THE ROLE OF DISGUST SENSITIVITY IN DISORDERED EATING SYMPTOMOLOGY

A Thesis
by
JORDAN JAMES HAMILTON

Submitted to the Graduate School
at Appalachian State University
in partial fulfillment of the requirements for the degree of
Master of Arts

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Department of Psychology

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Abstract

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Disgust, a fundamental emotion, garners minimal scientific consideration, relative to other basic emotions. While disgust is evolutionarily grounded in food appraisal, prima facie associations with disordered eating lack substantial empirical support. The present analyses examined the relationship between the Disgust Scale-Revised (DS-R), Eating Disorder Diagnostic Scale (EDDS), and Anxiety Sensitivity Index-3 (ASI-3) using a large (n = 1,339) demographically representative sample. Results from multiple regression analyses indicated that levels of core, animal-reminder, and contamination disgust sensitivity were predicted by the characteristics of gender, age, and race. Women, minority, and younger individuals displayed increased levels of each domain of disgust, with the exception of age and contamination disgust. Contrary to predictions, results from a hierarchical regression showed that disgust sensitivity did not predict disordered eating, after controlling for anxiety. Anxiety; however, was a significant predictor of disordered eating. Finally, two binary logistic regressions assessed the three disgust subscales as predictors of

eating disorder categorization. Results indicated that increased core disgust significantly predicted increased likelihood of bulimia nervosa and binge-eating disorder tentative diagnoses. Furthermore, increased contamination disgust predicted a decreased likelihood of a tentative diagnosis of binge-eating disorder. These findings suggest that specific demographic characteristics may be used as predictors of disgust sensitivity and that disgust may play a secondary role to anxiety in predicting disordered eating symptomology. Moreover, these results indicate that dimensions of disgust sensitivity could play a role in the etiology of disordered eating, suggesting the need for a greater understanding of this understudied emotion.

Keywords: disgust, eating disorders, anxiety, individual differences

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Dedication

This thesis is dedicated to anyone who has been impacted, directly or indirectly, by an eating disorder.

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Disgust, a fundamental emotion, garners minimal scientific consideration, relative to other basic emotions. While disgust is evolutionarily grounded in food appraisal, prima facie associations with disordered eating lack substantial empirical support. The present analyses examined the relationship between the Disgust Scale-Revised (DS-R), Eating Disorder Diagnostic Scale (EDDS), and Anxiety Sensitivity Index-3 (ASI-3) using a large (n = 1,339) demographically representative sample. Results from multiple regression analyses indicated that levels of core, animal-reminder, and contamination disgust sensitivity were predicted by the characteristics of gender, age, and race. Women, minority, and younger individuals displayed increased levels of each domain of disgust, with the exception of age and contamination disgust. Contrary to predictions, results from a hierarchical regression showed that disgust sensitivity did not predict disordered eating, after controlling for anxiety. Anxiety; however, was a significant predictor of disordered eating. Finally, two binary logistic regressions assessed the three disgust subscales as predictors of eating disorder categorization. Results indicated that increased core disgust significantly predicted increased likelihood of bulimia nervosa and binge-eating disorder tentative diagnoses. Furthermore, increased contamination disgust predicted a decreased likelihood of a tentative diagnosis of binge-eating disorder. These findings suggest that specific demographic characteristics may be used as predictors of disgust sensitivity and that disgust may play a secondary role to anxiety in predicting disordered eating symptomology. Moreover, these results indicate that dimensions of disgust sensitivity could play a role in the etiology of disordered eating, suggesting the need for a greater understanding of this understudied emotion.

Keywords: disgust, eating disorders, anxiety, individual differences

The Role of Disgust Sensitivity in Disordered Eating

Emotional experiences traditionally manifest as either fear, anger, surprise, happiness, sadness, or disgust (Ekman, 1992; Plutchik, 2001). Disgust is the basic emotion most intimately affiliated with food. Eating disorders (ED) are characterized by an inappropriate relationship with food. Therefore, disgust may play a salient role in the etiology of food-related mental health disorders. If disgust sensitivity is indicative of differential patterns in disordered eating, then it would also be helpful to understand demographic trends in disgust sensitivity. Currently, anxiety is the central focal point in academic literature regarding the emotional basis of disordered eating (McKay, 2017). While fear and anxiety may be responsible for a significant portion in the understanding of disordered eating, this thesis argues that disgust sensitivity is also a unique feature in the pathogenesis and symptomology of disordered eating

Disgust Sensitivity

Charles Darwin was the first scientist to describe disgust in an academic context (Darwin, 1872). From an evolutionary standpoint, disgust is thought to safeguard the individual from disease or infection risks (Chapman & Anderson, 2012; Davey, 2011; Haidt, McCauley, & Rozin, 1994; Oaten, Stevenson, & Case, 2009). Relative to other basic emotions, disgust is characterized by a distinct set of bodily markers (Cisler, Olatunji, & Lohr, 2009). This corporeal profile includes a decrease in heart-rate (Davey, 2011) and signature facial expression (Cisler et al., 2009). Neurological features include activation of the amygdala, insula, striatum, cingulate cortex, and basal ganglia (Klucken et al., 2012; Vicario, Rafal, Martino, & Avenanti, 2017; Watkins et al., 2016). Experientially, a sensation of nausea characterizes revulsion (Darwin, 1872); behaviorally, repugnance typically

translates into an increased distance between oneself and a disgusting stimulus (Cisler et al., 2009). A hereditary basis for disgust may account for about half of all genetic variability (Sherlock, Zietsch, Tybur, & Jern, 2016). While disgust propensity refers to the inclination to experience disgust in relation to an object, thought, or circumstance, disgust sensitivity captures the emotional intensity of these experiences (van Overveld, de Jong, Peters, Cavanagh, & Davey, 2006). Originally a disease-avoidance mechanism, disgust may have evolved to encapsulate a response set to a vast array of stimuli outside the realm of toxin rejection (Davey, 2011; Oaten et al., 2009). Since disgust sensitivity is a heterogeneous construct, the psychological measurement of these emotional subtleties is frequently partitioned into three dimensions: core, animal-reminder, and contamination (Olatunji, Haidt, McKay, & David, 2008).

Core Disgust Sensitivity

Core disgust is grounded in a primeval expression of biological revulsion and simultaneously reduces appetite and increase nausea (Rozin, Haidt, & McCauley, 2000). The potential risk of ingesting or contacting a poisonous substance is the fundamental harbinger of this reaction. Deemed the "gateway to the body," core disgust protects the physical form from pathological intrusion (Rozin & Fallon, 1987). Therefore, tainted food poses a serious threat as a medium of harmful microbial transmission. Core disgust is the antithesis of hunger, evoking a gastrointestinal rejection response in the event of incidental consumption (Chapman & Anderson, 2012).

Various types of animals and animal-based food are considered unsanitary for practical and cultural reasons. Creatures associated with carrion or decay, such as vultures and maggots, are deemed disgusting due to increased exposure to pathogens. The

characteristics of familiarity or similarity, in the case of pets and other primates, render these animals unsavory dietary options. (Rozin, Haidt & McCauley, 2008). In an ancestral environment, embodying this trait could be an advantageous technique in omnivorous nutritional assessment.

