The University Of Sheffield.

An Exploration of the role of disgust and other negative emotions in eating disorders and muscle dysmorphia

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A thesis submitted in partial fulfilment of the requirements for the award of

Doctor of Clinical Psychology at the University of Sheffield

The University of Sheffield

Faculty of Science

Clinical Psychology Unit

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Submission Date: November 2021

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Declaration

I declare that this work has not been submitted for any other degree at the University of Sheffield or any other institution. This thesis is my own original work and all other sources have been referenced accordingly

Structure & Words Counts

Part I: Literature Review

Excluding references and tables: 7 989

Including references and tables: 12 968

Part II: Research Report

Excluding references and tables: 7 763

Including references and tables: 8 773

Total Word Counts

Excluding references and tables: 15 752

Including references and tables: 21 741

Abstract/Summary

This thesis sought to investigate the role of disgust and other negative emotions in disorders of body image, specifically eating disorders and muscle dysmorphia. Eating disorders are known to negatively impact on the physical and mental wellbeing of a significant portion of the population, disproportionally affecting more females than males. Muscle dysmorphia, whilst classed under body dysmorphic disorders, has been theorized to be a predominantly male equivalent to eating disorders.

For eating disorders there are multiple conceptual theories on the maintenance of the disorders, largely focusing on the cognitive aspects of the disorders. There is a maintenance model as to the emotional processes, Schematic Propositional Analogical Associative Representation System for Eating Disorders (SPAARS-ED), which proposes that disgust is used to mediate unacceptable feelings of anger by converting the anger to disgust at the self. The role of disgust has been a subject of interest within eating disorders for a while, but there is not a recent systematic review of this. The literature review presented here, included twenty-seven studies, which covered the role of disgust in perception of emotions in others, in how disgust is experienced, its links to other emotions and to other pathologies. Large effect sizes were found within each area of study, which allowed the review to conclude that, despite the limitations of a single reviewer and an over-reliance on case control studies within the literature, disgust plays an important role in the maintenance of eating disorders and self-disgust may be of particular importance as to how the disorders cause distress.

The research around muscle dysmorphia has also included maintenance models that focus largely on cognitions. The experimental condition of this thesis interviewed five participants screened for a high probability of muscle dysmorphia as to the role of their emotions in their muscle gaining behaviours. The interviews demonstrated sadness, fear and anger to be prominent emotions related to muscle gaining behaviours, with self-directed components of each emotion being present. The self-directed elements of disgust, shame and guilt, were also discussed, though disgust itself was not commonly mentioned. The participants all indicated a pattern whereby muscle gaining behaviours were initially used to healthily suppress sadness, but then the progress towards matching an ideal body image, regulated by self-conscious emotions, becomes rigid and inflexible which led to further fear, anger, sadness and self-directed

derivatives of disgust. It was concluded that, even though the sample size for the study was small due to COVID-19 restrictions impacting on recruitment, the study showed sufficient promise for the use of current eating disorder treatments with this population, as well as recommending treatments that focus on alleviating sadness and soothing shame and guilt.

Acknowledgements

I would firstly like to express my gratitude to my supervisors, Professor Paul Overton and Dr Philip Powell for their exceptional support and advice during this project. In addition, the support of the collaborators Dr Lambros Lazarus and Dr Antonia Ypsilanti made the project possible alongside, of course, all the participants who completed several interviews. I would like to thank my fiancé Victoria for her wonderful support, patience, and belief in me. Lastly, I am grateful for my close and extended family for all the support, understanding and motivation they have given me, particularly my mother Clare and sister Laura.

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The role of disgust in Eating Disorders: A Systematic literature Review

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Word Count: 7 775

Date Submitted: 23/11/2021

Abstract

This systematic review aimed to examine the role of disgust in eating disorders. To do this, the review used Scopus, PsycINFO (via Ovid) and MEDLINE (via Ovid) to identify studies including key words of eating disorders, Anorexia Nervosa, Bulimia Nervosa and disgust. The studies were limited to quantitative journal articles, published after 2009, written in English and not including treatment or gene studies. The databases were last searched in March, 2020. Results were synthesised by conceptual theme and Critical Appraisal Skills Programme (CASP) tools were used to assess quality. The result was 27 studies including 3,319 participants. The results showed that disgust in those with eating disorders played a role in the perception of emotions in others, was experienced differently to healthy controls, and was linked to other emotions and pathologies. The limitations of this review were the use of one reviewer, the homogeneity of study designs and some small sample studies. The conclusion was that disgust plays an important role in the formation and maintenance of eating disorders, and it is likely that self-disgust is a key determinant of what causes distress within the condition.

Introduction

Eating disorders, inclusive of both Anorexia Nervosa and Bulimia Nervosa and their sub-types, cause distress and bodily harm to significant proportions of the population. Prevalence rates range from 3-10% of the population of females aged 15-19 (Hoek & van Hoeken, 2003). As well as the inherent distress of the disorders, at its most severe, eating disorders cause death, either through the physical complications and long-term health effects, or through suicide, as high rates of suicidal ideation and behaviour exist among individuals with eating disorders (Preti, Rocchi, Sisti, Camboni, & Miotto, 2011). Therefore, the importance of early detection & intervention is increasingly being recognised (Schmidt et al., 2015). In order to better detect and treat these disorders, it is important to gain an understanding of how they are formed and maintained. Recent strategies for doing so have largely come from studying the cognitive aspects of the disorders, as cognitive biases play an important role in the etiology and maintenance of psychopathology (Harvey, Watkins, Mansell, & Shafran, 2004) and these lead directly to treatment protocols (Waller, et al., 2007). The role of emotions within these treatment-based models have been looked at in regards to schemas and the role of avoidance of emotions (Luck et

al., 2005). However, having a more in-depth understanding of the role of emotions in eating disorders may further enhance our understanding, which may lead to better detection, enhancement of existing treatments and potentially new treatments.

As eating disorders are a form of anxiety disorder centered around fear of food and body shape, fear and anxiety have historically been explored as a key affective component (Barlow, 2004; Pallister & Waller, 2008). However, disgust has also begun to be viewed as an important emotion within anxiety disorders (Cisler, Olatunji, & Lohr, 2009) as well as depression (Powell, Overton & Simpson, 2014; Ypsilanti, Lazuras, Powell & Overton, 2019). Indeed, prior reviews have established that disgust is an important emotion in eating disorders (Troop, Treasure & Surpell, 2002). Although the evidence is somewhat mixed,those with disordered eating do not have increased global disgust sensitivity yet do show increased disgust towards areas that concern food and the body. Other studies have also established a link between the basic emotion of disgust and eating disorders. It has been suggested that disgust conditioning forms an important role in eating behaviors, as whilst fear conditioning has been used as a theoretical basis for food avoidance, direct experimentation into this has shown only moderate effects (Steinglass, et al., 2011), whereas Anorexia Nervosa patients themselves have identified food avoidance as the primary coping method for dealing with disgust (Espeset, et al., 2012). The role of disgust in eating disorders, and the implications of this for assessment, theory and treatment have been discussed alongside other pathologies (Olatunji & McKay, 2009). The role of brain structures has also begun to be investigated as to the role of disgust in eating disorders (Calder, et al., 2007). The qualitative evidence around the role of disgust in the development and maintenance of broad psychopathology has also recently been reviewed by Knowles et al. (2019). This review concluded that the qualitative evidence suggested that disgust-related biases may be observed in judgment of expectancies, memory, attention, interpretation, and at implicit levels.

Whilst disgust is therefore likely a significant basic emotion in relation to eating disorders, and the present review of the specific role of disgust in eating disorders is timely, it is also important to consider the role of self-conscious emotions and how they relate to disgust (Tracey & Robins, 2009). We experience self-conscious emotions in relation to a view of our actions or ourselves. For example, sadness can occur when a negative event unrelated to our actions transpires, but shame or guilt (two self-conscious emotions) include the acknowledgement that we have done

something that causes sadness (Tangney, 2012). Especially relevant in the current context are likely to be the negative self-conscious emotions, such as shame, self-disgust, guilt, and embarrassment, as their potential role will help to understand psychopathology and maintenance mechanisms at a more detailed level that accounts for a person's self-conscious emotional experiences. This additional focus will also aim to provide more detail of the function of disgust and self-disgust and how this fits with existing models related to eating disorder behaviours.

There are a couple of models for how disgust may play a role in eating disorders. The SPAARS-ED model (Espeset, et al., 2012), proposed that disgust is used to mediate threatening emotions of anger and sadness, by subverting these into disgust and directing it at the self, in the form of self-disgust. There has also been a recent narrative review (Anderson, et al., 2021), which proposed a model for the role of disgust in avoidance behaviours in eating disorders. However, as well as focusing specifically on threat responses and avoidance, the topic of disgust was not systematically reviewed and therefore a systematic review is still needed to ensure that key literature has not been missed and that the findings of it are extracted and thoroughly explored.

This systematic review therefore seeks to review the quantitative studies as to the role of disgust and self-disgust in eating disorders. This study will look at a broader conceptualization of disgust than has previously been reviewed, as well as being inclusive of findings related to self-disgust. The aim is that this review may help to elucidate whether disgust reactions are of prominent importance in eating disorders, as in other forms of anxiety. It will also offer clarification as to what moderates attention biases for disgust in this specific population, as well as other non-cognitive mechanisms that develop or maintain the disorders.

Method

Searches

To search for the appropriate literature, the databases of Scopus, PsycINFO (via Ovid) and MEDLINE (via Ovid) were searched. The last search took place in March 2020. A variety of search terms were used for eating disorders, Anorexia Nervosa or Bulimia Nervosa and disgust

(see Appendix A for full search terms). The variations for each of the search terms were combined in an AND formula, with title, abstracts and key terms being searched for variations of both.

The studies found were then filtered to include only those that were English language journal articles. Studies before 2010 were excluded, as the review by Olatunji & McKay (2009) comprehensively covers studies before this, and the results of this review and its included studies are used within the introduction and discussion of this study. Studies were also excluded due to being focused on treatment, not relevant to disgust, gene studies or qualitative research. The full inclusion and exclusion criteria are presented in Table 1. Age was not used an exclusion criterion, as the prevalence rates suggest the highest incidences occur between the ages 15-19, (Hoek & Van Hoeken, 2003), therefore, to have focused on either adolescents or adults would have split this range. Avoidant and Restrictive Food Intake Disorder (ARFID) was not specifically included as an inclusion criteria or search term as it more commonly classified as a childhood disorder (APA, 2013), which again would have split an important age range. Whilst ARFID does have proposed mechanisms for the role of disgust, it is not included in the SPAARS-ED model, which is of particular interest to this study and so its inclusion in the review could have weakened the exploration of the SPAARS-ED model and diluted the results pertaining to the role of disgust in AN and BN. Binge Eating disorder was also not specifically included as inclusion criteria, as there is not the same sex disparity in prevalence as with the other eating disorders (Hay, et al., 2015). Therefore including Binge Eating disorder, due to its different demographics and potentially difficult mechanisms of the role of discuss, would also, like ARFID have weakened the examination of the SPAARS-ED model and lessened the relevance of the synthesis of results. The records were reviewed by the main author only, due to

the constraints of a thesis submission. This was done by initially reviewing titles for clear exclusion criteria, then reading through the abstracts of all remaining reports and finally through examining full text articles. No automation tools were used in this process.

Inclusion Criteria	Exclusion Criteria
Journal Article	Reviews
Link with disgust to Anorexia Nervosa or Bulimia Nervosa	Non-Journal articles
Post-2009	Exclusively focused on treatment
	Not written in English
	Not relevant to disgust
	Gene Study
	Qualitative Research

Table 1. Inclusion and exclusion criteria.

PRISMA standards for reporting systemic reviews were followed (Page et al. 2020; please see PRISMA diagram below, Figure 1). Further directed reading outside of the scope of the above outlined search methodology was conducted in order to provide broader knowledge to be applied to this review.

Presentation and Synthesis of Results

Data pertaining to participant population was collected for all studies, including information on age ranges, means and standard deviations where provided. Outcome results related to disgust were prioritized and effect sizes for any outcomes were always sought. Typically these were presented as the Cohen's d, a measure of mean difference that is used as an effect size, or the measure of association that was given in the original study. Where the study did not provide a measure of effect size, data from the study was used to estimate an effect size using an effect size calculator (Wilson, 2021). Where the raw data from the study was not sufficient to produce an effect size, the results of the statistical analysis was presented. For the sake of quality analysis, where effect sizes were not present in the original study, the study was scored as producing no effect size. The studies were grouped and presented according to study outcome domain, as the search terms of this review made it likely that multiple areas of study would be included. The results were then synthesised narratively by conceptual theme, in order to link together the different domains of study to provide a cohesive picture of the role of disgust in eating disorders. A meta-analysis was not performed due to the heterogeneity of the study types and broad areas retrieved.

CASP Checklists (Critical Appraisal Skills Programme, 2018)) were used to quality-assess the studies (Appendix B). The quality of the study was rated based on the percentage score obtained on the relevant appraisal tool, with 75%-100% rated as High Quality, 50%-75% rated as Good Quality, 25-50% rated as Low Quality and 0%-25% rated as Poor Quality.

Results

The Search Process identified 27 studies for inclusion in this review (Figure 1).

