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Post-traumatic stress symptoms in sexual and non-sexual trauma: Comparisons on symptom severity, disgust, and contamination concerns.

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POST-TRAUMATIC STRESS SYMPTOMS IN SEXUAL AND NON-SEXUAL TRAUMA:

COMPARISONS ON SYMPTOM SEVERITY, DISGUST, AND CONTAMINATION

CONCERNS.

A Thesis

presented in partial fulfillment of requirements

for the degree of Master of Arts

in Clinical Psychology

The University of Mississippi

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May, 2021

ABSTRACT

A number of emotions have been identified as contributing to the experience of Post-traumatic Stress Disorder (PTSD) and Obsessive Compulsive Disorder (OCD), including fear and disgust. Given the high rates of comorbidity between PTSD and OCD, research has suggested that disgust may be a likely link between these disorders. The current study examined the relation between contamination disgust, trauma symptom severity, and contamination related-OCD (C-OCD) symptoms in a sample of sexual and non-sexual trauma survivors (N = 206). Specifically, it was proposed that sexual trauma survivors would endorse more severe PTSD symptoms, higher levels of disgust, and more C-OCD symptoms. Furthermore, it was hypothesized that contamination disgust would mediate the relationship between PTSD symptom severity and C-OCD symptoms.

Correlational analyses indicated in the overall sample, significant positive correlations between disgust sensitivity, PTSD symptom severity, anxiety sensitivity, and C-OCD symptoms. However, results varied between groups (sexual trauma, other trauma, no trauma) as the primary variables of interest (disgust sensitivity, PTSD symptom severity, and C-OCD symptoms) were not correlated in the sexual trauma group. A subsequent MANOVA was conducted which illustrated group differences on trauma symptom severity with the sexual trauma group reporting significantly higher symptom severity compared to both the non-sexual trauma group and the non-trauma control group. No group differences were found in the experience of contamination disgust or C-OCD symptoms. Finally, a mediation analyses was conducted which revealed that contamination disgust did not mediate the relationship between trauma symptom severity and C-

COD symptoms. Overall, findings support previous research that sexual trauma survivors experience heightened posttraumatic symptom severity, however, more research is needed to further understand the role of contamination disgust in the relationship between PTSD and OCD, as well as examine the potential contribution of other transdiagnostic variables, such as self-disgust, moral disgust, and mental contamination.

TABLE OF CONTENTS

1. INTRODUCTION

Post-Traumatic Stress Disorder

Post-Traumatic Stress Disorder (PTSD) is a psychiatric disorder that may develop following the experience of a traumatic event evoking horror or fear (American Psychiatric Association, 2013). In order to be diagnosed with the disorder individuals must also be experiencing a number of other symptoms for a period of one month or longer such as: intrusive trauma related thoughts and images, avoidance of trauma related stimuli, negative thoughts and changes in mood after the trauma, and changes in arousal levels such hypervigilance and aggression. Situations or events that are often associated with the development of PTSD are witnessing a death, fear of threatened death of the self or others, threatened or actual serious injury, threatened or actual sexual assault, kidnapping, torture, accidents, natural disasters, and combat exposure (American Psychiatric Association, 2013).

PTSD is a highly prevalent disorder with an estimated lifetime prevalence of 7.8 % (Kessler, Sonnega, Bromet, Hughes, & Neson, 1995). More specifically, in a study of treatment seeking individuals, it was found that 87.1% of females and 92.2% of men between the ages of 18-45 experienced some form of trauma in their lifetime, with 13% of women and 6.2% of males considered experiencing post-traumatic stress (PTS) symptoms in the clinical range. (Breslau, Chilcoat, Kessler, Peterson, & Lucia, 1999). This demonstrates that although most individuals experience a traumatic event in their lifetime, only a relatively small percentage develop PTSD.

When left untreated, PTSD can be a chronic disorder, with approximately one third of patients reporting clinically significant symptoms after three years, and some for as long as 10 years. Following the exposure to a trauma, individuals who develop PTSD often experience a poorer quality of life in a number of areas such as relationship/marital issues, occupational issues, and financial hardship (Solomon & Davidson, 1997) . Many trauma survivors experience an increase in physical issues post trauma which can affect other life domains. For example, following trauma, some individuals report increase in chronic health conditions such as psychogenic seizures, migraine headaches and gastrointestinal pain (Kimerling & Calhoun, 1994). Furthermore, sexual trauma survivors are at risk of contracting sexually transmitted diseases with women having the added risk of becoming pregnant, which can result in further financial and psychological stress (Koss, Woodruff, & Koss, 1991). Along with a range of physical limitations, individuals suffering from PTSD are at greater risk of experiencing additional psychiatric impairment compared to those without PTSD with comorbidity likely to occur with Major Depressive Disorder (MDD), Generalized Anxiety Disorder (GAD), Panic Disorder, and Obsessive Compulsive Disorder (OCD) (Solomon & Davidson, 1997). Specifically, in a review of four epidemiological studies Solomon and Davidson (1997) found individuals diagnosed with PTSD were 2-4 times more likely to suffer from another psychiatric disorder (i.e., GAD, MDD, specific phobias, mania, OCD) compared to those without PTSD.

