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Mentalisation in Anorexia Nervosa and Disordered Eating

Hannah Watkins

Doctorate in Clinical Psychology

The University of Edinburgh

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DClinPsychol Declaration of Own Work

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Signature

.....

Date02/05/16.....

Word Count: 11,992 (excluding abstracts, figures, tables and references)

Acknowledgements/Dedication

I would like to thank my academic supervisors, Helen Griffiths and Emily Newman, for their invaluable support and guidance. I would also like to thank all the school students who participated in my empirical study, without whom this project would not have been possible. Thanks finally to my fellow trainee, Ashley McColl, for her inter-rater help with my systematic review.

This thesis is dedicated to my brave mum.

1. Thesis Abstract

Background

It is posited that attachment difficulties in infancy may result in reduced mentalisation capacity (understanding self and others' subjective thoughts/mental processes), leading to potentially deleterious psychopathological outcomes such as eating disorders. The exact nature of the relationship between mentalisation and eating disorders/disordered eating is unclear however.

Objectives

A systemic review examined whether those with Anorexia Nervosa (AN) experience mentalisation deficits compared to those without EDs. An empirical study, examining the link between mentalisation and disordered eating (DE) in an adolescent sample, was conducted to assess whether borderline trait features mediated the relationship between the two constructs.

Method

A systematic search of 6 databases was conducted, and articles were assessed against pre-determined inclusion/exclusion criteria. Included articles were assessed against 14 quality criteria and study findings were reported. For the empirical study, 162 participants aged 12-18 completed a questionnaire pack including mentalisation, borderline traits, impulsivity, emotion dysregulation and depression scales, and sociodemographic questions.

Results

Results from 10 articles indicated those with AN may experience subtle mentalisation deficits, particularly in recognising negative emotions in others. Mentalisation ability may also vary according to interpersonal context. Mediation analyses found mentalisation ability exerted a significant effect on DE indirectly through borderline trait features, and partially through emotion dysregulation, but not impulsivity.

Conclusion

More robust empirical studies are required in order to assess the relationship between mentalisation and AN. Findings regarding the link between mentalisation, borderline traits and DE may further aid psychological assessment/treatment. Therapies where the main focus is improving mentalisation capacity may be useful.

Abstract Word Count: 250

2. Systematic Review^a

Title: What evidence is there of an impairment of mentalisation capacity in Anorexia Nervosa? A Systematic Review.

Author: Hannah Watkins^{bc}

^bUniversity of Edinburgh ^cNHS Grampian

Corresponding Author: Hannah Watkins

Address: University of Edinburgh, School of Health in Social Science, Medical School, Teviot Place, Edinburgh, EH8 9AG, Scotland, U.K

Email: s1370142@ed.ac.uk

^aProduced in accordance with European Eating Disorders Review journal author submission guidelines (see Appendix A).

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2.1 Abstract

Title: What evidence is there of an impairment of mentalisation capacity in Anorexia Nervosa? A Systematic Review.

Objectives

It is posited that attachment difficulties in infancy may result in reduced mentalisation capacity (understanding self/others' subjective thoughts/mental processes), leading to deleterious outcomes such as Anorexia Nervosa (AN). A systemic review examined whether those with AN experience mentalisation deficits compared to those without eating disorders.

Method

Web of Science Core Collection (including MEDLINE), PsycINFO, PsycARTICLES, Psychoanalytical Electronic Publishing Web and ASSIA databases were searched. Articles were assessed against pre-determined inclusion/exclusion criteria. Included articles were rated for quality and study findings were reported.

Results

Results from 10 articles indicated those with AN may experience subtle mentalisation deficits, particularly in recognising negative emotions in others. Mentalisation ability may also vary according to interpersonal context.

Conclusion

More robust empirical studies are required in order to assess the relationship between mentalisation and AN.

Key Words: Anorexia Nervosa, Mentalisation, Reflective Function, Theory of Mind, Emotional Intelligence

Abstract Word Count: 148

2.2 Introduction

2.2.1 Anorexia Nervosa (AN)

AN is characterised by the refusal to sustain body weight at a level that is adequate for age and height by the strict restriction of food intake, an extreme fear of weight gain or becoming overweight, and a disturbed view of body image (American Psychiatric Association, 2000). Higher prevalence rates are reported for females than males within this eating disorder (ED) category (Hudson, Hiripi, Pope, & Kessler, 2007). Whilst all EDs have an increased mortality risk, AN appears to carry the largest (Arcelus, Mitchell, Wales & Nielsen, 2011; Smink, van Hoeken & Hoek 2012). A retrospective study following up 6009 female AN inpatients, found a six-fold increase in mortality risk for those with AN compared to the general population (Papadopoulos, Ekbom, Brandt, & Ekselius, 2009). Within the AN category there are two subtypes: Anorexia – Restricting (AN-R), categorised by restricting food intake without undertaking compensatory behaviours (e.g. self-induced vomiting, over-exercise, laxative use), and Anorexia – Binge/Purging (AN-B/P) subtype; restricting intake plus compensatory behaviours (American Psychiatric Association, 2000). Although described in categorical terms, there is evidence of heterogeneity within subtypes (Vitousek & Manke, 1994) and movement between the two, the most common from AN-R to AN-B/P (Eddy et al., 2008).

Whilst it is common for those with AN to become increasingly withdrawn and socially isolated as the condition progresses (Fairburn & Harrison, 2003), there is evidence that premorbidly individuals may experience difficulties interacting within their social environment (Troop & Bifulco, 2002). Troop and Bifulco (2002) found women with AN-B/P, but not AN-R, to have experienced higher levels of shyness, loneliness and feelings of inferiority during adolescence compared to those without an ED history (Troop & Bifulco, 2002). Given possible premorbid social difficulties, coupled with research indicating social difficulties may pose a barrier to accessing treatment (Goodwin & Fitzgibbon, 2002), and contribute to poorer long-term outcomes for those with AN (Rastam, Gillberg & Wentz, 2003), it is perhaps surprising that until recently social cognition within AN has been a relatively under researched area. Zucker and colleagues (2007) posit a lack of understanding of the mechanisms underlying these difficulties as a possible reason for limited treatment success for those with AN. Given that there is a stronger evidence base for the

psychological treatment of bulimia nervosa and binge-eating disorder, than for AN (National Institute for Health and Care Excellence, 2004), understanding the aetiology of the disorder may be pivotal in addressing this. When conceiving how AN may develop, Fonagy and colleagues (2002) provide a mentalisation-based theoretical perspective positing that early attachment difficulties could impede the development of the capacity to mentalise, which could lead to later psychopathological outcomes such as AN.

2.2.2 Mentalisation

Mentalisation, the way in which we “make sense of each other and ourselves, implicitly and explicitly, in terms of subjective states and mental processes” (Bateman & Fonagy, 2010, p.11), has its origins in psychoanalytic literature. It has more recently been integrated with a developmental and cognitive neuroscience approach to provide a conceptual framework for understanding how individuals interact with their social environment (Choi-Kain & Gunderson, 2008). Mentalisation can be described in terms of four intra-traversable dimensions: automatic (happens unconsciously, is unreflective e.g. turn-taking in conversations)/controlled (conscious, involves reflection e.g. time is taken to think about and make sense of an interpersonal event), cognitive (e.g. using reasoning or insight)/affective (e.g. emotional understanding), internal-based (e.g. thoughts/feelings)/ external-based (physical realities), and self (the individual)/other (others in the individual’s environment) (Fonagy & Luyten, 2009).

According to mentalisation theorists, this ability develops in childhood from the integration of three modes of relating: psychic equivalence (viewing the internal and external world as being same), pretend (viewing internal and external reality to be different) and teleological mode (understanding the world in physical terms only) (Fonagy, Gergely, Jurist, & Target, 2002). The assimilation of these modes allows the child to make sense of the world in less concrete terms, that inner and outer reality are linked but neither are equal to, or divorced from, each other. Bateman and Fonagy (2006) argue that a lack of obvious and conditional mirroring by a primary caregiver may impede this assimilation, and that vulnerable individuals who have experienced developmental adversity relating to attachment may be more likely to develop psychopathological difficulties as a result of a reduced capacity to mentalise. This capacity does not appear to be static however, and may vary according to “emotion arousal and interpersonal context” (Fonagy & Luyten, 2009, p. 1357)

with individuals' capacity to mentalise being more compromised during times of intense emotional arousal. Reduced mentalisation capacity is seen to be a core deficit in a number of mental health problems, including borderline personality disorder (Bateman & Fonagy, 2010; Fonagy & Luyten, 2009), depression (Fischer-Kern et al, 2013) and EDs (Cate, Khademi, Judd, & Miller, 2013; Rothschild-Yakar, Levy-Shiff, Fridman-Balaban, Gur, & Stein, 2010; Skarderud, 2007).

2.2.3 Mentalisation and Anorexia Nervosa

When considering how mentalisation and EDs may be linked, the relationship is proposed to be a product of an individual's inability to fully integrate modes of relating described above, leading to "the body tak[ing] on an excessively central role for the continuity of the sense of self" (Fonagy et al., 2002, p.405). In the case of AN, psychic equivalence mode is argued to be central to the disturbed body image experienced by those with the disorder (Skarderud, 2007). Viewing their internal and external world as being the same, with thoughts and feelings equating to physical reality, means feeling overweight would equate to being overweight. A number of studies have indicated a link between EDs and reduced mentalisation, or reflective function ability (RF: operationalisation of the underlying mental capacities used to mentalise; Fonagy et al., 2002) (Fonagy et al., 1996; Kuipers, van Loenhout, van der Ark & Bekker, 2016), however findings have not been consistent (Pedersen, Lunn, Katznelson, & Poulsen, 2012; Pedersen et al., 2015). A small number of studies have focused specifically on mentalisation ability with those with AN (Rothschild-Yakar et al., 2010; Rothschild-Yakar, Waniel, & Stein, 2013) finding that those with the disorder may have reduced mentalisation capacity compared to non-ED groups. However anomalies have been observed within studies (e.g. Rothschild-Yakar et al., 2010) leading authors of a recent review, examining mentalisation ability in EDs in general, to query whether there may be an indirect relationship between the construct and the disorder (Kuiper & Bekker, 2012).

2.2.4 Measuring Mentalisation

Measuring mentalisation is recognised as a challenge (Newbury-Helps, 2011). There are a number of constructs which have considerable overlap with the construct, such as 'theory of mind' (ToM), and 'emotional intelligence' (EI), and others that may partially overlap including 'mindfulness' and 'empathy'. This has led to criticism that the term is difficult to quantify and measure (Choi-Kain & Gunderson, 2008). When empirically examining mental state attribution in

relation to others, ToM has dominated the literature in relation to AN. This may be due to mentalisation being a more recent consideration with this population. ToM, “the ability to attribute mental states (thoughts, knowledge, beliefs, emotions, desires) to oneself and others” (Sodian & Kristen, 2010), is one socio-cognitive function incorporated within mentalisation (Ha, Sharp, Ensink, Fonagy, & Cirino, 2013). When considering the overlap between ToM and mentalisation, the Reading the Mind in the Eyes (RME) task (Baron-Cohen, Wheelwright, Hill, Raste & Plumb, 2001), is a commonly used ToM measure which taps into four mentalisation dimensions. It requires respondents to mentalise in a controlled way (consciously), focus on others (using external stimuli to interpret others’ mental/emotional state), and to integrate affective and cognitive dimensions to complete the task. As the task assesses understanding the emotional states of others, it taps predominantly into the affective part of the affective/cognitive dimension.

Another term, seen to tap into all four dimensions of mentalisation, is EI. It describes the ability to accurately observe and understand emotions, and to use them to generate thought and enhance personal development/social connections (Mayer, Salovey, Caruso, & Sitarenios, 2001). Evidence of whether mentalisation tasks and those of related constructs measure similar concepts is scarce. Where it has been examined, results have been mixed. Assessing the psychometric properties of the Reflective Function Questionnaire (RFQ: Fonagy & Ghinai, unpublished manuscript), a questionnaire assessing mentalisation ability, the 46 item questionnaire was seen to significantly positively correlate with the RME (Perkins, 2008). When validating the Reflective Function Questionnaire for Youths (RFQ-Y: Sharp et al., 2009) however, authors found no significant relationship between their measure and the child version of the RME (Child Eyes Test: Baron-Cohen, Wheelwright, Scahill, Lawson & Spong, 2001). They posit that this may be due to the ToM task assessing a narrower aspect of mentalisation (Ha et al., 2013).

2.2.5 Research challenges specific to AN

Irrespective of the type of research being conducted with those with AN, there are a number of challenges faced by researchers due to the number of potential confounding factors that need consideration. There are a number of mental health comorbidities associated with AN including anxiety (Kaye, Bulik, Thornton, Barbarich, & Masters, 2004), depression (Fairburn & Harrison,

2003; Swanson, Crow, Le Grange, Swendsen & Merikangas, 2011) and personality disorders (Sansone and Levitt, 2006). Likewise, developmental disorders such as Autism Spectrum Disorder, a condition marked by ToM impairment, is also found to be over-represented in those with AN (Zucker et al., 2007). Cognitive deficits including cognitive inflexibility (Tchanturia, Campbell, Morris & Treasure, 2005), memory (Kemps, Tiggeman, Wade, Ben-Tovim & Breyer, 2006) and attention difficulties (Lauer, 2002) as also observable in those with AN.

2.2.6 Rationale and Aims

Using a mentalisation-based theoretical perspective of how individuals could develop social or interpersonal difficulties leading to later psychopathological outcomes such as AN, this review was conducted to ascertain whether deficits in mentalisation capacity characterise those with AN when compared to those without EDs. It was anticipated that results from the review would help to generate further understanding of the disorder and produce recommendations for areas of future research. In order to answer this question a search of the existing research literature, specifically focusing on measuring mentalisation accuracy in those with AN and comparing results to non-ED control groups, was conducted. In addition to mentalisation, articles that assessed 'theory of mind' or 'emotional intelligence' were also included given the considerable theoretical overlap observed between the constructs.

2.3 Methods

Prior to the conducting the search, consideration was made to the mentalisation terminology to be included in the search (see Appendix B.).

2.3.1 Database Search

PsycINFO, PsycARTICLES, Psychoanalytical Electronic Publishing Web, Web of Science Core Collection (including MEDLINE) and ASSIA databases were used to search for articles published up until 14th October 2015 (date search was conducted). Search terms used to capture mentalisation and related constructs were: mentaliz* or mentalis*, theory AND mind, reflective AND function, emotional AND intelligence. For AN, search terms were eating AND disorder*, anorexi*, bulimi*, binge*. Findings for mentalisation/related constructs and eating disorder terms were then

combined to produce final search results. In addition, a manual search of references of relevant articles found in the computerised search was conducted.