Human body products represent another realm within the core dimension of disgust sensitivity. Since excrement is decaying food matter, it is an elementary core disgust elicitor. Other human waste products include vomit, phlegm, mucus, sexual fluids, blood, saliva, bile, and urine. This defense mechanism is evolutionarily adaptive, helping to limit the risk of contracting communicable diseases (Rozin & Haidt, 2013). Tears, which are uniquely human and do not pose a microorganismal threat, are an exemption to this classification (Rozin et al., 2008). While tears, signifying separation from other animals, are not disgusting, recognition of humanity's connection to animals is consistently revolting.

Animal-Reminder Disgust Sensitivity

Animal-reminder disgust represents discomfort with the visceral nature of human beings. Holistic disruption of the human body, when perceived as a contiguous shape, is a reliable indicator of revulsion. Images of gore and deformity, operationalized as violations of the human body envelope in disgust research, emphasize the fragile and ephemeral nature of biological existence (Olatunji et al., 2008; Rozin et al., 2008). Bodily abnormalities and injuries are often deeply disturbing because they are reminiscent of the delicateness of organic life. Furthermore, individuals with fitness-reducing qualities are not ideal reproductive partners, from an evolutionary standpoint (Rozin & Fallon, 1987). Death, the other component of animal-reminder disgust, is closely affiliated with decay (Olatunji et al., 2008). Aversion to mortality salience can be triggered by exposure to stimuli containing

corpses, violence, and natural disasters. While animal-reminder disgust is chiefly concerned with gross visible threats, the final domain of disgust sensitivity concerns invisible threats.

Contamination Disgust Sensitivity

Contamination disgust is a multifaceted construct. The law of similarity and the law of contagion comprise this domain (Rozin & Fallon, 1987; Rozin et al., 2008). The law of similarity states that something resembling a noxious substance is also noxious in and of itself. The stereotypical example of this law is reluctance to eat a piece of chocolate shaped like feces (Rozin et al., 2000). This may be an adaptive function to protect the self from disease by avoiding false positives. The law of contagion, simply put, states that once something is in contact with an impurity, it will henceforth remain polluted. This motivation is likely an implicit endorsement of disease management, protecting an organism from invisible pathogens (Oaten et al., 2009). Davey (2011) further corroborates this hypothesis in an analysis of the diverse implications of disgust as a disease aversion strategy. Initially an ancient biological safeguard, disgust may have eventually evolved to also control social, cultural, and moral valuations (Rozin et al., 2008). From an evolutionary perspective, heightened contamination disgust sensitivity can be adaptive when food is potentially unsanitary due to invisible contagions.

Demographic Predictors of Disgust Sensitivity

A paucity of research has examined gender, age, or race as a function of disgust sensitivity (McKay, 2017; McNally, 2002). If specific demographic norms exist, then it is important to understand these differences as a frame of reference for conceptualizing expectations for disgust variations. Gender differences in disgust sensitivity are supported by evolutionary theory and scientific literature (Darwin, 1872; Haidt et al., 1994; Lieberman,

Tybur, & Latner, 2012). Women are regularly more disgust sensitive than men across all domains (Bassett, 2017; Berger & Anaki, 2014; Haidt et al., 1994; Tybur, Bryan, Lieberman, Caldwell Hooper, & Merriman, 2011). Biologically, women are thought to have the combined role of protecting themselves and their offspring from latent hazards. This hypothesis is supported by the finding that pregnant women display higher levels of disgust than non-pregnant women (Fessler, Eng, & Navarrete, 2005), and women with children are more disgust sensitive than women without children (Prokop & Fancovicova, 2016). Since disgust is a cautious and avoidant reaction, it could be adaptive to avoid potential risks associated with this signal.

Age, which brings with it life experience, is typically concomitant with a desensitization to aversive stimuli (Curtis, Aunger, & Rabie, 2004). Disgust is a negatively valanced emotion that declines with age (Cisler et al., 2009; Tybur et al., 2011). Furthermore, death anxiety peaks in young adulthood and is lowest in old age (Power & Smith, 2008). Berger and Anaki (2014) measured disgust sensitivity as a function of demographic variables in a large Israeli sample and found increased age significantly correlated with overall decreased disgust sensitivity. These investigations suggest that exposure to repulsive events over time reduces the emotional intensity of these experiences.

Preexisting cultural differences may be responsible for impediments to mental health diagnoses and psychological treatment in minority groups. Williams, Abramowitz, and Olatunji (2012) found that black participants scored higher on measures of contamination concern, but not disgust sensitivity, relative to white participants. These findings are corroborated by Williams and Turkheimer (2007), with the addition of increased contamination concerns regarding domestic animals. The *stereotype compensation* reporting

bias is one possible explanation for these results (Williams, Turkheimer, Magee, Guterbock, 2008). This theory holds that, in addition to the possibility of actual differences "such findings may be due to presentation concerns, resulting in the over-endorsement of cleaning items to counteract negative stereotypes about African Americans" (Williams et al., 2012, p. 635). Fluctuations in cultural attitudes towards cleaning behaviors and animals conceptually coincides with reporting differences in the core and contamination disgust dimensions (Williams & Turkheimer, 2007). In the first relevant cross-cultural study on disgust, Hirai and Vernon (2011) demonstrated that Asian American participants scored significantly higher on all three domains of disgust sensitivity, relative to white participants. The authors suggested that a tendency towards emotional restrictedness in Western cultures may elucidate these results (Fischer, Rodriguez Mosquera, van Vianen, & Manstead, 2004). Finally, Wheaton, Berman, Fabricant, and Abramowitz (2013) found that both African and Asian Americans reported higher levels of contamination concerns, relative to European Americans. Overall, these studies demonstrate a consistent association between non-white status and increased disgust sensitivity, especially contamination concerns.

Disgust is predictive of myriad mental health issues, such as small animal phobias, blood-injection-injury phobia, and obsessive-compulsive disorder (Chapman & Anderson, 2012; Curtis, 2011; Davey, 2011; Olatunji, Armstrong, & Elwood, 2017; Olatunji et al., 2008; Vicario et al., 2017). If gender, age, and race are indicative of different average levels of disgust, this highlights the need for a different clinical perspective in assessing expected levels of disgust. Based on a review of relevant literature, the present study is purported to be the first to use a large, representative, American sample to measure specific domains of disgust sensitivity in the context of demographic variations. This demographic analysis

aimed to illustrate differences in disgust sensitivity, as a platform for understanding expected group norms. If disgust plays an important role in disordered eating, then it is important to understand expected trends in disgust sensitivity, based on demographic characteristics.

Eating Disorders

Fundamentally, EDs reflect extremities in eating behaviors and attitudes. EDs are associated with a profound decrease in quality of life and negative affect (Martin, Padierna, Lorono, Munoz, & Quintana, 2017; Sanftner, 2011; Winkler et al., 2014). Furthermore, EDs have the highest crude mortality rate of all mental illnesses (Chu, Bodell, Ribeiro, & Joiner, 2015). This issue is further complicated by the frequent presence of comorbid psychiatric illnesses (Cisler et al., 2009). Therefore, a more thorough understanding of the underlying causes of EDs is necessary. Anorexia nervosa (AN), bulimia nervosa (BN), and binge-eating disorder (BED) are the three most prevalent ED diagnoses in the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM–5; American Psychiatric Association [APA], 2013). Diagnostic criteria for each of these disorders are hierarchically nested and mutually exclusive for a single episode.

