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Master Thesis

The Interacting Role of Emotion Regulation and Trait Anger on Eating Pathology

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Abstract

People with eating disorders (ED) have difficulty managing their anger levels and regulating their emotions. One hundred and seven University students were divided in displaying general eating pathology (20) and healthy controls (87) based on the Eating Disorder Examination Questionnaire (EDE-Q). The subjects were assessed with the State Trait Anger Inventory II (STAXI-II) and the Difficulties in Emotion Regulation Scale (DERS). The subjects in the eating pathology group displayed significantly higher levels of trait anger and anger suppression than the control group. They also scored significantly higher on lack of emotional regulation and lack of emotional clarity and non-significantly higher on lack of emotional awareness. Analysing the moderating effect of trait anger on the relation between emotional regulation and eating pathology showed no significance. Results are consistent with previous research and illustrate the implications of anger and deficits in emotional processing in individuals with disordered eating. These findings underscore the importance of highlighting anger and emotional processing strategies in therapeutic and preventative interventions.

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Introduction

The literature on eating disorders emphasises the relationship between emotional dysregulation, impulse control and bulimia on the one hand and between anger suppression, lack of emotional awareness and anorexia on the other. At second glance however, the relationship between anger, emotional regulation and eating disorders is more complex and interconnected. Establishing what role these personality, emotional and behavioural factors play in different eating disorders is important, as it might be addressed in treatment specifically and might have an effect on treatment efficiency, drop-out and relapse prevention.

Anger and eating disorders

Individuals with eating disorders frequently exhibit pervasive manifestations of anger, which tremendously influence their prognosis of recovery (Truglia et al., 2006). Anger and impulsivity have been previously hypothesised to be personality traits that predate the onset of eating disorders (Wonderlich et al., 2004). Anger can be conceptualized as a multifaceted construct, which is comprised of anger states (instances of subjective feelings of tension, annoyance, irritation, fury or rage that can be accompanied by hyperactivity of the autonomic nervous system) and anger traits (an enduring personality feature, determining how often and subjectively intense state anger is experienced by the individual) (Spielberger, 1999). Trait anger therefore reflects individuals' predisposition towards anger in general. There are also individual differences in the way individuals express or suppress their anger (Spielberger, 1999).

In the case of patients with eating disorders, research has found that anger is associated with different eating disorder subtypes, comorbidity as well as altered biochemical functioning (Krug et al., 2008). Inwards-directed anger can manifest as self-injurious behaviour and can be used as a mean for self-punishment (Favaro & Santonastaso, 2002). Not allowing oneself to eat can in this case also become a punishment that the individual uses as a coping mechanism for underlying emotional and psychological issues (Wagener & Much, 2010). The differences in anger expressions among AN and BN are further outlined.

Although anorexic subjects feel like they are in control of their eating, many are simultaneously aware that their eating disorder is controlling them (Reid et al., 2008).

Patients with AN have significantly higher levels of internalized anger and poorer self-assertiveness than those with BN (Fassino et al., 2001). Their internalised anger was found to be correlated to low levels of (*objective*) self-control and mastery, which is the *subjective* belief that one is capable of being in control of what is happening around them (Horesh et al., 2000). They do not just internalise, but also suppress anger and other negative emotion, which has been found to be related to silencing of negative affect (Geller et al., 2000). It is believed that AN patients' higher tolerance to frustration and lower outwards-directed anger come at the price of their emotional shifting to internalised anger and tendency to conflict avoidance (Cassin & Von Ranson, 2005).

Bulimia nervosa (BN) on the other hand was found to be significantly related to elevated state anger and anger suppression (Waller et al., 2003). Anger suppression refers to the amount of angry feelings that are present in an individual, but are not expressed and instead internalized (Spielberger, 1999). It has been associated with conflict avoidance, guilt and depressive symptomology (Martin & Dahlen, 2007). But even if anger is not internalized, it becomes a major risk factor for physical and psychological health problems and negatively impacts social and occupational functioning (Thomas, 2007). Bulimic behaviours might serve different functions. Waller and colleagues (2000) found that binge eating was associated with anger suppression thereby helping bulimic individuals to temporarily distract them from their anger. Vomiting on the other hand was related to high levels of state anger, which might serve the purpose to facilitate the reduction of immediate anger states and may block awareness of a negative emotional state. In general, bulimic individuals display low impulse control and low tolerance to frustration which generates anger (Truglia et al., 2006). Negative affective states can act as antecedents of bulimic behaviours including emotional eating, vomiting and binging (Miotto et al., 2008).

The role of trait anger in eating disorders is disputed and one study did not find a link between the two (Davis & Fischer, 2013). Another study found a relation between core beliefs, which are conceptualised as negative schemas about oneself and the world, and trait anger in both AN and BN (Waller et al., 2003). This absence of findings of higher trait anger in ED patients is somewhat surprising given that the frequency of binging behaviour was related to state anger, which in turn would only occur at such a high frequency if it was underlined by elevated trait anger. This why it was specifically investigated if trait anger is indeed elevated in disordered eating subjects in this study.