2.3.2 Inclusion/Exclusion Criteria

Papers were included if they met all inclusion criteria: (i) measured with human subjects, (ii) focus of paper was assessing the link between mentalisation/related construct and AN, (iii) AN was diagnosed using DSM-III/IV/5, ICD-10/11 criteria or clinical diagnosis was provided by suitably qualified clinician, (iv) papers that assessed mentalisation but used related terms of: 'theory of mind', 'emotional Intelligence' or 'reflective function'/'reflective symbolisation' (v) a non-ED control group was used as a comparison, (vi) papers had been published in a peer-reviewed journal (vii) studies were empirical, quantitative studies, (viii) papers were written in English. The exclusion criterion was (i) papers that assessed constructs that related to mentalisation but the construct itself was narrower (i.e. empathy) or broader than the term (i.e. metacognition). Once database searches were conducted, all abstracts were examined and papers were excluded if they did not meet inclusion criteria (i) and (ii), or met the exclusion criterion. Full articles were then examined to assess if papers met the remaining inclusion criteria or the exclusion criterion (see Figure 1. for search strategy and results).

2.3.3 Quality Assessment

Articles included in the review were then assessed for quality based on the Scottish Intercollegiate Guidelines Network (SIGN) 50 guidance relating to case-control studies (SIGN, 2015). The final checklist contained 14 items: 1) Study shows clear rationale for research question being posed based on empirical evidence, 2) Clear aims and hypothesis/es reported, 3) Power calculation conducted to support an appropriately powered study, and sample size based on this calculation achieved, 4) Inclusion/exclusion criteria are reported, and are the same for experimental and control conditions with the exception of ED diagnosis for experimental condition, 5) Clear information provided on recruitment strategy: number of participants approached, attrition rates and any potential bias due to drop-out reported, 6) Researcher bias controlled for by blinding to group being assessed, 7) Validated and reliable measures of mentalisation/related construct used,

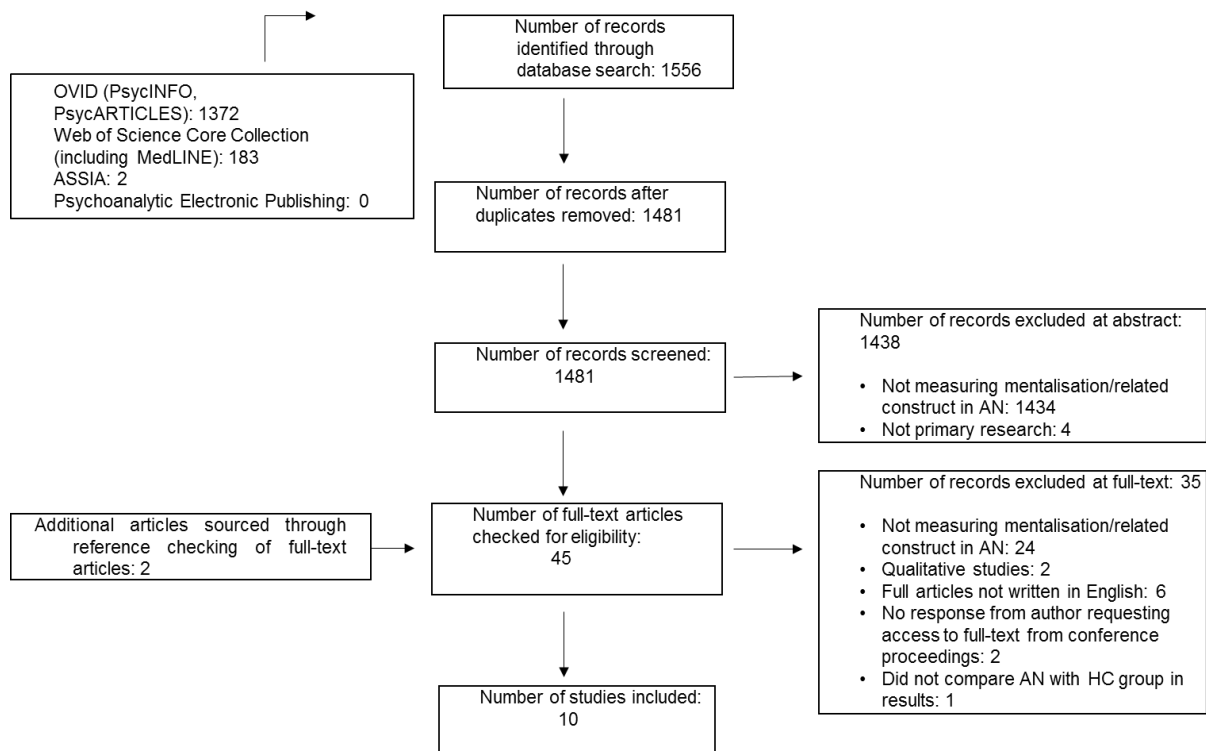


Figure 1. Search strategy and search results.

8) Homogeneous AN group recruited, based on DSM-III/IV/5, ICD-10/11 criteria or clinical diagnosis by a suitably qualified clinician, 9) Control group recruited from a comparable population, 10) ED pathology screened for in the control group and those meeting criteria excluded, 11) Potential confounding variables assessed and controlled for in analyses, 12) Effect sizes reported for main study variables, 13) Generalisability of study findings discussed, 14) Limitations of study reported and suggestions for improvements discussed (see Appendix C for quality assessment matrix). Studies were rated for each criterion as either 'well-covered', 'adequately addressed', 'poorly addressed', 'not addressed' or 'not reported'. Overall quality was calculated using criteria proposed by SIGN 50 and given a rating of either 'high', 'acceptable' or 'low quality'. To ensure the reliability of quality criteria results, an independent rater separately rated 5 of the 10 articles, selected at random. The Kappa value ($k = 0.71$) produced indicated sufficient inter-rater reliability for quality criteria results.

2.4 Results

Applying inclusion/exclusion criteria, 45 papers were identified, of which 35 were excluded (see Figure.1 for exclusion reasons). Of the 10 remaining papers included in the review, nine were

cross-sectional and one study was a longitudinal study (Gillberg et al., 2010), however the latter measured mentalisation at one time-point only. Two studies (de Sampaio, Soneira, Aulicino, & Allegri, 2013a; de Sampaio et al., 2013b) utilised the same participants in both studies but recruited two additional AN participants for their second study. Because of the small increase in sample size, results pertaining to these two studies are discussed as one, with the exception of times when different results were found between the studies or different aspects of mentalisation were measured. In relation to AN, one study specifically focused on an AN-B/P (Rothschild-Yakar et al., 2010), one analysed AN subtypes separately (Rothschild-Yakar et al., 2013), six reported sample sizes for AN-R and AN B/P subtypes but combined groups for analysis (Adenzato, Todisco & Ardito, 2012; de Sampaio et al., 2013a/b; Hambrook, Brown & Tchanturia, 2012; Russell, Schmidt, Doherty, Young & Tchanturia, 2009; Oldershaw, Hambrook, Tchanturia, Treasure & Schmidt, 2010; Tchanturia et al., 2004) and one study did not report AN subtypes (Gillberg et al., 2010). One study also included a recovered AN comparison group (Oldershaw et al., 2010), and two included a BN comparison group (results for AN versus HC groups reported only) (de Sampaio et al., 2013a/b; Rothschild-Yakar et al., 2013).

For five studies the AN group comprised of mixed inpatients/outpatients (Adenzato et al., 2012; de Sampaio et al., 2013a/b; Hambrook et al., 2012; Russell et al., 2009; Tchanturia et al., 2004), two were outpatients only (Gillberg et al., 2010; Oldershaw et al., 2010) and two inpatients only (Rothschild-Yakar et al., 2010; Rothschild-Yakar et al., 2013). Sample sizes ranged from 20-49 (Tchanturia et al., 2004; Rothschild-Yakar et al., 2013) for the AN groups and 20-47 for HCs (Tchanturia et al., 2004; Oldershaw et al., 2010). The mean age range across studies was 15-31 years old (Rothschild-Yakar et al., 2013; Hambrook et al., 2012) and mean age of onset ranged from 15-20 years old (Adenzato et al., 2012; Hambrook et al., 2012), however data were unavailable for 5 studies. Illness duration ranged from 3-10 years (Adenzato et al., 2012; Hambrook et al., 2012) (data were unavailable for two studies). Seven studies contained female participants only (Adenzato et al., 2012; de Sampaio et al., 2013a/b; Hambrook et al., 2012; Rothschild-Yakar et al., 2010; Rothschild-Yakar et al., 2013; Russell et al., 2009; Tchanturia et al., 2004), one included a mixed female/male sample (Oldershaw et al., 2010) and one where gender was not clearly reported (Gillberg et al., 2010) (see Table 1 for all study characteristics). Six studies measured ToM abilities (Adenzato et al., 2012; de Sampaio et al., 2013a/b; Oldershaw et al., 2010;

Russell et al., 2009; Tchanturia et al., 2004, one of which used a ToM task as a proxy-mentalisation measure (Gillberg et al., 2010). Two measured reflective function/reflective symbolisation (Rothschild-Yakar et al., 2010; Rothschild-Yakar et al., 2013) and one measured emotional intelligence (Hambrook et al., 2012).

2.4.1 Assessing Mentalisation Capacity from Results

In terms of mentalisation dimensions, all tasks required participants to mentalise in a controlled way; consciously involving reflection (see Table 2 for dimensions of mentalisation covered by each task). It was not possible to separate results according to internal/external dimensions given that it would not be clear whether results were attributable to either dimension. Results presented here therefore focus on cognitive/affective and self/other dimensions.

2.4.2 Mentalisation Ability in Relation to Others

Five studies, utilising 10 ToM tasks in total, found differences in recognising emotions or cognition perspectives in others for eight of the ten tasks, with AN groups being significantly less accurate than HC groups (de Sampaio et al., 2013a/b; Gillberg et al., 2010; Oldershaw et al., 2010; Russell et al., 2009; Tchanturia et al., 2004) (see Table 3 for individual study data). Estimated effect sizes ranged from small to large. For seven of the 10 tasks, control tasks (requiring no ToM/mentalisation ability to complete the task) were also utilised. The AN group were also significantly less accurate compared to HCs for four of the seven control tasks (de Sampaio et al., 2013a/b; Russell et al., 2009; Tchanturia et al., 2004). Regarding specific AN subtypes, AN-R and AN-B/P groups both produced lower reflective symbolisation scores than HCs when spontaneously asked to describe others (their mother and father) (Rothschild-Yakar et al., 2010). When examining the relationship between current AN, recovered AN and HCs, the recovered AN group was able to recognise emotions in the voices of others at an equitable level to the HC group, with both being more accurate than the AN group (medium effect size) (Oldershaw et al., 2010).

One of the studies which found the AN group to be less accurate on both ToM and controls tasks, reported evidence of a subgroup within the AN group however, who experienced ToM impairments but had equitable performance to HCs on the control task, when they calculated the proportion of cases performing worse on ToM tasks compared to control tasks (Tchanturia et al., 2004). Another

study found at least two AN subgroups within the wider AN group (Gillberg et al., 2010), one of which experienced difficulties in information processing particularly in relation to the ToM task. Further inconsistencies in relation to mentalising in others were found, with two studies focusing on inferring mental state by focusing on eyes of others finding no significant differences between groups (Adenzato et al., 2012; Oldershaw et al., 2013). Nor were there any significant differences found for perceiving the severity of facial emotions (Hambrook et al., 2012) or respondents' ability to use emotions in decision-making pertaining to others (Hambrook et al., 2012).

2.4.3 Differences in Recognising Positive and Negative Emotions in Others

Whilst AN/HC group differences were not observed for the ability to recognise neutral emotions on individual tasks, two studies found reading negative emotions in the eyes of others significantly more difficult for the AN group (de Sampaio et al., 2013a; Oldershaw et al., 2010) (estimated medium to large effect sizes). In addition, one study (Oldershaw et al., 2010) found the AN group to have more difficulty also reading negative emotions in the voice of others (medium effect size). No differences were found between AN and HC groups for recognising positive emotions in the voice of others. When examining performance across a number of tasks focussing on others (RME, RMV and RMF), authors found the AN group was significantly less accurate than HCs for both positive and negative emotions (medium and large effect sizes respectively).

2.4.4 Mentalising in Relation to Self

In contrast to both AN subgroups experiencing more difficulty with mentalisation in relation to others, Rothschild-Yakar and colleagues (2013) found the AN-R group, but not the AN-B/P group, obtained significantly lower reflective symbolisation scores than the HC group when spontaneously asked to describe themselves (medium effect size). In addition, although the authors did not report whether reflective symbolisation scores differed significantly between reflecting on the self versus others, scores were observed to be higher for both the AN-R and AN-B/P group when reflecting on the self than when they were asked to describe their parents (others). In contrast to the AN-R group, but mirroring AN-B/P results in relation to self, one study (Hambrook et al., 2012) found no significant group differences on three EI subtests focussing on the self: emotion management, understanding the complexity of emotions and ability to compare/contrast emotions with sensations.

Table 1. Study Characteristics

Study	Sample Size	AN group	Age in Years Mean (SD)	Gender (M/F)	Mean Body Mass Index: kg/m ² (SD)	Age of Onset in Years, Mean(SD)	Duration of Illness in Years, Mean(SD)
Adenzato et al., 2012	AN: N=30 (AN-R=16, AN-B/P=14) HC=32	Mixed inpatient and day patient	AN: 19.73 (6.06) HC: 20.47 (2.72)	F	AN:15.06 (1.74) HC:20.21 (1.45)	AN:15.77 (3.74)	AN:3.63 (5.27)
de Sampaio et al., 2013a ^a	AN: N=22 (AN-R=8, AN-BP=1, EDNOS- AN=13) HC=24	Mixed inpatient/ outpatient	AN: 24.3 (7.6) HC: 25.2 (6.9)	F	AN: 18.1 (1.8) HC: 21.5 (1.8)	AN: 17.0 (5.0)	AN: 7.4 (5.6)
de Sampaio et al., 2013b ^a	AN: N=24 (AN-R=8, AN-BP=1, EDNOS- AN=15) HC=24	Mixed inpatient/ outpatient	AN= 24.5 (7.6) HC: 25.2 (6.9)	F	AN: 18.1 (1.8) HC: 21.5 (1.8)	AN: 16.8 (4.8)	AN: 7.8 (5.9)
Gillberg et al., 2010	AN: n=42 HC: n=46	Community	Unclear	Unclear	No data	No data	No data
Hambrook et al., 2012	AN=N=32 (AN-R=19, AN-B/P=11, EDNOS- AN=2) HC=32	Mixed inpatient, outpatient & day service	AN:31.63 (11.46) HC: 28.38 (11.31)	F	AN: 15.79 (1.69) HC: 21.94 (2.31)	AN: 20.56 (8.13)	AN: 10.22 (10.11)
Oldershaw et al., 2010	ANRec=24 (subtypes numbers unclear) AN=40 (subtype numbers unclear) HC=47	ANRec: Community AN: Outpatient	ANRec: 29.9 (7.7) AN: 27.3 (10.0) HC: 29.8 (8.0)	ANRec: F:23,M:1 AN: F:37,M:3 HC: F:37,M:10	ANRec: 20.8 (2.0) AN: 16.6 (1.3) HC: 23.0 (2.8)	ANRec: 15.9(3.6) AN: 19.3 (6.5)	ANRec: 5.6 (3.8) AN: 7.4 (8.5)
Rothschild-Yaker at al., 2010	AN B/P=34 HC=35	Inpatient	AN B/P: 18.2 (2.70) HC: 17.80 (2.31)	F	AN B/P:16.52 (2.40) HC: 20.05 (2.10)	No data	No data
Rothschild-Yaker at al., 2013	AN: N=49 (AN-R=31, AN-BP=18) HC=45	Inpatient	AN-R: 15.19 (1.77) AN B/P: 16.44 (1.77) HC: 16.11 (1.35)	F	AN-R: 15.52 (1.62) AN B/P: 16.00 (1.54) HC: 20.84 (2.04)	No data	No data
Russell et al., 2009	AN: N=22 (AN-R=17, AN-B/P=5) HC=22	Mixed inpatient/ outpatient	AN: 26.7 (4.8)* HC: 30.3 (6.5)	F	AN: 15.26 (1.2) HC: 26.2 (2.0)	No data	AN: 9.5 (5.0)
Tchanturia et al., 2004	AN:N=20 (AN-R=10, AN-BP=10) HC: n=20	Mixed inpatient/ outpatient	AN: 27.4 (7.9) HC: 28.3(7.4)	F	AN: 15.8 (2.2) HC: 21.5 (1.5)	No data	No data

AN=Anorexia Nervosa, AN-B/P=Anorexia Nervosa – Binge/purging; AN-R=Anorexia Nervosa – Restricting, ANRec= Recovered AN group; Gender: F=female, M=male; HC=healthy controls, M=mean; (SD) = standard deviation; ^a same participants used in both studies with additional participants recruited for Sampaio et al., 2013b study.

