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Diminished facial emotion expression and associated clinical characteristics in Anorexia Nervosa

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ABSTRACT

This study aimed to investigate emotion expression in a large group of children, adolescents and adults with Anorexia Nervosa (AN), and investigate the associated clinical correlates. One hundred and forty-one participants (AN=66, HC= 75) were recruited and positive and negative film clips were used to elicit emotion expressions. The Facial Activation Coding system (FACES) was used to code emotion expression. Subjective ratings of emotion were collected. Individuals with AN displayed less positive emotions during the positive film clip compared to healthy controls (HC). There was no significant difference between the groups on the Positive and Negative Affect Scale (PANAS). The AN group displayed emotional incongruence (reporting a different emotion to what would be expected given the stimuli, with limited facial affect to signal the emotion experienced), whereby they reported feeling significantly higher rates of negative emotion during the positive clip. There were no differences in emotion expression between the groups during the negative film clip. Despite this individuals with AN reported feeling significantly higher levels of negative emotions during the negative clip. Diminished positive emotion expression was associated with more severe clinical symptoms, which could suggest that these individuals represent a group with serious social difficulties, which may require specific attention in treatment.

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1. Introduction

Anorexia Nervosa (AN) is associated with social and emotional difficulties (Bruch, 1962), which are considered to pre-date the onset of the disorder. For example, problems in making and sustaining friendships and higher levels of bullying during childhood (Davies, 2004; Doris et al., 2014; Schutz and Paxton, 2007; Treasure and Schmidt, 2013). Such difficulties are thought to be one of the maintaining factors of the disorder (Ohmann et al., 2013; Treasure and Schmidt, 2013). Individuals with AN report experiencing emotions and social interactions as highly problematic, as well as being more likely to report a poor social network and lack of social support than healthy controls (Hartmann et al., 2010; Tchanturia et al., 2012, 2013; Tiller et al., 1997) and there are also high comorbidity rates between AN and social

anxiety, with one study reporting that 20% of their participants with AN also had a comorbid diagnosis of social anxiety (Kaye et al., 2004). Numerous factors are postulated to influence the social difficulties commonly observed in individuals with AN such as attachment style (Jewell et al., 2015; Rommel et al., 2013), dissociation between cognitive and physiological responses (Nandrino et al., 2011), obsessionality and trait anxiety (Castro et al., 2010; Hambrook et al., 2012; Lulé et al., 2014) and avoidance and low-tolerance of difficult emotions (Harrison et al., 2011; Oldershaw et al., 2012).

In addition, numerous difficulties in socio-emotional processing in individuals with AN have been observed experimentally, such as emotion recognition (Oldershaw et al., 2011), theory of mind (Russell et al., 2009; Tchanturia et al., 2004), alexithymia (Nowakowski et al., 2013) and social anhedonia (Harrison et al., 2014; Tchanturia et al., 2012). There is also evidence to suggest they are present in individuals recovered from AN, as well as emerging evidence of similar difficulties in children and adolescents with AN (Davies et al., 2013; Lang et al., 2015; Rhind et al.,

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2014; Zonnevillage-Bender et al., 2002).

Individuals with AN also appear to have difficulties with emotion expression (Caglar-Nazali et al., 2014; Cardi et al., 2014; Claes et al., 2012; Dapelo et al., 2015; Davies et al., 2011; Dapelo et al., 2016). Facial expressions are known to be universal and are critical in signaling intentions to others and eliciting social responses in interactions (Izard and Izard, 1977). Three studies have described altered emotion expression in individuals with AN with stimuli designed to elicit a specific emotional response. Davies et al. (2011) found that adults with AN displayed less positive emotion than healthy controls (HC) whilst observing a positive film clip, despite subjectively reporting feeling the same levels of positive emotion as HC. The study also reported that patients with AN looked away significantly more during the negative clip. These findings were replicated in children and adolescents with AN (Rhind et al., 2014).

A third study explored emotion expression in AN using an alternative and more detailed scoring method, the Ekman scoring system (Ekman and Friesen, 1978). This study specifically investigated positive emotion expression through examination of the Duchenne smile (a spontaneous smile associated with genuine pleasure, characterised by movements around the corner of the eyes and lips, (Darwin, 1872)) in individuals with AN, BN and HCs. Individuals with AN displayed Duchenne smiles for significantly shorter periods of time in comparison to the BN and HC groups, and the smiles were also of lower intensity (Dapelo et al., 2015).

Altered emotion expression has also been observed across numerous psychiatric disorders that often occur comorbidly with AN, however; the nature of the difficulty with emotion expression is not necessarily the same across the disorders. Results from a meta-analysis investigating emotion expression in individuals with depression produced similar findings to the AN literature with reduced emotion expressivity to positive and negative stimuli. Furthermore, positive emotion expressivity was most reduced (Bylsma et al., 2008). Conversely, studies incorporating participants with anxiety disorders, Post-Traumatic Stress Disorder (PTSD) and Obsessive Compulsive Disorder (OCD) have reported heightened emotion expression in reaction to positive and negative stimuli and also disorder relevant stimuli (Oltmanns and Gibbs, 1995; Orsillo et al., 2004). There are also studies examining emotion expression in autism, however; the methodologies used in the autism field differ significantly from those of other psychiatric disorders and therefore it is difficult to compare outcomes.