The differences that stood out were that internalised anger and anger suppression are the most relevant anger-related factors in AN while as state anger and anger suppression were dominant in BN. What the two disorders have in common is that they both show difficulty in regulating their anger and suppress it in the context of negative affect to a greater extent than healthy controls. They differ in that externally directed anger and state anger appear to be more prevalent in BN.

Emotional difficulties in eating disorders

How people express and regulate their emotions is largely determined by personality and psychopathology. Individuals with eating disorders do not just have an abnormal relation to food and display pathological eating, but they also experience difficulties in emotional awareness and regulation after controlling for comorbidity with depression and anxiety disorders (Racine & Wildes, 2013). Emotional awareness is defined as the ability to recognise and make sense of oneself and others' emotions (Lawson et al., 2008). Emotional regulation on the other hand is a broad concept that has been defined as "the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions to accomplish one's goals" (Thompson, 1994, pp. 27–28). Emotional clarity can be distinguished from emotional awareness in that emotional clarity reflects purely the cognitive ability to recognise and distinguish between specific emotions while as emotional awareness includes how one feels about their emotions and themselves for having specific emotions. Preliminary literature has also suggested that individuals with eating disorders might use their eating disorder symptoms to avoid or cope with their feelings, just as they might with their anger (Brockmeyer et al., 2014). In other words, emotional regulation difficulties are suggested to be maintenance factors of disordered eating (Svaldi et al., 2012). Conflict or ambivalence over expressing emotion resulting from underlying goal conflict have been suggested to be the mechanisms underlying emotion regulation difficulties in disordered eating (Quinton & Wagner, 2005). This goal conflict could for instance be the desire to be thin and therefore restrict eating, but also to be mentally healthy and free of eating pathology.

Particularly patients with AN show difficulty labelling emotional states and labelling basic emotion in the absence of verbal cues (Zonnevylle-Bender et al., 2004). The correlation between AN and alexithymia indicates that next to limited emotional recognition in the self and others they also display poor emotional regulation strategies (Harrison et al., 2010). This suggest a cognitive-affective disturbance in emotion recognition.

Individuals with BN also experience lower levels of impulse control and emotional regulation problems compared to healthy controls (Lavender et al., 2014). They do not struggle as much with emotional awareness compared to those with AN (Lavender et al., 2015). The finding that emotional regulation difficulties are persistent in both AN and BN is in line with the view that emotional difficulties are a trans-diagnostic feature across the spectrum of eating disorders (Brockmeyer et al., 2014).

Given that emotion recognition, regulation and awareness are interconnected, it is not surprising that individuals with eating disorders struggle in each of them (Ochsner, 2008). It has to be considered though that emotional dysregulation might not relate to eating disorders as such, but to certain characteristics associated with eating disorders or even frequent comorbidities such as anxiety and depression (Eizaguirre et al., 2004).

Both emotional dysregulation and anger are thought to play key roles in the maintenance and unsuccessful treatment of eating disorders. What their specific relationship is and whether there might be a moderating effect of anger in emotional dysregulation and eating pathology has so far not been investigated. It is detrimental to explore the interplay of emotional dysregulation and anger in eating disorders since addressing them collectively might be beneficial in treatment. The focus of this treatment should be helping patients replace maladaptive emotion-focused coping strategies with a more adaptive solution-focused approach and developing anger management strategies. This study aims to assess what the relationship is between anger and emotional regulation in individuals with disordered eating.

Rationale

1. It is hypothesised that trait anger and anger suppression will be higher in people with overall eating pathology compared to healthy controls.
2. The second hypothesis states that emotional regulation, emotional awareness and emotional clarity will be higher in controls than individuals that display eating pathology.
3. The third hypothesis predicts that trait anger positively moderates the relation between emotional regulation and eating pathology.

Methods

Design

The study builds on an online questionnaire including the Eating Disorder Examination Questionnaire (EDE-Q), the State Trait Anger Inventory II (STAXI-II) and the Difficulties in Emotion Regulation Scale (DERS). To test hypotheses, a t-test was carried out for each subscale of anger for the first hypothesis. An ANCOVA was conducted for each subscale of emotional regulation while controlling for gender and BMI to test the second hypothesis. Gender was included as for women, increased emotion dysregulation and adaptive coping strategies combined predicted psychopathology, while it was not a predictor for psychopathology in men (Nolen-Hoeksema, 2012). BMI was hypothesised to influence emotion regulation given the frequent occurrence of emotional eating and underweight on emotional processing. A moderated linear regression was carried out for hypothesis 3 to assess the moderating effect of trait anger on the relation between emotional regulation and eating pathology.

Participants

Out of the 107 participants, the sample consisted of 22 males (20.5%) and 85 females (79.5%), aged between 17 and 30 years with a mean age of 22.5. The mean BMI of the sample was 22.2, which falls in the normal healthy range and did not significantly differ between genders (22 in females vs. 23.1 in males).

20 (18.7% of overall sample, 19 of which were female) were classified as having overall eating pathology and the other 87 (81.3%) were classed as healthy controls. Whereas those with eating pathology group showed current symptoms of eating disorders and controls did not, neither of them had received an ED diagnosis in the past.

