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Exploratory Factor Analysis of Body Dysmorphic Disorder Symptom Clusters

Rachel A. Maxwell

Eastern Illinois University

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Exploratory Factor Analysis of Body

Dysmorphic Disorder Symptom Clusters

(TITLE)

BY

Rachel A. Maxwell

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Rachel A. Maxwell

Eastern Illinois University

Department of Psychology

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Abstract

Body dysmorphic disorder (BDD) is a distressing condition that involves a preoccupation with a perceived defect(s) in appearance. Despite the importance of early identification, it is often misdiagnosed. The literature suggests that issues with diagnosis may be because BDD is typically defined by the single symptom of dysmorphic concern (i.e., over concern with an imagined or slight defect in physical appearance). Dysmorphic concern is insufficient to fully characterize the disturbance. This study used exploratory factor analysis to identify symptom clusters from four well-known BDD measures completed by 457 undergraduate students. The extracted content suggested the following symptoms: (a) Dysmorphic Concern, (b) Social Anxiety and Avoidance, and (c) Appearance Investment which differ slightly from the hypothesized factors of Dysmorphic Obsessions, Compulsions, and Avoidance. Likely explanations for the results and suggestions for future research are presented.

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Exploratory Factor Analysis of Body Dysmorphic Disorder Symptom Clusters

Body dysmorphic disorder (BDD) is a serious, but little recognized psychological disorder characterized by the unsupported conviction of having a gross appearance defect (DSM-5 [American Psychiatric Association, 2013]). Current research suggests the reason for the under-recognition of BDD is because it is a heterogeneous disorder with multiple, non-overlapping symptoms (i.e., symptom clusters) that cause individual cases to manifest uniquely (Lobo & Agius, 2012; Mataix-Cols, Conceicao do Rosario-Campos, & Leckman, 2005). There is growing consensus that the Diagnostic and Statistical Manual of Mental Disorders' (DSM) definition of BDD as the single symptom of dysmorphic concerns, or the preoccupation with an imagined defect in appearance, is insufficient to fully characterize this disturbance (Veale 2004, 2010). Reliance on the single symptom of dysmorphic concerns, however, prevents validation of other key symptoms (Veale, 2004, 2010). The lack of a comprehensive definition of BDD has impeded progress in this area of research, and a systematic empirical approach is required to clarify the key symptoms clusters that comprise this disorder.

Although BDD has been recognized for over a century, speculation about the benefits of expanding on its description is recent (Ănescu, Crișan, & Ănescu, 2011; Jerome, 2001; Littleton, Axsom, & Pury, 2005; Phillips, 2005; Phillips, Pinto, Menard, Eisen, Mancebo, & Ramussen, 2007). In this regard, clarifying the parallels between the symptoms of BDD and those of the obsessive and anxiety disorders have promise for better defining of this disturbance. For example, Obsessive Compulsive Disorder. BDD's relationships with obsessive compulsive and social anxiety disorder are often discussed in

the literature due to the overlapping symptom of obsessions and compulsions and social avoidance (Didie, Tortolani, Walters, Menard, Fay, & Phillips, 2006; Kelly, Walters, & Phillips, 2010; McKay, Neziroglu, & Yaryura-Tobias, 1997; Phillips, 2005; Phillips et al., 2007). Attempts to empirically validate these symptom clusters have been largely neglected.

An empirical methodology with the potential to clarify the symptom clusters of BDD is suggested by factor-analytic approaches that have been successful in the advancement of understanding other heterogeneous, multidimensional conditions such as obsessive compulsive disorder. Exploratory factor analysis is a data reduction technique that can extract content clusters from self-report measures of BDD to suggest relevant symptom clusters (Lobo & Agius, 2012; Mataix-Cols et al., 2005). Factor analysis is also used to test the latent structure of measures of multidimensional constructs. Previous factor analytic studies of BDD measures have reported a variety of factor solutions that support exploration of multiple symptoms clusters from existing BDD measures (Littleton et al., 2005; Littleton & Breitkopf, 2008).

Body Dysmorphic Disorder

Researchers have discussed obsessions with perceived appearance flaws for over a century. In the 19th century, Enrico Morselli described ‘dysmorphophobia’ as an anxiety provoking disorder involving a fixation on perceived deformities (Jerome, 2001; Phillips, 2005). In 1987, “dysmorphophobia” appeared in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R; American Psychiatric Association, 1987) as a somatoform disorder (Phillips & McElroy, 1993). It was renamed Body Dysmorphic Disorder in the fourth edition of the Diagnostic and

Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994) in 1997. In the DSM-5, BDD was categorized as an obsessional disorder emphasizing its similarities with Obsessive Compulsive Disorder (APA, 2013).

BDD typically has its onset in adolescence (Phillips, 2005). The average age of onset has been reported as approximately 16 years of age (Coles et al., 2006; Phillips, Pinto, Menard, Eisen, Mancebo, & Rasmussen, 2007; Bjornsson, Didie, Grant, Menard, Stalker, & Phillips, 2013). The appearance preoccupations can involve specific body parts (Phillips, Kim, & Hudson, 1995; Altamura et al., 2001) or be a feeling of overall ugliness (Rosen & Reiter, 1996). Such preoccupations are distressing and/or anxiety provoking which influence persons to engage in compulsive behaviors or avoidance to reduce the anxiety.

Despite the serious nature of the concern with appearance that is a core feature of BDD, this disturbance is misunderstood and trivialized. In reality, BDD is an under-diagnosed and chronic condition that largely remains untreated despite its association with disability, suicide, and social isolation (Oosthuizen, Lambert, & Castle, 1998; Yanhui et al., 2010). The core feature of exaggerated appearance concerns involves a high degree of body image disturbance that may result in harmful iatrogenic treatments for the perceived defect (Cororve & Gleaves, 2001; Didie, Kuniega-Pietrzak, & Phillips, 2010; Dyl et al., 2006; Hartmann et al., 2013; Hrabosky et al., 2009; Rosen, Reiter, and Orosan, 1995; Phillips, 2011 a).

As the primary concern is with external appearance, the person may seek multiple, unnecessary cosmetic or dermatological treatments rather than mental health care (Altamura, Paluello, Mundo, Medda, & Mannu, 2001; Phillips, Kim, Hudson, 1995;

Boroughs, Krawzyck, & Thompson, 2010; Rief, Buhlmann, Wilhelm, Borkenhagen, & Brähler, 2006; Phillips, 2005; Zimmerman & Mattia, 1998). This restricted pattern of treatment may contribute to the low rate of diagnosis and to the misperception that it is uncommon; whereas its prevalence is about 2% in the general population (Buhlmann et al., 2010; Rief et al., 2006; Veale, 2004).

BDD is thought to be even more prevalent in college populations (Buhlmann et al., 2010). For example, Boroughs et al. (2010) found a prevalence rate of 4.9% in an undergraduate population. Slightly higher rates of BDD have been reported in females. For example, Buhlmann and colleagues (2010) reported BDD prevalence rates of 2.0% in females and 1.5% in males. Rief and colleagues (2006) also reported higher rates of concern with physical appearance among females.

There is also a lack of consensus about its conceptualization. At issue is that, until the release of the DSM-5, BDD's only criterion in this nosology was dysmorphic concerns – an exaggerated concern with an imagined or slight physical defect (Oosthuizen et al., 1998). Not only is there debate about whether dysmorphic concerns is actually unique to BDD, but BDD is increasingly being recognized as a heterogeneous condition with multiple symptom clusters (Jorgensen, Castle, Roberts, & Groth-Marnat, 2001; Littleton, Axsom, & Pury, 2005; Monzani et al., 2012; Oosthuizen et al., 1998). A summary of findings implies that BDD is most likely composed of the following three candidate symptoms clusters related to a perceived appearance flaw (a) dysmorphic compulsions—repetitive behaviors to reduce anxiety about the defect (b) dysmorphic obsessions—pejorative cognition about the defect (c) dysmorphic avoidance—fear of negative social evaluation of the defect (Veale, 2004, 2010; Phillips, 2001). Although

there is a growing literature, comparing these symptoms and those of obsessive compulsive disorder (OCD) and social anxiety disorder (SAD), the three BDD symptom clusters need be explicitly defined.

Body Dysmorphic Disorder Symptom Cluster Candidates

Understanding BDD's relationship with OCD and social anxiety disorder is important in clarifying the three key symptom clusters of dysmorphic obsessions, dysmorphic compulsions, and dysmorphic avoidance. At issue is that BDD has multiple symptom clusters with heterogeneous presentation. As with other heterogeneous conditions, such as OCD, people with the same diagnosis can have different symptom presentations that vary in both number and intensity (Mataix-Cols et al., 2005). In other words, the number and magnitude of BDD symptoms are more varied than is currently accounted for in the current nosology.