The social difficulties observed in AN have been shown to correspond with the high morbidity rates observed in AN and negatively impact treatment outcome (Zucker et al., 2007). In particular, difficulties in signaling your own emotional state are likely to lead to poor treatment engagement and prognosis, as many psychological therapies rely on communicating one's own emotional state and intentions. In addition, suppression of emotional expression is associated with problematic relationships and limited friendship groups, which may hinder the use of social support and often contributes to maintenance of the illness (Doris et al., 2014; Treasure and Schmidt, 2013). It is therefore important to investigate differences in emotion expression further and in particular the associated mechanisms and characteristics, for example illness severity and co-morbidities. A recent study by Lang et al. (2015) found that compared to patients of an older age group, younger individuals with AN displayed the greater difficulties in recognizing emotions through body movements, suggesting that emotion processing may be more difficult for younger age groups with AN. Adolescence is a time of pubertal change, with significant amounts of hormone change and rapid brain development taking place (Blakemore and Choudhury, 2006). It is also a crucial time of social cognitive development, whereby many novel and complex social situations are experienced, aiding the development of social behaviors and abilities such as mentalising. Differential social

experiences during this time can idiosyncratically affect developmental brain processes, such as synaptic pruning (Blakemore, 2012). It is therefore important to consider the consequences of starvation on hormonal changes and brain development, as well as social withdrawal and isolation due to eating disorder (ED) pathology, during this time on social cognitive development for young people with AN, and investigate the effect of age on emotion expression in more depth.

Examining the underlying mechanisms associated with poor emotion expression could be used to develop more targeted treatments for AN. Historically, treatment of ED has focused on changing illness related symptoms however, research findings and clinical observations regarding socio-emotional difficulties are being translated into clinical practice, and treatments are being tailored accordingly by broadening treatment goals (Fairburn et al., 2013; Lynch et al., 2013; Schmidt et al., 2012; Tchanturia et al., 2014). A number of treatments for AN now include modules focusing on socio-emotional processing, including the Maudsley Model of Anorexia Nervosa Treatment for Adults (MANTRA) (Schmidt et al., 2012); Cognitive Remediation and Emotion Skills Training (CREST) (Tchanturia et al., 2014); Emotion Acceptance Behavior Therapy (EABT) for Anorexia Nervosa (Wildes and Marcus, 2011); and Radically Open-Dialectical Behavior Therapy (RO-DBT) (Lynch et al., 2013).

With this in mind the current study aimed to build on the current literature by: (1) providing a replication of Davies et al. (2011), investigating emotion expression in an age diverse group of individuals with AN; (2) investigate demographic and clinical correlates of emotion expression within the AN group; (3) investigate differences in emotion expression between children and adolescents with AN and adults with AN. We hypothesise based on previous research that firstly, participants with AN will demonstrate altered emotion expression in response to film clips designed to evoke emotion. Secondly, altered emotion expression will be associated with a more severe clinical profile. Thirdly, we hypothesise that due to possible interactions between underlying difficulties and typical developmental trajectories children and adolescents with AN will show poorer emotion expression than adults with AN.

2. Methods

2.1. Participants

Sixty-six participants with a DSM-5 diagnosis of AN were recruited for the study (age range 11–47). Child and adolescent AN participants ($N=36$) were recruited from the Child and Adolescent Eating Disorder Service at the South London and Maudsley (SLaM) NHS Trust. Adult AN patients were recruited from both the SLaM inpatient and outpatient treatment programs, the Vincent Square eating disorder clinic, and also from advertisements on the eating disorder charity BEAT's website. Participants were included in the study if they had a body mass index (BMI) of 18 or under (for adults, > 18 years), or an ideal body weight (IBW) of 90% or under (for children and adolescents, < 18 years). Exclusion criteria included a diagnosis of learning disability, psychosis or Autism Spectrum Disorder (ASD).

Seventy-five age, IQ and ethnicity matched controls took part in the study. The ages of the HC group ranged from 11–53 years. From the HC group 39 of the participants were children and adolescents. All HC participants had a BMI over 18 (for adults) or an IBW of 91% or over (if < 18 years of age). HC participants were recruited through advertisements in the local community. Exclusion criteria for the HC group included current or history of a mental health problem, or similar in first degree relatives.

The study was approved by an NHS ethics committee (Ethical approval number: 12/LO/2015).

2.2. Measures

2.2.1. Experimental stimuli

The current study used the same experimental methodology described in Davies et al. (2011, 2013). Participants were presented with positive, negative and

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