Appetite 59 (2012) 181–186

Contents lists available at SciVerse ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Research report

The influence of emotional intensity on facial emotion recognition in disordered eating

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ARTICLE INFO

Article history:
Received 2 September 2011
Received in revised form 16 April 2012
Accepted 19 April 2012
Available online 24 April 2012

Keywords:
Facial emotion recognition
Emotion misidentification
Emotional intensity
Eating psychopathology
Depression
Alexithymia

ABSTRACT

Significant facial emotion recognition (FER) deficits have been observed in participants exhibiting high levels of eating psychopathology. The current study aimed to determine if the pattern of FER deficits is influenced by intensity of facial emotion and to establish if eating psychopathology is associated with a specific pattern of emotion recognition errors that is independent of other psychopathological or personality factors. Eighty females, 40 high and 40 low scorers on the Eating Disorders Inventory (EDI) were presented with a series of faces, each featuring one of five emotional expressions at one of four intensities, and were asked to identify the emotion portrayed. Results revealed that, in comparison to Low EDI scorers, high scorers correctly recognised significantly fewer expressions, particularly of fear and anger. There was also a trend for this deficit to be more evident for subtle displays of emotion (50% intensity). Deficits in anger recognition were related specifically to scores on the body dissatisfaction subscale of the EDI. Error analyses revealed that, in comparison to Low EDI scorers, high scorers made significantly more and *fear-as-anger* errors. Also, a tendency to label anger expressions as sadness was related to body dissatisfaction. Current findings confirm FER deficits in subclinical eating psychopathology and extend these findings to subtle expressions of emotion. Furthermore, this is the first study to establish that these deficits are related to a specific pattern of recognition errors. Impaired FER could disrupt normal social functioning and might represent a risk factor for the development of more severe psychopathology.

Introduction

Emotional facial expressions provide vital non-verbal cues about the intentions and motivations of others (Darwin, 1872) and, as such, are a crucial aspect of everyday social functioning. Evidence suggests that individuals who exhibit deficits in facial emotion recognition (FER) tend to experience difficulties in their social functioning. For example, Pan, Chen, Chen, and Liu (2009) reported that poor social functioning in a sample of schizophrenic patients was significantly associated with impairments in FER. Consistent with this proposal, Besel and Yuille (2010) demonstrated that participants' FER accuracy predicted the quality of their social skills, as measured by the Empathy Quotient scale (Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004).

There is consistent evidence that clinically diagnosed eating disorders, in particular anorexia nervosa (AN) and bulimia nervosa (BN), are associated with impaired social functioning (Fairburn, Cooper, Doll, & Welch, 1999; Fairburn et al., 1998; Godart, Flament, Perdereau, & Jeammet, 2003; Troop & Bifulco, 2002) and with deficits in FER, particularly of expressions of negative emotions (Kucharska-Pietura, Nikolaou, Masiak, & Treasure, 2004; Zonnevijlle-Bender, van Goozen, Cohen-Kettenis, van Elburg, & van Engeland, 2002). It is plausible that deficits in FER exhibited by individuals with disordered eating might underlie or contribute to the social problems reported by these individuals. Jones, Harmer, Cowen, and Cooper (2008) reported that participants exhibiting sub-clinical levels of disordered eating (indexed by the Eating Attitudes Test; EAT, Garner, Olmsted, Bohr, & Garfinkel, 1982) demonstrated impaired recognition of happy and neutral expressions from static faces. They also reported that participants with high levels of disordered eating exhibited a problem in discriminating anger from other emotions. Similarly, a recent study conducted by Ridout, Thom, and Wallis (2010) revealed that participants with sub-clinical disordered eating (indexed by scores on the Eating Disorders Inventory; EDI, Garner, 1991) exhibited deficits in recognising emotion from dynamic stimuli (short video clips of social interactions). They reported that, compared with low scorers, participants with High EDI scores exhibited a general deficit in emotion recognition, with a particular impairment in recognising expressions of anger. Ridout et al. (2010) proposed that, due to the negative consequences for social functioning, this deficit might

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0195-6663/$ - see front matter © 2012 Published by Elsevier Ltd.
http://dx.doi.org/10.1016/j.appet.2012.04.013

act as a risk factor for more serious eating pathology. In line with this proposal, Ferriter, Eberhart, and Hammen (2010) demonstrated that the quality of social functioning moderated the relationship between depression and eating pathology (EP). Furthermore, Jackson, Weiss, Lunquist, and Soderlind (2005) reported that interpersonal problems in a sample of female college students were associated with a greater prevalence of disordered eating.