The relationship between Body Dysmorphic Disorder and other psychopathologies has been documented repeatedly in the literature. Among the most prominent are obsessive compulsive disorder and social anxiety disorder (Phillips, 2005). These disorders are not only closely related but have a number of overlapping features that are ignored in the definition of BDD. The issue is that BDD symptoms similar to that of SAD and OCD can lead to incorrect diagnoses as clinicians are not looking out for symptoms resembling these disorders (Phillips, 2005). To further complicate the situation, obsessions with perceived defects are unlikely to be revealed unless specific questions are asked about the BDD-obsessions (Veale, 2004), allowing BDD to continue to go unnoticed. Despite indications in the literature that BDD is associated with

dysmorphic specific avoidance, obsessions and compulsions, these are not included as core feature.

Obsessive Compulsive Disorder

BDD and Obsessive Compulsive Disorder. The obsessive compulsive spectrum disorders are well researched, and became a distinct category in the DSM-5. BDD has now been re-categorized as one such disorder (APA 2013; Bienvenue et al., 2000). Understanding the relationship between OCD and BDD is useful for making analogies between the obsessions and compulsions that are characteristic of both disorders. There are high rates of comorbidity as evidenced by reported rates of 6% to 30% of participants in various research studies with BDD also having a comorbid OCD diagnosis (Gunstad & Phillips, 2003; Veale, Boocock, Gournay, & Dryden, 1996).

There are general similarities between OCD and BDD but also noteworthy differences. (McKay et al., 1997; Phillips et al., 2007). The obsessions and compulsions found in BDD are more severe than those observed in OCD (McKay et al., 1997). In comparison to OCD, BDD is also associated with higher levels of impairment and poorer insight (Frare, Perugi, Ruffolo, & Toni, 2004; Phillips et al., 2007). These differences suggest that BDD and OCD have similarities but are also distinct.

Dysmorphic Obsessions

Obsessions. Obsessions are frequently occurring, persistent, and intrusive thoughts and/or images that result in anxiety or distress (American Psychiatric Association, 2000; Phillips et al., 2010). They are typically unwanted yet repeatedly flood the mind (Blom, Hagestein-de Bruijn, de Graaf, ten Have, & Denys, 2011). Obsessions

are a prime feature of OCD but can manifest in other disturbances (Blom et al., 2011; Yaryura-Tobias, 2004).

Dysmorphic Obsessions in BDD. Being concerned with one's appearance is not necessarily indicative of a mental disturbance (Geremia & Neziroglu, 2001). In fact, most people have some concern or dissatisfaction with an aspect of their appearance (Buhlmann, Teachman, Gerbershagen, Kikul, & Rief, 2008; Lambrou, Veale, & Wilson, 2011). BDD obsessions differ from less distressing appearance concerns as they are more severe, and persistent and the perceived defect(s) are typically either slight or non-existent (Cash, Phillips, Santos, & Hrabosky, 2004; Lambrou et al., 2011). One of the primary features of BDD is the preoccupation with perceived defects. The preoccupations most often involve the skin, hair, and nose (American Psychiatric Association, 2000; Didie et al., 2010), but can be about any part of the body (Phillips, Kim, Hudson, 1995; Altamura et al., 2001). Appearance concerns often begin as self-statements that come to be increasingly believable and automatic due to constant repetition (Rosen & Reiter, 1996), becoming progressively obsessive.

The term preoccupation has been used interchangeably with BDD beliefs (Rosen et al., 1995), appearance concerns (Littleton & Bretkopf, 2008; Ruffolo, Phillips, Menard, Fay, & Weisberg, 2006), and obsessions (Costa, et al., 2012; Phillips et al., 2007) in the literature. However, dysmorphic obsession is a more suiting descriptor of the cognitive experiences related to BDD. BDD preoccupations will be referred to as *dysmorphic obsessions* for the remainder of this document due to its reclassification in DSM-5 as an obsessive compulsive spectrum disorder as well as its obsessional nature (Littleton et al., 2005; Phillips et al., 2010)

Dysmorphic obsessions are absorbing, excessive, and time consuming ruminations with the negative theme of concern about an appearance defect (Buhlmann et al., 2008; Phillips et al., 2010; Phillips, Moulding, Kyrios, Nedeljkovic, & Mancuso, 2011b). These obsessions can take the form of intrusive thoughts or images (Phillips, 2005). The importance of dysmorphic obsessions is suggested by research (Phillips et al., 1995). For example, one study of intrusive imagery in a BDD sample found that 84.6% of participants reported recurrent, intrusive imagery (Onden-Lim & Grisham, 2013). In fact, obsessions are regarded as characteristic of BDD.

Dysmorphic Compulsions

Compulsions. Compulsions are ritualistic, repetitive behaviors that alleviate the anxiety and/or distress provoked by intrusive obsessions (Phillips, 2005; Starcevic et al., 2011). Compulsions can take the form of an observable behavior or a mental act (Phillips, 2005). These compulsions usually are performed automatically or consciously (Starcevic et al., 2011). As with OCD, there is a drive to execute compulsive behaviors in BDD (Phillips et al., 2010). These behaviors become progressively harder to resist. (Buhlmann et al., 2008; Rosen & Reiter, 1996).

Dysmorphic Compulsions in BDD. Dysmorphic compulsions are repetitive behaviors that are triggered by dysmorphic obsessions and have been proposed as a method to reduce the anxiety related to the perceived appearance defect (Altamura et al., 2001; Kelly, Dalrymple, Zimmerman, & Phillips 2013; Phillips et al., 2010). Generally these behavioral rituals have the goal of checking, concealing, or altering the perceived appearance flaws (Phillips, 2011a). These may include frequent checking in reflective surface, making comparisons with others or seeking reassurance for the perceived

defective feature. Other dysmorphic compulsions include attempts to disguise or remove the perceived flaw with excessive grooming, physical camouflage or seeking cosmetic surgery (American Psychiatric Association, 2000; Phillips, 2005). Phillips and colleagues (2011) referred to such behaviors in cognitive behavioral terms, labeling these as *neutralization strategies* and *safety-seeking behaviors*.

Dysmorphic Avoidance

BDD and Social Anxiety Disorder. Empirical research suggests parallels between social anxiety disorder and BDD (Coles, Phillips, Menards, Pagano, Fay, Weisberg, & Stout, 2006). Although this relationship requires further empirical investigation, research has demonstrated that there are many similarities and differences between BDD and social anxiety disorder (Coles et al., 2006). High rates of comorbidity between Body Dysmorphic Disorder and Social Phobia have been reported in the literature ranging from 16 to 37% (Coles et al., 2006; Gunstad & Phillips, 2003; Veale et al., 1996).

Although social anxiety disorder and BDD appear to share high rates of social distress and avoidance, distinctions suggest these are related but separable disorders (Kelly et al., 2010; Pinto & Phillips, 2005). Social anxiety disorder is associated with the fear and avoidance of being judged negatively for a social performance (APA, 2000); whereas, BDD is associated with the fear and avoidance of being judged negatively for a perceived physical defect (Kelly et al., 2010). In addition, unlike social anxiety disorder, BDD is frequently associated with a distorted body image and seeking cosmetic and/or dermatology treatment (Kelly et al., 2013). These findings warrant further investigation of dysmorphic avoidance, social avoidance due to feared negative evaluation of a bodily defect.

Dysmorphic avoidance in BDD. In BDD, an unreasonable importance is attached to the perceived appearance flaws (Anson, Veale, & Silva, 2012). There is a fear of anticipated negative evaluation and embarrassment due to observation of the perceived defect(s) by others (Fang, Asnaani, Gutner, Cook, Wilhelm, & Hofmann, 2011; Fang & Hoffman, 2010; Rosen et al., 1995). Persons with BDD tend to have idealized values about the importance of their appearance (Veale, 2002). As such, there is an overwhelming desire to look perfect, and this unrealizable expectation increases obsessions with appearance flaws (Bartsch, 2007). Hence, the reports of intensification of BDD symptoms in social settings are not surprising (Phillips, 2005).

Social settings are often endured with considerable distress (Phillips et al., 1993; Phillips, 2005; Veale, Kinderman, Riley, & Lambrou, 2003), and/or with the use of safety behaviors such as compulsions (Veale, 2002). In other instances the social situations are completely avoided due to real or anticipated distress and scrutiny (Kelly et al., 2010; Phillips, 2005; Rosen et al., 1995; Veale et al., 2003). Social avoidance is influenced and maintained by a tendency to misinterpret people's actions towards them as reflecting disgust and/or rejection (Buhlmann et al., 2010). Their misrepresentation of others' responses to them further reinforces their beliefs and results in a continuous cycle. As such, BDD can be disabling (Yanhui et al., 2010).

Empirical support suggests that dysmorphic avoidance is an important characteristic of BDD (Kelly et al., 2010). In one BDD study, 88.5% of the participants reported that their preoccupations led to lifetime avoidance of social activities and interactions (Didie et al., 2006); 69.7% of the participants also reported current avoidance of dating or intimacy due to appearance obsessions (Didie et al., 2006). Phillips and

colleagues (1993) found that 97% of their sample engaged in avoidant behaviors and as much as 30% were homebound. These studies show both the extent and detrimental effects of dysmorphic avoidance due to perceived physical imperfections. Dysmorphic avoidance, however, has received little attention when discussing the core features (i.e., the symptom clusters) of BDD (American Psychiatric Association, 2013).