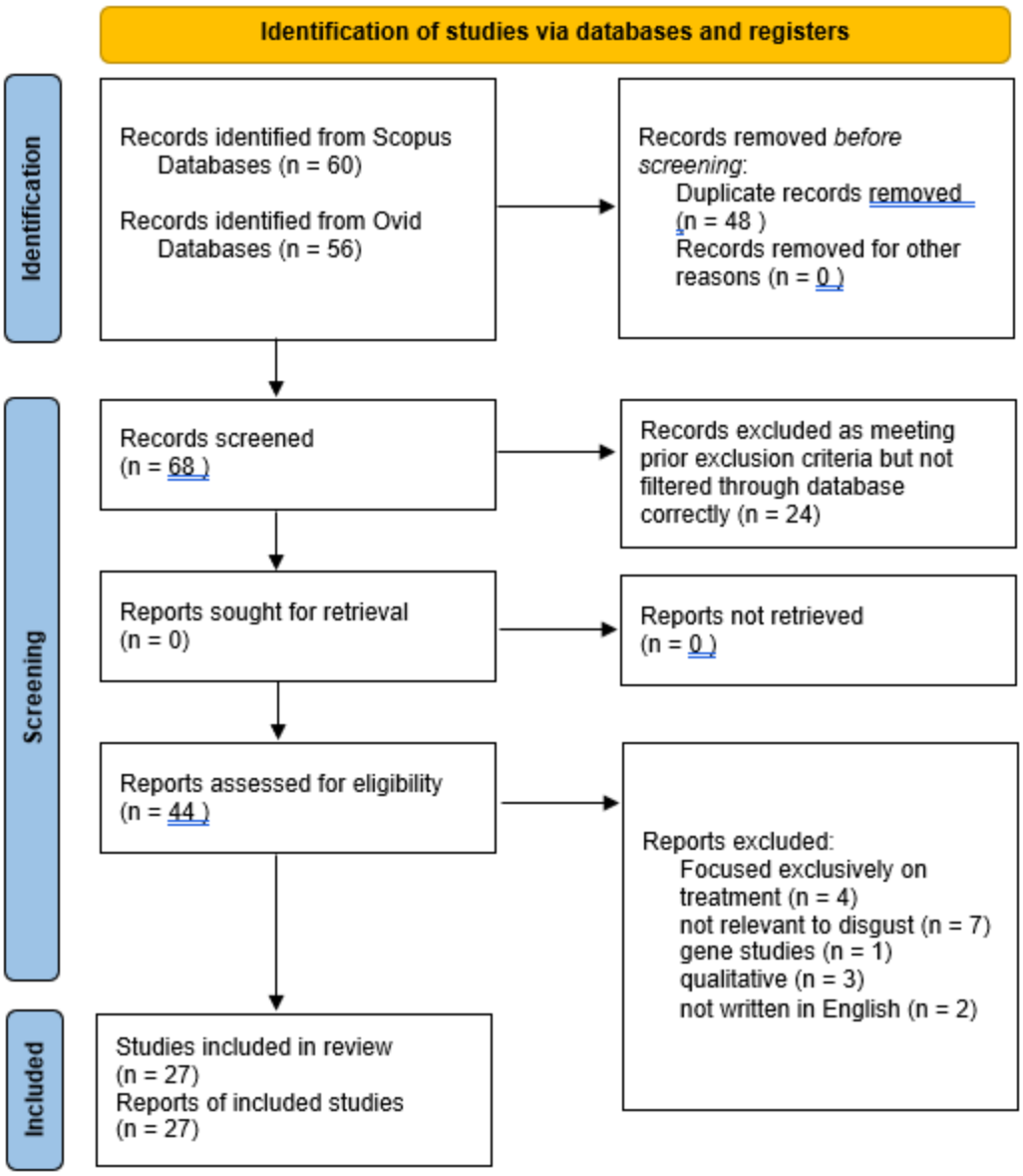

Figure 1. PRISMA diagram.

The details of these 27 studies are organised in Table 2, and included 3,319 participants, with the quality assessment to be found in Appendix B. The studies identified through the searching process produced outcomes relating to the role of disgust, ability to recognise disgust in others, experience of disgust and disgust sensitivity, how disgust is moderated by or interacts with other emotions, how disgust links other psychopathologies, and the brain structures involved in

experiencing disgust. Only two of the studies involved self-directed emotions, with these studies including self-disgust.

Table 2. Results of literature search with key features of each study.

Authors	Design	Participants (n=)	Measures used	Outcome	Results	Quality Rating
Perception						
Aharoni & Hert, (2011)	Case Control	124. 62 AN vs 62 HC. No Demographic information given.	International classification of diseases-10 (ICD-10). Eating Disorder Examination-12 (EDE-12). The Disgust Sensitivity Questionnaire (DSQ).	AN patients scored consistently higher on all domains of disgust sensitivity. The largest significant difference was on the domains of food and magical thinking	Overall disgust sensitivity d = 0.76 ($p<0.001$). Difference in food domain d = 0.94 ($p<0.001$) Difference in magical thinking domain d = 0.84 ($p<0.001$).	8/11 – Good Quality
Ashworth, et al. (2011)	Case Control & Experimental Design.	28 (100% female). 12 BN, Mean Age = 24.4 (SD = 4.4). Vs 16 HC, Mean Age = 27.4 (SD = 5.4)	fMRI task matching disgusted and angry facial expression.	BN were less accurate at matching angry and disgusted facial expressions of emotion Patients with BN had a decreased neural response in the precuneus to facial expressions of both anger and disgust and a decreased neural response to angry facial expressions	Difference in matching angry and disgusted facial expressions F = 5.37 ($p<0.03$).	9/11 – High Quality

				in the right amygdala.		
Dapelo, et al. (2015)	Case Control Study	N = 77 (100% female). Age Range unknown. (M = 27.54, SD = 8.36 in experimental condition. M = 26.98, SD = 7.55 in control condition).	Body Mass Index (BMI). Structured Clinical Interview for DSM-IV-TR Axis I Disorders (SCID-I). . Eating Disorder Examination Questionnaire (EDE-Q). Hospital Anxiety and Depression Scale (HADS). Obsessive Compulsive Inventory – Revised (OCI-R). Toronto Alexithymia Scale-20 (TAS-20). Facial Emotion Recognition Task.	Participants with Anorexia Nervosa were less accurate than Healthy Controls recognising expressions of disgust, when shown less ambiguously. Participants with Anorexia Nervosa also showed response bias towards anger.	AN accuracy at 90% proportion of disgust depiction, compared to HC, r = -0.39 ($p<0.01$). AN response bias at 90% proportion of anger depiction, compared to HC, r = 0.36 ($p<0.01$).	11/11 – High Quality
Dapelo, et al. (2017)	Case Control Study	N = 93. 100% female. Age range not specified.	BMI. SCID-I. EDE-Q. HADS. Facial Emotion recognition task. Body motion emotion recognition task.	Bulimia nervosa participants less able to recognise disgust and over-interpreted neutral stimulus' as fear.	Bulimia nervosa participants less able to recognise disgust vs HC, r = 0.34 ($p<0.01$).	10/11 – High Quality

Fukiwara, et al. (2017)	Case Control & Experimental Design	74 (100% female). 24 eating disorder patients (mixed AN & BN), Mean Age = 23.33 (SD = 7.12). Vs 25 Low Alexithymia HC, Mean Age = 19.92 (SD = 3.80). Vs 25 High Alexithymia Healthy Controls, Mean Age = 18.60 (SD = 2.04)	Facial emotion discrimination task. Eye Tracking. TAS-20. Depression Anxiety Stress Scales – 21 item. Eating Disorder Inventory (EDI).	The ED group was less accurate judging ambiguous blends containing anger or disgust and attended less to the faces compared with low-alexithymia controls. Reduced attention to faces, in particular the eye region, was linked to confusion with ambiguous disgust and anger and disgust in the ED group only. The differences were not due to alexithymia in the ED group.	ED had less accuracy in judging ambiguity containing disgust and anger d = 0.86 ($p<0.01$). ED groups spent less time attending to ambiguous disgust and anger faces F = 12.4 ($p<0.001$)	11/11 – High Quality
Kim, et al. (2014)	Randomised Control Trial	64 (100% female). 31 AN, Mean Age = 23.10 (SD = 9.35). 33 HC, Mean Age = 22.18 (SD = 2.14)	SCID-I. Wechsler Adult Intelligence Scale (WAIS). Visual Probe Task. EDE. EDE-Q. STAXI. BDI. STAI. Autism-Spectrum Quotient (AQ).	Oxytocin attenuated attentional vigilance to disgust in patients with anorexia nervosa and healthy controls. The effect size of this was smaller in the anorexia nervosa participants.	Anorexia nervosa participants Oxytocin attenuation to attention vigilance to disgust d = 0.408 ($p<0.12$). Compared to HC's Oxytocin attenuation to attention	10/11 – High Quality

					vigilance to disgust d = 0.848 (p<0.004)	
Lule, et al. (2014)	Case Control & Experimental Design.	N = 30 (100%) female. Age Range 14-18 (M =16.2, SD = 1.26) in experimental condition. Age Range 14-18 (M = 16.5, SD = 1.09) in experimental condition.	General Assessment. BMI. Hamburg Wechsler Intelligence Test for Children (HAWIK III). MRI Scans. EDE-Q. Eating Disorder Inventory (EDI-2). Youth Self Report (YSR). Child Behaviour Checklist (CBCL). Beck Depression Inventory II (BDI-II). State-trait-anxiety Inventory (STAI). The Toronto Alexithymia Scale (TAS-26). Interpersonal Reactivity Index. The facially expressed emotion labeling (FEEL) test.	Anorexia Nervosa patients had significantly higher alexithymia scores, as well as higher levels of state and trait anxiety and of depression compared to healthy controls. There was also a trend for a anorexia nervosa patients having a lower ability to recognize disgust.	AN scored higher on depression measures d = 2.05, (p<0.01), and anxiety state, d = 1.44, (p<0.01), and trait d = 1.77, (p<0.01). AN less able to recognise disgust F = 3.39, (p<0.01).	10/11 – High Quality
Wallis, et al. (2018)	Case Control & Experimental Design	89 (100% female). Age range = 18-31 (M = 20.94, SD =	EDI-2. BDI-II. TAS-20. STAI. Ratings of emotional faces from images & videos. Emotion	Emotion recognition accuracy was negatively associated with Drive for Thinness, but not Bulimia or Body Dissatisfaction.	High EDI scorers recognised significantly fewer emotional	10/11 – High Quality

		1.91)	Evaluation section of The Awareness of Social Inference Test (TASIT).	Those in the high EDI score group, were not worse at recognising negative emotions than positive emotions. No outcome difference between static or dynamic images.	expressions, d = -0.43 ($p<0.05$).	
Experience						
Bell, et al. (2017)	Case Control Study	N = 591 (100% female) Age range 18-70 (M = 25.36, SD = 9.57)	The Self-Disgust Scale (SDS) The Disgust Propensity and Sensitivity Scale-Revised Beck Anxiety Inventory Sensory Profile, Adolescent and Adult Report Version Eating Disorder Examination Questionnaire	Those with an eating disorder reported significantly higher rates of self-disgust than those with no history of disordered eating. In groups of women with self-reported bulimia, self-disgust was associated with sensation avoidance and sensation seeking.	Self-disgust in AN vs HC, d = 1.62 ($p<0.001$). Self-disgust in BN vs HC, d = 1.88 ($p<0.001$). self-disgust in BN vs AN, d = 0.17. Disgust sensitivity in AN vs HC, d = 0.41 ($p<0.001$). Disgust sensitivity in BN vs HC, d = 0.56 ($p<0.001$). Disgust sensitivity in BN vs AN, d =	11/11 - High Quality

					0.08.	
Dodd, et al. (2017)	Cohort Study	N = 80 (100% female). Age 18-22 (M = 18.81, SD = 0.99)	EMG picture stimuli. Self-report Pleasantness Rating. Attitude Towards Emaciation Scale. EDE-Q. Disgust Scale-Revised (DS-R). BMI	Eating Disorder Symptomology negatively correlated with pleasantness towards overweight body image. Eating Disorder Symptomatology was associated with attenuated negative affect to emaciated bodies.	Pleasant rating – overweight, t = -2.58 (p<0.012). Corugator supercilii – emaciated, t = -3.28 (p<0.002).	11/11 – High Quality
Foroughi, et al. (2020)	Case Control & Experimental Design.	180 (100% Female). 61 AN, Mean Age = 16.47 (SD = 2.08). Vs 26 A-typical AN (AAN), Mean Age = 18.92 (SD = 7.53). Vs 39 BN, Mean Age = 25.20 (SD = 10.26). Vs 13 Binge-eating Disorder (BED), Mean Age = 31.38 (SD 15.13). Vs 41 HC, Mean Age = 21.02 (SD = 8.02)	Mini International Neuropsychiatry Interview V.7. Ratings of emotions following food and non-food images. EDE-Q. HADS. TAS.	Negative emotional responses when viewing images were significantly greater in EDs compared with HCs. Emotional responses were not significantly different within the ED groups. At post weight-restoration, individuals were significantly less anxious/disgusted when viewing the images	Difference in disgust in respond to food; AN vs HC, d = 1.69; atypical AN vs HC, d = 1.69; BN vs HC, d = 1.62; binge-eating disorder vs HC, d = 1.29. Reduction in disgust response post weight-restoration, Mahn-Whitney U = -3.40 (p<0.001)	9/11 – High Quality
Hay & Katsikitis	Case Control &	107 (100% females). 26 ED,	Food Images. Self-report measures of	Participants in the eating disorders group had	ED groups higher rating of	10/11 – High

(2014)	Experimental Design	Mean Age = 26.1 (SD = 8.3). Vs 20 Psychiatry Controls, Mean Age = 30.9 (SD = 10.9). Vs 61 HC, Mean Age = 26.1 (SD = 7.7).	fear, happiness and disgust. DSM-IV.	significantly higher ratings of fear and disgust to food images. This difference was consistent when controlled for baseline levels of fear, disgust and happiness.	baseline disgust vs HC, d = 0.46; ED vs Psychiatry Controls, d = 0.60. ED groups higher rating of disgust in response to food vs HC, d = 1.33; ED vs PC, d = 1.20.	Quality
Hilderbrandt, et al. (2015)	Case Control & Experimental Design	N = 29 (100% Female). Age Range 11-22 (M = 25.05, SD = 1.87 in experimental condition. M = 17.64, SD = 2.71 in control condition).	Conditioning paradigm which used a food based discrimination and learning paradigm adapted from Schiller et al., (2008). Facial Electromyography (EMG).	Response inflexibility was higher in those with Anorexia Nervosa. Those with Anorexia Nervosa also displayed disgust responses to food that were associated with impaired extinction and elevated pleasure responses to stimuli that cued an absence of food.	AN participants more likely to have disgust response d = 1.36 ($p<0.001$). Increased pleasure response to non-food cue's in AN F= 1.41 ($p<0.246$).	11/11 - High Quality
Horndasch, et al. (2012)	Case Control	31. 13 AN, Mean Age = 15.7, (SD = 1.8) vs 18 HC, Mean Age = 16.6 (SD = 1.8).	EDI-2. Custom-made emotion rating scale. Stimulus materials of varying body images.	no differential experience of emotions between AN and HC. Higher amplitudes of LLP in AN patients for pictures of	No significant difference in experience of disgust at overweight	8/11 – Good Quality