There are a number of factors that may put an individual at increased risk of developing PTSD such as exposure to multiple traumas and the type of trauma experienced (Breslau, Chilcoat, Kessler, & Davis, 1999; Breslau, Chilcoat, Kessler, Peterson, et al., 1999). Breslau, Chilcoat, Kessler, and Davis (1999) investigated the influence of previous trauma exposure on the development of PTSD in individuals who experienced subsequent traumatic events. The

sample consisted of over 2,000 individuals between the ages of 18-45 who were randomly selected from a number of midwestern households. Data were collected through telephone interviews where participants completed a diagnostic interview and reported all traumatic events experienced in their lifetime. Results indicated participants who experienced two or more previous traumas (n= 753) were at increased risk (OR = 2.12-2.41) of developing PTSD following their most recent traumatic experience. Previous assaultive traumas (i.e., military combat, rape/other forms of sexual assault, shot/stabbed, held captive/tortured/kidnapped, mugged, badly beaten-up) also increased the likelihood of meeting PTSD criteria compared to experiencing other types of previous trauma (i.e., car accident, natural disaster, life-threatening illness, witnessed killing/serious injury).

In a separate study using the same sample Breslau, Chilcoat, Kessler, Peterson, et al., (1999) examined potential sex differences in types of traumas. Results from the study indicated females were at greater risk of developing PTSD after experiencing an assaultive trauma (military combat, rape/other forms of sexual assault, held captive/torture/kidnapped, shot/stabbed, mugged, badly beaten up), with a conditional risk of 35.7% for females and 6% for males. This difference in the sample could, in part, be due to the higher number of rape and sexual traumas reported by females (rape = 9.4%, sexual assault other than rape = 9.4%) compared to males (rape = 1.1%, sexual assault other than rape = 2.8%). Of those who met criteria for PTSD, over half of women and 15% of men experienced an assaultive trauma. These differences may be partially accounted for by risk factors that are more commonly reported in females such as peritraumatic fear, helplessness, negative posttraumatic cognitions, avoidance, and numbness (Breslau, Chilcoat, Kessler, Peterson, et al., 1999; Christiansen & Hansen, 2015).

That being said, assaultive trauma appears to have a robust effect on the development of PTSD with sexual trauma being particularly influential.

Sexual Trauma

Sexual trauma is defined as any form of unwanted and nonconsensual sexual contact. When separated into specifics of penetration (rape) and non-penetration sexual trauma, these have the third and fourth highest conditional risk of PTSD (respectively; Breslau, Chilcoat, Kessler, Peterson, et al., 1999). Unwanted sexual experiences are associated with increased risk of PTSD among both males and females, with women reporting higher rates of sexual assault and rape (Kessler, et al., 1995). Foa and Riggs (1995) investigated PTS symptoms over a 12-week period in a sample of rape survivors ($\mathcal{M}$ = 12.64 days post-trauma). Participants, 95 females, who were recruited from hospitals, mental health clinics, and police referrals were administered structured interviews and completed self-report measures on a weekly basis. Analyses revealed 94% of rape survivors began to display PTS symptoms in as little as 2 weeks after the incident with 47% meeting DSM-III-R criteria after 12 weeks, demonstrating the high rates of PTS symptoms in rape survivors. A review by Atwoli, Stein, Koenen, and McLaughlin (2015) summarized global findings investigating PTSD prevalence, risk factors, and impairment in a number of epidemiological studies. Participants in studies across a number of countries including South Africa, Japan, Italy, Spain, and Northern Ireland were administered the WHO Composite International Diagnostic Interview; (CIDI). Data were used to estimate prevalence of PTSD which ranged from 1.3%- 8.8%, depending on country. Further, individuals who experienced sexual and physical violence demonstrated the highest conditional risk of meeting PTSD criteria in Japan, Spain, and Northern Ireland. More specifically, sexual and physical trauma experiences resulted in the longest duration of symptoms in a number of European

studies. Findings support how unwanted sexual experiences can be particularly traumatic compared to other forms of trauma.

