A Pilot Study Exploring Performance-based Emotional Intelligence in Anorexia Nervosa

Tchanturia, Ketevan

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A Pilot Study Exploring Performance-based Emotional Intelligence in Anorexia Nervosa

David Hambrook

July 2011

Thesis submitted in partial fulfilment of the requirements for the degree of Doctor in Clinical Psychology (DClinPsy), Royal Holloway, University of London
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Abstract

Previous research has demonstrated that people with anorexia nervosa (AN) experience difficulties in processing emotional states and affective information. Recent explanatory and treatment models of AN and other eating disorders (EDs) hypothesise that these difficulties may contribute to the maintenance of EDs and influence outcome. However, much of the existing literature is based on self-report data, experimental tasks that have questionable ecological validity, and has often not adequately explored potentially confounding effects of IQ and current affective distress. The current study sought to build on existing research and explore emotional processing in AN using a theoretically derived, performance-based measure of emotional intelligence (EI). Specifically, this study explored the abilities of people with AN to identify emotions in themselves and others, to understand emotional meaning, use emotions to facilitate thought, and manage their own and others’ emotions through their behaviour. A cross-sectional design was employed. Thirty two women with AN and 32 age- and IQ-matched healthy control (HC) women were compared regarding their performance on the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT), along with measures of ED symptomatology, indices of clinical severity, anxiety and depression, social functioning, and the Big Five personality dimensions. Results indicated that women with AN demonstrated EI scores within the broadly average range compared to normative data, but exhibited significantly lower overall EI compared to HCs in the current study. The two groups did not differ with regard to specific branches of EI. EI in people with AN was not related to ED symptomatology or indices of illness severity, but it was with anxiety and Agreeableness. Regression analyses indicated that both anxiety and Agreeableness significantly predicted EI over and above diagnostic status. The current study suggests that people with AN may not experience particular difficulties in their abilities to reason about emotions and use emotional knowledge to guide their behaviour. Anxiety was highlighted as important in influencing EI.
Implications for developing emotion-focused interventions in AN are discussed, along with a discussion of the study limitations and suggestions for further research.
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<td>AN</td>
<td>Anorexia Nervosa</td>
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<td>ASD</td>
<td>Autistic Spectrum Disorder</td>
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<td>BMI</td>
<td>Body Mass Index</td>
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<td>BN</td>
<td>Bulimia Nervosa</td>
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<td>CBT</td>
<td>Cognitive Behavioural Therapy</td>
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<td>CREST</td>
<td>Cognitive Remediation and Emotional Skills Training</td>
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<td>ED</td>
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<td>EDE</td>
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<td>EDE-Q</td>
<td>Eating disorder Examination Questionnaire</td>
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<td>EDNOS</td>
<td>Eating Disorder not Otherwise Specified</td>
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<td>EI</td>
<td>Emotional Intelligence</td>
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<td>eToM</td>
<td>Emotional Theory of Mind</td>
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<td>DSM-IV</td>
<td>Diagnostic and Statistical Manual of Mental Disorders (4th Edition)</td>
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<td>GAD</td>
<td>Generalised Anxiety Disorder</td>
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<td>HADS</td>
<td>Hospital Anxiety and Depression Scale</td>
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<td>HC</td>
<td>Healthy Control</td>
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<td>IGT</td>
<td>Iowa Gambling Task</td>
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<td>IQ</td>
<td>Intelligence Quotient</td>
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<td>MANTRA</td>
<td>Maudsley Model of Treatment for Adults with Anorexia Nervosa</td>
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<td>MHS</td>
<td>MultiHealth Systems</td>
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<td>MSCEIT</td>
<td>Mayer-Salovey-Caruso Emotional Intelligence Test</td>
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<td>NEO-FFI</td>
<td>NEO Five Factor Inventory</td>
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<td>OCD</td>
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<td>RME</td>
<td>Reading the Mind in the Eyes task</td>
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<td>ToM</td>
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Chapter 1
Introduction

Introduction to the Thesis
The overarching aim of this thesis is to understand more about emotional processing in people with Anorexia Nervosa (AN). What follows is a description of an original research study which has attempted to explore the concept of performance-based emotional intelligence (EI) in people with AN. Specifically, the study assessed the extent to which people with AN differ from a sample of healthy individuals in their abilities to perceive, use, understand, and manage their emotions adaptively. This was achieved through the use of a performance-based test of EI, derived from an established theory of EI within the general population. The thesis also aimed to address the issue of whether EI in people with AN is associated with specific clinical features of the disorder, including symptomatology and social functioning. It is hoped that the results of this study will inform researchers and clinicians further about the role of emotional functioning in this highly disabling and refractory illness.

Anorexia Nervosa: An Overview
Anorexia Nervosa (AN) is a serious mental illness characterised by self-starvation leading to significant weight loss and low body mass index (BMI; kg/m²). Diagnostic criteria include an intense fear of gaining weight, denial of current low weight and its impact on health, and (in females) amenorrhea (American Psychiatric Association, 2000). AN is frequently associated with compensatory behaviours to prevent weight gain or increase weight loss, such as excessive driven exercise, self-induced vomiting, and/or the misuse of ‘diet pills’, laxatives, and enemas. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; APA, 2000) there are two distinct subtypes of AN; 1) Restricting subtype, when the person has not regularly engaged in binge-eating or purging behaviour during the current episode of AN, and 2) Binge-Eating/Purging subtype, associated with regular binge-eating
and purging behaviour during the current episode. In clinical practice, a significant proportion of patients being treated for AN do not fulfil all the diagnostic criteria as stated in the DSM-IV, yet present with many of the anorectic features listed in the diagnostic criteria for AN (Fairburn & Cooper, 2007). These individuals are usually assigned a diagnosis of eating disorder not otherwise specified, with anorectic features (EDNOS-AN). This diagnosis might be applied to individuals who fulfil most but not all of the diagnostic criteria for AN. For example, an individual will likely be diagnosed with EDNOS-AN if they present with all the other diagnostic criteria for AN, except amenorrhea, or someone who fulfils all other criteria, but denies a fear of fatness or body image concerns. Individuals with EDNOS comprise the majority of people presenting for treatment for disordered eating (Fairburn & Bohn, 2005). Recent research indicates that EDNOS comprises between 40% (Button, Benson, Nollett, & Palmer, 2005; Ricca et al., 2001; Rockert, Kaplan, & Olmsted, 2007) to 60% (Fairburn et al., 2007; Turner & Bryant-Waugh, 2004) of treatment-seekers at specialist tertiary eating disorder (ED) clinics.

The estimated prevalence of AN is highest in adolescent females, and up to 0.7% of this age group may be affected (Fitzpatrick & Lock, 2011). AN is widely recognised as significantly and disproportionately overrepresented in females compared to males, with approximately 90% of patients presenting for treatment in the National Health Service (NHS) being female (National Institute for Health and Clinical Excellence; NICE, 2004). While most people with AN recover completely or partially, around 20% develop a chronic eating disorder (ED), often accompanied by multiple physical and mental health co-morbidities (Steinhausen, 2002). AN also has the highest mortality rate of all psychiatric illnesses, the most common causes of death being medical complications associated with prolonged and severe starvation or suicide (Harris & Barraclough, 1998; Hoek, 2006; Steinhausen, 2002). AN often has a chronic course (Robinson, 2009), high levels of functional and social impairment (Maxwell et al., 2011), and is widely seen as difficult to manage and treat by clinicians (Bamford &
Mountford, 2011). Indeed, treatment outcomes for AN have reportedly not improved significantly in the last 60 years (Steinhausen, 2002), and there is as yet no empirically supported psychological (or pharmacological) treatment of choice for adults with the illness (Fitzpatrick & Lock, 2011; NICE, 2004).

Importantly, AN also has far reaching implications beyond the individual sufferer. People with AN are often hospitalised for inpatient treatment. This is disruptive to school/work, family and social life, and inpatient treatment is an expensive option, with little evidence to support its cost-effectiveness (Romeo, Byford, & Knapp, 2005). In addition, the families and carers of people with AN more often than not experience high levels of distress and carer-burden (Whitney et al., 2005), which can result in their own mental health difficulties (Zablana, McDonald, & Treasure, 2009).

Given all of the above, it is clear that AN is a dangerous and systemically burdensome illness, associated with negative consequences for the individual, carers, and the health system. The current poor treatment outcomes and lack of evidence to support any given individual treatment suggests that much is still unknown about the causes and effective treatments for this illness (Treasure, Claudino, & Zucker, 2010).

**Emotions in AN**

Numerous aetiological and maintenance models for AN have been proposed in recent years which have implicated a multitude of biopsychosocial factors that interact with each other in the genesis and continuation of AN. The aim of these models is twofold; 1) to build valid and reliable explanations of how AN develops and is maintained, and 2) to translate these explanations into clinically effective treatments that target and ameliorate these aetiological and maintenance mechanisms. Recently there has been growing interest in the role of emotional and social factors that might predispose people to AN and maintain the illness once
it has developed. Even from its earliest descriptions in the medical literature, the relevance of emotional and social factors in the origins of AN have been discussed. As early as 1873, Charles Lasègue noted that young women with AN “conceal” their emotions from others (cited in Vandereycken & van Deth, 1990). A century later the prominent psychoanalyst and expert in the field of EDs Hilde Bruch concluded that women with AN have an underlying deficiency in the identification of emotional states (Bruch, 1962) and that they “suffer from definite deficits in the way in which they interpret human relationships and think of their own role in life” (Bruch, 1977, p. 111).

These early insights into the importance of socioemotional factors in AN have since been elaborated and refined through more recent empirical research. In a comprehensive review of the literature on interpersonal functioning in patients with AN, McIntosh et al. (2000) concluded that families of such individuals are often overly enmeshed and rigid, with contradictory communication resulting in submissive behaviour by the AN patient. Aside from their family relationships, individuals with AN also show high levels of shyness and social anxiety (Kaye et al., 2004), view themselves as less socially capable than others (Connan et al., 2007), and have smaller and poorer quality social networks compared to controls (Murphy et al., 2000; Tiller et al., 2006). The clinical importance of addressing socioemotional difficulties in people with AN is also highlighted by recent research demonstrating the link with treatment outcomes. For example, longitudinal treatment studies have found that socioemotional difficulties or ‘impairments’ predict poor treatment outcome, and interfere with treatment adherence and application (Speranza et al., 2007; Zipfel et al., 2000). This is not surprising, as the ability to process emotions is a fundamental requirement of many talking therapies, such as cognitive behaviour therapy (CBT). For example, difficulties in identifying one’s own emotions, or in tolerating distress, are likely to interfere with many of the tasks of cognitive behavioural interventions. Clinicians and carers of people with AN, and even patients themselves have highlighted the emotional difficulties that can be
seen in this illness. For example, a recent study (Kyriacou, Easter, & Tchanturia, 2009) qualitatively analysed the views of AN patients, their carers, and their clinicians in order to establish what the most commonly experienced problems are relating to emotional processing in people with AN. All three groups of participants attended separate focus groups where they were asked to discuss their views about the most common problems related to emotions and emotional processing in AN, and what problems people with AN have in social situations, in interpersonal interactions and in relationships. Thematic analysis was undertaken on transcribed data collected in the focus groups. Overall there was congruence across all three perspectives (patients, carers, clinicians), and considerable difficulties were identified in the areas of emotion recognition, emotional understanding, and the expression and tolerance of emotions. These difficulties appeared to be related to impaired social experiences and interpersonal relationships in people with AN. This study was the first to explore the subjective attitudes and beliefs about emotional difficulties in AN from the perspectives of AN sufferers themselves, along with those who are actively involved in their care and therefore have a more objective experience of the emotional difficulties faced by these individuals.

The following subsections will describe and discuss some of the extant research that has explored emotional processing in people with AN. The term emotional processing is used here to refer to a broad range of cognitive, affective, and behavioural processes. Throughout this chapter, key specific emotional processing terms will be defined and explained. Information will be discussed and organised according to key concepts and research paradigms in the field. Important theories and models which have attempted to explain the role of emotions in AN will also be discussed. An argument will then be proposed as to why it might be particularly useful to explore the concept of performance-based emotional intelligence specifically in AN.
Recognising and Identifying Emotions in Others

The ability to accurately recognise emotions in facial expressions and other nonverbal cues displayed by others plays an essential role in social communication, is underpinned by distinct neural substrates (Adolphs, 2009) and, evolutionarily, is thought to be an adaptation important for survival (Darwin, 1872). Awareness of the emotional state of others provides considerable advantages for the social perceiver. By attending to indicators of another’s emotional state, the perceiver can acquire knowledge helpful for guiding interaction with that person. For example, knowing that someone is sad or angry will lead to a somewhat different interaction than will knowing that they are happy (Davidson et al., 1990). Knowledge of the affective state and related behaviours of others allows the perceiver to tailor their own behaviour toward achieving desirable and successful interactions, and avoiding potentially harmful transactions. The information acquired regarding other people’s emotional states helps guide the perceiver toward socially adaptive encounters. Failure to acquire this information, in contrast, can have negative consequences for social interactions, communication and relationships (Johnston, Miles, & McKinlay, 2008).

The most comprehensively studied domain of emotion recognition is the ability to identify emotions in others’ facial expressions. Emotional facial expressions are particularly salient stimuli for conveying important nonverbal communications to other species members, and, in humans, are immediate indicators of affective dispositions in other people. Facial affect recognition is comprised of perceptual processing, which involves the identification of the geometric configuration of a face, as well as recognition of the emotional meaning of the stimulus and the production of an emotional response in return (Adolphs, 2003). It is well recognised that within the general population there are individual differences in the ability to accurately perceive emotions in others (e.g., Ekman & Friesen, 2003; Haman & Canli, 2004), and that this capacity is selectively impaired in several psychiatric disorders, notably autism spectrum disorders (ASD), schizophrenia spectrum psychoses (Couture et al., 2010), and
psychopathy/antisocial personality disorder (Shamay-Tsoory et al., 2010). Indeed, such impairments in emotion perception may be key contributors to poor functional outcomes and social problems in these disorders (e.g., Muris et al. 1999; Couture et al. 2006; Crespi & Badcock, 2008; Sharp, 2008).

Oldershaw et al. (2011a) have recently conducted a systematic review and meta-analysis of the available published experimental studies that have explored the ability to recognise others emotions in people with AN. A variety of experimental paradigms and stimuli have been employed by researchers to examine emotion recognition in AN, and Oldershaw et al. attempted to synthesise the existing research and quantify any difficulties experienced by the AN population in this domain. Their review found that thirteen published studies had examined recognition of emotion in social-affective stimuli in currently ill AN patients (Harrison et al., 2009, 2010a,b; Jänsch et al., 2009; Kessler et al., 2006; Kucharska-Pietura et al., 2004; Mendlewicz et al., 2005; Oldershaw et al., 2010; Pollatos et al., 2008; Russell et al., 2009; Zonnevylle-Bender et al., 2002, 2004a,b), two of which also examined this ability following recovery from AN (Harrison et al., 2010b; Oldershaw et al., 2010). Eight of these studies examined participants’ ability to recognise basic emotions (anger, fear, sadness, happiness, surprise, disgust) in the faces of others, and five assessed the ability to recognise complex or ‘social’ emotions in other people’s eyes specifically (e.g. distrustful, flirtatious). The majority of studies used a forced-choice paradigm that required participants to identify prototypical emotions expressed in static photographs of faces, as well as other stimuli (e.g. voices), and some studies also tested the ability to free-name emotions expressed in faces.

Oldershaw et al. (2011a) report that findings from the available studies were mixed; four studies indicated no basic emotion recognition deficits in AN relative to healthy controls (HCs) when using forced-choice paradigms (Kessler et al., 2006; Mendlewicz et al., 2005; Zonnevylle-Bender et al., 2004a,b), whilst nine studies suggested AN participants are
impaired relative to HCs (Jänsch et al., 2009; Harrison et al., 2009, 2010a,b; Kucharska-Pietura et al., 2004; Oldershaw et al., 2010; Pollatos et al., 2008; Russell et al., 2009; Zonnevylle-Bender et al., 2002). In order to clarify the extent of any deficits, Oldershaw et al. conducted a meta-analysis of 10 studies that used a forced-choice emotion recognition paradigm with AN patients who were currently ill. The meta-analysis revealed a small to medium pooled standard effect size between AN and HC samples for basic emotion recognition ($d = -0.33$), a large effect size for complex emotion recognition ($d = -1.01$), and a medium strength effect size for all emotion recognition studies combined ($d = -0.51$). Therefore, despite some discrepancy between individual studies, overall facial emotion recognition is impaired in AN relative to HCs. The authors noted that the studies using more complex paradigms such as a free-naming instruction (e.g., Zonnevylle-Bender et al., 2004a & 2004b), use of complex emotions such as ‘ashamed’ and ‘bewildered’ (e.g., Harrison et al., 2009; Oldershaw et al., 2010; Russell et al., 2009) or morphing of stimuli (Jänsch et al., 2009; Mendlewicz et al., 2005) yielded larger effects, suggesting that deficits may be subtle and less detectable using basic emotions in forced-choice paradigms.

Several of the studies included in the Oldershaw et al. (2011a) review also explored whether people with AN have particular difficulties recognising specific emotions or particular emotional valences (positive, neutral, negative). The findings with respect to both of these issues were mixed, with some studies showing specific difficulties and others failing to do so.

In addition to recognition of emotions in other people’s facial expressions, Oldershaw et al. (2011a) reviewed those studies which had investigated Theory of Mind (ToM) and emotional Theory of Mind (eToM) in people with AN. ToM can be defined as the ability to infer another person’s thoughts, beliefs or intentions, and eToM as the ability to make inferences about another person’s emotional state (Oldershaw et al., 2010). Both ToM and eToM enable one to take and understand another person’s perspective and predict his/her behaviour,
leading to effective management of social interaction and the achievement of individual or shared goals. Several studies explored these abilities in people currently ill with AN, using a range of stimuli and paradigms. Overall, most studies found that the ability to correctly infer emotional and mental states in others is impaired in people with AN relative to HCs.

Interestingly, in a further empirical study by Oldershaw et al. (2011b) the performance of people with AN on three tasks measuring eToM was compared with the performance of people with ASD. ASD is well known to be associated with a characteristic deficit in the ability to mentalise and understand other people’s thoughts and emotions (e.g., Baron-Cohen, Ring, Bullmore, Wheelwright, Ashwin, & Williams, 2000; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001; Golan, Baron-Cohen, Hill, & Golan, 2006; Golan, Baron-Cohen, Hill, & Rutherford, 2007). Oldershaw et al. (2011b) found that people with AN performed significantly better than people with ASD on a basic eToM task (identifying emotions in pictures of people’s eyes), but performed equally or worse than the ASD group on two more complex eToM measures, that require integration of social contextual information and non-verbal emotional information.

Whether or not the apparent emotion recognition difficulties outlined here remain following recovery from the acute AN state is unclear at present. Few studies to date have explored this issue by administering facial emotion recognition tests to individuals who have functionally recovered from AN. One study found a pattern for poorer performance among recovered AN participants relative to HCs, particularly for complex emotion recognition (Oldershaw et al., 2010). However, this study was limited by a small recovered sample. A second study (Harrison et al., 2010b) had a larger sample and clearly demonstrated that people recovered from AN had poorer recognition of complex emotions than HCs ($d = 0.25$). One further study has explored ToM, not emotion recognition, in people with AN, the majority of whom had functionally recovered from AN (Gillberg et al., 2010). This study found that selective ToM
problems persisted in people who had previously had AN but had now recovered. While it may be too soon to conclude with any certainty, it is possible that poor emotion recognition and difficulties identifying the emotional and mental states of others persists following recovery, and may represent a trait factor in AN.

All of the research described in this section so far has explored emotion recognition in clinical samples of individuals either currently diagnosed with AN or recovered from the illness, as compared to HCs. It is noteworthy that a small number of studies have also examined emotion recognition in non-clinical samples displaying varying levels of ED behaviours/psychopathology. One study (Jones et al., 2008) compared a non-clinical sample of women with high levels of ED symptomatology with another sample of women with low levels of ED symptoms in terms of their performance on a facial affect recognition test. Women with high levels of ED symptoms were found to be less accurate at recognising happy and neutral faces, but showed no differences in their accuracy in recognising other emotions. Using the same facial affect stimuli, another study (Pringle et al., 2010) recruited a sample of young female dieters (a group vulnerable to the development of EDs) and demonstrated that difficulties in correctly recognising neutral and angry faces predicted ED symptomatology. This limited data from the non-clinical population, whilst preliminary, suggests that difficulties in recognising emotions in others is associated with subclinical ED symptoms in the ‘normal’ population, and that these difficulties might act as a risk factor for the development of EDs. Due to the cross-sectional nature of the data it is not possible to draw definitive conclusions regarding causality however.

**Recognising and Identifying Emotions in Oneself**

The ability to accurately recognise/identify and describe one’s own emotions is widely considered to be crucial for adaptive social and interpersonal functioning. Awareness and communication of one’s emotions are also important for meaningful engagement in
psychological therapies. Without these abilities, relatively simple therapeutic tasks such as recording and reflecting on thoughts, emotions, behaviours, and identifying links between them, are likely to be very difficult. Numerous methodologies have been employed to explore this concept in people with AN.

Oldershaw et al.’s (2011) systematic review included a synthesis of the existing experimental research which has explored recognition of own emotions in AN. Within the experimental literature, a variety of paradigms have been used. Three studies have examined recognition and description of past emotions in the autobiographical memories of AN patients. The results indicate that individuals with AN are slower to retrieve memories and provide more generalised descriptions than HCs (Dalgleish et al., 2003; Nandrino et al., 2006). Doba et al. (2007) extended this research and found that people with AN reported more negative emotions and fewer neutral states in their memories than controls. In a reversed design, Godley et al., (2001) presented participants with an emotional or mental state (“positive and enjoyable”, “negative and worrying”) but asked them to describe situations that would give rise to these emotional states in the next week, year or 5-10 years, then rate the likelihood of the events occurring. AN participants did not differ from HCs or individuals with Bulimia Nervosa (BN) in their ability to recognise and express positive expectations, however they did show higher levels of negative future-directed thinking compared to HCs.

A further three studies have used the Levels of Emotional Awareness Scale (LEAS; Lane et al., 1990) to examine the ability of AN participants to infer emotions in both oneself and others following written information (Bydlowski et al., 2005; Oldershaw et al., 2010; Subic-Wrana et al., 2005). The LEAS is a performance-based measure of the ability to put imagined feelings into words. Participants are presented with vignettes describing difficult or problematic social scenarios involving oneself and a specified other (e.g. a friend, partner). Following events described, participants are then asked to describe, in writing, how they and
the other person would feel in the given situation. The responses are scored using specific structural criteria giving rise to two separate scores (one for self, one for other) and a composite global score. Bydlowski et al. (2005) compared global performance of AN and BN patients with HCs. Overall, both ED groups had lower LEAS scores than HCs, and AN patients performed significantly worse than BN patients. This was replicated in a further study examining self and other performance separately (Oldershaw et al., 2010) where it was demonstrated that AN patients show poorer awareness of both their own and others’ emotions compared to HCs. Subic-Wrana et al. (2005) compared several psychiatric groups on the LEAS and reported no specific ED impairment. However, this study did not include a healthy comparison group and the ED scores reported by Subic-Wrana et al. were poorer than both AN and HC means reported in other studies. More recently, Parling, Mortazavi, and Ghaderi (2010) compared AN patients with HCs and failed to find significant group differences on either of the LEAS subscales. Results for the LEAS therefore appear to be equivocal.

In addition to the experimental or performance-based studies mentioned above, it has consistently been shown that AN patients self-report high levels of alexithymia. Alexithymia is defined as a trait involving four clusters of cognitive and affective characteristics: 1) difficulty identifying one’s own feelings and differentiating feelings from the sensations of physical arousal, 2) difficulty describing feelings to others, 3) scarcity of fantasies, and 4) an externally oriented/concrete thinking style (Taylor, Parker, & Bagby, 1997). Many studies have examined self-reported alexithymia in AN compared to HCs, and AN patients reliably demonstrate significantly more problems in identifying their own feelings and communicating these feelings to others (e.g. Berthoz et al., 2007; Bydlowski et al., 2005; Corcos et al., 2000; Gilboa-Schechtman et al., 2006; Kessler et al., 2006; Schmidt, Jinawy, & Treasure, 1993; Taylor et al., 1996; Zonnevylle-Bender et al., 2002). Alexithymia in AN has also been found to negatively predict treatment outcome, highlighting its clinical importance (Speranza et al., 2007).
An important caveat of the proposed over-representation of alexithymia in AN is the fact that several studies have suggested that heightened alexithymic tendencies might be accounted for by both anxiety and depression. For example, Monteburroccci et al. (2006) found that high alexithymia scores among patients with ED, compared to healthy HCs, were mainly related to negative affect (anxiety and depression). Bydlowski et al. (2005) also found that alexithymia differences between their AN group and HCs disappeared after controlling for depression, but not for anxiety. Eizaguirrea et al. (2004) found that depression actually accounted for the majority of the alexithymia in people with EDs, and that differences between people with EDs and HCs regarding alexithymia scores disappeared after controlling for anxiety and depression. Parling et al. (2010) have also recently reported that alexithymia group differences between AN and controls were non-significant after controlling for anxiety and depression. Depression and anxiety are well-known correlates of starvation and low nutritional status (Pollice, Kaye, Greeno, & Weltzin, 1997), and co-morbid clinical levels of depression and anxiety disorders are common in patients with AN (Godart et al., 2006; Kennedy et al., 1994). As the research discussed here suggests, it is possible that the high rates of alexithymia reported by patients with AN might be more attributable to negative affect (depression and/or anxiety), as opposed to being part of the core psychopathology of AN per se. More research is needed to clarify this issue however, as the current evidence base appears to be rather equivocal.

**Emotion Regulation and Emotion Management**

Emotion regulation has been conceptualised as the processes through which individuals modulate their emotions consciously and nonconsciously to respond to environmental demands (Aldao, Nolen-Hoeksema, & Schweizer, 2010). Individuals deploy regulatory strategies to modify the magnitude and/or type of their emotional experience or the emotion-eliciting event (Gross, 2007). Emotion regulation is theorised to have a goal-oriented
function, such that it assists individuals in achieving desired emotional outcomes, as well as broader goals (Thomson, 1994). In recent years, different theoretical models have highlighted specific emotion regulation strategies as adaptive or maladaptive. Adaptive strategies, such as problem-solving and reappraisal, are associated with positive self-esteem and adaptive social interactions, a greater frequency of positive emotional experiences, more effective coping during stressful circumstances, and a wider variety of possible actions in response to social situations (Gross, 2002; Tugade & Frederickson, 2002). Conversely, difficulties with emotion regulation seem likely to be related to the deployment of inflexible strategies, as opposed to a complete absence of emotion regulation. These maladaptive strategies are argued to have previously served a specific function, but currently work to interfere negatively with social, cognitive and interpersonal functioning (Cole, Michel & O’Donnell Teti, 1994).

Many research studies have explored emotion regulation/management in AN using a range of methodologies. Aldao, Nolen-Hoeksema and Schweizer (2010) recently reviewed the literature concerning emotion regulation across various psychological disorders, including EDs. The review assessed emotion regulation across 6 key strategies that have been highlighted in the literature: acceptance (of emotions), avoidance, problem-solving, reappraisal, rumination, and suppression. It was found that individuals with EDs had greater difficulties compared to controls in all of these areas apart from reappraisal, with medium effect sizes, and acceptance, for which there was no data available.

A limitation of the Aldao et al. (2010) review is that it included studies that looked at emotion regulation in EDs generally (including individuals with AN, BN and binge eating), and therefore did not identify emotion regulatory difficulties in people with AN specifically. One study not included in the review was that by Holliday, Uher, Landau, Collier, and Treasure (2006), who found that people with AN show extreme personality features of emotional...
dysregulation and inhibition, which includes social avoidance, anxiousness and affective liability.

AN sufferers also report difficulty in tolerating distress, and tendency towards emotional avoidance (e.g., Buchholz et al., 2007; Corstorphine et al., 2007; Geller et al., 2000; Hambrock et al., 2011; Lampard et al., 2011; Serpell et al., 1999; Waller, Corstorphine, & Mountford, 2007). Several studies have demonstrated an association between this emotional avoidance or inhibition and ED symptomatology, including weight and shape concern, body dissatisfaction, dietary restraint, and binge eating (Corstorphine et al., 2007; Ross & Wade, 2004; Smolak & Munstertieger, 2002; Wildes, Ringham, & Marcus, 2010; Zaitsoff, Geller, & Srikaneswaran, 2002).

Three further studies have used the multidimensional self-report Difficulties in Emotion Regulation Scale (DERS) (Gratz & Roemer, 2004) in participants with AN (Harrison et al., 2009; Harrison et al., 2010a, b). The DERS measures self-reported non-acceptance of emotional responses, difficulties in engaging in goal-directed behaviour, impulse control difficulties, emotional awareness, access to emotion regulation strategies, and emotion clarity. In each of the three studies that have used this measure, people with AN scored significantly higher (representing greater difficulties with emotion regulation) than HCs on each of the DERS subscales or total score.