Anorexia Nervosa

AN is typified by three characteristics: a gross restriction of caloric intake, subsequent maintenance of an extremely low weight, and concerns with body shape and weight, or lack of acknowledgement of the medical severity of extremely low weight (APA, 2013; Wildes et al., 2017). AN emerges in two subtypes - either restrictive or binge-purge (APA, 2013). The restrictive subtype limits overall level of food consumption, while the binge-purge subtype consists of pathological overeating followed by compensatory behaviors. AN is the deadliest mental health disorder due to elevated suicide risk and fatal

starvation (Chu et al., 2015). Prolonged malnutrition negatively impacts every major organ system and can cause irreversible loss to bone mineral density (Kaye, 2008). In malnourished individuals with a dangerously low body weight, but without AN, depressive symptoms are common, leading researchers to propose that starvation itself may create depressive symptoms (Westmoreland, Krantz, & Mehler, 2016). Perfectionism, death anxiety, low self-esteem, and neuroticism are all positively correlated with AN (Le Marne & Harris, 2017). Crossover between subtypes and diagnostic categories of EDs is frequent and bidirectional, occurring in approximately half of those with an initial diagnosis of AN (Monteleone, Di Genio, Monteleone, Di Filippo, & Maj, 2011). These findings lend support to a dimensional, rather than categorical, approach to EDs.

Bulimia Nervosa

BN includes episodes of pathological over-eating and subsequent compensatory behaviors to prevent weight gain. These pathological weight management strategies include, but are not limited to, self-induced vomiting, fasting, laxative or diuretic use, excessive exercise, and prolonged fasting (APA, 2013). Self-induced vomiting is the most common compensatory behavior, often leading to erosion of tooth enamel due to stomach acid exposure (Westmoreland et al., 2016). BN also contains features of body dysmorphia and low self-esteem, although individuals with BN are either normal weight or overweight (Lewis & Nicholls, 2016). The binge-purge subtype of AN is essentially identical to BN, except for a significantly low body mass index (BMI) in individuals with binge-purge AN. Furthermore, both AN and BN patients displayed increased activation in the right amygdala, relative to healthy controls, indicating a shared pathway (Monteleone et al., 2017).

Binge-Eating Disorder

BED is characterized by occurrences of extreme over-eating, without any accompanying compensatory behaviors. Therefore, BED is nearly identical to BN, excluding the presence of pathological weight mitigation behaviors. As a result, individuals with BED are typically obese, due to chronic episodes of uncontrolled eating (Zeeck, Stelzer, Linster, Joos, & Hartmann, 2011). BED is differentiated from obesity in that eating binges must display an impulsivity and loss of control during a limited window of time. While AN and BN prominently feature body image concerns, these attitudes are not required for a BED diagnosis. A lack of interoceptive awareness, linked to insular pathway abnormality, is also a trend in BED and BN patients (Frank, Shott, Keffler, & Cornier, 2016). These results suggest that BED and BN individuals are less sensitive to rewards and cues which suppress the desire for additional food consumption (Frank et al., 2016). Inactivity in the insula in response to food-related cues is suggested to contribute to reduced satiety (Watkins et al., 2016). Furthermore, chronic food over-consumption is posited to alter neurological reward pathways due to dopamine insensitivity (Vicario et al., 2017). While the supposition of an addition to food is not entirely accurate, there are neurological commonalities between cerebral activation in EDs and other types of substance addictions (Barbarich-Marsteller, Foltin, & Walsh, 2011). Since BED as a specific diagnosis is new to the DSM-5, the corpus of research is relatively nascent (APA, 2013).

Disgust Sensitivity and Disordered Eating

Disgust, which may have initially evolved as a food-orientated defense mechanism, only appears three times in the *Feeding and Eating Disorders* section of the DSM-5. Given that this chapter of the DSM-5 focuses on maladaptive relationships with food, the absence

of references to disgust is unexpected. Evidence for the role of disgust in disordered eating emerges from neurological, biological, and psychological research.

Disgust communicates cultural values (Rozin et al., 2008). In industrialized societies, thin body shapes are valued, and large body shapes can be perceived as disgusting (Vartanian, 2010). This weight bias, potentially motivated by disgust, may encourage AN and BN individuals from becoming disgusting themselves. Otherwise put, increased disgust sensitivity may help explain the presence of body dysmorphia in AN and BN patients. Additionally, increased disgust was found to predict increased suicidal ideation in disordered eating patients (Chu et al., 2015). Evidence for the role of disgust also arises from comparisons between remitted and current AN and BN patients. Those in remission from these EDs displayed lower levels of disgust toward the human body and its products than those still afflicted, perhaps due to persisting body image concerns (Troop & Murphy, 2000). Therefore, relative levels of disgust may be quantifiable as a measure of symptom severity and trajectory of recovery in disordered eating patients. Disproportionate displeasure with feces, a reminder of previously eaten food, and exposure to vomit due to habitual purging may help explain these results. Disgust towards the human body, human body products, and magical thinking are the most robust findings (Aharoni & Hertz, 2012; Davey, Buckland, Tantow, & Dallos, 1998).

Disgust, which evokes nausea, is incompatible with an increased appetite. Since food is desired so strongly, appetite is heightened. Houben and Havermans (2012) found that higher BMI was negatively correlated with core and contamination disgust sensitivity. Results from studies investigating neurological pathways of food regulation also suggest a relationship between disgust and eating disorders. In an fMRI study of obese and lean

individuals, Watkins et al. (2016) found that obese individuals displayed lower activation in the insula while viewing disgusting images. The insula, known as the *taste cortex,* is the primary neural substrate of the gustatory pathway (Prinster et al., 2017). Prolonged disordered eating can also result in changes to insular volume, suggesting alterations to disgust processing mechanisms (Watkins et al., 2016).

Anxiety Sensitivity and Disordered Eating

Anxiety is a variation of fear, another basic emotion (Ekman, 1992). While fear is a response to an immediate threat, anxiety can be a maladaptive strategy for coping with the anticipation of a future fearful event. Anxiety and disgust are both negatively valanced emotions with considerable differences and commonalities (Mason & Richardson, 2012; Plutchik, 2001). Physiologically, anxiety is typified by an increase in heart-rate and autonomic nervous system (ANS) stimulation (Cisler et al., 2009; Olatunji, McKay, Cisler, & Phillips, 2010). Conversely, disgust is typified by a decrease in heart-rate and parasympathetic nervous system (PNS) stimulation (Cisler et al., 2009). Behavioral avoidance is a hallmark trait of both disgust and anxiety. Anxiety and disgust are each associated with decreased intake of food (Randler et al., 2017). While anxiety is characterized by a specific neuropsychological configuration (Dorenkamp & Vik, 2018) relative to other basic emotions, the neurological pathways of anxiety and disgust overlap substantially (Klucken et al., 2012; Vicario et al., 2017; Watkins et al., 2016). Activation of the amygdala is common to both reactions, but activation of the insula is unique to disgust (Cisler at al., 2009). The insula, as previously mentioned, is subsumed by the *gustatory cortex*, suggesting a unique association with food (Prinster et al., 2017). Therefore, a strong neurological association between food appraisal and disgust is inherent.