Similar to other forms of trauma, sexual trauma has been shown to be highly comorbid with a wide variety of disorders such as MDD, Social Anxiety Disorder (SAD), GAD, eating disorders, and substance abuse (Ashby & Kaul, 2016; Klingensmith, Tsai, Mota, Southwick, & Pietrzak, 2014; Ziobrowski, Sartor, Tsai, & Pietrzak, 2017). Klingensmith and colleagues (2014) investigated the association between military sexual trauma and psychiatric disorders in the National Health and Resilience in Veterans Study (NHRVS). Veterans (N = 1,484) completed a number of self-report measures assessing a range of disorders including MDD, Alcohol Use Disorder (AUD), GAD, Social Phobia, PTSD, and also suicidal ideation. Findings indicated that military sexual trauma survivors were more likely to screen positive for current PTSD (OR = 2.19), MDD (OR = 2.52), GAD (OR = 3.12), and suicidal ideation/attempts (OR = 2.19), suggesting PTSD is highly comorbid. Using the same data, Ziobrowski et al., (2017) examined gender differences in mental and physical health conditions in a sample of U.S. military veterans. Results revealed higher rates of MDD and AUD were found among both male and female sexual assault survivors compared to those without an assault history. Specifically, male sexual assault survivors were at increased risk for current MDD, lifetime AUD, and heart disease compared to their female counterparts. The authors noted this was an interesting finding given that MDD tends to be more prevalent in women, suggesting military sexual trauma may result in higher rates of comorbidity in males. These studies demonstrate how highly comorbid sexual assault can be, and also how it can affect individuals who are not traditionally seen as vulnerable such as military personnel.

Studies investigating the prevalence of military sexual trauma has ranged broadly from 15.1%-32.4% in women and 0.7%-4.8% in men (Kimerling et al., 2010; Klingensmith et al., 2014). NHRVS data has found that 32.4% of female veterans and 4.8% of male veterans reported some form of military sexual trauma ranging from verbal sexual remarks to rape (Klingensmith et al., 2014). Although sexual traumas are the least common type of traumas reported by military personnel, individuals experiencing sexual trauma have a high probability of developing PTSD (Wisco et al., 2014). Kimerling et al., (2010) found both men and women with a history of military sexual trauma were more likely to receive a diagnosis for a number of disorders including PTSD and other anxiety-related disorders.

Another population in which sexual trauma is highly prevalent is in children and adolescents. Prior research investigated history of sexual abuse and its related factors in a high school sample (8,194) who completed a packet of questionnaires assessing sexual abuse, PTSD symptoms, resilience, and family support. Results indicated 15.2% of females and 4.4% of males experienced childhood sexual abuse characterized by either inappropriate touching or penetration, with 42.2% experiencing multiple unwanted sexual acts (Hébert, Lavoie, & Blais, 2014). Worldwide, it is estimated that 20% of women experience childhood sexual abuse, with one third of females exposed to physical or sexual violence (World Health Organization, et al., 2013). Adolescent girls from low socio-economic areas report the highest rates of sexual abuse (World Health Organization, et al., 2013) and are more likely to experience two or more sexual traumas. Experiencing multiple traumas not only increases the risk of PTSD symptoms (Breslau, Chilcoat, Kessler, & Davis,1999), but also increases risk of suicidality and other comorbid disorders such as Major Depressive Disorder and anxiety (Ashby & Kaul, 2016). These studies demonstrate how sexual assault is an ongoing issue which can affect a variety of populations.

6

PTSD is a complex disorder in which a number of factors contribute to its development. While many aspects of this disorder are relatively well understood, it is still unclear as to why some traumas result in higher rates of PTSD. Specifically, what aspect of sexual trauma is potentially more 'traumatic' compared to other traumas? Examining the emotions associated with trauma may provide some insight into this area.

Emotions in PTSD

Research has indicated that a number of emotions contribute to PTSD symptomatology including disgust, fear, anger, and sadness. In the past, fear has been the most commonly reported emotion associated with anxiety-related disorders, but recent research has shown disgust to play an important role (Coyle, Karatzias, Summers, & Power, 2014; Finucane, Dima, Ferreira, & Halvorsen, 2012) . While both fear and disgust can be viewed as emotions of avoidance, they differ in that fear is an adaptive response to an imminent physical threat or perceived danger, while disgust is also an adaptive response that focuses more on harm avoidance of contamination or moral/interpersonal threat. Difficulty in identifying the subtle differences between fear and disgust may be an explanation as to why these emotions become confused (Woody & Teachman, 2000). Given that the two emotions are similar in many ways, it has been suggested that experiencing one may activate the other (Davey, 2011). Finucane et al., (2012) examined the prevalence of five basic emotions (happiness, sadness, fear, anger, and disgust) across a number of clinical diagnostic populations (PTSD, MDD, chronic pain, and healthy). Participants consisted of 439 individuals recruited through general practitioners, a university, a pain clinic, and a trauma center in Edinburgh, Scotland, who completed the Basic Emotions Scale (BES). Analyses found fear and anger to be the most common emotions experienced by PTSD patients, with this trauma sample also reporting experience of significantly more disgust compared to the

