Research Report

Do Body Dysmorphic Traits Translate to Deficits in Body Emotion Recognition?

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Abstract

Recent research has indicated a marked deficit in recognition of facial expressions in those presenting with body dysmorphic disorder (BDD), yet it remains to be investigated whether this deficit translates to body emotion recognition. Using a between-subjects design, the present study used The Body Expressive Action Stimulus Test (BEAST) to measure the effects of body dysmorphic symptoms on the ability to recognise emotions from the body. Results showed a significant deficit in the ability of participants with high levels of BDD traits to recognise sad emotional displays from body language, however, this was not replicated in other emotions. Further, despite the findings of previous studies, those with high levels of BDD traits did not express a recognition bias to negative or neutral emotions. Possible explanations for the results include poor insight, ideas of reference, local processing differences, and hypersensitivity to negative emotion. Future research would benefit from research into clinical populations.

Key Words: Body dysmorphic disorder, emotion recognition, facial perception, recognition bias.

Introduction

Body dysmorphic disorder is a mental illness characterised by a distorted perception of one's appearance, alongside various compulsive and avoidance behaviours. Sufferers commonly fixate on a seemingly minor or imagined imperfection, often associated with an area of the face, and hold an intense fear towards how others perceive them because of it (World Health Organisation, 2019). This can lead to other comorbid mental health issues such as social phobia, panic disorder, obsessive-compulsive disorder, or depressive disorders (Hart, Niemiec, & Phillips, 2017). Symptoms are known to lead to severe impairment in many aspects of the sufferer's life (e.g. work, education, and ability to carry out daily tasks) as well as self-injurious behaviours and suicide attempts (Phillips, McElroy, Keck, Pope, & Hudson, 1993).

The true factors that cause BDD remain unknown. Understanding these factors is imperative for establishing successful treatment options and improving the life outcomes of sufferers (Beilharz, Castle, Grace, & Rossell, 2017). Possible suggestions have focused on visual perception (Madsen, Bohon,

& Feusner, 2013), and neurocognitive functioning (Feusner, J. D., Neziroglu, Wilhelm, Mancusi, & Bohon, 2010) in those with a diagnosis of BDD.

In recent years, some research surrounding BDD has turned towards the emotion recognition capabilities of sufferers and its implications for future treatment strategies. Research thus far has focused on emotion recognition from the face, eyes (Buhlmann, Winter, & Kathmann, 2013), and voice (Buhlmann, Wacker, & Dziobek, 2015). Inaccuracies in facial emotion recognition are present in multiple prior studies. A variety of different methods have been used to conclude these findings. In using the Movie for the Assessment of Social Cognition (MASC), BDD patients were found to have less accuracy in both thought and emotion perception (Buhlmann, Wacker, & Dziobek, 2015). However, this was also true for the Seasonal Affective Disorder (SAD) patients, meaning it is uncertain whether the results reflected a deficit specific for BDD patients or is present in multiple psychiatric illnesses. Toh, Castle, and Rossell (2017) also provided evidence of less emotion recognition accuracy when patients with BDD observed their own face, as well as showing they displayed increased focus on specific features rather than the overall picture. In other research, some studies presented that emotion recognition deficits were only present under certain parameters, such as neutral expressions (Buhlmann, Gleiß, Rupf, Zschenderlein, & Kathmann, 2011), self-referent scenarios (Buhlmann, Etcoff, & Wilhelm, 2006), and all emotions except fear (Grace, Toh, Buchananb, Castle, & Rossella, 2019). This uncertainty in the true nature of the deficit suggests scope for further extensive research on the topic.

Some studies have made references to the reaction times of patients with BDD (Feusner, Bystritsky, Hellemann, & Bookheimer, 2010; Grace, Toh, Buchanan, Castle, & Rossell, 2019). Feusner et al., (2010) reported an overall slower mean reaction time in the BDD group in comparison to healthy controls. Grace et al., (2019) also showed slower reaction times in anger, neutral, and happy expressions, however, they did not find the BDD group to be significantly slower in all emotions overall in comparison to healthy controls. Both experiments used facial emotion recognition tasks, however, they differed in the number of photographs used as well as the number of participants in each group. Feusner et al., (2010) used a total of 32 emotional faces, 32 neutral faces, and 32 oval/circle stimuli, with 12 BDD participants, and 11 healthy controls. Comparatively, Grace et al., (2019) used 200 stimuli of emotional expressions, with 20 BDD participants and 21 healthy controls. It is likely the increased sample sizing and larger scales of testing may have contributed to the differences in the findings of each study.

