



The Multidimensional Youth Body Dysmorphic Inventory: Development and Preliminary Validation

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Abstract

A new measure specifically designed for adolescents to assess body dysmorphic disorder (BDD) symptoms is needed to identify youth who could benefit from intervention to reduce their BDD-related symptomology. To address this gap, the Multidimensional Youth Body Dysmorphic Inventory (MY BODI) was developed and the psychometric properties were evaluated. Following development and expert assessment, Australian secondary school students ($N=582$; 55% female; $M_{\text{age}}=13.62$, $SD=1.59$, aged 11 to 18 years, grades 7 to 12) completed a survey with the new items and validation measures. Results from the factor analysis supported a 3-factor, 21-items measure, which aligned with the DSM-5 diagnostic criteria of Impairment/avoidance, Preoccupation/repetitive behaviours, and Insight/distress. Supporting the convergent validity of the measure, the MY BODI total score and sub-scale scores correlated with measures of BDD symptoms, including the Appearance Anxiety Inventory (AAI) and Body Dysmorphic Disorder Questionnaire-Adolescent Version (BDDQ-A). This study provides preliminary validation of the MY BODI, a self-report measure of BDD symptoms and symptom severity, using a response set aimed to facilitate more reliable reporting, which may identify risk for BDD, and symptoms of BDD.

Keywords Body dysmorphic disorder · Adolescents · Scale development · Appearance anxiety · Psychometrics

Introduction

Body dysmorphic disorder (BDD) is a debilitating mental health disorder, characterised by extreme preoccupations with perceived flaws or defects in one's physical appearance, and is associated with pathological distress, avoidance, and ritualizing behaviours [1]. BDD frequently onsets in early to late adolescence ($M_{\text{age}} \text{ onset}=16$ years) [2], and subclinical body dysmorphic symptoms (BDS) begin, on average, several years before individuals experience diagnostic levels of symptom severity ($M_{\text{age}}=12.9$ years) [3]. Although rarely studied, the prevalence of BDD among adolescents has ranged from 1.7 to 2.3% in community samples [4–7] and 6.7% [8] to 14.3% [9] in samples of adolescent inpatients. BDS are even more common, with one study finding that 9% of Australian school students (ages 10 to 13 years) reported a symptom level approaching the clinical cut-off

equal to that observed in adult clinical samples (clinical cut off = 20, as measured by the Appearance Anxiety Inventory) [10]. These rates are concerning given that one longitudinal study has shown that most girls show one of two patterns, either high BDS as early as age 10 to 12 years that remains chronic over the following years, or alternatively, somewhat lower BDS at age 10 to 12 years yet symptoms steeply increase over time [11]. In addition, in this same study, a substantial majority of boys also showed a steep increase in symptoms over 3 years. In general, adolescents with BDD report significant impairments in their social functioning, initiation of romantic relationships, and educational and vocational attainment [3, 12]. Furthermore, research indicates adolescents with BDD report high lifetime rates of suicidal ideation and a history of attempted suicide [3]. As BDD tends to follow a chronic course [12], these difficulties are likely to persist into adult life.

Although definitions and measures of BDD are available, the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; [1]) included important changes in the description and classification of BDD that suggest an expanded measure is needed. In the DSM-5, BDD was reclassified under the new diagnostic category

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of obsessive–compulsive and related disorders (OCRD), which describes and accounts for the highly similar and co-occurring nature of obsessional and repetitive disorders, including obsessive–compulsive disorder (OCD), hoarding disorder, trichotillomania (hair-pulling disorder), excoriation (skin-picking) disorder, and BDD. Previously classified as a somatoform disorder in DSM-II-R [13] and DSM-IV [14], the change to a new category was largely in response to research demonstrating the overlap in clinical features, elevated comorbidity, increased family history, and similar response to treatment between BDD and OCRD, in particular OCD [15]. In addition, a new criterion for BDD was defined, which requires a report of repetitive behaviours or mental acts in response to appearance concerns in order to meet diagnostic threshold. These mental acts include persistent thoughts about a perceived defect, including comparing appearance with that of others, and evaluative concerns (e.g., that others may be looking at, talking about or mocking their appearance) [1]. Given that individuals with BDD excessively check their appearance concerns, camouflage, or hide their perceived defect (e.g., applying makeup, changing clothing, tanning), these behaviours tend to result in repetitive, ritualistic behaviours such as excessive grooming (e.g. excessive hair combing or hair removal), skin picking, mirror checking, and reassurance seeking from others [16, 17]. There are two other additions in the DSM-5, including the addition of a delusional variant of BDD, which identifies individuals who are completely convinced that their perceived defects or flaws are real. If this occurs, BDD is described as BDD with *absent insight/delusional beliefs specifier*. This reflects clinical observations indicating that BDD is characterised by poor insight [2]. A lack of insight into the pathological nature of the condition is a major obstacle in early detection and reliable assessment of BDD symptoms given that patients rarely seek treatment for their appearance concerns. Finally, the DSM-5 includes a BDD specifier of “muscle dysmorphia” to reflect growing evidence that a preoccupation with one’s muscle size (i.e., usually as too small or the perception of insufficient muscularity) is an important subtype of BDD, occurring almost exclusively in males [3].

