

Evaluating perceptual measures of body image disturbance: Relationships between dimensions and their predictive value in eating and body dysmorphic disorder symptomatology

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Abstract

Body image disturbance is a common characteristic of eating and body dysmorphic disorders that can manifest through three theorised dimensions: evaluative, behavioural, and perceptual. Despite this, the perceptual aspect of body image disturbance is not well understood, nor how it relates to the evaluative and behavioural dimensions. This study investigates the relationship between the perceptual and other dimensions of body image disturbance, as well as its potential to predict symptoms of eating disorders and body dysmorphic disorder. Two hundred and sixty-two female undergraduate students between the ages of 17 and 25 completed various assessment measures of body image disturbance, along with clinical measures for eating disorder and body dysmorphic disorder symptoms. The findings revealed strong relationships overall between most perceptual measures and evaluative and behavioural measures. Additionally, multiple regression analyses showed that several perceptual measures were significant, unique predictors of symptoms related to eating disorders and, to a lesser extent, body dysmorphic disorder. These results provide valuable insight into the relationship between the three dimensions of body image disturbance as well as reinforce the importance of the perceptual dimension in understanding body image disturbance. We discuss the study's implications for understanding and addressing eating disorders and body dysmorphic disorder.

Introduction

Body image describes the combination of thoughts, feelings, attitudes and beliefs we have about our body. Individuals may feel many different things about their body and appearance, such as positivity and self-confidence, or dissatisfied and negative (Butterfly Foundation, 2022). People who have poor or negative body image are more vulnerable to develop clinical disorders such as eating disorders and body dysmorphic disorder (Butterfly Foundation, 2022). In particular, dissatisfaction with one's physical appearance is a widespread issue among teenage girls and young women (Swami et al., 2010; Wang et al., 2019); in Australia, more than 90% of young people report some concern about their body image (Butterfly Foundation, 2022). This prevalence raises alarms due to its association with a range of detrimental consequences, including the development of clinical eating disorders (Stice, 2002) and body dysmorphic disorder (Bjornsson et al., 2010), the onset of depressive episodes (Bornioli et al., 2021) and delaying help-seeking behaviours aimed at modifying weight (Solmi et al., 2021).

Research has shown that there is a high correlation between eating disorder and body dysmorphic disorder pathology, indicative of a shared 'body image' pathology known as body image disturbance (Mitchison et al., 2013). Body image disturbance represents alterations in the way one's body shape or weight is experienced (American Psychiatric Association, 2022). Eating disorders and body dysmorphic disorder are severe mental health conditions characterised by persistent disturbances in body image and appearance-related concerns (American Psychiatric Association, 2022). However, the underlying mechanisms of body image disturbance remain largely unknown (Cash & Deagle, 1997).

In the literature, body image disturbance is characterised as a multidimensional construct that can manifest through three theorised dimensions: evaluative, behavioural, and perceptual (Cash & Deagle, 1997; Kling et al., 2019; Prnjak et al., 2022). The *evaluative* dimension refers to the cognitive-affective aspects of body image, such as the negative thoughts and feelings about bodies that often lead to higher levels of body dissatisfaction and weight/shape concerns (Keel et al., 2005; Mölbert et al., 2017; Stice, 2002). The evaluative component of body image disturbance has strong relationships with clinical symptomology: evaluative body dissatisfaction has been shown to be strongly associated with both body dysmorphic concern (Rosen et al., 1996) and eating disorder symptoms (Lavoisy et al., 2008; Villarroel et al., 2011), and body appreciation (a positively related evaluative construct) has been shown to be negatively associated with eating disorder symptoms (Soulliard & Vander Wal, 2019; Tylka & Wood-Barcalow, 2015).