			EEG.	underweight women may reflect motivational significance of strongly underweight body shapes.	images with AN compared to HC.	
Ille, et al. (2014)	Case Control	N = 224 (81.58% female). Age Range unknown. Mean Age = 30.8, SD = 12.8 in experimental condition. Mean Age = 31.1, SD = 13 in control condition.	The Questionnaire for the assessment of self-disgust (QASD). The Brief Symptom Inventory (BFI).	Self-disgust was elevated in those with mental disorders in comparison to healthy controls. Those with Borderline Personality Disorder and Eating Disorders reported the highest scores on both personal disgust and behaviour disgust. traumatic events during childhood constitute a risk factor for self-disgust.	Eating Disorder personal disgust compare to Healthy Controls, d = 1.65, ($p<0.001$). Eating Disorder behavioural disgust compare to Healthy Controls, d = 1.25, ($p<0.001$).	11/11 – High Quality
Mayer, et al. (2011)	Cohort Study & Experimental Design	61 (100% female). Age Range 18-28 (M = 20.26, SD = 2.16)	EDE-Q. DS. STAI. Visual Analogue Scales related to thought experiment responding to images of differing body shapes and again following emotional faces.	All participants displayed a bias toward linking obese bodies and disgust-relevant outcomes, which was not affected by eating disorder symptomology. Eating disorder pathology was positively associated with a bias towards linking slim body images to disgust.	Effect sizes or statistical analysis not clearly given for the most relevant findings	6/12 – Good Quality

Links to other emotions						
Fox, et al. (2013)	Case Control & Experimental Design.	N = 41 (100% female). Age range unknown. M = 23.70, SD = 4.2 in experimental condition. M = 23.38, SD = 3.03 in control condition	EDE-Q. Regulation of Emotion Questionnaire (REQ). Basic Emotions Scale (BES). Brief Core Schema Scale (BCSS). State-Trait Anger Expression Inventory-2 (STAXI). HADS. DS-R. Body Shape Silhouettes (BSS). Reliability of Anger Induction Technique.	Participants with Anorexia Nervosa showed a significant increase in levels of disgust and body size estimation following an anger induction when compared with those in the control condition.	Difference in internal dysfunction in AN compared to HC, d = 2.02, ($p<0.01$).	11/11 – High Quality
Joos, et al. (2011)	Case Control	112. 23 AN, Mean Age = 24 (SD = 4.7). 29 BN, Mean Age = 26.2 (SD = 6.3). Vs 35 Depressed patients, Mean Age = 27.6 (SD = 4.7). Vs 25 HC, Mean Age = 27.4 (SD = 5.5)	Visual Stimulus: IAPS (Lang et al., 2005). Self-ratings of emotional experiences to the stimulus. EDI. BDI. MWTB.	Eating disordered patients and Depressed Patients (DP)reported less anger than healthy controls. Depressed patients showed increased disgust levels when confronted with anger stimuli compared to eating disordered patients and healthy controls	Difference in anger reported in DP vs HC, d = -0.65; ED vs HC, d = -0.63. Difference in disgust levels when confronted with anger stimuli in DP vs HC, d = 0.7; ED vs HC, d = 0.39.	9/11 – High Quality

Khalil, et al. (2018)	Case Control Study	N = 131. 71% female. Age range 13-68.	Marks and Mathews scale or fear questionnaire (FQ). Disgust scale-revised (DS-R). SCOFF questionnaire.	Levels of disgust increased when fear increased. Vulnerability to eating disorder had higher levels of disgust. Fear and disgust are clinically associated.	r = 0.377 & r = 0.225	9/11 – High Quality
Kollei, et al. (2012)	Case Control	133. 31 BDD (61.3% female), Mean Age = 28.77 (SD = 8.91). Vs 32 AN (93.% female), Mean Age = 26.94 (SD = 9.15. Vs 34 BN (97.1% female), Mean Age = 25.94 (SD = 8.25). Vs 33 HC (69.7% female), Mean Age = 26.91 (SD = 8.48).	Structured Diagnostic Interview: Mini-DIPS. SCID-I. Yale-Brown obsessive compulsive scale, modified for Body Dysmorphic Disorder (BDD-YBOCS). Body Dysmorphic Disorder Questionnaire. Differential Emotions Scale (DES). Control of Intrusive Thoughts Questionnaire (CITQ).	Cody Dysmorphic Disorder (B)DD and eating disorder patients all reported higher negative emotions than healthy controls. Being instructed to think about their own body had a significantly worse effect on the emotional reaction of the clinical groups compared to the healthy controls.	Difference in experience of disgust in BDD vs HC, d = 0.92; AN vs HC, d = 0.63; BN vs HC, d = 0.99. Difference in body-related disgust in BDD vs HC, d = 1.82; AN vs HC, d = 1.92; BN vs HC, d = 1.48.	10/11 – High Quality
Mayer, et al. (2012)	Cohort Study & Experimental Design	148 (68.24% female). Age Range = 14-18 (M = 15.33, SD = 0.97)	EDE-Q. Brief Self-Control Scale (BSCS). Visual Analogue Scales related to thought experiment responding to words	All adolescents displayed a bias towards pairing words associated with a loss of control to fear and disgust related outcomes.	Link in females between eating disorder symptoms and and contingency estimates of loss	6/12 – Good Quality

			related to eating behaviours and control and again following emotional faces.	In females, some support was found for a link between level of eating disorder symptoms and contingency estimates of loss of control of overeating behavior and disgust	of control of overeating and disgust R^2 = 0.04 ($p<0.05$)	
Soussignan, et al. (2010)	Case Control & Experimental Design.	41 (100% female). 16 AN, Mean Age = 26.68 (SD = 7.30) Vs 25 HC, Mean Mean Age = 24.6 (SD = 6.93)	Hunger vs non-Hunger (safety). Stimuli – food pictures of varying energy content. Self-ratings of arousal, wanting and liking. Affective Primes – neutral and emotionally expressive faces. Facial EMG. Skin Conductance. Coding of facial behaviour.	Subliminal ‘ fear faces ’ increased corrugator muscle reactivity to food stimuli in fasting AN patients, as compared to controls. This is contrast to disgust, which did not elicit a priming response.	No significant result with disgust produced.	7/11 – Good Quality
Links with other pathologies						
Chu, et al. (2015)	Cohort Study.	341 (66% female). Mean Age = 19.3 (SD – 1.6).	EDI. Disgust with life scale. Disgust propensity and sensitivity scale-revised (BSS). Beck anxiety inventory	ED symptoms and body dissatisfaction were associated with increased suicidal ideation at high levels of disgust with the self and the world. At low	Disgust with self as a predictor variable partial r^2 = 0.17	19. Chu, C., Bodell, L.P., Ribeiro, J.D. & Joiner,

			(BAI). BDI-II.	levels of disgust, ED symptoms and body dissatisfaction did not significantly relate to suicidal ideation.	($p<0.04$) Disgust with the world as a predictor variable partial $r^2 = 0.30$ ($p<0.005$).	T.E. (2015)
Kauer, et al. (2015)	Case Control & Experimental design	389 (62.5% female). Mean Age = 36.56 (SD = 13.77)	Self-categorisation as picky eater or non-picky eater. 63-item questionnaire assessing food selection and eating behaviors. Intensity rating of taste solutions. The Disgust Scale. The Padua Inventory. BDI. The Eating Attitudes Test (EAT-26).	Picky eaters had significantly higher OCD symptoms, disgust sensitivity, and food neophobia than non-picky eaters, and were more likely to score within the clinical range of depression symptoms	Picky eaters as a predictors of disgust sensitivity d = 0.93. Picky eaters as a predictor of BDI Score d = 1.17	6/11 – Good Quality
Khairallah, et al. (2019)	Case Control Study	N = 150. 77% female. Age range 18-60.	Becks abbreviated Depression Inventory (BDI). Eating Attitudes Test (EAT-26). Barrat Impulsivity Scale (BIS). Disgust Scale (DS)	Those at high risk for eating disorders, also scored higher for depression, impulsivity and disgust.	Depression (OR = 1.1. Impulsivity (OR =1.16). Disgust (OR = 1.54)	9/11 – High Quality.

Brain Structures & Activity						
Joos, et al. (2011)	Case Control & Experimental Design	22 (100% female). 11 AN, Mean Age = 26.0 (SD = 5.2) vs 11 HC, Mean age = 25.0 (SD = 5).	fMRI. Stimuli – photos of food and non-food.	Results showed increased activity of the right amygdala in the sample of AN patients in comparison to healthy controls. Disgust ratings correlated with the amygdala signal negatively.	Increased right amygdala activity T = 5.21 Disgust rating correlated with amygdala signal negative T = 4.68 ($p<0.001$)	9/11 – High Quality
Monteleone, et al. (2017).	Case Control	60 (100% female). 20 AN, Mean Age = 27.1 (SD = 4.7) vs 20 BN, Mean Age = 25.5 (SD7.8), vs 20 HC, Mean Age = 27.7 (SD = 8.0)	fMRI. EDI-2. Cloninger's Temperament and Character Inventory-Revised (TCI-R). general Labeled Magnitude Scale (gLMS). Visual analogue scale (VAS).	In AN and BN patients the pleasant sweet stimulus induced a higher activation in several brain areas than that induced by the aversive bitter taste. The opposite occurred in healthy controls. Compared to healthy controls, AN patients showed a decreased response to the bitter stimulus in the right amygdala and left anterior cingulate cortex, while BN patients showed a decreased response to the bitter stimulus in the right	AN patients decreased response to disgust stimulus in right amygdala, t = 5.53 ($p<0.005$); and left anterior cingulate cortex, t = 3.98 ($p<0.005$). BN patients showing decreased response to disgust stimulus in the right amygdala, t =	10/11 – High Quality

	amygdala and left insula.	4.2 ($p<0.005$); and left insula, t = 3.9 ($p<0.005$)

Note: Studies categories by primary output, but some studies are discussed in multiple sections

Perception

Many of the studies in this review looked into the ability to perceive disgust in others, and one's own experience of disgust, including the sensitivity of it. Aharoni & Hert (2011), found increased disgust sensitivity in Anorexia Nervosa participants, especially in the domains of food and magical thinking. Dapelo et al. (2015, 2017), Ashworth et al. (2011), Lule et al. (2014) and Fukiwara et al. (2017), all found that patients with eating disorders, including both Anorexia Nervosa and Bulimia Nervosa participants, were less able to accurately identify disgust in the faces of others. Whilst the results in these studies were significant, the effect sizes in most were moderate. These findings also appear to be consistent with Ashworth, et al., (2011) who demonstrated decreased neural activity in response to observing disgust in others in patients with eating disorders. In addition, Kim et al. (2014), showed that oxytocin did not attenuate vigilance to disgust in others to the same extent as it did in the healthy control group. Wallis, Ridout & Sharpe (2018) also provides further clarification of these relationships by demonstrating that emotional recognition was negatively correlated with drive for thinness, but not Bulimia Nervosa or body dissatisfaction.

Experience

Eight of the studies looked at the experiences of disgust in eating disorders. Hay & Katsikis (2014) demonstrated an increased disgust response to food images. Foroughi et al. (2020) also found that negative emotions in response to food images were higher in the eating disorder population. Similarly, Dodd et al. (2017), found that eating disorder symptomology correlated with attenuated negative affect to images of emaciated bodies. Foroughi et al. (2020) also found that negative emotions in response to food images were higher in the eating disorder population. Mayer et al., (2011) demonstrated that all participants linked obese bodies to disgust related outcomes.

Hilderbrandt et al. (2015) provided an important finding into how disgust is processed in those with eating disorders. This study found that those with eating disorders had a strong delay in extinguishing a conditioned disgust response to food compared to healthy controls. However, in contrast to these studies, Horndasch et al. (2012) found no significant difference in experience of emotions between those with Anorexia Nervosa and healthy controls. Additionally, Bell, Coulthard & Wilbur (2017) reported significantly higher levels of self-disgust in those with eating disorders and associated self-disgust in those with Bulimia Nervosa with sensation avoidance and sensation seeking. Ille et al., (2014) also reported these higher levels of self-disgust in those with eating disorders and those with borderline personality disorder, in contrast to healthy controls.

One of these studies, Foroughi et al., (2020) was the only study in this review to demonstrate a difference within eating disorders subjects between when they are actively unwell and when they are in recovery. This study found that disgust reactions in response to images were strongly reduced when weight was restored (a meaningful indicator of successful treatment).

Links to other emotions

Numerous studies looked at the associations and interactions between disgust, other emotions and other mental health difficulties. Kollei et al. (2012) reported a greater experience of all negative emotions in those with both eating disorder and borderline personality disorder. In regard to anger, Dapelo et al. (2015) demonstrated a moderate strength response bias to anger alongside decreased recognition of disgust. Fox et al. (2011) showed that inducing anger

significantly increased disgust and body size estimation. Ashworth et al. (2011) found decreased neural responses to both anger and disgust in eating disorder patients. Joos et al. (2011) showed that eating disorder and depressed participants reported less anger than healthy controls, but that eating disorder participants showed less disgust when confronted with fear stimuli than in comparison to depressed patients.

Khalil et al., (2018) demonstrated a clinical association between fear and disgust and Dapelo et al., (2017) found that alongside being less able to recognise disgust, patients with Bulimia Nervosa had a tendency to over-identify fear. Hay & Katsikis (2014) also found that eating disorder groups had both raised fear and disgust responses to food stimuli. Mayer et al. (2012) showed that adolescents paired both fear and disgust outcomes to words associated with a loss of control. However, Soussignan et al. (2010), found that fearful faces increased negative appraisals of food, whilst faces expressing disgust did not.

Links with other pathologies

Numerous studies also found links between eating disorders and other pathologies, linked by disgust. Khairallah et al. (2019) found that those at high risk of eating disorders also showed higher levels of depression, impulsivity and disgust. Ille et al., (2014) found a strong effect of heightened self-disgust to be a feature of both eating disorders and borderline personality disorder. Kollei et al. (2012), linked eating disorders to Body Dysmorphic Disorder, through patients from both disorders reporting higher levels of negative emotions. As this study also reported that negative emotions were increased, disproportionately to the controls, when participants were asked to concentrate on their own bodies, this may indicate a role of self-disgust. Kauer et al. (2015) demonstrated that picky eaters (a reasonably presumed indication of eating disordered phenomenology in the non-clinical population), were more likely to fall in the clinical range of depression, had higher OCD symptomology, increased sensitivity to disgust and neophobia. Finally Chu et al. (2015) linked disgust to specific symptomology/distress, identifying a small but significant effect of disgust in predicting suicidal ideation and behaviour, which was stronger in disgust at the world than self-disgust. Some of the studies' findings also provided evidence as to the difference in function of disgust in eating disorders in comparison to other disorders. Joos et al. (2011) showed that whilst depressed and eating disorder patients both reported less anger than healthy controls, depressed patients reported higher levels of disgust in

response to anger stimuli. This fits with prior research which has shown increased disgust in those with eating disorders to be specifically related to food and body stimuli, and not a global increase (Fox & Power, 2009).