Given that BDS often onsets in adolescence [2, 10, 11], are associated with severe impairments [2, 12], and tend to run a chronic course [12], identifying symptoms early may improve outcomes for youth. However, early detection of BDS indicative of potential BDD is challenging given that patients rarely seek help for their appearance concerns when they are first problematic [17]. Moreover, even when sufferers do present to mental health services, they are unlikely to spontaneously disclose their appearance concerns [7] due to shame and embarrassment about symptoms, poor insight, and a desire for non-mental health treatment such as cosmetic surgery [18]. Thus, explicit queries about BDS

during initial clinical evaluations are often required. This is challenging, however, as there currently exist few screening measures for BDD in adolescents, hampering both clinical and research efforts to identify symptoms in young people. There is also evidence that adolescents may try to mask or minimise symptoms of BDD [9]. Thus, in the present studies, our purpose was to develop and assess the reliability and validity of a new self-report measure of BDS, designed specifically for adolescents using a format that has been described as effective in minimising socially desirable responding and improving accurate disclosure [19].

Existing Self-Report Measures of Body Dysmorphic Disorder or Symptoms

We could locate six reliable and valid self-report measures available that have been used to assess (or screen for) the presence of BDD and associated symptoms. The six measures are the Body Dysmorphic Disorder Questionnaire (BDDQ; [20]), the Dysmorphic Concern Questionnaire (DCQ; [21]), the Body Image Disturbance Questionnaire (BIDQ; [22]), the Cosmetic Procedure Questionnaire (COPS; [23]), the Appearance Anxiety Inventory (AAI; [24]), and the Body Dysmorphic Disorder Symptom Scale (BDD-SS; [25]). Each of these measures were originally developed for use with adults and have largely been used exclusively with adults in clinical research. Furthermore, some of the measures are very short and do not capture the full range of symptoms (e.g., delusionality), rely on limited response options and most of these measures were developed specifically aligned to DSM-IV criteria for assessing BDD and are not consistent with more recent diagnostic criteria. Each of these six self-report measures are reviewed below.

The BDDQ, DCQ, BIDQ, COPS, AAI, and BDD-SS

The BDDQ [20], for example, is limited by its small number of items (four) and its limited yes/no response. In particular, the BDDQ does not assess the repetitive behaviour (i.e., camouflaging, seeking reassurance, checking), mental acts (i.e., comparing appearance with others) or insight/delusionality criterion of BDD, which have been identified as key symptoms of BDD in the DSM-5. In addition, although the scale has been used in adolescent research to screen for the presence of DSM-IV BDD in psychiatric [9], and community settings [6], there is no published psychometric data available for use in adolescents.

The DCQ [21] is also short and limited in its coverage of BDD symptoms. It is a 7-item self-report measure designed to assess over-concern with physical appearance without establishing a diagnosis of BDD. Respondents are required to rate their concern about their physical appearance relative to others on a scale ranging from 0 (*not at all*) to 3 (*much*

more than most people). However, the DCQ does not appear to assess the full spectrum of repetitive behaviour (e.g., checking), mental acts, insight/delusional or functional impairment, which have been identified as core domains in the DSM-5 classification of BDD. This scale has not been used in studies of adolescents to our knowledge.

The BIDQ [22] is a 7-item self-report measure of body image disturbance derived from the BDDQ [20]. While the BIDQ and BDDQ are similar, the BIDQ displays notable changes to wording, structure, and content, and responses ranging from 1 (*not at all*) to 5 (*extremely*) replace the forced-choice response format. Two items assess appearance concern and preoccupation, a third item measures perceived distress, and the final four items assess functional impairment and avoidance. Four of the items also follow-up asking for an open-ended clarification of responses (e.g., nature of the perceived “defect,” examples of its effects or interference with one’s life, etc.). An example item is, “Are you concerned about the appearance of some part(s) of your body, which you consider especially unattractive?” In an initial validation study of 295 university students ($M_{\text{age}}=22.0$ years, $SD=6.1$) [22], the scale demonstrated good internal consistency (Cronbach’s $\alpha=0.89$). However, the BIDQ is not a comprehensive measure of all BDD symptomatology and does not appear to assess repetitive behaviour (e.g., checking), or insight/delusional, which have been identified as core symptoms of BDD in the DSM-5. Consistent with other self-report scales currently available, the one-factor structure of the BIDQ suggests this scale does not assess the heterogeneity dimensions of BDD symptoms. The BIDQ has not been used with children or adolescents.

The COPS is a 9-item self-report measure designed to screen for the presence of BDD in cosmetic surgery settings [23]. The questionnaire asks participants to indicate the feature(s) they find unattractive, and the nature of the cosmetic procedures they are seeking. An example item is, “To what extent do you feel your feature(s) are currently ugly, unattractive or not right?” Items are scored on a 9-point Likert scale, ranging from 0 (*least impaired*) to 8 (*most impaired*). Consistent with other self-report scales currently available, the COPS may not be a comprehensive assessment of BDD symptomatology. Furthermore, the scale has limited applicability with regard to contexts other than cosmetic surgery settings. There is no published data for the validity and reliability of this scale among adolescents.

Possibly the most widely used self-report measure for BDD symptoms is the AAI [24], which has been used in clinical and community samples to assess for BDD severity (and response to treatment) in both adolescent and adult samples (e.g., [24, 26, 27]). The AAI has also been recently used in cross-sectional and longitudinal studies exploring the development of BDD among healthy, school-aged adolescents [11, 28, 29]. The AAI is a 10-item self-report scale that