7

healthy control group. This was an interesting finding given that disgust was the least frequently reported emotion in the healthy, depressed and chronic pain groups. Although disgust may not be the most frequently experienced emotion in trauma survivors, this study provides support for the notion that trauma survivors experience emotions beyond anger and fear.

Coyle et al. (2014) investigated different emotions experienced in an adult sample of childhood sexual abuse survivors. Participants (N = 109) completed a packet of self-report measures upon referral to a trauma focused treatment center, which included three forms of the Basic Emotions Scale (BES; weekly, general, and coping) and the Posttraumatic Checklist-Civilian (PCL-C). Analyses revealed the emotion of disgust accounted for the largest portion of variance of all three versions of the BES, in that disgust was the most common emotion experienced among survivors of childhood sexual abuse. The type of trauma experienced by this sample, sexual abuse, may be a key aspect in determining whether fear or disgust is the more dominant emotion in trauma. It is possible that different emotional responses are heightened depending on the type of trauma experienced, with disgust being more relevant to sexual trauma. Recent research has shed light on the proposition that trauma survivors experience a broad range of emotions, with disgust potentially being an important and often overlooked factor in the experience PTSD.

Disgust

Disgust is one of six basic emotions identified by Ekman (1993) and is one of few emotions that has a specific link to a motivation system, hunger, in that disgust functions to oppose this system as a form of disease avoidance (Rozin et al., 1993). Disgust responses promote protection or avoidance in that when a potentially harmful stimulus is detected, contact is avoided in order to prevent the transfer of disease or illness (Oaten, Stevenson, & Case, 2009).

Angyal (1941) defined disgust as "a specific reaction towards the waste products of the human and animal body" and related the strength of the emotional reaction of disgust to the degree of intimacy of contact, with the mouth as the most sensitive focus (p. 395). While the waste of human and animal body products is a key aspect of disgust, this is a rather narrow view of the emotion. Darwin (1872/1965) provided a broader definition of disgust: "something revolting, primarily in relation to the sense of taste, as actually perceived or vividly imagined; and secondarily to anything which causes a similar feeling, through the sense of smell, touch and even of eyesight" (p. 253). Darwin's definition was more similar to that of Tomkins (1963) who described disgust as a reaction to unwanted intimacy. While these definitions certainly describe aspects of the emotion of disgust, Rozin and Fallon (1987) identified three general domains of disgust that are contemporarily used: core disgust, animal reminder, and contamination.

Core disgust refers to the rejection or revulsion at the possibility of oral incorporation of a potentially offensive object (Rozin et al., 1993). Disgust elicitors associated with core disgust are rotten foods, small animals (i.e., rats, cockroaches, spiders), and human or animal body products (i.e., feces, vomit and urine). Due to the mouth being the principle route of entry and the gateway to the body, oral ingestion can be seen as a highly personal and risky act (Rozin, Haidt, & McCauley, 2008). Oral rejection can be dismembered into three possible reasons for rejection, including: an object that has a negative effect on our senses (i.e., foul odor, distaste), an expectation of harm after ingestion, and rejection due to the origin of the object or ideational factors (Rozin & Fallon, 1987). Humans tend to have a very strong aversion to all animal bodily products including feces, urine, vomit, saliva, and blood. (Rozin, et al., 1993).

The second domain of disgust is animal-reminder disgust with the primary disgust elicitors associated with this domain being death and body envelope violations (i.e., surgery,

9

gore). Individuals tend to experience animal-reminder disgust when reminded of their mortality and vulnerability to death (Rozin et al., 2008). Rozin et al., (1993) discussed how humans view themselves as unique and far more superior than other animals and aim to avoid any uncertainty that the two are similar. Although humans are remarkably similar to animals in a number of ways, an emphasis tends to be put on differences and referring to similarities is often seen as an insult (Rozin & Fallon, 1987). The Terror Management Theory suggests that humans' disgust towards animal reminders is based upon the idea that it reminds people of their vulnerability to death (Kollareth & Russell, 2017). Given the disgust elicitors associated with animal-reminder disgust, this domain appears to be associated with Blood Injection Injury Phobia (BII; Olatunji et al., 2008) and could potentially be associated with traumas involving serious injury or body envelope.