Self-selected sampling was chosen as the sampling method so that those participants that had relevant experiences with disordered eating could decide to take part. A volunteer sample also had the advantage that nobody was chosen that might have felt pressurized to take part but instead only those that chose themselves to sign up got to be part of the study. Online questionnaires are useful in that they are economical, brief, easy to administer and objectively scored. They also avoid bias caused by the interviewer-subject interaction and can be done anonymously.

No incentives were given for participation besides SONA credits.

Measures and Procedure

Participants were recruited online through voluntary sampling mainly from the Netherlands, the UK and Germany. Social networking sites like 'Survey Circle' and 'Facebook' were used next to the University's 'Sona Systems Research Management System' to advertise the questionnaire to potential participants that met the requirements of the study.

Before being given the questionnaires, participants were briefed about the study and then given the consent form to fill out. After consenting, they proceeded to fill out a sheet on demographic information, where they had to provide information about their age, gender, weight, height, level of study and their home country. Afterwards the survey continued with the questionnaires. Weight and height were asked for in order to calculate body mass index. Each patient completed a set of standardized self-report measures of trait anger, anger suppression, emotional processing and eating pathology. The questionnaires were given in the order below.

The State Trait Anger Inventory II (STAXI II; Spielberger, 1999) is a 44-item self-report questionnaire consisting of seven subscales. These aim to measure seven distinct facets of anger: State Anger, Trait Anger, Anger Expression In, Anger Expression Out, Anger Control In (Suppression), Anger Control Out and Anger Expression Index. Higher scores indicate higher levels of anger. The STAXI II has been found to be of very good reliability and validity among both clinical and nonclinical groups (Spielberger, 1999).

The Eating Disorder Examination Questionnaire (EDE-Q) is a widely used measure of eating-disordered behaviour which is the revised self-report version of the Eating Disorder Examination interview (EDE; Fairburn & Cooper, 1993). It is usually used for the assessment and diagnosis of eating disorders and provides a measure of the range and severity of eating disorder features. It is comprised of 28 items measured on a 7-point scale. The four subscales include dietary restraint, eating concerns, weight concerns and shape concerns, which can be summarized into a global score. Frequencies and types of eating behaviours displayed in the past 28 days are assessed to draw a conclusion on a possible eating pathology. Prior studies found that it was high in terms of internal consistency and test-retest reliability (Luce & Crowther, 1999). The global scale was used as a measure of general eating pathology. According to (Rø, Ø. & Reas, 2015), the cut-off of 2.5 was chosen to determine eating

pathology, with individuals scoring lower were considered controls and those above the cut-off score displayed eating pathology.

The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a 36-item multidimensional self-report measure of emotion regulation, which yields scores on six different scales and a total score. These subscales are Non-acceptance of emotional responses, Difficulties engaging in goal directed behaviour, Impulse control difficulties, Lack of emotional awareness, Limited access to emotion regulation strategies and Lack of emotional clarity. The DERS has shown to be high in predictive validity, construct validity, test-retest reliability and internal consistency (Gratz & Roemer, 2004).

After finishing the questionnaires, participants were debriefed and were provided with contact details of the researcher and local counselling services in case of questions or distress. The average completion time was 25 minutes. After the data collection was complete, the survey was closed for participants, data was typed into SPSS 23 and was analysed with the appropriate tests. Dummies were created to divide participants into the eating pathology and control group. Normality and other assumptions were checked and finally the results were written up.

Results

In Table 1, an overview of the dataset is given.

Table 1

Descriptive Statistics

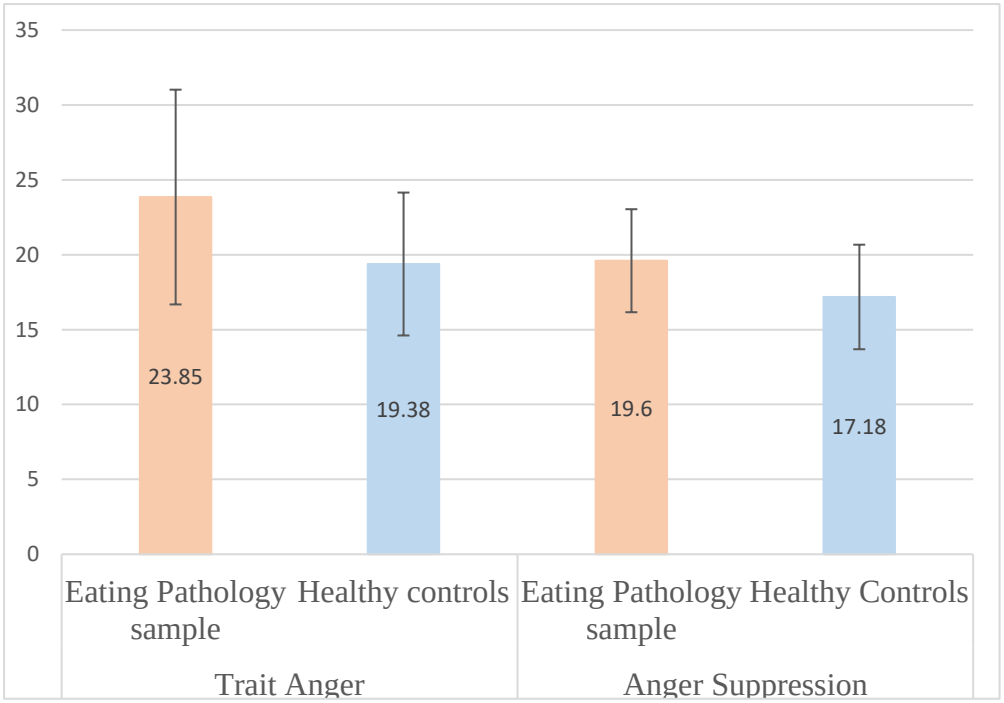
	N	Minimum	Maximum	Mean	SD
Emotional Regulation	107	11	32	18,46	4,95
Emotional Clarity	107	5	24	12,46	4,7
Emotional Awareness	107	5	21	13,18	3,09
Trait anger	107	12	37	20,21	5,54
Anger Suppression	107	10	27	17,64	3,59
Age	107	14	43	22,59	3,8
BMI	103	16,9	31,9	22,29	3,01
Gender (1=Male)	107	0	1	0,21	0,41
Eating pathology mean	107	1,00	4,61	1,96	0,84