Table 2. Assessment of Mentalisation/related Measures against Four Mentalisation Dimensions.

Measure(s) Used	Dimensions of Mentalisation Captured by Measure			
	Automatic/ Controlled	Internal/ External	Cognitive/ Affective	Self/Other
Faux Pas Test ^a	Controlled	Internal	Cognitive/(Affective) ^l	Other
Happé's cartoon task ^b	Controlled	Internal/External	Cognitive/(Affective) ^l	Other
Story Comprehension task ^c	Controlled	Internal	Cognitive/(Affective) ^l	Other
Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) ^d	Controlled	Internal/External	Cognitive/Affective	Self/Other
Assessment of Self & Assessment of Qualitative and Structural Dimensions of Object Representations measures from the Object Relations Inventory (ORI) ^e	Controlled	Internal/(External) ^l	Cognitive/Affective	Self/Other
Reading the Mind in the Eyes ^f	Controlled	External	Affective/(Cognitive) ^l	Other
Reading the Mind in Films ^g	Controlled	External	Affective/(Cognitive) ^l	Other
Reading the Mind in the Voice ^h	Controlled	External	Affective/(Cognitive) ^l	Other
Reflective Functioning (RF) Scale from the Adult Attachment Interview ⁱ	Controlled	Internal/(External) ^l	Cognitive/Affective	Self/Other
Two subscales used to assess Thematic Apperception Test (TAT) ^j narratives, from Social Cognition & Object Relation Scale (SCORS) ^k	Controlled	Internal/External	Cognitive/Affective	Self/Other

^aBaron-Cohen, O'Riordan, Stone, Jones & Plaisted, 1999; ^bHappé, Brownwell & Winner, 1999; ^cadapted from Happé, 1994b, ^dMayer et al., 2002; ^eBlatt, Auerbach & Levy, 1997; Blatt, Bers & Schaffer, 1993; ^fBaron-Cohen et al, 2001; ^gGolan, Baron-Cohen, Hill & Rutherford, 2007; ^hGolan, Baron-Cohen, Hill & Golan, 2006; ⁱFonagy, Target, Steele & Steele, 1998; ^jMurray, 1943; ^kWesten, 2002; ^lbrackets denote dimension as being partially applicable.

2.4.5 Mentalisation in Relation to Self and Others

For one study (Rothschild-Yakar et al., 2010) 'self' and 'other' dimensions could not be examined separately due to the nature of the task requiring integration of both mentalisation dimensions. This study found significantly lower RF scores for the AN-B/P group compared to the HC group (medium effect size). Two subtests from the SCORS were used by the same study to examine TAT narratives in order to assess individuals' abilities to differentiate between self/other perspectives, identify the subjective experiences of self/others and to assess reasoning and

accuracy of social causality in interpersonal relationships. Authors found a significant between group differences with the AN-B/P group producing lower scores for both subtests (both medium effect sizes). When considering average RF scores, authors noted that the AN-B/P group produced scores close to but lower than 4 (a score of 5 is indicative of normal functioning), compared to the HC groups who scored an average of 5-6 points. In contrast, whilst significant differences were found between AN and HC groups on total EI scores (combining tasks relating to 'self' and 'other'), authors described the AN group as still scoring broadly within the average range overall (Hambrook et al., 2012).

Rothschild-Yakar and colleagues' (2010) study highlight the potentially complex nature of the relationship between mentalisation and AN. Although significant between group differences were found, the expected significant negative correlation between RF, or combined SCORS scores, and drive for thinness in the AN-B/P group ($r=0.23$, $p>0.05$; $r=0.24$, $p>0.05$ respectively) was not produced. In addition, they found a significant positive correlation between RF and combined SCORS scores in relation to bulimic symptoms ($r=0.36$, $p<0.05$; 0.33 , $p<0.05$ respectively) which was also unexpected.

2.4.6 Cognitive and Affective Dimensions of Mentalisation

A number of tasks involved the integration of both cognitive and affective dimensions and so examining them separately was not possible. Four studies which utilised tasks predominantly focusing on the cognitive dimension (Story Comprehension, Faux Pas and Happé's cartoons task) (de Sampaio et al., 2013a/b; Gillberg et al., 2010; Russell et al., 2009; Tchanturia et al., 2004), found significant differences between groups, with AN groups being less accurate than controls (medium effect sizes). Three of the four studies also found significant between group differences for the control tasks as well (small to large effect sizes) (de Sampaio et al., 2013a/b; Russell et al., 2009; Tchanturia et al., 2004). One study (de Sampaio et al., 2013a/b), utilised a memory task and found whilst AN groups were less accurate on both ToM and control tasks, memory for the specifics of the tasks did not differ significantly, compared with the HC group.

Table 3. Individual Study Data.

Study	Mentalisation /related Construct Measure(s)	Results, including Effect Sizes for Significant Findings (d)				
Construct: Theory of Mind						
Adenzato et al., 2012	Reading the Mind in the Eyes (RME)	Variable	AN M (SD)	HC M (SD)		
		RME-ToM	25.60 (3.93)	26.97 (3.33)		
		RME-Control	34.20 (1.79)	34.69 (1.45)		
de Sampaio et al., 2013a	Reading the Mind in the Eyes (RME), Faux Pas Test (FP)	Variable	AN M (SD)	HC M (SD)	Post-hoc	Effect size (d)
		RME: ToM	22.1 (3.3)	25.9 (2.9)	AN<HC**	-0.61 ^a
		RME: Control	34.9 (0.9)	35.0 (0.9)	n/s	
		RME: Male Eyes	10.9 (2.1)	13.7 (1.8)	AN<HC**	-0.72 ^a
		RME: Female Eyes	11.2 (2.0)	12.2 (1.9)	n/s	
		RME: +ve Emotions	9.2 (1.8)	9.8 (2.1)	n/s	
		RME: -ve Emotions	7.6 (2.3)	10.1 (1.4)	AN<HC**	-0.66 ^a
		RME: Neutral/Cognitive	5.2 (0.9)	5.9 (1.1)	ns	
		FP: Faux Pas	24.5 (5.1)	27.4 (3.4)	AN<HC*	-0.34 ^a
		FP: Control	9.6 (0.7)	10.0 (0)	AN<HC*	-0.40 ^a
de Sampaio et al., 2013b	Reading the Mind in the Eyes(RME), Faux Pas Test (FP)	Variable	AN M (SD)	HC M (SD)	Post-hoc	Effect size (d)
		RME: ToM	22.3 (3.3)	25.9 (2.9)	AN<HC**	-0.58 ^a
		RME: Control	34.9 (0.9)	35.0 (0.9)	ns	
		FP: Faux Pas	24.0 (5.6)	27.4 (3.4)	AN<HC***	-0.37 ^a
		FP: Control	9.6 (0.7)	10.0 (0)	AN<HC*	-0.40 ^a
		FP: Memory	19.2 (1.1)	19.7 (0.6)	ns	

Study	Mentalisation /related Construct Measure(s)	Results, including Effect Sizes for Significant Findings (d)				
Gillberg et al., 2010	Happé's cartoon task	Variable	AN M (SD)	HC M (SD)	Effect size (d)	
		Control, accuracy	9.7 (3.9)	10.0 (3.9)		
		Mental, accuracy	9.1 (3.7)	10.8 (3.6)*	-0.23 ^a	
Oldershaw et al., 2010	Reading the Mind in the Eyes (RME), Reading the Mind in the Voice (RMV), Reading the Mind in Films (RMF)	Variable	AN M (SD)	AN Rec M (SD)	HC M (SD)	Post Hoc/Effect size (d)
		Accuracy:				
		RME ^b	26.5 (3.7)	27.9 (3.7)	28.3 (3.7)	ns
		RMV	15.7 (3.4)	17.9 (2.4)	17.7 (2.1)	AN<AN Rec** (d=-0.68), AN<HC** (d=-0.66), ANRec=HC
		RMF ^b	12.9 (2.6)	14.6 (2.6)	14.2 (2.5)	AN<AN Rec* (d=-0.65)
		Across tasks:				
		-ve emotions	63.05 (9.30)	70.22 (9.38)	70.90 (9.27)	AN<AN Rec* (d=-0.77), AN<HC** (d=-0.85), AN Rec=HC
		+ve emotions	69.03 (13.36)	72.96 (13.13)	76.53 (13.35)	AN<HC* (d=-0.56), AN=AN Rec
		Neutral	69.8 (15.30)	76.99 (15.76)	74.59 (15.56)	ns
		Within tasks:				
		RME: -ve emotions	No data	No data	No data	AN<HC** (d=1.26)
		RME: +ve emotions	75.5 (15.36)	76.9 (15.85)	81.6 (15.29)	ns
		RMV: -ve emotions	No data	No data	No data	AN<RecAN* (d=-0.64), ANRec>HC, AN<HC* (d=-0.57)
		RMV: +ve emotions	No data	No data	No data	AN<RecAN* (d=-0.67), ANRec>HC
RMF: -ve emotions	No data	No data	No data	AN<HC* (d=-0.59), AN<ANRec* (d=-0.69)		
RMF: +ve emotions	No data	No data	No data	ns		

Study	Mentalisation /related Construct Measure(s)	Results, including Effect Sizes for Significant Findings (d)			
		Variable	AN: M (SD)	HC: M (SD)	Effect size (d)
Russell et al., 2009	Reading the Mind in the Eyes (RME), Happé's cartoon task	RME %age correct:			
		All Eyes	77.5 (6.1)	85.4 (5.4)***	-0.69 ^a
		RME Control			
		No data			
		Male only			
		80.1 (7.8)			
		Female only			
		75.9 (10.3)			
		86.7 (11.4)**			
		-0.50 ^a			
Tchanturia et al., 2004	Story comprehension task, Happé's cartoon task	Happé cartoons accuracy:			
		ToM	12.0 (2.8)	16.5 (1.5)***	-1.00 ^a
		Control			
		13.1 (2.4)			
		15.4(1.7)***			
		-0.55 ^a			
		Variable			
		AN: M (SD)			
		HC: M (SD)			
		Effect size (d)			
Emotional Intelligence	Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT)	Stories:			
		ToM accuracy	13.4 (3.0)	15.0 (1.3)*	-0.69
		Control accuracy			
		11.4 (3.0)			
		13.9 (1.9)**			
		-0.99			
		Happé cartoons:			
		ToM accuracy	10.0 (3.6)	14.1 (2.1)**	-1.39
		Control accuracy			
		8.8. (2.9)			
12.4 (2.1)**					
-1.24					
ToM combined accuracy					
23.3 (5.2)					
29.3 (2.4)**					
-1.48					
Control combined accuracy					
20.2 (4.9)					
26.4 (2.5)**					
-1.59					
Hambrook et al., 2012	Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT)	Variable			
		AN: M (SD)			
		HC: M (SD)			
		Effect size (d)			
		Total			
		98.57 (13.78)			
		105.60 (11.03)*			
		-0.57			
		Experiential EI			
		100.51 (14.98)			
		106.78 (12.07)			
		Strategic EI			
		96.56 (11.05)			
		101.34 (8.53)			
		Perceiving			
101.44 (16.65)					
107.84 (12.91)					
Using					
99.35 (12.21)					
103.29 (10.48)					
Understand					
97.61 (13.15)					
102.56 (8.47)					
Managing					
95.35 (10.97)					
98.57 (7.55)					
Faces					
111.92 (24.92)					
117.97 (12.90)					
Pictures					
96.59 (12.03)					
101.58 (9.59)					
Facilitation					
101.68 (16.17)					
101.63 (11.71)					
Sensations					
98.28 (9.75)					
102.12 (9.27)					
Changes					
96.82 (13.77)					
103.11 (10.08)*					
-0.53					
Blends					
98.99 (10.66)					
100.77 (8.05)					

Study	Mentalisation /related Construct Measure(s)	Results, including Effect Sizes for Significant Findings (d)				
		Emotion Management	95.30 (10.55)	98.53 (8.44)		
		Social Management	95.29 (11.17)	97.87 (8.11)		
	Mentalisation/ Reflective Function					
Rothschild-Yaker at al., 2010	The RF Scale, Two subscales from Social Cognition & Object Relation Scale (SCORS)	Variable	AN B/P: M (SD)	HC: M (SD)	Effect size (d)	
		Reflective Function:	3.82 (1.80)	5.77 (1.46) ^{***}	-0.60 ^a	
		SCORS - Complexity	2.44 (0.55)	3.18 (0.86) ^{***}	-0.51 ^a	
		SCORS - Understanding	2.36 (0.81)	3.57 (1.07) ^{***}	-0.64 ^a	
Rothschild-Yaker at al., 2013	Assessment of Self & Assessment of Qualitative and Structural Dimensions of Object Representations measures from the Object Relations Inventory (ORI)	Variable: Reflective Symbolisation	AN-R: M (SD)	AN-B/P M (SD)	HC M (SD)	Post Hoc/Effect size (d)
		Mother	3.86 (1.55)	4.03 (1.71)	5.13 (1.20)	AN-R<HC ^{**} (d=-0.50 ^a), AN-B/P<HC [*] (d=-0.37 ^a), AN-R=AN-B/P
		Father	3.79 (1.59)	3.83 (1.60)	5.05 (1.27)	AN-R<HC ^{**} (d=-0.44 ^a), AN B/P<HC [*] (d=-0.42 ^a), AN-R=AN-B/P
		Self	4.59 (1.15)	5.19 (1.43)	5.59 (1.09)	AN-R<HC ^{**} (d=-0.50 ^a), AN-B/P=HC

* p<0.05; ** p≤0.01; ***p<0.001; AN=Anorexia Nervosa; AN-B/P= Anorexia Nervosa – Binge/Purging subtype; AN-R= Anorexia Nervosa – Restricting Subtype; EI=emotional intelligence; HC= healthy controls; ns=not significant; ToM=Theory of Mind; +ve=positive; -ve=negative; ^a effect sizes for study estimated using Cohen's d; ^b Adjusted for IQ.