Summary and Conclusions: Defining BDD symptoms

If BDD is to be properly defined, studies must explore the inclusion of dysmorphic obsessions, dysmorphic compulsions, and dysmorphic avoidance. Otherwise BDD will remain unrecognized and under-treated. For example, the frequently observed impairment due to social avoidance is the fear of personal rejection because of the appearance defect (Phillips et al., 1993; Veale, 2004). Due to the absence of dysmorphic avoidance in the definition of BDD it is often incorrectly attributed to and diagnosed as social anxiety disorder (Veale, 2004). The same argument can be made for dysmorphic obsessions and dysmorphic compulsions in BDD (Phillips, 2005).

Measures of Body Dysmorphic Disorder

Self-report measures of BDD have increased in number more recently but are still few in number. Nevertheless, these measures have the potential to help uncover the symptoms dimensions of BDD as they have received some empirical support for assessing and diagnosing this condition. As such, the measures and research findings regarding these measures will be reviewed.

Self-report measures of BDD include the Dysmorphic Concern Questionnaire (Oosthuizen et al. 1998), the Body Image Concern Inventory (Littleton et al., 2005), the Body Dysmorphic Disorder Examination-Self Report (Rosen & Reiter, 1996), and the

Body Image Disturbance Questionnaire (Cash, 2008). These measures are among the most utilized and empirically investigated measures of BDD in the literature. The Dysmorphic Concern Questionnaire (DCQ) is a brief measure that assesses over-concern with perceived defects and reactions to the over-concern (Oosthuizen et al., 1998; Jorgensen et al., 2001; Castle, Molton, Hoffman, Preston, & Phillips, 2004). Similarly, the Body Image Concern Inventory (BICI) aims to measure dysmorphic appearance concerns or over-concern with perceived appearance flaws that are either non-existent or slight (Littleton & Brietkopf, 2008; Littleton et al., 2005). The Body Dysmorphic Disorder Examination (BDDE) is among the oldest and most established measures of BDD (Phillips, 2005; Rosen & Reiter, 1996). It was originally a semi-structured clinical interview but has been adapted to serve as a self-report measure as well. The BDDE measures BDD symptoms and body image disturbance that is frequently associated with BDD.

The Body Image Disturbance Questionnaire (BIDQ) is slightly different from the previously mentioned measures as it assesses negative body image. However, it was adapted from the Body Dysmorphic Disorder Questionnaire which is a self-report measure that is often used to diagnose BDD. Cash (2004) adapted the BIDQ scale by making the response set polytomous rather than dichotomous.

Factor Analytic Findings with Existing Measures

A majority of self-report measures of BDD have been constructed using a rational theoretical approach in which items are based on logic, theory, and/or experience. For example, items for the BICI were created based on case studies discussing BDD symptoms, and previous measures (Littleton et al., 2005). The rational theoretical

approach to scale construction is to define the dimensions underlying the construct then to create items for the dimensions based on the definitions (Szymanski, 2003). It can be inferred from the literature that using this approach to create the measures of BDD has led to overlapping and confusing factors.

Exploratory factor analysis is a statistical data reduction method that allows researchers to identify and extract symptom dimensions (Costello & Osborne, 2005; Cullen et al., 2007). Conducting factor analysis on the existing BDD measures can uncover its symptom clusters by empirically demonstrating the items that cluster together. It has been demonstrated in research that factor analysis is advantageous in understanding heterogeneous psychological disorders (Mataix-Cols et al., 2005).

A limited number of factor analytic studies of self-report measures of BDD have been conducted. For example, factor analysis has not been conducted on the Body Dysmorphic Disorder Examination (Rosen & Reiter, 1996) or Body Image Disturbance Questionnaire (Cash, 2008). Hence, the authors' claims of these measures tapping into several dimensions cannot be verified.

Many of these measures claim to assess a single dimension of BDD – dysmorphic concerns. The factor analyses that have been conducted on BDD measures were largely executed by the authors of the measures (Castle et al., 2004; Littleton et al., 2005; Littleton & Bretkopf, 2008; Oosthuizen et al, 1998), and attempts to replicate the factor structures are scant. Hence, additional research is needed.

Factor analysis of the DCQ has demonstrated that most of the variance can be explained by one factor – dysmorphic concern (Castle et al., 2004; Oosthuizen et al, 1998). Both studies had a fair amount of participants (90 and 137). Oosthuizen and

colleagues (1998) sample being psychiatric patients whereas Castle and colleagues (2004) sample consisted of people seeking cosmetic treatment.

The DCQ does not aim to comprehensively assess for BDD but assesses dysmorphic concern, a single facet of BDD (Oosthuizen et al, 1998). As such, the items may have been written to measure only dysmorphic concerns. In addition, alternative multifactor solutions were not examined so it is unclear whether or not items could potentially load onto multiple factors. All of these reasons may explain the extraction of a single factor for the DCQ.

Despite the emphasis on dysmorphic concern, other factor analytic studies have demonstrated that BDD is actually composed of multiple symptom clusters. A principal axis factor analysis with oblique rotation of the Body Image Concern Inventory (BICI) revealed two factors: (1) dysmorphic appearance concern, and (2) interference in functioning due to appearance (Littleton et al., 2005). Based on the items that loaded on the second factor, it seems to describe issues pertaining to performing compulsions and social avoidance. The sample consisted of 384 undergraduate students at a medium sized university and primarily consisted of females (80%).

Contrary to Littleton and colleagues' (2005) suggestion that it is more parsimonious to view the BICI as having one primary factor of dysmorphic concern, subsequent confirmatory factor analysis provided contradictory results, as multiple factors were reported. A one-factor model presented an inadequate fit to the data (Littleton & Breitkopf, 2008); whereas a two-factor model was more suitable.

The two factors were highly correlated ($r = 0.69$; Littleton et al., 2005), implying that both factors have additional content that could serve as a third factor if there were

sufficient items, or if a third factor had been tried in the model. However, it also implies the possible presence of a hierarchical structure where a higher order, general factor explains both lower order ones (Canivez, in press). The fit indices from Littleton and Breittkopf's study were not optimal which also suggests a possible three factor model.

Current Study: Goal and Hypothesis

No comprehensive, empirical investigation has been conducted to date into the number of symptom clusters that compose BDD. A majority of the studies on BDD have targeted small samples of persons clinically diagnosed. The restricted range of and small amount of data from these samples make the results suspect. The sparse factor analytic studies that have been conducted have focused on single measures of BDD. Not surprisingly, little consensus exists about the number of factors that comprise BDD (Littleton et al., 2005; Oosthuizen et al., 1998).

The current study addresses deficiencies in the BDD literature and expands on existing research. BDD typically has its onset in late adolescence which suggests that undergraduates represent a suitable population for exploring the symptoms of BDD. As such, the sample for the current study was an undergraduate population, whereby participants are likely to present a full range of appearance concerns. As factor analysis was used for this study, the large size also provides some benefit for the interpretability of the factor structures.

The limited research and consensus in this area indicates a need to uncover BDD's symptom clusters through the use of objective empirical methods. The primary goal of this study was to examine the factor structure of Body Dysmorphic Disorder using self-report data from a large undergraduate sample. It was hypothesized that factor

analysis of existing self-report measures of BDD would identify three factors that correspond to the three symptom clusters of dysmorphic obsessions, dysmorphic compulsions, and dysmorphic avoidance.

Method

Participants

A total of 550 participants completed a web based survey. Data were retained from 467 of the 550 students who participated in the study. Students were removed for a variety of reasons with missing data and short completion times being the most common reasons. Two hundred and ninety one undergraduates from Eastern Illinois University participated for course credit. In addition, 168 undergraduates from a large community college participated for extra course credit. Participants were deemed eligible based on being at least 18 years old and being enrolled in undergraduate psychology courses at the two schools used. All participants provided electronic signatures for the informed consent before participating.

Participants were between the ages of 18 and 65. The majority of clients were between 18 and 25 years of age. Approximately 76 percent of the 550 participants were female, and 24 percent were male. The majority of participants self-identified as Caucasian (61%). Of the remaining participants, 19% were African American, 8% Hispanic/Latino, 7% Asian, and 5% identified as other.

Measures

Dysmorphic Concern Questionnaire (DCQ; Oosthuizen et al., 1998). The DCQ is a brief, seven item self-report measure of dysmorphic concern. It aims to assess

participant's over-concern with perceived defects (e.g., "have you ever been very concerned about some aspect of your physical appearance") and their ways of dealing with the perceived issue (e.g., "have you ever spent a lot of time covering up defects in your appearance / bodily functioning). For each item, responses are recorded on a four point Likert scale from 0 ("not at all") to 3 ("much more than most people") to indicate how appropriate the item is to their specific situation. The total score is derived by summing all the items.