Research into emotion regulation and emotional management in AN has predominantly made use of self-report methods. As such, much of what we know about emotion regulation in AN is based on patients’ subjective perceptions of the ways in which they regulate and manage their emotions. One research study that has made use of a quasi-experimental or performance-based design in that of Harrison et al. (2010c). This study used the Rosenzweig Picture Frustration Study (RPFS; Rosenzweig, 1945; Rosenzweig, Clarke, Garfield, & Lehndorff,
1946) to assess the regulation/management of anger and aggression in people with AN. The RPFS is a semi-projective technique that requires participants to respond verbally to a series of socially frustrating events and provides several outcome measures which reflect how participants regulate anger/aggression in social situations. The outcome measures are the direction of anger or aggression (whether it is directed outwardly, towards the self or neutralised) and the type of anger or aggression (whether it is focused on the people involved in the situation, or the obstacle, or whether a solution is proposed). Harrison et al. (2010c) administered the RPFS to a sample of women with AN and compared their results to a sample of HCs. The results showed that there were no group differences in the direction of aggression expressed (i.e., outward vs. inward), however, there were group differences in the type of anger/aggression expressed. Specifically, compared to HCs the people with AN used significantly fewer solution-focused responses, and significantly more responses involving aggression focused on people. The authors suggest, therefore, that the type of aggression used in socially frustrating situations may be different for individuals with AN compared to controls, with AN being associated with fewer solution-focused problem solving strategies but greater use of aggression/anger.

Another experimental paradigm which explores the ability to use emotional information to guide decision-making and subsequent behaviour is the Iowa Gambling Task (IGT; Bechara et al., 1994). In the IGT, participants are presented with four virtual decks of cards on a computer screen. They are told that each time they choose a card they will win some game money. Every so often, however, choosing a card causes them to lose some money. The goal of the game is to win as much money as possible. Every card drawn will earn the participant a reward. Occasionally, a card will also have a penalty. Thus, some decks are ‘bad decks’, and other decks are ‘good decks’, because some will lead to losses in the long run, and others will lead to gains. In order to perform well on the IGT, participants must learn to choose low-risk cards preferable in the long-term (small wins, but smaller losses leading to net gain) over
high-risk cards attractive in the short-term (high wins, but even higher losses leading to overall net loss). The IGT was designed to assess the ability of individuals to make adaptive decisions when presented with complex choices.

Individual differences in IGT performance are linked with the magnitude of anticipatory skin conductance responses (anticipatory SCR; i.e., raised SCR before making high-risk decisions) in the task (Bechara & Damasio, 2002; Bechara, Damasio, Tranel, & Damasio, 1997; Bechara, Tranel, Damasio, & Damasio, 1996). This relationship between IGT performance and SCR provides support for the *somatic marker hypothesis* (Damasio, 1996), which proposes that decision making is influenced by the combination of autonomic emotional representations (such as SCR) and prior experience, which highlight reward and suppress punishment. Thus, people make complex decisions as a result of learnt subconscious autonomic emotional responses (somatic markers) that become associated with particular actions. The IGT can therefore be seen as a measure of choice-based emotion regulation (weighing up of pros and cons based on autonomic emotional information) and outcome-based regulation (adjusting behaviour based on the outcomes of, and emotional responses to, previous choices). Several studies to date have examined IGT performance in people with AN. Four of these studies (Brogan et al., 2010; Cavedini et al., 2004; Cavedini et al., 2006; Tchanturia et al., 2007) demonstrated impairment in IGT performance in AN compared to HCs. In the four studies showing a significant effect, people with AN were more likely to make poor decisions on the IGT by consistently choosing from ‘risky’ or ‘bad’ decks, resulting in greater overall losses. In addition to task performance, anticipatory SCR to wins and losses were recorded in one study (Tchanturia et al., 2007). AN participants showed reduced SCR when choosing cards and following losses than controls. This finding, coupled with poor card choices in AN, is consistent with the somatic marker hypothesis, which predicts that subconscious emotional responding to choices and feedback (as measured by SCR) guides future choices and enhances task performance. In AN, it appears that there is
muted physiological emotional guidance informing decision-making which affects the ability to make advantageous choices. This is consistent with observations of the type of high risk, unpleasant behaviours that people with AN persistently engage in (e.g., prolonged self-starvation, self-harm etc.). At present it is impossible to comment on whether the muted physiological responses noted on the IGT are a physiological consequence of starvation, or whether this is a trait marker for AN, present before and after recovery.

Expression of Emotions
Humans express their emotions in various modalities. One can communicate to others how one is feeling verbally, but also non-verbally through tone of voice, non-verbal utterances, body posture and facial expressions, with six basic emotion expression categories being recognised across cultures (Ekman & Friesen, 1971) as well as in people born deaf and blind (Eibl-Eibesfeldt, 1989; Izard, 1977). Whilst the behavioural expression of emotion is a phenotype common to most humans, there is individual variation in our ability and willingness to express our emotions based on factors such as gender, culture, and psychopathology (Schmidt & Cohn, 2001). For example, it has been shown that women smile more often than men (Briton & Hall, 1995). The ability and willingness to express one’s emotions is generally thought to be associated with good health and social outcomes (e.g., Pennebaker & Braybeal, 2001; Smyth, 1998). Conversely, inhibited expression of emotions is associated with negative outcomes. For example, developmental research shows that depressed mothers’ reduced expression of positive emotion is associated with increased anxiety, distress, and disengagement in the child (Field, 1995). It has also been proposed that attenuated emotion expression in people with psychosis (Kring & Neale, 1996), depression (Berenbaum & Oltmanns, 1992), and facial paralysis (VanSwearingen, Cohn, & Bajaj-Luthra, 1999) may contribute to social difficulties in these populations.
Emotional expression in AN has been explored in a number of studies using various methodologies. Aside from the research that has specifically looked at alexithymia (see above), which involves a difficulty in communicating feelings, several self-report approaches have been used to explore attitudes towards emotional expression in AN. Four studies have found that people with AN score highly on measures of self-silencing. Self-silencing can be characterised as a tendency to avoid expressing negative emotions due to an over-anticipation of distress and discomfort, a heightened sensitivity to the reactions of others, and a preference for stable and emotionally calm environments (Jack & Dill, 1992). Three studies (Forbush & Watson, 2006; Geller, Cockell, Hewitt, Goldner, & Flett, 2000; Hambrook et al., 2011) have found that people with AN report higher levels of self-silencing compared to control groups (both healthy and clinical), and higher levels of self-silencing predict core ED symptomatology, such as drive for thinness and body dissatisfaction in women with AN (Buchholz et al., 2007). Using another self-report measure, Jänsch, Harmer, & Cooper (2009) have also reported that people with AN score significantly higher (denoting greater difficulty) on the Emotional Expressiveness Scale (EES: Hayaki et al., 2002), which assesses self-reported ability to acknowledge and express emotions in interpersonal situations. Fox and Ioannou (2009) also administered the EES to a group of women with ED to a) determine the relation between ED symptomatology and emotional expression, b) test the hypothesis that women with ED inhibit the expression of emotions perceived as threatening, by examining the relation between emotional expression and perceptions of threat from emotion, while partialling out the effects of depression; and c) determine whether perceptions of threat from anger are uniquely associated with emotional inhibition, when the effects of depression and body dissatisfaction are controlled for. They found that a) emotional expression was negatively related with symptomatology, b) perceived threat from emotion, particularly anger, was negatively correlated with emotional expression, when depression was partialled out in the analysis, and c) perceived threat from anger significantly and uniquely predicted emotional inhibition, over and above the effects of body dissatisfaction and depression. They
suggest that anger may be perceived as particularly threatening amongst women with EDs, and play a significant role in the emotional expression difficulties that this population experiences.

Using yet another self-report scale, Pascual, Etxebarria, and Soledad-Cruz (2011) administered the Attitudes towards Emotional Expression Scale (AEES; Joseph, Williams, Irving, & Cammock, 1994) to a sample of people with AN and compared their scores to people with BN. They found that people with AN scored significantly higher (denoting more maladaptive responses) on subscales that measured negative attitudes toward emotional expression and need for control over emotional expression. Meyer et al. (2010) have also demonstrated that more negative attitudes toward emotional expression as measured by the AEES are associated with greater eating, weight, and shape concerns in non-clinical healthy women. Finally, with regard to self-report studies, McLean, Miller, and Hope (2007) explored the meditational role of emotional suppression in the relationship between social anxiety and disordered eating. These authors found evidence to suggest that emotional suppression fully mediated the relationship between social anxiety and ED symptomatology, supporting their hypothesis that unexpressed negative affect is shifted towards the body, thereby promoting symptoms of disordered eating.

Emotional expression in AN has also been tapped using subjective qualitative methods. For example, Serpell, Treasure, Teasdale, and Sullivan (1999), asked AN patients to write two letters to their anorexia, one addressing it as a ‘friend’ and the other addressing it as an ‘enemy’. Using Grounded Theory to analyse the letters, Serpell et al. (1999) found that one of the key perceived benefits of AN, from the perspective of patients, was that restricting their diet and losing weight could suppress painful emotions. Having said this, patients also acknowledged that this was also a downfall of the AN, because it often went ‘too far’ and suppressed everything and left the person without any feeling. Fox (2009) also used
Grounded Theory to analyse interviews about the perception and management of emotion in patients with AN. This analysis revealed that people with AN report negative beliefs about the experience and expression of certain emotions. In particular anger and, to a lesser degree, sadness were discussed as being toxic and shaming and thus were inhibited by the participants. Anger seemed to be particularly toxic, and it appeared to play a triggering role in the rise of ED symptoms. However, there were differences in the beliefs about these emotions and why they should not be expressed. Anger was regarded as being ‘toxic’ and ‘dangerous’, and harmful to both the participant and other people, if it was allowed to be expressed. For sadness, the predominant belief was one of ‘weakness’. The analysis highlighted how people with AN often did not regard themselves as entitled to be an ‘emotional’ human being, or that being ‘emotional’ would lead to rejection from significant others.

Few attempts have been made to explore emotional expression in AN using an experimental research design. One study (Soussignan et al., 2010) has assessed facial emotional expression in AN and HCs objectively in response to explicit food pictures and subliminal affect pictures from the International Affective Pictures System (IAPS; Lang, Beadley, & Cuthbert, 1999). The only significant group difference regarding facial expressiveness was increased smiles in the HC group in response to food pictures. Another study (Davies et al., 2010) has explored facial emotional expression and subjective reports of emotion in response to watching positive (comedic) and negative (sad) film clips in people with AN compared to HCs. Key findings indicated that people with AN were less facially expressive than controls while watching positive and negative film clips, and reported feeling less positive emotion than controls, but an equal amount of negative emotion. People with AN were also found to look away significantly more than controls during the negative film clip. Duration of illness and depression were associated with greater attenuation of positive facial expression, and ED symptomatology was associated with greater attenuation of negative facial expressions. This
experimental study supports self-report studies demonstrating that people with AN inhibit the expression of their emotions and avoid negative affect.

**Summary of Previous Research into Emotional Processing in AN**

The evidence discussed thus far suggests that people with AN experience difficulties across a range of emotional processing domains, demonstrated through objective experimental and subjective self-report and qualitative methodologies. Oldershaw et al. (2011a) identified a significant impairment in the ability to recognise emotions in others, and this deficit appears most pronounced in experimental tasks requiring free-naming of emotions or where participants have to identify complex ‘social’ emotions. Both experimental and self-report paradigms have revealed that people with AN experience problems with awareness, identification, and communication of their own emotions to others. This alexithymic tendency has clinical implications as it negatively predicts long-term treatment outcomes in AN (Speranza et al., 2007). There is experimental data and a larger body of self-report evidence suggesting that people with AN adopt maladaptive emotion regulation strategies and have difficulty in managing their emotions in a healthy way. They may also undergo an altered physiological experience of emotion and therefore have difficulties in incorporating somatic emotional feedback in their decision-making, as demonstrated on the IGT. People with AN also appear to experience difficulties in expressing their emotions, and this difficulty may be particularly pronounced for certain emotional states (e.g., anger) and associated with negative beliefs about emotional expression. Despite these apparently clear conclusions, several limitations with the existing research need to be made clear.

**Limitations of the Existing Evidence-base**

*Need for Replication*

Firstly, an array of heterogeneous methods and paradigms have been employed by different researchers, meaning there is little consistency or replication in research findings. Oldershaw
et al.’s (2011a) systematic review and meta-analysis of emotion recognition experimental studies attempted to synthesise and statistically quantify the existing research results in this area; however, it also highlighted the clear need for further research to clarify and replicate the already observed findings. Regarding emotion regulation, the recent review by Aldao et al. (2010) was helpful in defining the difficulties faced by people with EDs generally when it comes to emotion management. However, their review adopted a ‘transdiagnostic’ view of EDs, and considered emotion regulation in EDs broadly, without delineating emotion regulation strategies in people with AN specifically. This loss of information may hide important differences between people with AN and other EDs.

Over-reliance on Self-report Data

Much of the evidence regarding emotional functioning in AN is based on self-report data, where individuals are asked to rate their beliefs and attitudes about their emotional processing. This is an important limitation to note for several reasons. Within the general psychological literature there are many criticisms of self-report data. For example, self-report measures of emotional functioning often ask people to imagine or remember how they behave, think, or feel in particular types of or specific situations. Such a task obviously requires the use of one’s memory to recall one’s previous experiences. Across a wide variety of tasks, memory for specific episodic details declines as a power function of time since encoding (i.e., a steep loss initially, a more gradual loss thereafter; Rubin & Wetzel, 1996). Memory for emotional events is no different. There are two consequences to this steep loss of episodic information. First, more memorable moments or details of an emotional event disproportionately affect retrospective estimates of emotion (Kahneman, 1999). This is a bias due to episodic memory. Second, there is a gradual decline in the accessibility of episodic information and therefore an increased reliance on more generalised beliefs about emotion to fill in the details. This is a bias due to semantic memory. As such, when people are asked to report on how they have felt in past specific or general situations, their responses will
inevitably be biased by the memory processes required to access this information, and as a result their reports will not necessarily be a true reflection of reality (Robinson & Clore, 2002).

Furthermore, Cook and Campbell (1979) have pointed out that when people answer self-report questionnaires they a) tend to report what they believe the researcher expects to see, or b) report what reflects positively on their own abilities, knowledge, beliefs, or opinions. Considering the description of individuals with AN as ‘people pleasers’ (Cohn & Lemberg, 1998) and the fact that AN is associated with lack of insight or self-awareness (Konstantakopoulos et al., 2011), this population may be disproportionately influenced by social desirability characteristics associated with self-report questionnaires. A recent study has highlighted the discrepancy between self-report and performance-based assessments of cognitive functioning in AN (Lounes, Khan, & Tchanturia, 2011). This study found poor correspondence between a self-report measure of cognitive flexibility and an experimental performance-based neuropsychological assessment of cognitive flexibility, suggesting that there is a discrepancy between how flexible people with AN think they are compared to how flexible they actually are. Another study has also highlighted the need for objective performance-based assessments of emotional functioning specifically in AN. Parling et al. (2011) explored alexithymia and emotional awareness in people with AN using both a self-report measure (the Toronto Alexithymia Scale or TAS-20; Bagby, Parker, & Taylor, 1994) and a performance-based measure (the LEAS; Lane et al., 1990). The authors found that people with AN had higher alexithymia scores on the self-report measure compared to HCs, but equivalent scores on the performance-based measure. These findings suggest that AN patients may believe that they have difficulties in identifying and reporting emotions, but actually perform as well as the control group when confronted with the actual task of identifying and reporting their emotions. Arguably, therefore, performance-based experimental paradigms provide a more objective and realistic measure of a person’s
emotional processing abilities. This is, of course, not to say that beliefs and attitudes about emotional processing are not important. Clearly, many psychological therapies aim to specifically target people’s beliefs about emotions, and these may be particularly important areas to address in people with AN. However, it is very important not to confound beliefs about emotions with actual behaviour, and it is true to say that at times some of the research into emotional functioning in people with AN has done this.

*Ecological Validity of Experimental Research*

Whilst experimental performance-based assessments of socioemotional processing may be preferable to self-report data, these performance-based assessments need to be ecologically valid if they are to tell us anything meaningful how about how people with AN process emotions in their day-to-day lives. It can be argued that some of the performance-based measures that have been used to date possess questionable ecological validity. For example, the Reading the Mind in the Eyes task (RME; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) has been used in a number of studies to assess eToM in people with AN (e.g., Oldershaw et al., 2010; Harrison et al., 2010a, b). The RME has recently been criticised for its low ecological validity because it asks people to identify emotions from the eye region of the face only, it uses static images, and the task does not take into consideration social context. When inferring another person’s mental or emotional state, we do not just see their eyes but rather their full facial expression and their body language. In addition, when inferring other’s mental states we also rely on verbal information, tone of voice, gestures and inflection. As such, the extent to which the RME relates to everyday social interaction has been questioned (Johnston, Miles, & McKinlay, 2008). The IGT, used to assess decision making and the somatic marker hypothesis, can also be criticised with the regard to the extent to which it measures processes involved in complex real-life decision making. As such, there is arguably a need for more research into emotional functioning in AN using more ecologically valid assessments.
Potential Confounds

A further related limitation is that much of the existing research into emotional processing in people with AN has not controlled for the potentially confounding effects of anxiety, depression, and/or cognitive functioning in influencing people’s self-reported beliefs/attitudes about emotions and their objective performance on experimental tasks. Despite the high prevalence of depression and anxiety disorders in those with EDs (e.g., Godart et al., 2006; Kennedy et al., 1994; Pallister & Waller, 2008), only a small proportion of the studies reviewed above statistically controlled for anxiety or depressive symptoms. Thus some of the significant effects observed may be due to general affective distress, rather than any ED-specific impairment. This is particularly relevant given that both anxiety and depression are known to be associated with both emotional processing deficits and characteristic biases in the processing of, for example, negative information. It is noteworthy that in several studies where anxiety and/or depression have been controlled for, group differences between people with AN and HCs on measures of emotional processing disappear. For example, Castro et al. (2010) compared people with AN with HCs on a facial affect recognition test and measures of IQ and clinical symptoms, including anxiety and depression. The results indicated that the ability to recognise sadness in others was predicted by a diagnosis of AN, BMI, and obsessive-compulsive symptoms; however, the strongest predictor of emotion recognition ability was obsessive-compulsive symptoms, over and above a diagnosis of AN. A study exploring self-reported negative beliefs about emotions and tendency to inhibit emotional expression in people with AN and HCs also found that, after controlling for depression and anxiety, most group differences on the measures tended to disappear (Hambrook et al., 2011). In addition, whilst the presence of alexithymia in AN is now well documented, the picture may be more complex that originally thought. For example, alexithymia has been associated with the presence of depressive symptoms and anxiety, and alexithymia differences between AN and controls have been found to disappear after controlling for these mood variables.
Following these findings, it has been suggested that the presence of alexithymia in AN may be more related to mood than eating behaviour per se (Eizaguirrea et al., 2004) and may play an indirect role in the pathogenesis and maintenance of abnormal eating behaviours by facilitating the presence of anxious and depressive symptoms. This, in turn, may further exacerbate disturbed eating and body dissatisfaction. Clearly then, there is a need to consider the role of mood and affect when conducting any exploration of emotional processing in AN.

Intellectual functioning, or IQ, is also a potential confound that has not adequately been controlled for in some of emotional processing studies. In several studies where AN performance is compared with HCs or other clinical groups, the groups are often not matched with regard to IQ. This is a potential confound, as it might be that any significant differences between the groups are more attributable to general IQ, than to poor emotional processing specifically. Indeed, a few studies have controlled for IQ in their analysis post-hoc, by conducting analyses of covariance (ANCOVA) or regression techniques. One such study (Oldershaw et al., 2010) found that IQ did significantly predict performance on two emotional Theory of Mind (eToM) tasks in people with AN, accounting for 4.3% to 31.7% of the variance in eToM performance. Group differences on most of the tasks did, however, remain significant after controlling for IQ. This, again, suggests that IQ is an important potential confound to control for when measuring emotional processing.

**Diversity of theory**

Another important limitation of existing research is that the diverse findings in relation to emotional processing difficulties in AN have yet to be explained within any one comprehensive or unifying model or theory. Indeed, there are multiple accounts and theories which have attempted to conceptualise and explain the role of emotional processing in the aetiology and maintenance of AN and other EDs. These will be discussed briefly in turn.
However, it is worth noting from the outset that none of the theories or models proposed as yet can fully account for or explain the wide range of emotional processing difficulties outlined above. Most of the models tend to focus on one aspect of emotional functioning, and how this relates to the functional features of AN. As such, much of what we currently know about emotional processing in AN is rather fragmented.

Different theoretical models place different degrees of emphasis on the various aspects of emotional functioning and their role in the development and maintenance of AN. For clarity, five of the most well-defined models that consider emotional processing as important in the aetiology and/or maintenance of AN will be briefly described.

**Psychological Models of Emotion in AN**

*The Cognitive-Interpersonal Maintenance Model: AN ‘valued and visible’*

Schmidt and Treasure (2006) developed this model to account for the maintenance of the restrictive subtype of AN, although it does include a developmental perspective as well. The model essentially argues that AN is maintained both intrapersonally and interpersonally by four interacting factors, including cognitive style (cognitive rigidity and an extreme attention to detail), emotional style (experiential avoidance of negative emotions), pro-anorexic thinking (e.g., “anorexia makes me special”), and the responses of close others (high expressed emotion from family and initial compliments from peers regarding weight-loss). Of particular relevance to this thesis are the predictions the model makes regarding emotional style and responses of close others. It is argued that when AN has developed, and the individual is in a state of starvation, eating increasingly arouses unpleasant physical sensations (such as feeling bloated, nauseous and overfull). The prospect of having to eat becomes a threat associated with these aversive consequences. Eating anything outside an idiosyncratic, self-imposed, limited range of low-calorie ‘safe foods’ or, in severe cases, eating anything at all is construed by the person to be a mistake and a failure, which causes
extreme negative emotions in those with a strong drive for perfection and a terror of making mistakes. Eating therefore becomes a threat to emotional and physical equilibrium. It is further hypothesised that as the illness progresses, close others become concerned and worried, and the illness typically arouses strong negative emotions in family members because of the patients’ reluctance to accept the need for change and the burden that the illness places upon carers. In some families, these negative emotions may be expressed directly and confrontationally as blame, criticism, or hostility, whereas in other families, overt conflict may be avoided and critical attitudes are expressed less directly (e.g., through changes in tone of voice). The person with AN distances themself from the exhortations of others because of a strong intolerance of negative emotions and sensitivity to criticism, which are hypothesised to be part of the premorbid avoidant and perfectionist traits of the person with AN, which become exacerbated through prolonged starvation. Closeness to others is perceived as progressively dangerous and threatening, as it becomes increasingly associated with the risk of being exposed to conflict, criticism and negative emotions and the dependable safe nature of the AN becomes more valued. People with AN therefore develop negative beliefs about the experience and expression of emotions, leading to experiential avoidance or an unwillingness to remain in contact with particular private experiences (e.g. bodily sensations, emotions, thoughts, memories, behavioural predispositions) and steps to alter the form or frequency of these events and the contexts that lead to them (e.g., avoiding situations that potentially trigger negative emotions).

Schmidt and Treasure’s (2006) model of AN has consequently been translated into the Maudsley Model of Treatment for Adults with Anorexia Nervosa (MANTRA), which is a modular outpatient treatment designed to specifically target the maintaining factors outlined in the model (rigid thinking styles, avoidance of strong emotion, pro-anorectic beliefs and responses of close others). MANTRA has recently been evaluated in a small case-series with some promising initial results (Wade, Treasure, & Schmidt, 2011). Further to this, an
emotional skills training intervention, derived in part from the cognitive-interpersonal model, has recently been developed for inpatients with AN. This intervention, named Cognitive Remediation and Emotional Skills Training (CREST), is a low-intensity individual treatment for inpatients with severe AN (Money, Davies, & Tchanturia, 2011; Money, Genders, Treasure, Schmidt, & Tchanturia, 2011). It aims to target rigid and detail-focussed thinking styles, but places greater emphasis on the development of emotion recognition skills, and the management and expression of emotion in AN. In CREST, patients and therapists engage together with psycho-educative material, and simple, collaborative cognitive tasks and game-like activities that encourage reflection on emotional processing skills, and practice implementing small behavioural changes. Different modules within CREST are designed to help individuals learn about a) the function of emotions, b) how to label and identify emotions in oneself and others, c) the positive intentions of emotions and the needs emotions communicate to the self and others, and d) practice tolerating and expressing emotions. The intervention was developed to be based on the cognitive interpersonal model, and adapted to address additional emotional processes following empirical reviews of the existing literature, highlighting what the main areas of emotional difficulty appeared to be for people with AN. It was also informed by service user, carer, and clinician input regarding what aspects of emotional processing were perceived to be the most difficult and necessary areas for intervention (Kyriacou et al., 2009). Two recent studies have reported that CREST is perceived as helpful by patients and it may produce objective improvements in emotional processing skills (Money et al., 2011a; 2011b). More comprehensive quantitative data regarding emotional processing improvement as a result of CREST are currently in preparation (Tchanturia, in preparation).

Emotional Avoidance, Blocking and the Distress Tolerance Hypothesis

Other researchers and clinicians have further conceptualised the role of dysregulated eating behaviours, particularly those involving binge-eating, as a mechanism that suppresses or
ameliorates the experience of negative affect (Cooper, Wells, & Todd, 2004; Fairburn, Cooper, & Shafran, 2003). In other words, binge-eating and food restriction are employed as emotional regulators to ‘dissociate’, ‘block’ or ‘escape’ from ‘painful’ emotions that the individual cannot tolerate (Heatherton & Baumeister, 1991; Reiser, 1990; Root, Fallon, & Friedrich, 1986). Moreover, theoretical models of EDs have given increasing centrality to the role of dysregulated eating in serving to distract from negative self-beliefs and alleviate the associated emotional distress (Cooper et al., 2004).

Implied in these conceptualisations is the idea that individuals with EDs may experience or perceive negative emotions as particularly difficult to tolerate and unmanageable. Corstorphine (2006) has proposed an affect regulation model, broadly based on Dialectical Behavioural Therapy (DBT; Linehan, 1993), that considers an individual’s subjective understanding of their own affective states and ability to tolerate distress. According to the model, as a result of growing up in an invalidating environment, where emotions and experiences are not ‘validated’ by caregivers, the individual comes to believe that emotions are ‘bad’ or ‘dangerous’, and so should not be experienced or expressed. When primary emotions such as anger or sadness are experienced, beliefs regarding their unacceptability are triggered along with a wish to suppress the emotion through bingeing or restricting. As a result, secondary emotions such as guilt or shame about experiencing the primary emotion are triggered. These exacerbate distress and interfere with one’s coping ability, leading to the enlisting of dysfunctional eating behaviours as a means of managing negative affect (see figure 1.1).
Corstorphine’s (2006) model is supported by evidence that people with AN do report high levels of difficulty in tolerating distress (e.g., Corstorphine et al., 2007; Hambrook et al., 2011), they report more invalidating childhood experiences compared to HCs, and that difficulties in tolerating distress mediate the relationship between perceived childhood emotional invalidation and ED symptomatology (Anestis et al., 2007; Corstorphine et al., 2006, 2007; Ford, Waller, & Mountford, 2010; Haslam et al., 2008; Mountford et al., 2007).

The importance of addressing distress tolerance and beliefs about emotions in the treatment of AN, and ways in which this can be achieved, has been highlighted by Corstorphine (2006). Little systematic research has yet specifically addressed the clinical effectiveness of targeting distress tolerance in AN and whether this has an effect on outcome.
The Transdiagnostic CBT Model

Fairburn, Cooper and Shafran (2003) proposed a new way of conceptualising and categorising EDs. They argued that instead of basing classification and treatment of the EDs on the separate diagnostic categories of AN, BN, and the atypical EDs, we should consider all EDs (AN, BN, EDNOS) as belonging to one category. Fairburn and colleagues base their proposition on the finding that AN, BN, and EDNOS are unstable diagnostic categories over time, and that many individuals ‘migrate’ between different ED diagnoses, most commonly from AN to BN or EDNOS (Eddy et al., 2008). Part of their proposal was that people with all EDs share the same core psychopathology and maintaining factors. At the centre of all EDs, they argued, is an over-valuation of eating, weight, shape, and their control, and the impact these have on self-evaluation. In addition to this, and maladaptive disordered eating behaviours (e.g., restriction, bingeing, purging), they argued that all EDs are maintained by a combination of four additional factors including core low self-esteem, clinical perfectionism, mood intolerance, and interpersonal difficulties.

Of relevance to this thesis is the focus on ‘mood intolerance’, which Fairburn et al. (2003) describe as an inability to cope appropriately with certain emotional states. This intolerance is usually related to adverse mood states, such as anger, anxiety or depression, but in some cases there is intolerance of all intense mood states including positive ones. Fairburn et al. argue that instead of accepting changes in mood and dealing appropriately with them, patients with EDs engage in “dysfunctional mood modulatory behaviour”. This reduces their awareness of the triggering mood state (and cognitions), and also neutralises it, but usually at a personal cost. The dysfunctional mood modulatory behaviour may take the form of self-harm (which rapidly dissipates the initial mood state), or it may involve taking psychoactive substances to directly modify how they feel. Both of these classes of behaviour are common among patients with EDs. More directly related to the ED, binge eating, self-induced vomiting and intense
exercising may also be used as forms of mood modulatory behaviour. Such forms of behaviour, according to the model, eventually become habitual means of mood modulation.