Another study, also finding no between group differences for memory (Gillberg et al., 2010), did find accuracy on a different cognitive ToM task to be significantly positively correlated with working memory ability ($r=0.27$, $p<0.05$) across groups however. Authors also found this to be the case for the non-mentalising control task ($r=0.25$, $p<0.05$) indicating those with high working memory ability were likely to score more highly on both tasks.

Regarding affective dimension of mentalisation (RME, RMV and RMF tasks), results were more mixed. Two studies found no significant differences between groups for inferring mental states from eyes (Adenzato et al, 2012, Oldershaw et al., 2010) whilst two others found the converse (medium effect sizes) (de Sampaio et al, 2013a/b; Russell et al., 2009). Of the two studies that found significant between group differences, both found AN and HC performance to be equitable on the control task. Understanding emotions in voices also yielded a significant between group difference with HCs being significantly more accurate than the AN group (medium effect sizes) (Oldershaw et al., 2010). When examining differences according to understanding of emotional complexity, comparing emotions and sensations, perceiving emotions in environment stimuli, rating emotional severity and understanding how emotions can change from one to another (i.e. fear to anger), one study (Hambrook et al., 2010) found the only group difference to be for understanding how emotions can change with the AN group being significantly less accurate (medium effect size).

2.4.7 Differences within AN groups

Five of the 10 studies examined the potential relationship of age of onset and/or illness duration for the AN group with ToM scores (Adenzato et al., 2012; de Sampaio et al., 2013a; Oldershaw et al., 2010; Russell et al., 2009; Tchanturia et al., 2004), finding no significant relationships between these variables and ToM scores. This was also the same for illness severity (de Sampaio et al., 2013a/b; Gillberg et al., 2010; Hambrook et al., 2012; Oldershaw et al., 2010; Russell et al., 2009). The results pertaining to differences between AN-R and AN-B/P subtypes has been discussed above for the one study that analysed subtypes separately (Rothschild-Yaker et al., 2013). Two other studies examined differences between AN-R and AN-B/P in ToM accuracy (Adenzato et al, 2012; Tchanturia et al., 2004) finding no significant differences between subtypes. One study

assessed for the presence of Cluster C personality disorders (PDs) but did not report findings or control for PDs in analyses (Gillberg et al., 2010) and one study (Oldershaw et al., 2010) assessed for the potential impact of psychological therapy on ToM performance but found no significant differences between those who had received therapeutic input and those who had not.

2.4.8 Quality Criteria assessment, including study limitations

The majority of studies in this review met criteria for an overall score of “acceptable” indicating that whilst most quality criteria were met, conclusions may change in light of further studies (see Table 4 for quality assessment of each study). There was one exception (Gillberg et al., 2010), which received a “low quality” rating. This was largely due to lack of clarity regarding inclusion/exclusion criteria, ED pathology, and comparison group screening. Confounding variables were also marked as “poorly addressed” as was the discussion relating to generalisability of findings, and study limitations were not reported. Attempts to contact authors of this particular study were unsuccessful.

All studies supplied clear research questions, aims and hypotheses. The majority of studies adhered to a rigorous screening process for AN in the ED group using DSM-III/IV criteria, however within three studies (de Sampaio et al., 2013a/b; Hambrook et al., 2012; Oldershaw et al., 2010), whilst all authors diagnosed AN participants using DSM-IV criteria, they also included a number diagnosed as Eating Disorder Not Otherwise Specified – AN type (EDNOS-AN). The experimental groups therefore constituted a more heterogeneous AN/ED-NOS mixed group. For one study (de Sampaio et al., 2013a/b), the mean BMI of the AN participants was also over 17.5 (DSM-IV threshold for AN diagnosis) indicating a higher than desired degree of BMI heterogeneity within the sample. Likewise, the control group mean BMI in one study (Russell et al., 2009) was higher than the normal range of 18.5-25.00 (World Health Organisation, 2016) and whilst a full ED diagnosis was an exclusion criterion for the HC group, ED symptomatology was not screened for. Controlling for potential researcher bias was limited to two studies (Rothschild-Yakar et al., 2010; Rothschild-Yakar et al., 2013). No studies reported apriori power calculations and sample sizes were seen to be low for a number of studies. When de Sampaio and colleagues (2013b) recruited two additional AN participants for their second study the significance level for RME differences

between AN and HC groups increased ($p < 0.05$ to $p < 0.001$) indicating a small difference in sample size produced a substantial change to the results. A power calculation conducted by the review author found, with a medium effect size at 0.64 (based on calculating the average of the effect sizes calculated/reported for significant results from each study) and power of .8, the sample size needed to achieve α at 0.05 was 31 for both experimental and HCs ($N=62$). Only four of the 10 studies recruited sample sizes over this figure (Gillberg et al., 2010; Hambrook et al., 2012; Oldershaw et al., 2010; Rothschild-Yakar et al., 2010) meaning the remainder were underpowered. There was also considerable variation in the robustness of psychometric properties found in measures assessing mentalisation/related constructs, with a small number using adapted measures (de Sampaio et al., 2013a/b; Tchanturia et al., 2004) or measures where ecological validity was sound but reliability and convergent, discriminant or construct validity was under-researched (Rothschild-Yakar et al., 2013). The number and type of potential confounding variables examined also varied. Whilst depression was almost universally assessed, only studies focusing on ToM and EI conducted any analysis to assess the potential relationship with mentalisation/related measures. This was not the case for the studies focusing on RF or reflective symbolisation. Only five studies assessed for anxiety. Six of the nine studies examined IQ/estimated IQ/intellectual ability differences between groups, controlling for IQ when necessary. Cognitive function was assessed by two studies, one using a brief cognitive impairment questionnaire and a memory control task (de Sampaio et al., 2013a/b), and the other assessed working memory, attention and executive function differences between groups (Gillberg et al., 2010). For two studies, presence of neurodevelopmental disorders, such as ASD, was an exclusion criterion (de Sampaio et al., 2013a/b; Tchanturia et al., 2004) and for one the presence of ASD/Asperger's Syndrome was assessed within the AN sample (Gillberg et al., 2010). The remaining six studies did not set neurodevelopmental disorders as an exclusion criterion or assess for ASD within the sample.

Table 4. Quality Criteria Assessment of Studies.

Study	Criterion															Overall quality conclusion ^a
	Question/Rationale	Aims & Hypothesis/Hypotheses	Power	Inclusion/Exclusion	Recruitment	Researcher bias	Measure(s) of mentalisation	AN Group	Control Group	ED pathology	Confounding Variables	Effect sizes	Generalisability	Limitations		
Adenzato et al., 2012	WC	WC	NR	PA	PA	NR	AA	WC	AA	AA	AA	NR	AA	WC	+	
de Sampaio et al., 2013a	WC	WC	NR	AA	AA	NR	PA	PA	WC	WC	AA	NR	PA	AA	+	
de Sampaio et al., 2013b	WC	WC	NR	AA	AA	NR	PA	PA	WC	WC	AA	NR	WC	WC	+	
Gillberg et al., 2010	WC	WC	NR	PA	AA	AA	AA	WC	WC	NR	PA	NR	PA	NR	0	
Hambrook et al., 2012	WC	WC	NR	AA	AA	NR	AA	PA	AA	WC	AA	WC	WC	WC	+	
Oldershaw et al., 2010	WC	WC	NR	AA	AA	NR	AA	WC	NR	WC	AA	WC	PA	WC	+	
Rothschild-Yaker et al., 2010	WC	WC	NR	AA	AA	WC	AA	WC	AA	WC	AA	WC	AA	AA	+	
Rothschild-Yaker et al., 2013	WC	WC	NR	WC	AA	WC	PA	WC	WC	WC	AA	WC	WC	WC	+	
Russell et al., 2009	WC	WC	NR	WC	AA	NR	AA	WC	NR	AA	AA	NR	WC	AA	+	
Tchanturia et al., 2004	WC	WC	NR	AA	AA	NR	PA	WC	AA	AA	AA	WC	PA	AA	+	

WC= well-covered; AA= adequately addressed; PA= poorly addressed; NA= not addressed; NR= not reported; ^a based on SIGN 50 guidance (<http://www.sign.ac.uk/methodology/checklists.html>): High quality (++): Majority of criteria met. Little or no risk of bias. Results unlikely to be changed by further research; Acceptable (+): Most criteria met. Some flaws in the study with an associated risk of bias. Conclusions may change in light of further studies; Low quality (0): Either most criteria not met, or significant flaws relating to key aspects of study design. Conclusions likely to change in the light of further studies.

2.5 Discussion

This review was conducted in an attempt to gain clarity regarding whether those with AN experience mentalisation deficits compared to those without the disorder. Studies were predominantly conducted with female participants so discussions here may be more applicable to females with AN. Results indicated those with AN experience mentalisation difficulties when relating to self and others, although these may be more subtle in nature and more indicative of a deficit in the affective dimension of mentalisation.

Three studies utilised tasks that covered seven of eight modes from the four mentalisation dimensions (Hambrook et al., 2012; Rothschild-Yakar et al., 2010; Rothschild-Yakar et al., 2013). All found mentalisation ability to be more compromised for those with AN compared to HCs. Scores produced generated a question regarding the level of deficit experienced however. When assessing EI, the AN group were still seen to score broadly within the average range overall (Hambrook et al., 2012). Authors of an additional study assessing all four dimensions (Rothschild-Yakar et al., 2010) concluded that, based on the scores produced, those with AN-B/P were able to mentalise but their ability to integrate these dimensions may be more compromised. Further adding to evidence of a more subtle deficit, one study reporting no significant between group differences for overall RME scores, found the AN group to be less accurate at understanding negative emotions in others within in the same task (Oldershaw et al., 2010). This finding was consistent across the two studies that assessed this, with medium to large effect sizes reported (de Sampaio et al., 2013a; Oldershaw et al., 2010). From a mentalisation-based perspective, this seems understandable given the hypothesis that disturbed body image, a key feature of AN which is linked with operating in psychic equivalence mode (viewing the internal/external world as being same), is more pronounced during negative affective arousal (Skarderud, 2007). Viewing negative emotional states in others may produce this type of arousal, causing disruption to mentalising ability. Results of these tasks may mirror occurrences in the individual's interpersonal environment, with mentalisation ability becoming more compromised at times when interpersonal relations are viewed as negative.

The majority of studies used tasks focusing on others rather than self. Findings pertaining to one study (Rothschild-Yakar et al., 2013) however are consistent with the idea that mentalisation may vary according to emotional arousal and also interpersonal context (Fonagy & Luyten, 2009). Whilst those with AN-R were less able to mentalise in relation to describing themselves and parents compared to HCs, scores were higher for describing themselves. It seems possible that increased emotional arousal in describing self could interrupt mentalising ability, however describing parents could produce more emotional arousal, thereby further compromising mentalisation capacity. Further exploration into mentalisation ability and the influence of different affective states, particularly negative ones, in those with AN would be useful. Comparing mentalisation ability for those with AN with others varying in relational closeness to the individual may also provide further transparency regarding the interpersonal nature of the relationship.

When considering AN subtypes, two studies found no significant differences between AN-R/AN-B/P groups (Adenzato et al., 2012; Tchanturia et al., 2004) whilst one found differences in relation to self-mentalisation only (Rothschild-Yakar et al., 2013), with the AN-B/P and HC groups producing equitable scores when describing themselves. This study recruited an adolescent sample whereas those finding non-significant results were conducted with adults. Given evidence of diagnostic cross-over in adults with AN (Eddy et al., 2008), in contrast to subtypes presenting as more discrete categories during adolescence (Swanson et al., 2011), this may account for the discrepancy. Also, equitable mentalisation ability has been evidenced in those with bulimia nervosa when compared to HCs (Pedersen et al., 2012). This ED is categorised by binge-purging, as is AN-B/P. Given this result it may be beneficial to continue to explore AN subtypes separately, focusing on how mentalising may differ in relation to the self versus others, given the infancy of research in this area. Conducting longitudinal studies from early adolescence through adulthood, specifically mapping symptomatology and mentalisation ability over time, would provide clarity regarding whether mentalisation ability changes according to particular AN features. It would also aid further understanding of the potential factors affecting recovery in AN, given results here show those categorised as recovered experienced fewer mentalising difficulties than those with a current diagnosis (Oldershaw et al., 2010).

Longitudinal studies would also aid understanding of the impact that illness duration and severity have on mentalisation ability. Of the studies that reported illness duration, the majority had moderate to long-term durations. Two studies, with the shortest durations (Adenzato et al., 2012; Oldershaw et al., 2010), found no significant differences between groups in terms of overall performance on the same affective ToM task (RME), whilst two with moderate-long duration reported significant between group differences using the same task (de Sampaio et al, 2013a/b; Russell et al., 2009). Skarderud (2007) draws on mentalisation-based theory to describe the way in which individuals with AN may find themselves involved in vicious negative cycles when navigating their social environment, with mentalisation deficits leading to fractures in interpersonal relationships, which will further reduce mentalisation ability. When considering this, it seems logical to conclude that those with a longer illness duration will experience more negative interpersonal cycles, thereby further compromising their mentalisation ability. No significant relationships were found between duration, or severity, and overall ToM task performance however, leading authors to posit poorer AN performance on tasks was independent of clinical symptoms (see Sampaio et al., 2013a/b; Hambrook et al, 2012). Illness duration and severity need to be considered carefully as certain factors may occlude a straightforward link between these clinical variables and reduced mentalisation ability. Psychological input could be one such factor. Given that those with longer durations and increased severity may have received more input from services it is possible that psychological therapies, which all involve the enhancement of mentalisation ability to some degree (Skarderud, 2007), may improve mentalisation ability and thereby obscure the true impact of a number of clinical variables on mentalisation capacity. This also has wider implications when thinking about the results pertaining to mentalisation ability of AN groups reported here. Psychological input should be routinely examined and controlled for given the influence it may exert over results.

Conclusions drawn here must be tempered by some anomalous findings. A number of studies found the AN group to be less accurate on both experimental and non-mentalising control tasks. This finding was predominantly for tasks that measured the cognitive dimension of mentalisation, pointing towards a those with AN experiencing a general deficit in functioning, rather than solely a mentalisation-based one. From the results it appears less likely this relates to memory deficits (de

Sampaio et al., 2013a/b; Gillberg et al., 2010). Executive functioning was only assessed in one study, finding significant between-group differences for time taken on the task only (Gillberg et al., 2010). Given that cognitive inflexibility, one executive function, is posited to be a core feature in AN (Tchanturia et al., 2005), it is possible that a more rigid approach to problem-solving, particularly for tasks that predominantly required cognitive abilities such as reasoning, could have contributed to poorer performance. The only two studies to conduct both affective and cognitive ToM tasks within the same study (de Sampaio et al., 2013a/b; Russell et al., 2009), both found significant between group differences on the cognitive control task, but not the affective control task, supporting the idea that affective tasks may be highlighting a mentalisation deficit whereas cognitive tasks are highlighting a deficit in another area of functioning, such as cognitive flexibility. The importance of examining cognitive functioning carefully when conducting research with those with AN, is exemplified here given the uncertainty with which results pertaining to tasks focusing on the cognitive dimension can be attributed to the specific factors studies were aiming to measure. Inconsistent findings across studies may be due, in part, to evidence of heterogeneity within AN groups. Three studies discussed the presence of subgroups within their AN groups, which seemed more compromised either in mentalisation ability (Gillberg et al., 2010; Tchanturia et al., 2004) or where results provided possible evidence of polarised mentalisation abilities within the group (Rothschild-Yakar et al., 2010). These findings indicate a possible indirect link between mentalisation ability and AN, with other factors influencing the relationship. Potential cognitive deficits have been discussed. Another factor could relate to mental health comorbidities. These were less consistently controlled for across studies and personality disorders (PDs) were scarcely considered. Given the higher prevalence rates of PDs within EDs (Sansone and Levitt, 2006) for example, and that certain PDs are associated with reduced mentalisation ability (Bateman & Fonagy, 2010), these may need consideration when conducting research with this population.