Brain Structures & Activity

There were also three studies that examined brain activity patterns and the brain structures that show differences in processing disgust in eating disorders in comparison to healthy controls. Ashworth et al. (2011) found that participants with Bulimia Nervosa had a decreased neural response in the precuneus to facial expressions of both anger and disgust and attributed the lessened amygdala activity in response to angry faces as avoidance to fear. Joos et al., (2011) also found the amygdala to be an important brain area, registering increased amygdala activity in response to food. Monteleone et al. (2017) found over-all lessened brain activity in response to bitter taste than pleasant taste which they linked to demonstrating an altered processing of aversive and pleasant taste stimuli in eating disordered patients.

Quality Analysis

Almost all of the studies included in this review were of High Quality, as judged by their percentage score on the relevant CASP checklists. This is because the majority of the studies used a simple case control design, using validated measures and well controlled experiments. The most commonly recurring weaknesses tended to come from a lack of information, as sometimes studies did not contain all participant and recruitment information that would have been helpful. Furthermore, the effect sizes were sometimes relatively small or unclear.

Strong effect sizes were shown for: higher scores of depression; impulsivity and disgust being risk factors for eating disorders; negatively correlating pleasantness with body images; those with Anorexia Nervosa displaying a higher disgust response to food, with an impaired extinction response; self-disgust being elevated in comparison to heathy controls; body-related disgust being greater in eating disorders than in healthy controls; showing a significant increase in levels of disgust and body size estimation following an anger induction task; increased disgust sensitivity; and disgust ratings correlating with the amygdala signal negatively. For all other studies, the effect size was small to moderate or difficult to interpret.

Five out of the twenty-eight studies did fall into the Good Quality category, with three of these on the border of Low Quality (Kauer, et al., 2015; Mayer, Muris & Wilschutt, 2011; Mayer, et al., 2012). These lower ratings were primarily due to these studies using novel designs that were more difficult to categorise, as well as not producing strong effects. The difficulty in categorising the studies, meant that they did not always fit the CASP tool ideally and may have lost scores on areas made very specifically for the study design that was a best fit, rather than an ideal fit.

Discussion

The results across the studies clearly show disgust to be a prominent and important feature of eating disorders that affects the individual's experiences and maintains their difficulties. A number of the studies consistently identified a deficit in attention to disgust, which is being able to identify disgust in others. These findings are indicative of those with ED being uncomfortable with disgust and finding it hard to tolerate; as also indicated by an altered experience of disgust (Foroughi et al., 2020), through an increased disgust response to food (Hay & Katsikis, 2014), greater links of obese body images to disgust (Mayer et al., (2011), lessened amygdala response to angry faces (Ashworth et al., 2011), higher levels of reported self-disgust (Bell, Coulthard & Wilbur, 2017), and impaired ability to dissociate conditioned disgust responses to food (Hilderbrandt et al., 2015). Studies also reported a bias towards interpreting ambiguous faces as angry, which indicates a potentially exaggerated/heightened fear response. These findings are consistent with the findings of the model of disgust in eating disorders proposed by Anderson et al. (2021), which also identified a heightened sensitivity to fear and disgust which leads to aversive conditioning of disgust. These findings are also consistent with the recent review on the cognitive elements of disgust in anxiety disorders, which proposed attentional avoidance as a disgust response (Knowles, et al., 2019). However, that a lot of the studies into attentional avoidance had relatively weak effect sizes further indicates that this model may not capture the full intricacies of the role of disgust.

Multiple studies also demonstrated a link between eating disorders and other pathologies, through an association with disgust. Along with the studies showing the amygdala being central in the processing of disgust and that inducing fear increased disgust, these are all strong indication that disgust in eating disorders is inter-linked with a fear response. This makes sense

as per the original hypothesis as to the function of disgust, to help humans to avoid infections, disease and food poisoning (Weigman & Fisher, 2021).

However, the other studies in this review give more detail as to how this healthy function has been maladapted in eating disorders, often through the role of disgust, which expands upon simply viewing disgust as a negative emotion that triggers bingeing behaviours as a means of regulation (Dingemans, Danner & Parks, 2017). Those with eating disorders were shown to prime fear responses to food quicker than healthy controls, unlearn paired disgust responses to food slower, experience more negative emotions, responded differently to aversive food tastes and images and experienced less soothing of their disgust response through bonding hormones.

Most instructive in the divergence from a healthy disgust sensitivity and response may be the role of self-disgust. Whilst some extrapolations can be made to suggest that the data does represent elements of self-disgust, such as the dramatically increased effect sizes for disgust when related to their own body than when taken as a general basic emotion, the literature retrieved did not often feature it explicitly. The studies that did include it demonstrated that it may be significant. Self-disgust performs an indirect protective function in regard to health, as it may function to extinguish unhealthy behaviours. For example, self-disgust could perform the function of reducing someone's eating when they are dangerously over-weight, which could protect their health. Also, there can be social threats implied to over-eating, as being seen as taking too much of group allocated resources, or being seen as greedy, could lead to social isolation. However, as this is a response to the self, rather than more primitive, naturally aversive stimuli, such as rotten food, or disgusted faces, which the studies have shown are not attended to properly, it may be harder to regulate accurately and healthily, as seen by the attentional avoidances, and altered disgust responses in the studies of this review. This may be as there is no objective outside stimulus to accurately anchor the correctly proportional intensity of the disgust response to, but self-generated cues that can be continually changing, leading to further and further drift away from a healthy norm over time.

Self-disgust was also demonstrated to worsen all negative emotions, linked to Body Dysmorphic Disorder and predicted greater suicidality. It is therefore possible to correlate self-disgust with increased distress. Whilst there are many cognitive elements that are already understood as to their role in the maintenance of unhealthy pathologies, it may be that self-disgust is a key

determinant in the distress the conditions causes and how disruptive a problem it therefore becomes.

The SPAARS-ED model, (Fox & Power, 2009) proposes that disgust is used to mediate anger by turning it into disgust at the self. Fox and Power (2009) proposed that disgust at the self is used to defend against more painful ego-dystonic emotions, such as anger and depression, which may be viewed by the individual as more dangerous due to potentially damaging social cohesion. This is consistent with the present review's findings of increased disgust sensitivity and higher levels of depression in eating disorder populations, and increased disgust responses when anger is induced. The findings of this study are also consistent with this SPAARS-ED model, as it theorises that self-directed disgust plays an important role in the emotional maintenance of eating behaviours.

As far as treatment is concerned, this review offers further support for previously well evidenced protocols for eating disorders (Waller, et al., 2007), as their inclusion of psycho-emotional-social functioning difficulties may be addressing some of the problems caused by deficits in being able to accurately recognise emotions in others, as well as cognitive restructuring and addressing body image concerns also helping to soothe heightened disgust and self-disgust. The findings of this review may also further help to understand some of the difficulties that some practitioners have in applying all necessary treatment components consistently (Waller, Stringer, & Meyer, 2012; Waller et al., 2013). It is possible that some of the treatment components are made more difficult to adhere to due to the patient's experience of disgust, a naturally aversive emotion. Therefore, understanding the role of disgust in this could suggest combining elements of therapy specifically to target feelings of disgust and self-disgust, as such as techniques from compassion focused therapy (Gilbert & Irons, 2005)

Limitations

The first limitation of this study is that that it was conducted by a single reviewer. Whilst this was necessary due to its production as a thesis, it means that bias in ratings or presentation of findings is more likely than if the review had been conducted with collaborators. The findings of this review are also limited by some weaknesses of the available studies on the whole. Mostly

the studies appear to have used small sample sizes, often without a power calculation to confirm their generalisability, and therefore the findings do not have irrefutable generealisability. There was also a lack of variety in study designs, with little deviation from case control studies. Whilst this does help to gain a good understanding of the difference in eating disorders, other pathologies and healthy controls, it limits the potential understanding of exactly how things function within the eating disorder population and how disgust responds to other factors. Furthermore, an additional weaknesses of this review is that it did not distinguish between studies involving adolescents and adults and that the populations used were predominantly female and routinely gave no information of ethnicity. It may be that there are further differentiations in the role of disgust based on how it functions within adolescents and adults, within the male population and within different ethnicities, which may or may not relate to a potential difference in its role in the formation or maintenance in eating disorders.

To address these limitations, it would be recommended for future research on the role of disgust in eating disorders to focus on more experimental designs with larger participant sizes. It may be possible to use more randomised control trials designs by randomly allocating the eating disordered population or healthy participants to food disgust conditions and measuring impact on desire to avoid food. Furthermore, additional research on the specific role of self-conscious emotions, such as self-disgust would appear to be an important new direction for future research.

Conclusion

In conclusion, this review has found that disgust plays a consistent and prominent role in eating disorders. The studies included in this review provided evidence in support of the theory that a heightened sensitivity to fear and disgust leads to a negatively conditioned disgust response as proposed by Anderson et al. (2021). The studies also provide evidence in support of the SPAARS-ED model (Espeset, et al., 2012), which suggests self-disgust is used to mediate anger and depression, which are seen as more threatening emotions in those with eating disorders. These findings suggest that self-disgust may be of particular importance in further understanding the nuances of maintenance of the disorders and directs that further experimental design studies are needed to explore this further. The findings of the review support the use of existing ED treatments and suggest that the addition of therapies specifically targeting disgust and self-

disgust, such as Compassion Focused Therapy, may also be effective and may improve the completion rate of treatments for ED.

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Appendix A

Search terms used for searching via Scopus: (TITLE-ABS-KEY (eating AND disorder*) OR TITLE-ABS-KEY (anorexia*) OR TITLE-ABS-KEY (bulim*) OR TITLE-ABS-KEY (* AND nervosa) AND TITLE-ABS-KEY (disgust))

Search terms used for via Ovid: eating disorder {Including Related Terms} OR anorexia {Including Related Terms} OR bulimia {Including Related Terms} AND disgust {Including Related Terms}

Appendix B

Case Control Studies	1	2	3	4	5	6	7	8	9	10	11	Total Score
Aharoni, R & Hert, M.M. (2011)	1	1	1	1	1	1	0	0	1	1	0	8
Ashworth et al. (2011)	1	1	1	1	1	1	0	1	1	0	1	9
Bell et al. (2017)	1	1	1	1	1	1	1	1	1	1	1	11
Dapelo et al. (2015)	1	1	1	1	1	1	0	1	1	1	1	10
Dapelo et al. (2017)	1	1	1	1	1	1	0	1	1	1	1	10
Dapelo et al. (2017)	1	1	1	1	1	1	1	1	1	1	1	11
Foroughi et al (2020)	1	1	1	0	1	0	1	1	1	1	1	9
Foxet al. (2013)	1	1	1	1	1	1	1	1	1	1	1	11
Fukiwara et al. (2017)	1	1	1	1	1	1	1	1	1	1	1	11
Hay, & Katsikitis,. (2014)	1	1	1	1	1	1	0	1	1	1	1	10
Hilderbrandt, T. et al. (2015)	1	1	1	1	1	1	1	1	1	1	1	11
Horndasch et al. (2012)	1	1	1	1	1	1	0	0	1	1	0	8
Illle et al. (2014)	1	1	1	1	1	1	1	1	1	1	1	11
Joos et al, (2011)	1	1	1	0	1	1	1	1	1	0	1	9
Joos et al. (2011)	1	1	1	0	1	1	0	1	1	1	1	9
Kauer et al., (2015)	1	1	0	0	1	0	0	1	1	0	1	6
Khairallah et al. (2019)	1	1	1	1	1	1	1	0	1	0	1	9
Khalil et al., (2018)	1	1	1	0	1	1	0	1	1	1	1	9
Kollei et al. (2012)	1	1	1	1	1	1	0	1	1	1	1	10
Lule et al. (2014)	1	1	1	1	1	1	0	1	1	1	1	10
Monteleone et al., (2017)	1	1	1	1	1	1	1	1	1	0	1	10
Soussignan et al. (2010)	1	1	1	0	1	1	0	0	1	0	1	7
Wallis et al., (2018)	1	1	1	0	1	1	1	1	1	1	1	10

Randomised Control Trial													
	1	2	3	4	5	6	7	8	9	10	11		Total Score
Kim et al., (2014)	1	1	1	1	0	1	1	1	1	1	1		10
Cohort Studies													
	1	2	3	4	5	6	7	8	9	10	11	12	Total Score
Mayer et al., (2012)	1	1	1	1	1	0	0	0	1	0	0	0	6
Mayer et al., (2011)	1	1	1	1	1	0	0	0	1	0	0	0	6

Exploring negative emotions in males with muscle dysmorphia: A qualitative study.

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Word Count: 7 467

Date Submitted: 23/11/2021

Abstract

This qualitative study aims to gain an understanding of the functional role of basic negative emotions in the wellbeing and unhealthy behaviours of those with Muscle Dysmorphia, a pathological drive for muscularity which is classed as an eating disorder. Previous work has shown that emotions play a critical role in the behavior of people with eating disorders. Work has also demonstrated that emotions are important in men's body image. However, there has so far been no qualitative, in-depth research into the role of basic negative emotions in Muscle Dysmorphia. Gaining a deeper, qualitative understanding of the role of emotions in Muscle Dysmorphia may therefore lead to a refinement in classification and diagnosis of the disorder and may help with treatments that successfully alleviate the suffering and distress associated with the disorder. To achieve this, the study uses Template Analysis to identify themes coming from interviews with participants who have been screened as having potential Muscle Dysmorphia. The interviews found that themes of sadness and anxiety were prominent and that muscle gaining exercise regulated these through healthy and potentially unhealthy mechanisms. The study also found that rigidity and control became significant themes around exercise behaviour, which were likely representative of less healthy suppression mechanisms of sadness and anxiety. In contrast to eating disorders, this study did not find disgust or self-disgust to be a central mechanism. This demonstrates that sadness and anxiety are core features in muscle dysmorphia, including which in diagnosis may lead to more accurate diagnosis and targeting treatments towards these emotions may further enhance recovery rates.