Recognition Bias has frequently been noted in studies related to emotion recognition in BDD. Participants with BDD commonly misinterpret emotions as negative, suggesting a possible bias for these emotions. Jeffries, Law, and Fineberg (2012) found that surprise and sadness were commonly mistaken for fear in BDD patients. This differed to research by Buhlmann, Etcoff, and Wilhelm (2006), as well as, Buhlmann, McNally, Etcoff, Tuschen-Caffier, & Wilhelm (2004), who instead showed BDD patients commonly misinterpreted expressions as anger. Despite these findings, not all studies concluded a specific recognition bias for BDD participants. In their study Rossell, Labuschagne, Dunai, Kyrios, and Castle (2014) conducted a variety of tests including emotional recognition on 14 patients with BDD and 14 healthy controls. Findings noted that a particular impairment was present in the ability of the BDD group to recognise angry emotions correlated according to their illness severity. However, the study found that both groups had an equal bias when emotions were incorrectly identifying, suggesting that no particular recognition bias was present in the BDD group.

Based on the conclusions of prior studies conducted within this field, the current study aimed to investigate the effect of higher levels of body dysmorphic disorder symptoms on body emotion recognition capabilities. Two hypotheses were proposed. The first

hypothesis states those with higher levels of body dysmorphic symptoms will provide less accurate responses in the body emotion recognition task. The second hypothesis states those with higher levels of body dysmorphic symptoms will display a recognition bias towards negative emotions.

Method

Participants

Participants included 50 anonymised individuals (12 Experimental Group, 38 Control Group) recruited via the research platform 'Prolific'. Participants were automatically excluded from the study if they had a current or prior diagnosis of either BDD or an eating disorder, to reduce possible psychological stress incurred from answering body-focused questions. All participants had normal or corrected-to-normal vision. Participants were reimbursed for their time as per the conditions of the recruitment website, and all provided their informed consent before taking part in the study. The study was approved by Durham University's Psychology Department Ethics Committee.

Measures

The experiment was conducted using a two-part survey developed using 'Qualtrics' (https://www.qualtrics.com/uk/) and posted to the website 'Prolific' (https://prolific.co/) for participants to complete. The first part of the survey used the Appearance Anxiety Inventory (Veale, Eshkevari, Kanakam, Ellison, Costa, & Werner, 2014) to assess the level of BDD symptoms each participant possessed. The AAI consisted of 10 body image-focused statements accompanied by a series of Likert scales to measure the degree to which participants identified with the statement (see appendix 1).

The second component of the survey used The Bodily Expressive Action Stimulus Test (BEAST) (de Gelder & Van den Stock, 2011), to measure the ability of each participant to recognise emotions from body language. The presented stimuli encompassed a total of 100 different stimuli. The stimuli used 20 different actors (10 male, 10 female) who each displayed all 5 emotions. Faces were blurred out to prevent influence from facial expressions (Figure 1).

Figure 1 – Example of one set of stimuli for each of the five emotions presented to participants from The Bodily Expressive Action Stimulus Test (BEAST).

Procedure

Due to COVID-19 restrictions, the study was conducted remotely. As such, participants accessed the study via their own electronic devices, which did not allow for consistency in both how close to the screen participants were and in what dimensions the stimuli was presented. Following an information sheet and consent form, participants were instructed they would be shown a short questionnaire relating to their feelings surrounding their body image. For each statement participants were required to select one response from the following options: "Not at all", "A little", "Often", "A lot", and "All the time". Each response corresponded to a score of 0, 1, 2, 3, or 4, respectively, and a cumulative total was recorded at the end of the survey. Based on this data, participants were divided into two groups of 'High levels of BDD symptoms' (Experimental Group), and 'Low levels of BDD symptoms' (Control Group), with 'High levels of BDD symptoms' determined as a total score of 19 or above on the AAI.