In anxiety disorders, disgust is more resistant to extinction via exposure therapy, and implicated in the probability of relapse (Mason & Richardson, 2012). Furthermore, in some phobias, the experience of disgust is considered primary to anxiety (Olatunji et al., 2017). Spider phobia, blood-injection-injury (BII) phobia, and obsessive-compulsive disorder are all differentially linked to both fear and disgust (Bianchi & Carter, 2012; Davey, 2011; Cisler et al., 2009). In individuals with a diagnosed spider or BII phobia, heart-rate was shown to rapidly increase and then drop below baseline in response to stimuli, indicating a sequential experience of fear and disgust (Cisler et al., 2009). Moreover, the interaction between disgust and anxiety was revealed to anticipate increased contamination concerns in a measure of obsessive compulsions (Cisler, Reardon, Williams & Lohr, 2007). Small animal phobias, hypochondriasis, height phobia, claustrophobia, separation anxiety, and agoraphobia are all also associated with irregular levels of disgust (Davey, 2011). This line of research sets a precedent for the concealed influence of disgust sensitivity in disorders typically attributed to fear or anxiety. The emotional underpinning of a dysregulation in food intake may originate from a mixture of disgust and anxiety responding (Berthoud, Munzberg, & Morrison, 2017; Cisler et al., 2009; Mason & Richardson, 2012).

EDs are often characterized by excessive worry, yet apprehension alone may not fully capture the underpinnings of maladaptive relationships with food, due to the biological nature of food regulation (Chapman & Anderson, 2012). While anxiety sensitivity is an important feature of disordered eating, disgust is suggested to also comprise a significant role (Anderson et al., 2018; Curtis, 2011; Mayer, Muris, Kramer Freher, Stout, & Polak, 2012). Davey and Chapman (2009) found a significant relationship between disgust and disordered eating in a non-clinical population of college-aged women. However, this relationship was

not significant when controlling for anxiety sensitivity (Davey & Chapman, 2009). Researchers used the Disgust Propensity and Sensitivity Scale- Revised (DPSS-R; van Overveld et al., 2006), potentially confounding the individual role of disgust sensitivity and the three domains of disgust sensitivity. The aim of the present study is to elucidate the relationship between disgust sensitivity, anxiety sensitivity, and disordered eating symptomology, using a large representative sample.

Present Study

Generally, disgust safeguards an individual from visible and invisible disease threats (Davey, 2011; Oaten et al., 2009). Previous research suggests that demographic influences in disgust levels would emerge based on gender, age, and race (Berger & Anaki, 2014; Hirai & Vernon, 2011; Tybur et al., 2011; Williams et al., 2012). Disordered eating is conceptually classified as a health threat resulting from extreme eating behaviors (Frank et al., 2016). Despite being grounded in food assessment, disgust generates negligible consideration in the context of disordered eating research (McKay, 2017; McNally, 2002). While anxiety sensitivity is expected to play a central role in disordered eating, disgust sensitivity may uniquely contribute to the understanding of these mental illnesses (Cisler et al., 2009; Davey & Chapman, 2009; Olatunji et al., 2017). Finally, differences in the three domains of disgust are expected to predict eating disorder diagnostic groups.

In the present study, specific demographic characteristics were assessed as predictors of disgust sensitivity. Overall, women were expected to exhibit higher disgust sensitivity across all measures. In accordance with evolutionary theory and motivation to protect potential offspring, core and contamination scores were expected to show the greatest gender differences. Young participants were hypothesized to demonstrate higher disgust sensitivity

across all measures. Due to peak mortality salience in young adulthood, animal-reminder disgust sensitivity was expected to be highest compared to other types of disgust. Due to extant differences or compensatory reporting biases, racial minorities were expected to display higher levels of disgust sensitivity across all measures. Specifically, minorities were expected to reveal significantly higher levels of core and contamination disgust, relative to white participants. Therefore, young, women, and minority participants were expected to predict the overall highest levels of disgust sensitivity.

The current study assessed disgust sensitivity and anxiety sensitivity as predictors of disordered eating. Increased disgust and increased anxiety were each expected to significantly predict disordered eating symptomology. However, higher composite disgust sensitivity was expected to significantly predict increased disordered eating symptomology after controlling for anxiety sensitivity.

Finally, an exploratory analysis examined the three domains of disgust sensitivity as predictors of AN, BN, and BED. Given that AN is primarily characterized by wholesale avoidance of food and discomfort with the human body, core, animal-reminder, and contamination disgust sensitivity were expected to significantly predict AN categorization. BN overlaps substantially with BED and AN. Yet, what separates individuals with BN and BED from those with AN is the overwhelming urge to counteract the effects of increased food consumption. Therefore, disgust sensitivity in individuals with BN is expected to closely resemble individuals with AN, in that increased core, animal-reminder, and contamination disgust will significantly predict BN classification. Lastly, decreased core and contamination disgust sensitivity is expected to predict BED membership, due to a lack of introspective awareness.

Method

Participants

An Amazon Mechanical Turk (MTurk) sample of 1,339 adults (804 women, 533 men; 80% White, 10% Black, 5% Asian, 3% Hispanic, 2% Other) successfully participated in a survey about adult development and picky eating. Amazon's MTurk is a compensation-based data collection platform that is typically more representative of the American population, relative to traditional college samples (Berinsky, Huber, & Lenz, 2012). Participants were told that they would be participating in a study about adult development and given no indication that this study was about disgust, anxiety, or disordered eating. Appalachian State University's Institutional Review Board approved the procedure, and participants either younger than 18 years old or not an American resident were excluded from the study. Participants received $0.50 for finishing the survey.

Measures

Demographic Variables. Participants initially completed a sequence of biographical questions that recorded gender, age, race, income, education level, and parents' ages. BMI was ascertained from participants' self-reported height and weight measurements. BMI was computed by dividing weight in kilograms by height in centimeter, squared. Age was measured in years, gender was measured dichotomously, and race was measured in seven mutually exclusive categories.

Disgust Sensitivity. The Disgust Scale-Revised (DS-R) measured intensity of experienced disgust, relative to hypothetical situations (Haidt, McCauley, & Rozin, 1994; Olatunji et al., 2007). This 25-item measure included three subscales assessing the primary domains of disgust. The core, animal-reminder, and contamination subscales were 12, 8, and

5 items respectively. All scales have displayed satisfactory psychometric properties (Olatunji et al., 2007; van Overveld, de Jong, Peters, & Schouten, 2011). Internal consistency was adequate in the current study for composite (α = .81), core (α = .81), animal-reminder (α = .82), and contamination disgust scores (α = .68). Reverse items were re-coded to retain item consistency. Likert-type scores ranged from 0, which indicated *not disgusting at all*, to 4, which indicated *extremely disgusting*. Example items included: *I would, under some circumstances, try eating monkey meat* for core disgust, *It would bother me to stay in a hotel room knowing that someone died there the night before* for animal-reminder disgust, and *I would not eat at my favorite restaurant if I knew the cook had a cold* for contamination disgust. Two questions were also included as an attention check, and participants were excluded if they indicated agreement with these statements. An example attention check item was: *You see a person eating an apple with a knife and fork.*