Introduction

Muscle Dysmorphia has been defined as a person's pathological pre-occupation with the concept that they are not muscular enough, which often results in excessive weight-lifting, dieting and substance use, frequently to the detriment of their physical and psychological wellbeing (Pope et al., 2005). It is thought to affect 0.7% of the UK population (Tod, Edwards & Cranswick, 2016). However, this prevalence rate may be under-representative, as Muscle Dysmorphia itself is not regularly seen as a clinical problem, and there is no clinical pathway for it in the UK. Therefore, those suffering the effects of Muscle Dysmorphia are less likely to seek treatment for it directly, and only likely to come to the attention of services when the effects

impact on other issues more likely to involve mainstream services, such as depression and anxiety disorders.

Muscle Dysmorphia has recently been added to the DSM in the DSM-5 (American Psychiatric Association, 2013), being sub-categorised as a form of Body Dysmorphic Disorder (BDD). However, a recent review (Murray et al., 2017) has identified Muscle Dysmorphia as distinct from BDD. This paper further argues that a number of behaviours in Muscle Dysmorphia are eating disorder-related, with similar levels of dietary restraint, weight concern and shape concern found in those with Muscle Dysmorphia as are found in those with Anorexia Nervosa. A number of research papers have further established links between eating disorders and Muscle Dysmorphia (Hartman, Greenberg & Wilhelm, 2013; Murray et al., 2012). Given its disproportionate representation in males (it has been shown in recent epidemiological data to have a similar prevalence in men as eating disorders in women), it has been suggested that the pathological pursuit of muscularity may be the male equivalent of the pathological pursuit of thinness seen in women with Anorexia Nervosa (Mosley, 2008), and is often colloquially referred to as “bigorexia”.

This link between eating disorders and Muscle Dysmorphia is important for a number of reasons. Firstly, like eating disorders, Muscle Dysmorphia can be a highly distressing disorder that has a major impact on a person’s life. It has been associated with a higher incidence of psychopathology (Mitchell et al., 2016), poorer quality of life, a higher incidence of substance and steroid abuse (Pope et al., 2005) and higher rates of attempted suicide (Angelakis, Gooding & Panagiota, (2016). Secondly, some of the emotional mechanisms that play a role in eating disorder behaviours are starting to be understood (Espeset et al., 2012), which is subsequently leading to new targets for therapy to counter the underlying mechanisms of eating disorders (Powell, Simpson & Overton, 2015). Therefore, if the underlying emotional mechanisms of Muscle Dysmorphia and the damaging behaviour that it leads to are understood and found to be similar to those in eating disorders, then there may be pre-existing treatments that can be applied to alleviate suffering, or new treatments may be able to be developed or adapted for this.

Muscularity, the drive towards muscularity in males and the link to male body image and self-esteem, have long been areas of interest for research, predating the label of Muscle Dysmorphia. In particular, research has focused on the emotions in Muscle Dysmorphia in order

to understand the psychopathology behind it and the negative impacts that it can have. Studies have focused on the role of emotions, as central to almost all pathologies, being the attempt to alleviate distress, usually in the form of an unwanted emotional state (Barlow, Farchione & Bullis, 2017). This past literature has looked at emotions and male body image in a number of ways, such as the impact of emotional responses to exposure to idealized body images (Cahill & Mussap, 2007), or gender and age patterns in emotional expression. Whilst there has been a recent growth in quantitative research and reviews, there remains very little qualitative research into the area of basic emotions in Muscle Dysmorphia (Eckman, 1992), which means the basic mechanisms driving these problematic behaviours are unknown. An initial search of the literature (of PsycInfo and Scopus databases) in 2019 returned only two qualitative research papers, one of which concerned clinicians' judgements (Kinnaird Norton & Tchanturia, 2018), the other focused on drive for muscularity with a focus on enhancing sporting performance (Steinfeld et al., 2011). Furthermore, less constrained searching produced more qualitative literature, but studies focused very specifically on attitudes, beliefs and steroid use, exploring the motivators behind initiating and continuing steroid use, including self-esteem, body dissatisfaction and social acceptance (Greenway & Price, 2018), rather than on the role of basic negative emotions.

Quantitative studies in the area are largely concerned with correlates with other psychopathologies, certain behaviours, cognitive models, symptomology and impact. Some quantitative studies have attempted to examine the role of emotions, such as Edwards, Tod, Molnar and Markland (2016), who found that drive for muscularity predicted weightlifting, muscle-related worry and muscle dissatisfaction. Grieve (2007) included negative affect in a model of factors contributing to the development of Muscle Dysmorphia, and Fabris, Longobardi, Prino and Settanni (2018) linked Muscle Dysmorphia with an insecure avoidant attachment style. However, these studies do not look in-depth at the role basic emotions have in predicting wellbeing and potentially unhealthy behavior in people with Muscle Dysmorphia, or explore the emotional experience of the participants as related to Muscle Dysmorphia.

It is also of importance to look not only at basic emotions, but also self-conscious emotions (Tracey & Robins, 2009). Self-conscious emotions are the emotions that we experience in relation to a view of ourself or our actions. For example, sadness can occur when a negative

event unrelated to our actions transpires, but shame or guilt (two self-conscious emotions) include the acknowledgement that we have done something that causes sadness (Tangney, 2012). Especially relevant in the current context are likely to be the negative self-conscious emotions, such as shame, self-disgust, guilt and embarrassment, as their potential role will help to understand psychopathology and maintenance mechanisms at a more detailed level that accounts for a person's self-conscious emotional experiences. There is no current research into the emotions associated with or underlying the extreme behaviours of Muscle Dysmorphia in non-athlete males, such as excessive exercise, the following of strict training regimes to the detriment of other life events and changes in eating. It is expected that the experience of Muscle Dysmorphia and the emotions precipitating risky health behaviours in males would be qualitatively different to those of women. It has previously been suggested that Muscle Dysmorphia in women is more likely related to fear of attack (Sandgren & Lavallee, 2017). There is an increased prevalence of Muscle Dysmorphia in men and the focus on the emergent literature of Muscle Dysmorphia is predominantly being focused on males so far. Therefore, the focus of this study will be on males in order to best make use of the available literature.

There is a significant evidence base that pertains to the robustness of Muscle Dysmorphia as a distinct concept and a growing literature examining the impact of the disorder and association with other similar disorders. However, there is currently a paucity of qualitative research exploring the role of basic negative emotions in people experiencing Muscle Dysmorphia. Therefore, a qualitative study is needed to attempt to fill this gap in the literature, which may then lead to a greater understanding of the negative emotions experienced by those with Muscle Dysmorphia and how these emotions relate to behaviour. This may in turn inform potential interventions to alleviate the distress associated with the disorder.

This qualitative study aims to explore the emotional experiences of males with Muscle Dysmorphia flexibly and in-depth, particularly in regard to how they relate to basic emotions and the theoretical derivatives of self-referential beliefs. Analysis of this will then allow us to explore processes underlying risk-taking behaviours, such as anabolic steroid use and the impact on psychological wellbeing. As a relatively new research area, the literature is quite scant, but some conceptual theories have been proprosed, such as a relationship between nine variables (body mass, media influences, ideal body internalization, low self-esteem, body dissatisfaction, health

locus of control, negative affect, perfectionism, and body distortion), as described by Greive (2007) and as depicted in Figure 1. As a consequence, it makes sense to start off by simply talking to people about their experiences. Due to this, the lack of qualitative research within the literature and its fit with the aims of this study, a qualitative methodology has been selected. Five participants who scored significantly for the presence of Muscle Dysmorphia were interviewed as to their emotional experiences related to muscle gaining behaviours. The thematic content of these interviews were then analysed using Template Analysis.

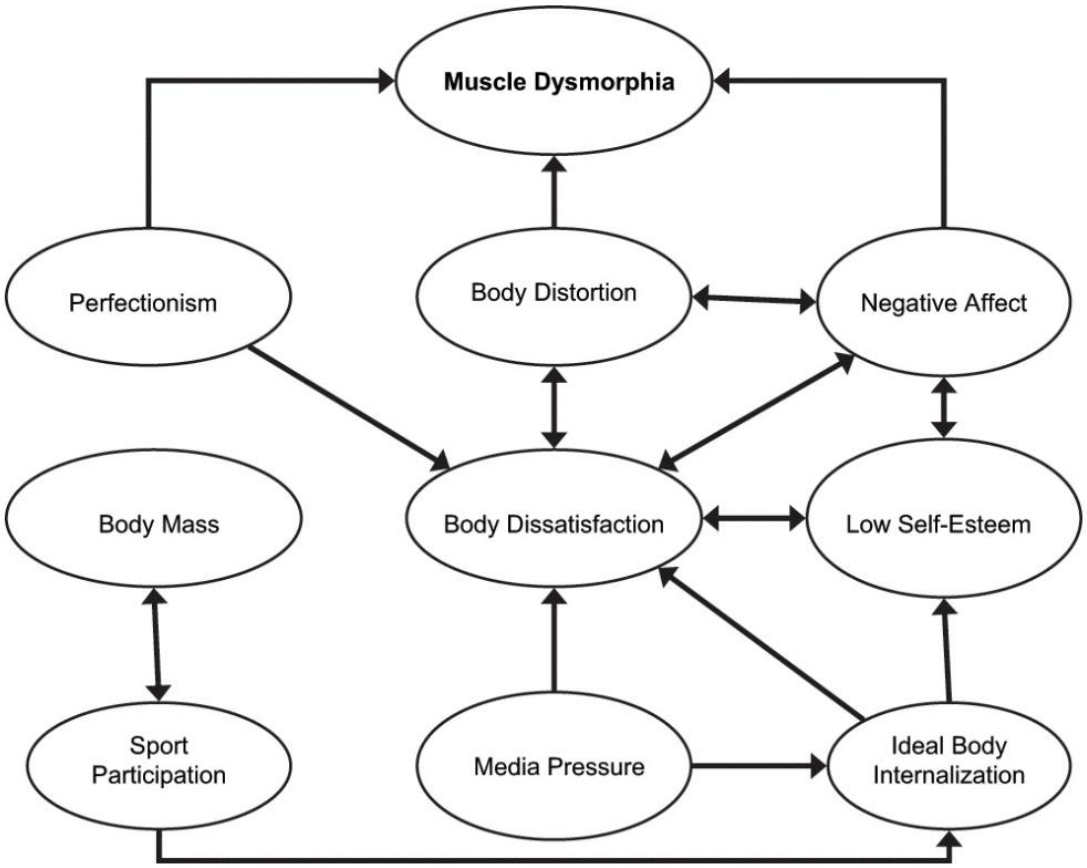

Figure 1. Relationship of nine variables conceptualized as contributing to the development of Muscle Dysmorphia (Greive, 2007).

Method

Participants

Out of 59 participants who completed an online screening survey, five males self-identifying with traits of Muscle Dysmorphia in the United Kingdom completed interviews. Convenience sampling using a snowball technique was used. Additionally, to aid recruitment, specific organisations with relevant populations, such as special interest social media groups and gym mailing lists, were approached. The rationale behind this was that males with Muscle Dysmorphia are a hard to reach population, but with a well-developed peer-to-peer network. Making use of this network allowed for timely recruitment of participants as well as removing barriers that would be expected as an outsider trying to gain access to this group.

Table 1. Inclusion and Exclusion criteria for recruitment.

Inclusion Criteria	**Exclusion Criteria**
Males	Females
Screening positive for body dysmorphia, using MDDI cut-off score of >39	Screening negative for body dysmorphia, using MDDI cut-off score of <39
Aged 18 +	Aged under 18

Recruitment

Participants in the study first completed an online screening survey. Participants were approached through promotional materials posted on social media, through gym mailing lists (Appendix A) or through someone known to them already participating in the screening, if they gave informed consent to then participate in the study. Contact with males with Muscle Dysmorphia who also recruited other participants, were established through prior contacts made by research collaborators. Additional, further contacts were established by contacting organizations with a high association with males experiencing Muscle Dysmorphia, such as special interest social media groups and by using mailing lists of gyms. They then completed the

screening measures online. Completion of the initial survey was incentivised by offering a £50 prize draw for those who complete the screening.

This process was used to identify appropriate potential participants presenting with Muscle Dysmorphia, operationalised as those with clinically significant scores on the Muscle Dsymorphia Disorder Inventory (MDDI; Santarnecchi, E., & Dèttore, 2012). A cut-off score of 39 has been recommended with use of the MDDI, as having a reliable rate of detecting those at risk of Muscle Dysmorphia (Longobardi et al., 2017; Zeek, et al., 2018). The focus on a non-clinical sample was because it was suspected the problem may not penetrate through to the clinic, certainly not as an eating disorder. Those with scores on the MDDI above the recommended cut-off were invited to participate in one-to-one semi-structured interviews focusing on Muscle Dysmorphia, discrete negative emotions, problematic behaviour and psychological wellbeing. The sample was to be chosen by randomly allocating from a sampling framework based on those in different ranges of MDDI score, age and training. This was to be done in order to ensure that the study included a breadth of people who were affected and issues that may impact on their experiences, such as different stages of lifespan and severity of dysfunction. However, due to the COVID-19 pandemic limiting numbers of participants eligible for interview, this random allocation technique was not used.

The MDDI was chosen due to it being validated and having clear cut offs; it has been found to have 75% specificity and 73.7% sensitivity at scores >39 with a Cronbach's alpha coefficient equal to 0.85 (Santarnacchi & Dettore, 2012). The online survey also collected information on types and frequency of exercise as well as demographic information (age, gender, employment status).

Sample Size

Using Template Analysis, there is no pre-determined number of participants. The study recruited and interviewed for as long as time limits allowed, as the COVID-19 pandemic posed a number of significant barriers to recruitment. The emergence of themes was continually monitored as the methodology chosen requires transcripts to be continually analysed and coded against a framework. When no new codes were emerging, saturation would be deemed to have been reached. Saturation was not reached in this study, due to the small participant number as a result

of the pandemic. However, themes were consistent across the interviews and no new themes were identified after the third transcript was analysed.

