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Emotional processing in women with anorexia nervosa and in healthy volunteers

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ABSTRACT

Emotional processing was investigated in patients with anorexia nervosa (AN) and in healthy volunteers (HVs) using self report questionnaires and information processing tasks. Compared to the HVs, patients with AN had lower levels of self reported emotional awareness and expression. They also responded more slowly to, correctly identified fewer emotions and misclassified more emotions in a facial recognition task, and responded more slowly to, and recalled fewer, self-referent emotion words. There were no key differences between the two groups on non-emotional control tasks, suggesting that their deficits are specific to emotional information and not a general feature of the illness. Analysis indicated that some, but not all, of the differences found remained when depressive symptoms were taken into account. Exploratory analysis of sub-groups (medicated vs. unmedicated patients) indicated that those who were on medication may perform very differently from those who were not on medication, including when level of depression is controlled, although it is important to emphasise that these findings are preliminary. The implications of a deficit in emotional processing in those with AN, including discussion of the specific differences found between medicated and unmedicated, are discussed in relation to previous findings in the area. A number of implications for future research, theory and therapy with those with AN are discussed.

Anorexia nervosa (AN) is notoriously difficult to treat (Steinhausen, 2002). Cognitive therapy (CT) is often the treatment of choice, but AN is likely to involve multiple factors in addition to dysfunctional cognitions. One factor that may be involved, both in its cause and persistence, is a deficit in general emotional processing (i.e. of emotional information not linked specifically to patients concerns with eating and weight). Such a deficit was first suggested by Bruch (1973, p254) who described "marked deficiencies in identifying emotional states" amongst those with AN. To date its presence has rarely been studied in people with AN, or indeed in those with eating disorders (EDs) more generally.

Theoretically, emotion and emotional processing are being given an increasingly important role in cognitive theories of EDs (e.g. Cooper, Todd, & Wells, 2009; Fairburn, Cooper, & Shafran, 2003). However, relatively little is known about the precise nature of any deficits or their significance for the practice of cognitive therapy (CT) in those with EDs. In other disorders, a number of emotional deficits which make CT difficult have been described. In borderline personality disorder, for example, lack of emotional awareness has been identified, and it has been suggested that emotional awareness training is an important prerequisite for effective CT (Farrell & Shaw, 1994; Farrell, Shaw, & Webber, 2009). Emotional Awareness Training (Farrell & Shaw, 1994) includes learning to verbally describe and label affective states, and the deficits it is designed to address echo those described by Bruch (1973, p254) in AN. These deficits include inability to recognise, label, and describe emotions in detail, and inability to link feelings with bodily correlates. Without these abilities even relatively simple CT tasks such as recording thoughts, emotions and behaviours, and subsequently identifying links between them, a principle that needs to be grasped and experienced for successful CT, are likely to be impossible.

Even if accurately recognised and labelled, reporting on and recording emotions in therapy also require the ability to express emotional states. More broadly, ability to accurately recognise and express emotions in self and others is widely regarded as crucial in interpersonal and social functioning. Faces in particular provide a rich source of emotional information and mediate communication. Deficits in these abilities may underlie some of the social deficits reported in those with EDs (e.g. Ratnasuriya, Eisler, Szmuckler, & Russell, 1991), and may as well make basic cognitive therapy procedures difficult. Importantly, understanding other people's emotions and understanding and expressing one's own emotions appear to be related, and like social difficulties, may have their origins in early attachment relationships (Fonagy, Gergely, Jurist, & Target, 2002).

Research on emotional processing in EDs has used self report questionnaires as well as objective experimental tasks. Several studies with self report questionnaires, including the Interoceptive Awareness subscale of the Eating Disorder Inventory (EDI; Garner, Olmsted, & Polivy, 1983), indicate those with EDs, including those with AN, do

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have emotional processing deficits (e.g. Garner et al., 1983; Bourke, Taylor, Parker, & Bagby, 1992; Troop, Schmidt, & Treasure, 1995; Eizaguirre, de Cabezon, de Alda, Olariaga, & Juaniz, 2004). There is also some evidence that emotional processing difficulties predict outcome at 3 years (Speranza, Loas, Wallier, & Corcos, 2007), and that improvement of the ED is not strongly related to change in emotional processing (Iancu, Cohen, Yehuda, & Kotler, 2006). However, a relatively small pool of measures has been used, and few studies have controlled for the possible confounding effects of depressed mood. Two promising but untried measures in this context include the Emotional Expressiveness Scale (Hayaki, Friedman, & Brownell, 2002), which investigates ability to acknowledge and express emotions in interpersonal situations, and the Attitudes Towards Emotional Expression Scale (Joseph, Williams, Irwing, & Cammock, 1994), which assesses negative attitudes towards emotional expression.

Experimental techniques have mostly used response to facial stimuli depicting various emotions. Results are somewhat mixed and difficult to interpret, and a limited range of outcome measures has been used, which may not reflect the multidimensional nature of everyday emotional processing. Nevertheless, a small number of relevant studies have been conducted, and the key studies are considered below.