The third domain of disgust, which may be the most prevalent when dealing with sexual assault, is contamination disgust. This form of disgust may be elicited when there is a risk of transmission of harmful pathogens or illness (Rozin et al., 2008). Contamination implies there are invisible traces that somehow infect an object permanently (Rozin, Fallon, & Augustoni-Ziskind, 1985). Only minimal contact or being in close proximity to a perceived polluted object is necessary for the transfer of contaminants (Rozin & Royzman, 2001). Direct contamination refers to the emotions experienced after direct exposure with a contaminant (i.e., touching garbage), while indirect contamination is the belief that one is contaminated without coming into direct physical contact with the perceived contaminant (Adams, Badour, Cisler, & Feldner, 2014). Both direct and indirect contamination can elicit a disgust response. Indirect contamination can be further explained by the construct of sympathetic magic. Sympathetic magic has been described as improbable beliefs regarding the transmission of contaminants and

10

consists of two primary laws: the Law of Similarity and the Law of Contagion (Tolin, Worhunsky, & Maltby, 2004).

The Law of Similarity states that similar items share similar properties. For example, Rozin, Millman and Nemeroff (1986) demonstrated the law of similarity in a study where participants were asked to eat chocolate fudge which had been molded into the shape of dog feces. Some participants refused to eat the uncontaminated snack due to the negative perceptions associated with the shape of item (i.e., disgust reaction to eating something in the shape of feces). The second law of sympathetic magic, the Law of Contagion, states once a neutral object has come into contact with a perceived contaminated object, that neutral object is now infected even after contact has ceased (Rozin, Millman, & Nemeroff, 1986). Rozin, Nemeroff, Wane, and Sherrod (1989) demonstrated this effect in a sample of college students who were asked to identify an individual they loved (romantically), liked (a best friend), disliked, and an unsavory person (i.e., homeless person). They were then presented with a prompt (i.e., how would you feel about taking a bite out of an apple where each of the following individuals had previously bitten?) and asked to provide a pleasantness rating. Participants were more likely to reject food or items that had been touched or bitten by a stranger or somebody they disliked compared to a friend or lover. Similarly, Rozin et al., (1986) found participants rejected to drink a beverage after it had come in contact with a sterile cockroach due to the perceived contaminants left behind. These studies demonstrate how robust the effects of contamination can be, suggesting that even minimal unwanted physical contact could evoke a strong disgust response.

Like other basic emotions, disgust is defined by three components (behavioral, physiological, and expressive; Rozin et al., 2008). The behavioral component describes an approach or avoidance reaction to a given stimulus or situation. When faced with a disgust

11

elicitor, avoidance is a common behavioral response as individuals tend to distance themselves from the event or object. This has been demonstrated in a number of studies as disgust has repeatedly shown to be a predictor of behavioral avoidance, particularly in contamination-related behavioral avoidance tasks (Deacon & Maack, 2008; Fan & Olatunji, 2013). Deacon and Maack (2008) investigated disgust sensitivity (DS) as a predictor of contamination-related behavioral avoidance and anxiety in a sample of undergraduates. Participants were assigned to a low or high contamination group based on their contamination fear scores on the Padua Inventory (low contamination group = < 6, high contamination group > 14) and then completed several self-report measures assessing DS, symptoms of anxiety and depression, and contamination cognitions. Participants then completed three contamination-related behavioral avoidance tasks (BATs), at which point the researcher recorded the number of steps completed/refused out of a possible three steps (e.g., holding a used comb, brushing hair with the comb, touching the comb to their lips). Results from a hierarchical multiple regression revealed DS to be a significant predictor of BAT anxiety and avoidance when controlling for a number of other variables including anxiety and depression. Conclusions suggested DS as an important vulnerability factor in contamination-related avoidance.

Similarly, Fan and Olatunji (2013) conducted a study examining DS as a predictor of health-related anxiety and behavioral avoidance in a sample of college students. Participants, 60 undergraduates, completed a set of self-report measures followed by three health-related BATs which exposed participants to stimuli related to a common cold (used tissue), flu (oral thermometer), and mononucleosis (infected water bottle). Participants were asked to complete five steps (touching a bag containing an infected item, opening the bag, touching the item, touching their lips after touching the item, and finally touching the item against their lips) for

each task and avoidance was assessed by recording the number of steps refused. Participants were asked to rate their anxiety immediately after completing each task. Results from the analyses found DS to be a unique predictor of behavioral avoidance in the health-related BATs (exposure to a common cold i.e., used tissue). Results suggested that individuals who have higher levels of DS are more likely to avoid stimuli where there is potential for illness or sickness. This adaptive behavior prevents the transfer of potentially harmful pathogens and acts as method of disease avoidance.