Table 2

t-test results for Hypothesis 1

		N	Mean	SD	t	df	p	Mean Diff.	Std. Error Diff.
Trait anger	Healthy controls	87	19.38	4.77	-3,41	105	0,001	-4,47	1,31
	Eating Pathology sample	20	23.85	7.17	-2,65	23.01	0,014	-4,47	1,68
Anger Suppression	Healthy controls	87	17.18	3.49	-2,79	105	0,006	-2,42	0,86
	Eating Pathology sample	20	19.60	3.44	-2,28	28.72	0,009	-2,42	0,85

In table 2, the t-tests for hypothesis 1 are presented. The eating pathology group (M = 23.85, SD = 7.17) scores significantly higher on trait anger than the control group (M = 19.38, SD = 4.77); t(23.01) = -2.65, p = 0.014. Anger suppression is also significantly higher in the eating pathology group (M = 19.6, SD = 3.44) compared to the control group (M = 17.18, SD = 3.49); t(28.72) = 2.82, p = 0.009.



In table 3, 4 and 5, the ANCOVA results for Hypothesis 2 are presented.

Table 3

IV: Lack of Emotional Regulation

DV: Eating Pathology (Adjusted R Squared = 0,358)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	0,13	1	0,13	1,35	0,248
Gender (Male = 1)	0,33	1	0,33	3,44	0,067
BMI	0,66	1	0,66	6,84	0,011
Lack of Emotional Regulation	7,09	1	0.35	3,63	0,00

There is a significant effect of eating pathology on emotion regulation (F 106, 1) = 3,63, p < 0.001. Both gender (p = 0.067) and BMI (p = 0.011) have a significant effect on emotion regulation.

Table 3

IV: Lack of Emotional Clarity

DV: Eating Pathology (Adjusted R Squared = 0,273)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	0,06	1	0,06	0,58	0,44
Gender (Male = 1)	0,48	1	0,48	4,36	0,04
BMI	0,28	1	0,28	2,62	0,11
Lack of Emotional Clarity	5,83	1	0,32	2,93	0,00

There is a significant effect of eating pathology on emotional clarity (F 106, 1) = 2,93, p < 0.001. BMI and gender both significantly explain some of the variance on emotional clarity.

Table 4

IV: Lack of Emotional Awareness

DV: Eating Pathology (Adjusted R Squared = 0,097)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	0,14	1	0,14	1,02	0,316
Gender (Male = 1)	0,56	1	0,56	4,07	0,047
BMI	0,42	1	0,42	3,1	0,082
Lack of Emotional Awareness	3,09	14	0,22	1,61	0.092

On a 5% significance level, the effect of eating pathology on emotional awareness is found to be significant (F 106, 1) = 1,61, p = 0.092. Again, both gender and BMI have an effect on eating pathology.

In table 6, the moderated linear regression results for Hypothesis 3 are presented.

Table 6

DV = Eating Pathology (Adjusted R Square = 0.314)

	Stand. Beta	t	p
(Constant)		-0,86	0,393
Trait anger	-0,43	-1,22	0,226
BMI	0,17	2,05	0,043
Gender (Male = 1)	-0,12	-1,7	0,092
Lack of Emotional Regulation	0,09	0,31	0,761
Moderator	0,8	1,51	0,133

The moderator (Lack of Emotional Regulation * Trait Anger) has no significant effect on eating pathology (p = 0.133). Main effects of trait anger and emotion regulation are also not significant. Checks for multicollinearity and heteroskedasticity were normal. The adjusted R Square of 0.314 means that the model explains a significant variance of 31.4%.

Discussion

The current study aimed to assess the role of different facets of anger and emotion regulation in individuals who display eating pathology, but do not hold a clinical diagnosis. It not only explored the relationship between different behavioural characteristics and eating pathology, but also the role that anger specifically plays in emotion regulation to find out, if it is the driving force in emotion dysregulation in eating disorders.