The *behavioural* dimension of body image disturbance refers to body-related behaviours such as body checking and avoidance behaviours (Reas et al., 2002; Rosen et al., 1991) and appearance related safety behaviours (Summers & Cogle, 2018). Body checking behaviours involve intense scrutiny of one's appearance, weight, and shape through actions like ritualistic mirror checking, frequent weighing, and comparing one's body to others (Nikodijevic et al., 2018; Reas et al., 2002; Shafran et al., 2004). In contrast, body-related avoidance behaviours include evading situations that may lead to appearance evaluation, wearing baggy clothes, refusing to be weighed, and avoiding mirrors (Ahrberg et al., 2011; Nikodijevic et al., 2018). Individuals with eating and body dysmorphic disorders exhibit higher frequencies of both body checking and avoidance behaviours compared to those without eating disorders (Nikodijevic et al., 2018; Pellizzer et al., 2018; Sandoz et al., 2020; Senín-Calderón et al., 2020; Summers & Cogle, 2018).

The *perceptual* dimension refers to an altered perception of one's own and/or other people's body or body parts (Farrell et al., 2005; Skrzypek et al., 2001), which can affect body size judgements and lead to body image distortions. While size judgment inaccuracies are common (Kuchler & Variyam, 2003), individuals with more pronounced deficits in accuracy are particularly vulnerable to negative impacts (Ralph-Nearman et al., 2021). For example, individuals with elevated eating disorder symptomatology also show larger errors when judging the size of other bodies, compared with those with low symptomatology (Alexi et al., 2019a). Similarly, individuals with body dysmorphic disorder have a preoccupation with perceived defects or flaws in their physical appearance, which are either not observable by others or appear to be only slight (American Psychiatric Association, 2022). Furthermore, a recent systematic review has shown that individuals with body dysmorphic disorder demonstrate perceptual differences that include deficits in emotional face processing, potential overreliance on detail processing, aberrant eye-scanning behaviours, and a tendency to overvalue attractiveness (Virgili et al., 2024).

Among the dimensions of body image disturbance, the perceptual component of body image and its theoretical and treatment implications for eating disorders is less commonly studied and has been a subject of debate (Farrell et al., 2005). This controversy primarily stems from inconsistencies in findings,

likely related to the variability in the type of assessment methods and the lack of a relationship between body size estimation accuracy and treatment outcome (Farrell et al., 2005). Hsu and Sobkiewicz (1991) have even argued that body size estimation tasks reveal nothing useful about body image disturbance, and that it should be abandoned as a measure of the construct. Other studies downplay the importance of the perceptual dimension, suggesting, for instance, that evaluative measures may be the stronger predictor of clinical symptoms (Prnjak et al., 2022) in comparison to perceptual measures. Still others suggest that perceptual body image disturbance is more important in specific disorders, such as anorexia nervosa (AN; especially for its maintenance; Glashouwer et al., 2019). To summarise, unlike the evaluative and behavioural components, fewer research studies have examined the perceptual component, and those that have often provide conflicting advice related to its importance to the construct of body image disturbance. In relation to understanding body dysmorphic disorder, research has examined visual processing biases (i.e., eye scanning behaviours; Virgili et al., 2024), however not much research has been done on investigating how this effects female body size judgments.

Given the potential consequences of experiencing a poor body image, it is important to determine the individual and collective contributions of each component of body image disturbance to the development and maintenance of symptomatology. However, the dimensions of body image disturbance have often been studied in isolation or in pairs, meaning that a comprehensive understanding of the relationship between all three dimensions is generally lacking or reliant on limited comparisons. For instance, studies using the figure rating scale as a *perceptual* measure of body image dissatisfaction have found it to be correlated with scores on negative body *evaluations* measures (Altabe & Thompson, 1992; Mölbert et al., 2017; Swami et al., 2012). Additionally, negative body *evaluations* have been found to be associated with body avoidance (Bennett et al., 2022; Williams et al., 2018) and checking *behaviours* (Pellizzer et al., 2018). Measures of the *behavioural* dimension have also been linked to *perceptual* body image disturbances, with increased body-related behaviours correlating with larger perceived body size discrepancies (Swami et al., 2012; Zakaria et al., 2022).