Kucharska-Pietura, Nikolaou, Masiak, and Treasure (2003) found that women with AN had difficulty recognising emotions from facial expressions and vocal tone compared to healthy controls. However, the analyses did not consider individual emotions separately, despite the suggestion that certain emotions may be differentially processed by people with EDs (Jones, Harmer, Cowen, & Cooper, 2008). Only a small number of stimuli were presented, which may have been insufficient to provide an accurate measure of recognition ability. The length of time that stimuli were presented (10 s) might also be considered problematic and not "ecologically valid" given that emotional expressions in real life are usually displayed for significantly shorter time periods (Ekman & Friesen, 1974). Participants chose between nine possible emotions, which included both basic and more complex social emotions — to date most facial expression recognition tasks have used only the six basic emotions described by Ekman and Friesen (1976), and it is possible that basic (e.g. happy, anger) and social (e.g. guilt, jealousy) emotions may be differentially processed. The conclusion that AN patients were particularly impaired in the recognition of negative emotions may also have been unduly influenced by the predominance of negative emotions in the task.

Zonnevylle-Bender, van Goozen, Cohen-Kettenis, van Elburg, and van Engeland (2002) found that adolescents with EDs performed significantly worse on a free-labelling and a forced-choice version of an emotional facial expression recognition task than healthy controls. However, the study included participants with bulimia nervosa (BN), eating disorder not otherwise specified (EDNOS) as well as AN, and it is possible that different diagnoses are associated with differences in emotional processing. Again, the analysis did not consider individual emotions separately.

Unlike the studies discussed so far, Mendlewicz, Linkowski, Bazelmans, and Philippot (2005) employed a computer-based task. This study found no difference between participants with AN and a control group in accuracy or reaction time to five different emotions. Stimulus presentation time was very brief (300 ms) and may have made the task too difficult for both groups. Kessler, Schwarze, Filipic, Traue, and von Wietersheim (2006) also used computerised presentation of emotional face stimuli (including all six basic emotions) and also found no overall difference in the recognition abilities of those with AN and a control group, although they did find that those with AN appeared to be slower to recognise surprise.

One technique that has been found to be particularly sensitive to differences between groups is the Facial Emotion Recognition Task (FERT), which has primarily been used to investigate depression (e.g. Bhagwagar, Cowen, Goodwin, & Harmer, 2004; Hayward, Goodwin, Cowen, & Harmer, 2005). It uses morphed stimuli to provide expressions of different intensities, thus potentially allowing measurement that is more sensitive. It also provides several measures of emotional functioning including accuracy, reaction time and number of misclassifications. This measure has recently been employed with some success to investigate women with high levels of ED symptoms (Jones et al., 2008). Those with high levels of ED symptoms, compared to those with low levels, selected from the top and bottom quartiles of a larger non clinical, community sample, were less accurate at recognising happy faces, and more likely to misclassify faces as angry, and surprised — which could represent a heightened response to the latter two emotions rather than a deficit. The current study is the first to use this task with a clinical ED group.

Deficits in recall of emotional information, with words as stimuli, have also been found in a number of psychiatric disorders, using a range of paradigms (Williams, Watts, MacLeod, & Matthews, 1997). This deficit is particularly associated with depression, where it has an important role in cognitive theory (Beck, Rush, Shaw, & Emery, 1979; Teasdale & Barnard, 1993). As with facial recognition difficulties, such deficits may maintain AN, and also hinder CT. For example, verbal challenging of dysfunctional thoughts often relies on past evidence and experiences to evaluate the usefulness of particular cognitions, typically in the form of evidence for or against unhelpful thoughts. Deficits, for example a bias towards recall of emotional information may make the task of challenging a distressing thought, by retrieving a less distressing thought, difficult. An experimental approach with particular promise employs a self-referent encoding paradigm to assess this ability in which data on recall of emotional information is obtained (Williams et al., 1997). A version of this paradigm adapted for EDs (Hunt and Cooper (2001) found that women with BN recalled significantly fewer emotional words than controls. To date the paradigm does not appear to have been used with in those with AN.

Interestingly, few studies have measured or controlled for level of depression in participants in ED emotional processing research. Depression is commonly co-morbid with EDs, and is also known to be associated with emotional processing deficits (Mendlewicz et al., 2005), thus any effects found in some of the key studies may not have been specific to ED symptoms, but rather to elevated levels of depression in the ED participants. In addition, no study in those with EDs appears to have controlled for general, non-emotional deficits, in order to investigate whether deficits in experimental tasks are emotion-specific or of a more general nature. Finally, the medication status of participants with EDs is rarely recorded (or considered in the analyses) despite the widespread sensitivity of information processing tasks to pharmacological effects. For example, changes have been found in the processing of emotional stimuli in experimental studies, including when self reported mood does not alter (e.g. in a tryptophan depletion study, Hayward, Goodwin, Cowen, & Harmer (2005); and following administration of an antidepressant, Harmer, Mackay, Reid, Cowen, & Goodwin (2006)). Failure to assess medication status may therefore mean important differences between groups are masked by the effects of any drugs that act on the central nervous system.

The current study had five main hypotheses. Compared with healthy participants, it was predicted that those with AN would:

1. show lower levels of emotional awareness and expression of emotions;
2. respond more slowly to, correctly identify fewer, and misclassify more emotions in a facial expression recognition task;
3. respond more slowly to self-referent emotion words in a categorisation task;
4. recall fewer self-referent emotion words in a memory test;
5. show no difference on non-emotional control tasks — famous faces, animal word categorization and animal word recall.

Patients' medication status and level of depression were also recorded in order to explore the role of both these factors in any