Interviews

Interviews were conducted with those participants who scored above the cut-off on the MDDI. A descriptive study design (Corbin & Strauss, 2008) based on the principles of Thematic Analysis was used as the method for the interviews and analysis. Thematic Analysis looks at manifest themes as well as more implicit content and can be used to examine existing theoretical constructs, as well as allowing theory based on the experience of the phenomenon itself to emerge (Neuendorf, 2018). It is therefore well suited to the purpose of this study, as it allows an examination of the experience of those with Muscle Dysmorphia which can then be used to inform a theory base which is currently emerging (Chapman, Hadfield & Chapman, 2015), but underdeveloped. For the purpose of this study, the conversation with participants facilitated an exploration of their emotional experiences and how these interact with potentially self-injurious behaviours. Other qualitative methodologies were considered, such as IPA, grounded theory and Discourse Analysis, but were determined to be less suitable for the aims of this study as the interviewer would have had significant bias due to significant reading of quantitative research, including proposed models, and would have lacked the structure desired to examine these specific areas the study aimed to explore. This was because there were specific areas related to previous research that were aiming to be studied and the consistency of responses across participants was deemed more relevant to this study than taking a less structured approach may have allowed for.

Procedure

Those who consented to participate in the study were given a link to complete the online screening, where they also supplied their name and their contact information (Appendix B). Prior to completing the online screening and supplying any information, participants were presented with information regarding consent to participate, confidentiality, debriefing and withdrawal (Appendix C). This also included a specific statement explaining that filling in the screening

form did not guarantee participation in an interview. The process of not selecting those who scored below 39 on the MDDI was not explained to the participants as it could have compromised data collection by providing an incentive to inflate their MDDI scores. Participants were then contacted by phone or email to discuss the interview process in more detail. Interviews were arranged with participants scoring significantly on the MDDI, consenting to and available for interview. All interviews were conducted by telephone or video-links due to the COVID-19 pandemic. The format of the semi-structured interview schedule (Appendix D) was based on helping participants to initially feel comfortable and relaxed, so that they were then able to answer more difficult questions later in the interview. The interviews were based around exploring known problematic behaviours and focus areas of Muscle Dysmorphia with frequent prompts for negative emotions. Before working with participants, a practice interview was run with a collaborating academic with relevant life experiences, and feedback given to ensure that the interviews were administered effectively. This meant that whilst there was some variation in the order of the questions asked in the interviews in the study, as some participants did give answers related to future questions, the majority of the interviews followed uniform patterns.

A second formal consent was obtained at the beginning of the interview and participants were given the opportunity to ask questions. The second formal consent was emailed prior to the interview and the participants receipt and agreement to this was verified at the beginning of the interview. The returned electronically signed consent forms were then retained in accordance with data protection standards.

Data Analysis

The interview data was transcribed by transcribers approved internally by the University of Sheffield. The transcribed interview data was analysed using Template Analysis methodology (Brooks et al, 2015). The template analysis method required developing deductive codes based on previous research into emotional experiences in eating disorders, such as Espeset et al., 2012, and inductive codes derived from the manifest and latent content of the data. For this process to occur, an initial transcript was created based on prior research and models (Appendix E). This coding template was then used to analyse the following transcript, with the new codes emerging from the data being added into the template. The template was then planned to be used to analyse

each following two transcripts, with new codes emerging from the data being used to further refine the coding template. After three transcripts had been analysed, no new codes affecting the coding template emerged from the data of the final two transcriptions and the final coding template was complete (Appendix E). The coding was done by the first researcher (trainee). A coded transcript was checked by a fellow doctoral student to ensure validity and reliability of the coding. Member checking was also used, whereby we shared a copy of the results and a summary document of the findings with previously identified service user participants, both for their input and views, which helped to assess the reliability of the findings.

Service User Participation

Groups containing participants who have experience of Muscle Dysmorphia and that may contain people who have 'been there', such as the Juice project in Sheffield, who arrange the safe exchange of needles for steroid use, were approached and consulted as to their views on the suitability of the design of this study and for their suggestions as to improvements or changes to the design as well as the interview schedule. Furthermore, the list of appropriate social media sites and gyms was collected from the service user group.

Ethics

Ethical approval was obtained via the University of Sheffield Research Ethics Approval system (see Appendix F).

Results

In all interviews participants discussed negative emotions, how they manage these and how their exercise behaviours relate to managing negative emotions. They expressed different views on the mechanisms by which their exercise behaviours managed their negative emotions, with different degrees of insight, with some explicitly stating that it helped them to move away from their negative emotions and some implicitly implying that they "wouldn't be good" if they weren't able to exercise.

Where emotions would seem to be present in how something is described or would be a logical or necessary reaction to what is being described but was not expressed or acknowledged by the participant, this was classified as regulation, suppression or avoidance of that specific emotion. This does not indicate itself whether this was a healthy regulation of a negative emotion, such as through finding a positive way to move away from an unhealthy state to a healthier one, or an unhealthy suppression, such as through not acknowledging a difficult emotion that allows it to linger and cause negative impacts throughout the person's life and perception of other experiences. Some emotions were also described by participants more in terms of their associated long-term states where the emotion is persistent over time, such as persistent low mood over fleeting sadness and so were coded as such.

In the analysis the results are presented by emotion, with sub-sections detailing how these were presented in the data, with illustrative quotes from participants. Extracts may have been edited to remove pauses and clarify preceding questions or colloquialisms, but any importance of tone and all content will have been retained.

Sadness

All participants discussed sadness, frequently in relation to numerous aspects of Muscle Dysmorphia and its associated behaviours. It appears to have been the easiest emotion for participants to be able to recognise and feel comfortable discussing.

"Yeah definitely, definitely quite sad, quite frustrated at myself, [not achieving a set goal around muscularity] wondering where I've sort of gone wrong err, I would sort of think what is it the training, is it the diet you know what have I done that's sort of it's not led to sort of the positive gains that I want and I sort of try and think about it that way. But I'd definitely feel quite sad and I would probably ruminate on it a little bit." – Participant 1.

Participants also discussed periods of prolonged or intense sadness that could justifiably be coded as low mood. Multiple participants also discussed feelings of inferiority, both in relation to others and an idealized self, as well as feelings of failure for not matching others or reaching this idealized self

"[what is it you fear of people thinking about your body?] … It'd be coming down to carrying too much fat on your body to be honest… Probably the image or the idea in my head of what I

deem as a good body I suppose, compare myself to, comparing myself to what I have in my head as an idea of what is attractive." – Participant 5.

Whilst multiple participants related feelings of joy and achievement in successful exercise sessions, none expressed happiness or contentment in their current muscularity or a well-defined endpoint of what they were hoping to achieve. Multiple participants more often discussed dissatisfaction, sadness and feeling like a failure around exercise or when checking themselves.

It was also apparent that in a number of interviews the subjects appeared to self-regulate sadness. This occurred in healthy ways, such as through explaining they had previously struggled with sadness and longer-term low-mood and that exercise, positive social contacts and moving towards their ideal body image raised their mood

"I just started getting a lot more compliments from people that then say "oh yeah you look good, you look strong". Giving me compliments on my physique." – Participant 5

However, some also discussed potentially less healthy suppression of their sadness, such as not being able to recognise their sadness when it would be an appropriate emotional response,

"[If you didn't have that training today how would you be feeling right now?] … Yeah I think a bit down to be honest I think it replaced, so I used to party a lot a little while ago so I've been sober like 2 years now (mm) and I think that replaced it quite a lot so obviously you get endorphins and stuff, that sort of extreme bit of my life like if I can put a lot into it like I used to with the partying and going out and that sort of thing, I need that replacement otherwise I don't know I don't have that exciting." – Participant 3.

All participants also discussed struggling with low mood when not able to exercise or when moving away from their ideal body image. Participants also discussed the self-conscious emotions of disappointment and failure, which were sub-themes of sadness. Disappointment was commonly referred to when the prospect of not reaching their body ideal was raised, "disappointment I think really, erm, cos I do obviously, as I say, I enjoy going to the gym and it, it, I use it as like a sort of mental stress release as well as a lot of other things and then I know that when I've, let's say in the example that I can feel a bit of a twinge maybe potentially an injury coming on. I know that I'm gonna take a few weeks out which will put my, let's say my

diet off, my erm, erm, work towards like let's say a target physique I know that's it gonna set me back by a few weeks and then it just, it, yeah." – Participant 5.

Self-directed feelings of failure were brought up when specific self-made targets were not or could not be met, "Err just I'd feel anxious about sort of not being able to achieve what I wanted to so feel like I've sort of hmm I've sort of tried something and I've sort of failed a bit here (hmm) I'm not sure why. So I'd be sort of more worried, more annoyed about sort of failing and not being able to achieve it and that'd be quite annoying. [So the anxieties around kind of experiencing that as failure?] Yeah, yeah definitely." – Participant 1.

Anger

Anger was again discussed by all participants, but the discussions around it were limited. All discussed anger at themselves if they did not train how they wanted to or were not reaching the goals they had set themselves.

"that's really annoyed me, [be]cos obviously now I'm not able to sort of finish the routine at all, I sort of have to stop at that time and I don't like that, so that does make me feel quite sad and frustrated yeah." – Participant 1

Some participants did discuss anger or frustration if they were prevented from training by external factors. One participant discussed anger at others if they perceived negative comments from others and how this became redirected at themselves. Anger was also used as motivation to fulfill a goal as well as vindication for not having met goals.

"That was always like, thinking back then it was like really was filled with a lot of shame and self-loathing, sadness. And most of that's now converted into like an anger in my older age, with the whole thing, because now I use that as a large core of like reserve of energy. So when I need to train, I honestly just go into flashbacks, I close my eyes, and I'll try and think about how I felt back then. And I'll try and turn it into anger because anger is a really good emotion to train on. Because it's a doing emotion." – Participant 4

This example appears to also demonstrate how negative self-conscious emotions of shame and self-loathing are turned into anger and then used to motivate muscle building behaviours. This

can then be cyclical with using checking behaviours at other points in the week, that participants know will lead to further shame, self-loathing and anger, which can then be used as greater motivation.

“I do weigh myself probably once or twice a week. Normally if I'm feeling bad about myself, I'll weigh myself as a kind of verification for my hate.” – Participant 4

Fear

All participants discussed fear and longer-term anxiety. This was mostly around fear of losing progress and moving away from their ideal body image.

“Fear that I'm missing out on progress, I'm missing out on the chance to progress and there's only 365… if you miss too many days you're missing out on key progression points, and for something that's a big part of my life and my hobby that's important to me.” – Participant 3

This also included fear of judgement from others in regard to their appearance, particularly current or potentially romantic partners.

“[You might say you were looking for and expecting some positive feedback?] … From my partner … when she doesn't shower me with showers of compliments, then yeah I read into that a lot. … ultimately like she’s my partner and I want to be with her. I don't, you know, if she doesn't really vindicate or like, tell me how I look and it's good, then I just, yeah, very distressing for me.” – Participant 4.

But more often it was a fear of their own internal judgements or a fear of returning to a state of sadness or prolonged low mood.

Disgust

Disgust was not commonly discussed in the interviews; despite being prompted for with each question. Most participants denied experience of it, and only two discussed it as being on the extreme end of how they feel about certain parts of their body when further from their ideal body images. One participant did relate how general feelings of inferiority from a specific event did lead to disgust at his own lack of muscularity which drives his muscle building behaviours.

“Very unhappy. Very unhappy. If you go right back to before I even started doing any sort of weightlifting… When I was young, really young and my Dad was still alive, we were in a supermarket …. there was somebody in the checkout queue who was really heavily built, really big. He was really muscular. Looking back now I can tell he was on something, but that doesn’t matter at the time. And I do remember my Dad saying to me that he was going to ask that man what he was doing so he could help train me. And I think my Dad meant it in a nice way but it just made me feel like crap”. “So disgust may come into when thinking about that specific memory of feeling as though you were too small and were inadequate [Yes] as we talked about.” – Participant 2

Self-conscious emotions

More commonly discussed were lesser variations of guilt, predominantly around not training and not reaching goals, and feelings of shame if focusing upon their distance from their body image ideals or making comparisons with others they considered less muscular. Any experiences of this theme and its sub-themes were always self-directed, with participants being very clear that they did not judge or fixate on others around them, even if they judged others as superior in their attainment or recognised similar difficulties in them. Guilt was frequently related to having not trained with enough intensity, for long enough, or having not begun earlier.

“I do look back with some regret that I didn’t do it when I was eighteen, nineteen, twenty. I was too busy not doing it and sitting on my bum you know”. – Participant 4

Shame was also discussed in relation to how they perceived some of their actions, both past and present.

“shame I think, I think it's quite shameful because I did some stupid things back then even, and I knew it, people told me it as well so it wasn't, I think I knew deep down people were telling me deep down, with what I already knew myself erm and I ignored it in pursuit of that and people have mentioned occasionally about exercise, like my parents, maybe it is a bit too much they're dead supportive and stuff most of the time (ok) but the fact that I won't go without ever, really, they have brought it up a couple of time” – Participant 3.

Regulation of emotions

There were significant sub-themes of rigidity, routine, checking and control discussed by all participants. These were difficult to categorise exclusively under one emotion theme, as they related more to how multiple emotions were regulated or defended against. Participants discussed exercise routines quickly becoming a part of a rigid routine, which took up large amounts of their time. Whilst some participants did say that they would prioritise other events over exercise if necessary, this was always mitigated by a plan to exercise worked around this, and/or expected feelings of fear, shame, guilt and sadness if there was no way to achieve this. Participants reported regularly checking their bodies in the mirror, focusing particularly on areas that they were most insecure about, and some checked their weight, though not all.

Checking behaviours mostly focused around weight concern, shape concern and overall muscularity. They sometimes resulted in satisfaction, but more often resulted in fear, sadness, guilt and shame. Control came up frequently throughout many areas of the interviews and across participants. The relationship to control appeared to be that taking action that the participant felt moved them towards their ideal body image, such as exercise, eating plans and supplement use, gave them a sense of control, which helped to regulate negative emotions. However, this also meant that anything threatening their progress appeared to threaten their sense of control and allowed for the re-emergence of suppressed negative emotions.

In combination with previous themes of sadness and fear, these themes of rigidity, routine, checking and control can commonly be seen occurring in a pattern in participants who were struggling with a period of prolonged low mood or anxiety, either due to social isolation, relationship breakdowns or dissatisfaction of body image.