was originally designed to assess the cognitive processes and safety seeking behaviours characteristic of a response to a distorted body image and associated shame in individuals with BDD (e.g., items assess self-focused attention, rumination, appearance-checking in reflective surfaces etc.), with possible responses to items ranging from 0 (*not at all*) to 4 (*all the time*). Although an improvement over the BDDQ, DCQ and COPS by including items to assess a wider range of symptoms of BDD, there are also several limitations of the AAI. In an initial study on the psychometric properties of the AAI [24], the scale demonstrated a 2-factor structure in a sample of individuals diagnosed with BDD, but a 1-factor structure in a community sample of individuals reporting high appearance concerns. Thus, it is unclear whether the scales assesses multiple domains of BDD symptomatology or rather taps a general overall factor of appearance anxiety. In an independent evaluation of the AAI’s factor structure and convergent validity in an Australian university sample ($N=730$; $M_{\text{age}}=21.2$ years, $SD=5.3$) and adolescent student sample ($N=862$; $M_{\text{age}}=13.73$ years, $SD=1.33$), findings from an exploratory analysis with one-half of the university students supported a 1-factor solution with nine items [30]. Furthermore, findings from the confirmatory factor analysis in both university students and adolescents demonstrated the proposed 1-factor model was an adequate fit on most indicators, suggesting the AAI measures a single factor with 9 of the original 10 items [30]. The one factor finding of the AAI aligns with Veale et al. [24] in his community sample of individuals that were selected due to their high appearance concerns, yet is discrepant from his study of adult BDD patients where a 2-factor solution was proposed. Furthermore, the AAI does not assess the insight/delusional criterion of BDD. These findings indicate the AAI may not represent a comprehensive assessment of the broader symptom domains of BDD symptomatology.

Recognising the need to assess the heterogenous symptoms of BDD, Wilhelm et al. [25] developed the BDD-SS, a self-report scale consisting of 54 items assessing different symptoms across 7 broad symptom domains. The symptom domains include: checking rituals, grooming rituals, shape/weight-related rituals, hair pulling/skin picking rituals, surgery/dermatology seeking rituals, avoidance, and BDD-related cognitions. Patients endorse (yes/no) symptoms they experienced in the past week. In groups where at least one symptom is endorsed, patients are asked to rate the overall (combined) severity of that symptom domain on a 10-point scale (0=*no problem* to 10=*very severe*). In an initial psychometric study of the BDD-SS [25], the authors found the BDD-SS showed good internal consistency (symptom scale: $\alpha=0.81$, severity scale: $\alpha=0.75$) and convergent validity (symptom scale: $r=0.66$, severity scale: $r=0.46$) with the Yale-Brown Obsessive–Compulsive Scale Modified for Body Dysmorphic Disorder (BDD-YBOCS; [31]). The

BDD-SS has been used in clinical trials of adolescents with BDD to measure symptom severity and to assist therapists in selection of optional treatment modules [32]. However, the BDD-SS is also lengthy to administer and uses the word “problem” in the response set, which may not be ideal when assessing risk in large community groups, especially youth who may not be clearly exhibiting clinical symptomatology.

The Current Study

In summary, the aims of the two studies reported here were to develop a self-report measure to assess BDD symptoms that could be used with adolescents and to provide an initial validation of the newly developed Multidimensional Youth Body Dysmorphic Inventory (MY BODI). In Study 1, the development of MY BODI items is described. Items were developed to assess BDD symptoms across each of the four diagnostic criteria for BDD in the DSM-5 and pilot tested with an expert panel. The factor structure of the refined set of MY BODI items was then explored in Study 2 in a large adolescent sample. Also, in Study 2, interitem correlations of MY BODI items were calculated, and convergent and divergent validity of the MY BODI scores were tested.

Study 1

The aim of Study 1 was to develop items for an adolescent self-report measure that could be used to assess BDD symptoms across all four domains according to recent changes in the DSM-5 diagnostic criteria. These domains included preoccupation with appearance concerns, compulsive/repetitive behaviours, distress/impairment, and insight and delusional.ity.

Method

Participants and Procedure

An initial pool of 83 items was generated to reflect the range of BDD symptoms of preoccupation with appearance concerns, compulsive/repetitive behaviours, distress/impairment and insight and delusional.ity. A subset of items was informed by the BDDQ [20], DCQ [21], COPS [23], AAI [24], and BDD-SS [25]. Furthermore, rater-administered scales, including the Yale-Brown Obsessive Compulsive Scale, Modified for BDD (BDD-YBOCS; [31]), and Body Dysmorphic Disorder Examination (BDDE; [33]), were used to inform items. The Brown Assessment of Beliefs Scale (BABS; [34]), was also used to inform insight items, as this scale has been used as a reliable and valid measure that is suitable for assessing delusional.ity in BDD [35]. A further

5 new items were also developed to reflect diagnostic criteria. This process resulted in a total of 27 items that were expected to tap preoccupation (e.g., “I spend a lot of time worrying about how I look”), 33 expected to tap repetitive behaviours (e.g., “I discuss how I look with others or question them about it”), 15 expected to tap distress and impaired day-to-day functioning related to body concerns (e.g., “I am so concerned with my looks, it gets in the way at school, work and with friends”), and 8 expected to tap lack of insight (e.g., “I believe my problem with my body or looks is real”).

Items were reviewed by an international panel of seven researchers with expertise in adolescent development and BDD or OCD, as well as clinicians working with children and adolescents with BDD and OCD from a university specialist clinic. All experts rated the face validity of the 83 items, which were presented to them in random order. The items were presented in a simple statement format for easy review by experts. Experts were requested to indicate for each item which of the four BDD diagnostic categories it was most likely to represent and to comment on the quality of the wording of the item (e.g., content, clarity, wording, readability, and developmental-appropriateness of the item).

Results

Item ratings were summarised and decisions were made regarding retaining items in their original form or modifying or removing some items. Of the initial 27 preoccupation items, 4 items were retained, 11 items modified and retained, and 11 items removed (too general, too normative, potential lack of clarity). Most experts rated one preoccupation item as an insight item (5/7 experts) so this item was retained and reclassified as an insight item. This left 15 preoccupation items. Of the 33 items designed to assess repetitive behaviours, 12 were retained, 9 modified and retained, and 12 removed (too general, lack of clear wording). Of the 15 distress items, 11 were retained, 3 were modified and retained, and 1 distress item was removed (too general). Finally, of the initial 8 insight items, 5 items were retained, and 3 items modified and retained. Four additional insight items were added after expert review to increase the pool of these items, and rated once again by a sub-sample of the expert researchers/clinicians ($n = 3$). All of these items were retained.