The second component of the emotion of disgust is the physiological response. When experiencing disgust the two main physiological reactions endorsed are nausea and increased salivation (Rozin et al., 1993). Disgust is a unique negative emotion in that parasympathetic activation is seen rather than sympathetic system activation. Levenson (1992) investigated emotional differences in autonomic nervous system activation. While the emotional experience of fear, anger, and sadness resulted in increased activation of the sympathetic nervous system the opposite was seen for disgust, which was evidenced by lack of heart rate acceleration and increased salvation and gastrointestinal activation (nausea). More specifically, Van Overveld, Jong, & Peters (2009) examined physiological differences between experiences of core and animal-reminder disgust. While no differences in physiological reactivity were identified between the two domains, increases in saliva production and decreases in the sympathetic nervous system were recorded.

Finally, the expressive component of disgust, the gape response, was first identified by Darwin (1872/1965) who recognized a number of facial characteristics that occur when an individual is experiencing the emotion of disgust. He identified a gape and retraction of the upper lip, dropping of the corners of the mouth, along with nose wrinkles and widening of the nostrils

to encourage discharge of unwanted objects. The movements around the mouth function to expel potentially harmful objects from the mouth, while the nose wrinkles aim to restrict inhalation of foul odors (Rozin, Lowery, & Ebert, 1994). This gape response can also be seen in other circumstances when expulsion is not the primary goal. For example, research has reported individuals with spider phobia to exhibit the 'disgust face' when presented with threatening stimuli (Olatunji, Cisler, Mckay, & Phillips, 2010).

There is a growing body of evidence supporting the role of disgust in the development and maintenance of anxiety-related psychopathology. Olatunji, Unoka, Beran, David, and Armstrong (2009) reported disgust to be correlated with a number of psychological symptoms including depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism, obsessive compulsive symptoms, interpersonal sensitivity, and somatization. Specifically, research has found disgust to be strongly associated with the following disorders: spider phobia, BII, contamination based OCD, and PTSD (Brake, Rojas, Badour, Dutton, & Feldner, 2017; Olatunji, Cisler, Mckay, & Phillips, 2010; Schienle, Stark, Walter, & Vaitl, 2003). Disgust may have a role to play in a variety of disorders, however, its relation to PTSD has become increasingly salient, particularly in assaultive traumas.

PTSD and Disgust

Research investigating the development and maintenance of PTSD has begun to shift its focus from anxiety and fear to a previously overlooked emotion, disgust. This redirection has resulted in evidence suggesting individuals who score high on DS are more likely to develop PTSD symptoms (Brake et al., 2017; Engelhard, Olatunji, & de Jong, 2011; Olatunji, Babson, Smith, Feldner, & Connolly, 2009). A study conducted by Engelhard et al., (2011) measured levels of DS and PTSD symptomatology in military personal before and after their deployment

to Afghanistan. Participants (N = 176) were administered a number of self-report measures prior to deployment and were given the questionnaires again along with a clinical interview upon returning home. Results indicated that veterans who reported higher levels of peritraumatic disgust (i.e., higher disgust scores prior to deployment), displayed more severe PTSD symptoms six months post deployment. Additionally, to further explicate potential relations, Olatunji et al., (2009) examined sex differences in disgust and anxiety responses to trauma exposure in a community sample. Participants (N = 99) who experienced a traumatic event, 45 who were formally diagnosed with PTSD, completed a clinical interview followed by exposure to two different scripts: one, a neutral script (guided imagery of participant sitting in a lawn chair) and another, an individualized trauma script for each participant based on information gathered in the interview. The scripts were recorded and presented as audiotapes to each participant. Following exposure to each script, participants were asked to rate their levels of disgust and anxiety using the Subjective Units of Distress Scale (SUDS). Analyses revealed females diagnosed with PTSD reported an increased disgust reaction compared to females without PTSD, while no differences were seen between males with and without PTSD, when exposed to the traumatic event script. The authors suggest that a potential explanation for increased levels of disgust in females could be due to the fact that women experience more disgust-related traumatic experiences such as childhood sexual abuse and rape.