The maintenance model of EDs proposed by Fairburn et al. (2003) has consequently been translated into a ‘transdiagnostic’ therapy based on cognitive behavioural principles that can be applied to all EDs, regardless of DSM-IV diagnosis. There are two forms of this “enhanced” treatment (CBT-E): a focused form (CBT-Ef) that targets eating disorder psychopathology exclusively, and a more complex broad form (CBT-Eb) that also addresses the additional maintaining factors outlined in the model (mood intolerance, clinical perfectionism, low self-esteem, and interpersonal problems). Preliminary evidence for the effectiveness of both forms of CBT-E seems to be promising in comparison to a waiting-list control group in reducing ED symptoms (Fairburn et al., 2009). Patients with marked mood intolerance, clinical perfectionism, low self-esteem, or interpersonal difficulties also appeared to respond better to the more complex CBT-Ef treatment.

A key criticism of the transdiagnostic theory and treatment outlined above is that it has so far only been applied to ED patients who have a BMI over 17.5 kg/m² (i.e., above the AN range). A large proportion of individuals with EDs presenting for treatment, particularly those with a diagnosis of restrictive AN, have a BMI well below 17.5 kg/m², and so the utility of this model in treating these individuals is as yet unknown. More research is needed to explore whether the model and treatment proposed by Fairburn and colleagues is indeed helpful for the more severe presentations of AN.

The Integrative Neuroscience Model of AN: INTEGRATE-AN

Hatch et al. (2010) propose what they describe as an “integrative neuroscience” model of AN, which draws on a review of neuroscientific, behavioural, and self-report studies of emotions in AN. The model proposes that emotions are fundamentally processed differently in the

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brains of people with AN, which is driven by a genotypic predisposition, and subsequently reinforced and maintained by a ‘starvation syndrome’ that accompanies AN. Hatch et al. argue that in people with AN, there is altered experience of emotion generated by abnormal temporo-limbic activity very early on in the processing of emotions (<200 msecs), in response to innately significant emotion danger-reward stimuli. Specifically, food becomes conditioned as a threatening/dangerous stimulus. Over time, as AN develops and weight is lost, already lost, disturbances in ‘thinking’ and ‘feeling’ manifest as core aspects of cognition (executive functioning deficits including cognitive inflexibility, extreme attention to detail) and self-reported negative feelings (anxiety, depression, anhedonia). These aspects of cognition and feeling are also applied to thinking and feeling towards food specifically. That is, people will apply rigid and detail-focussed routines around their eating, and will experience fear and disgust in relation to food. These intense and negative reactions to food lead to maladaptive self-regulation by avoiding food to compensate for food-related alterations in emotion, thinking and feeling. This maladaptive self-regulatory strategy is reinforcing in the short-term as it temporarily allows ‘escape’ from unpleasant internal experiences. Thus, the individual is rewarded by a sense of perceived safety and control. However, a ‘starvation syndrome’ soon ensues. As has been reported in semi-starvation studies of non-clinical populations (Keys et al., 1950), extreme levels of starvation and malnourishment result in depressed mood and/or distress. Similarly, in individuals with AN, a starvation syndrome serves to create or exacerbate pre-existing levels of disturbance including low mood and obsessionality (Godart et al., 2000; Kaye et al., 2004; Thornton & Russell, 1997), thereby reducing the motivation and capacity of individuals to initiate change. Moreover, cognitive or thinking deficits are also exacerbated or worsened by the starvation syndrome, and consequently serve to maintain the AN (e.g., executive function deficits lead to cognitive rigidity and narrowed interests which serve to maintain eating disordered thoughts and decrease the capacity to engage in treatment).
In summary, despite individuals with AN perceiving food restriction as reward and a successful means to self-regulate, the effect is paradoxical as evidenced in the starvation syndrome which is an eventual exacerbation of predisposing difficulties in emotion processing, feelings and thinking.

Whilst the INTEGRATE-AN model is intriguing and a potentially useful heuristic for conceptualising the role of emotional processing in EDs, it is relatively new and requires further empirical validation through controlled and focussed research that tests the predictions it makes.

The Social-Cognitive Model of AN and the Link with ASD

It has been noticed by several authors that individuals with AN share a number of characteristics with ASD (e.g., Gillberg et al., 1992; Oldershaw et al., 2011a,b; Zucker et al., 2007). People with ASD and AN share a similar neurocognitive profile, with marked difficulties in “set-shifting” (the ability to shift attention between one stimulus and another) and a tendency toward “weak central coherence” (a cognitive style in which information is processed in a fragmented and detail-focussed way, as opposed to integrated, with processing occurring at the level of the whole or gestalt) (Roberts et al., 2007; Lopez et al., 2008; Oldershaw et al., 2011b). These neuropsychological difficulties persist after recovery from AN, and are also present in the unaffected family members of people with AN (Treasure, 2007). Furthermore, a significant minority of people with AN have a co-morbid ASD (Gillberg, Gillberg, Råstam, & Johansson, 1996; Gillberg, Råstam, & Gillberg, 1995; Wentz, Lacey, Waller, Råstam, Turk, & Gillberg, 2005), and a significant proportion of people with ASD have AN (Kalvya, 2009). Adults with AN have also demonstrated higher levels of autistic traits than HCs (Hambrook et al., 2008), and autistic traits have been associated with poor long-term-outcomes in adolescents with AN (Wentz et al., 2009).
In addition to the co-morbidity and non-social neurocognitive similarities between AN and ASD (i.e. set-shifting and central coherence), it has also been noted that the two disorders share similar deficits in the social cognitive domain, particularly the ability to recognise and infer the thoughts and emotions of others. It has already been discussed above that people with AN show a marked difficulty in these abilities, and a deficit in ToM and ‘empathy’ is one of the core features of ASD (Baron-Cohen, 2002). A recent study (Oldershaw et al., 2011b) has even documented that people with AN do not differ significantly from people with ASD on measures of set-shifting, central coherence, and several measures of eToM. This further substantiates the claim that AN and ASD share a similar neurocognitive and social cognitive profile.

Zucker et al. (2007) have recently assimilated these similarities and synthesised them with other theories of information processing in AN to propose a social cognitive model of AN (see Figure 1.2). In this model, people with AN are thought to compensate for deficits in social cognitive processes (such as empathy and ToM), by using models and systems in order to structure their world (in a similar way to people with ASD). However, the models and systems they choose are typically maladaptive and unhealthy ones (e.g., of ‘thinness’) that are influenced by environmental factors, such as sociocultural, peer, and family influences. The models are maintained by two sets of processes: 1) a pathological and over-responsive fear network which promotes avoidance of feared stimuli (i.e., of gaining weight), and 2) difficulties in learning and reinforcement as a result of impaired set-shifting, leading to “stuckness” in the use of the maladaptive models/systems. These processes eventually lead to and maintain interpersonal difficulties in AN (e.g. in forming new relationships, managing existing relationships).
Summary and Limitations of Existing Models of Emotion in AN

Five of the most prominent models/theories conceptualising the role of emotions in AN have been outlined. Each varies to some degree in the specific emotional processes they conceptualise, and how these emotional processes contribute to the maintenance/causality of AN. Schmidt and Treasure’s (2006) cognitive interpersonal maintenance model emphasises the role of difficult interpersonal relationships with close others and experiential/harm avoidance in maintaining AN once it has developed. The ‘distress tolerance and emotional avoidance’ hypothesis is somewhat similar in that it emphasises the central role of intolerance of emotion, and the role that ED-specific behaviours (e.g., exercise, restriction, binge-purging) have in allowing individuals to ‘escape’ or ‘block’ these intolerable states. Fairburn et al.’s (2003) ‘transdiagnostic’ model of EDs also highlights the role of ‘mood intolerance’ (akin to distress tolerance) in perpetuating AN through the ED behaviours that sufferers...
engage in to modulate their mood. Hatch et al. (2010) present an integrative neuroscience model that links early brain-based alterations in the way that emotions are processed in people with AN, and the subsequent effects that this has on specific thoughts and feelings towards food and eating, and self-regulatory behaviours individuals engage in to ‘avoid’ or escape to a sense of safety (i.e. by not eating). Finally, the social-cognitive model of AN proposed by Zucker et al. (2007) draws attention to the role of deficits in social cognitive processes such as empathy and ToM, the strategies that people with AN use to compensate for these difficulties (e.g., using unhealthy systems of ‘thinness’ to order their lives), and the role these processes play in maintaining AN and associated poor interpersonal functioning.

Clearly there is some overlap between the different models and the specific aspects of emotional processing that are focussed upon, but it can be argued that by itself, no one model fully considers all of the emotional processing difficulties that have been demonstrated in the empirical literature. This is obviously a difficult task to achieve. The primary aim of this thesis was to explore the preliminary usefulness of a different model of emotional functioning that has not previously been applied to people with AN, or EDs more generally. Specifically, the current study sought to pilot the use of an established performance-based measure of ‘emotional intelligence’ in a sample of people with AN.

**Emotional Intelligence: A New Way of Conceptualising Emotional Functioning in AN?**

In 1990, an article was published that sought to synthesise the then disparate fields of emotion and intelligence into a unifying theory (Salovey & Mayer, 1990). At this time emotional intelligence (or EI) was defined as “the ability to monitor one’s own and others’ feelings and emotions, to discriminate among them, and to use this information to guide one’s thinking and actions” (Salovey & Mayer, 1990; p. 198). Since then, definitions of EI across time and by different researchers have multiplied and now vary substantially. Brackett & Geher (2006) discuss two organisational schemes that categorise different classes of EI theories and
measurement tools. In particular, there are mixed (trait) models and ability models of EI. Mixed models focus on self-perceived abilities, skills, and personality traits. Because both perceived abilities (e.g. “distress tolerance”) and traits (e.g. “optimism”) are included in mixed-models, proponents of this approach have generally employed self-report measures as opposed to performance measures to assess EI. This is one of their main limitations, as self-report measures of mental skills are biased by socially desirable responding and the fact that people are generally poor at assessing their own mental skills (e.g., Dunning et al., 2003). Indeed, there is a general consensus that performance-based tests are the gold standard in intelligence research because they measure the actual capacity to perform well at mental tasks, not just one’s self-efficacy about one’s performance.

In contrast to mixed models, ability models conceptualise EI as a set of abilities or skills that relate to the accurate processing of emotion-relevant information. The most well-known and extensively researched ability model of EI is that proposed by Salovey and Mayer (1990), and later modified and expanded by Mayer and Salovey (1997). Emotions, in this model, are defined as evolved, integrated feeling states involving physiological changes, motor-preparedness, cognitions about action, and inner experiences that emerge from an appraisal of the self or situation (Mayer, Roberts, & Barside, 2008). EI in this model is defined as “the ability to carry out accurate reasoning about emotions and the ability to use emotions and emotional knowledge to enhance thought”. Mayer and colleagues’ model of EI takes as a starting-point the presumption that EI is a cognitive ability which is not measured by standard intelligence tests, and which relates to reasoning and problem solving in the emotional domain. The model views overall EI as an interrelated set of four skills or ‘branches’:

- **Branch 1: Perception of Emotions**

  This is the ability to accurately perceive and appraise emotional episodes in others and oneself. As already discussed, most people effortlessly perceive and infer emotional episodes in others by viewing a set of facial behaviours, vocal cues, and
bodily movement. However, there are strong individual differences in the ability to infer emotional cues from the behaviour of others (e.g., Baum & Nowicki, 1998; Petti, Voelker, Shore, & Haymen-Abello, 1998). Furthermore, people also vary widely in the precision and complexity with which they automatically perceive their own experience of emotion (e.g., Feldman, 1995).

- **Branch 2: Using Emotion to Facilitate Thought**

  This set of skills involves the ability to use emotional information to focus attention on important stimuli in the environment, guide momentary judgements and decisions, and predict future behaviour and outcomes. Some people are better than others at harnessing the mental sets generated by different emotional experiences and use them to focus on various kinds of problems (Schwarz, 1990).

- **Branch 3: Understanding Emotions**

  This involves the capacity to understand what emotions are and how they function. It encompasses language and propositional thought about emotions, and reflects the capacity to analyse emotions, appreciate their probable trends over time, and understand their outcomes. It includes a broad understanding of the emotional lexicon (emotional vocabulary) and draws on conceptual knowledge about emotions.

- **Branch 4: Managing Emotions**

  This branch relates to emotion regulation in oneself and others. It includes the ability to maintain awareness of emotional events, even when they are unpleasant, as well as the ability to solve emotion-laden problems (both one’s own problems and those involving other people) in the most effective manner possible.

Each of these EI branches is viewed as having a developmental trajectory from early childhood onward. For example, in perceiving emotion, a person’s ability to recognise basic emotions in faces is likely to precede the ability to detect the faking of emotional expressions.
(Mayer & Salovey, 1997). As skills grow in one area (e.g., perceiving emotions), so will skills in other areas, such as understanding emotions and being able to regulate or manage them.

The ability model above emphasises the importance of objective mental abilities in defining EI, and EI is therefore measured in terms of performance on putatively objective assessments tapping into specific emotion-related abilities. Mayer et al. have developed a multidimensional, task-based, ability measure of EI that maps on to their ability model of EI. The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT V2.0; Mayer et al., 2002) assesses the four components or branches of EI set out in their model: perceiving emotions, using emotions to facilitate thought, understanding emotions, and managing emotions. The MSCEIT is a computer-based assessment, is completed on-line, and requires respondents to solve realistic emotion-laden hypothetical scenarios and respond to specific emotion-related questions. It consists of 141 items divided among eight individual ‘tasks’ or subtests (two for each branch of EI). The test yields 15 main scores: a Total EI Score, two ‘Area Scores’, the four Branch Scores, and the eight individual Task Scores. The two Area Scores are termed Experiential EI (combined scores from the perceiving and using branches) and Strategic EI (combined scores from the understanding and managing branches). Figure 1.3 outlines the structure of the MSCEIT scores.

The first branch of the MSCEIT, perceiving emotions, consists of two subtests that assess the ability to identify basic and complex emotions in photographed facial expressions (faces subtest) and landscapes or artwork (pictures subtest). The second branch, using emotions to facilitate thought, requires participants to describe emotional sensations and their parallels to other sensory modalities using non-feeling vocabulary (sensations subtest), and to evaluate the usefulness of three different emotions during a specific cognitive task or behaviour (facilitation subtest). The third branch, understanding emotions, consists of two subtests that examine the participant's understanding of blended or complex emotions (blends subtest) and
their understanding of how emotions progress during social interactions (changes subtest). The fourth branch, managing emotions, consists of two subtests that examine the participant's understanding of the effectiveness of different ways of regulating emotions in oneself (emotion management subtest) and in situations involving others (social management subtest). The four branch model of EI proposed by Mayer and colleagues could be particularly helpful in furthering our understanding of emotional processing in AN. Several of the emotional processing skills that are tapped by the MSCEIT task/branch/area scores are closely related to aspects of emotional processing that have been explored in people with AN before, however, the MSCEIT assesses these abilities using a performance-based and more ecologically valid framework. For example, emotion regulation and management in AN has previously been assessed primarily using self-report methods or laboratory-based decision-making tasks such as the IGT (see above). The MSCEIT, however, assesses this aspect of emotional processing by presenting respondents with everyday emotion-laden social scenarios and asks people to indicate how they would respond in such a situation, or rate what particular action of outcome would be the most effective. The MSCEIT also taps abilities that have previously been underexplored in AN, particularly the ability to reason about emotional information and use emotional information to guide thinking and behaviour. For these reasons, the use of the MSCEIT in the current study will add to what is already known about emotional processing in people with AN and provide original data to compare with what has been found previously using different methodologies.
As well as being used as a research-based assessment measure to explore group EI performance, the MSCEIT has been used within applied settings, in a similar way to IQ tests, to assess and provide feedback to individuals regarding their particular areas of EI strengths and weaknesses (Mayer, Salovey, & Caruso, 2002). It is within the realms of human resources and occupational psychology where this application of the MSCEIT has flourished (Caruson, Bienn, & Kornacki, 2006). In such circumstances test-takers complete the MSCEIT and then receive a detailed feedback report (automatically generated by the MSCEIT) from the test administrator regarding their performance in the various EI domains, in comparison with the performance of the normative sample. Such feedback can highlight EI areas where individuals perform particularly well, and those areas where individuals score less well. This
information can then be used as the basis for recommendations about specific areas that individuals might like to focus on improving if they so wish. For example, if an individual learns from their MSCEIT feedback that they are not as proficient as they would like to be at recognising others’ emotions, then they can potentially spend time learning about how to recognise emotions in others. This individual approach to administering and providing feedback on MSCEIT performance was not used in the current study. This study should be seen as a pilot to explore whether a sample of people with AN actually score differently to a sample of HCs. Nevertheless, if the current study, and future replications of the study, did show that people with AN score differently to HCs on the MSCEIT, then there is some potential for the MSCEIT to be used in clinical practice to provide feedback to patients about areas of EI strength and weakness, and suggestions regarding strategies that might help to remediate areas of weakness.

Evidence to Support the Four-Branch Ability EI model and the MSCEIT

Since being published a considerable amount of research has explored the validity, reliability, and correlates of Mayer et al.’s four-branch EI model and the MSCEIT. Key findings are summarised here.

Reliability of the MSCEIT

The MSCEIT has been found to be reliable at the full-scale level, and at the area and branch levels (Mayer et al., 2003). The reliabilities for the eight individual Task Scores are somewhat low (split-half reliabilities range from $r = 0.55$ to $r = 0.88$), however, and the authors of the test do not recommend using these scores for most analyses. The 3-week test-retest reliability of the MSCEIT has also been found to be acceptable (Brackett & Mayer, 2003). These findings have been broadly replicated in subsequent studies (e.g., Palmer, Gignac, Manochac, &Stough, 2005).
Factor Structure of the MSCEIT

The MSCEIT has demonstrated a factor structure congruent with the four-branch model of EI on which the test was based (i.e., Mayer & Salovey, 1997). Using a large proportion of the original standardisation sample for the test, Mayer et al. (2003) performed confirmatory factor analyses on the eight tasks measured by the MSCEIT. They tested for one-, two-, and four-factor model solutions to examine the range of permissible factor structures. The best fit was for the four-factor (four-branch) solution. In further support of this, a recent study has reported that the factor structure of the MSCEIT does not vary cross-culturally between French and Pakistani samples (Karim & Weisz, 2010).

Validity of the MSCEIT

Several studies have provided evidence supporting the validity of the MSCEIT. To summarise, findings indicate that the MSCEIT is measuring something new, and not simply an alternative measure of personality constructs or cognitive intelligence. For example, scores on the MSCEIT correlate only modestly with measures of cognitive intelligence (Van Rooy & Viswesvaren, 2004), and personality accounts for only a small amount of variance in MSCEIT scores. Mayer, Salovey, & Caruso (2004) summarised research with over 1,500 participants that examined associations between MSCEIT scores and the ‘Big Five’ personality dimensions of Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. Mayer et al. (2004) demonstrated that all of the weighted mean correlations between MSCEIT performance and the five personality dimensions were below $r = 0.21$, the highest association being with Agreeableness, which is sometimes seen as a personality dimension denoting compassion and cooperativeness.

In terms of its convergent validity, as expected, numerous studies demonstrate that the MSCEIT does not overlap very much with self-report assessments of EI, based on trait or mixed-models (Brackett & Mayer, 2003; Livingstone & Day, 2005). Conversely, a number of
studies have demonstrated that MSCEIT performance does correlate with other established measures of performance-based emotional processing such as emotional perception (Austin, 2010) and ToM (Ferguson & Austin, 2010).

Regarding its predictive validity, performance on the MSCEIT has been found to predict important outcomes. For example, theoretically, EI is postulated to promote positive social functioning by a) focusing attention to important emotional information in the environment, b) facilitating the ability to adopt other peoples’ perspectives, leading to increased empathy and social support, c) enhancing communication about emotions, which leads to fewer misunderstandings, and d) regulating behaviour, which reduces the likelihood of anti-social actions (Mayer & Salovey, 1997). In several studies, MSCEIT performance is, even after statistically controlling for IQ and personality, indeed related to various indications of positive social relations, such as peer ratings of interpersonal sensitivity and prosocial behaviour, and positive relationships with family members (e.g., Brackett et al., 2006; Lopes et al., 2003, 2004, 2005). MSCEIT performance is also positively correlated with social network size and quality (Ciarrochi, Chan, & Bajgar, 2001) and positively predicts psychological well-being (e.g., Brackett & Mayer, 2003; Extremera et al., 2011; Lopes et al., 2003). This is what would be expected if the MSCEIT is measuring the ability to identify and use emotional information so as to promote or maintain well-being. Whilst the ecological validity of the MSCEIT is difficult to assess, the question items that make up the test have good face validity in that they present respondents with emotion-laden scenarios that one could feasibly encounter in one’s day-to-day life (see Method chapter for sample items).

Use of the MSCEIT in Clinical Populations

Whilst the MSCEIT has shown evidence of being a potentially helpful way to assess emotional functioning in the general population, little is known about the utility of the MSCEIT in assessing emotion processing in individuals with psychiatric illnesses. A handful
of studies have demonstrated that MSCEIT performance is poorer compared to HCs in people with diagnoses of major depression, substance misuse, borderline personality disorder and panic disorder (Hertel, Schütz, & Lammers, 2009; Perna et al., 2010), but this finding was not replicated in people with generalised social phobia (Jacobs et al., 2008). It has also been found that poorer MSCEIT performance is associated with higher levels of borderline personality disorder traits (Gardner & Qualter, 2009; Garnder, Qualter, & Temblay, 2010), schizotypy (Aguirre, Sergi, & Levi, 2008), and psychopathy in the general population (Visser, Bay, Cook, & Myburgh, 2010). A recent study (Fox et al., 2010) has also found that cocaine-dependent participants demonstrate selective EI difficulties compared with HCs, specifically with regard to the understanding, management, and regulation of emotion. These EI problems were associated with increased perceived stress and impulse control difficulties.

To date, the most extensive clinical application of the MSCEIT has been its use in assessing EI in people with schizophrenia-spectrum psychoses. Social cognitive and emotion processing deficits are widely reported in psychosis using a range of measures (Green & Horan, 2010; Oschner, 2008). Key findings from the research which has used the MSCEIT in samples of individuals with psychosis suggest that it demonstrates good reliability and validity in people with psychosis (Kee et al., 2010; Eack et al., 2010), and that people with psychosis perform significantly worse than HCs or normative levels on the MSCEIT. EI deficits have also been shown to be present during the prodromal phase of psychosis, in first episode patients, and in people with chronic psychosis (Green et al., 2011). In addition, poorer performance on the MSCEIT has been found to significantly correlate with greater negative and disorganised symptoms, whereas better performance predicts better work functioning, independent living, and social functioning (Horan et al., 2011a; Kee et al., 2010). EI, as measured by the MSCEIT, in people with psychosis can also be improved using a specific form of cognitive enhancement therapy that targets neurocognitive and social cognitive skills (Eack et al., 2007; Horan et al., 2011b), and these improvements in EI may mediate functional outcome (Eack et
al., 2011). That is, improvements in EI over time predict improvements in social functioning. Perhaps as an indication of the potential clinical utility of the MSCEIT, it has been included within the MATRICS Consensus Cognitive Battery (MCCB) developed by the Measurement and Treatment Research to Improve Cognition in Schizophrenia (MATRICS) initiative. This is a National Institute of Mental Health (NIMH) initiative that brought together key stakeholders to identify molecular and cognitive targets with the potential to improve cognitive processing in schizophrenia and to develop mechanisms for devising and testing interventions. In 2006 the MCCB was released and the Managing Emotions branch of the MSCEIT was included as the key measure of social cognition (Green et al., 2005). The MCCB, including the MSCEIT, is now widely used as an outcome measure in clinical trials focusing on neurocognitive and socioemotional functioning in schizophrenia (Fett et al., 2011).

The MSCEIT or the four-branch model of ability EI has never been used in research with people with EDs. Given that the MSCEIT has been used in other clinical populations to explore and define their emotional difficulties, it is possible that it could also be helpful in building a detailed and multifaceted understanding of emotional strengths and weaknesses in people with AN.

The Current Study: Aims and Hypotheses

Summary

It has been argued there is clear evidence that people with AN experience difficulties in the ways in which they process emotions, evidenced in their beliefs and attitudes about emotions and in their performance on ability-based tests of emotional processing. There is also some evidence demonstrating that certain difficulties in processing emotions may be functionally linked to indicators of illness severity (e.g., BMI), ED symptomatology and psychopathology, suggesting that these emotional processing problems may play a role in the maintenance
and/or aetiology of AN. However, the existing research is limited by heterogeneity in measurement methods, an over-reliance on self-report methodology, experimental assessments with questionable ecological validity, and a lack of a unifying framework that defines the specific types of emotional processing domains that are affected in AN. The result is that much of existing evidence-base is rather fragmented and lacking in a sense of theoretical coherence.

In addition, there is some evidence to suggest that specific emotional processing difficulties in AN may be mediated by general affective distress, such as anxiety and depression. Many studies have not considered the role of these potentially confounding variables. Some of the studies that have controlled for concurrent affective distress have found that emotional processing difficulties in AN disappear after anxiety and depression have been controlled for.

Finally, little is known about how people with AN use emotional knowledge to guide their thoughts and behaviour. Thus, the cognitive processing of emotions, the way that people with AN reason about emotions, and use emotional information to guide thinking and behaviour has not been systematically explored in AN to date.

Aims

The current study sought to address these issues and attempted to pilot the use of a multidimensional performance-based measure of emotional intelligence (the MSCEIT) in people with AN. The MSCEIT and the theoretical model on which it is based have not previously been explored in people with AN, or EDs more generally. The current study also sought to explore whether EI in people with AN was associated with symptomatology (both ED-specific symptomatology and anxiety and depression), clinical indicators of severity of illness (such as BMI, duration of illness, and age of onset of illness), and social functioning. Finally, the study sought to examine the extent to which EI is predicted by a diagnosis of AN,
over and above general affective distress (anxiety, depression) and the potentially confounding influence of personality.

Methodology

The current study addressed the above aims in a cross-sectional design by comparing the performance of a group of adult women with AN with a group of age- and IQ-matched healthy women on the MSCEIT. Demographic information, levels of depression and anxiety, ED symptomatology, level of social functioning impairment, personality, and clinical indicators of illness severity (including BMI, duration of illness, and age of onset) were also measured in order to determine their association with performance on the MSCEIT.

Hypotheses

Based on the aims of the study, and the review of the existing evidence-base, it was hypothesised that:

1. Women with a diagnosis of AN will perform significantly worse than an age- and IQ-matched sample of non-clinical healthy women across the broad scope of emotion processes assessed by the MSCEIT.

2. MSCEIT performance in people with AN will be significantly associated with a) ED-specific symptomatology, b) anxiety and depression, c) clinical indicators of illness severity (BMI, duration of illness, age of onset, lowest ever BMI, number of inpatient admissions), and d) social functioning impairment.

3. There will be a small but significant relationship between MSCEIT Scores and personality and IQ. Specifically, MSCEIT Scores will correlate positively with IQ and positively with Agreeableness.

4. MSCEIT performance will be significantly predicted by a diagnosis of AN, over and above a) anxiety, b) depression, and c) Agreeableness.
Chapter 2
Method

Design
A cross-sectional independent-groups design was employed. Two groups of participants were recruited. One consisted of females diagnosed with AN or EDNOS-AN according to DSM-IV-TR criteria (APA, 2000) and the other consisted of female healthy controls (HCs).

Participants
An a priori power calculation was conducted in order estimate the number of participants that would need to be recruited in order to achieve adequate power to detect group differences. The MSCEIT has not previously been used with AN participants, so the power calculation was based on data taken from a recent study which had compared MSCEIT performance between a group of individuals with schizophrenia and HCs (Kee et al., 2009). This study reported large effect sizes ($d > 0.8$) for several of the MSCEIT subscales. Extrapolating this finding to the current study, using G*Power (Version 3.1.2) power analysis software, it was calculated that in order to achieve 80% power, using a two tailed independent $t$-test, with alpha set at $p = 0.05$, and expecting a large effect ($d = 0.8$), the current study should aim to recruit at least 26 participants per group.

Thirty five females with current a diagnosis of AN or Eating Disorder not Otherwise Specified (EDNOS) (AN type) were recruited into the study. Only females were recruited into the study due to the relatively rare incidence of AN in males (NICE, 2004) and the expectation that few males would present to the ED service recruitment sites for treatment during the time period that the study was being conducted. Indeed, one of the recruitment sites did not offer treatment to males with EDs at all. Furthermore, males were also excluded as there are known gender differences in several aspects of social cognition and emotional
processing (Baron-Cohen, 2002; Russell et al., 2007), including EI as measured by the MSCEIT (Extremera, Fernández-Berrocal, & Salovey, 2006; Kafetsios, 2004). It was therefore considered important to control for the potentially confounding influence of gender differences in the current study by excluding males entirely.