Following the initial item development and refinement, items were re-designed to fit the alternative question format as used by Harter [36] for The Self-Perception Profile for Children [37] and The Self-Perception Profile for Adolescents [19]. This method involves the young person selecting a description and then indicating whether his/her chosen description is “really true for me” or “sort of true for me.” The effectiveness of this question format lies in the

implication that just as many adolescents in the world (or one's reference group) view themselves in one way, as compared to those who view themselves in the other way. That is, this type of question legitimizes and normalizes either choice. The option of checking either *sort of true for me* or *really true for me* broadens the range of choices over the typical two-choice format. In addition, none of the choices involves the response "false" or "not like me." Rather, the adolescent is asked to decide on a dichotomous option and then select how *true* it is for him or her. When adolescents have been individually administered instruments with this response option and asked to provide explanations for their choices, their verbal elaborations of their responses suggest that most are giving relatively accurate self-perceptions, rather than socially desirable responses [19].

Using wording developed for adolescents [19], items were designed to fit this question format, whilst balancing the need for the simplest possible language and keeping the original item wording (e.g., I repeatedly check certain parts of my body: *Some teenagers often check and look at certain parts of their body, other teenagers rarely check certain parts of their body*). Following this, 7 preoccupation items (too wordy), 2 distress items (similar to other items), and 2 insight items (too wordy) were removed. This resulted in 8 preoccupation items, 20 repetitive behaviour items, 12 distress/impairment items, and 11 insight items. The final 51-item scale was tested in a small volunteer sample of five adolescents (aged 11 to 17 years, $M = 15.20$, $SD = 2.40$), who reviewed the scale and added further comments on the wording of the items. Only three items were slightly modified in wording after this review.

Study 2

The aim of Study 2 was to investigate the factor structure of the 51 items, and to estimate reliability and convergent and divergent validity of the emergent and confirmed factors. It was predicted that factors would represent the domains of BDD diagnostic criteria. It was also hypothesized that the scale would be positively correlated with existing, validated, single-factor measures of BDD symptoms (i.e., AAI, BDDQ). It was hypothesized the scale would diverge from measures of personality, self-perceived athletic competence, and self-perceived scholastic competence.

Method

Participants

Participants were 582 Australian students in grades 7 to 12 (55% female; $M_{\text{age}} = 13.62$ years, $SD = 1.59$, age range = 11

to 18 years) from a large urban secondary school. Most students endorsed white (84%) or Aboriginal, Torres Strait Islander or Pacific Islander (4%) race/ethnicity. The remaining participants (4%) reported a diverse range of sociocultural backgrounds and 8% of participants failed to complete this question. A total of 24 participants failed to complete all items, and 13 participants had extreme patterned responses. These 37 participants were excluded from the analyses, resulting in a final sample of 545 for the factor analyses. Of the 545, 25 students did not report age, gender or grade level, and five participants failed to complete either the measure of appearance anxiety, or body dysmorphic symptoms, and were excluded from analyses involving these measures.

Procedure

The Griffith University Human Research Ethics Committee and a regional education department ethics committee granted approval for the current study. The participating school was contacted by email, and agreed to participate. Individual student participation required active return of consent forms signed by a parent/guardian. Consent forms were sent electronically to all parents, and a participation rate of 63% was obtained, with 5% of parents declining participation. The remaining nonparticipants did not respond to the contact. Questionnaires were completed in a classroom setting with students requested to observe test conditions, with a researcher and teacher present to answer any questions. Before completing the questionnaire, students were required to provide active consent to participate. In addition to demographic information (e.g., age, grade, gender), participants were required to list three aspects of their appearance (e.g., body part, facial feature, hair, skin) that they were most concerned about, with number 1 being the feature that bothered them the most. The purpose of this was to prime participants to the body part or feature that bothered them the most.

Measures

Youth Body Dysmorphic Symptom Items

Students completed 51 items related to BDD symptoms (or BDS) developed for this study. Items followed a structured alternative method format, whereby participants first endorsed a kind of teenager he or she was most like. For example, "Some teenagers spend a lot of time worrying about how they look" (Option 1): "Other teenagers don't spend a lot of time worrying about how they look" (Option 2). Having endorsed one description, the respondent next selected whether this description was *really true for me* or *sort of true for me*. Each combination of responses was then converted to conform to a scale from 1 to 4, where a

score of 1 was used to indicate the lowest level of symptoms or concerns and a score of 4 was used to indicate the highest level of symptoms or concerns. Thus, in the example given above, the adolescent who first indicates that he/she is like the type of teenagers who “spend a lot of time worrying about how they look” and that this is *really true for me* would receive a score of 4. The adolescent for whom that statement is only *sort of true for me* would receive a score of 3. By contrast, the adolescent who first indicates that he/she is like the type of teenagers who “don’t spend a lot of time worrying about how they look” and that this is *sort of true for me* would receive a score of 2. The adolescent for whom this part of the statement is *really true for me* would receive a score of 1. In addition, several of the items were worded such that the first part of the statement reflects low appearance concerns, and several were worded to first reflect high appearance concerns. This “counterbalancing” is reflected in the scoring of items, where some of the items are scored 1, 2, 3, 4, and some are scored 4, 3, 2, 1. This is to insure that adolescents are tracking the content of the items and are not simply providing random response choices or are always checking the same side of all questions. The final number of items that were worded to first reflect low appearance concerns/high appearance concerns is provided in the results section.