To further assess the potential association between sexual trauma and disgust, Araneo and Celozzi (2014) investigated disgust (moral, pathogen, and sexual domains) in mothers of sexually abused children. Participants (N = 72) were recruited through outpatient treatment centers and completed a variety of self-report measures including the Three Domains of Disgust Scale (TDDS) and the Impact of Event Scale-Revised to assess PTSD symptoms. Results

indicated that mothers with high levels of sexual disgust displayed increased PTS severity with one third of participants meeting clinical elevations of PTSD symptoms. This relation was significant for sexual disgust alone, as no associations between PTSD symptoms and moral or pathogen disgust were found. A potential contributing factor to these results was that a significant number of these mothers reported the experience of childhood sexual trauma themselves, which further supports a connection between disgust and sexual trauma.

Brake, Rojas, Badour, Dutton, and Feldner (2017) examined the connection between PTSD, self-disgust, and suicide which demonstrated that disgust not only plays a role in trauma, but may also be a potential risk factor for suicide risk. Self-disgust, which occurs when an individual has repulsive or negative views towards oneself, has also been shown to be a potential factor in the association between PTSD and suicide risk. A sample of undergraduate students (N=347) who had experienced at least one trauma completed a set of questionnaires including the PTSD Checklist-5 (PCL-5), Self-Disgust Scale, Suicide Behaviors Questionnaire-Revised, and the Patient Health Questionnaire-9. Results from a process model indicated a positive relation between PTSD symptoms and suicide risk in that this relationship was mediated by self-directed disgust (controlling for depressive symptoms). Further analyses revealed a significant relationship between suicide and self-disgust after controlling for PTSD symptoms severity, suggesting increased suicide risk among individuals with PTSD symptoms may be partly explained by self-directed disgust.

Taken together, the aforementioned studies provide support for disgust's role in trauma symptomatology. More specifically, the results demonstrate links between elevated levels of disgust and higher PTS severity in females as well as increased suicidal ideation. While a growing body of research has demonstrated a link between disgust and PTSD, similar research

16

has been conducted which has shown disgust to be strongly implicated in Obsessive Compulsive Disorder (OCD).

Obsessive compulsive disorder

Obsessive Compulsive Disorder is an anxiety-related disorder, that consists of uncontrollable intrusive thoughts and compulsions that are often time consuming and highly distressing and impairing (American Psychiatric Association, 2013). Individuals with OCD tend to avoid situations or objects that may provoke these obsessions and compulsions, which can result in a highly dysfunctional lifestyle (American Psychiatric Association, 2013). Twelve-month prevalence for OCD ranges from 1.2%- 1.6% and lifetime ranges from 2.3%-3.3% (Karno, Golding, Sorenson, & Burnam, 1988; Kessler, Chiu, Demier, Merikangas, & Walters, 2005; Ruscio, Stein, Chiu, & Kessler, 2010). OCD sufferers tend to report a lower quality of life in a number of functional domains such as employment, school, social and family functioning, and financial wellbeing (Hollander et al., 1997). When examining OCD data in the National Comorbidity Survey Replication (NCS-R), Ruscio, Stein, Chiu, and Kessler (2010) found OCD sufferers spend an average between 4.6-5.9 hours per day dealing with obsessions and compulsions. Of the OCD sufferers, individuals classified in the clinically severe subgroup (N = 636) reported moderate to severe impairment in all functional domains (i.e., home management, work, relationships and social life), with the greatest impairment endorsed in the areas of social functioning and relationships. Kessler, Chiu, Demier, Merikangas, and Walters (2005) examined severity of impairment in a variety of DSM-IV disorders using the National Comorbidity Survey-Replication (N = 9282) and found OCD had the greatest percent of patients classified as severe (compared to all other anxiety disorders) with 50% of individuals with OCD classified in this severity range. Within OCD sufferers, a large number of individuals report experiencing

obsessions and compulsions revolving around contamination and cleaning. In the presentation of

OCD, contamination worries account for approximately half of all concerns reported by patients

(Brady, Adams, & Lohr, 2010; Ruscio et al., 2010) which has led to an increase in interest in

contamination-based OCD.

Contamination-based OCD (C-OCD) is a specific subtype of the disorder in which an

individual's intrusive thoughts or obsessions revolve predominantly around contamination

issues. While these individuals tend to avoid potentially "threatening" contaminated objects (i.e.,

cockroaches, bodily fluids), they also avoid objects that most people view as sterile or non-

threatening such as handrails or doorknobs (Brady et al., 2010). The maladaptive belief that

contaminated stimuli tend to transfer to neutral stimuli rendering it contaminated is a common

belief among those with contamination fear (Mckay, 2006). Contamination-related intrusive

thoughts revolve around fear of contracting harmful bacteria or pathogens (i.e., contracting

disease in a public restroom), which often result in the individual engaging in excessive cleaning

compulsions (Brady et al., 2010). Common compulsions with this disorder include excessive

hand washing and hand sanitizer usage, consistent bleaching and disinfecting of surroundings,

and avoidance of stimuli that may be perceived to be contaminated.