Anger and Eating Pathology

The first hypothesis stated that trait anger and anger suppression would be higher in individuals who display eating pathology than those who do not. Correspondingly, the present results revealed that the eating pathology group did indeed score significantly higher on both types of anger. This finding is in line with other studies that have found elevated scores of anger suppression in individuals with EDs (Krug et al., 2008; Fassino et al., 2008; Miotto et al, 2008). This suggests that abnormalities related to experiences of anger as well as frequency and management are already prevalent in sub-clinical groups that display eating disordered behaviour but are not (yet) in the clinical range.

Some studies could not find a link between trait anger and eating disorders (Davis & Fischer, 2013), which is not in accordance with this study's results. Instead, David & Fischer (2013) did find that instead negative urgency, which is the tendency to act impulsively while distressed and trait anxiety predicted disordered eating. This points towards the fact that anxiety might be more implicated in eating disorders than anger. Another study found a relation between trait anger and unhealthy core beliefs, bingeing and vomiting behaviour respectively in both clinical and non-clinical samples of women with disordered eating (Waller et al., 2003). These unhealthy core beliefs and coping behaviours can reflect difficulties in emotion regulation but also other emotions such as previously mentioned anxiety and possibly maladaptive coping, however the exact relation between the two has to be further investigated.

Anger suppression was the less controversial variable, where research has consistently linked it back to female high school adolescents with ED symptoms (Zaitsoff et al., 2002), AN patients (Geller et al., 2000) and BN patients (Waller et al., 2002). In one of those studies anger suppression was related to general inhibition of negative feelings, presenting an outer compliant self and judging the self by external standards (Zaitsoff et al., 2002). This again

points to a general emotional imbalance but also the ability to largely hide those negative internal states from others being implicated in feelings of anger. This provides evidence for why individuals who greatly suffer mentally as well as specifically from their disordered eating often manage to keep up their daily functioning and educational achievements (Sundquist et al., 2016) in the first few months of their eating disorder.
Overall, this suggests that the link between anger and negative emotions in eating disorders is both supported by the findings of this study as well as the literature.

Emotional Functioning and Eating Pathology

The second hypothesis stated that emotional regulation, emotional awareness and emotional clarity would be higher in the healthy controls than the eating pathology group. This hypothesis was supported by the results, which found that there was a significant relation between all emotional functioning facets and eating pathology, especially lack of emotional regulation and lack of emotional clarity.

Overall, there was evidence that individuals with AN, BN and BED all dispose worse emotion regulation strategies than healthy controls, this included strongly agreeing to statements such as “When I’m upset, I believe that there is nothing I can do to make myself feel better.” and “When I’m upset, I believe that I’ll end up feeling very depressed.” (Lavender et al., 2015). Given the overall prevalence of emotional regulation difficulties in all eating disorders, ED behaviours, such as bingeing and purging in BN and restricting in AN can be interpreted as maladaptive coping mechanisms to compensate for impairments in emotion regulation (Brown et al., 2018). One study that investigated the effects of restoration of a healthy body weight in AN patients found that those who gained weight actually had higher emotional dysregulation compared to those without weight restoration, which is likely to be due to the distress and discomfort about gaining weight as such (Brockmeyer et al., 2012). This is particularly striking when comparing it to other clinical symptoms. Weight restoration was related to improvements in depression and anxiety scores as well as reductions in ED symptoms in AN patients, but not emotion regulation (Haynos et al., 2014). This points to the importance and clinical implication of emotion dysregulation in AN individuals due to its treatment resistance. However, studies do not specifically address whether emotion regulation strategies are not existing in those ED patients or whether they are just not able to access them when distressed.

Much research has been undertaken that showed that especially AN is related to alexithymia

(Eizaguirre et al., 2004), which encompasses not being able to identify and describe one's emotions and therefore also includes emotional unawareness. Disagreeing to statements such as "When I'm upset, I acknowledge my emotions" and "When I'm upset, I believe that my feelings are valid and important" was related to low scores on emotional awareness, which the eating pathology group of the current study demonstrated. But decreased self-awareness while simultaneously having no deficits in facial emotion recognition was also found in a sample of BN patients (Legenbauer et al., 2008), which suggests that this again is a trans-diagnostic criterium, as our general eating pathology sample reflects. One study found that deficits in emotional awareness were uniquely related to eating disorder cognitions and specifically entitlement belief, which is the assumption that one's own wishes are paramount, and that one can act without considering others (Lawson et al., 2008). Another study has linked their low levels of emotional awareness back to them being generally low on emotional intelligence (Foye et al., 2019). What the exact underlying mechanisms of deficits in emotional awareness in ED patients are, has to be further identified.

Emotional clarity was characterised by statements such as "I am confused about how I feel" and "I have no idea how I am feeling". This ability was significantly lower in the eating pathology group than HCs. This is supportive of the findings by Svaldi and colleagues (2012) who used various clinical samples and found emotional clarity to be particularly low in the AN group. However, it is contradictory to the findings of Merwin et al. (2010), who found that there was no lack in emotional clarity but only lack in emotional acceptance was associated with eating restraint in a mixed ED sample. They explain this with possible neurobiological differences caused by persistent eating restraint which might predispose them for heightened somatic sensitivity, which might be experienced as aversive.
The difference in our findings is possible to be explained by differences in sample characteristics. While as this study used a student population who was on average in their early twenties, their study used an adult population with the oldest participants being in their forties. Emotional clarity does develop with life experience, which would explain why only our sample experienced a significant lack in emotional clarity.