The AN sample was heterogeneous in terms of the sources from which participants were recruited. Twenty five (71.4%) of the 35 individuals who were recruited into the study were receiving treatment from the South London and Maudsley (SLaM) NHS Foundation Trust Eating Disorders Service, and two (5.7%) were receiving treatment from the Hertfordshire Partnership NHS Foundation Trust Community Eating Disorders Service. In these services, posters advertising the study were displayed in clinic waiting rooms, and clinicians were asked to mention the study to any patients who met the inclusion criteria. Eight (22.9%) individuals were recruited from the community by responding to advertisements for the study placed on the Beating Eating Disorders (b-eat) website (the largest UK charity supporting people with EDs and their carers). From the initial 35 AN participants who agreed to take part in the study, three (8.6%) were excluded as they failed to complete all the study measures. All three of these individuals were receiving inpatient treatment from the SLaM ED service at the time. The final sample size for the AN sample was therefore 32.

The final AN sample (n = 32) had an average age of 31.63 years (SD = 11.46), with a relatively late average age of onset for AN (M = 20.56, SD = 8.13), and a relatively long duration of illness (M = 10.22 years, SD = 10.11). At the time of assessment, twelve (37.5%) of the 32 AN participants were receiving inpatient hospital treatment, seventeen (53.1%) were receiving outpatient treatment, two (6.25%) were receiving day-care treatment, and one (3.1%) was receiving treatment in a specialist community-based residential rehabilitation centre. AN participants recruited via the SLaM and Hertfordshire ED services had received clinician-confirmed diagnoses according to DSM-IV criteria. Those recruited from the
community via website advertisements had diagnoses of AN confirmed by their responses to the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) and by completing a brief screening questionnaire (see below and Appendix 1). Nineteen (59.4%) of the AN participants had a diagnosis of AN-R, eleven (34.4%) had AN-BP, and two (6.2%) fulfilled criteria for EDNOS-AN. In total, twelve (37.5%) of the AN sample were taking some form of medically prescribed psychotropic medication at the time of assessment, the most common class of medication being selective serotonin reuptake inhibitors (SSRI). Three participants were taking more than one form of psychotropic medication.

The HC group were screened to ensure that they a) did not score greater than one standard deviation above healthy community norms on the EDE-Q global score (see Mond, Hay, Rogers, & Owen, 2006), b) did not score above the clinical cut-off indicating caseness for both anxiety and depression, c) had a BMI within the ‘healthy’ range (19 - 26 kg/m²), d) had no personal history of an ED, and d) were not currently experiencing a DSM-IV Axis I Disorder as assessed using the Structured Clinical Interview for DSM-IV (SCID; First et al., 2002 - see below). Additional exclusion criteria applied to both the AN and HC groups were non-fluent English, diagnosed learning disability (IQ < 70), pervasive developmental disorder, neurological disease, or history of head injury.

In total 37 female HCs were screened and recruited into the study, but five (13.5%) of these were excluded from the final analysis because they declared that they were currently experiencing a psychiatric illness (n = 3), or they scored more than one standard deviation above the general population norm on the EDE-Q (n = 2). The final HC sample size was therefore 32. The sample was recruited via various sources. Nine (28.1%) responded to an e-mail advertising the study that was circulated to all staff and students at King’s College London, sixteen (50%) responded to advertisements for the study that were located around the community and within Royal Holloway and King’s College London campuses, and seven
(21.9%) were undergraduate psychology students at Royal Holloway, University of London, who took part in the study in order to gain research method ‘credits’ for their degree course.

The HC group were recruited to roughly match the AN participants with regards to their ethnicity, mean age, educational background, and mean IQ. Table 2.1 displays basic demographic and clinical data for the two groups. In order explore whether the matching process was successful, the two groups were compared with regard to their age, years in education, and IQ using independent t-tests (alpha set at $p < 0.05$). The mean BMI of each group was also compared using an independent t-test. There were no significant differences between the two groups with regards to their mean age, IQ, or the mean number of years spent in formal education, indicating that the matching process was successful. As expected, the AN group had a significantly lower BMI than HCs. Both groups had a roughly equal composition in terms of their ethnicity.

The study was reviewed and approved both by the South East London NHS Research Ethics Committee 4 (ref: 10/H0807/30) and by the Royal Holloway Psychology Department Ethics Committee (ref: 2010/027). Local Research and Development (R&D) approval was also sought and obtained from the SLaM and Hertfordshire NHS Trusts (see Appendix 2, 3, and 4 for copies of ethical and R&D approval confirmation). Prior to taking part in the study, all participants were given an information sheet which described the study, and then offered the opportunity to ask the researcher any questions before providing their informed consent (see Appendix 5 and 6). In the information sheet, participants were also informed of their right to anonymity, their right to withdraw themselves and their data from the study at any time, and they were given information about how to contact b-eat, the leading UK charity for people with EDs, should they wish to.
## Table 2.1
*Between-groups Comparisons for Basic Demographic and Clinical Information*

<table>
<thead>
<tr>
<th>Variable</th>
<th>AN Group $(n = 32)$</th>
<th>HC Group $(n = 32)$</th>
<th>Test Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age $(M, SD)$</td>
<td>31.63 (11.46)</td>
<td>28.38 (11.31)</td>
<td>$t = 1.14 (62); ns$</td>
</tr>
<tr>
<td>Years in Education $(M, SD)$</td>
<td>16.11 (2.87)</td>
<td>15.94 (2.66)</td>
<td>$t = 0.25 (62); ns$</td>
</tr>
<tr>
<td>BMI $(M, SD)$</td>
<td>15.79 (1.69)</td>
<td>21.94 (2.31)</td>
<td>$t = -12.15 (62); p&lt;0.001$*</td>
</tr>
<tr>
<td>Verbal IQ $(M, SD)$</td>
<td>108.13 (10.60)</td>
<td>110.66 (11.65)</td>
<td>$t = -0.90 (61); ns$</td>
</tr>
<tr>
<td>Performance IQ $(M, SD)$</td>
<td>110.52 (9.72)</td>
<td>109.28 (8.43)</td>
<td>$t = 0.54 (61); ns$</td>
</tr>
<tr>
<td>Full-Scale IQ $(M, SD)$</td>
<td>110.52 (9.18)</td>
<td>111.44 (9.16)</td>
<td>$t = -0.40 (61); ns$</td>
</tr>
<tr>
<td>Ethnicity $(n)$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White British = 26</td>
<td></td>
<td>White British = 23</td>
<td></td>
</tr>
<tr>
<td>White Other = 2</td>
<td></td>
<td>White Other = 5</td>
<td></td>
</tr>
<tr>
<td>Black African = 1</td>
<td></td>
<td>Indian = 2</td>
<td></td>
</tr>
<tr>
<td>Asian Indian = 2</td>
<td></td>
<td>Pakistani = 1</td>
<td></td>
</tr>
<tr>
<td>Jewish = 1</td>
<td></td>
<td>Mixed Race = 1</td>
<td></td>
</tr>
<tr>
<td>Psychotropic Medication $(n)$</td>
<td>SSRI = 6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>SNRI = 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TCA = 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TeCA = 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AAP = 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS = 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NBH = 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of Onset $(M, SD)$</td>
<td>20.56 (8.13)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Duration of Illness $(M, SD)$</td>
<td>10.22 (10.11)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Inpatient Admissions $(M, SD)$</td>
<td>2.19 (2.55)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Note.* *p* < 0.001, SSRI = Selective Serotonin Reuptake Inhibitor, SNRI = Selective Norepinephrine Reuptake Inhibitor, TCA = Tricyclic Antidepressant, TeCA = Tetracyclic Antidepressant, AAP = Atypical Antipsychotic, MS = Mood Stabilizer, NBH = Nonbenzodiazepine Hypnotic
Measures and Procedure

All participants completed the same assessment protocol including a pack of self-report questionnaires, the performance-based MSCEIT, and a brief IQ test (see below). Assessments were completed in the same order by all participants, and the whole battery was completed in one sitting with the researcher present in the testing room. Testing took place in various locations, always within a quiet room. The time taken to complete all measures in total was approximately 90 minutes per participant. Sample copies of the self-report measures used are included in the Appendix and are described below.

Screening Form

All participants completed a brief self-report screening form which asked them to record whether they had ever experienced any type of mental health problem, including EDs, and/or neurological illness, serious head injury, or family history of mental illness. Participants were excluded from the final analysis if they answered positively to any of the exclusion criterion questions. See Appendix 1 for sample copy.

Demographic and basic clinical data

A brief questionnaire (see Appendix 7) was designed to collect data regarding participant weight and height (to calculate their BMI), age, ethnicity, educational background, and occupational status. In the AN group, data was also collected regarding age of onset and duration of illness, lowest ever BMI, number of in-patient hospitalisations, and current psychotropic medication status.

Structured Clinical Interview for DSM-IV Axis I Disorders (SCID; First et al., 2002)

The SCID is a semi-structured interview administered by trained researchers and used to assess for the presence of DSM-IV Axis I disorders (see Appendix 8). The screening module used in the current study comprises 12 questions paralleling DSM-IV diagnostic criteria.
Criteria are rated on a three-point scale: 0 (absent), 1 (subthreshold) or 2 (threshold or true). Test-retest reliability of the SCID is generally good across Axis I disorders (range $r=0.4 – 0.8$) (Zanarini et al., 2000). All participants were administered the screening module from the SCID. For HCs, any 2 point rating resulted in the participant’s data being excluded from the final analysis.

_Eating Disorder Examination Questionnaire – Version 4 (EDE-Q; Fairburn & Beglin, 1994)_

The EDE-Q is a 36-item self-report measure of ED symptomatology and behaviours experienced in the previous 28 days (see Appendix 9). The questionnaire is derived from the Eating Disorder Examination interview schedule (EDE; Fairburn & Cooper, 1993), widely regarded as the instrument of choice for the assessment and diagnosis of DSM-IV eating disorders (Garner, 2002). Like the EDE, the EDE-Q provides a similarly comprehensive assessment of the specific psychopathology of eating-disordered behaviour in a relatively brief self-report format. In the EDE-Q, agreement with 36 items pertaining to a variety of eating disordered cognitions, beliefs and behaviours is rated from 0 (not at all) to 6 (most severely or frequently), resulting in scores across four subscales (Dietary Restraint, Weight Concern, Shape Concern, Eating Concern). The mean of these subscales give rise to a Global Score reflecting overall illness severity. The maximum score on each of the subscales is six. The EDE-Q also records frequency of key ED behaviours in the past 28 days, including bulimic episodes (subjective and objective) and compensatory behaviours (i.e., self-induced vomiting, laxative and diuretic abuse, and intense exercise).

Psychometric evaluations of the validity of the EDE-Q have demonstrated a high level of agreement between the EDE-Q and EDE in assessing the core attitudinal features of eating disorder psychopathology in the general population and ED samples (Binford, LeGrange, & Jellar, 2005; Fairburn & Beglin, 1994; Mond et al., 2004). The EDE-Q has also demonstrated good internal consistency and test-retest reliability (Luce & Crowther, 1999). For these
reasons, and the fact that it is much quicker to administer than the EDE, the EDE-Q has increasingly been employed as an outcome measure in its own right and as an adjunct to the use of the EDE in descriptive studies. In the current study, internal consistency for each subscale was high (Restraint $\alpha = 0.91$; Eating Concern $\alpha = 0.91$; Weight Concern $\alpha = 0.90$; Shape Concern $\alpha = 0.96$) suggesting that the measure can be considered a reliable index of ED symptomatology in the current sample.

Hospital Anxiety and Depression Scale (HADS; Snaith & Zigmond, 1994)

The HADS is a widely used self-report measure consisting of 14 items, designed to detect adverse anxiety and depressive states (see Appendix 10). Items require respondents to rate Likert-type statements based on feelings and behaviour during the previous week. Items are scored 0 to 3, and the 14 items are divided into two subscales (anxiety and depression), leading to a maximum score of 21 for each subscale. The HADS has strong psychometric properties and reliably identifies two-factors, anxiety and depression (Cronbach’s $\alpha = 0.82$ and 0.83 respectively; Bjelland et al., 2002). Sensitivity and specificity of the measure ($r = 0.80$ for both subscales) is sufficient to detect ‘caseness’ and severity of anxiety and depression within a wide range of psychosomatic, psychiatric and healthy populations (Bjelland et al., 2002). A cut-off score of 10 is recommended as an indication of ‘caseness’ for both scales. As such, in the current study, the data from any HC participant who scored $\geq 10$ on either of the HADS subscales was excluded from the final analyses. In the current study, internal consistency for both the anxiety ($\alpha = 0.91$) and depression ($\alpha = 0.91$) subscales of the HADS was high.

Work and Social Adjustment Scale (WSAS; Marks et al., 1986)

The WSAS is a simple and brief five-item self-report scale designed to measure degree of functional impairment (see Appendix 11). The scale items tap into different domains of functioning (ability to work, home management, social leisure, private leisure, ability to form
and maintain close relationships). Each item is rated on a 9-point Likert-type scale, ranging from 0 (no impairment) to 8 (very severe impairment). Responses to each of the five items are summed to provide a global score, with higher scores representing greater impairment. The WSAS has demonstrated good internal consistency, test-retest reliability, and is sensitive to patient differences in disorder severity (Mundt et al., 2002). In the current study, internal consistency for the WSAS total score was high ($\alpha = 0.93$).

The NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992a)

The NEO-FFI is a 60-item self-report measure of personality based on the influential and widely-accepted Five-Factor or ‘Big 5” model of personality (see Appendix 12). The NEO-FFI is the shortened version of the 240-item NEO-Personality Inventory-Revised (NEO-PI-R; Costa & McCrae, 1992b). Each of the five factors or domains (Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness) is measured by a subscale consisting of 12 questions. Each question is answered on a 5-point Likert-type scale ranging from ‘strongly disagree’ to ‘strongly agree’.

The first scale of the NEO-FFI, Neuroticism, refers to a chronic level of emotional maladjustment and instability. High scores identify proneness to psychological distress and low scores are indicative of emotional or psychological stability. High scores on the Extraversion scale refer to sociable, active, talkative, person-oriented, optimistic, fun loving and affectionate persons. Persons with low scores tend to be reserved, sober, aloof, independent and quiet. High scores on the Openness to Experience scale, indicate persons who are curious, imaginative and willing to entertain novel ideas and unconventional values. Low scores refer to conventionality, rigidity in beliefs and attitudes, conservatism in tastes and dogmatism. High scores on the Agreeableness scale identify softhearted, good-natured, trusting, helpful, compassionate, forgiving and altruistic persons. Low scores refer to a cynical, rude, suspicious, uncooperative, irritable, manipulative or vengeful individual. High
scores on Conscientiousness are associated with people who are organised, reliable, hard working, self-directed, punctual, scrupulous, ambitious and persevering; while individuals with low scores tend to be aimless, unreliable, lazy, careless, lax, negligent and hedonistic (Costa & Widiger, 1994).

For each of the subscales the raw scores may vary from 12 to 60. Raw scores can also be transformed into standardised T-Scores, based on the normative standardization sample, with a mean T-score of 50. Raw scores are presented in the current study. Psychometric properties of the NEO-FFI are sound, demonstrating acceptable internal consistencies for each of the subscales (α ranges from 0.74 – 0.89) and good test-retest reliability (r ranges from 0.86-0.90) (Costa & McCrae, 1992a; Robins et al., 2001). In the current study, internal consistency for each of the subscales was high or acceptable (Neuroticism α = 0.92; Extraversion α = 0.89; Openness α = 0.64; Agreeableness α = 0.76; Conscientiousness α = 0.83).

Wechsler Abbreviated Scale of Intelligence (WASI; Psychological Corporation, 1999)

The WASI is a brief test of general intelligence and is a short-form of the full Wechsler Adult Intelligence Scale Third Edition (WAIS-III) (Wechsler, 1997) and the Wechsler Intelligence Scale for Children Third Edition (WISC-III) (Wechsler, 1991). The WASI is performance-based and can involve either a four- or two-subtest format. The current study used the four-subtest format, composed of the Matrix Reasoning (measuring nonverbal fluid abilities), Block Design (visuomotor/coodination skills), and Vocabulary and Similarities (verbal IQ) subscales. Raw scores from the four-subtest format can be transformed into Full-Scale IQ (FSIQ) scores, Performance IQ (PIQ) scores, and Verbal IQ (VIQ) scores, as well as empirical percentiles and 90% and 95% confidence intervals for each of these indices. Test administration takes approximately 40 minutes per participant. The WASI has demonstrated good psychometric properties, can be considered a valid and reliable estimate of an
individual’s general intellectual functioning, and can be considered a legitimate brief measure of IQ (Psychological Corporation, 1999; Garland, 2005).

*Mayer-Salovey-Caruso Emotional Intelligence Test – Version 2 (MSCEIT V2.0; Mayer, Salovey, & Caruso, 2002)*

The MSCEIT V2.0 (Mayer et al., 2002) is the direct operationalisation of Mayer and Salovey’s (1997) ability EI model. In line with this ability EI conceptualisation, the MSCEIT measures one’s capacity to reason with emotional information and to use emotional information to enhance thought. The test itself is an on-line computer-based assessment of EI consisting of 141 multiple-choice items, divided into eight subtests. The responses to the items give rise to 15 different scores: 8 Task/subscale Scores, 4 Branch Scores, 2 Area Scores, and a Total EI Score. Each of these scores and how they map on to Mayer et al.’s model is described below and illustrated in Figure 1.3 in the Introduction:

*Total EI Score:* This score provides an overall index of a respondent’s EI, and is computed as the average of the individuals’ raw scores for the 8 subscales/Task Scores (see below).

*Area Scores:* The MSCEIT measures EI across two main areas – Experiential EI and Strategic EI.

- *Experiential EI Scores* provide an index of the respondent’s ability to perceive emotional information, to relate this information to other sensations such as taste and colour, and to use this information to facilitate thought. Experiential EI Scores are computed as the average of an individual’s scores across the Faces, Pictures, Facilitation, and Sensations Task (see below).

- *Strategic EI Scores* are an index of a respondent’s ability to understand emotional information and use it strategically for planning and self-management. These scores
are computed as the average of the individual’s scores across the Changes, Blends, Emotional Management, and Social Management Tasks (see below).

*Branch Scores:* As mentioned previously, the MSCEIT measures four branches, or conceptual components of EI as outlined in Mayer et al.’s theoretical model, each of which is comprised of the individual’s performance on two subtests/tasks:

- **Perceiving Emotions Branch Score:** This indicates the degree to which an individual can identify emotions in himself or herself and others. This branch score is the average of the individual’s score for the Faces and Pictures Tasks.
- **Using Emotions Branch Score:** This branch score reflects and individual’s ability to use their emotions to improve their thinking and cognition. This branch score is computed as the average of the individual’s scores for the Facilitation and Sensations Tasks.
- **Understanding Emotions Branch Score:** This score indicates how well the respondent understands the complexities of emotional meanings, emotional transitions (how one emotion can transition from one to another), and emotional situations. This branch score is the average of the individual’s score for the Blends and the Changes Tasks.
- **Managing Emotions Branch Score:** This is a measure of how well the individual is able to manage emotions in his or her own life, and in the lives of others. This score is calculated as the mean of the individual’s scores for the Emotion Management and Social Management Task.

*Task Scores:* The 141 items of the MSCEIT are spread across 8 different subtests or ‘tasks’, each measuring a different aspect of EI:

- **Faces Task:** This task requires participants to accurately perceive emotions as expressed in the faces of other people. Respondents are asked to rate the severity of happiness, fear, surprise, disgust, and excitement in relation to colour photographs of
peoples’ faces (both male and female), on a 1 (no happiness or other emotion) to 5 (extreme happiness or other emotion) rating scale.

- **Pictures Task:** This task involves determining the respondent’s ability to perceive emotions expressed through art and the surrounding environment. Participants rate the extent to which various images and landscapes express happiness, sadness, fear, anger, disgust on a 1 to 5 rating scale.

- **Facilitation Task:** Different moods assist certain kinds of cognitive activity. This task assesses an individual’s understanding of how specific moods may underlie, facilitate, or interfere with cognitive and behavioural tasks. For example, respondents are asked to rate “What mood(s) might be helpful to feel when creating new, exciting decorations for a birthday party?” Response options include: annoyance, boredom, joy on a 1 to 5 rating scale.

- **Sensations Task:** This task assesses an individual’s ability to compare and contrast certain emotions with sensations generated within other sensory modalities such as colour, light, temperature, or taste. For example, “Imagine feeling guilty that you forgot to visit a close friend who has a serious illness. In the middle of the day, you realise you completely forgot to visit your friend at the hospital. How much is the feeling of guilt like each of the following?” Options include: anger, blue, and sweet on a rating scale of 1 to 5.

- **Changes Task:** This task assesses the respondents’ understanding of how emotions can transition from one to another (e.g., how frustration can change into anger) while considering contextual factors that may cause a change in emotions. For example, “Marjorie felt more and more ashamed, and began to feel worthless. She then felt ___?” Response options include: Overwhelmed, depressed, ashamed, self-conscious, or jittery.

- **Blends Task:** This task assesses how well respondents are able to comprehend the complexity of emotions, and how mixtures of more simple emotions can combine to
form more complex emotions. For example, “A feeling of concern most closely combines the emotions of ____?” Response options include: (a) love, anxiety, surprise, and anger; (b) surprise, pride, anger, and fear.

- **Emotion Management Task:** This task assesses the ability of the respondent to incorporate their own emotions into a decision-making scenario involving emotion regulation. This task asks respondents to rate the effectiveness of alternative actions in achieving a certain result in situations where a person must regulate his/her emotions. For example, “Mara woke up feeling pretty well. She had slept well, felt well rested, and had no particular cares or concerns. How well would each action help her preserve her mood?” Participants are then presented with two alternative “Actions” that this individual may take in order to do this, and are subsequently asked to rate the effectiveness of each action on a scale of 1 to 5.

- **Social Management Task:** This task measures participants’ ability to incorporate emotions into decision making that involves other individuals. The task asks respondents to evaluate how effective different actions would be in achieving an outcome involving other people. For example, “John developed a close friend at work over the last year. Today, that friend completely surprised him by saying he had taken a job at another company and would be moving out of the area. He had not mentioned he was looking for other jobs. How effective would John be in maintaining a good relationship, if he chose to respond in each of the following ways?” Two subsequent “Actions” are presented. The respondent rates the effectiveness of each one on a scale of 1 to 5.

*Scoring the MSCEIT*

After respondents answer the items of the MSCEIT on-line, all their responses are automatically sent electronically to the test publishers, Multi-Health Systems (MHS), where they are scored and then sent back to the researcher in the form of a Microsoft Excel
spreadsheet. There are two options for the procedure that can be used to score participants’ responses to the MSCEIT. One option indicates a person’s correctness on the test as judged by a ‘general consensus criterion’. The second option indicates a respondent’s correctness as judged by an ‘expert criterion’.

In the general consensus method, each one of a respondent’s answers is scored against the proportion of the standardisation sample for the test (a heterogeneous sample of over 5,000 people) that endorsed the same MSCEIT answer. For example, if a respondent indicated that surprise was “definitely present” in a face, and the same alternative was chosen by 45% of the standardisation sample, the individual’s score would be incremented by the proportion 0.45. These scored responses are then used to derive the mean raw score for each of the eight Tasks. From here one can calculate the raw scores for each of the four Branch Scores as the mean of the two constituent Task Scores. For example, the mean of the Faces and Pictures Task Scores comprises the Perceiving Emotions Branch Raw Score. Area Scores can then be computed by averaging the four constituent raw Task Scores (e.g., the mean of the Faces, Pictures, Facilitation and Sensations Tasks comprises the Experiential EI Area Score). Finally, the respondent’s Total EI raw score is the average of all eight unadjusted raw Task Scores.

In a similar way to the method used to calculate cognitive or general intelligence quotients (IQ), raw scores are then transformed into empirical percentiles and standard scores. As such, raw scores are statistically positioned on a normal curve with a mean of 100 and a standard deviation of 15. These standard scores are reported for the Total, Area, Branch, and Task Scores. Therefore if an individual’s score is well above the average (i.e., >115), that means they did very well on that area of the test in comparison to the normative sample. If the score is about average, this means that the individual’s emotional intelligence is equivalent to that
of most people in the normative sample. If the score is low, that means most people in the standardisation sample scored higher than the respondent.

The other way to score the MSCEIT is according to an expert scoring method. This method is the same as the former, except that each of the respondent’s scores is evaluated against the criterion formed by proportional responding of an ‘expert’ group. In this case, the proportion of 21 members of the International Society for Research on Emotions (ISRE) who endorsed the same response. So, in a similar way to the consensus based scoring method, if 18 of the 21 experts felt “D” was the correct response to an item, then the response “D” for that item would be given a score of 0.86 (18 out of 21 converted to a proportion). The emotion experts were selected to judge the test item responses because they had spent much of their careers investigating facial expressions of emotion, emotional language, the subjective experience of emotion, and emotion regulation. The 21 experts consisted of 10 men and 11 women aged 30 to 52, with a mean age of 39.4 years.

Whilst the full-scale MSCEIT scores based on both the consensus norms and the expert norms correlate highly ($r_s \geq 0.90$; e.g., Mayer et al., 2002; Mayer, Salovey, Caruso, & Sitarenios, 2003), the authors of the MSCEIT have recommended that the consensus based measurement (CBM) approach should be used. The theory underlying the ability model of EI is that emotions convey information about both people and the environment, and that this information system has evolved biologically, and is modified and refined further by culture (Mayer, Salovey, Caruso, & Sitarenios, 2001). The authors of the MSCEIT have argued that assessing the correctness of an answer according to group consensus is one operationalization of EI. The assumption underlying consensual scoring or CBM is that large samples of individuals converge on correct answers (Legree, Psotka, Tremble, & Bourne, 2005). CBM relies on a representative sample of individuals to approximate how knowledge is used and applied. CBM is useful when a formal information source or criterion of absolute correctness
is not readily available (Legree et al., 2005). Because the formalisation of knowledge related to the perception, use, understanding, and regulation of emotions is at present still emerging, and varies according to cultural norms, utilising CBM is arguably appropriate for measuring ability EI (Rivers, Brackett, Salovey, & Mayer, 2007).

**Psychometric Properties of the MSCEIT**

A growing amount of evidence is being mounted to support the psychometric properties of the MSCEIT, some of which was discussed in the previous chapter. As previously highlighted, the MSCEIT has been found to be reliable at the full-scale level, and at the area and branch levels (Mayer et al., 2003). The reliabilities for the eight individual Task Scores have been reported to be somewhat low (split-half reliabilities range from $r = 0.55$ to $r = 0.88$). As such the authors of the test do not recommend using these scores for most analyses. The internal consistency of the MSCEIT in the current study was assessed by calculating Cronbach’s $\alpha$ for each of the different test subscales. Cronbach’s $\alpha$ for each of the main MSCEIT Scores are presented in Table 2.2 below. This shows that the Using Emotions Branch Score, as well as most of the Task Scores (with the exception of the Faces, Pictures, and Changes Tasks) did not demonstrate acceptable internal consistency at the $\alpha \geq 0.70$ level. The Total MSCEIT Score shows the highest internal consistency, and can be considered an overall index of a person’s EI. As such, it will be the MSCEIT Total Score that will be used in the current study as the primary index of EI.
<table>
<thead>
<tr>
<th>MSCEIT Score</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Score</td>
<td>0.92*</td>
</tr>
<tr>
<td>Experiential EI Area Score</td>
<td>0.83*</td>
</tr>
<tr>
<td>Strategic EI Area Score</td>
<td>0.91*</td>
</tr>
<tr>
<td>Perceiving Emotions Branch Score</td>
<td>0.91*</td>
</tr>
<tr>
<td>Using Emotions Branch Score</td>
<td>0.62</td>
</tr>
<tr>
<td>Understanding Emotions Branch Score</td>
<td>0.79*</td>
</tr>
<tr>
<td>Managing Emotions Branch Score</td>
<td>0.72*</td>
</tr>
<tr>
<td>Faces Task Score</td>
<td>0.86*</td>
</tr>
<tr>
<td>Pictures Task Score</td>
<td>0.90*</td>
</tr>
<tr>
<td>Facilitation Task Score</td>
<td>0.56</td>
</tr>
<tr>
<td>Sensations Task Score</td>
<td>0.44</td>
</tr>
<tr>
<td>Blends Task score</td>
<td>0.57</td>
</tr>
<tr>
<td>Changes Task Score</td>
<td>0.73*</td>
</tr>
<tr>
<td>Emotion Management Task Score</td>
<td>0.55</td>
</tr>
<tr>
<td>Social Management Task Score</td>
<td>0.61</td>
</tr>
</tbody>
</table>

Note * = α > 0.70
Chapter 3

Results

Analytical Strategy

All data were analysed using PASW Statistics 18 software. Prior to testing any of the hypotheses, all variables were examined to assess whether they met the assumptions required for parametric analysis. The distributions of all variables were examined separately for each group (AN and HC) by visually inspecting histograms and box-plots, followed by statistically assessing the normality of distributions using Kolmogorov-Smirnov tests, with post-hoc examinations of skewness and kurtosis z-scores (Clark-Canter, 1997; Field, 2000). Variables that were significantly non-normally distributed were transformed using an appropriate transformation as suggested by Palant (2005). For variables where transformation was unsuccessful in achieving a normal distribution, non-parametric statistical tests were used. When the same results were obtained from using parametric and non-parametric tests, only the former are reported as they have greater statistical power (Field, 2000).