Convergent Validity: Appearance Anxiety and Body Dysmorphic Symptoms

Two measures were completed for the purpose of examining convergent validity. First, the 10-item Appearance Anxiety Inventory (AAI; [24]) was completed to assess BDD symptoms. The AAI is designed to assess obsessive thoughts and repeated behaviours characteristic of BDD. An example item is “I think about how to camouflage or alter my appearance”. Responses ranged from 0 (*never*) to 4 (*always*). The total AAI score was obtained by summing all items. Cronbach’s α for the current sample was 0.92.

Second, participants completed the Body Dysmorphic Disorder Questionnaire-Adolescent Version (BDDQ-A; [38]). The BDDQ-A is a brief screening measure designed to assess BDD symptoms according to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV; [14]). Participants indicated if they have experienced each of the symptoms by selecting *yes* or *no*. An example of an item is “Are you very worried about how you look?” The total BDDQ-A score was obtained by summing all items. The adult BDDQ has good sensitivity (100%) and specificity (89–93%) in psychiatric settings [9, 20], although sensitivity and specificity information has not yet been established for the BDDQ-A. Cronbach’s α for the current sample was 0.75.

Divergent Validity: Personality and Self-Competence

As divergent validity measures, adolescents completed the 10-item openness subscale of the Big Five Inventory (BFI-O; [39]) and two subscales of Harter’s Self-Perception Profile for Adolescents (SPPA; [19]), including the academic (5 items, $n=463$), and athletic (5 items, $n=470$) subscales. On the BFI-O, response option for each item ranged from 1 (*almost never*) to 5 (*almost always*). A BFI-O example item is “I see myself as someone who is original, comes up with new ideas.” Items were summed to create a total openness score. Cronbach’s α in the current sample was 0.67. On the SPPA, items followed a structured alternative method format, whereby participants first endorsed a kind of teenager he or she was most like. For example, “Some teenagers do very well at all kinds of sports” (Option 1), “Other teenagers don’t feel that they are very good when it comes to sports” (Option 2). Having endorsed one description, the respondent next selected whether this description was *really true for me* or *sort of true for me*. Items were re-coded to indicate low (1) to high (4) symptoms for analyses. Responses were averaged, so that higher scores indicated greater perceived academic or athletic competence. Cronbach’s α s were 0.87 for academic and 0.90 for athletic competence in the current study.

Results

Item Reduction and Initial Analyses

After examining correlations of the 51 items, three items were excluded that had low correlations with all other items ($r < 0.30$), and one item was excluded that was highly correlated with another item ($r > 0.80$). The remaining 47 items were evaluated to assess whether they met two assumptions of exploratory factor analysis (EFA; [40]). First, Bartlett’s Test of Sphericity was significant, $\chi^2(1081) = 16371.42$, $p < 0.001$, indicating an acceptable number of significant correlations among variables. Second, the Kaiser–Meyer–Olkin Measure of Sampling Adequacy (KMO) for the overall sample was good (0.98).

Factor Analyses and Reliability

EFA was conducted using principal axis factoring (PAF) with an oblique rotation (direct oblimin). In line with best practices, the number of factors to extract was based on a range of methods, including traditional examination of eigenvalues and variance accounted for in the items, as well as Velicer’s test and parallel analysis [41].

In an initial PAF of all 47 items, seven factors with eigenvalues over 1 (ranging from 1.02 to 20.53) were

Table 1 Factor loadings for the initial 7-factor solution of 47 items

Item #	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
27.	0.73						
4.	0.72						
36.	0.69						
39.	0.57						
47.	0.55						
21.	0.51						
43.	0.50					0.28	
16.	0.46						
32.	0.43					0.32	
7.	0.41						
31.	0.34						0.27
50.	0.33						0.26
45.	0.33						
3.		-0.78					
42.		-0.73					
46.		-0.70					
20.		-0.63					
38.		-0.55					
15.		-0.32					
18.		-0.29					
25.							
24.		-0.27	0.47				
30.			0.44				
26.		-0.31	0.41				
6.			0.39	0.34			
34.	0.34		0.36				
9.			0.36	0.32			
2.							
14.				0.75			
29.				0.65			
5.				0.62			
23.				0.53			
51.				0.50			
1.				0.48			
17.			0.33	0.46			
8.				0.36			
40.				0.29			0.28
11.					0.71		
22.					0.64		
48.					0.54		
13.					0.48		
37.							
41.						0.37	
28.						0.27	
44.				0.28			0.46
49.							0.30
10.			0.25				0.29

Values less than |0.25| are not shown

Items 12, 19, 33 and 35 were removed prior to this initial factor analysis

extracted and rotated, which accounted for 62.03% of the variance in the items. However, many items had high loadings on two or more factors, two factors had very few items with high loadings, and the first three eigenvalues (20.53, 2.63, 1.54) were quite large relative to the further four (see Table 1 for loadings for all 47 items). In addition, in support of three factors, Velicer's MAP test suggested that three factors should be maintained as it resulted in the lowest and almost the same average squared partial correlation as was reported for a 4-factor solution [41]. Considering this evidence for the superiority of a 3-factor solution and the parsimony of three rather than four factors, along with a parallel analysis with results indicating that only the first three eigenvalues were greater than the first three randomly generated eigenvalues [41], a second analysis was conducted to extract and rotate three factors. In this second analysis, 25 of the 47 items loaded highly on at least one of the three factors (0.50 or above) and had no cross-loading on another factor of greater than 0.30. The remaining 22 items had lower loadings, and most of these loaded similarly on more than one of the three factors. Thus, these 22 items were removed and the remaining 25 items were submitted to a PAF that was also constrained to the extraction and rotation of three factors. In this analysis, 23 of the items had high loadings (> 0.50) and no cross-loading of more than 0.35 (8 items on F1, 8 items on F2, 7 items on F3). The two items with loadings below 0.50 were removed and the remaining 23 items were subjected to another PAF.