Despite these unanimous study findings, more research is needed to confirm them, since most of the mentioned studies were cross-sectional and correlational, utilised only self-report measures and used inhomogeneous ED individuals as their samples.

Anger as a predictor for emotional dysregulation in EDs

The third hypothesis was not corroborated, because anger did not moderate the relationship between emotional dysregulation and eating pathology. The idea behind this hypothesis was given the persistent emotional dysregulation in eating disorders even after treatment, weight restoration and symptoms being no longer met, this might be due to a specific emotion which keeps the emotional dysregulation in place. This study chose to investigate the effect of trait anger specifically, since this has not been done before and different anger facets are common in all ED subtypes. Although the moderated model including the moderator trait anger did explain about 31% of the emotional dysregulation variance in eating disorders in our model ($p = 0.133$) which points out that it is indeed an important factor within emotional dysregulation, it did not act as a significant moderator. This suggests that the underlying processes and emotions of emotional dysregulation are more complex and are not just made up of one major emotion, as this study hypothesised. This is in line with the findings of a metanalytic review, which found that rumination, avoidance, and difficulties with reappraisal as forms of emotional dysregulation were less associated eating disorders than mood and anxiety disorders (Aldao et al., 2010). Some overlapping forms of emotional dysregulation, namely rumination, catastrophizing, and low positive appraisal were all predictive of trait anger (Martin & Dahlen, 2005). Given the evidence that trait anger does seem to be implicated in emotional dysregulation but only in combination with other variables, future research could focus on adding trait anxiety and cognitive reappraisal to the model.

The strengths of this study include a comprehensive dataset based on a relatively large and international sample of individuals from 22 different countries on all 5 continents and reliable and valid questionnaires/scales that allowed to assess emotional dysregulation and anger in detailed sub aspects.

Although the current study findings are contributing to our understanding of the processes underlying emotional functioning and anger in eating disorders, there are also certain limitations that have to be acknowledged. Firstly, there was no differentiation between different ED subtypes, because of the use of a non-clinical sample and the already small sample size of the eating pathology group. Therefore, replicating this study with a clinical sample but also dividing between AN and BN (and possibly even restrictive, binge-purge or not otherwise specified types) could be aspired for in future research.

Although the sample overall consisted of 20.5% males, they only made up 5% of the eating pathology group, which is too small to draw any conclusion from and therefore highlights the already existing lack of extensive literature about eating disorders in men.
Lastly, this study only used self-report measures to assess participants emotions, which are linked to subjective component of self-evaluations and I likely to be impacted by self-report bias, social desirability bias and recall bias.

These results have important clinical implications. Even though trait anger might not solely explain emotional dysregulation in individuals with eating pathology, it nonetheless does contribute to its maintenance and therefore should be specifically addressed during treatment. Furthermore, lack of emotional awareness and clarity is also prevalent in those with disordered eating regardless of their subtype of ED and even despite being sub-clinical, which points out that this might be a risk factor in addition to a maintenance factor in ED. This means that it might be beneficial to develop preventative measures for schools and communities for individuals who are already at risk or display minor symptoms since this might prevent them in engaging in eating disorder behaviour as maladaptive coping mechanism for their emotional deficits.

In sum, the present study helped to elucidate the role that emotional functioning and anger play in eating disorders. This is the first study to our knowledge which shows that trait anger is not a moderator for emotional dysfunction in eating pathology. Individuals with eating pathology scored significantly higher on trait anger, anger suppression, emotional dysregulation, emotional awareness and emotional clarity than HCs. The importance of anger in emotional dysregulation was highlighted for clinical implications. By gaining a better understanding of how these emotional constructs interact, research like this will help increase our theoretical understanding of emotional functioning in ED.

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Appendix

Eating Disorder Examination Questionnaire

Instructions: The following questions are concerned with the past four weeks (28 days) only. Please read each question carefully. Please answer all of the questions. Please only choose one answer for each question. Thank you.

Questions 1 to 12: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days) only

	On how many of the past 28 days ……	No days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
1	Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
2	Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?	0	1	2	3	4	5	6
3	Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
4	Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
5	Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?	0	1	2	3	4	5	6
6	Have you had a definite desire to have a totally flat stomach?	0	1	2	3	4	5	6
7	Has thinking about food, eating or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	0	1	2	3	4	5	6
8	Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	0	1	2	3	4	5	6
9	Have you had a definite fear of losing control over eating?	0	1	2	3	4	5	6
10	Have you had a definite fear that you might gain weight?	0	1	2	3	4	5	6
11	Have you felt fat?	0	1	2	3	4	5	6
12	Have you had a strong desire to lose weight?	0	1	2	3	4	5	6

Questions 22-28: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days)

	On how many of the past 28 days ……	Not at all		Slightly		Moderately		Markedly
22	Has your weight influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
23	Has your shape influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
24	How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?	0	1	2	3	4	5	6
25	How dissatisfied have you been with your weight?	0	1	2	3	4	5	6
26	How dissatisfied have you been with your shape?	0	1	2	3	4	5	6
27	How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?	0	1	2	3	4	5	6
28	How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?	0	1	2	3	4	5	6

Questions 13-18: Please fill in the appropriate number in the boxes on the right. Remember that the questions only refer to the past four weeks (28 days).