The first aim of our study was to assess the relationship between all three dimensions – using multiple measures for each component – as a step towards a comprehensive model of body image disturbance. Our second aim was to determine the relative contribution of measures of each dimension of body image disturbance on eating disorder and body dysmorphic disorder symptoms. Within this second aim, our specific goal was to determine the extent to which perceptual measures, separate from evaluative and behavioural measures, predicted eating disorder and body dysmorphic disorder symptoms.

Based on the existing research, we hypothesised (1) that measures of the perceptual, evaluative and behavioural aspects of body image disturbance would all be significantly associated with each other. We further hypothesised (2) that by including measures of evaluative, behavioural, and perceptual components, a combined model would strongly predict both eating disorder and body dysmorphic disorder symptoms. Finally, when considering the role of perceptual measures specifically, we hypothesised (3) that a limited model containing only perceptual measures of body image disturbance

would still significantly predict eating disorder and body dysmorphic disorder symptoms, with the opportunity to examine unique contributions of different perceptual tasks.

Method

Participants

Three hundred and five female undergraduate students from the University of Western Australia were recruited to participate in the study. To maintain consistency with prior studies on perceptual biases and body image disturbance (Alexi et al., 2018, 2019a; Marinko et al., 2024), the research focused on a demographic of young adult women (17–25 years). We removed participants who did not meet the eligibility criteria for our study. This resulted in data from eight participants who identified as male or other genders being removed from the data set, and from two participants for being outside of the 17–25 age range. Data from an additional fourteen participants were excluded because their data were incomplete, from five participants due to non-realistic BMI values, and from fourteen participants due to incorrect responses in attention checks, which indicated inattention on the tasks. These exclusions resulted in a final sample of 262 participants. Prior to recruitment, a sensitivity analysis was conducted using G*Power software to determine the required sample size for detecting potentially small effect sizes, $f = .08$ (Faul et al., 2007), in a multiple regression with three predictors. The analysis indicated that a sample of 219 participants would be sufficient to achieve an alpha of .05 and power of .95. This sample size is also consistent with a previous analogues study (i.e., similar statistical analyses and design) by Turbett et al., (2019). The experimental procedure was approved by the institutional Human Research Ethics Committee at the University of Western Australia, Protocol 2021/ET000004. The experiment was preregistered on the Open Science Framework (OSF): <https://osf.io/nmq25>. The experimental program and anonymised data are also available on OSF: <https://osf.io/54zec/>.

Materials

Apparatus

Participants completed the experiment on their personal computers. The experimental task was programmed and run within Inquisit 6 (2021) software, and the questionnaires were presented using Qualtrics (2020). Data was transformed in Matlab (MATLAB, 2022) and then analysed in GraphPad Prism 9 (2020) and IBM SPSS statistics Version 27 (2020) software.

Body image disturbance measures

In selecting measures for assessing the three dimensions of body image disturbance, we chose published instruments that have been used in multiple studies and which could feasibly be combined into a single testing session.

Evaluative component measures. Typically, the evaluative dimension is assessed using questionnaires that measure positive appraisals, or body dissatisfaction. Consistent with this, we assessed the evaluative dimension using questionnaires to measure body dissatisfaction and body appreciation.

Body Shape Questionnaire-8C (BSQ-8C; Evans & Dolan, 1993). The BSQ-8C is an 8-item questionnaire that explores the extent of concerns about body shape. The BSQ-8C has high test–retest reliability, internal consistency, and convergent validity (Welch et al., 2012). The Cronbach’s alpha in the current sample was $\alpha = .93$.

Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015). The BAS-2 is a 10-item measure of body appreciation. In the current study, Cronbach’s alpha was $\alpha = .95$.