“but it's very empowering. Sadness makes you stop. So you can turn one into the other. And then lastly, after that, my first girlfriend was when I was 18. I had a series of attempting to woo girls that I really, really liked and always got rejected and I've always associated it with being fat and unappealing” – Participant 4. Participants reported that they would use muscle gaining exercises which lead to a healthy suppression of these negative emotions, through providing routine, positive social contacts and a moving towards ideal body image, all of which provided a sense of control. However, themes of rigidity around exercise, excessive checking of body against ideals and expected progress threaten this sense of control and can either become more intense in an

unhealthy suppression of negative emotions or lead to increased fear, anxiety and shame around any progress not being achieved as planned.

Discussion

This study aimed to explore the emotional experiences of males with Muscle Dysmorphia and the results have provided in-depth information as to these emotional experiences, how they relate to muscle gaining behaviours and the patterns of experience of and suppression of emotions. The most prominent finding was the prevalence of sadness which was mentioned by every participant and therefore coded as the most prominent major theme in the template. Sadness and its sub-themes of self-directed disappointment and feelings of failure, were consistent themes as to what led to muscle building behaviours, were what exercise and progress towards an idealized body image successfully defended against and what occurred when participants were unable to train, due to injury or other restrictions. Anger and fear were also easily identified by participants in how they relate to themselves and how they feel others may perceive them and so were also coded as prominent major themes in the template. Whilst separated into different themes, a relationship can be suggested between the two, whereby participants expressed variations of fear in relation the idea of losing progress or muscle mass or gaining weight, which would lead to self-directed anger, frustration with others and very rarely, anger at others. It is possible that underlying these emotions, is again sadness, as a fear of sadness and anger at being made to feel sad would be understandable as the meaning behind not meeting set targets as to body shape. This again justifies the coding of sadness as the most prominent major theme in the template.

Disgust was a less clear major theme in the template. Disgust and its self-conscious aspects were expected to be a central feature of the emotions experienced due to its seemingly central importance in anxiety, eating disorders (Knowles et al., 2019) and depression (Powell, Overton & Simpson, 2014). However, it was rarely openly discussed, despite being prompted for as much as the other emotions. Whilst disgust itself was not explicitly identified commonly, that there were enough sub-types coded into the template of self-directed negative emotions, such as shame and guilt, for it be classified as a major theme, demonstrates its presence to be likely, if not confirmable by this study. It is also possible to make this deduction as shame and guilt are considered by some to be derived from disgust (Power and Dalgleish, 1997, 2007) and fit in with

evidence for being secondary disgust features (Marziller & Davey, 2004), which is why they have been coded as sub-themes of disgust in the template. It is also suggested by the prominence of depression and anxiety, which we know from other research disgust plays an important role in the experience and maintenance of.

Self-directed variations of each major negative emotions were present throughout each interview. Participants, frequently discussed guilt, shame, disappointment, feelings of failure and self-directed anger. This suggests that self-conscious emotions are likely to be of significant importance in the maintenance of Muscle Dysmorphia. Some of these self-conscious emotions had direct relations to muscle gaining behaviours, such as self-directed sadness, through feelings of failure and disappointment, leading to goal setting and behaviours designed to meet these self-set goals. Self-directed anger was directly used to increase motivation for exercise. The self-directed derivatives of disgust, shame, and guilt occurred when either the individual felt that they had not trained well enough or were looking back on past behaviour that inhibited their progress or where they went too far. Therefore, shame and guilt appear to perform the function of keeping the participants within a certain framework and level of intensity of training towards increased muscularity.

This study's findings are consistent with a number of previous studies. In accordance with Murray et al. (2017), this study also found high levels of dietary restraint, weight concern and shape concern. The findings are consistent with the model proposed by Greive (2007), as the findings demonstrate the interlinked areas of Ideal Body Internalisation, low self-esteem, negative affect and body dissatisfaction. What participants have described in their routines and checking that has been categorised as rigidity and control, could also be more broadly categorised as the perfectionism in this model.

The findings are also potentially consistent with Fabrs, Longobardi, Prino and Settanni (2018), who linked Muscle Dysmorphia with an insecure avoidant attachment style. Whilst this study did not focus on information directly related to attachment styles, the participants all discussed a negative view of themselves, characterised by a general inferiority to others and feeling of failure. Participants also discussed patterns of suppression of emotions, both of which are consistent with the insecure avoidant attachment style. These findings additionally fit with Waller, Corstorphine & Mountford (2007), who proposed that emotional invalidation is a key

component of the psychopathology of Bulimia Nervosa and Waller (2003) noted that core beliefs consistent with abandonment were prevalent in those with Bulimia Nervosa, a potentially equivalent disorder. Emotional invalidation would be consistent with the development of an insecure avoidant attachment style and the findings of this study. This also fits with the current protocols for treatment of eating disorders, a key component of which is addressing mood intolerance typical of an avoidant attachment style (Fairburn, et al., 2008: Waller, et al., 2007).

As predicted, the results show a consistency with eating disorders as to the use of behaviours such as restricted eating, physical exercise and body checking to manage emotional experiences (Corstorphine, 2006; Espeset, et al., 2012; Skårderud & Fonagy, 2011; Schmidt & Treasure, 2006). However, a notable difference was the increased focus on anaerobic, over aerobic exercise, the focus on consuming high calories rather than low calories and the use of dietary supplements with the goal of gaining as opposed to losing mass.

The findings demonstrated sadness as being the most common emotion related to both motivations for increasing muscularity and effects of the focus on muscularity. This is again similar to eating disorders. This fits with prior research that indicates a close relationship between negative affect and body dissatisfaction (Sim & Zeman, 2006; Stice, 2001).

One of the more striking differences between previous research into the emotional mechanisms of eating disorders is that this study did not find disgust to be a key component. Previous research (Espeset, et al., 2012 ; Fox, et a., 2013) has suggested that disgust may be used to inhibit sadness from being experienced or expressed. Whilst the SPAARS-ED model (Fox & Power, 2009) is consistent with the finding of anger being quickly directed towards the self, the difference in findings in this study may indicate that a different mechanism is used to inhibit sadness, and exercise itself or the subsidiary benefits, such as routine and positive social affirmations, may be a more healthy form of inhibition. It may be that control performs this inhibitory function, instead of disgust, which would account for the increased rigidity around routines and checking. Or it could be that the inhibition of sadness does not occur to the same level. In comparison to Espeset et al., (2012) most participants did not have difficulty expressing their sadness.

A further implication of disgust not being consistently identified as a key component is that previously proposed mechanisms for treating eating disorders may not be effective in treating

Muscle Dysmorphia. For example, Powell, Simpson and Overton (2015) found evidence for self-affirming kindness attenuated disgust towards one's own physical appearance. However, if self-disgust is not a key mechanism, then this may not be effective. Indeed, as this study found sadness to be the most prominent emotion, it would make sense for future interventions to include treatments for low mood, such as behavioural activation (Dimidjian, et al., 2015), cognitive restructuring (Clark, 2013) or even Values based goal-setting (Bramwell & Ricahrdson, 2018) to ensure a wider range of activities that help the individual to manage their mood, so that they are not overwhelmed if anything effects their ability to increase muscularity. The presence of shame and rigid striving to meet a hard to obtain ideal, could also indicate that a Compassion Focused Therapy may be successfully used in treatment (Gilbert, 2019; Matos & Steindl, 2020). This study provides no evidence against applying the most recent treatments developed for non-underweight eating disorders (Pellizer, Waller & Wade, 2018). This treatment protocol focused on body image flexibility, which similar to Values based goal-setting, has been shown to improve mood and anxiety through offering alternative, less rigid, coping mechanisms.

Limitations

Due to the occurrence of the COVID-19 pandemic during the recruitment phase, this study had to be conducted with less participants than was planned. There was consistency of themes across all of the interviews, however any repetition of this study, with a greater number of participants, would lend further reliability to the study's findings.

Whilst all participants did score beyond the cut off-point of the MDDI which reliably indicates the presence of Muscle Dysmorphia, all participants scored within a few points above the cut-off points on the measure. None of the participants scored near to the maximum and all participants were recruited from a non-clinical population. Also, none of the participants discussed some of the more extreme self-injurious behaviours, such as steroid use. Therefore, it is possible that the sample of this study contained those at the milder end of Muscle Dysmorphia. As a consequence, it is possible that if this study were to be repeated with those who score very highly on the MDDI, they may discuss different emotional experiences and mechanisms related to their behaviours and wellbeing. Specifically, this may be why disgust and self-disgust were not as prominent as expected in accordance with other research. It is possible that those who score

higher on the MDDI may be those who more have a greater experience of disgust and self-disgust. This is a reasonable supposition as self-disgust may be a factor in what makes a body image-based disorder more distressing (Chu, et al., 2015), which would elevate the MDDI score. Furthermore, the difficulty in recruiting those at the more extreme end of the scale of Muscle Dysmorphia may in itself be indicative of higher levels of unhealthy suppression of emotion, leading to less recognition of their problems. It may also lead to less willingness to communicate this to others, especially as self-disgust, and the related self-conscious emotion of shame leads to social isolation, rather than seeking help (Tracey, Robins & Tangney, 2007).

The Covid-19 pandemic also affected the interviews themselves, as participants were living under restrictions unusual in other times, in particular access to gyms were restricted at the time of a number of the interviews. This potentially may have led to an exaggeration of emotional experiences due to a lack of mechanisms that suppress emotions or may have demonstrated more healthy coping mechanisms and a lack of unhealthy emotional suppression mechanisms leading to a more sustained use of healthy coping mechanisms due to an ability to access their usual unhealthy alternatives.

Conclusion

In conclusion, this study has found sadness and anxiety to be key emotional experiences of those with Muscle Dysmorphia and a driver to related muscle gaining behaviours. The main findings of the template analysis were that sadness, fear, anger and self-disgust were the main emotions present in the participants of the study, coded in that order. The muscle gaining behaviours and progress towards a perceived body ideal appear to initially provide a healthy suppression of these negative emotions. However, over time, increased rigidity around muscle gaining behaviours and increased need for feelings of control in relation to body image lead to increased experiences of the coded negative emotions, which then drive more extreme muscle gaining behaviours and a greater need to for control over perceived body image. Therefore, whilst the study did report a role of self-conscious emotions, such as shame and guilt, it did not find the extremes of disgust or self-disgust that may have been expected, potentially due to the non-clinical nature of the study population, which meant a lack of highly unwell patients in the study.

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Appendix A. Advert for Study

Do you feel that your muscles are never big enough no matter how much you diet and how much time you spend training? If yes, you may wish to take part in my study which is about the lived experiences of people who exercise but feel dissatisfied with their body

I am looking for participants for a research study aimed at better understanding the experiences of those who have high commitment to building the muscles.

This will involve completing a short online survey for which there is a £50 prize draw. Afterwards, you may be invited to participate in an hour long face to face or video-call interview, for which you will be reimbursed any travel expense. We hope that this research will be helpful in understanding and alleviating the distress that some people can experience when they feel they are not hitting their body image goals.

I am a Trainee Clinical Psychologist and this project will form a part of my thesis. You will be eligible if you:

- Are male
- Are fluent in English
- Are over 18 years of age

If you are interested in participating in this study and want to be included in the £50 prize draw, please follow this link

https://sheffieldpsychology.eu.qualtrics.com/jfe/form/SV_ea3a05k8bYFgVHD

Appendix B. Online Survey

Age:

Gender:

Employment Status:

Years spent training to increase muscularity:

Types of Exercise used:

Frequency of Exercise:

Duration of Exercise:

MDDI:

	Never	Rarely	Sometimes	Often	Always
I think my body is too small					
I wear loose clothing so that people cannot see my body					
I hate my body					
I wish I could get bigger					
I think my chest is too small					

I think my legs are too thin					
I feel like I have too much body fat					
I wish my arms were bigger					
I am very shy about letting people see me with my shirt off					
I feel anxious when I miss one or more workout day					
I pass up social activities with friends because of my workout schedule					
I feel depressed					

when I miss one or more workout days					
I pass up chances to meet new people because of my workout schedule					

Appendix C. Screening Information & Consent Form

Participant Information Sheet

You are being invited to take part in a research project. Before you decide whether or not to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Take time to decide whether or not you wish to take part.

The purpose of this project is to gain an understanding of the role of emotions in men who are concerned about their physical appearance, specifically with not appearing muscular enough, and how this might lead to certain related behaviours.

1. Why have I been chosen?

You have been asked to participate because you take a keen interest in your physical appearance and are focused on increasing your muscle mass for aesthetic purposes.

2. Do I have to take part?

Involvement in this study is entirely voluntary. You will be asked to sign a separate consent form. However, even having signed the consent form you are still able to withdraw your consent and have yourself and any information you have provided removed from the study at any time and at no penalty to yourself. You will still be included in the £50 prize draw, if you have previously completed the screening questionnaire.

If you wish to be removed from the study at any point in time, please contact snewton3@sheffield.ac.uk

3. What will happen to me if I take part? What do I have to do?

If you choose to participate in this study, you will first complete an online screening. This will involve completing a questionnaire about your exercising habits and your views about your body. We will also take demographic information, such as your age, and information about your

exercising habits and substance use. You will be entered into the £50 prize draw once you have completed this screening.

A proportion of those who complete the online screening will then be selected for interview. Completing the screening does not guarantee you being selected for interview. If you are selected for interview, you will be contacted by the researcher, using the contact information you have provided, to arrange an interview. The interview will last for roughly an hour, and will be a discussion about your emotions related to exercising, your appearance and your exercise related behaviours. You will be reimbursed for any expense occurred in travelling for interview if travelling for a face to face interview. Alternatively, interviews can be arranged via video-call. There is also the possibility that you may be contacted after your interview for some follow up questions. However, we would only keep personal data, such as your contact details, for a long as it would be necessary to ask follow up questions and this data would only be used for these specified purposes.

4. What are the possible disadvantages and risks of taking part?

You may be asked to travel to attend the interview or to have internet access and appropriate video-calling software and equipment to enable the interview to take place. The interview will take place with a trained professional, however discussing your emotions can be a challenging experience for some people and can cause some distress. If you do find this experience distressing at all, we would be able to signpost you to services that may be able to provide appropriate support.