Disordered Eating Symptoms. The Eating Disorder Diagnostic Scale (EDDS) measured pathological eating behaviors and tendencies (Stice, Telch, & Rizvi, 2000). The EDDS is a 22-item measure that predicts clinical eating disorder diagnoses of AN, BN, and BED. Response types included a combination of yes/no forced choice, frequency, open-ended, and Likert-type items. An example item asked participants*: During the past 6 months, have there been times when you felt you have eaten what other people would regard as an unusually large amount of food (e.g., a quart of ice cream) given the circumstances?* The EDDS is useful as a tool in psychiatric settings, by using cutoff scores to help identify pathologically abnormal eating behavior (Krabbenborg et al., 2012). Since this study relied on a nonclinical sample, a continuous score was created in addition to using the clinical cutoff diagnostic criteria. Composite scores were calculated by converting the yes/no forced

choice, frequency, and Likert-type items into an overall numerical score. Criteria were mutually exclusive for each eating disorder category. AN tentative diagnoses required a BMI of less than 75% of typical body weight. BN tentative diagnoses required weekly episodes of impulsive binge-eating and compensatory behaviors, while BED tentative diagnoses required only weekly episodes of impulsive binge-eating. The EDDS has shown stable test–retest reliability (r = .87) and internal consistency (α = .81) in a prior psychometric analysis (Stice, Fisher, & Martinez, 2004). In the present study, EDDS aggregate scores of the quantifiable items indicated adequate internal consistency (α = .71).

Anxiety Sensitivity. The Anxiety Sensitivity Index-3 (ASI-3) measured perceived emotional intensity of fear-provoking experiences (Taylor et al., 2007). The ASI-3 is a revision of the original ASI (Reiss, Peterson, Gursky, & McNally, 1986) The ASI-3 encompasses physical, social, and cognitive subscales of anxiety using 18 Likert-style questions on a 5-point scale. A response of 0 indicated *very little* agreement, and a response of 4 indicated *very much* agreement with each statement. Example questions included: *When my thoughts seem to speed up, I worry that I might be going crazy* and *When I notice my heart skipping a beat, I worry that there is something seriously wrong with me*. The ASI-3 has demonstrated satisfactory psychometric properties (α > .70) for all scales (Taylor et al., 2007). The ASI-3 displayed acceptable reliability in the present study (α = .94).

Statistical Analyses

Statistical analyses were performed using IBM SPSS version 24.0. Reliability analyses were calculated to assess whether the DS-R, EDDS, and ASI-3 have acceptable internal consistency. Regression diagnostics and the assumptions of independence, linearity, additivity, normality, homoscedasticity and multicollinearity were assessed for each model.

Since previous research consistently demonstrates lower disgust sensitivity in white individuals, race was dummy coded as either 0 for white or 1 non-white in the demographic analyses.

Descriptive statistics were examined for each demographic characteristic and outcome measure. A bivariate correlation matrix was used to examine relationships between the composite and subscales scores of the DS-R, the composite EDDS scores, and the composite ASI-3 scores. For the first set of hypotheses, demographic variables were evaluated as predictors of disgust. Multiple regression analyses tested age, gender, and race as predictors of DS-R subscale scores. For the second set of hypotheses, disgust was evaluated as an independent predictor of disordered eating, after controlling for anxiety. A hierarchical multiple regression analysis was used to test if disgust significantly predicts disordered eating, independent of anxiety. Predictors consisted of ASI-3 composite scores in the first step, DS-R composite scores in the second step, the interaction between ASI-3 and DS-R in the third step, and EDDS composite scores as the outcome variable. Finally, exploratory analyses were performed to examine the predictive efficacy of the three domains of disgust sensitivity in the context of disordered eating tentative diagnostic category. Logistic regressions were conducted to test disgust sensitivity subscales scores as simultaneous predictors in each of the two models. Disordered eating classifications were included separately as the outcome measures in each binary logistic regression model.

Results

At the conclusion of data collection, 2187 Amazon MTurk workers consented to participate in this study. Of these participants, 546 failed to finish the entire survey, and 302 were unsuccessful in responding to validity checks. Validity items that were included in the

survey instructed participants to select a specific response to certain items. Participants who did not correctly respond to these items were automatically excluded. Descriptive statistics of some demographic characteristics of the participants who completed the survey (n = 1339) are presented in Table 1. Participants were primarily white, and more women than men participated in the study. Ages ranged from 18-70 years of age and the mean age of the sample was 40.39 (SD = 13.39) years. The mean self-reported BMI was 27.67 (SD = 7.18), suggesting that this sample was typical of American population estimates (Hales, Carroll, Fryar, & Ogden, 2017). Fifty-three percent of participants reported obtaining at least a 4-year university degree. Forty-one percent of participants reported earning over $50,000. Participants completed the DS-R, EDDS, and ASI-3, and the properties of these measures are available in Table 2. Demographic descriptive statistics, by race, gender, and age, of each of the three disgust subscales are presented in Table 3. Preliminary analyses assessed violations of assumptions of normality, linearity, and independence of measures. No assumptions were found to be violated in these analyses.

Pearson correlation analyses revealed multiple significant relationships between variables of interest, see Table 4. The DS-R, each of the three disgust sensitivity subscales, ASI-3, and EDDS were all positively correlated with one another. Additionally, increased age was negatively correlated with the DS-R, animal-reminder disgust subscale, ASI-3, and EDDS. Finally, BMI was negatively correlated the contamination disgust subscale, and positively correlated with the EDDS and increased age.

Three multiple regression analyses were used to examine age, gender, and race as simultaneous predictors of core, animal-reminder, and contamination disgust sensitivity, see Table 5. Results of the first regression indicated that all three demographic variables

predicted core disgust. Specifically, core disgust was higher in younger individuals, women, and individuals of minority status. Similarly, in the second regression, findings revealed that all three demographic variables were significant predictors of animal-reminder disgust. Specifically, animal-reminder disgust was higher in younger individuals, women, and individuals of minority status. Results from the third regression showed that race and gender, but not age, predicted contamination disgust sensitivity. Specifically, women and minority participants were predicted to demonstrate increased contamination disgust sensitivity.

A hierarchical regression was used to examine disgust sensitivity and anxiety sensitivity as predictors of disordered eating symptomology, see Table 6. In the first step of the hierarchical regression, higher levels of anxiety sensitivity predicted increased disordered eating symptomology. In the second step of the regression, disgust sensitivity significantly contributed an additional 1% explained variance to the model, indicating that higher levels of disgust sensitivity predicted increased disordered eating symptomology, independent of anxiety. In the third step, anxiety sensitivity was the only significant predictor after including the interaction between disgust and anxiety. The final model explained 23% of the variance in disordered eating symptomology.