Before testing any of the primary hypotheses, exploratory independent samples t-tests were conducted to assess whether the AN and HC groups differed significantly with respect to ED symptomatology, anxiety and depression, and personality. Following this, independent t-tests were used to address the first hypothesis that the AN group would perform significantly worse than the HC group on the MSCEIT. Separate t-tests were conducted for each of the MSCEIT Scores. To address Hypothesis 2, relationships between the MSCEIT Total Score and measures of symptomatology and illness severity were assessed using Pearson’s Product Moment correlation coefficients ($r$) or non-parametric Spearman’s Rho correlation coefficients ($r_s$). The MSCEIT Total Score was used as the primary dependent variable in order to reduce the potential for Type I errors that would be associated with testing all of the MSCEIT scores individually. Hypothesis 3 was also explored by conducting Pearson’s
Product Moment correlations between MSCEIT Total scores and personality, IQ, and demographic variables. Hypothesis 4 was tested by conducting three separate hierarchical multiple regressions to examine the extent to which diagnostic status predicted MSCEIT scores over and above anxiety, depression, and personality. Finally, a post-hoc power analysis was conducted using G*Power (Version 3.1.2) to explore the actual power achieved in the current study.

An alpha level of $p < 0.05$ was adopted for all analyses unless post-hoc Bonferroni corrections for multiple comparisons were indicated. For group comparisons using $t$-tests, Cohen’s $d$ ($\text{mean}_1-\text{mean}_2/\text{pooled standard deviation}$) was calculated to provide a measure of effect size, with effect sizes of $\leq 0.2$ defined as small, $\geq 0.5$ defined as medium and $\geq 0.8$ defined as large (Cohen 1988).

**Exploratory Symptomatology and Social Functioning Group Comparisons**

Independent samples $t$-tests were used to compare the AN and HC groups in terms of their eating disorder symptomatology (EDE-Q scores), anxiety and depression (HADS scores), and social functioning (WSAS scores) (see Table 3.1 for untransformed means, standard deviations, test statistics, and effect sizes). As expected, the AN group had significantly higher scores, and scores within the clinical range, on each of the EDE-Q subscales and both anxiety and depression (large effects). Means and standard deviations for each of the frequency of ED behaviours as measured by the EDE-Q are also presented in Table 3.1 for reference. The AN group had significantly higher WSAS scores compared to the HC group, indicating significantly greater work and social functional impairment (large effect).
# Table 3.1
**Between-groups Comparisons for Symptomatology and Social Functioning Measures**

<table>
<thead>
<tr>
<th>Variable</th>
<th>AN Group (n = 32)</th>
<th>HC Group (n = 32)</th>
<th>Test Statistics</th>
<th>Effect Size (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (S.D)</td>
<td>M (S.D)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDE-Q Global Score</td>
<td>3.55 (1.72)</td>
<td>0.74 (0.65)</td>
<td>( t = 8.78 ) (55.23); ( p &lt; 0.001^* )</td>
<td>2.22</td>
</tr>
<tr>
<td>EDE-Q Dietary Restraint</td>
<td>3.46 (1.96)</td>
<td>0.78 (0.96)</td>
<td>( t = 6.25 ) (62); ( p &lt; 0.001^* )</td>
<td>1.76</td>
</tr>
<tr>
<td>EDE-Q Eating Concern</td>
<td>3.11 (1.69)</td>
<td>0.27 (0.31)</td>
<td>( t = 9.32 ) (33.1); ( p &lt; 0.001^* )</td>
<td>2.37</td>
</tr>
<tr>
<td>EDE-Q Weight Concern</td>
<td>3.51 (1.91)</td>
<td>0.83 (0.77)</td>
<td>( t = 6.89 ) (62); ( p &lt; 0.001^* )</td>
<td>1.87</td>
</tr>
<tr>
<td>EDE-Q Shape Concern</td>
<td>4.13 (1.80)</td>
<td>1.07 (0.97)</td>
<td>( t = 8.10 ) (62); ( p &lt; 0.001^* )</td>
<td>2.15</td>
</tr>
<tr>
<td>Objective Bulimic Episodes</td>
<td>5.38 (8.85)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Subjective Bulimic Episodes</td>
<td>0.66 (0.55)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Episodes of Vomiting</td>
<td>6.25 (9.65)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Episodes of Laxative Misuse</td>
<td>9.47 (15.36)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Episodes of Diuretic Misuse</td>
<td>0.25 (1.24)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Episodes of Excessive Exercise</td>
<td>2.66 (6.99)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HADS Anxiety</td>
<td>13.69 (4.53)</td>
<td>5.59 (2.98)</td>
<td>( t = 8.44 ) (62); ( p &lt; 0.001^* )</td>
<td>2.15</td>
</tr>
<tr>
<td>HADS Depression</td>
<td>10.53 (4.41)</td>
<td>1.78 (2.11)</td>
<td>( t = 10.14 ) (44.46); ( p &lt; 0.001^* )</td>
<td>2.57</td>
</tr>
<tr>
<td>WSAS Total Score</td>
<td>23.28 (8.47)</td>
<td>1.00 (3.45)</td>
<td>( t = 13.76 ) (40.95); ( p &lt; 0.001^* )</td>
<td>3.5</td>
</tr>
</tbody>
</table>

*Note.* \( ^* p < 0.001 \)

**Exploratory Personality Group Comparisons**

Independent samples \( t \)-tests were again used to assess whether the AN and HC groups differed significantly with regard to their scores on each of the NEO-FFI personality dimensions (see Table 3.2). After applying Bonferroni’s post-hoc correction for multiple comparisons (\( p = 0.05/5 \) personality dimensions = 0.01), the AN group had significantly higher Neuroticism scores, and significantly lower Extraversion scores compared to the HC.
group (large effects). There was a trend indicating that the AN group scored lower on Agreeableness ($p = 0.02$), however this difference was not significant once the Bonferroni correction had been applied. The two groups did not differ significantly in terms of their scores on the other NEO-FFI personality dimensions.

### Table 3.2

**Between-groups Comparisons for IQ and Personality**

<table>
<thead>
<tr>
<th>Variable</th>
<th>AN Group ($n = 32$)</th>
<th>HC Group ($n = 32$)</th>
<th>Test Statistics</th>
<th>Effect Size ($d$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEO-FFI Neuroticism</td>
<td>35.47 (8.58)</td>
<td>21.56 (7.12)</td>
<td>$t = 6.82 (62)$; $p &lt; 0.001^*$</td>
<td>1.41</td>
</tr>
<tr>
<td>NEO-FFI Extraversion</td>
<td>19.84 (7.31)</td>
<td>31.22 (6.79)</td>
<td>$t = -6.45 (62)$; $p &lt; 0.001^*$</td>
<td>1.64</td>
</tr>
<tr>
<td>NEO-FFI Openness</td>
<td>28.84 (6.10)</td>
<td>30.50 (7.64)</td>
<td>$t = -0.96 (62)$; ns</td>
<td>0.24</td>
</tr>
<tr>
<td>NEO-FFI Agreeableness</td>
<td>31.69 (5.81)</td>
<td>35.19 (6.23)</td>
<td>$t = -2.33 (62)$; $p = 0.02^{**}$</td>
<td>0.59</td>
</tr>
<tr>
<td>NEO-FFI Conscientiousness</td>
<td>32.47 (6.73)</td>
<td>33.38 (7.91)</td>
<td>$t = -0.49 (62)$; ns</td>
<td>0.13</td>
</tr>
</tbody>
</table>

*Note.* $^* p < 0.001$

### Hypothesis 1: MSCEIT Group Comparisons

To address Hypothesis 1, independent samples $t$-tests were conducted to establish whether the AN and HC group differed significantly with regard to their MSCEIT Total score (see Table 3.3). The HC group had a significantly higher MSCEIT Total Score compared to the AN group, which was associated with a medium strength effect size.

Further supplementary analyses were conducted to explore whether the two groups also differed significantly on each of the MSCEIT Area, Branch, and Task Scores. There was a non-significant trend for the AN group to score lower than HCs on both the Experiential EI
Score ($p = 0.07$) and Strategic EI Score ($p = 0.06$). The groups did not differ significantly on any of the MSCEIT Branch Scores. The AN group did score significantly lower than the HC group on the MSCEIT Changes Task at the $p < 0.05$ level. However, once Bonferroni’s correction had been applied ($p = 0.05/8$ tasks$= 0.006$), this difference became non-significant. There was a non-significant trend for the AN group to score lower on the Pictures Task ($p = 0.07$).

<table>
<thead>
<tr>
<th>Variable</th>
<th>AN Group (n = 32)</th>
<th>HC Group (n = 32)</th>
<th>Test Statistics</th>
<th>Effect Size</th>
<th>Energy Efficacy Area Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSCEIT Total Score</td>
<td>98.57 (13.78)</td>
<td>105.60 (11.03)</td>
<td>$t = -2.25 (62); p &lt; 0.05^*$</td>
<td>0.57</td>
<td></td>
</tr>
<tr>
<td>Experiential EI Area Score</td>
<td>100.51 (14.98)</td>
<td>106.78 (12.07)</td>
<td>$t = -1.84 (62); p = 0.07$</td>
<td>0.47</td>
<td></td>
</tr>
<tr>
<td>Strategic EI Area Score</td>
<td>96.56 (11.05)</td>
<td>101.34 (8.53)</td>
<td>$t = -1.94 (62); p = 0.06$</td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td>Branch 1: Perceiving Emotions</td>
<td>101.44 (16.65)</td>
<td>107.84 (12.91)</td>
<td>$t = -1.72 (62); ns$</td>
<td>0.44</td>
<td></td>
</tr>
<tr>
<td>Branch 2: Using Emotions</td>
<td>99.35 (12.21)</td>
<td>103.29 (10.48)</td>
<td>$t = -1.38 (62); ns$</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>Branch 3: Understanding Emotions</td>
<td>97.61 (13.15)</td>
<td>102.56 (8.47)</td>
<td>$t = -1.79 (62); ns$</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>Branch 4: Managing Emotions</td>
<td>95.35 (10.97)</td>
<td>98.57 (7.55)</td>
<td>$t = -1.37 (62); ns$</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>Faces Task</td>
<td>111.92 (24.92)</td>
<td>117.97 (12.90)</td>
<td>$t = -1.06 (61); ns$</td>
<td>0.31</td>
<td></td>
</tr>
<tr>
<td>Pictures Task</td>
<td>96.59 (12.03)</td>
<td>101.58 (9.59)</td>
<td>$t = -1.84 (62); p = 0.07$</td>
<td>0.47</td>
<td></td>
</tr>
<tr>
<td>Facilitation Task</td>
<td>101.68 (16.17)</td>
<td>101.63 (11.71)</td>
<td>$t = -0.52 (56.52); ns$</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sensations Task</td>
<td>98.28 (9.75)</td>
<td>102.12 (9.27)</td>
<td>$t = -1.62 (62); ns$</td>
<td>0.41</td>
<td></td>
</tr>
<tr>
<td>Changes Task</td>
<td>96.82 (13.77)</td>
<td>103.11 (10.08)</td>
<td>$t = -2.09 (56.83); ns$</td>
<td>0.53</td>
<td></td>
</tr>
<tr>
<td>Blends Task</td>
<td>98.99 (10.66)</td>
<td>100.77 (8.05)</td>
<td>$t = -0.76 (62); ns$</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td>Emotional Management Task</td>
<td>95.30 (10.55)</td>
<td>98.53 (8.44)</td>
<td>$t = -1.36 (62); ns$</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>Social Management Task</td>
<td>95.29 (11.17)</td>
<td>97.87 (8.11)</td>
<td>$t = -1.06 (62); ns$</td>
<td>0.27</td>
<td></td>
</tr>
</tbody>
</table>

*Note. * $p < 0.05$
Hypotheses 2 and 3: Correlations between the MSCEIT and Other Variables

As depicted in Table 3.4, associations between MSCEIT Total Scores and demographic and clinical variables, and IQ and personality were explored separately for each group by calculating Pearson Product Moment ($r$) or Spearman’s Rho ($r_s$) correlation coefficients.

In the AN group, there was a moderate strength positive relationship between MSCEIT Total Scores and age, such that EI increased with age. There was also a medium strength negative correlation between MSCEIT Scores and BMI, and MSCEIT Scores and HADS Anxiety, such that higher MSCEIT Scores were associated with lower BMI and lower Anxiety. The fact that there was a negative correlation between MSCEIT Scores and BMI was unexpected. Indeed, it was originally hypothesised that there would be a positive correlation between BMI and MSCEIT performance. One possible explanation for this unexpected observed relationship between MSCEIT scores and BMI, is that anxiety might be mediating the relationship. Whilst there is mixed evidence in the literature (Mattar et al., 2010), it has been suggested that low weight in AN has an anxiolytic function, and that anxiety increases with weight gain in people with AN as individuals start to lose that part of themselves which they have come to value so deeply (Nunn, Lask, & Frampton, In press). Thus, it could be that the anxiety associated with increased weight explains why people with higher BMI performed worse on the MSCEIT than people at lower weights. In other words, the poorer MSCEIT performance of people at higher weights might be due to the fact they were more anxious than the people at lower weights. To investigate this hypothesis, an unplanned partial correlation was carried out between MSCEIT Scores and BMI, while controlling for anxiety. It was found that after controlling for anxiety, there was no longer a significant relationship between BMI and MSCEIT Scores ($r$ (29) = -0.33, $p = 0.07$). This suggests that anxiety may have been partially mediating the relationship between EI and BMI, and that people with higher BMIs may have been performing worse on the MSCEIT because they had greater levels of anxiety.
In addition to the above, as predicted there was a medium strength positive relationship between MSCEIT Scores and Agreeableness at the $p < 0.05$ level, such that higher MSCEIT Scores were associated with higher Agreeableness. However, once Bonferroni’s correction had been applied and a more stringent alpha level adopted ($p = 0.05/5$ personality dimensions $= 0.01$), this correlation no longer remained significant. MSCEIT Total scores did not correlate significantly with any of the EDE-Q subscales, frequency of ED behaviours, depression, social functioning, age at onset of illness, or duration of illness.

In the HC group a different pattern of correlations emerged. In this group there was a medium strength positive correlation between MSCEIT Scores and Verbal and Full-scale IQ Scores, such that higher MSCEIT Scores were associated with higher Verbal and Full-Scale IQ. There was also a medium strength positive correlation between MSCEIT Scores and Agreeableness, with higher MSCEIT Scores associated with higher Agreeableness.

**Table 3.4**

<table>
<thead>
<tr>
<th>Variable</th>
<th>AN Group (n = 32)</th>
<th>HC Group (n = 32)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>$r = 0.38; p &lt; 0.05^*$</td>
<td>$r = -0.31; ns$</td>
</tr>
<tr>
<td>BMI</td>
<td>$r = -0.46; p &lt; 0.01^{**}$</td>
<td>$r = 0.16; ns$</td>
</tr>
<tr>
<td>Age at onset of AN</td>
<td>$r = 0.11; ns$</td>
<td>-</td>
</tr>
<tr>
<td>Duration of AN</td>
<td>$r = 0.20; ns$</td>
<td>-</td>
</tr>
<tr>
<td>Lowest ever BMI</td>
<td>$r = -0.08; ns$</td>
<td>-</td>
</tr>
<tr>
<td>Number of in-patient admissions</td>
<td>$r = -0.04; ns$</td>
<td>-</td>
</tr>
<tr>
<td>EDEQ Global Score</td>
<td>$r = -0.17; ns$</td>
<td>$r = -0.04; ns$</td>
</tr>
<tr>
<td>EDEQ Restraint</td>
<td>$r = -0.11; ns$</td>
<td>$r = -0.21; ns$</td>
</tr>
<tr>
<td>EDEQ Eating Concern</td>
<td>$r = -0.18; ns$</td>
<td>$r = -0.11; ns$</td>
</tr>
<tr>
<td>EDEQ Weight Concern</td>
<td>$r = -0.20; ns$</td>
<td>$r = 0.08; ns$</td>
</tr>
</tbody>
</table>

85
Hypothesis 4: To what extent does diagnostic status predict MSCEIT Scores over and above anxiety, depression, and Agreeableness?

Three separate hierarchical multiple regressions were carried out to assess the ability of diagnosis (AN vs. HC) and a) anxiety, b) depression, and c) Agreeableness to predict MSCEIT Total Scores. Agreeableness was chosen as a predictor as this was the only
personality dimension to correlate significantly with MSCEIT Scores. An interaction term between diagnosis and each of the other predictors (anxiety, depression, Agreeableness) was also entered into the respective models to assess whether the relationship between MSCEIT scores and the predictor differed significantly between the two groups. This is recommended when using categorical along with continuous predictor variables.

Prior to entering any of the variables into the regression models, it was assumed that there was a high level of multicollinearity between the main effect of each predictor (anxiety, depression, and Agreeableness) and the interaction term, seeing as the former is used in the computation of the latter. One way to reduce multicollinearity between predictor variables is to centre the variables around the mean of the individual predictor variables. This procedure, known as mean centring, involves subtracting the sample mean from each observed value of the predictor, and has been advocated as a feasible solution to high and extreme multicollinearity (Shieh, 2011). As such, anxiety, depression, and Agreeableness were transformed and centred prior to being entered into their respective models.

**Anxiety**

In the model for anxiety, MSCEIT Total Scores were entered as the dependent variable (DV), and diagnosis and (centred) anxiety were entered as independent variables (IVs) at Step 1. Step 1 accounted for 14.9% of the variance in MSCEIT Scores ($F (2, 61) = 5.34, p < 0.01, R^2 = 0.149, \text{Adjusted } R^2 = 0.121$). After entry of the diagnosis and anxiety interaction term at Step 2, the total variance explained by the model was 19.5% ($F (3, 60) = 4.84, p < 0.01, R^2 = 0.195, \text{Adjusted } R^2 = 0.155$). The interaction between diagnosis and anxiety accounted for an additional 4.6% of the variance explained, however this change was non-significant ($F \text{ change (1, 60) = 3.43, ns, } R^2 \text{ change = 0.046}$). In the final model, only anxiety made a significant unique contribution to explaining the variance in MSCEIT Scores ($\text{Beta} = -1.29, t (60) = -2.52, p < .05$). Diagnosis ($\text{Beta} = 0.08, t (60) = 0.47, \text{ns}$) and the diagnosis by anxiety
interaction (Beta = 0.99, \( t (60) = 1.85, \) ns) did not make significant unique contributions to explaining the variance in MSCEIT Scores. This suggests that anxiety predicted MSCEIT Scores over and above diagnosis, with higher MSCEIT Scores being associated with lower levels of anxiety. The non-significant interaction effect suggests that the relationship between anxiety and MSCEIT scores was not significantly different in the two groups.

**Depression**

The same analysis was conducted separately for depression. MSCEIT Total Scores were entered as the DV, and diagnosis and (centred) depression were entered as IVs at Step 1. Step 1 accounted for 7.6% of the variance in MSCEIT Scores, but this did not reach statistical significance (\( F (2, 61) = 2.52, \) ns, \( R^2 = 0.076, \) Adjusted \( R^2 = 0.046 \)). After entry of the diagnosis and depression interaction term at Step 2, the total variance explained by the model was 7.8%, however this was again not significant (\( F (3, 60) = 1.68, \) ns, \( R^2 = 0.078, \) Adjusted \( R^2 = 0.032 \)). The interaction between diagnosis and depression accounted for an additional 1% of the variance explained, however this change was non-significant (\( F \) change (1, 60) = 0.09, ns, \( R^2 \) change = 0.001). In the final model, none of the predictors made a significant unique contribution to explaining MSCEIT Scores (Diagnosis: Beta = 0.2, \( t (60) = 0.83, \) ns) (Depression: Beta = 0.14, \( t (60) = 0.21, \) ns) (Diagnosis*Depression Interaction: Beta = -0.22, \( t (60) = -0.3, \) ns). This suggests that when each is held constant, neither depression nor diagnosis significantly predicted MSCEIT Scores, and that the relationship between depression and MSCEIT Scores was not significantly different between the two groups.

**Agreeableness**

In the model for Agreeableness, MSCEIT Total Scores were again entered as the DV, and diagnosis and (centred) Agreeableness were entered as IVs at Step 1. Step 1 accounted for 24.4% of the variance in MSCEIT Scores (\( F (2, 61) = 9.84, p < 0.001, R^2 = 0.244, \) Adjusted \( R^2 = 0.219 \)). After entry of the diagnosis and Agreeableness interaction term at Step 2, the
total variance explained by the model was 24.5% ($F (3, 60) = 6.48, p < 0.01, R^2 = 0.245$, Adjusted $R^2 = 0.207$). The interaction between diagnosis and Agreeableness accounted for an additional 0.01% of the variance explained, however this change was non-significant ($F$ change $(1, 60) = 0.063, ns, R^2$ change = 0.001). In the final model, only Agreeableness made a significant unique contribution to explaining the variance in MSCEIT Scores (Beta = -0.43, $t$ (60) = 3.69, $p < 0.001$). Diagnosis (Beta = 0.15, $t$ (60) = 1.31, ns) and the diagnosis by Agreeableness interaction (Beta = -0.95, $t$ (60) = -0.25, ns) did not make significant unique contributions to explaining the variance in MSCEIT Scores. This suggests that Agreeableness predicted MSCEIT Scores over and above diagnosis, with higher MSCEIT Scores being associated with higher levels of Agreeableness, and that the relationship between Agreeableness and MSCEIT scores was not significantly different in the two groups.

**Power Analysis**

A post-hoc power analysis was conducted using G*Power (Version 3.1.2) software. The primary analysis from Hypothesis 1 (i.e., $t$-test comparing group means for MSCEIT Total Score) was used to calculate the power achieved. The power calculation (one-tailed, with $\alpha = 0.05$) revealed a power level of $1 - \beta = 0.72$ (72%). If the study were to achieve 80% power, with the effect size found in the current study ($d = 0.57$), a total of 78 participants ($n = 39$ in each group) would need to have been recruited.
Chapter 4

Discussion

This study sought to investigate the emotional processing abilities of women with AN, as compared to healthy women, through the use of a performance-based measure of emotional intelligence (the MSCEIT), which has not previously been used in this population. The overarching aim of the research was to pilot the usefulness of the MSCEIT in assessing a broad range of emotional processing abilities in people with AN, specifically abilities required to carry out accurate reasoning about emotions and the ability to use emotions and emotional knowledge to enhance thought and behaviour. This was considered necessary as previous research into emotional processing in AN has generally been quite fragmented, looking at very specific aspects of emotional processing in isolation from others. Previous research has also tended to rely on self-report data (the reliability and validity of which may be particularly problematic in people with AN) and experimental paradigms that have questionable ecological validity. The MSCEIT arguably overcomes these limitations. Secondary to this, the study attempted to explore whether emotional intelligence (EI) in AN was associated with functional ED symptomatology, indicators of illness severity, affective distress, and social functioning. Relationships between EI and ED symptoms could provide useful information about the role of emotional processes in driving particular symptoms. It was considered important to explore relationships between EI and affective distress, as many previous studies of emotional processing in AN have failed to account for this potential confound. It was also considered important to measure social functioning to explore whether EI was able to predict adaptive social functioning. Finally, it was deemed important to address the question of whether EI in AN was predicted by having a diagnosis of AN, over and above general affective distress and potentially confounding personality traits. The remainder of this chapter will be divided into sections that will aim to interpret and discuss
the pertinent findings of the current study and issues relating to the relevance and limitations of these findings.

**Hypothesis 1: Women with a diagnosis of AN will perform significantly worse than an age- and IQ-matched sample of non-clinical healthy women across the broad scope of emotion processes assessed by the MSCEIT.**

The first hypothesis posited that the AN group would score significantly lower than HCs on the MSCEIT. This hypothesis was partially supported, in that the AN group did demonstrate significantly lower MSCEIT Total Scores, which was associated with a medium effect size. There was a non-significant nominal trend for the AN group to score lower on each of the MSCEIT Area Scores (Experiential and Strategic EI). It was also apparent that people with AN scored lower than HCs on all of the Branch and Task Scores, however at the more stringent alpha level imposed by the Bonferroni correction, there were no significant group differences on any of the Branch or Task scores.

It is noteworthy that whilst the AN group’s Total MSCEIT Scores were significantly lower compared to the HCs, their mean scores for most of the subscales (Task, Branch, and Area scores) and the total score were only nominally lower than 100 (lowest score was 95.29, highest was 111.92). As previously discussed, the MSCEIT is scored in a similar way to general IQ tests such as the WAIS, in that raw scores are transformed into empirical percentiles and standard scores so that an individual’s performance can be compared against that of the standardisation sample for the test. Like IQ scores, MSCEIT scores have an average standard score of 100, with a standard deviation of 15, which marks the 50th percentile. Table 4.1 outlines the guidelines for interpreting MSCEIT Standard Scores as published in the MSCEIT administration manual (Mayer, Salovey, & Caruso, 2002). The AN group did indeed score close to, but just under, 100 on most of the MSCEIT subtests.
According to the interpretative guide provided by the MSCEIT test publishers, this would equate to the current sample of people with AN having EI scores within the ‘Low Average’ to ‘High Average’ range.

Table 4.1
Guidelines for Interpreting MSCEIT Scores (from Mayer, Salovey, & Caruso, 2002)

<table>
<thead>
<tr>
<th>MSCEIT Score Range</th>
<th>Qualitative Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 69</td>
<td>Consider Development</td>
</tr>
<tr>
<td>70-89</td>
<td>Consider Improvement</td>
</tr>
<tr>
<td>90-99</td>
<td>Low Average Score</td>
</tr>
<tr>
<td>100-109</td>
<td>High Average Score</td>
</tr>
<tr>
<td>110-119</td>
<td>Competent</td>
</tr>
<tr>
<td>120-129</td>
<td>Strength</td>
</tr>
<tr>
<td>≥ 130</td>
<td>Significant Strength</td>
</tr>
</tbody>
</table>

The authors of the MSCEIT suggest that the individual Task scores of the MSCEIT should be interpreted with caution due to the fact that some of the subscales have demonstrated rather low internal consistency. Nevertheless, it is interesting to note that the subtest on which the AN group produced their highest score ($M = 111.92$, interpreted as ‘Competent’) was the Faces Task, in which respondents are required to look at photographs of people’s faces and then indicate how the individual in the photograph is feeling, based on their facial expression. The AN group’s relatively high score on this subtest, although nominally lower than the HCs, suggests that they performed better on this subtest than the majority of the standardisation sample. This finding is interesting and somewhat unexpected given that Oldershaw et al. (2011a) reported that across previous studies there is a tendency for people with AN to perform poorly on such emotion recognition tasks. Oldershaw et al. did, however, note that this finding has not always been replicated, and that effect sizes tended to be greater for studies that required the identification of complex (as opposed to basic) emotions and in
paradigms that used free-naming as opposed to forced-choice response formats, suggesting that emotion recognition difficulties in AN may be subtle and less detectable using basic emotions in forced-choice paradigms. The Faces Task from the MSCEIT is a forced-choice task and requires the identification of basic emotions (happiness, sadness, fear, surprise, excitement), and as such this may be one explanation for why people with AN performed relatively well on this task. Another potential explanation for why people with AN appeared to perform relatively well on the Faces Task is that the task does not assess the ability to identify emotions quickly. Indeed, individuals can take as long as they want to consider each task item before making a decision about how much of each emotion is being expressed in the picture. Several studies exploring emotion recognition in AN have used tasks that have a specific time limit that individuals have to respond within (e.g., Zonnevijlle-Bender et al., 2002), or response/reaction times are sometimes recorded (e.g., Oldershaw et al., 2010). It is possible that people with AN struggle more with emotion recognition/inference when emotions have to be identified quickly, which is often the case in real-time social scenarios. Of course, this is a speculation which cannot be addressed by the current study’s findings. It would be important for future research to examine this possibility though.

The MSCEIT task on which the AN group scored lowest was the Social Management Task ($M = 95.29$, interpreted as ‘Low Average’). This task measures the respondent’s ability to incorporate emotions into decision making that involves other people, and asks respondents to evaluate how effective different actions would be in achieving an outcome involving other people. While people with AN did not produce significantly lower scores than HCs on this task, their score on this task was the lowest out of all the MSCEIT scores. This is interesting in light of the research outlined in the Introduction, which suggests that people with AN experience attenuated physiological emotional guidance to inform their decision-making, as demonstrated in their poor performance on the Iowa Gambling Task (IGT) coupled with muted physiological response when making decisions and following outcomes of decisions.
(e.g., Tchanturia et al., 2007). The finding is also consistent with Schmidt and Treasure’s (2006) maintenance model of AN, which postulates that difficulties in interpersonal relationships with close others are a key perpetuating factor for the illness. Whereas the IGT is a somewhat artificial experimental paradigm and involves making decisions that relate to one’s self (i.e., the chances of winning or losing artificial game money), the Social Management Task of the MSCEIT is an ecologically valid measure of how effective people are in incorporating emotions in decisions which involve other people. Thus, this aspect of EI may be a relative weakness for people with AN, whilst not indicative of an impairment per se as they did score within the ‘Low Average’ range on this task, and not significantly different from HCs.