It is appropriate to assess clinical and subclinical appearance concerns (Jorgensen, Castle, Roberts, & Groth-Marnat, 2001). The DCQ has been validated against the BDDE, which has demonstrated validity and reliability as a measure of BDD (Rosen & Reiter, 1996). The Cronbach's alpha coefficients for the DCQ in studies has been .80 (Jorgensen et al., 2001), .86 (Monzani et al., 2012), and .88 (Oosthuizen et al., 1998; Castle et al., 2004).

Body Image Concern Inventory (BICI; Littleton, Axsom, & Pury, 2005). The BICI is a brief, 19 item self-report measure that assesses dysmorphic appearance concern. The BICI purports to measure body dissatisfaction (e.g. "I am dissatisfied with some aspect of my appearance"), compulsive behaviors (e.g. I spend a significant amount of time checking my appearance in the mirror"), and social avoidance (e.g. I have missed social activities because of my appearance"). It uses a five point Likert scale to measure how often individuals have the particular feelings or behaviors ranging from 1 ("never") to 5 ("always"). Scores range from 15 to 95 with higher scores indicative of greater levels of dysmorphic concern.

The BICI has excellent internal consistency as reported by Cronbach's alpha coefficients that range from .91 to .94 (Littleton & Brietkopf, 2008; Littleton et al., 2005; Luca et al., 2011). It has also demonstrated good concurrent validity with the Body Dysmorphic Disorder Examination-Self Report ($r=.83$) and the Yale-Brown Obsessive Compulsive Scale modified for BDD ($r=.60$) in Littleton et al.'s 2005 study. Support for BICI's ability to differentiate between people with subclinical BDD and a diagnosis of BDD has also been demonstrated (Littleton et al., 2005).

Body Image Disturbance Questionnaire (BIDQ; Cash, 2008; Cash, Phillips, Santos, & Hrabosky, 2004). The BIDQ is a brief, seven item self-report measure that assesses negative body image. It was adapted from the Body Dysmorphic Disorder Questionnaire (Dufresne, Phillips, Vittorio, & Wilkel, 2001; Phillips, 2004) which is used to screen for BDD. The BIDQ assesses concern and preoccupation with one's appearance, the effect the preoccupation with perceived defects has had various aspects of one's life (e.g. "has your physical defect significantly interfered with your social life"), and avoidance related to one's defect (e.g. "do you ever avoid things because of your physical defect"). Responses are recorded using a five point Likert scale and open ended responses. Higher scores are reflective of greater body image disturbance.

The BIDQ has demonstrated good reliability and validity (Cash et al., 2004a; Hrabosky et al., 2009). The internal consistency for the BIDQ was .89 (Cash et al. 2004a). The item-total correlations ranged from .46 to .81 and .43 to .78 for men and women respectively. It was also found to correlate with the dimensions of body image, and predict psychosocial functioning. It was appropriately correlated with depression, social anxiety, and eating disturbances with r ranging from .30 to .59. It has also

demonstrated good test-retest capabilities ($r = .88$) in a two week period (Cash & Grasso, 2005).

Body Dysmorphic Disorder Examination-Self Report (BDDE-SR; Rosen & Reiter, 1996). The BDDE-SR is a 30 item measure of BDD symptoms and body image disturbance. It aims to assess preoccupation with appearance (e.g. “how often have you thought about your appearance feature and felt upset as a result”), overvalued ideas (e.g. “how often have you felt that other people were noticing or paying attention to your appearance feature”), avoidance of social settings and the defect (e.g. over the past four weeks, how much have you avoided public areas because you felt uncomfortable about your appearance feature”), and camouflaging and checking behavior (Rosen, Reiter, and Orosan, 1995; Rosen & Reiter, 1994; Cororve & Gleaves, 2001; Boroughs et al., 2010). Most of the items (26) are rated on a seven point Likert scale ranging from 0 (“absence of distress about one’s perceived defect”) to 6 (“extreme concern or impairment”). It is scored by summing the ratings of the items, with higher scores being indicative of greater severity. The remaining items are open ended where participants are asked to problematic appearance features, and remedies they have used to counteract their concern.

No information has been provided on the psychometric properties or soundness of the BDDE-SR (Cash et al., 2004a, Littleton & Breitkopf, 2008), with the exception of one study reporting a Cronbach’s alpha coefficient of .94 (Boroughs et al., 2010).

Procedures

Data were collected using web-based survey method developed on the Qualtrics system. All procedures and measures were reviewed and approved by Eastern Illinois

University's Institutional Review Board. A demographic questionnaire and the self-report measures were administered to a group of undergraduate students. To maintain anonymity, all research study participants entered a sequence of linked Qualtrics websites to separate their identifying information from their answers to the self-report questionnaires.

Statistical Analysis

To identify and extract the underlying factors of Body Dysmorphic Disorder, an exploratory factor analysis (EFA) was performed on four measures of BDD. The measures included: BDDE-SR, DCQ, BICI, and the BIDQ. More specifically, a joint factor analysis of all symptom items was conducted to observe how many and what latent dimensions would emerge. The EFA was conducted using the Statistical Package for the Social Sciences (SPSS). Listwise deletion was specified for the principal axis factoring in order to delete incomplete responses which is typical in EFA. Listwise deletion involves the removal of data from participants with any missing responses for any of the variables specified in the analysis (McPherson, Barbosa-Leiker, Burns, Howell, & Roll, 2012).

The factor analysis was completed through a number of steps. First, the number of factors to extract was determined conducting a principal axis factoring with promax rotation ($k=4$) without specifying the number of factors for extraction. A visual scree test was conducted to assess the point at which the scree plot plateaued which typically indicated the appropriate number of factors. The magnitude of the factor loadings was also examined to exclude those with eigenvalues less than one.

Horn's Parallel Analysis (HPA; Horn, 1965) was also used to assess the number of factors to extract and factor analysis often results in over-factoring. Parallel analysis involves extracting eigenvalues from data sets which are parallel to the one's data in terms of the number of cases and variables (O'Connor, 2000). The *Monte Carlo PCA* for parallel analysis computer program (Watkins, 2000) was used to generate a distribution of eigenvalues which indicated the number of factors to be extracted for each measure. The PA selects the number of factors to extract from real data that have eigenvalues that exceed random data (O'Connor, 2000). 100 replications were specified to increase the likelihood of stable eigenvalues.

The number of factors to be extracted was then specified in the EFA based on the results from the HPA. The factors were assessed based on the items which loaded on a latent factor. The items with low factor loadings ($<.40$) and those which loaded on multiple factors were eliminated and the analysis was repeated. Items were once again removed for cross loading and failing to have a high enough factor loading. This process was repeated until there was no cross loading and items had salient loadings on each factor. The factor structure was assessed by examining the item content for each factor. The final criteria were that each factor must have an alpha coefficient of greater than or equal to $.70$ and be composed of at least five items. Interpretation of the factor was also based on logical consistency, theory, and previous research.

Results

The current study examined how many and what factors would emerge from conducting a factor analysis on combined items from four well utilized measures of

BDD. To explore the factor structure, an exploratory factor analysis was conducted. The analyses revealed what appears to be a three-factor solution.

Two analyses were conducted to determine whether factor analysis (FA) of these data would be appropriate. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy compares partial correlations to zero-order correlations (Munro, 2005). The KMO was .964, which indicates that the correlation matrix was “superb” with regard to appropriateness for FA (Hucheson & Sofroniou, 1999). The Barlett test of sphericity is used in conjunction with the KMO measure. Bartlett’s test of sphericity tests the hypothesis that the matrix is an identity matrix to determine if a correlation matrix is appropriate for factor analysis (Munro, 2005). The hypothesis was rejected in the current study with a probability of .000 which indicates that the correlation matrix is in fact appropriate. Taken together, the results provide strong support for the data being appropriate for conducting an EFA.

Exploratory Factor Analysis: Principal Axis Factoring

To explore the factor structure of Body Dysmorphic Disorder (BDD), exploratory factor analysis was conducted on the data from the four measures of BDD. The procedure of choice was principal axis factoring (PAF) using promax (oblique rotation). An oblique rotation was used due to the high possibility of the factors being correlated based on previous research (Littleton et al., 2005).

Eigenvalues > 1 rule suggested that five factors would be optimal (Kaiser, 1960). The rationale is that factors with eigenvalues less than one are assumed to represent error

variance (Maroof, 2012). However, Kaiser's criterion has a tendency to overestimate the number of factors (Zwick & Velicer, 1986). As such, additional criteria were utilized.

Cattell's (1960) scree test suggested that between two or three factors should be retained in this study, as the graph begins to plateau at those points. A graphical illustration of the plateau can be found in Figure 1. However, like Kaiser's eigenvalue greater than one criterion the scree test often overestimates the number of factors to retain (Zwick & Velicer, 1986).

Horn's Parallel Analysis

Exploratory factor analysis often results in over- or under-factoring (Ledesma & Valera-Mora, 2007). Hence, additional steps were taken to increase the likelihood of extracting the correct number of factors. Zwick and Velicer (1986) reported that parallel analysis is the most accurate means of determining the optimal number of factors to retain. Horn's Parallel Analysis involves the generation of eigenvalues for a random set of data with the same number of participants and variables, and comparing them to eigenvalues from the real data set (Garrido, Abad, & Ponsoda, 2013).