For the second component, participants were instructed that a series of images would be presented on the screen and that they would be required to select from the options which emotion they believed was being expressed by the image. Participants were shown 100 different BEAST stimuli from 10 male actors and 10 female actors, with each actor displaying 5 different emotions. Below each image participants selected whether they believed the emotion being expressed was Angry, Scared, Happy, Neutral, or Sad. Following completion of all 100 stimuli participants were required to read a debrief which concluded the study and provided resources for any body-image related concerns raised by the nature of the AAI.

Statistical Analysis – Accuracy of Emotion Recognition

To determine the effect of body dysmorphic symptoms on body emotion recognition, results from both groups were analysed using Mann-Whitney U independent samples t-tests across the 5 emotions. For each participant, the percentage of correct responses were recorded for each emotion and entered into JASP statistical software for analysis.

Statistical Analysis – Emotion Recognition Bias

For examining potential emotion recognition bias, the number of times each emotion was incorrectly selected when a different emotion was being displayed was recorded as a percentage for each participant. The data was then analysed once again using Mann-Whitney U independent samples t-tests across the 5 emotions through JASP statistical software.

Results

Appearance Anxiety Inventory

The Appearance Anxiety Inventory (Veale, Eshkevari, Kanakam, Ellison, Costa, & Werner, 2014) was used to determine the levels of BDD symptoms a participant exhibited. Based on the AAI scores 12 participants were placed into the experimental group (High levels of BDD symptoms) and 38 were placed into the control group (Low levels of BDD symptoms). For the experimental group, the mean AAI score was 24.33 (SD = 5.18), whereas for the control group the mean AAI score was 11.61 (SD = 5.18), both of which are presented below in Table 1.

Table 1 – Mean AAI scores for each group.

Descriptive Statistics

	AAI Score	
	Control Group	**Experimental Group**
Valid	38	12
Mean	11.605	24.333
Std. Deviation	5.176	5.176
Minimum	1.000	19.000
Maximum	18.000	34.000

Accuracy of Emotion Recognition

A Shapiro-Wilk test was performed to assess whether or not normality could be assumed for the data. The results showed that normality could not be assumed as shown by Table 2 and so a Mann-Whitney U test was applied to the data.

Table 2 – Shapiro-Wilk test for normality.

Test of Normality (Shapiro-Wilk)

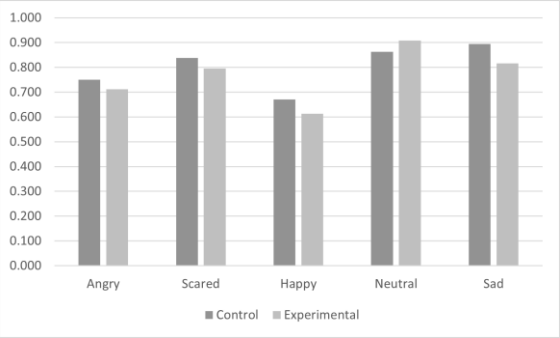
		W	**p**
Angry	Control Group	0.942	0.050
	Experimental Group	0.862	0.051
Scared	Control Group	0.930	0.020
	Experimental Group	0.756	0.003
Happy	Control Group	0.866	< .001
	Experimental Group	0.791	0.007
Neutral	Control Group	0.877	< .001
	Experimental Group	0.911	0.223

Test of Normality (Shapiro-Wilk)

		W	p
Sad	Control Group	0.898	0.002
	Experimental Group	0.853	0.039

Descriptive statistics on the data revealed a trend for greater mean accuracy at identifying the correct emotion in the control group (Angry: M = 0.750; Scared: M=0.838; Happy: M=0.671; Neutral: M=0.863; Sad: M=0.895) when compared to the experimental group (Angry: M = 0.713; Scared: M=0.796; Happy: M=0.613; Neutral: M=0.908; Sad: M=0.817) in all emotions except neutral (Figure 2).

Figure 2 – Mean accuracy for each group under each of the five emotions.