It is also interesting to compare the EI of people with AN in the current study with the EI scores that have been reported for other clinical groups. Table 4.2 displays the means and standard deviations for Total MSCEIT Scores in the five available studies that a) have used the MSCEIT in clinical populations, and b) report mean Total MSCEIT Scores (Eack et al., 2010; Fox et al., 2011; Hertel et al., 2009; Jacobs et al., 2008; Perna et al., 2010). The information displayed in Table 4.2 demonstrates that the clinical group with the lowest MSCEIT Total Score ($M = 80.68$) is substance misusing individuals in the Hertel et al. (2009) study, of whom 90% were alcohol dependent. Generalised social phobia was associated with the highest EI of the clinical groups considered here ($M = 99.40$) and demonstrated MSCEIT Total Scores similar to people with AN in the current study ($M = 98.57$). It should be noted that these comparisons between the EI of people with AN in the current study, and those of other clinical populations in previous studies are for reference only. Results reported in previous research represent the EI of samples who were mixed in gender, and differ from the current sample of AN on a number of other important demographic and clinical features, so definitive inferences should not be made from these comparisons.
Table 4.2
Comparing MSCEIT Total Scores across Different Clinical Groups

<table>
<thead>
<tr>
<th>Study Author and Date</th>
<th>Group(s)</th>
<th>MSCEIT Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>($)</td>
</tr>
<tr>
<td>Eack et al. (2010)</td>
<td>Schizophrenia (n = 64)</td>
<td>86.10 (15.46)</td>
</tr>
<tr>
<td>Fox et al. (2011)</td>
<td>Cocaine-dependent (n = 72)</td>
<td>89.89 (15.81)</td>
</tr>
<tr>
<td>Hertel et al. (2009)</td>
<td>Major Depression (n = 35)</td>
<td>85.85 (2.09)</td>
</tr>
<tr>
<td></td>
<td>Substance Abuse Disorder (n = 31)</td>
<td>80.68 (2.41)</td>
</tr>
<tr>
<td></td>
<td>Borderline Personality Disorder (n = 19)</td>
<td>83.64 (2.76)</td>
</tr>
<tr>
<td>Perna et al. (2010)</td>
<td>Panic Disorder with Agoraphobia (n = 51)</td>
<td>87.10 (9.04)</td>
</tr>
</tbody>
</table>

Hypothesis 2: MSCEIT performance in people with AN will be significantly associated with a) ED-specific symptomatology, b) anxiety and depression, c) clinical indicators of illness severity (BMI, duration of illness, age of onset, lowest ever BMI, number of inpatient admissions), and d) social functioning impairment.

Relationship between EI and ED symptomatology

Overall EI, as indexed by the MSCEIT Total Score, did not correlate significantly with any of the ED symptomatology variables in either the AN or HC group. Thus, there was no association between EI and ED-specific symptoms, including dietary restriction, concerns about weight, shape, or eating, or frequency of engaging in binge-eating and compensatory behaviours (self-induced vomiting, laxative and diuretic misuse, excessive exercise). This is contrary to predictions based on findings from previous research using the MSCEIT in people with other psychiatric illnesses. In psychosis specifically it has been found that poorer EI scores are correlated with greater negative and disorganised symptoms (Horan et al., 2011a; Kee et al., 2010), and lower EI is also associated with greater impulse control difficulties in cocaine-dependent individuals (Fox et al., 2010). The current study’s finding of a lack of
association between ED symptoms and EI is also in contrast to predictions based on the explanatory models outlined in the Introduction, which suggest that ED symptoms have specific links with emotional processing. For example, the Distress Tolerance hypothesis (e.g., Corstorphine et al., 2006) and the transdiagnostic cognitive behavioural model of EDs (Fairburn et al., 2003) argue that ED symptoms (such as excessive exercise, purging) fulfil maladaptive mood modulatory functions, such that people with AN engage in these behaviours to block out, avoid, or reduce what they experience to be intolerable emotions. From this perspective, it would be expected that there would be a negative linear relationship between the ability to, for example, manage one’s emotions, and ED symptoms. That is, one would predict that a greater ability to manage one’s emotions would be associated with lower levels of ED symptoms. This was not the case in the current study, as overall EI did not correlate with any of the ED symptomatology variables measured.

Relationship between EI and Anxiety and Depression

As expected, exploratory group comparisons revealed that the AN group reported significantly higher scores, and mean scores within the clinical ‘caseness’ range, on each of the anxiety and depression subscales of the HADS.

As predicted, overall EI correlated negatively with anxiety in the AN group. Thus, in people with AN, higher EI was associated with less anxiety, and higher anxiety was associated with lower EI. Very few previous studies have directly explored the link between ability EI (as measured by the MSCEIT) and anxiety. One study (Bastian, Burns, & Nettelbeck, 2005) exploring EI in healthy non-clinical individuals reported findings similar to those in the current study, in that Total MSCEIT scores were negatively correlated with self-reported anxious thoughts. Jacobs et al. (2004) have also found that MSCEIT Total, Area, and Branch Scores are all significantly negatively correlated with social anxiety in people with social phobia. Thus, the relationship between anxiety and EI found in the current study broadly
replicates what has been found in healthy individuals and people with social phobia. The precise mechanisms that might explain this association cannot be ascertained from the current study, unfortunately. However, possible explanations will be postulated in relation to Hypothesis 4 (see below).

Interestingly, while MSCEIT performance did correlate with anxiety, it did not correlate with depression. This suggests that the ability to carry out accurate reasoning about emotions and to use emotions and emotional knowledge to enhance thought is not related to affective distress generally, but is perhaps specifically influenced by anxiety-related processes.

*Relationship between EI and Severity of AN*

The only indicator of clinical severity to correlate significantly with the MSCEIT was BMI, in the opposite direction to that which was predicted, such that higher MSCEIT performance was associated with lower BMI. This finding was puzzling and unexpected. It was subsequently hypothesised that the negative relationship between BMI and MSCEIT Scores may potentially be being mediated by anxiety. Whilst there is mixed evidence in the literature (Mattar et al., 2010), it has been suggested that low weight in AN serves a reinforcing anxiolytic function, such that low weight facilitates a blocking of the subjective somatic experience of anxiety and distress. It has been argued that individuals with AN demonstrate altered neurobiological processing of rewarding stimuli, such that they experience food and eating as unpleasant which causes increases in anxiety. This altered processing of usually pleasurable stimuli is potentially underpinned by abnormal interpretations in response to endogenous dopamine release (Bailer et al., 2011). Based on this line of reasoning, it is possible that anxiety increases with weight gain in individuals with AN, as they are starting to eat more and therefore experience greater frequency and intensity of dopamine release, which they interpret as threatening (Bailer et al., 2011; Nunn, Lask, & Frampton, in press). As such, it was predicted that the poorer MSCEIT performance of people at higher weights might be
due to the fact they were more anxious than the people at lower weights. To investigate this hypothesis a partial correlation was carried out between MSCEIT Scores and BMI, while controlling for anxiety. When anxiety was controlled for, the relationship between BMI and MSCEIT Scores was no longer significant. Therefore, it can be argued that the poorer MSCEIT Scores of the individuals at higher BMIs is potentially attributable to their greater anxiety. This is one possible explanation for the unexpected finding observed in the current study, and requires further exploration in future research.

Other than BMI, Total MSCEIT Scores did not correlate significantly with any of the other indicators of illness severity including age of onset and duration of illness, lowest ever BMI or number of inpatient admissions. This suggests that EI in people with AN does not decrease as the level of severity of AN increases, which is contrary to what was predicted. Previous studies using the MSCEIT with other clinical populations have shown mixed results. In some studies lower EI is associated with greater illness severity, such as duration of illness in cocaine-dependent individuals (Fox et al., 2011) and people diagnosed with schizophrenia (Eack et al., 2010). However, in another study MSCEIT performance did not correlate significantly with degree of agoraphobic avoidance in people with panic disorder and agoraphobia (Perna et al., 2010). Previous studies in AN (e.g., Oldershaw et al., 2010; Harrison et al., 2010a; Pollatos et al., 2008) have also failed to find associations between BMI (and other severity variables) and emotional processing variables such as emotion recognition and eToM, so the current study broadly replicates these findings. It is nonetheless interesting that emotional processing and EI appear to be related to severity of illness in some clinical groups, but not in AN.

Relationship between EI and Social Functioning

The AN group demonstrated significantly greater levels of social and occupational impairment as measured by the WSAS in comparison with HCs, which is in keeping with
previous research demonstrating poor social and interpersonal functioning in AN (e.g., Hartmann, Zeeck, & Barrett, 2009; Zucker et al., 2007).

In relation to Hypothesis 2, overall MSCEIT performance was not related to social and occupational functioning, in either group, as measured by the WSAS (Marks et al., 1986). This finding is curious for several reasons. Firstly, EI as measured by the MSCEIT has demonstrated significant associations with social functioning in other clinical populations, such as schizophrenia (Eack et al., 2010; Kee et al., 2009) and individuals high in schizotypy (Aguirre, Sergi, & Levi, 2008). It has been argued that within these clinical populations, impaired EI is a key predictor of poor social functioning. Secondly, studies of non-clinical populations indicate that EI predicts several aspects of social functioning such as quality of relationships with parents, friends, and romantic partners (Lopes et al., 2003; 2004). The fact that MSCEIT scores were not correlated with social functioning in either the AN or HC group in the current study is contrary to both of these previous sets of findings. One possible explanation for this discrepancy between the current findings and those of previous research is that the current study used the WSAS as an index of social functioning. Previous research involving the MSCEIT has used other measures of social functioning, such as the Social Adjustment Scale (SAS-SR; Weissman & Bothwell, 1978). The WSAS was chosen for use in the current study as it is has shown good psychometric properties (Mundt et al., 2002), it is free to use, and is brief to administer (only five items). Other measures of social functioning, such as the SAS-SR, are arguably more comprehensive and more sensitive to subtle individual differences in social functioning, yet they are usually more expensive to buy and time-consuming to use. It is possible that the lack of association between MSCEIT performance and social functioning may be an artefact of the way in which social functioning was measured in the current study, and future research might benefit from accepting the cost of investing in the use of a more comprehensive measure.
Hypothesis 3: There will be a small but significant relationship between MSCEIT Scores and personality and IQ. Specifically, MSCEIT Scores will correlate positively with IQ and positively with Agreeableness.

**Relationship between EI and IQ**

Hypothesis 3 was partially supported. In relation to the predictions that were made about IQ, MSCEIT Total Scores were positively associated with Full-scale IQ in the HC group only. A small correlation between MSCEIT Scores and IQ would have been expected based on what has been reported in previous research (Mayer, Roberts, & Barside, 2008). In previous research, the overall relationships between the MSCEIT and verbal intelligence have been found to be low (about $r = 0.30$), with even lower correlations ($r = 0.10$ to $0.20$) for perceptual-organisational intelligence. This is to be expected given that EI, in part, is concerned with emotional knowledge which, of course, is influenced by general verbal abilities and semantic knowledge. Thus, the weak relationship between Total MSCEIT Scores and Verbal and Full-scale IQ in HCs found in the current reflects what has been found previously, and fits with what would be expected given the nature of the EI and IQ constructs.

It is, however, puzzling why an association between IQ and MSCEIT performance existed in the HC group only. It is possible that the lower standard deviations for both MSCEIT and Verbal IQ in the AN group may explain this finding. That is, there was less of a range in the MSCEIT and Verbal IQ scores in the AN group compared to HCs. As the likelihood of detecting a significant correlation increases with range, it is possible that the lower spread of IQ and MSCEIT scores in the AN group may explain why a significant correlation was not found in this group. Interestingly, the only other study which has explored the relationship between MSCEIT performance and IQ as measured by the WASI failed to find a significant correlation between EI and IQ in both a sample of people with social phobia and HCs (Jacobs et al., 2009). Clearly, more research is needed to further elucidate the relation between EI and IQ, and this work would benefit from adopting a unified and standardised approach to
measuring IQ. Previous research exploring IQ and EI associations have assessed IQ using a range of different tests. If we are to gain a better understanding of how IQ and EI overlap, and where they diverge, then it will be important for future researchers to operationalise IQ in the same way as each other.

**Relationship between EI and Personality**

Exploratory group comparisons revealed that the AN group reported significantly higher levels of Neuroticism (tendency to experience emotional instability and negative emotions, such as anger, anxiety, or depression) and significantly lower levels of Extraversion (characterised by positive emotions, and the tendency to seek out stimulation and the company of others) compared to HCs. This is consistent with existing evidence showing that AN is associated with elevated Neuroticism and lower Extraversion compared to the general population, and other EDs (Claes, Vandereycken, & Vertommen, 2004; Podar et al., 1999, 2007; Tasca et al., 2009). There was a trend for the AN group to score lower on the Agreeableness dimension of the NEO-FFI (denoting a tendency to be compassionate and cooperative rather than suspicious and antagonistic towards others), which has also been demonstrated in previous research (e.g., Claes et al., 2004; Podar et al., 1999, 2007), however this group difference disappeared once the more stringent alpha level was applied following the Bonferroni correction.

Regarding the relation between EI and personality, it was specifically predicted that there would be a positive correlation between MSCEIT scores and Agreeableness, which was indeed supported. This prediction was made following the results of previous research documenting that Agreeableness is the personality dimension showing the most consistent and strongest relationship with performance-based EI (Mayer et al., 2004; Van Rooy, Viswesvaran, & Pluta, 2005). In the current study, the strength of the positive relationship between Agreeableness and EI was not dissimilar between the groups ($r = 0.40$ for AN, $r =$
0.47 for HCs). It makes theoretical sense for Agreeableness to correlate positively with EI. Agreeableness is primarily a personality dimension of interpersonal tendencies. High Agreeableness is associated with warmth, friendliness, altruism and compliance to the needs of others (Digman & Takemoto-Chock, 1981; Graziano & Eisenberg, 1997), is predictive of social support and harmonious relationships (Asendorpf & Wilpers, 1998; Soldz & Vaillant, 1999), and is negatively associated with anger, aggression and interpersonal arguments (Jensen-Campbell & Graziano, 2001; Meier & Robinson, 2004). Individuals who score highly on Agreeableness are altruistic and are sympathetic to and eager to help and co-operate with others (Costa & McCrae, 1992a). These traits clearly overlap with the branches of EI defined in Mayer et al.’s model of EI, as one needs to be able to accurately perceive, use, understand, and manage emotions to interact successfully with others. Interestingly, both EI (measured by the MSCEIT) and Agreeableness have been found to correlate significantly and positively with measures of social-cognitive Theory of Mind (ToM), but both are also apparently unrelated to social-perceptual ToM. Social-cognitive ToM is the ability to reason about the mental states of others and use such reasoning to predict or explain their actions, whilst social-perceptual ToM is the ability to detect the mental states of others using immediately available cues such as facial expressions and bodily movements (Tager-Flusberg & Sullivan, 2000). Two separate studies have found that EI (Ferguson & Austin, 2010) and Agreeableness (Nettle & Liddle, 2008) are both related to social-cognitive ToM, but not social-perceptual ToM. Recent neuroscience research has also begun to suggest that Agreeableness and EI are associated with activation in similar brain regions, namely those regions that have previously been associated with processing information about the intentions and mental states of others (DeYoung et al., 2010; Reis et al., 2007). Thus, it seems that EI and Agreeableness are closely connected, and may be jointly underpinned by the brain mechanisms involved in social-cognitive ToM. Having said this, the correlations between Agreeableness and MSCEIT in the current study were also only modest in magnitude (also supported by previous findings – e.g., Van Rooy, Viswesvaran, & Pluta, 2005), suggesting that Agreeableness does not
account for all of the variance in EI (or vice versa), thereby providing evidence in favour of the incremental and discriminant validity of the MSCEIT.

**Hypothesis 4: MSCEIT performance will be significantly predicted by a diagnosis of AN, over and above a) anxiety, b) depression, and c) Agreeableness.**

All aspects of hypothesis 4 were unsupported. Diagnostic status did not predict Total MSCEIT scores over and above anxiety, depression, or Agreeableness.

The results of the hierarchical regression analysis indicated that anxiety and Agreeableness predicted MSCEIT Total Scores over and above diagnosis, with lower EI being associated with higher levels of anxiety, but higher EI associated with higher Agreeableness. Thus when anxiety and Agreeableness were held constant, group differences on the MSCEIT were not significant. However, when diagnostic status was held constant, anxiety and Agreeableness did explain a meaningful unique amount of variance in EI. This finding is consistent with the fact that MSCEIT scores were correlated with anxiety and Agreeableness, but not correlated with any of the ED symptomatology or illness severity variables. Thus, at both a categorical (diagnosis) and a dimensional (symptom) level there does not appear to be anything specific about having AN that can explain the relatively lower EI found in this group in the current study.

When depression was considered, it failed to predict a significant amount of variance in EI performance. This is supported by the lack of association between EI and depression also found here.

The results discussed here in relation to anxiety should be interpreted in the context of previous research which has explored the impact of affective distress on emotional processing
in AN. While many studies have not controlled for concurrent anxiety and depression when exploring group differences in emotional processing in AN, a few have. These studies have predominantly been within the alexithymia literature. For example, differences in alexithymia between AN and controls have been found to disappear after statistically controlling for anxiety (Montebarocci et al., 2006; Bydlowski et al., 2005; Kessler et al., 2006). Following these findings, it has been suggested that the presence of alexithymia in AN may be more related to mood than eating behaviour per se (Eizaguirrea, et al., 2004), and that heightened alexithymia (difficulties identifying and communicating emotions) in AN may be secondary to anxiety and/or depression. The results of the current study also suggest a similar conclusion; it is possible that the lower EI of people with AN is attributable to their heightened anxiety, and therefore anxiety somehow interrupts their ability to reason accurately about emotions and use emotional information to make adaptive decisions in a social context.

Whilst the exact mechanisms that might underlie this relationship cannot be inferred from the current study, it is possible to hypothesise what they might be. It is well known that anxiety and anxiety disorders are associated with a range of cognitive biases that filter and influence the way in which information is processed. These biases involve the executive functions of attention, judgment, interpretation, mental imagery and memory (e.g., Matthews & MacLeod, 2005). For example, anxiety disorders have been associated with a selective attentional bias toward threatening stimuli and an attentional style that serves the function of maintaining vigilance, thereby reducing cognitive resources available for other tasks (Mathews, 1990). Several anxiety disorders (e.g., OCD, panic disorder, social phobia) are also associated with heightened self-focused attention, which plays a role in reinforcing and maintaining anxiety in these disorders (e.g., Clark & Wells, 1995). It is also known that emotional experiences, more generally, colour and influence attentional processes, including directing the focus of one’s attention and acting as attentional interference (Barret, Mesquita, Oshner, & Gross, 2007;
Sander et al., 2005). In this way, it is possible that attentional biases associated with anxiety may affect the way in which emotional information is processed and acted upon – in other words one’s EI. To give an example, anxious people tend to exhibit a negative interpretation bias towards emotionally ambiguous stimuli, such that they judge future negative life events to be more likely to occur, and are more prone to choose negative interpretations of emotionally ambiguous stimuli than non-anxious volunteers (Bishop, 2007). It is feasible that anxious people with AN demonstrate the same cognitive biases as those that have been reported in the general anxiety literature, and it also feasible that such biases would affect their performance on a task like the MSCEIT where they are presented with hypothetical emotion-laden scenarios to which they have to interpret the information presented and respond appropriately. Similarly, heightened self-focused attention is likely to make individuals less sensitive to social cues as attention is focused inwards toward the self and not on what is occurring within the external environment.

It is noteworthy that research is steadily demonstrating that many of the cognitive biases associated with anxiety are also present in people with AN. For example, it has been noted that people with AN show an attentional bias toward threatening illness-specific (e.g., shape, weight, food) stimuli, and socio-emotional stimuli such as photographs of faces and emotion words (Brooks et al., 2011; Harrison et al., 2010a,b; Lee & Shafran, 2008; Oldershaw et al., 2011a; Shafran et al., 2007), such that they preferentially process and focus their attention on such stimuli. People with AN also tend to demonstrate a tendency toward negative future-directed thinking, a cognitive bias associated with anxiety and mood disorders (Godley et al., 2001). Interestingly, individuals with a range of anxiety disorders have also demonstrated reliable emotional processing deficits in similar domains as people with AN. For example, a recent meta-analysis has concluded that adults with anxiety disorders show a significant impairment in their ability to accurately recognise emotional facial expressions (Demenescu
et al., 2010). Specific anxiety disorders may also report high levels of alexithymia, with difficulties labelling their own emotions (e.g., Baker et al., 2004).

In addition to anxiety-related cognitive biases being present in AN, there is a vast literature highlighting the elevated co-morbidity between AN and anxiety disorders. Indeed, it has been suggested that half to two thirds of individuals with AN have a history of at least one co-morbid lifetime anxiety disorder, the most common being social phobia and obsessive-compulsive disorder (OCD) (Kaye et al., 2004). In many, but not all cases, particularly for social phobia and OCD, the onset of the anxiety disorder tends to precede the onset of AN (Bulik, Sullivan, Fear, & Joyce, 1997; Swinbourne & Touyz, 2007), and the onset of AN tends to exacerbate existing anxiety symptoms. The co-morbidity between AN and anxiety also has important clinical implications. Women with AN who report a history of childhood anxiety disorder report more extreme ED related personality traits and attitudes and they engage in more compensatory behaviours compared to those without such co-morbidity (Dellava et al., 2009; Raney et al., 2008). Furthermore, anxiety-related co-morbidity has a negative effect on outcome of AN (Herpertz-Dahlmann et al., 2001).

Aside from patterns of co-morbidity, there is also evidence of a shared genetic diathesis between AN and anxiety disorders (Keel et al., 2005), and people with AN reliably demonstrate abnormalities in anxiety-related brain structures (including the insula and limbic system) and neurotransmitter functioning, specifically in the serotonergic and dopaminergic systems (Kay, 2008). Given the clear overlaps between AN and anxiety, it has been argued that anxiety is a central and core feature of AN, and it has even been proposed that AN (and other EDs) is a specific behavioural and cognitive manifestation of anxiety, and should be reclassified within the soon-to-be-published DSM-V as belonging to the broader category of anxiety disorders (Waller, 2008). Whilst this is unlikely to happen, it is an interesting proposition, and Waller sets out a number of suggestions as to how to test his hypothesis.
Clearly there are significant phenomenological and epidemiological similarities between AN and anxiety disorders. Anxiety also seems to be a core feature of the clinical presentation of many people with AN. Indeed, the sample of individuals with AN in current study also scored, on average, within the clinical range on the HADS anxiety subscale. The results of the present study also demonstrate that the lower EI found in people with AN can probably be accounted for by their higher levels of anxiety. That is, the ability of people with AN to reason accurately about emotions and use emotional knowledge to guide effective thinking and behaviour is potentially impeded by their heightened anxiety. Whilst it has not possible to specify the underlying mechanisms explaining why anxiety might impact on EI in the current study, it is possible to hypothesise that the answer may lie in anxiety-related cognitive biases that impede the individual’s ability to effectively think about and act on emotional information. The author is unaware of any other existing studies that have explored the relationship between performance-based EI and anxiety-related cognitive biases, but this may be an interesting and useful issue that could be explored in future research.

The null findings in relation to depression and its lack of association with and predictive influence on EI are also interesting. Indeed, depression did not correlate with MSCEIT performance in either of the groups. This suggests that depression is not particularly important in determining how able people are to reason accurately about emotions and incorporate emotional information into effective decision-making and behaviour. Given the preliminary nature of this study it is important, however, not to completely rule out the role of depression in influencing EI and emotional processing more generally.

The ability of Agreeableness to predict MSCEIT Scores over and above diagnosis was another important finding. Given that the AN group scored lower than the HCs on Agreeableness (although not significantly so after the Bonferroni correction), it is possible
that their lower Agreeableness contributed to their overall lower MSCEIT Scores. Overall though, this finding is noteworthy as it adds to the literature discussed above suggesting that there is a degree of overlap between the personality dimension of Agreeableness and performance-based EI. The regression model with Agreeableness and diagnosis entered at Step 1 accounted for nearly 25% of the variance in MSCEIT scores, and only Agreeableness made a significant unique contribution to the model. This is a meaningful amount of variance to be accounted for by one predictor, which again points to the suggestion that the NEO-FFI Agreeableness scale and the MSCEIT tap overlapping constructs.

**Strengths and Limitations of the Current Study**

It is worth highlighting that the matching process was successful, and the AN and HC group did not differ significantly in terms of their age, number of years in formal education, and IQ (verbal, performance, and full-scale). This can be considered a strength of the study design. Many other research studies exploring emotional processing in people with AN have been unsuccessful in matching their groups in terms of age and IQ, and have thus had to covary for these post-hoc in their statistical analyses. The current study tried to reduce the potential for age and IQ to act as confounding variables, and was successful in ensuring that the two groups were, on average, very similar with regard to these characteristics. Despite matching the groups, it was however apparent that the relationship between MSCEIT performance and age and IQ was somewhat different across the two groups. That is, MSCEIT scores correlated positively with age in people with AN, which reflects what has been found in the general population (e.g., Extremera et al., 2006; Kafetsios, 2004), however, this was not the case in the HC group. Also, IQ correlated positively with MSCEIT Scores in the HC group, but not in people with AN. This is a somewhat curious finding, and quite difficult to explain. It is possible that some unknown third variable was influencing the relationship between age and EI, and that this confounding variable exerted its effect differently across the AN and HC group. If this study were to be replicated it would be important to explore this issue further.
Both of the groups also demonstrated mean verbal, performance, and full-scale IQ scores within the Average to High Average ranges of ability. This range of general intellectual ability is reflective of what is found within the AN population more generally. A recent systematic review and meta-analysis (Lopez, Stahl, & Tchanturia, 2011) of studies which have explored IQ in people with AN has documented that, on average, people with AN demonstrate IQs within the Average to High Average range, with slightly higher (average 5.9 points) IQs than HCs when directly compared using the Wechsler IQ Scales (including the WASI). As such, the IQ of the AN sample in the current study can be considered typical of the wider AN population.

The current study had several limitations that need to be considered when interpreting the results. Firstly, the study was restricted by the small sample sizes that were recruited. More participants were recruited into the study than suggested in the a priori power calculation ($N = 64$ recruited as opposed to $N = 52$ suggested), however, the original power analysis was based on the expectation that the between-group differences on the MSCEIT would be associated with a large effect size. This prediction was based on what had been reported in a study using the MSCEIT in individuals with schizophrenia (Kee et al., 2009). In the current study, the actual group differences in the MSCEIT were associated with a medium effect size ($d = 0.57$), meaning that with the current sample the ability to detect group differences on the MSCEIT Total Score was associated with only 72% power ($1 - \beta = 0.72$). As such, it is possible that some of the null findings reported in the current study may be due to Type II errors. If the study were to be replicated in any way in the future, and if at least 80% power is to be achieved, it was calculated that at least 39 participants should recruited in each group. This information will be helpful for future researchers wanting to plan their sample size.
Another limitation of the study is that it compared people with AN to HCs only, and therefore did not allow for any direct comparison with any other clinical control groups. This approach is disadvantageous as it does not allow for any firm conclusions to be made about whether any EI difficulties in people with AN are specific to AN, or whether they are common across different clinical populations and therefore possibly transdiagnostic features. If the current research were to be replicated and extended in the future it would be interesting to directly compare the EI in AN with a range of other clinical groups, including other EDs (such as BN), schizophrenia spectrum psychoses, ASD, and given the current study’s findings, people with different types of anxiety disorder. As mentioned in other sections of this thesis, both ASD and psychosis are associated with significant difficulties in various domains of emotional processing and social cognition (King & Lord, 2011; Pinkham et al., 2008). Given that it has already been demonstrated that people with AN do not perform significantly different to people with ASD on several measures of social- and non-social neurocognition (Oldershaw et al., 2011b), it would be interesting to see what EI strengths and weaknesses people with AN possess relative to well-matched samples of individuals with ASD, psychosis, or anxiety disorders.

The effect of taking psychotropic medication on EI was also not controlled for in the current study. Despite a lack of evidence for their efficacy, many people with AN are prescribed psychotropic medication to treat co-morbid disorders, to facilitate eating through the anxiolytic properties of some drugs, or to affect appetite and/or eating (Kaplan & Howlett, 2010). In order to enhance the current study’s sample size, it was decided that medication status should not be an exclusion criteria. Indeed, twelve of the 32 AN participants in the current study were taking at least one type of psychotropic medication at the time of assessment. Little is known about the effect of psychotropic medication on emotional and social cognitive processing, however, one study in this area has suggested that taking Citalopram (an SSRI), may increase the ability to detect basic emotions in the facial
expressions of others in healthy controls (Harmer et al., 2003). Kohler et al. (2010) have also found that use of anti-psychotic medication in individuals with schizophrenia significantly moderates the ability to accurately detect emotional expressions in the faces of others. That is, unmedicated individuals perform significantly worse on tests of emotion recognition than those who are taking anti-psychotic medication. It is therefore possible that psychotropic medication may improve emotional and social cognitive functioning, although this hypothesis remains to be confirmed. If it is the case that use of SSRI or other psychotropic medication enhances emotional processing abilities, this may have masked potential difficulties in the AN group in the current study as a substantial proportion of them were taking such medication. It was not deemed possible to examine the effect of medication status on MSCEIT performance in the current study due to the small sample sizes, and the associated issues of multiple testing and low power. However, further research is needed to continue to elucidate the effects of medication on emotional processing, and to control for any effects found, perhaps by selecting only medication-free individuals for inclusion in research.