In this PAF, all 23 items loaded highly on one factor (loadings from 0.461 to 0.841). Following visual inspection of the items, one item that loaded on F1 with the lowest loading (0.46) did not appear to be related to the other items and was therefore removed (Item 45: "Some teenagers are very worried about the look of their body or parts of their body"). Removing this item, left 7 items loading highly on F1, 7 loading highly on F2, and 8 loading highly on F3. To produce a final measure that was parsimonious but short and balanced across the subscales, we also removed the lowest loading item on F3 (Item 6, 0.51), to maintain 7 items on each factor for a total of 21 items. The factor loadings for the retained 21 items are shown in Table 2. Given the item content, F1 was labeled *Impairment/avoidance* (eigenvalue = 9.19, variance = 43.8%, factor loadings ranged from 0.51 to 0.81), F2 was labeled *Preoccupation/repetitive behaviour* (eigenvalue = 2.05, variance = 9.7%, factor loadings ranged from 0.57 to 0.75), and F3 which was labeled *Insight/distress* (eigenvalue = 1.36, variance = 6.5%, loadings ranged from 0.481 to 0.851). Overall, the three factors accounted for 60.0% of the variance in the items. The final number of items that were worded to first reflect high appearance concerns was 13, and the remaining 8 items were worded to first reflect low appearance concerns.

For the seven items on each subscale, Cronbach's α were 0.88 for Impairment/avoidance, 0.87 for Preoccupation/repetitive behaviour, and 0.90 for Insight/distress. The correlations between the subscale scores (formed by summing the 7 items that loaded highly on each factor) were $r = 0.52$ between Impairment/avoidance and Preoccupation/repetitive behaviour, $r = 0.62$ between Preoccupation/repetitive behaviour and Insight/distress, and $r = 0.68$ between Impairment/avoidance and Insight/distress. Given these moderate to strong correlations between the three subscale scores, we estimated the Cronbach's α of all items, which was 0.94. Thus, three factors were supported that conformed to the DSM-5 criteria of combined insight and distress, combined preoccupation and repetitive behaviour, and combined impairment and avoidance. Yet, a total score for the 21 items also produced a high interitem correlation and could provide a reliable assessment of the range of DSM-5 defined BDD symptoms.

The interitem correlations for all 21 items were high for males and for females, with Cronbach's α of 0.91 for males and 0.93 for females. When all 21 items were averaged to form total MY BODI scores, there was a difference in scores, females ($M = 50.07$, $SD = 15.49$) reported more symptoms than males ($M = 38.76$, $SD = 12.85$), $t(518) = -8.80$, $p < 0.001$, 95% CI $[-13.83, -8.79]$. The MY BODI total score and subscale scores were also significantly positively correlated with age (see Table 3).

Convergent and Divergent Validity

Correlations between all measures are shown in Table 3 and M s and SD s of all measures are shown in Table 4. In support of convergent validity, the MY BODI total score and subscales scores were positively associated with the AAI and BDDQ total scores, with correlations ranging from 0.67 to 0.85. Supporting divergent validity of the MY BODI, scores had only small to moderate (but significant) negative correlations with personality, and scholastic and athletic competence, correlations ranging from -0.16 to -0.40 .

Discussion

The aim of the current study was to develop a self-report measure to assess BDD symptoms in adolescents. Given the substantial changes to the classification and definition of BDD in the DSM-5 [1], no measure was located that assessed the full range of BDD symptoms in adolescents using an easy to implement self-report format, keeping in mind strategies to reduce socially desirable responding. Thus, using an innovative questionnaire format, we developed items to assess BDD symptoms in adolescents that were directly aligned with the current diagnostic

Table 2 Factor structure, factor loadings, means, and *SDs* of the 21-item multidimensional youth body dysmorphic inventory