Two binary logistic regressions were used to assess core, animal-reminder, and contamination disgust sensitivity as predictors of BN (n = 69) and BED (n = 80) tentative diagnoses. The outcome measure was whether participants were included or not included in each diagnostic category. Due to the low number of participants with a tentative diagnosis of AN (n = 4), this group was excluded from the analyses. The first binary logistic regression model, predicting BN, was statistically significant ($\chi 2(3) = 566.25$, $p < .001$). The model explained 4.0% (Nagelkerke R^2) of the variance in BN. Controlling for the other disgust

subscale predictors, each single unit increase in core disgust indicated an odds ratio increase of 1.64 for a tentative diagnosis of BN, at a level of marginal significance ($p = .05$). Animal-reminder ($p = .18$) and contamination disgust ($p = .91$) were not significant predictors in this model. The second binary logistic regression model, predicting BED, was statistically significant ($\chi 2(3) = 555.21$, $p < .001$). The model explained 4.0% (Nagelkerke R^2) of the variance in BED. Controlling for the other predictors, each single unit increase in core disgust indicated an odds ratio increase of 2.16 for a tentative diagnosis of BED ($p = .003$). Moreover, for each unit increase in contamination disgust, the odds ratio decreased by 0.59 for a tentative diagnosis of BED ($p = .004$). Animal-reminder disgust ($p = .31$) was not a significant predictor of BED in this model. Overall, core and contamination, but not animal-reminder, disgust sensitivity were demonstrated to be significant predictors of participants' probability of inclusion in a tentative BN or BED diagnostic category.

Discussion

Understanding disordered eating in the context of disgust sensitivity is important in because it is the basic emotion most closely associated with food (Ekman, 1992). Since eating disorders are the most fatal psychiatric illness, a comprehensive understanding of the etiology of these ailments is critical for effective treatment strategies (McKay, 2017). The purpose of the present study was to examine the role of disgust sensitivity, relative to disordered eating symptomology, in a large heterogeneous sample. Findings from this study showed that demographic traits predicted disgust sensitivity subscale scores. Moreover, disgust was revealed to play an ancillary role to anxiety sensitivity in predicting disordered eating symptomology. Finally, the exploratory analyses provided preliminary empirical

support for disgust subscale scores predicting specific types of eating disorder categorizations.

Demographic Predictors of Disgust

Previous research has demonstrated significant differences in emotional expression among individuals with different demographic traits (Williams et al., 2012). Since establishing baseline expectations for disgust sensitivity may be useful in determining deviations from population norms, the first set of analyses examined whether individual differences are present in levels of disgust sensitivity as a function of age, race, and gender. In support of these hypotheses, age, gender, and race all significantly predicted core, animal-reminder, and contamination disgust sensitivity, with the exception of age failing to reach significance in predicting contamination disgust sensitivity.

As expected, the demographic multiple regressions revealed that increased age predicted decreased core and animal-reminder disgust sensitivity. Generally, older individuals report lower levels of disgust (Quigley, Sherman, & Sherman, 1997). These findings provide support to research suggesting that age may lead to a general desensitization towards aversive stimuli (Rozin & Haidt, 2013). Also, emotion regulation has been shown to increase with age, potentially mitigating the severity of disgusting stimuli (Gross et al., 1997). The largest influence of age was for animal-reminder disgust, which involves death and gore. Since fear of death decreases with age, it is plausible that a general decrease in emotional reaction to death-related stimuli occurs (Power & Smith, 2008). One possible explanation for the lack of a significant finding in contamination disgust, is that life experience may lead an individual to be more cautious about potential sources of pathogen threats (Lee & Zietsch, 2015). Additionally, Petrowski et al. (2010) did not find significant

results related to disgust as a function of age in a German sample. Berger and Anaki (2014) also found modest, but significant, results with age and the DS-R, using a comparably sized Israeli sample. These findings demonstrate that increased age likely plays a small, but significant, role in predicting decreased disgust sensitivity.

In accordance with evolutionary theory, women demonstrated higher levels of disgust sensitivity than men across all three domains (Darwin, 1872). Specifically, core disgust was most strongly related to gender. A possible explanation for this is the dual role that women have of protecting themselves and offspring or potential offspring from infection threats and teratogens (Tybur et al., 2011). This claim is supported by results that demonstrate that women are more disgust sensitive during pregnancy (Fessler et al., 2005) and mothers are more disgust sensitive than motherless women (Prokop & Fancovicova, 2016). The overall framework of disgust as a disease-avoidance mechanism lends support for these findings (Davey, 2012; Oaten et al., 2009). Since core disgust reflects concerns with food and oral incorporation of substances, this has implications for eating disorders (Anderson et al., 2018; Rozin et al., 2008). Additionally, women have much higher rates of EDs, relative to men, so these findings coincide with each other (Sanftner, 2011).

As predicted, minority individuals were more likely to exhibit higher disgust sensitivity, relative to white participants, across all three domains. These findings mirror those of Williams et al. (2008) in a similar investigation of racial differences in contamination concern, however, this research examined white and black individuals. One potential explanation for these results is stereotype compensation, which is a hypothetical reporting bias intended to offset negative prejudicial attitudes towards members of an out-group (Williams et al., 2012). This issue should be carefully considered because it could

create additional barriers to clinical treatment, since minorities are already at risk for under-diagnosis for mental health disorders. Similar trends have been found in research examining racial differences in obsessive-compulsive disorder. Black individuals were found to endorse higher washing concerns, which parallels the dimension of contamination disgust sensitivity (Knowles, Jessup, & Olatunji, 2018). Wheaton et al. (2013) found similar results in racial differences and obsessive-compulsive washing concerns. Future research should investigate whether these differences are the resulting of stereotype compensation, or preexisting differences in attitudes, since the former is merely a reporting bias, and the latter is due to individual differences. Mental health professionals should be aware of different tendencies to experience the emotion of disgust based on demographic traits, especially in terms of disgust and anxiety in disordered eating. Finally, the interaction of age, gender, and race could provide additional insight into the relationship between these variables and disgust sensitivity. Understanding demographic predictors of disgust sensitivity may be relevant for capturing the complexities of eating disorders and establishing baseline expectations as a metric for understanding predispositions and deviations in disgust.

Disgust and Anxiety as Predictors of Disordered Eating

The primary emotional components of eating disorders, in the DSM-5, are fear and anxiety. The second set of hypotheses postulated that composite disgust sensitivity significantly predicts disordered eating symptomology, after controlling for anxiety in a hierarchical regression. As expected, increased anxiety sensitivity significantly predicted increased disordered eating symptomology. Furthermore, adding disgust sensitivity to this model significantly improved explained variance, but only by 1%. This demonstrates that, while disgust is indicative of disordered eating, anxiety may be the principle emotion. While

research into these relationships is limited (McKay, 2017), these results support the findings of Davey and Chapman (2011). In a similar investigation of the role of disgust and anxiety in the context of disordered eating the authors found that, while disgust predicted disordered eating scores, this relationship was no longer significant after controlling for anxiety sensitivity. Additionally, Mayer, Muris, Bos, & Suijkerbuijk (2008) failed to find any relationship between induced disgust and disordered eating attitudes in a non-clinical sample.

While anxiety has been shown to play a significant role in disordered eating, the influence on other emotions is less clear. Cisler et al. (2007) suggested that anxiety may amplify the severity of other negative emotions and was also found to be a risk factor in disordered eating symptomology (Anestis, Selby, Fink, & Joiner, 2007). Additionally, the interaction between anxiety and disgust has been demonstrated to predict contamination concerns (Cisler et al., 2007). Negative emotions, including disgust and anxiety, are linked to decreased amounts of food intake, suggesting that each may play an independent part in the etiology and maintenance of eating disorders (Randler et al., 2017). Also, disgust sensitivity was demonstrated to moderate suicidal ideation in individuals with an eating disorder, independent of anxiety, illustrating the importance of understand this relationship in greater depth (Chu et al., 2015).