Over the past four weeks (28 days)…….

13	Over the past 28 days, how many times have you eaten what other people would regard as an unusually large amount of food (given the circumstances)?	……
14	….On how many of these times did you have a sense of having lost control over your eating (at the time that you were eating)?	……
15	Over the past 28 days, on how many **DAYS** have such episodes of overeating occurred (i.e. you have eaten an unusually large amount of food and have had a sense of loss of control at the time)?	……
16	Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight?	……
17	Over the past 28 days, how many times have you taken laxatives as a means of controlling your shape or weight?	……
18	Over the past 28 days, how many times have you exercised in a "driven" or "compulsive" way as a means of controlling your weight, shape or amount of fat or to burn off calories?	……

Questions 19-21: Please circle the appropriate number. Please note that for these questions the term "binge eating" means eating what others would regard as an unusually large amount of food for the circumstances, accompanied by a sense of having lost control over eating.

19	Over the past 28 days, on how many days have you eaten in secret (ie, furtively)?.....Do not count episodes of binge eating	No days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
		0	1	2	3	4	5	6
20	On what proportion of the times that you have eaten have you felt guilty (felt that you've done wrong) because of its effect on your shape or weight? .....Do not count episodes of binge eating	None of the times	A few of the times	Less than half	Half of the times	More than half	Most of the time	Every time
		0	1	2	3	4	5	6
21	Over the past 28 days, how concerned have you been about other people seeing you eat? .....Do not count episodes of binge eating	Not at all		Slightly	Moderately			Markedly
		0	1	2	3	4	5	6

State And Trait Anger Inventory II

Part 1 Directions

A number of statements that people use to describe themselves are given below. Read each statement and then circle the number which indicates how you feel *right now*. There are no right or wrong answers. Do not spend too much time on any one statement. Mark the answer that best describes your *present feelings*.

Not at all 1	Somewhat 2	Moderately so 3	Very much so 4

How I Feel Right Now

1. I am furious 1 2 3 4
2. I feel irritated 1 2 3 4
3. I feel angry 1 2 3 4
4. I feel like yelling at somebody 1 2 3 4
5. I feel like breaking things 1 2 3 4
6. I am mad 1 2 3 4
7. I feel like banging on the table 1 2 3 4
8. I feel like hitting someone 1 2 3 4
9. I feel like swearing 1 2 3 4
10. I feel annoyed 1 2 3 4
11. I feel like kicking somebody 1 2 3 4
12. I feel like cursing out loud 1 2 3 4
13. I feel like screaming 1 2 3 4
14. I feel like pounding somebody 1 2 3 4
15. I feel like shouting out loud 1 2 3 4

Part 2 Directions

Read each of the following statements that people have used to describe themselves, and then circle the appropriate number to indicate how you *generally* feel or react. There are no right or wrong answers. Do not spend too much time. on any one statement. Circle the answer that best describes how you *generally* feel or react.

Almost never 1	Sometimes 2	Often 3	Almost always 4

How I Generally Feel

16. I am quick tempered 1 2 3 4
17. I have a fiery temper 1 2 3 4
18. I am a hotheaded person 1 2 3 4
19. I get angry when I'm slowed down by others' mistakes 1 2 3 4
20. I feel annoyed when I am not given recognition for doing good work 1 2 3 4
21. I fly off the handle 1 2 3 4
22. When I get mad, I say nasty things 1 2 3 4
23. It makes me furious when I am criticized in front of others 1 2 3 4
24. When I get frustrated, I feel like hitting someone.....1 2 3 4
25. I feel infuriated when I do a good job and get a poor evaluation 1 2 3 4

Part 3 Directions

Everyone feels angry or furious from time to time, but people differ in the ways that they react when they are angry. A number of statements are listed below which people use to describe their reactions when they feel *angry* or *furious*. Read each statement and then circle the appropriate number to indicate how often you *generally* react or behave in the manner described when you are feeling angry or furious. There are no right or wrong answers. Do not spend too much time on any one statement.

Almost never 1	Sometimes 2	Often 3	Almost always 4

How I Generally React or Behave When Angry or Furious

26. I control my temper 1 2 3 4
27. I express my anger 1 2 3 4
28. I take a deep breath and relax 1 2 3 4
29. I keep things in 1 2 3 4
30. I am patient with others 1 2 3 4
31. If someone annoys me, I'm apt to tell him or her how I feel 1 2 3 4
32. I try to calm myself as soon as possible 1 2 3 4
33. I pout or sulk 1 2 3 4
34. I control my urge to express my angry feelings 1 2 3 4
35. I lose my temper 1 2 3 4
36. I try to simmer down 1 2 3 4
37 I withdraw from people 1 2 3 4
38. I keep my cool 1 2 3 4
39. I make sarcastic remarks to others 1 2 3 4
40. I try to soothe my angry feelings 1 2 3 4