Items	Impairment/avoidance	Preoccupation/repetitive beh	Insight/distress	<i>M (SD)</i>
46. Some teenagers don't enjoy social things with family and friends (parties, family gatherings) because of how they look [Option 1] Other teenagers do enjoy social things regardless of how they look [Option 2]	0.81			1.60 (0.98)
42. Some teenagers prefer to be alone or just stay at home because of how they look [Option 1] Other teenagers don't prefer to be alone or stay home because of how they look [Option 2]	0.76			1.71 (1.05)
3. Some teenagers don't try to avoid going out in public (e.g., shopping, movies, parks) because of their appearance [Option 1] Other teenagers try to avoid going out in public because of the way they look [Option 2]	0.75			1.61 (0.91)
20. Some teenagers don't avoid situations/places or people because of their looks [Option 1] Other teenagers avoid situations/places or people because of their looks [Option 2]	0.67			1.78 (1.04)
38. Some teenagers don't let appearance concerns interfere with going places (to school, social events, or sports) [Option 1] Other teenagers do let appearance concerns interfere with going places [Option 2]	0.61			1.75 (1.06)
26. Some teenagers find that their concern about their looks gets in the way at school, at work, or with friends [Option 1] Other teenagers don't find that concern about their looks gets in the way at school, at work, or with friends [Option 2]	0.57			1.85 (1.08)
24. Some teenagers find it difficult to concentrate at school because they are thinking about how they look (their body, hair, face, etc.) [Option 1] Other teenagers don't find that thinking about their looks interferes with their concentration at school [Option 2]	0.51			1.72 (1.04)
17. Some teenagers spend a lot of time trying to improve their looks (e.g., applying makeup, hair combing, hair styling, hair plucking, shaving, tanning) [Option 1] Other teenagers don't spend a lot of time trying to improve their looks (e.g., applying makeup)		0.75		2.49 (1.20)
23. Some teenagers think about their body, face, or hair often [Option 1] Other teenagers don't think a lot about their body, face, or their hair [Option 2]		0.70		2.85 (1.15)
14. Some teenagers often check their body/facial features [Option 1] Other teenagers do not check their body/facial features often [Option 2]		0.65		3.07 (1.08)
5. Some teenagers often check their body or looks in mirrors [Option 1] Other teenagers rarely check their body or looks in mirrors [Option 2]		0.64		3.05 (1.11)
9. Some teenagers spend a lot of time worrying about how they look [Option 1] Other teenagers don't spend a lot of time worrying about how they look [Option 2]		0.58		2.45 (1.18)
41. Some teenagers often ask others about the way they look or about a particular body part [Option 1] Other teenagers rarely ask others about the way they look or about a particular body part [Option 2]		0.57		1.99 (1.15)
28. Some teenagers often discuss how they look with others or question them about it [Option 1] Other teenagers rarely discuss their looks with others or question them about it [Option 2]		0.57		2.11 (1.14)
27. Some teenagers believe it when others tell them their hair, body or face are fine [Option 1] Other teenagers don't believe it when others tell them their hair, body or face are fine [Option 2]			-0.85	2.25 (1.19)
36. Some teenagers are easily convinced their looks/appearance are normal [Option 1] Other teenagers are hard to convince that their looks/appearance are normal [Option 2]			-0.82	2.23 (1.20)
4. Some teenagers believe it when others tell them their body or looks are normal [Option 1] Other teenagers don't believe it when others tell them their body or looks are normal [Option 2]			-0.78	2.21 (1.15)
39. Some teenagers don't believe their family when they tell them they look OK [Option 1] Other teenagers believe their family when they say they look OK [Option 2]			-0.59	2.24 (1.24)
47. Some teenagers are sure others are making fun of their face, hair, or body parts [Option 1] Other teenagers don't think others are making fun of their face, hair, or body parts [Option 2]			-0.50	2.22 (1.18)

Table 2 (continued)

Items	Impairment/avoidance	Preoccupation/repetitive beh	Insight/distress	<i>M</i> (<i>SD</i>)
31. Some teenagers don't get upset when they think about their looks [Option 1] Other teenagers get really upset when they think about their looks [Option 2]			-0.48	1.93 (1.14)
16. Some teenagers know their appearance worries are not real [Option 1] Other teenagers believe the problem with their body or looks is real [Option 2]			-0.48	2.32 (1.16)

Values less than |0.30| are not shown

Table 3 Correlations of the multidimensional youth body dysmorphic inventory (MY BODI) total and subscale scores with other measures

Measure	MY BODI Total	Impairment/avoidance	Preoccupation/repetitive beh	Insight/distress
AAI	0.85**	0.74**	0.70**	0.77**
BDDQ-A	0.82**	0.67**	0.67**	0.78**
BFI-O	-0.16**	-0.16**	-0.10*	-0.16**
Self-competence—scholastic	-0.34**	-0.32**	-0.23**	-0.33**
Self-competence—athletic	-0.32**	-0.23**	-0.17**	-0.40**
Age	0.24**	0.19**	0.26**	0.17**

* $p < 0.05$. ** $p < 0.01$

AAI appearance anxiety inventory, BDDQ-A body dysmorphic disorder questionnaire-adolescent version, BFI-O The Big Five Inventory—Openness subscale

Table 4 Descriptive information

	Full sample	> 27 AAI ($n = 40$)	BDDQ (Total score of 4) ($n = 80$)
MY BODI ($n = 545$), <i>M</i> (<i>SD</i>)	45.43 (15.41)	70.40 (8.81)	67.19 (9.35)
AAI ($n = 541$) <i>M</i> (<i>SD</i>)	9.90 (8.90)	30.60 (2.85)	23.44 (7.15)
BDDQ-A ($n = 541$) <i>M</i> (<i>SD</i>)	1.42 (1.51)	3.67 (0.69)	4 (0)
Top appearance concerns n (%)	1. Stomach = 51 (9%) 2. Skin = 49 (9%) 3. Hair = 48 (9%) 4. Acne = 26 (5%) 5. Face = 24 (4%) 6. Legs = 23 (4%) 7. Weight = 22 (4%)	1. Stomach = 11 (28%) 2. Legs = 4 (3%) 3. Skin = 4 (3%)	1. Stomach = 20 (25%) 2. Legs = 8 (10%) 3. Skin = 8 (10%)

MY BODI multidimensional youth body dysmorphic inventory, AAI appearance anxiety inventory, BDDQ-A body dysmorphic disorder questionnaire-adolescent version

conceptualisation of BDD. The result was a 21-item measure, the MY BODI, that assesses BDD symptoms across all domains of DSM-5 diagnostic criteria, including preoccupation with appearance concerns, compulsive/repetitive behaviours, avoidance/impairment, and insight/delusional-ity, using a response set aimed to facilitate more reliable reporting of this debilitating condition which is highly secretive amongst sufferers.