These results indicate that composite disgust sensitivity may play an ancillary role to composite anxiety sensitivity. However, complexities of subtypes of disgust could explain why composite disgust sensitivity was not primary over anxiety sensitivity (Marzillier & Davey, 2004). Levels of food disgust, for example, could more accurately predict disordered eating tendencies, relative to the present measures of disgust and anxiety (Egolf, Siegrist, & Hartmann, 2018). Power and Tarsia (2007) also expressed concerns about the efficacy of

capturing disgust sensitivity in a single global inventory. Other researchers have proposed that disgust should be treated as a heterogeneous emotion (Simpson, Carter, Anthony, & Overton, 2006). The present findings also conflict with other similar studies with significant findings indicating disgust predicts disordered eating symptomology (Anderson et al., 2018; Harvey, Troop, Treasure, & Murphy, 2002; Troop, Treasure, & Serpell, 2002). The last set of analyses addressed the presumption that disgust is better understood as a heterogeneous construct by examining three dimensions of disgust sensitivity in predicting eating disorder diagnoses.

Domains of Disgust as Predictors of Disordered Eating

The final exploratory analyses examined whether the three subscales of disgust sensitivity predict likelihood of tentative disordered eating diagnosis. Increased core, animal-reminder, and contamination disgust was hypothesized to predict increased likelihood of BN membership. Conversely, decreased core and contamination disgust was hypothesized to predict increased probability of BED classification. In support of these hypotheses, increased core disgust sensitivity predicted increased likelihood of BN membership. Moreover, increased contamination disgust indicated decreased likelihood of BED. Contrary to expectations, increased core disgust predicted an increased probability of BED membership, and animal-reminder disgust was not a significant predictor in either model.

The disparate findings in the analyses of disgust and anxiety, relative to the exploratory analyses examining subtypes of disgust as predictors of BN and BED may be reconciled by the underlying mechanisms that differentiate each disorder. While each of these eating disorders are characterized by episodes of impulsive eating, BN is also captured by compensatory behaviors to offset increased food consumption (APA, 2013). Otherwise

put, different attitudes and behaviors encompass each disorder and could be motivated by differential types of disgust sensitivity. Sub-threshold BN and BED individuals may have also confounded results, as they were grouped with all other non-clinical individuals yet may have revealed similar patterns in disgust responding. Furthermore, when disgust and anxiety were compared as predictors of disordered eating, each were measured in composite form. Consequently, the seemingly contradictory results in the exploratory analyses may be a result of certain types of disgust as better predictors of specific types of eating disorders.

Since very few participants received the AN tentative diagnosis in the current studies, the hypotheses about this subtype symptomology were untested. The number of participants with a tentative diagnosis of AN were approximately at population estimates, however, BN and BED far exceeded prevalence estimates (APA, 2013). One possible explanation is the interface of Amazon MTurk, which allows participants to view the survey measures and then exit without penalty (Berinsky et al., 2012). Since this study was also about picky eating, individuals with AN may have failed to complete the survey at a higher rate, due to an aversion to food-related questions. Consequently, this could explain the relatively high number of participants with BN and BED, since questions about food may have attracted these individuals. Otherwise put, the nature of the survey content may have increased the likelihood that individuals with compulsive eating tendencies would finish the survey, and decreased the likelihood that individuals with food-restriction inclinations would finish the survey.

Limitations and Future Directions

The present study exhibited several limitations. First, an actual clinical sample of disordered eating individuals was not measured, so the generalizability of these results is

restricted. While EDDS tentative diagnoses have demonstrated excellent concordance rates with official diagnoses, the accuracy of these diagnoses in the present sample cannot be verified (Krabbenborg et al., 2011). Additionally, behavioral measures of disgust may yield different results, however, Rozin et al. (1999) found no significant difference between self-report and behavioral measures of disgust sensitivity. Furthermore, this study did not use a measure of disgust that specifically targeted typical food items, which may also decrease validity. The present sample was primarily white, educated, industrialized, rich, and democratic (WEIRD) English-speakers (Blum, 2017). Although the present study was more representative than typical university samples, future research should examine disgust from a cross-cultural perspective (Keith, Tay, & Harms, 2017). Additionally, some research has found that MTurk participants may report inflated negatively valanced emotions (Zhou & Fishbach, 2016). Given the previous findings in this study comparing white and nonwhite individuals, it is important to distinguish disgust as a function of race and ethnicity. For example, Skolnick and Dzokoto (2013) suggested that proximity to the equator and pathogen prevalence may influence disgust. Race and other demographic information were also measured categorically presenting another potential confound, as individuals in the same racial group may represent fundamentally different cultural backgrounds.

The differences between various subtypes of experiencing and responding to the emotion of disgust could also explain these results. Eating disorders encapsulate maladaptive coping with the emotional severity of attitudes towards the food and body, yet the frequency of experiencing negative emotions could also play a significant role. While disgust sensitivity is the overall intensity of responses to revulsive stimuli, disgust propensity is the tendency or inclination to perceive experiences as disgusting (van Overveld et al., 2006). Self-disgust

may also capture the body image attitudes of eating disorders, since negative self-appraisal is a fundamental component of AN and BN (Bell, Coulthard, & Wildbur, 2017; Monteleone et al., 2011). Moreover, while disgust sensitivity and propensity are primarily the cognitive responses to stimuli, disgust reactivity is usually operationalized as the behavior in response to a disgusting stimulus (Mayer et al., 2008). Kelley and Crowell (2018) found that disgust reactivity to noxious odors was predicted by disgust sensitivity, yet the measurement of the odor manipulation was not standardized. Conversely, Mayer et al. (2008) found no differences in self-reported disordered eating scores when experimentally manipulating disgusting smells, although the quality of these smells was not quantitatively measured. Since disgust reactivity has yet to be sufficiently measured using a reliable and validated scale, this concept provides a direction for future investigations. Olatunji et al. (2017) proposed the concept of *disgust proneness,* which encompasses disgust sensitivity, propensity, and reactivity. In a meta-analysis of forty-three studies on anxiety disorders, disgust proneness was found to significantly and positively correlate with anxiety-disorder symptoms (Olatunji et al., 2017).

Conclusion

The current findings increase the knowledge base of the emotional and demographic components of disgust sensitivity. Additionally, these results increase psychometric incremental validity of measures assessing disordered eating as a function of disgust sensitivity. Demographic patterns should be taken into consideration, since what is considered standard in one group may be deviant and serve as a risk factor in another cohort. Because the present sample was not recruited from a clinical population, future research should measure participants with a diagnosed eating disorder. Mental health practitioners

could take these baseline trends into consideration when determining whether an individual's disgust sensitivity is atypical. While disgust plays a role in predicting disordered eating symptomology, the current evidence suggests that this role is secondary to anxiety sensitivity. Finally, this study revealed that certain domains of disgust sensitivity may predict the likelihood of a tentative eating disorder diagnosis.