28. I take a deep breath and relax 1 2 3 4
29. I keep things in 1 2 3 4
30. I am patient with others 1 2 3 4
31. If someone annoys me, I'm apt to tell him or her how I feel 1 2 3 4
32. I try to calm myself as soon as possible 1 2 3 4
33. I pout or sulk 1 2 3 4
34. I control my urge to express my angry feelings 1 2 3 4
35. I lose my temper 1 2 3 4
36. I try to simmer down 1 2 3 4
37 I withdraw from people 1 2 3 4
38. I keep my cool 1 2 3 4
39. I make sarcastic remarks to others 1 2 3 4
40. I try to soothe my angry feelings 1 2 3 4
41. I boil inside, but I don't show it 1 2 3 4
42. I control my behavior 1 2 3 4
43. I do things like slam doors 1 2 3 4
44. I endeavor to become calm again 1 2 3 4
45. I tend to harbor grudges that I don't tell anyone about 1 2 3 4
46. I can stop myself from losing my temper 1 2 3 4
47. I argue with others 1 2 3 4

Almost never 1	Sometimes 2	Often 3	Almost always 4

How I Generally React or Behave When Angry or Furious

48. I reduce my anger as soon as possible 1 2 3 4
49. I am secretly quite critical of others 1 2 3 4
50. I try to be tolerant and understanding 1 2 3 4
51. I strike out at whatever infuriates me 1 2 3 4
52. I do something relaxing to calm down 1 2 3 4
53. I am angrier than i am willing to admit 1 2 3 4
54. I control my angry feelings 1 2 3 4
55. I say nasty things 1 2 3 4
56. I try to relax 1 2 3 4
57. I'm irritated a great deal more than people are aware of 1 2 3 4

Difficulties in Emotion Regulation Scale

Difficulties in Emotion Regulation Scale (DERS)

Please indicate how often the following statements apply to you by writing the appropriate number from the scale below on the line beside each item.

1	2	3	4	5
almost never (0-10%)	sometimes (11-35%)	about half the time (36-65%)	most of the time (66-90%)	almost always (91-100%)

_____ 1) I am clear about my feelings.
_____ 2) I pay attention to how I feel.
_____ 3) I experience my emotions as overwhelming and out of control.
_____ 4) I have no idea how I am feeling.
_____ 5) I have difficulty making sense out of my feelings.
_____ 6) I am attentive to my feelings.
_____ 7) I know exactly how I am feeling.
_____ 8) I care about what I am feeling.
_____ 9) I am confused about how I feel.
_____ 10) When I'm upset, I acknowledge my emotions.
_____ 11) When I'm upset, I become angry with myself for feeling that way.
_____ 12) When I'm upset, I become embarrassed for feeling that way.
_____ 13) When I'm upset, I have difficulty getting work done.
_____ 14) When I'm upset, I become out of control.
_____ 15) When I'm upset, I believe that I will remain that way for a long time.
_____ 16) When I'm upset, I believe that I will end up feeling very depressed.
_____ 17) When I'm upset, I believe that my feelings are valid and important.
_____ 18) When I'm upset, I have difficulty focusing on other things.
_____ 19) When I'm upset, I feel out of control.
_____ 20) When I'm upset, I can still get things done.
_____ 21) When I'm upset, I feel ashamed at myself for feeling that way.
_____ 22) When I'm upset, I know that I can find a way to eventually feel better.
_____ 23) When I'm upset, I feel like I am weak.
_____ 24) When I'm upset, I feel like I can remain in control of my behaviors.
_____ 25) When I'm upset, I feel guilty for feeling that way.
_____ 26) When I'm upset, I have difficulty concentrating.
_____ 27) When I'm upset, I have difficulty controlling my behaviors.

28) When I'm upset, I believe there is nothing I can do to make myself feel better.
29) When I'm upset, I become irritated at myself for feeling that way.
30) When I'm upset, I start to feel very bad about myself.
31) When I'm upset, I believe that wallowing in it is all I can do.
32) When I'm upset, I lose control over my behavior.
33) When I'm upset, I have difficulty thinking about anything else.
34) When I'm upset I take time to figure out what I'm really feeling.
35) When I'm upset, it takes me a long time to feel better.
36) When I'm upset, my emotions feel overwhelming.

4: Lack of Emotional Awareness (AWARE)

6) I am attentive to my feelings (R)
2) I pay attention to how I feel (R)
10) When I'm upset, I acknowledge my emotions (R)
17) When I'm upset, I believe that my feelings are valid and important (R)
8) I care about what I am feeling (R)
34) When I'm upset, I take time to figure out what I'm really feeling (R)

5: Limited Access to Emotion Regulation Strategies (STRATEGIES)

16) When I'm upset, I believe that I'll end up feeling very depressed
15) When I'm upset, I believe that I will remain that way for a long time
31) When I'm upset, I believe that wallowing in it is all I can do
35) When I'm upset, it takes me a long time to feel better
28) When I'm upset, I believe that there is nothing I can do to make myself feel better
22) When I'm upset, I know that I can find a way to eventually feel better (R)
36) When I'm upset, my emotions feel overwhelming
30) When I'm upset, I start to feel very bad about myself

6: Lack of Emotional Clarity (CLARITY)

5) I have difficulty making sense out of my feelings
4) I have no idea how I am feeling
9) I am confused about how I feel
7) I know exactly how I am feeling (R)
1) I am clear about my feelings (R)