ = 0.14, *p* = 0.71). The pattern of findings also remained unchanged after we included psychological treatment experience as a covariate (delusionality: $F(1,38)$ = 12.70, *p* = 0.001007; ideas/delusions of reference: $F(1,38)$ = 1.53, p = 0.22).

More individuals with BDD ($n = 11$, 50%) reported delusional appearance-related beliefs than those with AN ($n = 3$, 16%) (χ^2 (df = 1) = 5.31, $p = 0.021$, Cramer's V = 0.36). The groups, however, did not differ in the number of participants with overvalued ideas (AN: $n = 5$, 26%; BDD: $n = 5$, 23%; χ^2 (df = 1) = 0.71; $p = 0.79$, Cramer's V = 0.04). Statistically, the groups did marginally differ in the number of insightful members (AN: $n = 11$, 58%; BDD: $n = 6$, 27%; χ^2 (df = 1) = 3.94; $p = 0.047$, Cramer's V = 0.05).

3.4. Associations between delusionality and core psychopathology

Delusionality was not significantly associated with body image measures (BAAS, BIDQ) or clinical variables like BMI or illness duration in either group (Table 2). However, as hypothesized, delusionality was significantly associated with EDE shape concerns and EDI drive for thinness in the AN group, and with the BDD-YBOCS disorder severity in the BDD group. Additionally, there were no differences in the relative size of the correlation coefficients.

- Insert Table 2 here -

4. Discussion

The present study compared individuals with AN versus BDD with regard to their level of delusionality and the presence of overvalued ideas. Results indicate slightly higher delusionality in BDD compared to AN. Furthermore, the groups differed in the number of delusional cases but not in the number of cases with overvalued ideas. The number of cases with overvalued ideas in AN (26% in our study) corroborates earlier findings (23-27%; Steinglass et al., 2007; Konstantakopoulos et al., 2012). In our sample, there were fewer cases with delusional beliefs than in Konstantakopolous' (2012) and Steinglass' studies (16% vs.

28% and 24% respectively) and our BABS total score of 12.32 was intermediate between those of the two preceding studies (13.46 ± 4.76 and 9.90 ± 5.40, respectively). We attribute this difference to the higher number of voluntarily hospitalized patients in our study (53% in our study vs. 26% in Konstantakopoulos [2012]), the fact that all patients in the Steinglass' study were treatment-seeking, as well as the higher number of binge-purge AN participants in our study (74% vs. 44% in Konstantakopoulos' [2012]). We do not believe that the exclusion of comorbid cases contributed to the differences between our study and previous studies as Konstantakopoulos and colleagues (2012) shared the same exclusion criterion. As in BDD (Phillips, 2004), delusionality seems to occur along a continuum in AN. Previous research (Konstantakopoulos et al., 2012) and current results support recommendations to introduce a specifier for insight for AN in diagnostic classification systems. This specifier could range from delusional, to overvalued ideas, to good insight (Phillips et al., 1995; Van Der Zwaard et al., 2006).

We did not find delusionality to be associated with clinical variables such as BMI and duration of illness, as has been shown in AN by others (Konstantakopoulos et al., 2011; Konstantakopoulos et al., 2012). In Konstantakopoulus' study (2012), delusionality was positively associated with EDI body dissatisfaction. In the present study, delusionality was neither associated with general body image disturbance nor with beliefs about impact of appearance on different areas of life in either of the disorders. Thus, one might assume that delusionality is associated more with the emotional but not the cognitive or evaluative component of body image. In BDD, no study to date has investigated the link between body image dissatisfaction and insight. As expected, delusionality was positively correlated with symptom severity (BDD-YBOCS) in BDD (Eisen et al., 2004). In AN, we found delusionality to be positively

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correlated with drive for thinness as also found by Steinglass (2007) but not by

Konstantakopoulos (2012), as well as with EDE shape concern. The EDE has not

been used by previous studies investigating delusionality, but a link from

delusionality to shape concern scale makes sense given that it includes items

measuring "importance of shape" and "fear of weight gain" that are likely impacted

by delusionality. An investigation of whether the items of this scale might serve as a

short screening for delusionality in AN is warranted.