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Table 1

Participant Demographics by Gender, Age, and Race

	Women	Men	Total
Number by Gender	804 (60.0%)	535 (40.0%)	1339 (100%)
Age Range	18-83 years old	18-77 years old	
18-28	167 (20.8%)	127 (23.7%)	294 (21.96%)
29-38	243 (30.2%)	174 (32.5%)	417 (31.14%)
39-48	133 (16.5%)	100 (18.7%)	233 (17.40%)
49-58	138 (17.2%)	83 (15.5%)	221 (16.50%)
59-68	108 (13.4%)	43 (8.0%)	151 (11.28%)
69-78	14 (1.7%)	8 (1.5%)	22 (1.64%)
79-88	1 (0.1%)	0 (0.0%)	1 (0.07%)
Race			
White	648 (80.6%)	422 (78.9%)	1070 (79.91%)
Black	85 (10.6%)	44 (8.2%)	129 (9.63%)
Hispanic	26 (3.2%)	20 (3.7%)	46 (3.44%)
Asian	30 (3.7%)	36 (6.7%)	66 (4.93%)
Native American	4 (0.5%)	6 (1.1%)	10 (0.75%)
Pacific Islander	0 (0.0%)	1 (0.2%)	1 (0.07%)
Other	11 (1.4%)	6 (1.1%)	17 (1.27%)
Education			
< High School/GED	4 (0.3%)	1 (0.1%)	5 (0.4%)
High School/GED	88 (6.6%)	58 (4.3%)	146 (10.9%)
Some College	207 (15.5%)	104 (7.8%)	311 (23.2%)
2-year College Degree	111 (8.3%)	56 (4.2%)	167 (12.5%)
4-year College Degree	270 (20.2%)	235 (17.6%)	505 (37.7%)
Master's Degree	87 (6.5%)	64 (4.8%)	151 (11.3%)
Doctoral Degree	12 (0.9%)	12 (0.9%)	24 (1.8%)
Professional Degree	18 (1.3%)	2 (0.2%)	20 (1.5 %)
Vocational School	7 (0.5%)	3 (0.2%)	10 (0.7%)
Income			
< $20,000	137 (10.2%)	70 (5.2%)	207 (15.5%)
$20-35,000	179 (13.4%)	116 (8.7%)	295 (22.0%)
$35-50,000	178 (13.3%)	114 (8.5%)	292 (21.8%)
Over $50,000	310(23.2%)	235 (17.8%)	545 (40.7%)

Note: n = 1339

Table 2

Psychometric Properties of Key Measures

Measure	Item *M* (*SD*)	Total *M* (*SD*)	Range	
			Potential	Observed
EDDS		20.77 (17.01)	0-95	0-95
ASI-3	1.06 (0.81)	19.16 (14.65)	0-72	0-68
DS-R	2.18 (0.70)	54.52 (17.46)	0-100	4-100
Core	2.40 (0.71)	28.80 (8.52)	0-48	0-48
Animal-Reminder	2.13 (0.91)	17.04 (7.28)	0-32	0-32
Contamination	1.74 (0.88)	8.70 (4.40)	0-20	0-20

Note: EDDS Eating Disorder Diagnostic Scale, ASI-3 Anxiety Sensitivity Index-3, DS-R Disgust Scale-Revised

Table 3

Mean (Standard Deviation) Disgust Scores by Race and Gender

Race	Gender	*n*	DS-R	Core	A-R	Contamination
White	Men	422	1.92 (0.66)	2.09 (0.69)	1.89 (0.84)	1.57 (0.81)
	Women	648	2.27 (0.68)	2.54 (0.68)	2.21 (0.91)	1.69 (0.87)
Non-white	Men	113	2.19 (0.66)	2.28 (0.64)	2.17 (0.87)	2.01 (0.83)
	Women	156	2.52 (0.67)	2.69 (0.65)	2.45 (0.92)	2.22 (0.89)

Note: DS-R Disgust Scale-Revised, A-R Animal-Reminder Disgust Sensitivity

Table 4

Correlation Matrix of Psychometric and Demographic Characteristics

Measure	1	2	3	4	5	6	7	8
DS-R	--							
Core	.91**	--						
A-R	.87**	.65**	--					
Contamination	.77**	.61**	.53**	--				
ASI-3	.24**	.20**	.21**	.21**	--			
EDDS	.18**	.15**	.16**	.15**	.47**	--		
Age	-.08**	-.05	-.11**	-.04	-.25**	-.21**	--	
BMI	.01	.05	-.02	-.06*	.03	.30**	.13**	--

Note: DS-R Disgust Scale-Revised, A-R Animal-Reminder Disgust Sensitivity, ASI-3 Anxiety Sensitivity Index-3, EDDS Eating Disorder Diagnostic Scale, BMI Body Mass Index. Correlations among DS-R scores and core, animal-reminder, and contamination subscales are part-whole correlations.
** $p < .05$. ** $p < .001$.*

Table 5

Demographic Predictors of Disgust Sensitivity Subscales

Predictor	B	SE B	β	R^2	F
Core Disgust Subscale					
Constant	1.61**	0.10		.11	52.43**
Age	0.00*	0.00	-.06		
Race	0.15*	0.05	.08		
Gender	0.45**	0.04	.31		
Animal-Reminder Disgust Subscale					
Constant	1.65**	0.14		.05	25.08**
Age	-0.01**	0.00	-.11		
Race	0.22**	0.06	.10		
Gender	0.33**	0.05	.18		
Contamination Disgust Subscale					
Constant	1.00**	0.13		.06	27.18**
Age	0.00	0.00	-.01		
Race	0.50**	0.06	.23		
Gender	0.14*	0.05	.08		

Note: Men coded as 1, women coded as 2; white coded as 1, non-white coded as 2
** p < .05. ** p < .001.*

Table 6

Hierarchical Multiple Regression Analysis Predicting Disordered Eating

	B	SE B	β	R	ΔR^2	Adj R^2	F	ΔF
Step 1				.47	.22	.22	385.97	385.97**
ASI-3	0.55**	0.03	0.47					
Step 2				.48	.01	.23	393.81	7.84*
ASI-3	0.53**	0.03	0.46					
DS-R	1.69*	0.60	0.07					
Step 3				.48	.00	.23	394.60	0.79
ASI-3	0.45**	0.10	0.39					
DS-R	1.105	0.89	0.05					
ASI-3 x DS-R	0.04	0.04	0.08					

Note: ASI-3 Anxiety Sensitivity Index-3, DS-R Disgust Scale-Revised
** $p < .05$. ** $p < .001$.*

Vita

Jordan James Hamilton was born in Boone, North Carolina, to Chris and Robin Hamilton. He graduated from Watauga High School in June 2010. The following autumn, he entered the University of North Carolina Wilmington to study Philosophy and Psychology, and in May 2015 he was awarded two Bachelor of Arts degrees. In autumn of 2017, he enrolled in the Experimental Psychology program at Appalachian State University and began study toward a Master of Arts degree. The M.A. was awarded in May 2019. In June 2019 he commenced work in Environmental Philosophy.

Jordan is passionate about nature, animal rights, social equality, teaching, dreamwork, expressive arts, outdoor activities, reading, and creative writing. He plans to author a series of both fiction and non-fiction books and to teach at the university level.