In addition to the methodological issues described, over half of the studies were under-powered meaning results could be reported with less certainty. Heterogeneity within AN samples also meant direct comparison between studies could only be made tentatively. Adhering to strict diagnostic criteria for AN diagnosis will be important to ensure experimental groups do not transgress into an

AN-EDNOS category. This would allow for more transparency in interpreting results and when making comparisons between studies. Scales used to measure specific aspects of social cognition should also have sound psychometric properties. A number of scales used were either under-researched in terms of psychometric properties or adapted forms with no assessment of reliability/validity. One paper used a robust specific mentalisation measure; the RF scale (Rothschild-Yakar et al., 2010). That said, the RF provides one total score so whilst it assesses the four dimensions of mentalisation it is not able to examine these dimensions separately, in addition to assessing how they may inter-relate. Given the results of this review, and the contrast between findings for affective and cognitive dimensions, this would be an important consideration when thinking of how to assess mentalisation ability in future research.

2.5.1. Limitations of the Review

Results for cognitive and affective dimensions of mentalisation were presented separately. The RME task for example, predominantly assesses ability to understand the affective mental state of others, and was therefore described as an affective task. Reasoning and insight (the cognitive dimension) would also be needed to solve the task however. In addition, whilst careful consideration was made regarding the mentalisation constructs included in the search, other constructs whilst narrower or broader in focus, could provide information regarding the mentalisation capacity of those with AN. The specific aim of this review was to examine the evidence pertaining to deficits in mentalisation for those with AN and did not report findings of other factors, such as anxiety (Hambrook et al., 2012) and parental relationships (Rothschild-Yakar et al., 2010), which were seen to influence the relationship. Given that the aetiology of AN is seen to be complex, it seems logical that other factors will influence the mentalisation/AN relationship and should also be the subject of future research.

2.5.2. Conclusion

Findings of this review indicate those with AN demonstrate subtle mentalisation deficits when relating to self and others, particularly in relation to the affective dimension and recognising negative affective states in others. Individuals' ability to mentalise appears less integrated than for

those without EDs, and may vary according to emotional arousal and interpersonal context. A number of methodological issues observed in studies means conclusions can only be drawn tentatively. Recommendations for future research includes conducting studies with sufficient power, further examination and control of potential confounding variables, maintaining strict homogeneity within experimental/control groups, and ensuring measures are fit for purpose.

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3. Empirical Research Article^a

Title: Mentalisation and disordered eating in an adolescent sample: the mediating role of borderline features.

Author: Hannah Watkins^{bc},

^bUniversity of Edinburgh, ^cNHS Grampian

Corresponding Author: Hannah Watkins

Address: University of Edinburgh, School of Health in Social Science, Medical School, Teviot Place, Edinburgh, EH8 9AG, Scotland, U.K

Email: s1370142@ed.ac.uk

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3.1 Abstract

Title: Mentalisation and disordered eating in an adolescent sample: the mediating role of borderline features.

Objectives

Drawing on Sharp and Fonagy's mentalisation-based theoretical model for development of psychopathology in adolescents, this study focused on the relationship between mentalisation and disordered eating, hypothesising that borderline trait features (including emotion dysregulation and impulsivity) would mediate the relationship between the two constructs.

Method

162 participants aged 12-18 were recruited from two secondary schools. Participants completed a questionnaire pack including mentalisation, borderline traits, impulsivity, emotion dysregulation and depression scales, and general sociodemographic questions.

Results

Using data from 148 participants, mediation analyses showed that mentalisation exerted a significant effect on disordered eating indirectly through borderline traits, and partially through emotion dysregulation, but not impulsivity.

Conclusion

Understanding the relationship between mentalisation, borderline traits and DE may aid psychological assessment and treatment. Therapies where the main focus is improving mentalisation ability (e.g. Mentalisation-Based Treatment) may be useful.

Key Words: Borderline Traits, Disordered Eating, Mentalisation, Adolescents, Emotion Dysregulation, Impulsivity

Abstract Word Count: 150

3.2 Introduction

Mentalisation is the way in which we “make sense of each other and ourselves, implicitly and explicitly, in terms of subjective states and mental processes” (Bateman & Fonagy, 2010, p.11). The term mentalisation places emphasis on the cognitive, affective and conscious/unconscious ways individuals can conceive their own and others’ mental states (Choi-Kain & Gunderson, 2008; Fonagy & Luyten, 2009). Fonagy and colleagues (Fonagy & Bateman, 2006; Fonagy, Gergely, Jurist & Target, 2002) propose that vulnerable individuals who have experienced “developmental trauma” (Fonagy & Bateman, 2006, p.414) in terms of childhood attachment, may be more susceptible to psychopathological problems in adulthood due to difficulties in holding a constant and reliable understanding of others’ feelings and intentions, as well as their own, in mind. They propose that this is due to a lack of obvious and conditional mirroring on the part of the child’s primary caregiver, which impedes the child’s ability to internalise mental states, leading to a reduced capacity to mentalise. Whilst reduced mentalisation capacity could be a component of many mental health problems (Bateman & Fonagy, 2010), there are certain clinical diagnoses where mentalisation deficits seem to be a core construct, such as depression (Fischer-Kern et al, 2013), eating disorders (Cate, Khademi, Judd, & Miller, 2013; Rothschild-Yakar, Levy-Shiff, Fridman-Balaban, Gur & Stein, 2010) and most notably borderline personality disorder (Bateman & Fonagy, 2010; Fonagy & Luyten, 2009).

3.2.1 Borderline Personality Disorder (BPD) and Mentalisation

BPD is characterised by “a pervasive pattern of instability in the regulation of emotion, interpersonal relationships, self-image and impulse control” (Skodol et al., 2002, p.936) and poorer mentalisation abilities are said to result from earlier attachment difficulties (Fonagy & Bateman, 2006). Due to the chronicity and severity of BPD (Fonagy & Luyten, 2009), early intervention is seen to be vital (Ha, Sharp, Ensink, Fonagy & Cirino, 2013). There are ethical considerations to be taken into account when looking to diagnosis BPD in adolescents however. Adolescence is seen to be a time where personality is relatively fluid and subject to change, and cohesion is not expected to be achieved before 18 years of age (Crick, Murray-Close & Woods, 2005). It has also been argued that certain traits/states such as impulsivity, a core feature of BPD, may present at

higher levels in adolescence but as part of normal development rather than a psychopathological symptom (Romer, 2010). There is however some evidence of personality disorder stability in older adolescents (Chanen et al., 2005), and Crick and colleagues (2005) argue that personality does not just appear at 18 years old. There may therefore be benefit from identifying borderline personality traits/features as a potential risk-factor for the later development of BPD.

3.2.2 Personality Disorders (PDs) and Eating Disorders (EDs)

It has been posited that there is a high level of comorbidity between PDs and EDs (Rosenvinge, Martinussen & Østensen, 2000; Sansone, Chu, Wiederman & Lam, 2011) and that solely treating EDs without looking at the wider personality context that the disorder occurs within, may be problematic (Westen & Harnden-Fischer, 2001). Sansone and Levitt's (2006) systematic review found that Obsessive-Compulsive Personality Disorder was more likely to be associated with Anorexia Nervosa – Restrictive subtype and BPD more closely linked to Anorexia Nervosa – Binge/Purging Subtype, Bulimia Nervosa and Binge Eating Disorder. The link between specific types of PD and ED is not as clear-cut as this, however, with the authors also showing higher estimated prevalence rates for AN – Restrictive subtype and BPD. The proposed reason for the link between BPD and binge/purging subtypes of ED relates to higher levels of impulsivity evident in both these subtypes and BPD (Sansone & Levitt, 2006). Conversely, AN-R is perceived to be synonymous with “restraint and self-monitoring” (Sansone & Levitt, 2006, p. 34); however, there is some evidence that individuals with AN-R may experience episodic impulsivity (Fessler, 2002) which could provide one explanation for the incidence of BPD within this subtype.

Emotion regulation difficulties also characterise both BPD (Sharp et al., 2011) and all ED subtypes (Svaldi, Griepenstroh, Tuschen-Caffier & Ehring, 2012) and, given that both share a number of pathological features, it is interesting to note that deficits in mentalisation characterise BPD and EDs (Fonagy et al., 1996; Fossati, Feeney, Maffei, & Borroni, 2014; Gillberg et al., 2010). Mentalisation-Based Treatment (MBT: Fonagy & Luyten, 2009) was introduced to specifically target mentalisation deficits in adults with BPD and associated features. It has recently also been used with adolescent groups (Rossouw & Fonagy, 2012) and has provided some evidence of effectiveness in terms of reducing self-harm, borderline traits, depression and increasing

mentalisation ability (Rossouw & Fonagy, 2012). This treatment has also more recently been considered for adults (Robinson, 2014) and children/adolescents (Miller, 2013) with EDs, although assessing treatment effectiveness is still in its infancy.

3.2.3 Eating Disorders and Mentalisation

The proposed link between deficits in mentalisation and EDs involves the idea that EDs themselves are a product of an individual's inability to identify or verbalise his or her feelings/emotions which may lead to the individual processing these emotions through their body, physically (Cate et al., 2013). The majority of studies examining the proposed relationship between ED and mentalisation have focused on clinical populations with adults (Gillberg et al., 2010; Pedersen, Lunn, Katznelson & Poulsen, 2012; Ward et al., 2001). One exception, conducted by Cate and colleagues (2013), found that in females aged 9-12 years, those at higher risk for the development of an ED had greater mentalisation deficits compared with those at lower risk. Although there are a number of studies proposing a link between mentalisation deficits and EDs (Cate et al., 2013; Gillberg et al., 2010), the picture is not entirely clear. Pedersen and colleagues (2012) concluded that although mentalisation deficits may in part aid one's understanding of bulimia nervosa, the disorder itself could progress in the absence of mentalisation deficits. One reason for this lack of clarity may be due to the term "mentalisation" itself (Choi-Kain & Gunderson, 2008) which has been criticised for being too broad, and therefore difficult to define and measure.

3.2.4 Disordered Eating (DE), Mentalisation and Borderline Traits – a mediational relationship?

EDs and BPD are both chronic conditions that can pose challenges in terms of treatment (Bateman & Fonagy, 2010; Vitousek, Watson, & Wilson, 1998) and, as such, gaining a level of clarity regarding their relationship could have important implications for the provision of effective interventions. Given the importance of early intervention, and that little research has focused on this relationship in childhood, it was decided that an adolescent population should be the focus of this study. Fonagy and Sharp's (2008a) mentalisation-based model for the development of adolescent psychopathology postulates that early insecure attachment could negatively impact on the ability to mentalise. This may then lead to reduced emotion regulation capabilities which could

result in psychopathology later in adolescence (Sharp and Fonagy, 2008a). Given that EDs and BPD are associated with both mentalisation deficits and insecure attachment (Cate et al, 2014; Fossati et al, 2014) these could be both considered as potential psychopathological outcomes. The relationship between EDs and PDs have been conceptualised using a number of models (Cassin & von Ranson, 2005; Lilienfeld, Wonderlich, Riso, Crosby & Mitchell, 2006; Perkins, 2008) with no clear conclusions drawn. Sansone & Levitt (2006) postulate that “intuitively” (p.143) a personality disorder, like BPD, would seem to “precipitate or ...predispose” (p.143) an individual to developing an ED. It therefore seems plausible to view the ED as the behavioural outcome and that a PD, such as BPD, may precede and exert some influence over the manifestation or development of the ED. With this in mind, and considering Sharp and Fonagy’s (2008a) model, it seems reasonable to conclude that one possible relationship between mentalisation and EDs would include BPD characteristics acting as a mediator between the two.

As there is limited research evidence regarding this relationship these constructs were examined in a general population sample as opposed to a clinical setting, in order to examine general trends. Because of this, DE and borderline traits/features, as opposed to ED and BPD, were deemed to be appropriate constructs to be the focus of the study. Whilst BPD is seen to be equally prevalent for males and females (Grant et al., 2008), EDs appear to be more common with females (Fairburn & Harrison, 2003; Hudson et al., 2007). Subthreshold EDs show more of a mixed picture, however (Hudson et al., 2007). Given that the relationship between mentalisation, borderline traits and DE had not been examined in this way previously, and that DE and borderline trait features were to be the focus, no discrimination pertaining to gender was made in the study protocol.

The primary hypothesis for this study was that borderline traits would mediate the relationship between mentalisation and DE in adolescents, and a secondary hypothesis was that emotion dysregulation and impulsivity, as core borderline features, would also mediate the relationship between mentalisation and DE, thereby further explaining the nature of the relationship between the two constructs.

3.3 Methods

3.3.1 Participants

Participants aged 12-18 years were recruited from two secondary schools. Inclusion criteria also stated that participants were required to read and understand English (due to the complexity of the questionnaires) and be enrolled in mainstream education. Data were collected from 162 students from December 2014 to March 2015. Initially 172 students were approached about the study; one parental opt-out form was returned, eight students declined to take part on the day of data collection and 1 student signed a consent form but did not complete the questionnaire pack. Of the 148 datasets analysed, there were 77 males and 71 females (mean age=15.17 years, SD=0.51). The ethnic composition of the sample was: White British (89.9%), Mixed/Multiple Ethnicities (2%), Asian (2%), Polish (2%), Other (2%), European Other (1.4%) and Caribbean (0.7%).

3.3.2 Procedure

Four local schools were approached regarding participation, with two agreeing to take part. The researcher met with schools prior to commencement of the study to discuss the practicalities of conducting the research. Ethical approval was granted by the School of Health in Social Science, University of Edinburgh (see Appendix E.) and local education authority permission was received (see Appendix F.). The researcher attended Personal and Social Education (PSE) classes at two time points, with at least one week in between to allow time for students and parents/guardians to consider whether to participate. The first week involved the provision of a study overview for students and handing out information sheets, and parent/guardian opt-out letters (for those 15 years old or younger in line with British Psychological Society guidance (2011)). At the second time point, those taking part completed the questionnaires during their PSE class. All participants were asked to complete a consent form prior to questionnaire completion, reminded the exercise was voluntary and debriefed afterwards.

3.3.3 Measures

As well as general sociodemographic information (including age, ethnicity and frequency of alcohol/drug use), the following measures were administered in the questionnaire pack:

Borderline Trait Features Scale for Children (BPFS-C: Crick, Murray-Close & Woods, 2005)

The BPFS-C is a self-report questionnaire which requires respondents to rate 24 statements about the way they feel about themselves and others on a 5-point Likert scale from “Not at all true” to “Always true”. It has now been used in a number of studies assessing borderline traits in adolescents (Cate et al., 2013; Fossati et al., 2014). The Cronbach’s alpha calculation for this study showed BPFS-C questionnaire scores to be “good” in terms of internal consistency ($\alpha=0.87$). As the authors of the BPFS-C advise that only total scores can be interpreted (with higher scores signifying higher levels of borderline trait features), different measures of emotion dysregulation and impulsivity were used to examine the secondary hypothesis.