Behavioural component measures. Behavioural aspects of body image disturbance are typically measured using questionnaires that assess body checking and avoidance behaviours, and thus chose two questionnaires accordingly.

Body Image Avoidance Questionnaire (BIAQ; Rosen et al., 1991). The BIAQ is a 19-item self-report measure that includes questions around avoidance of situations that provoke concern about physical appearance i.e., avoidance of looking in the mirror, wearing tight-fitting clothes and physical intimacy. The BIAQ has adequate internal consistency and test–retest reliability, as well as correlating highly with negative attitudes about weight and shape (Rosen et al., 1991). In the current study, Cronbach’s alpha was $\alpha = .86$.

Body Checking Questionnaire (BCQ; Reas et al., 2002). The BCQ is a 23-item self-report questionnaire that measures the nature and frequency of body checking behaviours. Specifically, it explores checking behaviours related to specific body parts, overall appearance and idiosyncratic checking. The BCQ has demonstrated good internal consistency, convergent validity with measures of eating pathology, and sensitivity for detecting at-risk eating pathology (White et al., 2015). In the current study, Cronbach’s alpha was $\alpha = .95$.

Perceptual component measures. The perceptual dimension of body image disturbance has typically been measured using a variety of tasks. In these tasks, participants make judgments about either their own body or other bodies, so chose one task related to one’s “own body” and another for judgments of others’ bodies. Body adaptation tasks were considered as they have also been shown to be clinically relevant (Brooks et al., 2016), however they were not included for concerns over total task length.

The Figure Rating Scale (Stunkard, 1983). The figure rating scale is used to measure an individuals’ level of body dissatisfaction. The scale consists of nine figures that progressively increase in size. Participants are first asked to select the figure that reflects how they think they look and then to select their ideal figure. The ideal figure score is subtracted from the actual figure score, to indicate how dissatisfied individuals are with their body. Although several versions of the Figure Rating Scale have since been developed, often to reflect more diverse body representations (e.g., Arkenau et al., 2020,

Gardner et al., 2009 & 2010; Swami et al., 2012), the present study employed the traditional Figure Rating Scale as a widely recognised measure of body dissatisfaction and to maintain consistency with prior research (Jayawardena et al., 2021).

The Bodyline Task. The bodyline task (Alexi et al., 2018) was used to assess participants' perceptual judgments of "other" female body size. A benefit of this task is that it provides two separate measures of perceptual body image distortion in a single task; regression to the mean, which is when judgments of magnitude are biased towards the mean of a set (Hollingworth, 1910), and serial dependence, which occurs when the appearance of an object is distorted towards that of a previously viewed stimulus (Fischer & Whitney, 2014). Research has shown that larger serial dependence errors are made by those with elevated eating disorder symptoms (Alexi et al., 2019b), and both forms of perceptual error have been shown to relate to eating disorder symptoms (Alexi et al., 2019b; Cornelissen et al., 2016). Participants make judgments about body size on colour images depicting front facing, real, female bodies clothed in either swimwear or underwear, ranging from extremely thin to extremely large (Alexi et al., 2018).

Clinical measures

Eating Disorder Examination Questionnaire 6 (EDE-Q; Fairburn & Beglin, 1994). The EDE-Q is a widely used self-report questionnaire that assesses both feelings toward and frequency of eating disorder symptoms experienced over the past 28 days. The EDE-Q has demonstrated satisfactory internal consistency ($\alpha = .70-.93$; (Berg et al., 2012) concurrent and criterion validity, and appropriately distinguishes clinical from non-clinical cases (Mond et al., 2006). The Cronbach alpha for the total EDEQ score in the present study was $\alpha = .96$, indicating high reliability.

Dysmorphia Concern Questionnaire (DCQ; Oosthuizen et al., 1998). The DCQ assesses the cognitive and behavioural symptoms of overconcern with an imagined or slight physical defect of one or more body parts (i.e., characteristic of dysmorphia disorders). The DCQ has been shown to have good internal consistency and convergent validity with other measures of body dysmorphic disorder symptoms (Jorgensen et al., 2001; Oosthuizen et al., 1998). The Cronbach's alpha for the DCQ in the present study was $\alpha = .88$.