Results from the Horn's Parallel Analysis suggested that three factors should be extracted. More specifically, the first three eigenvalues representing three factors from the data was greater than the eigenvalues from the random data sets which indicates that a three factor solution is appropriate (see Figure 1).

Interpretation of Factors

An examination of the scree plot and Horn's parallel analysis alongside an examination of the item content suggest that a three factor solution is most logical for this

data set. As such, the principal axis factoring with oblique rotation was conducted again, and the number of factors to be extracted was specified as three. A number of items ($n = 21$) were removed for cross-loading and failing to achieve salient loading (eigenvalues $\geq .40$) through an iterative process. After removing such items and assessing the content of the remaining items, three factors appeared to be an adequate fit. Results from this procedure are reflected in table 1. Together, the three factors account for 56.08% of the variance.

Contrary to a priori predictions, it appeared that items reflecting dysmorphic obsessions and compulsions tend to load onto one factor (Factor One) which can be interpreted as more general 'Dysmorphic Concern.' It included items such as 'I am dissatisfied with some aspect of my appearance,' 'I try to camouflage certain flaws in my appearance,' and 'I fear that others will discover flaws in my appearance.' The 'Dysmorphic Concern' factor accounted for the most variance (46.01%) and consisted of 18 items.

Factor two accounted for 7.25% of the variance and consisted of eight items. The items that loaded on factor two are reflective of 'Social Anxiety and Avoidance,' which is often associated with Body Dysmorphic Disorder. As such, factor two can be interpreted as 'Social Anxiety and Avoidance.' It is similar to the hypothesized factor, *dysmorphic avoidance*. The 'Social Anxiety and Avoidance' factor includes 'I have missed social activities because of my appearance,' 'Do you ever avoid things because of your physical defect,' and 'How upset have you become when you felt someone was noticing or paying attention to your appearance feature.'

The third factor can be interpreted as ‘Appearance Investment’ had six items with salient loadings and accounted for 2.82% of the variance. It includes items such as ‘How important has appearance been in how you evaluate yourself as a person’ and ‘How important has appearance been in how you evaluate yourself as a person.’ See table 1 for the complete results and items.

Reliability and Descriptive Statistics

The main purpose of this study was to examine the factor analytic properties of the four measures. However, the reliability of each measure was considered via internal consistency. Likewise, the sample was explored in greater detail by comparing the mean scores of each measure with prior data in similar studies. To insure that this sample was varied in composition, cutoffs were used to determine whether many participants would fall into a ‘clinical’ range on each measure. Finally, the reliability coefficients for the extracted factors were determined to insure that they were stable ($\geq .70$).

Body Image Concern Inventory. A score of 72 or greater on the BICI represents clinically significant body dysmorphic symptoms (Littleton et al., 2005). Similar to self-reported rates of BDD which range from 5 to 13% among college students (Buhlmann et al., 2010), 8.1% of participants had clinically significant dysmorphic concern (a score ≥ 72). The average score was 49.54 and *SD* of 15.21 which compares to Littleton and colleagues (2005) reported mean of 50.4. The Cronbach’s Alpha for the BICI was found to be .94 which provides further support of internal consistency for this measure.

Dysmorphic Concern Inventory. Using a cutoff score for clinical dysmorphic concern of nine, 27.2% of participants had clinically significant dysmorphic concern. Oosthuizen

and colleagues (1998) reported a mean score of 5.2 ($SD = 5.6$) for the DCQ (Oosthuizen et al., 1998). The mean score for the present study was 5.74 ($SD = 4.71$) which is comparable. The Cronbach's alpha for the DCQ was .90 which is comparable to previous reports of .88, supporting assertions of the measure's internal consistency.

Body Dysmorphic Disorder Examination Self-Report. An individual must meet a number of criteria on the BDDE-SR to qualify for possible BDD as specified by the authors. Among the criteria are scores of ≥ 4 on: (1) item six measuring preoccupation with a defect, (2) either items seven or eight which measures social, (3) item 12 measuring overvalued appearance ideals, (4) item 13 measuring negative self-evaluation, and (5) items 4, 17, 18, 19, or 21 which measure impairment or distress. Based on the aforementioned criteria, 35.1% of the sample qualifies for possible BDD. The mean score for the BDDE-SR in the present study was 72.00 with a standard deviation of 32.25. Consistent with previous research which reported good internal consistency for the BDDE-SR ($\alpha = .94$), the current study found an alpha coefficient of .96.

Body Image Disturbance Questionnaire. No cut off scores were provided by the author for identifying clinically significant body image disturbance. As such, it is unclear how many participants in the current sample had clinically significant body image disturbance as described by this measure. Results from the current study supports the BIDQ as an internally consistent measure ($\alpha = .91$) as suggested by Cash and colleagues (2004) who reported coefficient alphas of .88 and .90 for men and women respectively. The mean score for participants was 1.82 with a standard deviation of .85 which is comparable to means of 1.81 ($SD = .67$) and 1.57 ($SD = .60$) for women and men respectively in Cash's (2004) validation study.

Alpha Coefficient for Derived Factors. Results from the current study suggest that the factors extracted are stable. The alpha coefficient for each factor was strong. More specifically, the alpha coefficients were .95 (Dysmorphic Concern), .94 (Social Anxiety and Avoidance), and .88 (Appearance Investment).

Discussion

This study is one of the first to examine the symptom clusters of Body Dysmorphic Disorder through the use of a joint EFA of four commonly used scales to measure the purported facets of BDD. In other words, the common factors underlying BDD were examined. The cumulative findings from the present study suggest that Body Dysmorphic Disorder may be composed of at least three factors. Overall, the hypothesis received partial support. That is, the prediction of three symptom clusters was correct. However, one unexpected factor emerged.

The three factors were interpreted as ‘Dysmorphic Concern,’ ‘Social Anxiety and Avoidance,’ and ‘Appearance Investment.’ These results are in contrast to the existing literature describing the factor structure of individual measures of BDD which typically suggest a one-factor solution; that is, *dysmorphic concern* (Castle et al., 2004; Oosthuizen et al, 1998). In some cases, an additional factor reflecting *impairment in functioning* has also been reported (Littleton et al., 2005; Littleton & Breitkopf, 2008).

Despite the retention of three factors, only one strong factor emerged (‘Dysmorphic Concern’) with an eigenvalue of 27.64, which accounted for 46.01% of the variance. The ‘Social Anxiety and Avoidance’ and ‘Appearance Investment’ factors were significantly weaker accounting for 7.25 and 2.62 percent of the variance respectively.

These findings may be reflective of the factors being moderately correlated with correlations ranging from .63 to .66 (see Table 2). However, it could also be reflective of the presence of a higher order factor.

Despite the DSM-IV-TR's lack of inclusion of compulsive behavior as a diagnostic criterion, the DSM-V rectified this issue, which is supported by this study. However, the present study suggests that obsessions and compulsions may not be distinct factors. Instead, these features of BDD may reflect an overall issue of dysmorphic concerns and reactions to such concerns, which has been empirically supported in prior studies (Castle et al., 2004; Jorgensen et al., 2001; Littleton et al., 2005; Oosthuizen et al., 1998). 'Dysmorphic Concern' included content reflective of an excessive and absorbing preoccupation with what one perceives as a physical defect which then results in compensatory behaviors to quell the anxiety (Monzani et al., 2012). Still, without the completion of a higher order EFA it can only be concluded that the collection of items in this study could be distilled to three correlated factors with content similar to BDD traits.

The second factor - which involves social anxiety and avoidance - is theoretically logical given reports of high rates of social anxiety and social phobia in individuals with BDD (Coles et al., 2006). People with Body Dysmorphic Disorder are often impaired with regard to their social functioning even in the absence of social phobia (Phillips, 2005). It is not surprising that 'Social Anxiety and Avoidance' was extracted as a factor as researchers have long considered the social impairment related to BDD. For example, many individuals are housebound, avoid social settings due to their defects, or even avoid seeing their defect (Phillips et al., 1993).

The second factor can be seen as representing two related issues. That is, an internal aversion to the defect (Cororve & Gleaves, 2001) which is evidenced by visual avoidance of the defect. The other issues reflected by this social factor are a fear of scrutiny or negative judgment from others because of their perceived flaws (Cororve & Gleaves, 2001; Kelly et al., 2010).

Although ‘Dysmorphic Concern’ and ‘Social Anxiety and Avoidance’ are fairly clear and often discussed in BDD literature, the third factor represents a more complicated factor. Based on the items that loaded on factor three, the factor is reflective of what might be named appearance investment. "Appearance investment" refers to the psychological importance of individuals evaluations of their bodies (Cash & Labarge, 1996; Cash et al., 2004). Individuals’ investment in their appearance can be reflected in their compulsive behaviors and the amount of influence they attribute to their defect(s) in affecting their lives (Didie et al., 2010). Despite a recent increase in empirical research, body image and BDD literature have been criticized for ignoring the investment component (Cash & Szymanski, 1995; Hrabosky et al., 2009). This neglect may be influenced by the scant information on body image disturbance in BDD (Phillips, 2011a).