Barratt Impulsivity Scale-Brief (BIS-Brief: Steinberg, Sharp, Stanford, & Tharp, 2013)

The BIS-Brief is a refinement of the Barratt Impulsivity Scale-11 (BIS-11: Patton, Stanford, & Barratt, 1995), one of the most frequently used, reliable and valid measures of trait impulsivity (Patton et al, 1995; Stanford et al., 2009). It is a self-report questionnaire which requires the respondent to rate 8 statements on a 4-point Likert scale from “rarely/never” to “almost always/always”, with higher total scores indicating higher impulsivity levels. It has been validated for use with adolescents (Steinberg, Sharp, Stanford, & Tharp, 2013). The Cronbach’s alpha calculation for this study showed BIS-Brief questionnaire scores to be “acceptable” in terms of internal consistency ($\alpha=0.77$).

Difficulties with Emotion Regulation Strategies Scale (DERS: Gratz & Roemer, 2004).

The DERS is a self-report questionnaire which assesses emotion regulation difficulties (Gratz & Roemer, 2004). It requires respondents to read 36 statements and answer how applicable each statement is to the individual on a 5-point Likert scale ranging from “almost never (0-10%)” to “almost always (91-100%)”, with higher scores indicating higher levels of emotion dysregulation. Difficulties can also be assessed using six subscales however only total scores were used in this study. It has been validated for use with adolescents (Neumann, van Lier, Gratz & Koot, 2010). The Cronbach’s alpha calculation for this study showed DERS questionnaire scores to be “excellent” in terms of internal consistency ($\alpha=0.93$).

Eating Attitudes Test (EAT-26: Garner, Olmstead, Bohr & Garfinkel, 1982)

The EAT-26 is a 26 item self-report measure used to detect symptoms and features of disordered eating. Whilst an overall score is used to detect “eating disorder risk”, with higher scores indicating higher risk, it also examines DE symptomatology using three subscales: dieting, bulimia and food preoccupation, and oral control (Garner et al., 1982). It has been validated for use in clinical (Garner et al., 1982) and non-clinical settings (Mintz & O’Hallaran, 2000). A Cronbach’s alpha calculation showed EAT-26 questionnaire scores to be “excellent” in terms of internal consistency ($\alpha=0.92$).

Reflective Function Questionnaire for Youths (RFQ-Y: Sharp et al, 2009)

The RFQ-Y is a 46 item self-report measure of mentalisation and requires respondents to rate statements on a 6-point Likert scale ranging from “Strongly Disagree” to “Strongly Agree”. The scale has recently been validated for use with adolescent, in-patient populations (Ha et al., 2013). Total scores are calculated by adding together the average of two scales (A and B) with higher total scores indicating higher mentalisation ability. The Cronbach’s alpha calculation for this study showed RFQ-Y questionnaire scores to be “good” in terms of internal consistency ($\alpha=0.82$).

Patient Health Questionnaire-9 (PHQ-9: Spitzer, Kroenke & Williams, 1999)

The PHQ-9 is a nine question self-report measure used to detect symptoms of current depression. It requires respondents to rate statements on a 4-point Likert scale ranging from “Not at all” to “Nearly every day”. The authors instructions state a tentative diagnosis of current depression can be made if respondents indicate they have experienced five or more depressive symptoms occurring “more than half the days/ nearly every day” (with the exception being suicidality which is counted if reported as occurring for several days or more) in the last two weeks, at least one of which must relate to either anhedonia and/or low mood. In addition, respondents must answer that they have found these symptoms “somewhat”, “very” or “extremely” difficult to deal with. The PHQ-9 has now been validated for use with adolescents (Richardson, et al., 2010). The Cronbach’s alpha calculation for this study showed the PHQ-9 questionnaire scores to be “good” in terms of internal consistency ($\alpha=0.88$).

3.4 Results

All data were analysed using IBM Statistical Package for Social Sciences (SPSS) version 21 (IBM Corp., 2012). To conduct mediation analysis Hayes' (2014) PROCESS package, version 2.15, was imported into SPSS (<http://www.processmacro.org/download.html>)

3.4.1 Sample Size

Guidelines provided by Fritz and Mackinnon (2007) on the required sample size to detect mediational effect were consulted. A bias-corrected bootstrapping test was decided upon given that it corrects for positive skew which is often present within data (Preacher & Hayes, 2004). From examining previous research, a medium effect size for the mentalisation-borderline trait relationship and a half-way-to-medium effect size for the borderline trait-disordered eating relationship were considered to be conservative estimates. Using these, the required sample size advised to achieve power of .8 was therefore 116. A later ethics amendment was agreed (see Appendix G.) whereby n=116 became the minimum requirement given further reflection on the scarcity of data in the area of research.

3.4.2 Missing Data

Data were collected from 162 participants. Missing data for the complete data set was 2.83% initially. 14 datasets were removed (reducing missing data for complete dataset to 1.34%) and analyses were conducted with the remaining 148 sets of participant data. Series mean substitutions were made for all remaining missing values with the exception of a sociodemographic question regarding current/past contact with mental health services (yes/no answer) where the level of missing data was seen to be 14.19% (46/324 data points). Data for these two questions were entirely removed and not entered into any analyses.

3.4.3 Normality of Data

All scores produced skewness z-score values of >1.96 and kurtosis z-score values for 6 of 11 of the measures were >1.96 indicating the majority of data was not normally distributed. Non-parametric tests were subsequently used in all analyses.

3.4.4 Descriptives

Descriptive statistics for the main study variables are summarised in Table 1.

Table 1. Descriptive statistics for main study variables.

Scale Variable	Range	Mean (SD)	Dichotomous/ Categorical Variables	Categories	Frequency (%)
Mentalisation (RFQ-Y)	5-10	8.67(0.90)	Depression Status (PHQ-9)	No Current Depression	125(84.50)
				Currently Depressed	23(15.50)
Disordered Eating (EAT-26)	0-68	10.91(12.64)	Alcohol Use	Do not drink alcohol	63(42.60)
Emotion Dysregulation (DERS)	49-167	90.73(24.92)		A small number of times	53(35.80)
				Occasionally	25(16.9)
Borderline Trait Features (BPFSC-C)	38-94	60.84(13.50)		Nearly every weekend/Every weekend	5(3.40)
			Almost every day/every day	2(1.40)	
Impulsivity (BIS-Brief)	8-31	17.61(4.15)	Substance Use (Street drugs and/or legal highs)	Have not used	140(95.0)
				A small number of times	8(5.0)

SD=Standard Deviation, %=percentage

3.4.5 Preliminary Analyses

Prior to mediation analyses being conducted, Spearman's rank correlation analyses were conducted with dichotomous (depression status, gender and substance use) and continuous (mentalisation, borderline trait features, disordered eating, emotion dysregulation, impulsivity and age) variables in order to examine the level of association between variables and identify potential confounding factors. For categorical variables (alcohol use and ethnicity), Kruskal Wallis tests were conducted to examine differences according to alcohol use and ethnicity categories across all other study variables, again to identify potential confounding factors to be controlled for in mediation analyses.

Relationship between mentalisation, DE, borderline traits, impulsivity and emotion dysregulation.

Mentalisation scores were significantly, negatively correlated with DE, borderline trait, emotion dysregulation and impulsivity scores (see Table 2.) indicating that higher mentalisation ability was associated with lower borderline trait, emotion dysregulation and impulsivity scores. Significant positive correlations were also found between DE scores and borderline, impulsivity and emotion dysregulation scores demonstrating that as participants' levels of DE symptomatology increased so did their impulsivity, emotion dysregulation and borderline trait scores.

Table.2 Correlation Coefficients between Study Variables.

	EAT-26	DERS	BPFS-C	BIS-Brief	PHQ-9	Gender	Age	Sub. Use
Mentalis. (RFQ-Y)	-0.189*	-0.139*	-0.198**	-0.314**	-0.152*	0.277**	0.000	-0.171*
Disordered Eating (EAT-26)		0.488**	0.460**	0.249**	0.400**	0.295**	-0.075	0.164*
Emotion Dysreg. (DERS)			0.677**	0.411**	0.414**	0.357**	0.024	0.260**
Borderline Trait Features (BPFS-C)				0.563**	0.431**	0.298**	0.004	0.296**
Impulsivity (BIS-Brief)					0.229**	0.075	0.042	0.261**
Depression Status (PHQ-9)						0.297**	0.053	0.279**
Gender							-0.069	0.037
Age								0.104

*p≤0.05, **p≤0.01; Dysreg.= Dysregulation; Mentalis.= Mentalisation; Sub. Use = Substance Use.

3.4.6 Confounding Variables

To identify potential confounding variables age, gender, current depression, substance use and ethnicity were further examined in relation to the main study variables. There were no significant correlations according to age, however, significant negative correlations were found for depression

status and mentalisation, with current depression being associated with lower mentalisation scores, and also with drug use and mentalisation, with trying drugs a small number of times being associated with lower mentalisation scores. The inverse was seen for depression status and drug use in relation to DE, borderline trait, emotion dysregulation and impulsivity scores (see Table. 2). Gender was significantly, positively correlated with mentalisation, DE, emotion dysregulation and borderline trait scores with higher scores being associated with female gender.

Significant differences were found according to alcohol use for impulsivity ($H(4)=14.98$, $p=0.005$), DE ($H(4)=9.47$, $p=0.05$), emotion dysregulation ($H(4)=12.93$, $p=0.012$) and borderline trait scores ($H(4)=12.40$, $p=0.015$) with mean rank scores being higher for those that reported drinking “almost every weekend/every weekend” or “almost every day/every day”.

No significant differences were found according to ethnicity, with the exception of emotion dysregulation scores ($H(4)=14.33$, $p=0.026$) which showed participants of Caribbean and Asian ethnicity to produce higher mean rank scores. Gender, depression status, alcohol and drug use were controlled for in all further analyses and ethnicity was controlled for in the second mediation model where emotion dysregulation was entered as a potential mediator.

3.4.7 Relationship between impulsivity, emotion dysregulation and borderline traits.

To assess whether impulsivity and emotion dysregulation could be confidently entered in mediation analyses as measuring core borderline trait features, multiple regression analyses were conducted. Results showed both were significant predictors of borderline traits scores, explaining 57.7% of the variance in the DV ($R^2=0.577$, adjusted $R^2= 0.571$, $F(2,147)=98.85$, $p<0.01$) with emotion dysregulation accounting for 45.1% (unadjusted) and impulsivity accounting for 12.6% (unadjusted) of variance. Both variables also provided significant independent contributions to the model (emotion dysregulation: unstandardised $\beta=0.29$, $t(2,147)=9.19$, $p<0.001$; impulsivity: unstandardized $\beta=1.24$, $t(2,147)=6.57$, $p<0.001$).

3.4.8 Mediation Analyses

Hayes' (2014) PROCESS programme was imported to SPSS to conduct mediation analyses. All analyses used 95% bias-corrected bootstrap confidence intervals based on 5000 bootstrap samples (Preacher & Hayes, 2008).

3.4.9 Hypothesis 1: Borderline features mediate the relationship between mentalisation and DE.

When controlling for gender, depression status, alcohol use and drug use, mediation analysis showed mentalisation exerted a significant effect on DE indirectly through borderline trait features (see Figure. 1). The *a* path (mentalisation-borderline traits) and *b* path (borderline traits-DE) were both found to be significant ($a = -2.83$, $p = 0.0104$; $b = 0.20$, $p = 0.0151$) and a bias-corrected bootstrap confidence interval for the indirect effect ($ab = -0.60$) did not contain zero (-1.70 - -0.10). In addition, the direct effect of mentalisation on disordered eating (*c'* path) was found to be non-significant ($c' = -1.98$, $p = 0.062$) suggesting that mentalisation did not influence disordered eating independent of its effect through borderline traits in this model. This model (including predictor and confounding variables) explained 34.06% (unadjusted) of the variance in DE scores.

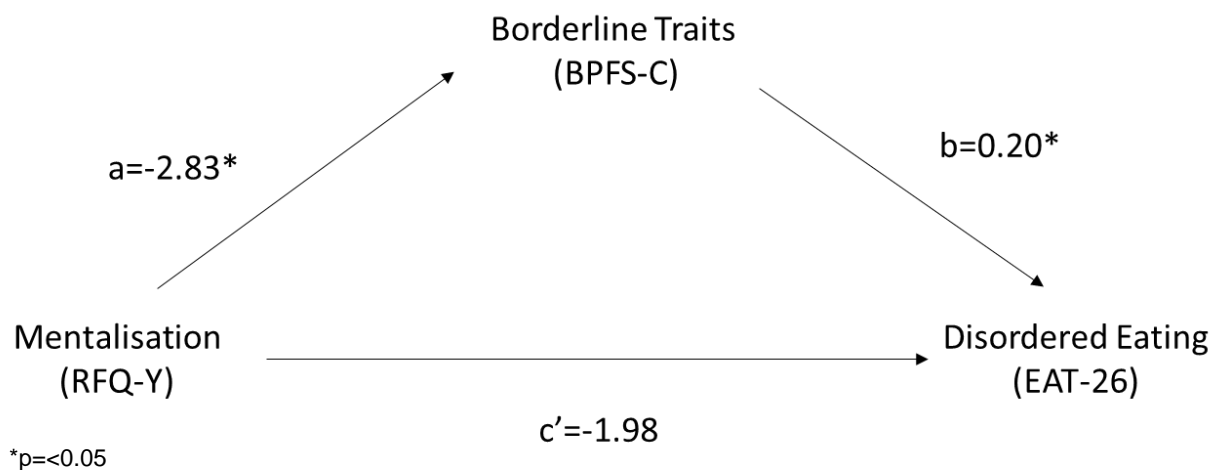
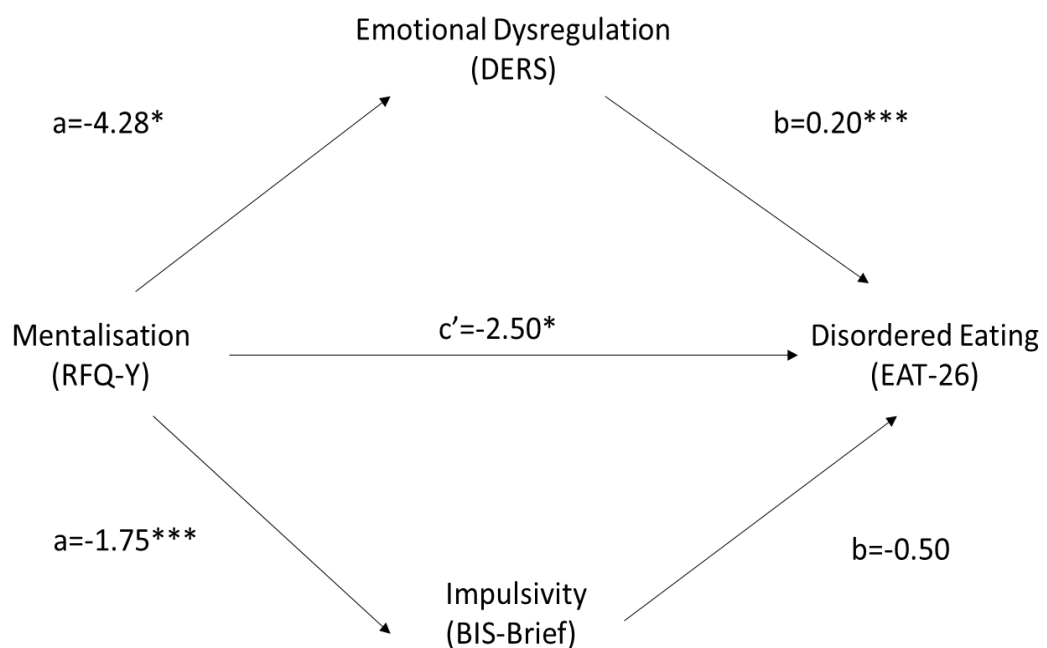


Figure 1. Results of mediation analysis with borderline trait scores entered as the mediator between mentalisation and DE scores.