Given that BDD and BDS often onset in adolescence [2], are associated with severe impairments [17], and tend to run a chronic course [12], identifying symptoms early may

improve outcomes for youth. However, early detection of BDD is challenging given that patients rarely seek help for their appearance concerns [17]. Youth with BDD are often referred to treatment only after a parent or teacher observes a marked change in affect or significant interference in functioning, depression, social withdrawal, anxiety, or school refusal [42]. However, even when sufferers do present to mental health services, they are unlikely to spontaneously self-disclose their appearance concerns [7] due to shame and embarrassment about symptoms, poor insight, and a desire for non-mental health treatment such as cosmetic

surgery [18]. There is also evidence that adolescents may try to mask or minimize symptoms of BDD [9]. Therefore, we designed this measure for adolescents using a format that has been described as useful for minimizing socially desirable responding and improving disclosure [19]. Specifically, the option of checking either *sort of true for me* or *really true for me* broadens the range of choices over the typical two-choice format. In addition, none of the choices involves the response “false” or “not like me.” Rather, the adolescent is asked to decide on a dichotomous option and then select how *true* it is for him or her. This type of question legitimizes and normalizes either choice. In addition, several of the items were worded such that the first part of the statement reflects low appearance concerns, and several were worded to first reflect high appearance concerns. This is to insure that adolescents are tracking the content of the items and are not simply providing random response choices or are always checking the same side of all questions. This measure should be useful in future research on early risk and development of BDS and BDD in adolescents. It could also serve useful as an assessment tool in clinical practice.

Items developed for the MY BODI were informed by the DSM-5 criterion [1], which has included two major revisions concerning the diagnosis of BDD since the previous edition. These revisions included the reclassification of BDD under a new diagnostic category (i.e., OCRDs) and secondly, the revision and extension of the diagnostic criteria. Specifically, a new criterion has been defined, which requires the presence of repetitive behaviours or mental acts at some point during the course of the disorder. The new DSM-5 criterion for a BDD diagnosis reflects the likely relatedness of BDD to OCRDs and may help to differentiate BDD from other disorders such as major depression or social phobia. Furthermore, repetitive behaviours and thoughts are considered to be key aspects of the clinical picture of BDD, as nearly all individuals with BDD perform at least one repetitive behaviour [15, 17].

Factor Structure and Contribution of the MY BODI

Results from the factor analysis supported a 3-factor, 21-item measure, with excellent validity. The three factors conformed to the DSM-5 diagnostic criteria of impairment/avoidance, preoccupation/repetitive behaviours, and insight/distress. The MY BODI demonstrated convergent validity with existing measures of BDD symptoms, including the AAI and BDDQ. Despite the availability of measures assessing BDD, existing measures were originally developed for use with adults and have largely been used exclusively with adults in clinical research. Furthermore, these measures are either very short (4 items on BDDQ), and/or do not capture the full range of symptoms (i.e., DCQ, COPS, AAI), rely on limited response options (i.e., BDDQ) and were

all developed prior to the revision to diagnostic criteria for BDD. The MY BODI therefore offers a new measure for assessing BDS—developed for youth, validated with youth, and assessing BDD across DSM-5 criteria.

Gender and Age

Although interitem correlations between MY BODI items were similar in males and females, there was a difference in total MY BODI scores for males and females, with females reporting significantly more BDS than males. This finding is consistent with previous research with adolescents in community samples, which has found BDD symptoms are significantly higher in girls than boys [43]. Findings also indicate a weak positive correlation between MY BODI scores and age, indicating higher BDS in older relative to younger adolescents. This is consistent with longitudinal research that found a significant increase in appearance anxiety symptoms from the age of 10 to 15 years [11].

Strengths and Limitation of the Study

The aim of this series of two studies was to develop a scale that would screen for the presence of BDD symptoms in adolescents and presents the first step in the initial development and validation of the scale. MY BODI has a conceptually sound factor structure aligned with current diagnostic criteria for BDD. In addition, the scale has excellent internal consistency and face/convergent/divergent validity. This is the first scale developed specifically to address the need to assess BDD symptoms, aligned with the DSM-5, in adolescents. Given that adolescents with BDD report significant impairments in their functioning, and have high rates of suicide, a scale developed for adolescents to screen for BDS is important, given they are unlikely to report symptoms to clinicians.

Despite methodological rigor in scale development and analyses, results should be considered within certain limitations. First, although representative of the region from which they were drawn, the adolescents who participated were a somewhat homogenous group of typical school students. The scale should be applied and validated in other settings and with more diverse groups of adolescents and children, in and outside Australia. In particular, the measure might be useful with an even younger age group to identify those at risk for BDD as early as possible. However, we anticipate that, given the processes used here to develop items relevant to youth that are easy to understand and follow a structure to reduce socially desirable responding, that the measure will perform well in other groups. Second and probably most important, future research is required to identify and validate clinical cut-scores for the MY BODI. To do this, a complete clinical assessment of BDD will be needed and this should involve

multi-modal and multi-informant assessment (including self report, parent report and clinical interviews) and that this measure is not intended to be a tool for diagnosing BDD but rather a self-report of symptoms and symptom severity which may identify risk for BDD, symptoms of BDD, as well as predict clinical levels of BDD which would then require clinical interviews to confirm diagnosis.

Summary

The reclassification and criterion changes of BDD in the DSM-5 have significant implications for clinical research and practice. This study aimed to develop and evaluate the psychometric properties of the Multidimensional Youth Body Dysmorphic Inventory (MY BODI), the first scale developed for adolescents to assess BDD symptoms according to DSM-5 diagnostic criteria. In our sample of 582 adolescents, results from the factor analysis supported a 3-factor, 21-item measure, with excellent validity. The results of this study provide preliminary validation for a screening tool to identify young adolescents who could benefit from intervention to reduce their BDD-related symptomatology. Future research is needed to extend the results of the present study to identify and validate clinical cut-scores for the MY BODI.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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