These findings suggest that, although obsessions and compulsions are necessary to diagnose BDD, it is possible that other factors also should be considered. However, in order to be confident that ‘Social Anxiety and Avoidance’ and ‘Appearance Investment’ should be incorporated into an assessment additional research must be conducted. The results from this study can be viewed as a starting point but replication is necessary as FA cannot fully validate the extracted factors.

Limitations

A number of limitations should be considered with regard to the present study and its results. First, a number of students did not complete the battery of surveys or took far less than the average time to complete the survey, which resulted in the removal of their responses. Additionally, the sample cannot be considered to be representative of the typical population of college students or general population as a whole. Hence, the generalizability of these results is unclear. The findings reported in this study are also limited to the measures of BDD that were utilized.

It is unclear how many of the participants in the present study met criteria for BDD. However, some estimation of the proportion of individuals with clinical levels of dysmorphic concern could be made based on their results. For example, approximately 8% of the sample had clinical levels of dysmorphic concern as measured by the BICI. Participants scored fairly similar to those in previous studies. Future research could include an interview to aid in more accurately diagnose BDD as many individuals with this condition are ashamed and may minimize or deny their symptoms.

Strengths

The present study has a few main strengths. First, the study had a large sample which was appropriate for the type of analysis conducted and increased the possibility of interpretable factors. Although the sample may not be representative of the entire United States population, the use of students from undergraduate institutions is also strength as many students are at the age where BDD-type symptoms tend to manifest. Finally, use of a non-clinical population can also be viewed positively as much of the BDD research

conducted includes clinical samples. However, BDD is a fairly common condition and should also be investigated in non-clinical populations as these individuals are likely to have a range of appearance concerns.

The results of this study provide support for a multidimensional conceptualization of BDD. This multidimensional condition should be assessed comprehensively with measures tapping into all the relevant dimensions. Although the current measures appear to adequately measure dysmorphic concerns, they do not appear to assess the other facets of BDD as thoroughly. It is necessary for items to be written to address the deficit of items that comprehensively assess the purported BDD facets.

The findings from the present study also suggest the number of items regarding social anxiety and avoidance found in BDD measures should be expanded if the findings are replicated. Perhaps measures of BDD should also include items reflecting appearance investment. Inclusion of all of the possible facets of BDD would increase the likelihood of correctly diagnosing BDD. However, additional research is needed to replicate the symptom dimensions found in the present study and to provide further clarification of the dimensions of BDD. Likewise, there is a need to compare the factors to external criteria that are related to BDD in order to strengthen the aforementioned assertions.

Future Considerations

Future research exploring the symptom dimensions that comprise BDD could include measures of BDD as well as measures of appearance investment, which is typically neglected. Including clinical and non-clinical samples in future research would also have the added benefit of examining how BDD manifests in both domains. Another

approach that should be considered is including individuals with a diagnosis of BDD and comparing the factor structure extracted with those who do not qualify for a diagnosis. However, the structure should be invariant across groups.

The present study was exploratory in nature. Therefore, the findings should be viewed as provisional. Future research should incorporate further analyses in order to increase the confidence in the extracted factor structure and its interpretation. The results demonstrate first order dimensions as captured by the items that were included in the study. Further examination is necessary to determine the hierarchical structure. The amount of item variance that is related to a more general factor as opposed to the lower order group factors identified in this thesis also warrants future exploration. Such analyses should include an exploratory bifactor model as the factors were moderately correlated.

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Figure 1

Scree Plot Showing Real and Random Data Eigenvalues from EFA and HPA

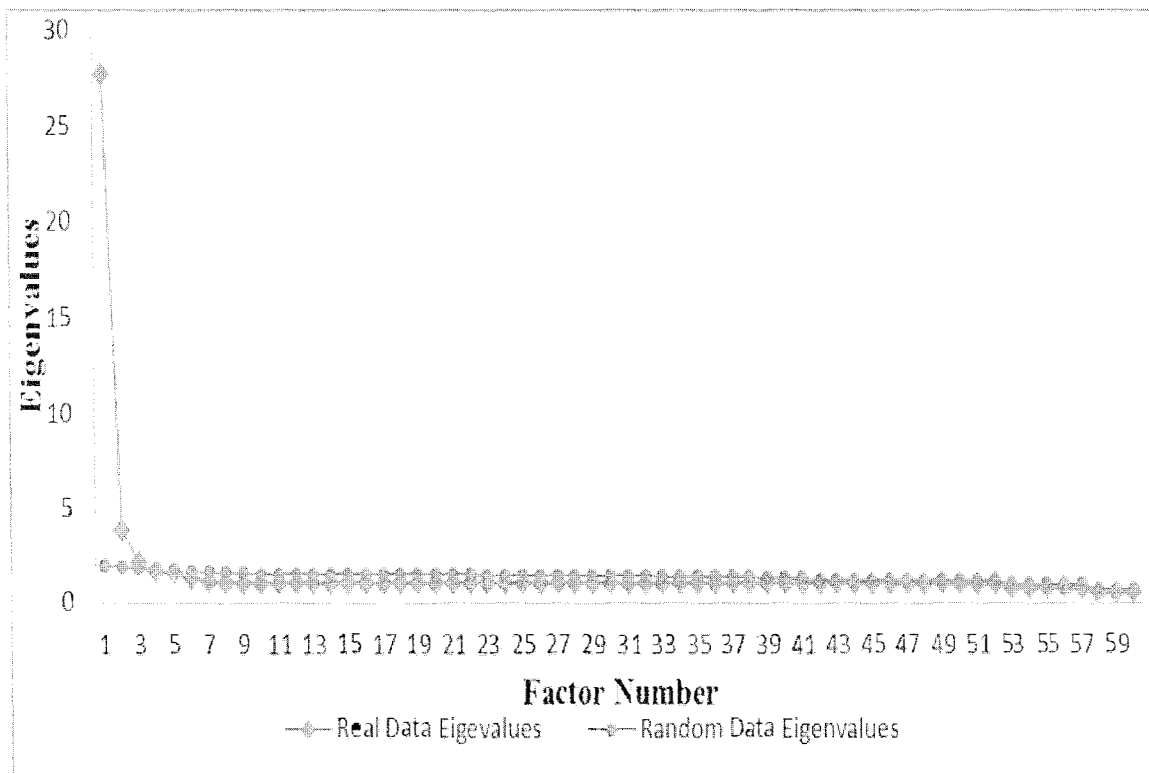


Table 1

Three Factor Solution from Principal Axis Extraction and Promax Rotation (n=346)

Scale Items	Unrotated Factor	Promax Rotated Factor Pattern (Structure)			h^2
	Coefficients	Coefficients			
	Factor I	Factor I	Factor II	Factor III	
		(DC)	(SA)	(AI)	
BICI1	.68	.95 (.80)			.67
BICI8	.64	.86(.76)			.58
BICI11	.70	.84 (.80)			.65
BICI9	.72	.84(.81)			.66
BIDQ1a	.79	.81 (.85)			.73
BICI12	.68	.80 (.77)			.61
BICI5	.73	.77 (.78)			.62
BICI14	.64	.75 (.72)			.52
BICI13	.72	.72 (.76)			.59
BDDE3	.77	.59 (.78)			.66
DCQ1	.78	.57 (.77)			.64

BICI3	.68	.56 (.68)		.49
BICI17	.76	.54 (.73)		.59
DCQ6	.78	.51(.75)		.63
DCQ7	.73	.50 (.71)		.55
DCQ2	.72	.47 (.68)		.53
BICI10	.63	.45 (.63)		.46
BICI7	.45	.42 (.48)		.24
BDDE17	.67		.85 (.80)	.65
BICI18	.73		.83 (.82)	.69
BDDE18	.60		.82 (.76)	.61
BIDQ6a	.61		.82 (.74)	.55
BIDQ5a	.71		.82 (.81)	.66
BIDQ4	.73		.77 (.81)	.66
BICI16	.70		.74 (.76)	.60
BDDE21	.60		.704 (.70)	.513
BIDQ7	.67		.66 (.71)	.52
BDDE19	.69		.60 (.74)	.59

BDDE10b	.67	.50 (.69)	.55
BDDE14	.68	.48 (.69)	.56
BICI15	.64	.47 (.63)	.43
BDDE24	.58	.41 (.59)	.38
BDDE9b	.77	.41(.73)	.64
BDDE2	.59	.58(.71)	.53
BDDE12	.49	.62 (.61)	.37
BDDE6	.77	.58(.80)	.69
BDDE10a	.41	.49 (.50)	.28
BDDE23	.66	.49 (.68)	.50
BDDE22	.68	.47(.68)	.52
Eigenvalues (Extraction)		17.94 2.83	1.10
% Variance (Extraction)		46.01 2.83	1.10
r_{α}		.95 .93	.88

Note. BICI = Body Image Concern Inventory; DCQ = Dysmorphic Concern Questionnaire; BDDE= Body Dysmorphic Disorder Examination; BIDQ = Body Image Disturbance Questionnaire; h^2 = Extracted Communalities from EFA; r_{α} = Alpha Coefficients.