3.5. Hypothesis 2: Emotion dysregulation and impulsivity, as core borderline features, mediate the relationship between mentalisation and DE.

Borderline trait scores were then removed from the model and both emotion dysregulation and impulsivity were substituted as mediators. When controlling for gender, depression status, alcohol use, drug use and ethnicity, multiple mediation analyses showed that mentalisation exerted a significant effect on DE indirectly through emotion dysregulation, but not through impulsivity (see Figure. 2).



* $p < 0.05$
 ** $p \leq 0.01$
 *** $p < 0.001$

Figure 2. Results of mediation analysis with emotion dysregulation and impulsivity scores entered as the mediator between mentalisation and DE scores.

Emotion Dysregulation:

The *a* path (mentalisation-emotion dysregulation) and *b* path (emotion dysregulation-DE) were both found to be significant ($a = -4.28, p = 0.034$; $b = 0.20, p < 0.001$) and a bias-corrected bootstrap confidence interval for the indirect effect ($ab = -0.85$) did not contain zero ($-2.21 - -0.20$). The direct effect of mentalisation on DE (*c'* path) was found to be significant ($c' = -2.50, p = 0.02$) however,

suggesting that emotion dysregulation only partially mediated the relationship between mentalisation and DE. This model (including predictor and confounding variables) explained 39.6% (unadjusted) of the variance in DE scores.

Impulsivity:

The *a* path (mentalisation-impulsivity) was found to be significant ($a = -1.75$, $p < 0.001$) however the *b* path was not ($b = -0.50$, $p = 0.06$) and a bias-corrected bootstrap confidence interval for the indirect effect ($ab = -0.78$) contained zero (-0.09 - 2.22) suggesting that impulsivity did not indirectly influence the relationship.

3.6 Discussion

The aim of this study was to gain further clarity regarding the relationship between mentalisation, borderline traits and DE in an adolescent sample within the general population. Using Sharp and Fonagy's (2008a) mentalisation-based theoretical model, coupled with theoretical discussions regarding the proposed relationship between ED and PDs (Sansone & Levitt, 2006), a mediation model was constructed to test the hypotheses that a) borderline traits would mediate the relationship between mentalisation and DE in adolescents, and that b) emotion dysregulation and impulsivity, as core borderline features, would also mediate the relationship, thereby further explaining the nature of the relationship between the two constructs.

Results supported the first hypothesis, and partially supported the second, suggesting that it is possible to view DE as a behavioural outcome and, with lower mentalisation abilities as a precursor, higher levels of borderline trait behaviours (including emotion dysregulation) precede and exert some influence over the manifestation or development of DE. Simply put, a young person with reduced ability to mentalise may be more likely to communicate emotional distress physically, in the form of DE, and the likelihood of a young person expressing psychological distress in this way appears to depend on the level of borderline trait features (including emotion dysregulation to a lesser extent) they possess, with higher levels making it more likely. Given that emotion dysregulation only partially mediated the relationship between mentalisation and DE,

whilst borderline trait features were seen to fully mediate this relationship, it seems logical to conclude that additional borderline trait features may be involved.

Impulsivity was not seen to play a mediational role in the translation of mentalisation to DE. Results did show that mentalisation explained a significant proportion of variance in impulsivity scores, demonstrating that those with higher mentalisation abilities exhibited lower levels of trait impulsivity. This however did not translate to impulsivity indirectly influencing DE scores. One reason for this could be the type of DE behaviours displayed by participants in this study. The EAT-26 divides scores into three subscales; dieting, bulimia and food preoccupation, and oral control. A number of questions could apply to both BN and AN behaviours for example, so it was not possible to assess whether bulimic or anorexic symptoms predominated in the sample. Given that impulsivity is more synonymous with BN, and BED, than AN it may be that more AN-type symptoms were reported.

The mediation models in this study were constructed based on the rationale described above. One other study posed a conflicting hypothesis to this study and found that mentalisation partially mediated the relationship between multi-impulsivity and EDs (Perkins, 2008). Whilst Perkins' study focused on multi-impulsivity and ED in an adult population, it raises an important point regarding inferring causality of developmental processes using cross-sectional data (Maxwell & Cole, 2007). Mediation analysis, by its very nature, implies directionality and causality (Hayes, 2013) and both are inferred in this study. Its cross-sectional nature does not provide evidence regarding the emergence of borderline traits, including emotion dysregulation, occurring prior to the emergence of DE behaviour. Future research would benefit from examining this relationship over time, in order to ascertain the direction of effects with more certainty.

When considering the results pertaining to borderline trait features, the findings of this study showed no significant direct relationship between mentalisation and DE. This finding is congruent with a number of studies that have found no direct relationship between mentalisation deficits and EDs in adults (Pedersen et al., 2012; Pedersen, Poulsen & Lunn, 2015), adding weight to the idea there may be an indirect link between the two constructs (Kuipers & Bekker, 2012). There are however a number of studies that have found a direct association (Cate et al., 2013; Gillberg et al.,

2010; Rothschild-Yakar et al., 2010). The difficulty in finding a consensus could be due to a number of factors, including the term itself and how it is measured. Mentalisation is a multi-faceted construct and it could be argued that studies that have used Theory of Mind (ToM) tasks as proxy measures of mentalisation and found deficits in those with EDs (e.g. Gillberg et al., 2010) could be measuring mentalisation in a relatively narrow sense. It has also been posited that ability to mentalise may vary according to emotion arousal level and interpersonal context (Fonagy & Luyten, 2009). This then poses a question regarding whether using both state and trait measures of mentalisation may more accurately reflect an individual's overall capacity to mentalise. More recently measures such as the RFQ-Y (Sharp et al., 2009) have been utilised which, it is argued, capture mentalisation more holistically and so it may be that a more unified approach to measurement may provide further clarity in time.

When considering results here it is important to note that borderline traits, and emotion dysregulation analysed separately, did not explain all the variance accounted for in both mediation analyses conducted and so it cannot be assumed that they are the only constructs involved in the relationship between mentalisation and DE. In addition, whilst core borderline constructs have been analysed separately here, examining individual constructs may be a relatively simplistic way of viewing the relationship. It seems logical to conclude that it is more complex than this and may involve multiple mediating factors that may be inter-related.

3.6.1 Limitations

In addition to the limitations mentioned, the adolescent sample recruited was a convenience sample dictated by school curriculum and consequently the age range was relatively narrow. Therefore, whilst findings here may be applicable to adolescents aged 14-16 years, these results cannot be generalised to the wider adolescent population. Only two core borderline trait components were examined and so future research may benefit from assessing additional borderline trait constructs to provide further transparency regarding the nature of the relationship. In terms of internalising disorders, depression was controlled for but anxiety was not. No externalising disorders, such as Attention-Deficit Hyperactivity Disorder or Conduct Disorder were controlled for. Given that characteristics seen in borderline traits, such as impulsivity and emotion

dysregulation, could also be present in a number of these disorders (Northover, Thapar, Langley & van Goozen, 2015; Winstanley, Eagle & Robins, 2006) future research would benefit from controlling for these.

3.6.2 Implications

This is to the authors' knowledge, the first study to examine the relationship between mentalisation, borderline traits and DE in adolescents and so may be a good starting point, given the results, for future research into this area. Replicating this study with longitudinal data to monitor the stability of this relationship over time would be important given that the translation of borderline trait features in adolescence into BPD in adulthood has been described as "suggestive rather than well-established" (Fonagy & Luyten, 2009; p.1357). Longitudinal data would also offer the opportunity to better understand how these constructs operate in the context of normal adolescent development.

Understanding the link between mentalisation, borderline traits and DE has a number of clinical implications both in terms of symptom identification and treatment. Increased understanding of the link between borderline traits and DE may enhance clinical assessment with each being a potential marker for the other, and indicate that therapies that enhance mentalisation capabilities, such as MBT, may be useful. Fairburn (2005) discusses that, in relation to AN, treatment response seems to be better for adolescents than adults and he attributes this to DE behaviours being less entrenched and therefore more amenable to change. With this in mind results from this study may also add further support to considering earlier intervention, given that borderline trait and DE symptomatology both appear to present at a younger age.

3.6.3 Conclusion

This study highlights the intricate interaction of a number of different, inter-related constructs and one way in which reduced mentalisation ability may lead to a potentially deleterious outcome. The task of future research will be to further understand these processes, how they may change over

the course of childhood development, and what factors may contribute to them remaining part of the adolescent experience versus developing into later psychopathology requiring intervention.

3.6.4 Acknowledgements

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5. Appendices

5.1 Appendix A. European Eating Disorders Review Author Guidelines.



Manuscript Submission

European Eating Disorders Review has now adopted ScholarOne Manuscripts, for online manuscript submission and peer review. The new system brings with it a whole host of benefits including:

- Quick and easy submission
- Administration centralised and reduced
- Significant decrease in peer review times

From now on all submissions to the journal must be submitted online at <http://mc.manuscriptcentral.com/erv>. Full instructions and support are available on the site and a user ID and password can be obtained on the first visit. If you require assistance then click the Get Help Now link which appears at the top right of every ScholarOne Manuscripts page. If you cannot submit online, please contact Maurine Balansag in the Editorial Office (EEDRedoffice@wiley.com).

Illustrations must be submitted in electronic format. Save each figure as a separate file, in **TIFF** or **EPS** format preferably, and include the source file. We favour dedicated illustration packages over tools such as Excel or Powerpoint. Grey shading (tints) are not acceptable. Lettering must be of a reasonable size that would still be clearly legible upon reduction, and consistent within each figure and set of figures. Supply artwork at the intended size for printing. The artwork must be sized to the text width of 7 cm (single column) or 15 cm (double column).

Manuscript style. All submissions, including book reviews, should be double-spaced and clearly legible.

The first page should contain the **title** of the paper, full names of all authors, the address where the work was carried out, and the full postal address including telephone, fax number and email to whom correspondence and proofs should be sent. The name(s) of any **sponsor(s)** of the research contained in the paper, along with **grant number(s)** should also be included.

The second sheet should contain an **abstract** of up to 150 words. An abstract is a concise summary of the whole paper, not just the conclusions, and is understandable without reference to the rest of the paper. It should contain no citation to other published work. Include up to five **keywords** that describe your paper for indexing purposes.

- **Research articles** reporting new research of relevance as set out in the aims and scope should not normally exceed 6000 words with no more than five tables or illustrations. They should conform to the conventional layout: title page, summary, introduction, materials and methods, results, discussion, acknowledgements and references. Each of these elements should start on a new page. Authors may not find it necessary to use all of these subdivisions, and they are listed here only as a guide.
- **Review articles** should offer a synthesis of current knowledge in a field where rapid or significant progress has been made. The text should ideally not exceed 7000 words, 50 references and 5 figures or tables.
- **Brief reports** should concisely present the essential findings of the author's work and be comprised of the following sections: Abstract, Introduction and Aims, Method, Results, Discussion, and References. Tables and/or figures should be kept to a minimum, in number and size, and only deal with key findings. In some cases authors may be asked to prepare a version of the manuscript with extra material to be included in the online version of the review (as supplementary files). Submissions in this category should not normally exceed 2500 words in length.

Brief reports bring with them a whole host of benefits including: quick and easy submission, administration centralised and reduced and significant decrease in peer review times, first publication priority (this type of manuscript will be published in the next available issue of the journal).

- **Case Reports** The journal does not accept case reports for publication. Authors of case reports are encouraged to submit to the Wiley Open Access journal, Clinical Case Reports www.clinicalcasesjournal.com which aims to directly improve health outcomes by identifying and disseminating examples of best clinical practice.

Reference style . The APA system of citing sources indicates the author's last name and the date, in parentheses, within the text of the paper.

A. A typical citation of an entire work consists of the author's name and the year of publication .

Example: Charlotte and Emily Bronte were polar opposites, not only in their personalities but in their sources of inspiration for writing (Taylor, 1990). Use the last name only in both first and subsequent citations, except when there is more than one author with the same last name. In that case, use the last name and the first initial.

B. If the author is named in the text, only the year is cited .

Example: According to Irene Taylor (1990), the personalities of Charlotte. . .

C. If both the name of the author and the date are used in the text, parenthetical reference is not necessary .

Example: In a 1989 article, Gould explains Darwin's most successful. . .

D. Specific citations of pages or chapters follow the year .

Example: Emily Bronte "expressed increasing hostility for the world of human relationships, whether sexual or social" (Taylor, 1988, p. 11).

E. When the reference is to a work by two authors, cite both names each time the reference appears .

Example: Sexual-selection theory often has been used to explore patters of various insect matings (Alcock & Thornhill, 1983) . . . Alcock and Thornhill (1983) also demonstrate. . .

F. When the reference is to a work by three to five authors, cite all the authors the first time the reference appears. In a subsequent reference, use the first author's last name followed by *et al* . (meaning "and others") .

Example: Patterns of byzantine intrigue have long plagued the internal politics of community college administration in Texas (Douglas *et al* ., 1997) When the reference is to a work by six or more authors, use only the first author's name followed by *et al* . in the first and all subsequent references. The only exceptions to this rule are when some confusion might result because of similar names or the same author being cited. In that case, cite enough authors so that the distinction is clear.

G. When the reference is to a work by a corporate author, use the name of the organization as the author .

Example: Retired officers retain access to all of the university's educational and recreational facilities (Columbia University, 1987, p. 54).

H. Personal letters, telephone calls, and other material that cannot be retrieved are not listed in References but are cited in the text .

Example: Jesse Moore (telephone conversation, April 17, 1989) confirmed that the ideas. . .

I. Parenthetical references may mention more than one work, particularly when ideas have been summarized after drawing from several sources. Multiple citations should be arranged as follows .

Examples:

- List two or more works by the same author in order of the date of publication: (Gould, 1987, 1989)

- Differentiate works by the same author and with the same publication date by adding an identifying letter to each date: (Bloom, 1987a, 1987b)
- List works by different authors in alphabetical order by last name, and use semicolons to separate the references: (Gould, 1989; Smith, 1983; Tutwiler, 1989).