Demographic questionnaire

A brief questionnaire was included to collect basic demographic information, such as age, gender and self-reported height and weight. Participant's height and weight were collected to calculate the BMI using the formula: $BMI = kg/m^2$.

Procedure

Participants began by reading an information sheet and provided digital informed consent. Using their personal computers, participants first completed the figure rating scale, followed by the bodyline task. Next, participants were redirected to questionnaires in the following order: Demographic Questionnaire, EDE-Q, DCQ, BAS-2, BSQ-8C, BCQ and BIAQ. Since there was a large battery of questionnaires, two attention-check questions were embedded within the BCQ and BAS-2 to ensure data quality. Finally, participants were provided with a debrief sheet and given the opportunity to provide feedback on their experience of the experiment. The experiment was self-paced but took approximately 45 minutes for participants to complete.

Results

Data screening

We screened the data on all questionnaire and task measures for outliers using the outlier labelling rule $g = 2.2$ (Hoaglin & Iglewicz, 1987), such that data that went beyond 2.2 standard deviations from the mean were considered outliers. Ninety-three individual data points were identified as outliers, which represented 3.5% of all the data. All were subsequently winsorised (Tukey, 1992) using $+/- 1$ rule (Gignac, 2023). All variables were assessed for normality and all variables used satisfied guidelines for skew $< |2.0|$ and kurtosis $< |9.0|$ (Curran et al., 1996), and all assumptions were met for analyses. When sphericity assumptions were violated in our ANOVA, results were interpreted using Huynh-Feldt adjusted values (Gignac, 2023).

Additionally, due to its task nature, we ensured that all participants were able to differentiate between body sizes in the Bodyline task, using the same regression slope procedure described in previous studies (Alexi et al., 2018, 2019b; Marinko et al., 2024). We confirmed that all participants could distinguish between body size categories, and consequently no task data was removed.

The relationship between components of body image disturbance

Descriptive statistics for all evaluative, behavioural and perceptual measures of body image disturbance are presented in Table 1 and correlations between these measures are presented in Table 2. These analyses included scores from evaluative (BSQ-8C, BAS-2), behavioural (BIAQ, BCQ), and perceptual (FRS discrepancy scores, BL regression to the mean, BL serial dependence) measures.

Table 1
Descriptive statistics for measures of body image disturbance

	Evaluative		Behavioural		Perceptual		
	BSQ-8C	BAS-2	BIAQ	BCQ	FRS	BL RTM	BL SerDep
<i>M</i>	25.10	32.58	31.39	55.08	0.94	0.91	0.08
<i>SD</i>	9.76	8.23	12.53	18.35	1.01	0.10	0.06

Note. BSQ-8C: Body Shape Questionnaire; BAS-2: Body Appreciation Scale; BIAQ: Body Image Avoidance Questionnaire; BCQ: Body Checking Questionnaire; FRS: Figure rating scale discrepancy; BL RTM: Bodyline Regression to the mean; BL SerDep: Bodyline Serial dependence.

The correlations revealed significant and moderately strong relationships between all evaluative and behavioural measures of body image disturbance, aligning with previous research (Bennett et al., 2022; Pellizzer et al., 2018; Walker et al., 2018; Williams et al., 2018). It is worth noting that the BAS-2 correlated negatively with other measures, because it is a positive scale where lower scores indicate lower levels of body appreciation (Tylka & Wood-Barcalow, 2015). Two of our three perceptual measures (FRS and BL regression to the mean but *not* BL serial dependence) were significantly correlated with *all* the evaluative and behavioural measures, with small to moderately sized correlations. These findings partially supported our first hypothesis of a significant association between all three measures of body image disturbance – notably, BL serial dependence (i.e. 1 of 3 perceptual measures) did not significantly correlate with *any* of the other measures. BMI significantly correlated with all measures apart from BL serial dependence.