Table 2

Correlation between Extracted Factors

Measure	Dysmorphic Concern	Social Anxiety and Avoidance	Appearance Investment
Dysmorphic Concern	---	---	---
Social Anxiety and Avoidance	.63	---	---
Appearance Investment	.66	.65	---

Appendix A

Dysmorphic Concern Questionnaire

These questions ask about how you see yourself.

Please read the questions carefully and answer them by ticking the box which you think is most appropriate for your specific situation.

HAVE YOU EVER:	Not at all	Same as most people	More than most people	Much more than most people
1. Been very concerned about some aspect of your physical appearance				
2. Considered yourself to be misformed or misshaped in some way (e.g. nose / hair skin / sexual organs / overall body build).				
3. Considered your body to be malfunctioning in some way (e.g. excessive body odour, flatulence, sweating).				
4. Consulted or felt that you needed to consult a plastic surgeon / dermatologist / physician about these concerns.				
5. Been told by others / doctor that you are normal spite of you strongly believing that something is wrong with your appearance or bodily functioning.				
6. Spent a lot of time worrying about a defect in your appearance / bodily functioning				
7. Spent a lot of time covering up defects in your appearance / bodily functioning.				
TOTAL SCORE				

Body Image Disturbance Questionnaire

This questionnaire assesses concerns about physical appearance. Please read each question carefully and circle the answer that best describes your experience. Also write in answers where indicated.

1a. Are you concerned about the appearance of some part(s) of your body which you consider

especially unattractive?

1	2	3	4	5
Not at all	Somewhat	Moderately	Very	Extremely

1b. What are these concerns? What specifically bothers you about the appearance of these body parts?

2a. If you are at least somewhat concerned, do these concerns preoccupy you? That is, you think

about them a lot and they're hard to stop thinking about?

1	2	3	4	5
Not at all	Somewhat	Moderately	Very	Extremely

2b. What effect has your preoccupation with your appearance had on your life? (Please describe):

3a. Has your physical “defect” often caused you a lot of distress, torment, or pain? How much?

1	2	3	4	5
No distress	Mild, and not too disturbing	Moderate and disturbing but manageable	Severe, and very disturbing	Extreme, and disabling

4. Has your physical “defect” caused you impairment in social, occupational or other important areas of functioning? How much?

1	2	3	4	5
No limitation	Mild interference but overall performance not impaired	Moderate, definite interference, but still manageable	Severe, causes substantial impairment	Extreme, incapacitating

5. Has your physical “defect” significantly interfered with your social life? How much?

1	2	3	4	5
Never	Occasionally	Moderately	Often	Very Often

5b. If so, how?

6a. Has your physical “defect” significantly interfered with your schoolwork, your job, or your

ability to function in your role? How much?

1	2	3	4	5
Never	Occasionally	Moderately	Often	Very Often

6b. If so, how?

7a. Do you ever avoid things because of your physical “defect”? How often? (Circle the best)

1

2

3

4

5

Never

Occasionally

Moderately

Often

Very Often

7b. If so, what do you avoid?

Body Image Concern Inventory

Please respond to each item by circling how often you experience the described feelings or how

often you perform the described behaviors.

1. I am dissatisfied with some aspect of my appearance
2. I spend a significant amount of time checking my appearance in the mirror
3. I feel others are speaking negatively of my appearance
4. I am reluctant to engage in social activities when my appearance does not meet my satisfaction
5. I feel there are certain aspects of my appearance that are extremely unattractive
6. I buy cosmetic products to try to improve my appearance
7. I seek reassurance from others about my appearance
8. I feel there are certain aspects of my appearance I would like to change
9. I am ashamed of some part of my body
10. I compare my appearance to that of fashion models or others
11. I try to camouflage certain flaws in my appearance
12. I examine flaws in my appearance
13. I have bought clothing to hide a certain aspect of my appearance
14. I feel others are more physically attractive than me
15. I have considered consulting/consulted some sort of medical expert regarding flaws in my appearance
16. I have been embarrassed to leave the house because of my appearance
17. I fear that others will discover my flaws in appearance
18. I have missed social activities because of my appearance
19. I have avoided looking at my appearance in the mirror

Body Dysmorphic Disorder Examination- Self Report

The following questions will ask you to think about your “appearance feature” – this refers to the body part you ranked as number “1” on the list. Answer according to *the past four weeks*. To answer the questions, you may circle any number from 0 to 6, even if there is no description next to it.

1. Over the past four weeks, how common have you felt it is for people your age and sex to have

an appearance feature just like the one you believe you have?

0 — everyone has the same feature

1 —

2 — many people have the same feature

3 —

4 — few people have the same feature

5 —

6 — no one else has the same feature (or the extent of the problem in others is not as severe)

2. Over the past four weeks, how frequently have you checked out your appearance feature (for example, looked at it, felt it, measured it in some way) in order to evaluate the extent of the problem?

0 — (0 days) no checking

1 — (1-3 days)

2 — (4-7 days) checking once or twice a week

3 — (8-11 days)

4 — (12-16 days) checking on about half the days

5 — (17-21 days)

6 — (22-28 days) checking every or almost every day

3. Over the past four weeks, how dissatisfied have you been with your appearance feature?

0 — no dissatisfaction

1 —

2 — slight dissatisfaction (but no feelings of distress)

3 —

4 — moderate dissatisfaction (with some feelings of distress)

5 —

6 — extreme dissatisfaction (with extreme distress; could not imagine feeling more upset or dissatisfied)

4. Over the past four weeks, how dissatisfied have you been with your overall appearance?

0 — no dissatisfaction

1 —

2 — slight dissatisfaction (but no feelings of distress)

3 —

4 — moderate dissatisfaction (with some feelings of distress)

5 —

6 — extreme dissatisfaction (with extreme distress; can't imagine feeling more dissatisfied)

5. Over the past four weeks, how frequently have you tried to get reassurance from someone that your appearance feature isn't as bad or abnormal as you think it is?

0 — (0 days) never sought reassurance

1 — (1-3 days)

2 — (4-7 days) sought reassurance once or twice a week

3 — (8-11 days)

4 — (12-16 days) sought reassurance on about half the days

5 — (17-21 days)

6 — (22-28 days) sought reassurance every or almost every day

6. Over the past four weeks, how often have you thought about your appearance feature AND felt upset as a result?

0 — (0 days) never thought about the appearance feature with upset feelings

1 — (1-3 days)

2 — (4-7 days) thought about it and felt upset once or twice a week

3 — (8-11 days)

4 — (12-16 days) thought about it and felt upset on about half the days

5 — (17-21 days)

6 — (22-28 days) thought about it and felt upset every or almost every day

7. Over the past four weeks, how much have you worried or felt embarrassed about your appearance feature when you were in public areas such as shopping malls, grocery stores, city streets, restaurants, movies, clubs, buses or planes, waiting in lines, parks or beaches, public restrooms, or other areas where mainly there were people you didn't know? (When answering, think about how many of these situations you worry in and how intense your worrying is.)

0 — no worrying or embarrassment

1 —

2 — slight amount of worrying or embarrassment

3 —

4 — moderate amount of worrying or embarrassment

5 —

6 — extreme worrying or embarrassment

8. Over the past four weeks, how much have you worried or felt embarrassed about your appearance feature when you were in social settings with co-workers, acquaintances, friends, or family members (for example, at work, parties, family gatherings, meetings, talking in groups, having a conversation, dating or going on an outing with others, speaking to a boss or supervisor)?

0 — no worrying or embarrassment

1 —

2 — slight amount of worrying or embarrassment

3 —

4 — moderate amount of worrying or embarrassment

5 —

6 — extreme worrying or embarrassment

9a. Over the past four weeks, how often have you felt that other people were noticing or paying attention to your appearance feature? (Include times when you realize you might be imagining it.)

0 — (0 days) never occurred

1 — (1-3 days)

2 — (4-7 days) occurred once or twice a week

3 — (8-11 days)

4 — (12-16 days) occurred on about half the days

5 — (17-21 days)

6 — (22-28 days) occurred every or almost every day

9b. Over the past four weeks, how upset have you become when you felt someone was noticing or paying attention to your appearance feature? (When answering, think about whether you felt differently depending on who the person was that noticed.)

0 — not upsetting (or others did not notice)

1 — slightly upsetting when certain people were involved, but not others

2 — slightly upsetting regardless of who was involved

3 — moderately upsetting when certain people were involved, but not others

4 — moderately upsetting regardless of who was involved

5 — extremely upsetting when certain people were involved but not others

6 — extremely upsetting regardless of who was involved

10a. Over the past four weeks, how often did someone unexpectedly make a positive or negative comment on your appearance feature? (Only include comments that came “out of the blue,” not comments you might have tried to get from the person.)