All references must be complete and accurate. Where possible the DOI for the reference should be included at the end of the reference. Online citations should include date of access. If necessary, cite unpublished or personal work in the text but do not include it in the reference list. References should be listed in the following style:

Journal Article

Gardikiotis, A., Martin, R., & Hewstone, M. (2004). The representation of majorities and minorities in the British press: A content analytic approach. *European Journal of Social Psychology*, *34*, 637-646. DOI: 10.1002/ejsp.221

Book

Paloutzian, R. F. (1996). *Invitation to the psychology of religion* (2nd ed.). Boston: Allyn and Bacon.

Book with More than One Author

Natarajan, R., & Chaturvedi, R. (1983). *Geology of the Indian Ocean*. Hartford, CT: University of Hartford Press.

Hesen, J., Carpenter, K., Moriber, H., & Milsop, A. (1983). *Computers in the business world*. Hartford, CT: Capital Press. and so on.

The abbreviation *et al.* is not used in the reference list, regardless of the number of authors, although it can be used in the text citation of material with three to five authors (after the initial citation, when all are listed) and in all parenthetical citations of material with six or more authors.

Web Document on University Program or Department Web Site

Degelman, D., & Harris, M. L. (2000). *APA style essentials*. Retrieved May 18, 2000, from Vanguard University, Department of Psychology Website: http://www.vanguard.edu/faculty/ddegelman/index.cfm?doc_id=796

Stand-alone Web Document (no date)

Nielsen, M. E. (n.d.). *Notable people in psychology of religion*. Retrieved August 3, 2001, from <http://www.psywww.com/psyrelig/psyrelpr.htm>

Journal Article from Database

Hien, D., & Honeyman, T. (2000). A closer look at the drug abuse-maternal aggression link. *Journal of Interpersonal Violence*, *15*, 503-522. Retrieved May 20, 2000, from ProQuest database.

Abstract from Secondary Database

Garrity, K., & Degelman, D. (1990). Effect of server introduction on restaurant tipping. *Journal of Applied Social Psychology*, *20*, 168-172. Abstract retrieved July 23, 2001, from PsycINFO database.

Article or Chapter in an Edited Book

Shea, J. D. (1992). Religion and sexual adjustment. In J. F. Schumaker (Ed.), *Religion and mental health* (pp. 70-84). New York: Oxford University Press.

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5.2 Appendix B. Rationale for Inclusion/Exclusion of Terminology relating to Mentalisation

Term	Included /Excluded	Rationale
Affect Consciousness	Excluded	Focus is on affective (emotional) states only rather than cognitive and affective.
Alexithymia	Excluded	Focus on “self” rather than “self” and “other”.
Emotional Intelligence	Included	Although focus is on emotions (affect), there is a cognitive element to the construct intimating cognitive processes at work.
Empathy	Excluded	Commonly used in relation to “other” rather than “self” and “other”.
Metacognition	Excluded	A number of ways of defining construct. Mentalisation could be one metacognitive function. In ED research, focus appears to be on cognitions e.g. thoughts about self.
Mindfulness	Excluded	Focuses on conscious processes and is applicable to both physical and mental states.
Mindreading	Excluded	Focus on “other” rather than “self” and “other”
Perspective-taking	Excluded	Too narrow. Perspective-taking could one aspect of mentalising.
Psychological-mindedness	Excluded	Focus on “self” rather than “self” and “other”.
Reflective Functioning	Included	The term refers to the operationalisation of the underlying mental capacities used to mentalise.
Social Cognition, Social perception, Socio-cognitive abilities	Excluded	Terms are too broad; mentalisation could be one such process involved in social cognition/perception, socio-cognitive abilities.
Theory of Mind	Included	Considerable overlap with mentalisation. Mentalisation may underlie capability to develop ToM.

5.3 Appendix C. Quality Criteria Matrix

	Well covered (WC)	Adequately Addressed (AA)	Poorly Addressed (PA)	Not Addressed/ Reported (NA/NR)
Criterion				
1) Clear Research Question and Rationale	Shows clear rationale for the research question being posed based on empirical evidence.	Shows rationale for the research question being posed based on empirical evidence but is less clear.	Shows some rationale but is not clear or is based on little empirical evidence.	No rationale reported.
2) Aims and hypothesis/ hypotheses clearly stated.	Clear statement(s) providing reviewer with clear understanding of aims and hypothesis	Statement providing reviewer with some understanding of aims and hypothesis.	Statement providing reviewer with limited understanding of aims and hypothesis.	No hypothesis/ hypotheses reported.
3) Power calculation used initially to instruct sample size needed and power is achieved.	Power calculation reported and power achieved.	Power calculation reported but study slightly under-powered in terms of sample size.	Power calculation reported but study drastically under-powered in terms of sample size.	No mention of power calculation
4) Inclusion/ exclusion criteria for study participants are clearly stated and identical for experimental and control condition (with the exception of ED for experimental condition and non-ED for controls).	Inclusion/ exclusion criteria for study participants are clearly stated and are identical for experimental and control condition with the exception of ED for experimental condition and non-ED for controls.	Inclusion/ exclusion criteria for study participants are clearly stated and are mostly the same for experimental and control condition with the exception of ED for experimental condition and non-ED for controls.	Inclusion/exclusion criteria for study participants are discussed but not clearly stated and/or are not the same for experimental and control condition.	Inclusion/ exclusion criteria are not discussed.
5) Clear information given on recruitment strategy, number of participants approached,	Clear information given on recruitment strategy, number of participants approached, attrition rates, and potential	Some information given on recruitment strategy, number of participants approached, attrition rates, and potential bias due	Limited information given on recruitment strategy, number of participants approached, attrition rates, and potential bias due	No information given on recruitment strategy, number of participants approached,

	Well covered (WC)	Adequately Addressed (AA)	Poorly Addressed (PA)	Not Addressed/ Reported (NA/NR)
attrition rates, and potential bias due to drop-out reported.	bias due to drop-out reported.	to drop-out reported.	to drop-out reported.	attrition rates, and potential bias due to drop-out reported.
6) Researcher bias is controlled for by blinding to condition group being assessed.	Researcher bias is controlled for by blinding researcher to all condition groups being assessed.	Researcher bias has been partially controlled for (e.g. blinding to one condition group only).	Some acknowledgement has been given to researcher bias although this has not been controlled for.	No mention of researcher bias.
7) Validated and reliable measures of mentalisation/ related construct used.	Measure(s) used has/have robust reliability and validity.	Measure(s) used has/have reasonable reliability or validity.	Measure(s) used has/have questionable reliability and validity.	No valid or reliable measure(s) used.
8) Homogeneous AN experimental group recruited diagnosed using DSM-III/IV/5, ICD-10/11 criteria or clinical diagnosis given by suitably qualified clinician	Strict diagnostic criteria adhered to using DSM-III/IV/5, ICD-10/11 criteria for AN group. No other groups (e.g. EDNOS-AN) considered.	Clinical diagnosis of AN made by a suitably qualified clinician. No other groups (e.g. EDNOS-AN) considered.	Diagnostic criteria adhered to using DSM-III/IV/5, ICD-10/11 criteria for AN group, however, other groups (e.g. EDNOS-AN) considered.	
9) Control group recruited from a comparable population.	Control group is clearly described and taken from a comparable population (both age and gender-matched) to that of the experimental group.	Control group is clearly defined and group is age or gender-matched that of the experimental group.	Control group is defined but there is little evidence of age/gender-matching to that of the experimental group.	Comparison group used but no age/gender matching or no details reported.
10) ED pathology is screened for in control group and those meeting criteria are excluded from	Eating disorder and disordered eating pathology screened for in the control group with those meeting pre-determined	Eating disorder or disordered eating pathology screened for in the control group with those meeting pre-determined criteria being excluded	One eating disorder only (e.g. anorexia) being screened for in the control group with those meeting pre-determined criteria being excluded	

	Well covered (WC)	Adequately Addressed (AA)	Poorly Addressed (PA)	Not Addressed/ Reported (NA/NR)
control group condition.	criteria being excluded from control-group condition.	from control-group condition.	from control-group condition.	
11) Confounding variables are stated and controlled for during analyses.	Confounding variables (e.g. gender, other mental health problems) have been identified in the study design and all of which are controlled for during analyses.	There is evidence of consideration of confounding variables, the majority of which have been controlled for in all analyses.	There is evidence of consideration of confounding variables but few of those discussed have been controlled for in all analyses.	No confounding variables were discussed and/or controlled for.
12) Effect sizes are reported for main study variables.	Effect sizes reported for main study variables.	Effect sizes partially reported.	Effect sizes discussed but not calculated.	Effect sizes not reported.
13) Generalisability of study results discussed.	Generalisability of study results discussed; focussing on AN, mentalisation and implications of findings in the wider context e.g. clinical care.	Generalisability of study results partially discussed.	Generalisability of results eluded to but not discussed in-depth.	No discussion regarding generalisability of results.
14) Limitations of study reported and suggestions for improvement discussed.	A number of limitations of study design reported and possible improvements detailed.	One/two limitations discussed and possible improvements detailed.	Limitations superficially discussed and little evidence of possible improvements.	No limitations or possible improvements discussed.

5.4 Appendix D. Journal of Adolescence Author Guidelines



JOURNAL OF ADOLESCENCE

GUIDE FOR AUTHORS

Introduction

The Journal is an international, broadly based, cross-disciplinary, peer-reviewed journal addressing issues of professional and academic importance to people interested in adolescent development. The Journal aims to enhance theory, research and clinical practice in adolescence through the publication of papers concerned with the nature of adolescence, interventions to promote successful functioning during adolescence, and the management and treatment of disorders occurring during adolescence. We welcome relevant contributions from all disciplinary areas.

For the purpose of the Journal, adolescence is considered to be the developmental period between childhood and the attainment of adult status within a person's community and culture. As a practical matter, published articles typically focus on youth between the ages of 10 and 25. However, it is important to note that JoA focuses on adolescence as a *developmental period*, and this criterion is more important than age per se in determining whether the subject population or article is appropriate for publication.

The Journal publishes both qualitative and quantitative research. While the majority of the articles published in the Journal are reports of empirical research studies, the Journal also publishes reviews of the literature, when such reviews are strongly empirically based and provide the basis for extending knowledge in the field. Authors are encouraged to read recent issues of the Journal to get a clear understanding of style and topic range.

Types of contributions

Specific instructions for different manuscript types

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Brief reports: The Editors will consider Brief Reports of between 1000 and 1500 words (three to five typewritten pages). This format should be used for reports of findings from the early stages of a program of research, replications (and failures to replicate) previously reported findings, results of studies with sampling or methodological problems that have yielded findings of sufficient interest to warrant publication, results of well designed studies in which important theoretical propositions have not been confirmed, and creative theoretical contributions that have yet to be studied empirically. The title of the Brief Report should start with the words: "Brief Report:" A footnote should be included if a full-length report is available upon request from the author (s).

International notes: The Journal is interested in developing a new format for the very brief reporting of research replications from developing countries and places with a less well supported adolescence research field, where it may be difficult to find international publication outlets and bring the work to the attention of a wider audience. International Briefs would be published as a very brief summary in the Journal (up to 1000 words in length), with a fuller version available as on-line supplementary material (see above). They are likely to focus on local replications of well-known phenomena or findings.

BEFORE YOU BEGIN

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Acknowledgements

Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

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- Keywords
- All figure captions
- All tables (including title, description, footnotes)

Further considerations

- Manuscript has been 'spell-checked' and 'grammar-checked'
- References are in the correct format for this journal
- All references mentioned in the Reference list are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the Internet)

Printed version of figures (if applicable) in color or black-and-white

- Indicate clearly whether or not color or black-and-white in print is required.

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5.5 Appendix E. Ethical Approval from The School of Health in Social Science



SCHOOL of HEALTH IN SOCIAL SCIENCE
CLINICAL PSYCHOLOGY

The University of Edinburgh
Medical School
Doorway 6, Teviot Place
Edinburgh EH8 9AG

Telephone 0131 651 3969
Fax 0131 650 3891
Email submitting.ethics@ed.ac.uk

Hannah Watkins
Trainee Clinical Psychologist

03 October 2014

Dear Hannah,

Application for Level 2/3 Approval

Re: Mentalisation and disordered eating in a non-clinical adolescent sample: the mediating role of borderline features?

Thank you for submitting the above research project for review by the Section of Clinical Psychology Ethics Research Panel. I can confirm that the submission has been independently reviewed and was approved on the 3rd October 2014.

Should there be any change to the research protocol it is important that you alert us to this as this may necessitate further review.

Yours sincerely,

Kirsty Gardner
Secretary
Clinical Psychology

5.6 Appendix F. Local Authority Approval

From: Pat McLennan [Pat.McLennan@moray.gcsx.gov.uk]
Sent: 15 September 2014 16:32
To: Watkins Hannah (NHS GRAMPIAN)
Subject: RE: Research Project - Schools in Morayshire (Clinical Psychology)

Hello, Hannah.

Provided all of the ethical approval steps have been taken then I am quite happy for this project to go ahead. I did discuss it with Chris and gave him my agreement at the time.

I hope that you can get what you want from the project and I am delighted that a couple of schools are willing to work with you.

Good luck!

Pat

Pat McLennan
Inclusion Manager
Education and Social Care
The Moray Council
Tel: 01343 563332
Fax: 01343 563990
email: pat.mclennan@moray.gov.uk
Website: www.moray.gov.uk

5.7 Appendix G. Approval for Ethics Amendment from The School of Health in Social Science

University of Edinburgh, School of Health in Social Science



RESEARCH ETHICS APPLICATION (REA)

The forms required when seeking ethical approval in the School of Health and Social Sciences have now been merged into this single electronic document. The sections you are required to complete will depend on the nature of your application. Please start to complete the form from the beginning and proceed as guided. On completion the entire document should be submitted electronically to your section's ethics tutor using the email addresses detailed on the final page.

ER38 AMENDMENT/S: REQUEST FOR APPROVAL

Subsequent to receipt of ethical approval, I the applicant, would like to request the following amendment to my original proposal.

I have proposed a bias-corrected bootstrapping method for my mediation analysis. With a medium effect sizes for X (mentalisation) -M (borderline traits) and M (borderline traits) -Y (disordered eating), it is advised that a minimum sample size of 71 is required to achieve power of 0.8 (Fritz and Mackinnon, 2007). A number of studies assessing the X-M relationship were found but it was much more difficult when assessing the M-Y relationship given that prevalence rates were most commonly reported. Given that the effect sizes reported for M-Y were from one adult in-patient/outpatient study, as opposed to a non-clinical adolescent sample, I proposed a half-way-to-medium effect size as I thought this would be a conservative estimate (N=116). During supervision we have discussed the fact that this is an under-researched area and so my half-way-to-medium effect size estimate may not be conservative enough. Because of this I would like to change my ethics so that it states a minimum sample size of 116 should be obtained with the view to hopefully recruiting more participants than this, rather than it being the maximum number I can recruit.

Signature: *Naamah Watkins*

Date: 19/01/15

ER39 CONCLUSION TO ETHICAL REVIEW OF AMENDMENT

I can confirm that the above amendment has been reviewed by the Ethics Tutor. It is their opinion that: Ethical issues have been satisfactorily addressed and no further response from the applicant is necessary,

Signature: *Ang. MacB*

Position: Lecturer in Clinical Psychology, Ethics Tutor

Date: 20/01/15