The psychological treatment experiences of the AN sample were also not taken into consideration in the current study. That is, the individuals in the AN sample would have been exposed to a variety of treatment experiences, that may or may not have impacted on how they process emotions. It would have been preferable to recruit a treatment naive sample, although this would have taken much longer to achieve due to the low incidence of AN. Future researchers might benefit from actively trying to recruit a sample of treatment naive individuals, and planning for this within the timeframe of their research.

Rates of co-morbidity between AN and other Axis I and Axis II disorders were also not measured in the current study. Given the high co-morbidity rates for AN reported in the literature, and the importance of anxiety highlighted in the current study’s findings, it would
have been helpful to have comprehensively assessed for the presence of lifetime and current Axis I and II diagnoses, to see whether this had an impact on the observed outcomes.

Another limitation of the current study is its cross-sectional design. This type of design does not allow for the investigation of whether any difficulties in emotional processing are state-like effects that are limited to the acutely ill state, or whether any potential difficulties exist prior to the onset of or after recovery from AN, and therefore represent potential trait markers for the illness. Future prospective and longitudinal studies are required to address this issue. The cross-sectional design of the current study also prevents any definitive conclusions regarding the direction of causality to be established. For example, it has been argued that lower EI in AN compared to HCs may be caused by their higher anxiety, and that anxiety may in some way interfere with the ability to process emotional information. It is of course also possible that difficulties in emotional processing cause increased anxiety. That is, if individuals are aware that they find emotional and social information difficult to navigate, this may cause their anxiety to rise. It is likely that the actual direction of causality is bidirectional to an extent, in that anxiety reduces EI, and the knowledge that one has difficulties with EI-related tasks causes anxiety levels to rise. The current study is unable to fully address this issue however.

The samples used in the current study were also comprised entirely of females, as is often the case with ED research. The reasons for excluding males from the current study were both pragmatic and theoretical. It was expected that there would be limited opportunity to obtain data from male patients as they are so rarely encountered in clinical practice, and the inpatient ED service where a significant proportion of recruitment took place does not admit male patients at all. In addition, there are known gender differences in a number of aspects of emotional and social cognitive processing (e.g., Baron-Cohen, Knickmeyer, & Belmonte, 2005), including EI (e.g., Extremera et al., 2006), and thus it was considered important to
control for this potentially confounding variable by entirely excluding males. Nonetheless, it would be very interesting and important to thoroughly explore the emotional processing of men affected by AN, as most studies in this area have neglected male sufferers, meaning that we know little about how these individual process emotions, and whether they differ from women with AN. Males continue to be neglected by ED researchers and it is important that future researchers should attempt to pay due attention to addressing this gender bias.

The samples recruited in the current study were also self-selecting and to some extent opportunity samples, as a significant proportion of the HC sample were Kings College London and Royal Holloway staff and students. A true random sample would have been desirable, giving each person in the population an equal chance of taking part. However, this would have required greater funds, time and resources and these were not available within the context of this DClinPsy thesis. Having said this, every effort was made to reach as wide a sample as possible; for example adverts were placed in public places in the local community, and the study was advertised on websites available to anyone with an internet connection. In addition, the AN group and HCs were matched with regard to their age, educational level, and IQ, which is a strength of the current study’s design.

Care was also taken to ensure that the AN sample represented inpatients, outpatients and individuals in the community, although the final AN sample was comprised predominantly of outpatients and inpatients. Interestingly, the mean age of onset in the current AN sample ($M = 20.56$ years) was relatively high compared to what has been reported in the epidemiological literature, where it often quoted that AN has an average age of onset of around 15 years old (Morris & Twaddle, 2007). The AN sample also had a relatively long duration of illness ($M = 10.22$ years). As such, the current AN sample can be considered a relatively late-onset sample with a chronic duration if illness. This, to some extent, limits the generalisability of the current studies’ findings to the wider population of people with AN.
In addition to those methodological limitations already highlighted, the use of the MSCEIT to measure EI, and the four-branch ability model of EI itself, have recently been criticised on a number of grounds. Firstly, whilst there is a body of evidence supporting the criterion validity of the MSCEIT (see Mayer, Roberts, & Barsade, 2008, for a summary), there has been criticism of the use of consensus or expert scoring for this test (e.g., Matthews, Zeidner, & Roberts, 2007). The two forms of scoring are highly consistent, correlating in the range $r = 0.93–0.98$ (Mayer et al., 2002), but both methods results in the maximum score on an item being obtained when the respondent chooses the option previously endorsed by the majority of either a standardisation sample or a group of experts. This scoring method does not correspond with that used in standard intelligence tests, such as the WAIS, where most test items generally have well-defined correct answers. Secondly, the structural validity of the MSCEIT has also been called into question by a number of recent studies. While some studies have supported a four-factor MSCEIT structure consistent with the Four-Branch Model (e.g., Karim & Weisz, 2010; Mayer et al., 1997, 2002, 2003), others have questioned its factorial fidelity (e.g., Fan et al., 2010; Palmer, Gignac, Manocha, & Stough, 2005). A recent study has also suggested that the factor structure of the MSCEIT may be different in people with schizophrenia compared to HCs (Eack et al., 2009). Unfortunately the sample sizes in the current study were too small to conduct any kind of meaningful factor analysis. However, if the current study were to be extended and/or replicated in future, it would be important for future researchers to consider the structural validity of the MSCEIT in people with AN.

Thirdly, the MSCEIT is a commercial test with scoring performed by its publishers (MultiHealth Systems), rather than the scoring key being made available to researchers. This means that access to the MSCEIT is limited by considerations of cost, which has negative implications for its potential use in both research and routine clinical work as a means of assessing emotional processing. The MSCEIT is also the primary, and most psychometrically
evaluated, measure of ability or performance-based EI available to researchers. Within other areas of individual difference research (i.e., intelligence and personality), investigators and clinicians can select from a wide range of tests and assessment methods. This is also the case for trait/mixed model EI, where a number of independently developed self-report scales are available, for example, the Trait Emotional Intelligence Questionnaire (TEIQue) (Petrides & Furnham, 2003), the Schutte Emotional Intelligence Inventory (SEIS) (Schutte et al., 1998), and the Emotional Quotient Inventory (Bar-On, 1997). This means that for trait EI, as for intelligence and personality, psychometric properties such as reliability and validity can be compared between tests, as can the performance of tests developed using different theoretical perspectives. This is not currently the case with performance-based ability EI, where the MSCEIT is the dominant paradigm available.

Finally, whilst the MSCEIT is perhaps useful in assessing global emotional processes, the scoring methods do not provide information about the relative processing of specific emotions. Previous research has highlighted that certain emotions (e.g., anger, sadness, guilt, shame) may be particularly important in driving and maintaining EDs (e.g., Fox, 2009; Goss & Allan, 2009). As such, it would have been helpful if the MSCEIT could have provided information about whether people with AN exhibit particular difficulties in the cognitive processing of specific emotions.

Despite the limitations associated with the MSCEIT, it is the primary and most well-validated measure of performance-based EI available. The goal of the current study was also to pilot the use of the MSCEIT in people with AN, as it had not previously been applied in the AN population.
Summary Discussion

The overarching aim of the current study was to explore whether people with AN demonstrate attenuated scores on a multidimensional measure of performance-based EI relative to a matched sample of HCs. Whilst it was demonstrated that people with AN performed significantly worse than HCs in terms of their overall EI, they still scored within the Average to Low Average range on the MSCEIT. Interestingly, the results of the correlation and regression analyses indicated that MSCEIT performance did not seem to be related to functional ED symptoms, nor did having a diagnosis of AN predict MSCEIT scores. Indeed, both levels of anxiety and Agreeableness were better predictors of MSCEIT performance than diagnostic status.

As discussed above, the MSCEIT can be considered a measure of social cognitive processing, as opposed to social-perceptual processing. Social-cognitive processing is the ability to reason about the mental states of others and use such reasoning to predict or explain their actions. This involves the use of high-order thinking and reasoning skills. Social-perceptual processing on the other hand is the ability to detect the mental states of others using immediately available cues such as facial expressions and bodily movements (Tager-Flusberg & Sullivan, 2000). Such processing involves relatively automatic and basic perceptual processes, and is likely to be underpinned by somewhat different brain structures and functions compared to social-cognitive processing. The MSCEIT can be regarded as a measure of social-cognitive processing as it has recently been shown to correlate highly with social-cognitive ToM, but not social-perceptual ToM (Ferguson & Austin, 2010). Thus, the MSCEIT measures thinking and reasoning about emotional and mental states, as opposed to basic perceptual processes involved in identifying the thoughts and emotions of others.

One potential interpretation of the current study’s findings is therefore that people with AN are not particularly impaired when it comes to social-cognitive processing involving high-
order thinking and reasoning about emotions and mental states. Previous research into socioemotional processing in people with AN has tended to focus more on relatively basic social-perceptual processing, such as attentional biases to socioemotional stimuli (e.g., Harrison et al., 2010a, b) or the ability to recognise or infer emotions and mental states in photographs of people’s faces (e.g., Kucharska-Pietura et al., 2004; Oldershaw et al., 2010). As demonstrated by Oldershaw et al.’s (2011a) systematic review, people with AN do demonstrate a clear impairment on such tasks. Few studies in AN have, however, explored thinking and reasoning about emotions and mental states using a performance-based paradigm. Interestingly, studies that have explored higher-order social-cognitive processing in AN have found that this type of processing may not be selectively impaired in AN. For example, Tchanturia et al. (2004) asked people with AN and a sample of HCs to comprehend complex ToM tasks that involved making a range of complex social inferences, such as detection of double bluff, mistakes, persuasion, humour, and white lies. These are high level social cognitive processes. In addition, both the AN and HC groups were administered control tasks that required non-social and non-mental state comprehension and reasoning. It was found that people with AN performed worse than HC subjects on both the ToM and on control tasks. However, there was no evidence of any selective impairment of ToM in AN sufferers. Another more recent study (Torres et al., 2010) asked participants with AN (compared to HCs) to imagine how they would feel in hypothetical everyday situations, and therefore involved high order reasoning about the emotions one might feel given a specific situation. The researchers demonstrated that participants with AN were as able as HCs to imagine emotions in hypothetical situations and to identify and label them. This again suggests that people with AN may not have difficulty with complex ToM and emotional processing.

Unfortunately the current study did not include a measure of basic or social-perceptual ToM, and so it has not been possible to directly compare and explore whether there is a dissociation
between AN performance on basic and complex ToM tasks, and therefore whether or not people with AN exhibit a selective impairment in social-perceptual as opposed to social-cognitive processing. This would be a potentially interesting direction for future research to explore, as it has not yet been addressed in the existing literature. Future studies might simultaneously assess EI using the MSCEIT, along with more basic social-perceptual ToM tasks, such as the Reading the Mind in the Eyes task (Baron-Cohen et al., 2001) or other well validated ToM and emotion recognition stimuli.

If it is the case that AN is associated with a selective impairment in social-perceptual as opposed to more complex social-cognitive processing, this is consistent with what has been reported in the wider neuropsychological literature in AN. That is, while people with AN generally exhibit average to above average performance in the broad realm of general IQ (Lopez et al., 2011), they nevertheless demonstrate robust deficits in selected executive functions, namely set shifting and central coherence (Lopez et al., 2008; Roberts et al., 2007). Thus, it may be that AN is associated with a range of specific neurocognitive deficits, but appear to perform at least as good as the general population in broad-based and higher-order assessments of functioning. The intact general intellectual functioning in people with AN may also mean that they are able to compensate for basic social-perceptual deficits by learning how to reason about emotions and mental states through experience. This is of course a hypothesis to be tested, and not a definitive conclusion.

Clinical Implications

Some of the prominent findings from the current study were that people with AN exhibit poorer overall ability to reason with and about emotions than HCs, but their ability level was within the broadly average range compared to the published norms and standardisation sample for the MSCEIT. The regression analysis indicated that anxiety was a strong predictor of EI, such that the greater anxiety in the AN group may explain why they demonstrated
lower EI. Whatever the mechanism involved, it remains the case that people with AN have slightly lower EI than HCs. The fact that anxiety is likely to be involved poses potential translational targets for future therapeutic interventions.

A number of novel clinical interventions have recently been designed with the specific purpose of improving emotional functioning in AN. The Maudsley Model of Treatment for Adults with Anorexia Nervosa (MANTRA), derived from Schmidt and Treasure’s (2006) cognitive-interpersonal maintenance model of AN, is a structured and time-limited outpatient treatment that adopts a motivational approach to specifically targeting the maintaining factors outlined in the model (rigid and detail-focussed thinking styles, emotional avoidance, pro-anorexic beliefs and responses of close others). Parts of this intervention have been adapted, extended and reformulated into Cognitive Remediation and Emotional Skills Training (CREST), which is designed specifically to be delivered in inpatient settings. CREST is a low-intensity individual treatment for inpatients with severe AN (Money, Davies, & Tchanturia, 2011; Money, Genders, Treasure, Schmidt, & Tchanturia, 2011). It aims to target rigid and detail-focussed thinking styles, but places greater emphasis on the development of emotion recognition skills, and the management and expression of emotion in AN. In CREST, patients and therapists engage together with psycho-educative material, and simple, collaborative cognitive tasks and game-like activities that encourage reflection on emotional processing skills, and practice implementing small behavioural changes. Different modules within CREST are designed to help individuals learn about a) the function of emotions, b) how to label and identify emotions in oneself and others, c) the positive intentions of emotions and the needs emotions communicate to the self and others, and d) practice tolerating and expressing emotions. The intervention was developed following empirical reviews of the existing literature, highlighting what the main areas of emotional difficulty appeared to be for people with AN. It was also informed by service user, carer, and clinician input regarding what aspects of emotional processing were perceived to be the most difficult.
and necessary areas for intervention (Kyriacou et al., 2009). Two recent studies have reported
that CREST is perceived as helpful by patients and it may produce objective improvements in
emotional processing skills (Money et al., 2011a; 2011b). More comprehensive quantitative
data regarding emotional processing improvement as a result of CREST are currently in
preparation (Tchanturia, in preparation).

Two findings from the current study could be translated to further develop existing
interventions, such as CREST and MANTRA. Firstly, it was found that people with AN
demonstrate average to low average ability to reason about emotions and use emotional
knowledge to facilitate their thinking and behaviour. This suggests the abilities that comprise
EI, as measured by the MSCEIT, should perhaps take less precedence than, say more basic
social-perceptual processes, in future targeted treatment developments. Specific treatments,
such as cognitive enhancement therapy (Hogarty & Greenwald, 2006), which aim to
remEDIATE impaired social perceptual processes through structured group and computer
exercises teaching the skills necessary to correctly infer other people’s thoughts and emotions
have recently been demonstrated as effective in improving socioemotional functioning and EI
in people with psychosis (e.g., Eack et al., 2009; Hogarty et al., 2004, Horan et al., 2011). It is
possible that adopting a similar framework could be potentially useful for patients with AN.
Indeed, there is some preliminary evidence to suggest that CREST, which uses a similar
approach to cognitive enhancement therapy, may help to improve socioemotional
functioning in people with AN (Money et al., 2011a, b). In addition to adopting a skills-
training approach to improving emotional processing in AN, interventions might also draw on
strategies used in already existing psychological therapies. For example, mentalization-based
therapies (e.g., Bateman & Fonagy, 2004), which draw on psychodynamic and attachment
theory and involve reflecting on the mental states of oneself and others, could be helpful
(Skårderud, 2007a, b, c). Indeed, a specific form of mentalization-based therapy that has been
adapted for people with EDs is currently being trialled with adults who have AN (Schmidt et
Similarly, techniques taken from systemic therapies, such as circular questioning to encourage thinking about other people’s thoughts and feelings and the reasons for them, might be helpful. Therapeutic writing exercises, which encourage individuals to reflect on the emotional perspectives of others, have already been found to significantly reduce anxiety and ED symptomatology in a non-clinical student population (East, Startup, Roberts, & Schmidt, 2010).

Secondly, the relationship between EI and anxiety was highlighted in the current study. Greater anxiety was associated with lower EI, and it was suggested that anxiety may in some way prevent individuals from reasoning effectively about emotions. One implication of this is that if anxiety is specifically targeted within emotion-based therapies for AN, then this may have a secondary positive impact on EI and related emotional processing skills. An opposite relationship with EI was also found for Agreeableness, such that greater EI was associated with greater Agreeableness. In this way, it may be that bolstering Agreeableness would also increase one’s EI. This is less amenable to intervention, however, as Agreeableness is a relatively stable personality trait, whereas anxiety on the other hand is more state-like and responsive to environmental contingencies. There are many examples of effective evidence-based psychological treatments for state anxiety and anxiety disorders, and so it may be helpful to draw upon and include some of these techniques in future emotion-focused AN treatment protocols. Targeting specific anxiety-related cognitive biases may be one potentially useful approach, and a specific form of cognitive bias modification has demonstrated efficacy in reducing both cognitive biases and anxiety in anxiety disorders (for a recent meta-analysis see Hallion & Ruscio, 2011). Of course, much further research is required to establish which, if any of the anxiety-related cognitive biases influence social-cognitive and social-perceptual processing in AN. Interventions for AN that target cognitive biases could draw on existing cognitive behavioural models and therapies in the anxiety disorder literature, including cognitive bias modification techniques (e.g., Hakamata et al.,

al., in preparation).
‘Third wave’ therapies, including mindfulness based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002) and acceptance and commitment therapy (ACT; Hayes, Strosahl, & Wilson, 1999), may also provide helpful frameworks to address cognitive biases and anxiety related processes. MBCT encourages attention to internal experiences, including emotions, through developing mindfulness, which involves a purposeful, flexible, nonjudgmental awareness of the present moment (Kabat-Zinn, 1990). ACT targets experiential avoidance, the unwillingness to allow internal experiences including emotions, in interventions that facilitate the process of acceptance, which involves allowing one’s internal experiences without trying to alter or change them. Both of these approaches have potential to both reduce anxiety, and at the same time facilitate processing emotions without avoidance. As such, elements from both of these therapeutic approaches might usefully incorporated within emotion-focused interventions for AN. Indeed, such treatment developments are currently underway (e.g., Wildes & Marcus., 2011) but require further empirical validation.

Conclusions
The results of the current study have demonstrated that people with AN perform roughly within the low average to average range on a validated performance-based measure of EI, which assesses the ability to carry out accurate reasoning about emotions and the ability to use emotions and emotional knowledge to enhance thought. Compared to a matched sample of healthy individuals, individuals with AN demonstrated lower EI, however this difference is likely to be influenced by heightened anxiety and lower levels of Agreeableness. These findings, in addition to the lack of association between EI and ED symptomatology, suggest that people with AN are not markedly impaired in their social-cognitive processing involving thinking and reasoning about emotions. This is in contrast to previous research demonstrating that people with AN show clear difficulties with basic social-perceptual processing, such as low-level mental state and emotion inference, and demonstrable maladaptive beliefs about emotions. EI in AN was also unrelated to social functioning, suggesting that any difficulties
with EI are relatively independent of their ability to function in the social domain. As such, EI, and its constituent facets, might not be a priority target for treatment.

It is important to remember when interpreting the findings discussed here that the study was associated with sub-optimal statistical power, and therefore it is possible that some of the null findings reported here may be due to Type II errors. This is also the first study to have explored performance-based EI in people with AN, and so the results should be seen as preliminary. If the study were to be replicated in future it would be important to recruit larger samples in line with the medium effect size reported in the current study. Future research might also benefit from exploring associations between performance on the MSCEIT with performance on social-perceptual measures of ToM, and further delineating the mechanisms underlying the relationship between EI and anxiety.

Despite the limitations of the current study, the design was original in that it was the first attempt to explore performance-based EI in people with AN. The study also adds a potentially important message to the expanding field of research that is documenting the social and emotional phenotype of a devastating illness associated with poor outcomes and considerable psychological and physical morbidity.
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onset neuropsychiatric disorders in adult eating disorder patients: A pilot study.

Experience of caring for someone with anorexia nervosa: Qualitative study. *British


Appendix 1

Screening Questionnaire
TELEPHONE SCREENING AND PERSONAL INFORMATION FORM FOR PARTICIPANTS

Participant No. ______________

Eating / Weight History
- In your view, have you ever had an eating disorder? YES □ NO □
If yes, at what age did you first have an eating disorder?
_______________________

- Have you ever had or been diagnosed with any of the following eating disorders?
  □ Anorexia Nervosa at the age of_______
  □ Bulimia Nervosa at the age of_______
  □ Binge Eating Disorder at the age of_______
  □ Other _____________ at the age of_______

Do you still suffer from an eating disorder? If yes, specify
___________________________________________________________________

- What is current height? ________________________________
- What is your current weight? ________________________________
- How old are you? ________________________________
- Do you deliberately try to limit the amount of food you eat every day?
  YES □ NO □
Have you ever done this in the past, for more than three months at a time?
  YES □ NO □

- Have you done this in the past 12 months for more than three months at a time?
  YES □ NO □

- Do you ever have the experience of eating what other people would consider an unusually large amount of food given the circumstances? YES □ NO □
If yes, what is the average number of times this happens per week?
___________________________________________________________________

- Have you ever had this experience in the past for more than three months at a time?
  YES □ NO □
- Have you had this experience during the past twelve months for more than three months at a time?  
  YES ☐  NO ☐

- Do you ever vomit, use laxatives, stimulant drugs or diuretics as a means to control your weight or shape?  
  YES ☐  NO ☐
If yes, what is the average number of times per week? _______________________

- Have you ever done this in the past for more than three months at a time?  
  YES ☐  NO ☐

- Have you done this in the past twelve months for more than three months at a time?  
  YES ☐  NO ☐

- Do you exercise hard as a means of controlling your weight or shape?  
  YES ☐  NO ☐

- Have you ever done this in the past for more than three months at a time?  
  YES ☐  NO ☐

- Have you done this in the past twelve months for more than three months at a time?  
  YES ☐  NO ☐

- Do you have regular periods?  
  Irregular ☐  Regular ☐

-Have your periods ever stopped? Length of time______________________________

If REGULAR now, How long have you had regular periods for?_______________

Are you currently using the oral contraceptive pill?  
  YES ☐  NO ☐

Are you currently using any other hormonal contraceptive?  
  YES ☐  NO ☐

- Have any of your family ever had a problem with eating or weight?  
  YES ☐  NO ☐
If yes, please detail their relationship to you (eg. mother, sibling, aunt, uncles, etc.) and their eating problem (eg. anorexia, obesity, etc.) ____________________________

- Do you have any current medical illness? _________________________________
- Do you have diagnosis of any learning disability or attention deficit disorder?  
  YES ☐  NO ☐
- Have you ever had a fit, convulsion or seizure?  
  YES ☐  NO ☐
- Have you ever had a head injury?  
  YES ☐  NO ☐
- Have you ever been diagnosed with any mental health problem?  
  YES ☐  NO ☐
  - Please specify _________________ (eg. depression, anxiety disorder)
- Are you currently taking any medication? (please specify)

- Have you ever had a problem with alcohol or illicit substances (such as cannabis, ecstasy, amphetamines or heroin)?  
  YES ☐  NO ☐
- Has anyone in your family ever experienced any kind of mental health problem?  
  YES ☐  NO ☐
If YES, please specify__________________________________________________
Appendix 2

Confirmation of Ethical Approval from Royal Holloway

Psychology Department Ethics Committee
Ethics Proposal 2010/ 027

Blackman, Carol

Sent: 21 June 2010 11:58
To: Hambrook, D
Cc: Brown, Gary

Dear David,

Ethics Proposal 2010/027: A pilot study exploring emotional intelligence in people with anorexia nervosa

Your above ethics proposal has been reviewed by the DEC, and has received ethical approval for 12 months.

Good luck with your study.

Best Regards,

Carol

Miss Carol Blackman
Faculty Administrator
Psychology Department
Royal Holloway University of London
Egham
Surrey TW20 0EX

Tel: +44 (0) 1784 443528
Fax: +44 (0) 1784 434347
Email: carol.blackman@rhul.ac.uk
Appendix 3

Conformation of NHS Ethical Approval
18th May 2010

Mr David Hambrock
Trainee Clinical Psychologist
Camden and Islington NHS Foundation Trust
Doctorate in Clinical Psychology
Royal Holloway, University of London
Egham Hill, Egham, Surrey
TW20 0EX

Dear Mr Hambrock,

Study Title: A pilot study exploring emotional intelligence in people with anorexia nervosa

REC reference number: 10/H0807/30
Protocol number: 1.0

The Research Ethics Committee reviewed the above application at the meeting held on 16 April 2010. Thank you for attending to discuss the study.

Ethical opinion

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see “Conditions of the favourable opinion” below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

- The PIS should be re-written to ensure that participants are fully aware that they are to be included in the study.
Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

For NHS research sites only, management permission for research ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rforum.nhs.uk. Where the only involvement of the NHS organisation is as a Participant Identification Centre, management permission for research is not required but the R&D office should be notified of the study. Guidance should be sought from the R&D office where necessary.

Sponsors are not required to notify the Committee of approvals from host organisations.

It is responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The documents reviewed and approved at the meeting were:

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<th>Document</th>
<th>Version</th>
<th>Date</th>
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<td></td>
<td>03 March 2010</td>
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<tr>
<td>REC application</td>
<td>39485/10262</td>
<td>09 March 2010</td>
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<td>Protocol</td>
<td>1.0</td>
<td>17 February 2010</td>
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<td>Investigator CV</td>
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<td>03 March 2010</td>
</tr>
<tr>
<td>Participant Information Sheet: for Patients with AN</td>
<td>1.0</td>
<td>17 February 2010</td>
</tr>
<tr>
<td>Participant Information Sheet: for Healthy Controls</td>
<td>1.0</td>
<td>17 February 2010</td>
</tr>
<tr>
<td>Participant Consent Form: for Patients with AN</td>
<td>1.0</td>
<td>17 February 2010</td>
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<tr>
<td>Participant Consent Form: for Healthy Controls</td>
<td>1.0</td>
<td>17 February 2010</td>
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<tr>
<td>GP/Consultant Information Sheets</td>
<td>1.0</td>
<td>17 February 2010</td>
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<tr>
<td>Referees or other scientific critique report</td>
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<td>15 January 2010</td>
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<td>Interview Schedules/Topic Guides</td>
<td>1.0</td>
<td>17 February 2010</td>
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<tr>
<td>Questionnaire: Demographic Questionnaire</td>
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<td>Advertisement</td>
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CV = Academic Supervisor

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research
Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.rcpse.nhs.uk.

Please quote this number on all correspondence 10/H080730

With the Committee’s best wishes for the success of this project

Yours sincerely

Mr T Eaton
Chair

Email: audrey.adams@nhs.net

Enclosures: "After ethical review – guidance for researchers"

Copy to: Dawn Langdon, Royal Holloway, University of London [R&D office for NHS care organisation at lead site]
11 June 2010

Mr David Hambrook
Trainee Clinical Psychologist
Camden and Islington NHS Foundation Trust
Doctorate in Clinical Psychology
Royal Holloway, University of London
Egham Hill, Egham, Surrey
TW20 0EX

Dear Mr Hambrook,

Full title of study: A pilot study exploring emotional intelligence in people with anorexia nervosa

REC reference number: 10/H0807/30
Protocol number: N/A
EudraCT number:

Thank you for your letter of 27 May 2010. I can confirm the REC has received the documents listed below as evidence of compliance with the approval conditions detailed in our letter dated 16 April 2010. Please note these documents are for information only and have not been reviewed by the committee.

Documents received

The documents received were as follows:

<table>
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<th>Date</th>
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<tr>
<td>Covering Letter</td>
<td></td>
<td>27 May 2010</td>
</tr>
<tr>
<td>Participant Information Sheet: Anorexia Nervosa</td>
<td>2</td>
<td>27 May 2010</td>
</tr>
<tr>
<td>Response to Request for Further Information</td>
<td></td>
<td>27 May 2010</td>
</tr>
<tr>
<td>Participant Information Sheet: Healthy Control</td>
<td>2</td>
<td>27 May 2010</td>
</tr>
<tr>
<td>Participant Consent Form: Anorexia Nervosa</td>
<td>2</td>
<td>27 May 2010</td>
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<tr>
<td>Participant Consent Form: Healthy Control</td>
<td>2</td>
<td>27 May 2010</td>
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You should ensure that the sponsor has a copy of the final documentation for the study. It is the sponsor’s responsibility to ensure that the documentation is made available to R&D offices at all participating sites.
Please quote this number on all correspondence: 10/H0807/30

Yours sincerely

[Signature]
Audrey Adams
Committee Co-ordinator

E-mail: audrey.adams@nhs.net

Copy to:
Dawn Langdon, Royal Holloway, University of London
R&D office for NHS care organisation at lead site
Appendix 4

Confirmation of R&D Approval from SLaM NHS Foundation Trust and
Hertfordshire Partnership NHS Foundation Trust
Dear David

Re: A Pilot Study Exploring Emotional Intelligence in People with Anorexia Nervosa

Thank-you for sending me the documentation for the above study. Following a review by our R&D team, I am pleased to tell you that the study now has R&D approval on behalf of Hertfordshire Partnership NHS Foundation Trust.