In sum, delusionality seems to occur in both disorders, in particular in the

form of overvalued ideas, and ideas/delusions of reference. Still, more research is

needed to clarify the utility of adding an insight specifier for AN (similar for the one

for BDD in DSM-5) to future versions of our diagnostic classification system. On the

one hand, such an inclusion could prompt treatment providers to adapt their therapies

to include strategies addressing delusionality in AN as already done in BDD (e.g.,

Wilhelm et al., 2013). For example, therapists should be aware that treatment in these

patients might progress slower and that pushing the patients might lead to dropouts.

Also, it might be advisable to be careful with identifying cognitive errors. Instead of

asking for arguments for and against the thoughts or empirical testing it might be

easier to start by asking about the helpfulness of the current and potential other

thoughts (Wilhelm et al., 2013). On the other hand, AN already has subtypes

(restricting vs. binge/purge) and two other specifiers or subtypes have been discussed

but not included into DSM-5 (fat-phobic vs. non fat-phobic, Becker et al., 2009;

treatment-resistant vs. non-treatment-resistant, Hay et al., 2012). Thus, the discussion

of yet another subtype or specifier for delusionality might introduce too many details

and subgroups. However, future research might identify clinical or etiological overlap

among proposed specifiers (e.g., fat-phobic patients may be more delusional and more

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treatment-resistant), or determine which specifer scheme explains a greater proportion

of the variance in treatment outcome or mortality, and therefore warrants attention for

future versions of the DSM. With regard to differential diagnostic issues of both

disorders, the similarity in delusionality might foster discussion about the etiological

relationship of eating disorders, particularly AN, and BDD.

The current study had several limitations. Due to the small sample size, type II

errors cannot be completely ruled out, as a post-hoc power analysis (G*Power;

Erdfelder et al., 1996) indicates that we were only able to detect large ($d = 0.90$)

between-group effects. We had to exclude several participants upon initial screen that

misidentified as having either diagnosis or that indicated that they met criteria for

both disorders. This might have limited the generalizability of our results. However,

this comparison study is the first of its kind, and we decided to allow for a clear-cut

group comparison by excluding individuals with AN-BDD comorbidity. An

additional potential limitation were our different recruitment strategies. Post-hoc

analyses, however, confirmed that there were no differences in relevant clinical

variables between residential patients who were asked if they wanted to participate by

their treatment staff and outpatients who needed to self-identify as having AN after

seeing an advertisement. The same holds true for participants with BDD. Still, it is

possible that delusionality might be higher in community samples (for AN see

Vitousek et al., 1998), as individuals with highly delusional beliefs might avoid health

care settings altogether. Another possible limitation is that an outpatient and a

residential subsample of participants with AN were combined. However, previous

studies in AN (i.e., Steinglass et al., 2007; Konstantakopoulos et al., 2012), as well as

current analyses in both disorders, show the comparability of the subsamples on

relevant disorder-specific characteristics. And lastly, the BDD-YBOCS has not been

previously used in individuals with eating disorders, thus the results of group comparisons with BDD in the present study should be interpreted with caution. Strengths of the study include a thoroughly diagnosed sample, the use of gold-standard measures, highly trained interviewers, and good inter-rater reliability on our primary measure. In addition, this is the first direct comparison of two body image disorders with regard to delusionality.

The present study also delineates future research avenues. First, research is needed to determine whether delusionality is predictive for treatment attrition and outcome in AN. Second, if further studies confirm the present results, pharmacological augmentation strategies might be considered (McKnight and Park, 2010). For example, neuroleptics could be used to augment treatment with (selective) SRIs as in BDD, in particular for patients with low insight (Grant, 2001; Phillips et al., 2001; Phillips, 2005a, 2005b; Uzun and Ozdemir, 2010). To date, pharmacological treatment trials of AN with neuroleptics are rare and results are inconsistent (e.g., Bissada et al., 2008; McKnight & Park, 2010; Attia, et al., 2011; Hagman, et al., 2011; Kafantaris, et al., 2011), and trials specifically targeting patients with delusional body image beliefs have not been conducted. Third, current psychotherapy augmentation strategies focusing on the enhancement of cognitive abilities (i.e. flexibility), in AN such as Cognitive Remediation Therapy (Tchanturia et al., 2007) should also be tested to determine their impact on delusionality in both disorders. Fourth, given the differences in delusionality between AN subtypes (Konstantakopoulos et al., 2012) future research should investigate whether delusionality predicts diagnostic crossover and/or associated medical consequences (Mehler and Andersen, 2010). Specifically, it needs to be tested whether the level of delusionality predicts if individuals with restrictive AN are more likely to cross over