Table 2 Correlations between BMI, EDE-Q, DCQ and measures of body image disturbance

	BMI	EDE-Q	DCQ	Evaluative		Behavioural		Perceptual		
				BSQ-8C	BAS-2	BIAQ	BCQ	FRS	RTM	SerDep
BMI	—									
EDE-Q	0.27***	—								
DCQ	0.061	0.66***	—							
BSQ-8C	0.29***	0.90***	0.66***	—						
BAS-2	-0.16**	-0.69***	-0.62***	-0.71***	—					
BIAQ	0.23***	0.74***	0.67***	0.74***	-0.65***	—				
BCQ	0.14*	0.80***	0.66***	0.80***	-0.60***	0.71***	—			
FRS	0.60***	0.51***	0.26***	0.57***	-0.42***	0.41***	0.42***	—		
RTM	0.07	0.26***	0.17**	0.25***	-0.13*	0.21***	0.24***	0.16**	—	
SerDep	0.04	-0.01	0.03	0.01	-0.06	0.02	0.09	-0.03	-0.03	—

Note * Indicates $p < .05$, ** indicates $p < .01$, *** indicates $p < .001$. BMI: Body Mass Index; EDE-Q: Eating Disorder Examination Questionnaire; DCQ, Dysmorphic Concern Questionnaire. BSQ-8C: Body Shape Questionnaire; BAS-2: Body Appreciation Scale; BIAQ: Body Image Avoidance Questionnaire; BCQ: Body Checking Questionnaire; FRS: Figure rating scale discrepancy; BL RTM: Bodyline Regression to the mean; BL SerDep: Bodyline Serial dependence.

Component contributions to eating disorder symptoms

Next, we conducted a regression with all measures included (i.e., attitudinal, behavioural and perceptual), predicting eating disorder (EDE-Q) symptoms. To account for the influence of BMI, we included BMI as a variable (consistent with similar research; Alexi et al., 2019b). The combined regression model was statistically significant, $R^2 = .84$ and adjusted $R^2 = .83$, indicating that a model with all measures included accounted for 84% of the variance and hence, supported our second hypothesis that a combined model would strongly predict eating disorder symptoms. That full analysis, including individual predictor weightings is reported in Supplementary Materials section.

Our more specific aim was to determine whether perceptual measures of body image disturbance alone served as significant predictors of eating disorder symptoms. Although BL serial dependence (BL SerDep) was not correlated with EDE-Q scores, we retained it in the regression analyses as prior work had reported it to be a significant predictor (Alexi et al., 2019b). The regression model was statistically significant $F(4, 257) = 26.99, p < .001$, with an R^2 of 0.30, indicating that combined, the perceptual measures and BMI accounted for approximately 30% of the variance in EDE-Q global scores. This represents a large effect size (Gignac & Szodorai, 2016).

Examination of individual predictors using standardised beta weights revealed that FRS discrepancy scores, $\beta = 0.52, p < .001$ and BL regression to the mean, $\beta = 0.18, p < .001$ were significant individual predictors. BL serial dependence ($\beta = 0.01, p = .809$) and BMI ($\beta = -.060, p = .363$) were not significant predictors of eating disorder symptoms. These findings partially support our third hypothesis that our perceptual measures of body image disturbance would be significant unique predictors of eating disorder symptoms (again, this was only partially supported because BL serial dependence was not a significant predictor).

Component contributions to body dysmorphic disorder symptoms

Next, we ran a regression model including all our body image disturbance measures and BMI (Alexi et al., 2019b), predicting dysmorphic symptoms. The multiple regression model was statistically significant, $R^2 = .57$ and adjusted $R^2 = .56$, indicating that a model with all measures included accounted for 57% of the variance in dysmorphic concern symptoms, supporting our second hypothesis. The full regression analysis, including individual predictor weightings are reported in Supplementary Materials.