0 — (0 days) never occurred

1 — (1-3 days)

2 — (4-7 days) occurred once or twice a week

3 — (8-11 days)

4 — (12-16 days) occurred on about half the days

5 — (17-21 days)

6 — (22-28 days) occurred every or almost every day

10b. Over the past four weeks, how upset have you become when someone commented — positively or negatively — on your appearance feature? (When answering, think about whether you felt differently depending on who the person was that made the comment.)

0 — not upsetting (or others did not comment)

1 — slightly upsetting when certain people commented, but not others

2 — slightly upsetting regardless of who commented

3 — moderately upsetting when certain people commented, but not others

4 — moderately upsetting regardless of who commented

5 — extremely upsetting when certain people commented, but not others

6 — extremely upsetting regardless of who commented

11a. Over the past four weeks, how often did someone do something to you or for you that you think was a result of your appearance feature?

0 — (0 days) never occurred

- 1 — (1-3 days)
- 2 — (4-7 days) occurred once or twice a week
- 3 — (8-11 days)
- 4 — (12-16 days) occurred on about half the days
- 5 — (17-21 days)
- 6 — (22-28 days) occurred every or almost every day

11b. Over the past four weeks, how upset did you become when someone did something to you or for you because of your appearance feature? (When answering, think about whether you felt differently depending on who the person was.)

- 0 — not upsetting (or others did not treat me differently)
- 1 — slightly upsetting when certain people were involved, but not others
- 2 — slightly upsetting regardless of who was involved
- 3 — moderately upsetting when certain people were involved, but not others
- 4 — moderately upsetting regardless of who was involved
- 5 — extremely upsetting when certain people were involved, but not others
- 6 — extremely upsetting regardless of who was involved

12. Over the past four weeks, how important has appearance been in how you evaluate yourself as a person? Before answering, think about other things that influence how you judge yourself, such as personality, intelligence, work or school performance, quality of your relationships with others, ability in other areas, and so on. Compared to these (and maybe others), how much importance have you given to appearance when evaluating yourself?

- 0 — no importance
- 1 —
- 2 — some importance (definitely an aspect of self-evaluation)
- 3 —
- 4 — moderate importance (one of the main aspects of self-evaluation)
- 5 —

6 — extreme importance (nothing is more important as a means of evaluating yourself)

13. Over the past four weeks, how negatively (if at all) have you thought of yourself as a person as a result of your appearance feature? This question is not asking whether you think your appearance is attractive or unattractive. Rather, it is asking how much your appearance made you feel that you had a personal flaw or were undesirable or inadequate in a non-physical way.

0 — no negative evaluations of yourself resulting from your appearance feature

1 —

2 — slightly negative evaluations of yourself

3 —

4 — moderately negative evaluations of yourself

5 —

6 — extremely negative evaluations of yourself; the appearance feature made you unable to find positive qualities in yourself

14. Over the past four weeks, how negatively (if at all) have you felt other people evaluated you as a person as a result of your appearance feature? Again, this question is not asking how attractive or unattractive other people thought you were. Rather, it is asking how much you thought your appearance made other people see you as undesirable or inadequate in some non-physical way.

0 — no negative evaluations by others resulting from your appearance feature

1 —

2 — slightly negative evaluations by others

3 —

4 — moderately negative evaluations by others

5 —

6 — extremely negative evaluations by others; the appearance feature made others unable to find positive qualities in you

15. Over the past four weeks, how attractive physically did you feel other people thought you were? (If friends view you differently than strangers, how attractive on average did you feel people thought you were?)

0 — attractive, or at least not unattractive

1 —

2 — slightly unattractive

3 —

4 — moderately unattractive

5 —

6 — extremely unattractive

16a. Over the past four weeks, have you ever thought your appearance feature might not be as bad as you generally think, or have there been times that you've felt significantly better about your appearance feature?

Yes No

16b. Over the past four weeks, have you ever felt that your appearance was basically normal?

Yes No

17. Over the past four weeks, how much have you avoided public areas because you felt uncomfortable about your appearance feature? (Such areas might include shopping malls, grocery stores, city streets, restaurants, movies, clubs, buses or planes, waiting in lines, parks, beaches, public restrooms, or other areas where mainly there would be people you don't know.)

0 — no avoidance of public situations

1 —

2 — avoided with slight frequency

3 —

4 — avoided with moderate frequency

5 —

6 — avoided with extreme frequency

18. Over the past four weeks, how much have you avoided work or other social situations with friends, relatives, or acquaintances because you felt uncomfortable about your appearance feature? Social situations could include going to work or school, parties, family gatherings, meetings, talking in groups, having a conversation, hanging out with others at work, dating or going on an outing with others, or speaking to a boss or supervisor.

- 0 — no avoidance of social situations
- 1 —
- 2 — avoided with slight frequency
- 3 —
- 4 — avoided with moderate frequency
- 5 —
- 6 — avoided with extreme frequency

19. Over the past four weeks, how much have you avoided close physical contact with others because of your appearance feature? This includes sexual activity as well as other close contact such as shaking hands, hugging, kissing, or dancing close.

- 0 — no avoidance of physical contact
- 1 —
- 2 — avoided with slight frequency
- 3 —
- 4 — avoided with moderate frequency
- 5 —
- 6 — avoided with extreme frequency

20. Over the past four weeks, when making contact physically with others (for example, lovemaking, hugging, shaking hands, kissing, dancing close), how often have you tried to restrict the amount of actual contact that occurs (for example, by changing your posture, limiting your movement, or preventing contact with certain body parts)?

- 0 — never deliberately restricted physical contact
- 1 —

2 — restricted on less than half the physical contact occasions

3 —

4 — restricted on about half the physical contact occasions

5 —

6 — restricted on every or almost every physical contact occasion

21. Over the past four weeks, how much have you avoided physical activities such as exercise or outdoor recreation because of feeling self-conscious or uncomfortable due to your appearance feature?

0 — no avoidance of physical activity

1 —

2 — avoided with slight frequency

3 —

4 — avoided with moderate frequency

5 —

6 — avoided with extreme frequency

22. Over the past four weeks, how much have you deliberately dressed, made yourself up, or groomed yourself in some special way in order to cover up your appearance feature or distract attention from it? This can include avoiding certain clothes or cosmetics. (This is called “camouflaging.”)

0 — (0 days) never camouflaged or avoided certain clothes/cosmetics

1 — (1-3 days)

2 — (4-7 days) camouflaged once or twice a week

3 — (8-11 days)

4 — (12-16 days) camouflaged on about half the days

5 — (17-21 days)

6 — (22-28 days) camouflaged every or almost every day

23. Over the past four weeks, how frequently have you deliberately changed your posture or body movements (such as the way you stand or sit, where you put your hands, how you walk, what side of yourself you show to other people, etc.) in order to hide your appearance feature or distract people's attention from it?

0 — (0 days) no changing of posture or body movements

1 — (1-3 days)

2 — (4-7 days) changed once or twice a week

3 — (8-11 days)

4 — (12-16 days) changed on about half the days

5 — (17-21 days)

6 — (22-28 days) changed every or almost every day

24. Over the past four weeks, how often have you avoided looking at your body, particularly at your appearance feature, in order to control feelings about your appearance? This includes avoiding looking at yourself clothed or unclothed, either directly or in mirrors or windows.

0 — (0 days) never avoided looking at body

1 — (1-3 days)

2 — (4-7 days) avoided once or twice a week

3 — (8-11 days)

4 — (12-16 days) avoided on about half the days

5 — (17-21 days)

6 — (22-28 days) avoided every or almost every day

25. Over the past four weeks, how frequently have you avoided other people seeing your body unclothed because you felt uncomfortable about your appearance feature? This includes not letting your spouse, partner, roommate, etc., see you without clothes, or people in public settings, such as in health club showers or changing rooms.

0 — no avoidance of others seeing body unclothed

1 —

2 — avoided with slight frequency

3 —

4 — avoided with moderate frequency

5 —

6 — avoided with extreme frequency

26. Over the past four weeks, how often have you compared your appearance with the appearance of other people around you or in magazines or television? Include both positive and negative comparisons.

0 — (0 days) no comparing with others

1 — (1-3 days)

2 — (4-7 days) compared once or twice a week

3 — (8-11 days)

4 — (12-16 days) compared on about half the days

5 — (17-21 days)

6 — (22-28 days) compared every or almost every day

Appendix B

Please answer each question below. Some items require a written response other require you to select one of the options provided.

1) Enter your age in years

2) What is your gender?

- Male

- Female

3) What is your racial background?

- White

- Black

- Hispanic

- Asian

- Other

4) What is your marital status?

- Single

- Married

- Divorced

- Widowed

- Other

5) What is your year in school?

- Freshman

- Sophomore

- Junior

- Senior

- Other

6) Are you employed (in addition to being a student)?

- Full time
- Part time
- Student (full time)
- Other

7) Have you ever had mental health treatment?

- Yes
- No