to binge-purge AN or bulimia nervosa, which requires different treatment or prevention efforts. Fifth, our findings of high levels of delusionality in AN might stimulate brain imaging research. Research examining the level of delusionality of appearance beliefs in neuroimaging studies in AN and BDD has not yet been done. A literature review of neuroimaging studies in AN links general (not appearance-related) insight in AN to neurological abnormalities (van Kuyck et al., 2009). And lastly, delusionality might be an interesting construct to study not only with different methodologies, but also across multiple disorders (i.e. OC-spectrum disorders or of individuals with both AN and BDD), as well as in conjunction with potential underlying psychological mechanisms (i.e. emotion recognition, ToM, and metacognitive functioning).

In conclusion, the current study partially confirmed earlier research findings and shed light on another potential common maintaining factor in both disorders. More research on delusionality in body image disorders is needed, as it might inform pharmaco- and psychotherapy, serve as a measure of disorder severity, and have the potential to provide directions for further neuroimaging studies and investigations of neurocognitive bases of insight.

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Table 1.

Participant demographic and clinical characteristics

	AN	BDD	t-tests	p-values
	(n = 19)	(n = 22)	df(39)	
			X^2 (df = 1)[a]	
Age M (SD)	25.74 (10.92)	30.18 (13.73)	-1.13	.26
BMI M (SD)	16.50 (1.29)	24.03 (5.03)	-6.32	<.000001
Sex (female) n $(\%)$	17 (89.5)	16 (72.7)	3.49	.062
Marital status (single) n $(\%)$	17 (89.5)	17 (77.3)	1.59	.452
Race (Caucasian) n $(\%)$	16 (84.2)	17 (77.3)	4.84	.18
Ethnicity (non-Hispanic) n $(\%)$	19 (100.0)	22 (100.0)	--	--
Illness duration (yrs) M (SD)	8.97 (10.36)	13.75 (14.53)	-1.19	.24
Comorbid diagnoses M (SD)	2.68 (1.73)	1.50 (2.06)	1.97	.056
Medication				
SRI, NRI, & SNRI n $(\%)$	10 (52.6)	6 (27.3)	5.38	.0203
Neuroleptic n $(\%)$	6 (31.6)	2 (0.9%)	3.23	.07005
Psychotherapy experience[b]	19 (100.0)	13 (59.1)	9.96	.0016
EDE total score M (SD)	3.81 (0.91)	2.03 (1.41)	4.74	.000029
BDD-YBOCS total score M (SD)	32.10 (5.88)	29.00 (3.99)	2.00*	.052

Note. EDE, Eating Disorder Examination; BDD-YBOCS, Yale-Brown Obsessive Compulsive Scale adapted for BDD.

[a]Student's t-test for independent samples for parametric data with *df*= 39 and Chi Square statistics for categorical data (sex marital status, race, ethnicity, and medication); [b] Being in current or having been in treatment in the past within limits of inclusion/exclusion criteria (< 10 sessions of lifetime CBT).

Table 2.

Correlations of delusionality with measures of disorder severity, disorder-specific pathology, and body image

	EDE Shape Concerns	EDI Drive-for-Thinness	Body Mass Index	Yale-Brown Obsessive-Compulsive Scale modified for BDD	Illness Duration (years)	Body Image Disturbance Questionnaire	Beliefs About Appearance Scale			
							Inter-personal	Achieve-ment	Self-view	Feelings
AN: BABS	.71**	.58**	.14	.46	< .01	.10	.34	.31	.30	.27
BDD: BABS	.41	.39	-.16	.41*	.25	-.20	.01	.23	.30	-.01
Z-score[a]	1.33	0.74	0.89	0.18	-0.75	0.89	1.01	0.26	0	0.85

Note. SC EDE, EDE, Eating Disorder Examination Shape Concern Scale; EDI DT, Eating Disorder Inventory, Drive For Thinness Subscale;

BMI, body mass index; BDD-YBOCS, Yale-Brown Obsessive-Compulsive Scale adapted for BDD; BIDQ, Body Image Dissatisfaction

Questionnaire; BAAS, Beliefs about Appearance Scale.