Finally, we performed another regression analysis to specifically investigate whether perceptual measures of body image disturbance would predict body dysmorphic disorder symptoms. The regression model was statistically significant, $F(4, 257) = 7.01, p < .001$, with an R^2 of 0.10, indicating that the perceptual measures and BMI accounted for approximately 10% of the variance in DCQ total scores (albeit representing a small effect size; Gignac & Szodorai, 2016). Individual predictors using standardised beta weights revealed that FRS discrepancy scores, $\beta = 0.32, p < .001$, BL regression to the mean, $\beta = 0.13, p = .031$, and BMI, $\beta = -0.15, p = .050$ were significant predictors, although weaker compared to the eating disorder symptoms model. Partially supporting our third hypothesis, these findings indicate that multiple perceptual measures of body image disturbance (i.e. FRS discrepancy scores and BL regression to the mean errors) can independently predict body dysmorphic disorder symptoms, although again, BL serial dependence was not a significant predictor of body dysmorphia symptoms ($\beta = .05, p = .380$).

Discussion

The aims of this study were: one, to investigate the relationships between the three dimensions of body image disturbance – perceptual, evaluative, and behavioural – and two, to determine to what extent these dimensions contribute variance to symptoms of both eating disorders and body dysmorphic disorder, with particular focus on understanding the contribution of the perceptual dimension to these clinical symptoms.

Regarding our first aim, we hypothesised that perceptual, evaluative, and behavioural measures of body image disturbance would significantly correlate. Consistent with this, our findings revealed significant relationships between the perceptual, evaluative, and behavioural dimensions of body image disturbance. These results align with and extend previous research (Altabe & Thompson, 1992; Bennett et al., 2022; Mölbert et al., 2017; Pellizzer et al., 2018; Swami et al., 2012; Williams et al., 2018; Zakaria et al., 2022), now examining multiple measures for all three dimensions within a single study. It is important to note the strengths of the correlations differed and not all correlations were equal. Specifically behavioural and evaluative measures correlated most strongly with eating disorders and body dysmorphic symptoms, in comparison to the perceptual measures. This is consistent with previous research which has shown that evaluative measures may be the stronger predictor of clinical symptoms (Prnjak et al., 2022) in comparison to perceptual measures.

Turning to our second aim, we found that regression models with all body image disturbance measures included significantly predict both eating disorder and body dysmorphic symptoms, consistent with our second hypothesis. Measures of the evaluative and behavioural dimensions were found to be strong individual predictors of both clinical symptoms. Whilst the individual contribution of perceptual measures was small and nonsignificant within the larger model involving eight predictors, our primary interest was around perceptual measures specifically. In models involving only perceptual measures as predictors to directly assess their contribution, we found that two of three perceptual measures were significant predictors of eating disorder and dysmorphic symptoms, though less variance was accounted

for when predicting the latter. Therefore, this partially supported our third hypothesis, i.e., in both models, only one of our three perceptual measures (BL Serial dependence) was not a significant predictor.

Overall, while perceptual measures contributed unique variance to the clinical symptoms, they were not the strongest predictors of clinical symptoms. This result is complementary with previous research that has indicated both evaluative and behavioural measures are stronger predictors of body image disturbance (Hsu & Sobkiewicz, 1991; Prnjak et al., 2022). Toward this point, the FRS (Stunkard, 1983) arguably functions more closely as a measure of dissatisfaction than a 'pure' perceptual measure, as it involves the accuracy of perception but also measures self-evaluation via discrepancy. This may explain its stronger association with other dimensions of body image disturbance (in comparison to regression to the mean and serial dependence), as well as clinical symptom measures.