Despite the apparent consistency of the results concerning FER deficits in disordered eating, two studies have failed to replicate this finding (Kessler, Schwarze, Filipic, Traue, & von Wietersheim, 2006; Mendlewicz, Linkowski, Bazelmans, & Philippot, 2005). There are a number of plausible explanations for the variation in findings across studies. For example, it is possible that differences in mood may have contributed to impaired FER exhibited in the patients with EP, as previous studies have demonstrated that depression (e.g. Persad & Polivy, 1993; Surguladze et al., 2004) and anxiety (Surcinelli, Codispoti, Montebarocci, Rossi, & Baldaro, 2006) are associated with impaired FER. Furthermore, variations in the personality trait alexithymia might account for differences in FER across studies. Alexithymia is characterised by a difficulty in describing and identifying feelings and with an externally oriented cognitive style. This personality trait is strongly associated with disordered eating (e.g. Beales & Dolton, 2000; Gilboa-Schechtman, Avnon, Zubery, & Jeczmien, 2006) and has been linked to emotion recognition deficits (Lane, Sechrest, Riedel, Shapiro, & Kaszniak, 2000; Ridout et al., 2010). Another factor that might account for the variation in FER deficits across studies concerns the tendency of most previous studies to utilise tests using static pictures of individuals posed in different emotional expressions. These stimuli are comparatively easy to interpret, especially when the faces are presented for relatively long durations (e.g. 2000 ms) and when participants are required to make forced choice decisions from a limited set of emotional labels, which may have masked group differences due to all participants' performance being at or near ceiling. Law Smith, Montagne, Perrett, Gill, and Gallagher (2010) used dynamic facial stimuli that varied in their emotional intensity to examine FER in a group of patients with autism. They reported that the patients exhibited impaired FER, compared with the control group, and this deficit was more evident on trials featuring less intense emotional expressions. Following similar logic it would be expected that, compared with individuals with low levels of disordered eating, participants with high levels would exhibit greater deficits in FER at lower levels of stimulus intensity. The motivation for the present study was to establish if manipulating emotional intensity influenced the pattern of FER exhibited by participants with elevated levels of disordered eating.

In line with research in other disorders (e.g. depression, schizophrenia), the vast majority of previous work into FER deficits in eating psychopathology has considered only accuracy of emotion recognition (i.e. the number or percentage correct). Whilst it is important to demonstrate that the deficits of emotion recognition are robust, there is a need to extend our understanding of this deficit. For example, are the disordered participants making systematic errors or are they just less accurate than the non-disordered participants? Such information is potentially important, as understanding the type of errors could provide a target for an intervention to improve facial emotion recognition in this group. Therefore an additional aim of the current work was to analyse the pattern of emotion recognition errors exhibited by the two groups. Improving the current understanding of FER in these individuals is vital, given the potential link between impaired FER, social functioning deficits and serious eating psychopathology.

Overview and predictions

Two groups of participants, categorised as high or low scorers on the Eating Disorders Inventory (EDI-II; Garner, 1991), were presented with a series of faces, each featuring one of five emotional expressions (happiness, sadness, fear, anger and disgust) at one of four emotional intensities (50%, 75%, 100% and 125%), and were asked to identify the emotion portrayed. Participants also completed self-report measures of mood (Hospital Anxiety and Depression Scale; HADS, Zigmond & Snaith, 1983) and the personality trait alexithymia (Toronto Alexithymia Scale; TAS-20; Bagby, Parker, & Taylor, 1994). It was predicted that high scorers on the EDI would recognise significantly fewer emotional expressions than would low scorers. However, in line with our previous findings (Ridout et al., 2010), this deficit was expected to be particularly evident for angry expressions. Further, it was expected that group differences in FER would be greater when the intensity of expressed emotion was lower. Given that depression, anxiety and alexithymia have all been shown to impair FER the influence of these variables was assessed in the current study. In line with our previous findings (Ridout et al., 2010), it was predicted that impaired anger recognition would be associated specifically with eating psychopathology (body dissatisfaction) and not mood or alexithymia. In order to explore the nature of any observed FER deficits the pattern of errors (misidentifying one emotional expression as another emotion, e.g. angry faces as disgust) will also be examined.

Method

Participants

Eighty female participants were recruited from the undergraduate populations of Aston and Loughborough universities and from a self-help centre for people with concerns about their eating. All participants were categorised according to their scores on the eating subscales of the 2nd edition of the Eating Disorders Inventory (EDI-II; Garner, 1991). As the students and self-referral groups did not form truly orthogonal groups with regard to the EDI scores, the two groups were formed using a median split of the scores on the EDI (median = 18). This is justified as inspection of the EDI scores revealed evidence of a bimodal distribution. Participants with scores of 17 and below were categorised as the Low EDI group (Mean EDI = 6.1, SD = 4.8) and those with scores of 18 and above were classified as the High EDI group (Mean EDI = 39.5, SD = 14.1). It should be noted that the two groups differed significantly in terms of their age (Low EDI group = 22.8 years, SD = 5.5; High EDI group = 26.4 years, SD = 9.8). This study was approved by the research ethics committees of Aston and Loughborough universities. All participants provided full written informed consent prior to taking part in the study.

Assessment of facial emotion recognition (FER)

One Hundred and sixty static images of faces were drawn from the Facial Expression of Emotion: Stimuli and Tests (FEEST: Young, Perrett, Calder, Sprengelmeyer, & Ekman, 2002), each featuring one of five emotions (happiness, sadness, anger, fear and disgust) at one of four emotional intensities (50%, 75%, 100% and 125%). Emotional intensity refers to the extent to which the facial features had changed from neutral (0%) to a particular expression (100%). One hundred and twenty five percent intensity was created by exaggerating the changes to the facial features denoting each expression. Each emotion was portrayed by four male and four female actors. The stimuli were presented to the participants via a computer screen using version 2 of the experimental presentation software Superlab (Cedrus Corporation, 2002). The 160 trials were presented in a new random order for each participant. Each trial consisted of a focus point in the form of a cross (presented for 1000 ms), which