To further investigate this trend, an independent samples Mann-Whitney U test was used to determine whether there were significant differences between the experimental and control groups in the accuracy of body emotion recognition for each of the 5 emotions. For the Sad stimuli, there was a significant difference in the percentage correct scores for the Control Group (Median = 0.90) and the Experimental Group (Median = 0.85); U = 316.00, N_A = 38, N_B = 12, p = 0.021, r_b = 0.386 (two-tailed). This provides partial support for the hypothesis that those with higher levels of BDD symptoms show greater inaccuracy at recognising emotions. For Angry, Scared, Happy, and Neutral stimuli there was no significant difference in the percentage correct scores for the Control Group and the Experimental Group, (Table 3) providing little support for the initial hypothesis.

Table 3 – Mann-Whitney U test for emotion recognition accuracy.

Independent Samples T-Test

	W	df	p	Rank-Biserial Correlation
Angry	233.500		0.455	0.024
Scared	223.500		0.546	-0.020
Happy	218.500		0.590	-0.042
Neutral	197.000		0.766	-0.136
Sad	316.000		0.021	0.386

Emotion Recognition Bias

A Shapiro-Wilk test was performed to assess whether or not normality could be assumed for the data. The results showed that normality could not be assumed as shown by Table 4 and so a Mann-Whitney U test was applied to the data.

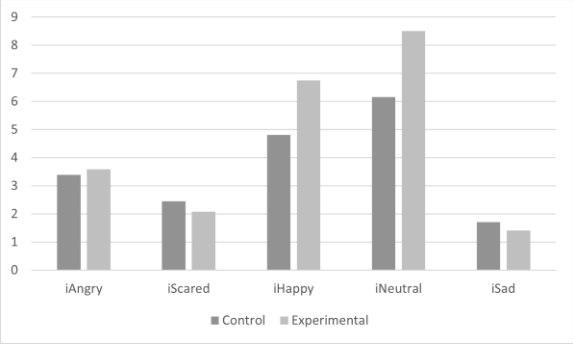
Table 4 – Shapiro-Wilk Test for Normality.

Test of Normality (Shapiro-Wilk)

		W	p
Angry	Control Group	0.851	< .001
	Experimental Group	0.704	< .001
Scared	Control Group	0.795	< .001
	Experimental Group	0.915	0.245
Happy	Control Group	0.904	0.003
	Experimental Group	0.744	0.002
Neutral	Control Group	0.908	0.004
	Experimental Group	0.917	0.259
Sad	Control Group	0.822	< .001
	Experimental Group	0.884	0.100

Descriptive statistics on the data revealed a trend for greater mean recognition bias in the experimental group for Angry (M=3.583), Happy (M=6.750), and Neutral (M=8.500) stimuli when compared to the control group (Angry: M=3.395; Happy: M=4.816; Neutral: M=6.158) (Figure 3).

Figure 3 – Mean recognition bias for each group under each of the five emotions.



To further investigate these differences, an independent samples Mann-Whitney U test was used to determine whether there were significant differences between the experimental and control groups in the emotion recognition bias for each of the 5 emotions. For all stimuli, there was no significant difference between the experimental and control groups for recognition bias of the emotions (Table 5).

Table 5 – Mann-Whitney U test for recognition bias.

Independent Samples T-Test

	W	df	p	Rank-Biserial Correlation
Angry	213.000		0.370	-0.066
Scared	221.500		0.444	-0.029
Happy	198.000		0.250	-0.132
Neutral	174.500		0.113	-0.235
Sad	238.000		0.597	0.044

Discussion

It was hypothesised that those with higher levels of body dysmorphic symptoms will provide less accurate responses in the body emotion recognition task. It was also hypothesised that those with higher levels of body dysmorphic symptoms will display a recognition bias towards negative emotions. Results indicated a significant difference between the control group and experimental group when identifying sad stimuli, however, this difference was not reciprocated between the other four emotions. In addition, despite showing greater mean recognition bias of the experimental group in three of the emotions, these results were not identified as a significant difference when analysing recognition bias of each of the five emotions under the Mann-Whitney U test.