Nevertheless, despite being weaker predictors, perceptual tasks offer unique advantages. Unlike self-report measures, which to varying degrees rely on participants' self-awareness and language comprehension, perceptual tasks assess implicit processes without typically requiring verbal input or introspection (Dang et al., 2020). Perceptual tasks are also highly adaptable; they can be tailored to target specific features or concerns and often provide multiple measures, such as accuracy and reaction time, to capture nuanced aspects of body image disturbance. These characteristics position perceptual tasks as versatile tools for advancing research in this area while offering practical applications in monitoring treatment progress or conducting longitudinal studies. Indeed, in the context of our results, it is worth considering that self-report questionnaire measures typically exhibit stronger inter-correlations compared to associations between questionnaires and behavioural measures (experimental tasks; Dang et al., 2020), with the differing format between the perceptual tasks and clinical questionnaires potentially driving weaker associations. Despite this, with our results indicating that the perceptual tasks can predict self-reported symptomatology, future research should continue to probe the perceptual domain of body image disturbance, which is an area that remains relatively understudied in the existing literature. Importantly, this future work should consider optimising these measures of perceptual biases, especially considering judgments of 'other bodies' alongside a perceptual measure of self-perception; our results indicate that how individuals evaluate others and themselves can each influence body image perceptions. We also argue that including multiple measures represent all three domains of body image disturbance is an important approach to understand the relationships and relative contributions of all three theorised components.

Our study was not without its limitations. We chose a selection of frequently used, published measures with sound psychometric properties (where available) that independently capture each dimension of body image disturbance, and our data support the unique contributions of each, however future research may incorporate additional, or alternative measures to probe different aspects of these concepts. The online nature of our study also precluded direct observation of participants – we included attention check questions to mitigate data quality issues, but measures that benefit from direct observation could be considered in future studies. Additionally, our sample was restricted to women, who were asked to evaluate female bodies, leaving men's perceptions of male bodies unexplored. Emerging research

highlights a significant rise in these conditions among men (Gorrell & Murray, 2019; Halbeisen et al., 2024; Lavender et al., 2017), with notable differences in presentation. For example, while women often exhibit a drive for thinness, men are more likely to pursue muscularity (Badenes-Ribera et al., 2019; Gorrell & Murray, 2019; Prnjak et al., 2022).. Consequently, future research could build on these findings by including male participants and stimuli that vary in muscularity to better capture gender-specific dynamics (e.g., Arkenau et al., 2020). Finally, the study used a non-clinical sample of undergraduate university females (17–25 years), and our findings revealed evidence of body image disturbance symptoms despite being an unselected sample, and this demographic is known to exhibit heightened eating disorder symptoms and body image concerns (Hart et al., 2011; Volpe et al., 2016). Nevertheless, this limits the investigation of differences between clinical and non-clinical groups, which may be explored more systematically in future research.

In conclusion, this study used a novel approach to examine the interconnectedness of the perceptual, evaluative, and behavioural dimensions of body image disturbance. The significant associations found between these dimensions underscores the complex nature of body image disturbance. While the perceptual dimension's independent contribution to predicting these symptoms was small within the full regression model, it remained clinically relevant when analysed separately. This reinforces the concept of a common underlying structure of body image disturbance, where perceptual distortions play a role in both eating disorders and body dysmorphic disorder (Mitchison et al., 2013). Beyond theoretical insight, these findings potentially inform and motivate more targeted and effective interventions for individuals with body image disturbance.

Declarations

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Conflicts of interest/competing interests. The authors declare no conflicts of interest.

Ethics approval. The study was approved by the UWA Human Research Ethics Office, Protocol 2021/ET000004.

Consent to participate. Informed consent was obtained from all participants involved in the study.

Consent for publication. We only report data from participants that consented their data to be used for research purposes.

Availability of data and materials. The experiment was preregistered on the Open Science Framework (OSF): <https://osf.io/nmq25>. The experimental program and anonymized data are also available on OSF: <https://osf.io/54zec/>.

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