Approval is given on the understanding that you will notify the R&D Office of any amendments to the study design, that you will carry out the study as specified in the final version of the protocol, and that you will comply fully with the HPFT R&D Policy. I attach a copy of this document for your records.

Kind Regards,

Tim M Gale Ph.D
R&D Manager
Visiting Professor, School of Psychology, UoH
Mr David Hambrook  
Trainee Clinical Psychologist  
Camden and Islington NHS Foundation Trust  
Royal Holloway, University of London  
Egham Hill, Egham  
Surrey TW20 OEX  

27 July 2010  

Dear Mr Hambrook  

Trust Approval: R&D2010/072  
A pilot study exploring emotional intelligence in people with anorexia nervosa  

I am writing to confirm approval for the above research project at South London and Maudsley NHS Foundation Trust. This approval relates to Behavioural and Developmental Psychiatry Directorate and to the specific protocol and informed consent procedures described in your R&D Form. Any deviation from this document will be deemed to invalidate this approval. Your approval number has been quoted above and should be used at all times when contacting this office about this project.  

Amendments, including extending to other Trust directorates will require further approval from this Trust and where appropriate the relevant Research Ethics Committee. Amendments should be submitted to this R&D Office by completion of an R&D Amendment form together with any supporting documents. A copy of this is attached but is also available on the R&D Office website.  
(http://admin.iop.kcl.ac.uk/randd/downloads/RD_Approval_Amendment_Form.doc)  

I can confirm that King's College London be taking on the role of Sponsor for this study.  

Approval is provided on the basis that you agree to adhere to the Department of Health's Research Governance requirements including:  

- Ethical approval must be in place prior to the commencement of this project.  
- As Chief Investigator and/or Principal Investigator for this study you have familiarised yourself with, and accept the responsibilities commensurate with this position, as outlined in the Research Governance Framework  

South London and Maudsley NHS Foundation Trust
Compliance with all policies and procedures of the Trust which relate to research, and with all relevant requirements of the Research Governance Framework. In particular the Trust Confidentiality Policy. (http://admin.iop.kcl.ac.uk/randd/downloads/Confidentiality_Policy_080219.pdf).

Co-operating with the Trust R&D Office’s regular monitoring and auditing of all approved research projects as required by the research governance framework, including complying with ad hoc requests for information.

Informing the Trust’s Health and Safety Coordinators and/or the Complaints Department or of any adverse events or complaints, from participants recruited from within this Trust, which occurs in relation to this study in line with Trust policies. Contact details are available from the R&D Office if required.

Sending a copy of any reports or publications which result from this study to the Trust Departments involved in the study if requested.

Honorary Contracts must be in place prior to patient contact for all relevant members of the research team. Advice on this will be provided by the R&D Office at the point of obtaining R&D approval and on an ongoing basis for new members of staff joining the research team.

Sending a copy of the annual reports and end of project notification submitted to ethics.

Failure to abide by the above requirements may result in the withdrawal of the Trust’s approval for this research.

If you wish to discuss any aspect of this research approval with the R&D Office, please contact Jenny Liebscher jennifer.liebscher@kcl.ac.uk in the first instance.

I wish you every success with this study.

Yours sincerely

Jenny Liebscher
R&D Governance and Delivery Manager
SLaM/IoP R&D Office

Enc. R&D Approval Amendment Form
Mr David Hambrook  
Trainee Clinical Psychologist  
Camden and Islington NHS Foundation Trust  
Royal Holloway, University of London  
Egham Hill, Egham  
Surrey TW20 0EX

27 July 2010

Dear David Hambrook

Letter of access for research

As an existing NHS employee you do not require an additional honorary research contract with this NHS organisation. We are satisfied that the research activities that you will undertake in this NHS organisation are commensurate with the activities you undertake for your employer. Your employer is responsible for ensuring such checks as are necessary have been carried out. This letter confirms your right of access to conduct research through The South London and Maudsley NHS Foundation Trust for the purpose and on the terms and conditions set out below. This right of access commences on 27 July 2010 and ends on 21 September 2011 unless terminated earlier in accordance with the clauses below.

You have a right of access to conduct such research as confirmed in writing in the letter of permission for research from this NHS organisation. Please note that you cannot start the research until the Principal Investigator for the research project has received a letter from us giving permission to conduct the project.

You are considered to be a legal visitor to The South London and Maudsley NHS Foundation Trust premises. You are not entitled to any form of payment or access to other benefits provided by this organisation to employees and this letter does not give rise to any other relationship between you and this NHS organisation, in particular that of an employee.

While undertaking research through The South London and Maudsley NHS Foundation Trust, you will remain accountable to your employer Central and Northwest London NHS Trust but you are required to follow the reasonable instructions of your nominated manager Emmanuelle Peters in this NHS organisation or those given on her/his behalf in relation to the terms of this right of access.

Where any third party claim is made, whether or not legal proceedings are issued, arising out of or in connection with your right of access, you are required to cooperate fully with any investigation by this NHS organisation in connection with any such claim and to give all such assistance as may reasonably be required regarding the conduct of any legal proceedings.

You must act in accordance with The South London and Maudsley NHS Foundation Trust policies and procedures, which are available to you upon request, and the Research Governance Framework.
You are required to co-operate with The South London and Maudsley NHS Foundation Trust in discharging its duties under the Health and Safety at Work etc Act 1974 and other health and safety legislation and to take reasonable care for the health and safety of yourself and others while on The South London and Maudsley NHS Foundation Trust premises. Although you are not a contract holder, you must observe the same standards of care and propriety in dealing with patients, staff, visitors, equipment and premises as is expected of a contract holder and you must act appropriately, responsibly and professionally at all times.

You are required to ensure that all information regarding patients or staff remains secure and strictly confidential at all times. You must ensure that you understand and comply with the requirements of the NHS Confidentiality Code of Practice (http://www.nhs.uk/NHSEngland/D408/891454/C4089254.pdf) and the Data Protection Act 1998. Furthermore you should be aware that under the Act, unauthorised disclosure of information is an offence and such disclosures may lead to prosecution.

The South London and Maudsley NHS Foundation Trust will not indemnify you against any liability incurred as a result of any breach of confidentiality or breach of the Data Protection Act 1998. Any breach of the Data Protection Act 1998 may result in legal action against you and/or your substantive employer.

You should ensure that, where you are issued with an identity or security card, a bleep number, email or library account, keys or protective clothing, these are returned upon termination of this arrangement. Please also ensure that while on the premises you wear your ID badge at all times, or are able to prove your identity if challenged. Please note that this NHS organisation accepts no responsibility for damage to or loss of personal property.

We may terminate your right to attend at any time either by giving seven days' written notice to you or immediately without any notice if you are in breach of any of the terms or conditions described in this letter or if you commit any act that we reasonably consider to amount to serious misconduct or to be disruptive and/or prejudicial to the interests and/or business of this NHS organisation or if you are convicted of any criminal offence. Your substantive employer is responsible for your conduct during this research project and may in the circumstances described above instigate disciplinary action against you.

If your circumstances change in relation to your health, criminal record, professional registration or any other aspect that may impact on your suitability to conduct research, or your role in research changes, you must inform the NHS organisation that employs you through its normal procedures. You must also inform your nominated manager in this NHS organisation.

Yours sincerely

Jenny Lisbsoch
R&D Governance and Delivery Manager
South London and Maudsley NHS Foundation Trust

cc: HR department of the substantive employer (and provider of honorary clinical contract, where applicable)
Appendix 5

Information and Consent Form for the AN Group
Information Sheet for Patients
Study: Emotional Intelligence in Anorexia Nervosa

My name is David Hambrook and I am a Trainee Clinical Psychologist at Royal Holloway, University of London. I am carrying out a study looking at levels of emotional intelligence in people with anorexia nervosa as compared to a group of healthy control participants. Emotional intelligence in this context refers to our ability to identify, understand, use, and manage emotions in oneself and others. The study is being supervised by Dr Gary Brown and Dr Kate Tchanturia, both of whom are qualified clinical psychologists. If you would like to discuss any aspect of the research with Dr Brown or Dr Tchanturia, you can contact them by email (gary.brown@rhul.ac.uk; kate.tchanturia@kcl.ac.uk) or by phone on 01784 414330 (GB) or 0207 8480134 (KT). If you need to contact me, please email david.hambrook.2008@live.rhul.ac.uk or call 01784 443581 and leave a message. I would appreciate your participation, because we hope that this research will improve our understanding of anorexia nervosa and possibly even inform future treatment developments.

If you decide to take part I will send or give you a pack of questionnaires to complete that will ask you about various things, such as your eating habits, your personality, and your experience of mental health problems. These will take approximately 45 minutes to complete. After this you will be invited to attend a one-off meeting with me where I will ask you to complete a general intelligence test and a computerised test of emotional intelligence. The emotional intelligence test will require you to answer questions about how you respond to emotional information. This will take around 60-75 minutes and will take place at the site where you have been receiving treatment for your eating disorder.

Your participation in the study will be completely confidential. From the beginning of your involvement, you will be given an identification number and only your number, NOT your name, will label your completed questionnaires and other paperwork. Your data will be kept under lock and key, and your name will not appear anywhere in any publication or in any description of our findings. Only myself, my supervisors, and an examiner will be allowed to see your files/questionnaires.

You do not have to take part in this study if you do not want to. If you decide to take part you may withdraw at any time without having to give a reason. Your decision whether or not to take part will not affect your treatment and/or care in any way. We usually like to inform participants’ GP when they are taking part in research and as such we will ask you whether you consent to us sending a letter to your GP to let them know that you will be involved in our study. You may see a copy of this letter prior to us sending it to your GP.

If, during your participation in the study, we become concerned that you might be at risk of harming yourself or others we would like to have your permission to contact and inform the health professional responsible for your care (either your GP or staff within the eating disorder service).

Please keep this information sheet for your reference and feel free to ask any questions before you complete the consent form overleaf, then hand the completed consent form to the
researcher. It will be stored separately from the anonymous information you provide for the research study. This study has been reviewed and approved by the Psychology Department internal ethics committee at Royal Holloway, University of London [2010/027] and by the South East London Research Ethics Committee 4 [10/H0807/30]. By completing the consent form you are agreeing to take part in the research study described above. However, if you decide that you would like to withdraw from the study after signing the form, please let the researcher know, preferably in writing or by e-mail.

If you would like further independent advice about taking part in this study then please ask the clinician responsible for your care, or alternatively you can contact the national Eating Disorders Association (BEAT), the leading UK charity for people with eating disorders and their families. You can visit their website at www.b-eat.co.uk or contact their helpline on 0845 634 1414.

If, at any point, you have a complaint please raise this with the researcher in the first instance. If you wish to speak to an independent person please contact the South London and Maudsley NHS Foundation Trust Patient Advice and Liaison Service (PALS) on 0203 228 2444 / 2499 or alternatively contact the King’s College London Research Ethics Office (contact details below) who will re-direct your complaint as appropriate.

Contact details for KCL Research Ethics Office: Research Ethics Office, King’s College London, Room 7.21 James Clerk Maxwell Building, 57 Waterloo Road, London, SE1 8WA. Email: rec@kcl.ac.uk
CONSENT FORM: PARTICIPANTS WITH AN
Emotional Intelligence in Anorexia Nervosa

You have been asked to participate in a study about emotional intelligence in anorexia nervosa, which is being carried out by David Hambrook, trainee clinical psychologist. Have you (please tick):

- Understood the information sheet and have had an opportunity to consider the information provided and ask any questions? [ ]  
- Received satisfactory answers to your questions? [ ]  
- Understood that your participation in this study is entirely voluntary and confidential and that in giving consent, you may change your mind at any time and withdraw from the study without giving a reason? [ ]

Do you agree to take part in the study? [ ] Yes [ ] No

Do you agree to the researcher writing to your GP to notify them that you are taking part in this study? [ ] Yes [ ] No

Do you agree to the researcher contacting the health professional responsible for your care if he becomes concerned about you? [ ] Yes [ ] No

___________________ ___________   ______________
Name of participant  Date   Signature
________________________________________
Contact Telephone Number

NB: This consent form will be stored separately from the anonymous information you provide.

As the researcher, I have explained the study to the participant and have answered their questions honestly and fully.

___________________ ___________   ______________
Name of researcher  Date   Signature
________________________________________
Contact Telephone Number
Appendix 6

Information and Consent From for the HC Group
Information Sheet for Healthy Controls
Study: Emotional Intelligence in Anorexia Nervosa

My name is David Hambrook and I am a Trainee Clinical Psychologist at Royal Holloway, University of London. I am carrying out a study looking at levels of emotional intelligence in people with anorexia nervosa as compared to a group of healthy participants who are similar to them in age. Emotional intelligence in this context refers to our ability to identify, understand, use, and manage emotions in oneself and others. The study is being supervised by Dr Gary Brown and Dr Kate Tchanturia, both of whom are qualified clinical psychologists. If you would like to discuss any aspect of the research with Dr Brown or Dr Tchanturia, you can contact them by email (gary.brown@rhul.ac.uk; kate.tchanturia@kcl.ac.uk) or by phone on 01784 414330 (GB) or 0207 8480134 (KT). If you need to contact me, please email david.hambrook.2008@live.rhul.ac.uk or call 01784 443581 and leave a message. I would appreciate your participation, because we hope that this research will improve our understanding of anorexia nervosa and possibly even inform future treatment developments.

If you decide to take part, I will ask you to answer a brief screening interview over the telephone to ensure that you are eligible to take part. This will take about 10 minutes and I will ask you a number of questions related to your mental health. Please note that some of these questions may be of a sensitive nature, and you are under no obligation to answer any questions that you do not want to. If you are eligible to take part in the study after completing this short telephone interview, I will send you a pack of questionnaires to complete that will ask you about various things such as your eating habits, your personality, and experience of mental health problems. These will take approximately 45 minutes to complete. Finally, you will be invited to attend a one-off meeting with me where I will ask you to complete a general intelligence test and a computerised test of emotional intelligence. The emotional intelligence test will require you answer questions about how you respond to emotional information. This will take around 60-75 minutes and will take place within the Department of Clinical Psychology at RHUL in Egham or at the Institute of Psychiatry in Denmark Hill (the choice is yours).

Your participation in the study will be completely confidential. From the beginning of your involvement, you will be given an identification number and only your number, NOT your name, will label your completed questionnaires and other paperwork. Your data will be kept under lock and key, and your name will not appear anywhere in any publication or in any description of our findings. Only myself, my supervisors, and an examiner will be allowed to see your files/questionnaires.

If, during your participation in the study, we become concerned that you might be at risk of harming yourself or others we would like to have your permission to contact and inform the health professional responsible for your care (your GP).

You do not have to take part in this study if you do not want to. If you decide to take part you may withdraw at any time without having to give a reason. If you would like further independent advice about whether or not to take part in this study, please contact the
national Eating Disorders Association (BEAT), the leading UK charity for people with eating disorders and their families. You can visit their website at www.b-eat.co.uk or call their helpline on 0845 634 1414.

Please keep this information sheet for your reference. Feel free to ask any questions before you complete the consent form overleaf, and then hand the completed consent form to the researcher. It will be stored separately from the anonymous information you provide for the research project. This study has been reviewed and approved by the Psychology Department internal ethical procedure at Royal Holloway, University of London [2010/027] and by the South East London Research Ethics Committee 4 [10/H0807/30].

By completing the consent form you are agreeing to take part in the research study described above. However, if you decide that you would like to withdraw from the study after signing the form, please let the researcher know, preferably in writing or by e-mail.

If, at any point, you have a complaint please raise this with the researcher in the first instance. If you wish to speak to an independent person please contact the King’s College London Research Ethics Office (contact details below) who will re-direct your complaint as appropriate.

Contact details for KCL Research Ethics Office: Research Ethics Office, King’s College London, Room 7.21 James Clerk Maxwell Building, 57 Waterloo Road, London, SE1 8WA. Email: rec@kcl.ac.uk
CONSENT FORM: HEALTHY CONTROLS
Emotional Intelligence in Anorexia Nervosa

You have been asked to participate in a study about emotional intelligence in anorexia nervosa, which is being carried out by David Hambrook. Have you (please tick):

- Understood the information sheet and have had an opportunity to consider the information provided and ask any questions? [ ]
- Received satisfactory answers to your questions? [ ]
- Understood that your participation in this study is entirely voluntary and confidential and that in giving consent, you may change your mind at any time and withdraw from the study without giving a reason? [ ]

Do you agree to take part in the study? Yes No

Do you agree to the researcher contacting the health professional responsible for your care if he becomes concerned about you? Yes No

Name of participant __________________ Date ___________ Signature ______________

Contact Telephone Number __________________

NB: This consent form will be stored separately from the anonymous information you provide.

As the researcher, I have explained the study to the participant and have answered their questions honestly and fully.

Name of researcher __________________ Date ___________ Signature ______________

Contact Telephone Number __________________
Appendix 7

Demographic Questionnaire
Demographic Questionnaire

Before we start it is helpful for us to find out a little more about you. Please answer the following questions as best as you can.

About you

1. Date today:

2. How old are you?

3. What is your date of birth? / /

4. What do you consider your ethnicity to be?

- White British □
- White Irish □
- Other White British □
- Black African □
- Black Caribbean □
- Other Black Background □
- Asian Indian □
- Asian Bangladeshi □
- Asian Pakistani □
- Asian Chinese □
- Asian Japanese □
- Other Asian Background □
- Mixed background (specify) □
- I would prefer not to say □

5. Do you consider English to be your first Language?

     Yes           No

6. Which language do you mainly speak when you are at home?__________________________

Your Health

Physical Health

7. What is your current weight? ____________________

8. What is your current height? ____________________

9. Have you ever been treated for a serious head injury? If Yes, please explain what and when if you can.

     Yes           No
10. Are you currently taking any medication? If yes, please give details of what medication you take, your dosage, and how many a day?

Yes   No

11. Have you ever been diagnosed with a neurological condition, such as epilepsy? If yes, please give details.

Yes   No

Mental Health

12. Are you currently experiencing, or have you in the past experienced any mental health problems other than an eating disorder (e.g. depression, psychosis, bipolar affective disorder)? If yes, please give a brief description of what these are. If no problems, please go to question 13

12a. How old were you when you first became unwell with this health problem? ________

12b. For how long were you unwell with this health problem? If these problems are ongoing, please state this. ________

12c. What treatment have you received for this problem? Have you ever received:

i. Outpatient Treatment? If so, please give details of how many times, when and what this treatment involved e.g. counselling, medication or therapy (please describe in as much detail as you can).

Yes   No

ii. Inpatient hospital treatment? If so, please give details of how many times, when and what this treatment involved e.g. counselling, medication or therapy (please describe in as much detail as you can).

Yes   No
13. Besides you, to your knowledge, has anyone in your family ever been diagnosed with an eating disorder such as Anorexia Nervosa, Bulimia Nervosa, or Binge Eating Disorder? 

Yes   No

Your Family and Living Situation

14. How many siblings do you have?  (please circle)

0   1   2   3   4   5   6+

15. Who lives with you at home?  (please tick the box next to anyone who does)

Spouse/partner  □  Friend(s)  □
Mum            □  Dad       □
Siblings       □  Step-Dad  □
Step-Mum       □  Children  □
Carer          □  Grandparent(s) □
No one         □  Other     □ (please specify)

Your Education & Work

16. How many years have you spent in formal education so far (including university)?

__________________

17. Please indicate the highest level of qualification you have achieved (please circle):

Less than GCSE  □  GCSE       □
A Level         □  University (e.g. BA, BSc ) □
Postgraduate (e.g. MA, PhD) □

18. What is your occupation? If you are currently unemployed, please indicate for how long you have been unemployed and what your previous job was.
About your eating disorder*
*Please only complete this section if you currently have an eating disorder

19. How old were you when you were first diagnosed with an eating disorder?

20. How many years has it been since you were first diagnosed with an eating disorder?

21. Since being diagnosed, what was your lowest ever Body Mass Index (BMI)? If you don’t know your lowest ever BMI, can you remember what your lowest ever weight was?

22. How many times have you received treatment as an in-patient for your eating disorder?
Appendix 8

SCID Axis I Screening Module
SCID Screening Module

Now I want to ask you some more specific questions about problems you may have had. We'll go into more detail about them later.

RESPOND TO POSITIVE RESPONSES WITH: We'll talk more about that later.

1. Has there been any time in your life when you had five or more drinks (beer, wine, or liquor) on one occasion?
   1. No 2. Yes

2. Have you ever used street drugs?
   1. No 2. Yes

3. Have you ever gotten “hooked” on a prescribed medicine or taken a lot more of it than you were supposed to?
   1. No 2. Yes

4. Have you ever had a panic attack. When you suddenly felt frightened or anxious or suddenly developed a lot of physical symptoms?
   1. No 2. Yes

5. Were you ever afraid of going out of the house alone being in crowds, standing in a line, or travelling on buses or trains?
   1. No 2. Yes

6. Is there anything that you have been afraid to do or felt uncomfortable doing in front of other people, like speaking, eating or writing?
   1. No 2. Yes

7. Are there any other things that you have been especially afraid of like flying, seeing blood, getting a shot, heights, closed places, or certain kinds of animals or insects?
   1. No 2. Yes

8. Have you ever been bothered by thoughts that didn’t make any sense and kept coming back to you even when you tried not to have them?
   1. No 2. Yes

9. Was there ever anything that you had to do over and over again and couldn’t resist doing, like washing your hands again and again, counting up to a certain number, or checking something several times to make sure that you’d done it right?
   1. No 2. Yes

10. In the last six months, have you been particularly nervous or anxious?
    1. No 2. Yes

Scoring the SCID:
1= absent or false 2= subthreshold 3=threshold or true
Appendix 9

Eating Disorder Examination Questionnaire (EDE-Q)
The following questions are concerned with the past four weeks only (28 days). Please read each question carefully and tick the appropriate box.

Please answer all the questions.

<table>
<thead>
<tr>
<th>On how many days out of the past 28 days...</th>
<th>No days</th>
<th>1-5 days</th>
<th>6-12 days</th>
<th>13-15 days</th>
<th>16-22 days</th>
<th>23-27 days</th>
<th>Every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2. Have you gone for long periods of time (8 hours or more) without eating anything in order to influence your shape or weight?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3. Have you tried to avoid eating foods which you like in order to influence your shape or weight?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4. Have you tried to follow definite rules regarding your eating in order to influence your shape or weight, for example, a calorie limit, a set amount of food, or rules about what or when you should eat?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5. Have you wanted your stomach to be empty?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6. Has thinking about food or its calorie content made it much more difficult to concentrate on things you’re interested in; for example, read, watch TV or follow a conversation?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7. Have you been afraid of losing control over eating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>8. Have you had episodes of binge eating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>9. Have you eaten in secret? (Do not count binges)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
On how many days out of the past 28 days...

<table>
<thead>
<tr>
<th></th>
<th>No days</th>
<th>1-5 days</th>
<th>6-12 days</th>
<th>13-15 days</th>
<th>16-22 days</th>
<th>23-27 days</th>
<th>Every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Have you definitely wanted your stomach to be flat?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>11. Has thinking about shape or weight made it more difficult to concentrate on things you are interested in; e.g., read, watch TV or follow a conversation?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>12. Have you had a definite fear that you might gain weight or become fat?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>13. Have you felt fat?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>14. Have you had a strong desire to lose weight?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Over the past 4 weeks (28 days)

<table>
<thead>
<tr>
<th></th>
<th>None of the times</th>
<th>A few of the times</th>
<th>Less than ½ the time</th>
<th>Half the time</th>
<th>More than ½ the time</th>
<th>Most of the time</th>
<th>Every time</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. On what proportion of times that you have eaten have you felt guilty because of the effect on your shape or weight? (Do not count binges)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>16. Have there been any times when you have felt that you have eaten what other people would regard as an unusually large amount of food given the circumstances?</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. How many such episodes have you had over the past four weeks?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. During how many of these episodes of overeating did you have a sense of having lost control over your eating?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Have you had other episodes of eating in which you have had a sense of having lost control and eaten too much, but have not eaten an unusually large amount of food given the circumstances?</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
20. How many such episodes have you had over the past four weeks?

21. Have you made yourself sick (vomit) as a means of controlling your shape or weight? 0 1

22. How many times have you done this over the past four weeks?

23. Have you taken laxatives as a means of controlling your shape or weight? 0 1

24. How many times have you done this over the past four weeks?

25. Have you taken diuretics (water tablets) as a means of controlling your shape or weight? 0 1

26. How many times have you done this over the past four weeks?

27. Have you exercised hard as a means of controlling your shape or weight? 0 1

28. How many times have you done this over the past four weeks?

Over the past 4 weeks (28 days)

29. Has your weight influenced how you think about (judge) yourself as a person? Not at all Slightly Moderately Markedly

30. Has your shape influenced how you think about (judge) yourself as a person?

31. How much would it upset you if you had to weigh yourself once a week for the next four weeks?

32. How dissatisfied have you felt about your weight?
33. How dissatisfied have you felt about your shape?  

34. How concerned have you been about other people seeing you eat?  

35. How uncomfortable have you felt seeing your body; for example, in shop window reflections, while undressing or taking a bath or shower?  

36. How uncomfortable have you felt about others seeing your body; for example, in communal changing rooms, when swimming or wearing tight clothes?
Appendix 10

Hospital Anxiety and Depression Scale (HADS)
Hospital Anxiety and Depression Scale

Please read each item below and underline the reply which comes closest to how you have been feeling in the past week. Ignore the numbers printed in the columns.

Don’t take too long over your replies; your immediate reaction to each item will probably be more accurate than a long, thought-out response.

<table>
<thead>
<tr>
<th>A</th>
<th>D</th>
<th></th>
<th>A</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>I feel tense or ‘wound up’</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Most of the time</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A lot of the time</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>From time to time, occasionally</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>I feel as if I am slowed down</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nearly all of the time</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very often</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sometimes</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>I still enjoy the things I used to enjoy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>Definitely as much</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Not quite so much</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Only a little</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Hardly at all</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>I get a sort of frightened feeling like butterflies in the stomach</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occasionally</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quite often</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very often</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>I get a sort of frightened feeling as if something awful is about to happen</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Very definitely and quite badly</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Yes, but not too badly</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>A little, but it doesn’t worry me</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>Not at all</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>I have lost interest in my appearance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Definitely</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I don’t take as much care as I should</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I may not take quite as much care</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I take just as much care as ever</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>I can laugh and see the funny side of things</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>As much as I always could</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Not quite so much now</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Definitely not so much now</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Not at all</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>I feel restless as if I have to be on the move</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very much indeed</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quite a lot</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not very much</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Worrying thoughts go through my mind</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>A great deal of time</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>A lot of the time</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Not too often</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>Very little</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>I look forward with my enjoyment to things</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>As much as I ever did</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rather less than I did</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Definitely less than I used to</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hardly at all</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>I feel cheerful</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Never</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Not often</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Sometimes</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>Most of the time</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>I get a sudden feeling of panic</strong></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Very often indeed</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quite often</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not very often</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>I can sit at ease and feel relaxed</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>Definitely</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Usually</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Not often</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Not at all</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>I can enjoy a good book or radio or television programme</strong></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Often</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sometimes</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not often</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very seldom</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Total:   Total A:  Total D: 198
Appendix 11

Work and Social Adjustment Scale (WSAS)
Work and Social Adjustment Scale (Marks, 1986)

Please rate each of the following questions on a 0 to 8 scale: 0 indicates no impairment at all and 8 indicates very severe impairment. If you are not currently experiencing any physical or mental health problems, please answer the questions anyway.

1. Because of my disorder, my ability to work is impaired. 0 means not at all impaired and 8 means very severely impaired to the point that I cannot work. (please circle)
   0 1 2 3 4 5 6 7 8

2. Because of my disorder, my home management (cleaning, tidying, shopping, cooking, looking after home or children, paying bills) is impaired. 0 means not at all impaired and 8 means very severely impaired.
   0 1 2 3 4 5 6 7 8

3. Because of my disorder, my social leisure activities (with other people, such as parties, bars, clubs, outings, visits, dating, and home entertainment) are impaired. 0 means not at all impaired and 8 means very severely impaired.
   0 1 2 3 4 5 6 7 8

4. Because of my disorder, my private leisure activities (done alone, such as reading, gardening, collecting, sewing, walking alone) are impaired. 0 means not at all impaired and 8 means very severely impaired.
   0 1 2 3 4 5 6 7 8

5. Because of my disorder, my ability to form and maintain close relationships with others, including those I live with, is impaired. 0 means not at all impaired and 8 means very severely impaired.
   0 1 2 3 4 5 6 7 8
Appendix 12

NEO Five Factor Inventory (NEO-FFI)

(Item absent due to copyright prohibition)