5. What are the possible benefits of taking part?

This study will provide an opportunity to discuss your emotions, which some people find cathartic. Furthermore, if this study provides no immediate benefit to yourself, it may provide future benefit to those who are distressed by their physical appearance or have their life negatively impacted by their exercising regime.

6. Will my taking part in this project be kept confidential?

All the information that we collect about you during the course of the research will be kept strictly confidential and will only be accessible to members of the research team. You will not be able to be identified in any reports or publications unless you have given your explicit consent

for this. If you agree to us sharing the information you provide with other researchers (e.g. by making it available in a data archive) then your personal details will not be included unless you explicitly request this. Personal data will be stored for no longer than necessary, and will be destroyed once there is no further need for contact from ourselves.

7. What is the legal basis for processing my personal data?

According to data protection legislation, we are required to inform you that the legal basis we are applying in order to process your personal data is that 'processing is necessary for the performance of a task carried out in the public interest' (Article 6(1)(e)). Further information can be found in the University's Privacy Notice https://www.sheffield.ac.uk/govern/data-protection/privacy/general.

As we will be collecting some data that is defined in the legislation as more sensitive (information about substance use and health), we also need to let you know that we are applying the following condition in law: that the use of your data is 'necessary for scientific or historical research purposes.

8. What will happen to the data collected, and the results of the research project?

Due to the nature of this research it is very likely that other researchers may find the data collected to be useful in answering future research questions. We will ask for your explicit consent for your data to be shared in this way.

9. Who is organising and funding the research?

The research is organised and funded by the Clinical Psychology Department of the University of Sheffield.

10. Are there any circumstances under which confidentiality would be broken?

Yes. Whilst confidentiality is important, the interviewer also has a duty of care to you and those around you. This means that if at any point it is felt that there may be a risk of harm to either yourself or anyone else, the interviewer will discuss this with you and discuss putting measures

in place to help to manage your safety, or the safety of others. This may involve contacting services designed to help to support you with this.

11. What if I wish to complain about the way the study has been carried out?

In the first instance you can contact the lead researcher, Samuel Newton on snewton3@sheffield.ac.uk. Alternatively, you can contact the other researchers involved in the project; Professor Paul Overton on p.g.overton@sheffield.ac.uk or Philip Powell on p.a.powell@sheffield.ac.uk.

If you feel that your complaint has not been handled to your satisfaction following this, you can contact Dr Glenn Waller, Head of Psychology Department on G.Waller@sheffield.ac.uk or Dr Thomas Webb, Chair of the University of Sheffield Psychology Research Ethics Committee on T.Webb@sheffield.ac.uk

12. Contact Information

This research is being conducted by **Samuel Newton,** Trainee Clinical Psychologist. This research will be used to write a thesis which fulfils part of their doctoral training. If you have any questions about the research, you can leave a telephone message with the Research Support Officer on: 0114 222 6650 and he will ask **Samuel Newton** to contact you.

13. Additional Information about your data

New data protection legislation came into effect across the EU, including the UK on 25 May 2018; this means that we need to provide you with some further information relating to how your personal information will be used and managed within this research project.

The University of Sheffield will act as the Data Controller for this study. This means that the University is responsible for looking after your information and using it properly. In order to

collect and use your personal information as part of this research project, we must have a basis in law to do so. The basis that we are using is that the research is ‘a task in the public interest’.

As we will be collecting some data that is defined in the legislation as more sensitive (e.g. information about your health, we also need to let you know that we are applying an additional condition in law: that the use of your data is ‘necessary for scientific or historical research purposes’.

Further information, including details about how and why the University processes your personal information, how we keep your information secure, and your legal rights (including how to complain if you feel that your personal information has not been handled correctly), can be found in the University’s Privacy Notice https://www.sheffield.ac.uk/govern/data-protection/privacy/general.

CONSENT FORM

Samuel Newton:

Please initial box

1. I confirm that I have read the information sheet dated..... (version.....) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐

3. I understand that the information collected about me will be used to support other research in the future, and may be shared anonymously with other researchers. ☐

4. I agree to take part in the above study. ☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Person taking consent	Date	Signature

Appendix D. Coding Templates

Initial Coding Template

Code Name	Definition	Example
1. Disgust	A feeling of revulsion, contamination or despising	"I was revolted"
1.1 Shame	A painful or distressing feeling due to a self-conscious attribution of wrongness or foolishness	"I just hate the way that I look, I shouldn't be this puny".
2. Fear	A feeling of threat or foreboding, that a bad consequence will occur in the future	"I would worry that I would gain weight"
3. Anger	A strong feeling of annoyance, displeasure or hostility	"I wanted to smash the mirror"
4. Sadness	An upsetting feeling; the feeling of being unhappy, especially because something bad has happened.	"I feel low"
4.1 Disappointment	Feeling that an expectation has not been met	"I should be bigger by now"

Final Coding Template

Code Name	Definition	Example
1. Sadness	An upsetting feeling; the feeling of being unhappy, especially because something bad has happened.	“that definitely makes you feel quite sad”
1.1 Disappointment	Feeling that an expectation has not been met	“There’s a little sense of disappointment”
1.2 Low Mood	Persistent sadness over time, including symptoms of depression	“I'd probably see a mood drop halfway through the week”
1.3 Inferiority	An expression of being lessor than a other in some aspect	“I’ll never have the natural physical that some enjoy”
1.4 Failure	A feeling of not having achieved a specified goal	“I just couldn’t get my Biceps any bigger and I couldn’t get to 60kg reps”
1.4 Suppression of Sadness	A lack of conscious awareness of sadness, where that emotion would be an appropriate response to the context or where there are other indications of sadness being present.	“It was really bad that that happened, but I just focused on my routine”
2. Fear	A feeling of threat or foreboding, that a bad consequence will occur in the future	“I do get fearful about it”

2.1 Anxiety	A lower intensity manifestation of fear that may be longer lasting.	"Of definitely a little bit of anxiety about it, you get a little bit worried about it"
2.2 Suppression of Fear	A lack of conscious awareness of anxiety, where that emotion would be an appropriate response to the context or where there are other indications of anxiety being present.	"I get quite defensive"
3. Anger	A strong feeling of annoyance, displeasure or hostility	"Maybe anger at the change, irrationally obviously, anger at the fact that I'm having to change"
3.1 Self Directed anger	A strong feeling of annoyance, displeasure or hostility towards oneself	"I am annoyed at myself for not starting sooner"
3.2 Anger, directed at others	A strong feeling of annoyance, displeasure or hostility towards others.	"They really pissed me off"
3.3 Frustration	A lower intensity manifestation of anger that can be longer lasting	"I am really frustrated that I can't get past this PB no matter what I try"
3.3 Suppression of Anger	A lack of conscious awareness of anger, where that emotion would be an appropriate response to the context or where there are other indications of anger being present.	"I wouldn't focus on it [someone giving negative feedback], I'd just train extra hard that week".
4. Disgust	A feeling of revulsion,	"So disgust may come into

	contamination or despising	when thinking about that specific memory"
4.1 self-directed disgust	A feeling of revulsion, contamination or despising related to the self, as opposed an external stimulus	"I couldn't stand to look in the mirror"
4.2 Shame	A painful or distressing feeling due to a self-conscious attribution of wrongness or foolishness	"I just hate the way that I look, I shouldn't be this puny". . So just to clarify again. So disgust may come into when thinking about that specific memory of feeling as though you were too small and were inadequate [Yes] as we talked about. so I'm like annoyed and probably a bit, disgusted with myself for falling for the same trap that they have, and maybe fearful that I'm going to be super like them (mm) I should be able to see their faults and move away it instead of kind of re-enacting what they've already done like self-loathing because-, which we'll get to but I had a lot of teasing at school for

		like having man-boobs when I was fatter.
4.3 Guilt	A feeling of shame related to prior actions	"I know I shouldn't have said it, I regret it now."
5. Rigidity	A lack of flexibility or nuance in thought or expression of emotion. May include implied negative consequences of rules not being followed	"I have a set system I need to follow"
5.2 Routine	A repeating pattern that is consistently adhered to	"Every morning I…."
5.3 Checking	Repeated seeking of information in response to distress	"I look in the mirror and check my stomach every morning"
5.4 Control	A theme of desiring or attempting to feel in control, often as a means of suppressing other emotions	"If I can make sure to stay on top of my routine, I don't really feel those things anymore"

Appendix E. Interview Schedule

Before the interview

The interviewer will introduce themselves, and thank you for agreeing to take part.

They will provide some background to this research:

"The purpose of this project is to gain an understanding of the role of emotions in men who are concerned about their physical appearance, specifically with not appearing muscular enough, and how this might lead to certain related behaviours. While we may touch on things that may have affected you in the past, or may affect you in the future, we are interested in the things that are important to you today, in the present."

The interviewer will go through some important points with you:

1. With your permission we would like to record this interview. This will help us to focus on the things you say.

2. Everything you say is confidential. Information you share in this interview will not be passed on to others outside of the research team, unless there is a concern about an immediate risk of harm to yourself or others, in which case we have a duty to contact services designed to help support you. Any quotes used in reports will be anonymised.

3. In the interview, we might discuss things you may find difficult. You do not have to answer any questions you do not want to. If there are any questions that you are uncomfortable with, or you find difficult, we can move on, so please don't worry.

4. The interview will take us approximately an hour to complete. However, you can stop the interview at any time, or take a break, if you wish to do so.

The interviewer will provide a further copy of the information sheet, and, if you have not done so already, ask you to complete a consent form and a form with some background details about you.

The interviewer will ask you if there is anything you would like to ask us before we begin.

During the interview:

NOTE: The interview begins after informed consent has been acquired. Participants are reminded of their right to stop the interview at any point and withdraw their data before it has been anonymised and coded. They will also be reminded that the interview is being recorded and transcribed. Questions for each topic area are numbered by order of being asked. However, if sufficient information is gained without the need for further prompting, not every question will be asked, nor in the specified order.

At the start of the interview the researcher will begin with:

Thank you for taking part in this interview.

[Background]

If you would like to stop the interview at any time, or have any concerns or questions please let me know. Do you have any questions before we begin?

Questions:

1. I'd like to start by asking you some general questions about yourself and your lifestyle. **Can you tell me about a typical day in your life?**
   (Prompts: You typically get up at what time? What then?)

2. **Tell me about your training**
   (Prompts: Can you remember your first time in the gym? What was your last personal best? Would you describe yourself as competitive and if so in what way does that show itself)

3. Now I'd like to get a little more specific and a little more personal. As you know, I want to find out about how people feel about their physical appearance, so **how do you feel about yours**?
   (Prompts: Would you change your body – if so, how? You look in the mirror – what do you see? What feelings do you have? Do you feel disappointment or concern? What other feelings (emotions) are involved and what words would you use to describe them? Prompt relating to negative emotions - sadness/anger/fear/disgust)

4. I'd now like to follow that up with some questions about exercise and the role it plays in your life. **How do you feel about exercising?**
   (Prompts: What feelings do you have when exercising for long hours [prompt relating to negative emotions]. What emotion do you have before? What are these emotions directed at? What causes you to feel that way? How do you feel if you miss a day's training?)

5. **[Follow on question] How does exercising for long-hours impact on your life?**
   (Prompts: What sorts of events have you missed due to exercise? What sorts of events would you be prepared to miss due to exercise?)

6. **What do you experience when you are missing other events due to exercise**?
   (Prompts: Do other emotions and feelings play a role ? If so, what feelings [prompt relating to negative emotions]? What causes you to feel that way? How do you feel if you are made to attend something at the expense of training?)

7. Thank you – I'd like to move on now to explore your interactions with other people in relation to exercise. **What role do other people play in maintaining your exercise regime?**

(Prompts: Do you compare yourself to other people inside the gym, if so, in what way? Outside the gym? On TV, in films, or magazines/newspapers?)

8. **How do you feel when your body is visible to other people?**
   (Prompts: Negative emotions? What are these emotions directed at? What causes you to feel that way? Do you actively shy away from social contact with your fellow gym members? People more widely?)

9. **How often do you check your body or weigh yourself?**
   (Prompts: How do you feel about mirrors? What sorts of things do you look for when you check your body? Do you weigh yourself with others around? What feelings and emotions are associated with this activity [prompt relating to negative emotions]?

10. **How do you feel when seeking feedback from others in regard to your body, or reading in others what you think of as (unstated) feedback about your body?**
    (Prompts: Negative emotions? What are these emotions directed at? What causes you to feel that way? How do you feel if you get negative feedback? How do you feel if you get positive feedback? Do you enter competitions - if so, why?)

11. Thank you. I'd now like to move on and talk a little bit about some of the health-related consequences of your exercise regime. **Do you spend a lot of time thinking about your body size? How does that make you feel?**
    (Prompts: Do you find yourself dwelling on your body size? Do you find yourself having low mood as a consequence of body-size issues? Do you find yourself having becoming anxious as a consequence of body-size issues? How would you describe your feelings [prompt relating to negative emotions]?)

12. **Aside from exercise, are there other ways which you use to achieve your body size ideal?**
    (Prompts: Diet? Steroids?)

13. **How do you feel when your taking part in activities that you know could be harmful to you?**
    (Prompts: Negative emotions? Do these feelings occur before, during or after use? What are these emotions directed at? What causes you to feel that way? How do you feel about the prospect of not taking those risks?)

14. **How would you describe your general wellbeing?**
    (Prompts: Do you feel that you're treating your body well? Do you feel that you're treating your body badly? What causes you to feel that way?)

15. **Have we chatted about anything you want to revisit? Or is there anything else you think is important?**

16. **Is there anything you want to ask me?**

After the interview

The interviewer will turn off the recording and ask you if you have any questions about the project. They will then thank you for your time.

Appendix F. Ethics Approval

The University Of Sheffield.

Downloaded: 19/04/2019
Approved: 19/04/2019

Samuel Newton
Registration number: 170149329
Psychology
Programme: Doctorate in Clinical Psychology

Dear Samuel

PROJECT TITLE: Exploring negative emotions in males with muscle dysmorphia: A qualitative study.
APPLICATION: Reference Number 024746

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 19/04/2019 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 024746 (dated 04/04/2019).
- Participant information sheet 1059052 version 1 (01/04/2019).
- Participant consent form 1059054 version 1 (01/04/2019).

If during the course of the project you need to deviate significantly from the above-approved documentation please inform me since written approval will be required.

Yours sincerely

Jilly Gibson-Miller
Ethics Administrator
Psychology