These results mostly diverge from both predicted hypotheses as well as evidence of previous literature. Despite this, the significant result identified of deficits in recognising sad emotions in those with higher levels of BDD symptoms does remain consistent with previous studies. This significant result also partially supports previous indications that those with BDD may have greater inaccuracy at recognising negative emotions specifically (Grace et al., 2019). Results gathered with regards to recognition bias present similar to those in research conducted by Rossell, Labuschagne, Dunai, Kyrios, and Castle (2014). Findings from this study suggested no particular recognition bias was expressed from the BDD group, noting that both groups displayed equal bias when incorrectly identifying emotions.

A variety of different suggestions have been put forward to explain the cause of the emotion recognition deficits described throughout the current literature. One dominant explanation is the overuse of local processing by those with BDD (Feusner et al., 2010). By being overly reliant on specific features, BDD patients may be exhibiting a reduced reaction time with greater inaccuracies due to an inability to view the expression holistically. A suggestion for recognition bias is that people with BDD may be desensitised to the idea of threat due to commonly misinterpreting it in daily life, which may explain observed deficits in threat recognition (Jeffries et al., 2012). In addition, due to often experiencing fear themselves they may have become hypersensitive to the emotion, thus leading to overidentifying the expression in emotion recognition tasks (Jeffries et al., 2012). Other explanations have looked into the symptomology of patients with BDD to explain the root of the deficit. As a

result, it is reasonable to consider that poor insight and ideas of reference, common in those presenting with BDD, may have contributed to the bias expressed in some of the literature to date (Buhlmann et al., 2006). However, due to differences presented in the current study, more definitive studies need to be conducted in this area to confirm this.

Several limitations in the present study can be identified as possible factors affecting the difference in results presented. Given the COVID-19 pandemic, the experiment was conducted through online platforms, this did not allow for control of image size, or resolution, as well as any distractions participants may have experienced. Perhaps the most significant limitation is due to the fact that participants in the experimental group did not have a clinical diagnosis of BDD due to ethical considerations. This provides a possible explanation for the difference between the results gathered in the current study in comparison to previous literature. As such, it is reasonable to suggest that future directions for this field may focus on body emotion recognition within clinical populations.

Possible implications of emotion recognition research for individuals with BDD, concern new treatment options in clinical settings. Buhlmann et al., (2011) has shown some promising research into this area by studying the effect of training on facial emotion recognition deficits. Findings have indicated that, when measuring deficits before and immediately after focused emotion recognition training, BDD patients improved significantly on their accuracy. It is yet to be seen whether the results of such training translate to long term improvement in emotion recognition and subsequent reduction of symptoms. However, if successful this could open new avenues of treatment for the BDD patient population.

To conclude, data analysis showed a significant result in the emotion recognition accuracy of sad emotions in those with high levels of BDD symptoms. No other results identified a significant difference between the two groups concerning either emotion recognition accuracy or emotion recognition bias. As a result, the initial hypotheses can only be said to be partially supported by the finding observed in this study. Since the current study was the first of which to focus on body emotion recognition in those with high levels of BDD symptoms, future directions may benefit from the replication of this study with a higher focus on clinical populations.

Word Count 2895

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Appendices

Appendix 1 – Appearance Anxiety Inventory (AAI).

Appearance Anxiety Inventory

Please tick the box that best describes the way you have felt about your appearance of a specific feature OVER THE PAST WEEK, INCLUDING TODAY

Name_____ Date_____

		Not at all 0	A little 1	Often 2	A lot 3	All the time 4
1	I compare aspects of my appearance to others					
2	I check my appearance (e.g. in mirrors, by touching with my fingers, or by taking photos of myself)					
3	I avoid situations or people because of my appearance					
4	I brood about past events or reasons to explain why I look the way I do					
5	I think about how to camouflage or alter my appearance					
6	I am focussed on how I feel I look, rather than on my surroundings					
7	I avoid reflective surfaces, photos, or videos of myself					
8	I discuss my appearance with others or question them about it					
9	I try to camouflage or alter aspects of my appearance					
10	I try to prevent people from seeing aspects of my appearance within particular situations (e.g., by changing my posture, avoiding bright lights)					

	Total
Avoidance subscale	
Threat monitoring subscale	
Total	