The law of contagion is particularly relevant to compulsions in C-OCD patients in that

acts such as washing and checking are significantly precipitated by an excessive concern of

contamination (Tolin, Woods, & Abramowitz, 2006). These excessive and irrational thoughts

about the transmission of contaminants are known as sympathetic magic beliefs. Tolin,

Worhunsky, and Maltby (2004) investigated these beliefs in a C-OCD sample. Participants (N =

41) were split into three groups: (1) OCD group consisting of individuals diagnosed with OCD,

with their primary obsession being contamination fear, (2) an anxious control group consisting of

individuals diagnosed with panic disorder, and (3) a non-anxious control group. Participants were asked to rate a contaminated object on a scale of 0-100. Researchers then touched a clean pencil against the contaminated object, and then another clean pencil against the now 'contaminated' pencil. After replicating this process for 12 pencils, both anxious controls and non-anxious controls rated the pencils as uncontaminated significantly faster than the C-OCD group. In fact, the C-OCD group rated the 12th pencil as contaminated indicating these individuals perceive a 'chain of contagion', in that these invisible contaminated traces do not decrease across objects. This study not only demonstrates how individuals with C-OCD view potentially harmless stimuli as threatening, but also how strong and long lasting these beliefs of contagion can be.

OCD and Disgust

An abundance of literature has identified how disgust appears to be a central feature in the development and maintenance of disorders like OCD (David et al., 2009; Mancini, Gragnani, & D'Olimpio, 2001; Olatunji, Ebesutani, Haidt, & Sawchuk, 2014; Thorpe, Patel, & Simonds, 2003; Tolin et al., 2006; Woody & Tolin, 2002). Mancini et al., (2001) investigated the connection between DS and OCD symptoms in a non-clinical sample. Participants (N = 278) completed several self-report questionnaires assessing disgust sensitivity, and symptoms of Obsessive Compulsive Disorder, anxiety, and depression. Findings indicated a significant relationship between disgust and obsessive symptoms even when controlling for general psychological distress (i.e., anxiety and depressive symptoms), with higher DS scores in women compared to men. More specifically, regression analysis revealed disgust to be the best predictor of the washing and checking domains of OCD symptoms compared to symptoms of anxiety and depression.

Woody and Tolin (2002) investigated the connection between DS and avoidant behavior in a number of studies assessing OCD, Spider Phobia, and Blood Injection/Injury (BII) Phobia samples. In the OCD study, the participants were recruited from anxiety treatment centers with diagnoses of OCD (n=56) and SAD (n=12), combined with non-anxious controls (n=14) who were recruited from a University. Participants were administered a structured clinical interview and were asked to complete the Disgust Scale and Yale-Brown Obsessive Compulsive Scale to assess OCD symptoms and severity. Findings revealed participants with washing compulsions scored significantly higher in disgust compared to non-anxious controls, but no differences were seen compared to the SAD group. Further subscale analysis of the Disgust Scale (Haidt et al., 1994) revealed individuals with washing compulsions reported higher scores on the sympathetic magic, body products, and animals subscales from the Disgust Scale. These findings provide insight into disgust's role in avoidance in individuals with OCD, more specifically, avoidance of contaminants.

While a number of disgust domains are associated with OCD, it has been proposed that contamination disgust may be the most relevant domain due to its connection with pathogen concerns (Olatunji, Ebesutani, Haidt, & Sawchuk, 2014). Olatunji, Ebesutani, Haidt, and Sawchuk (2014) conducted a study examining the relation between disgust domains of the Disgust scale-Revised (DS-R) and contamination avoidance. Undergraduate students (N = 55) completed the DS-R and participated in a contamination-related BAT where they were asked to touch five potentially contaminated items in a public restroom (e.g., toilet handle, inside the toilet). Analyses revealed, core, animal-reminder, and contamination disgust were all significantly negatively correlated with steps approached on the contamination-related BAT's. However, further analysis demonstrated contamination disgust to be the sole predictor of

contamination avoidance (i.e., refusal to touch stimuli) in the BATs when controlling for gender.

Moretz and McKay (2008) assessed the role of trait anxiety as a mediator in the connection

between DS and washing and contamination-related OCD symptoms. A large sample of over 700

undergraduate students completed several self-report measures assessing disgust, OCD

symptoms, anxiety, and obsessional beliefs. Results using structural equation modeling

demonstrated a direct relation between DS and C-OCD symptoms in that the relationship was not

mediated by trait anxiety. These findings further support the notion that high levels of DS

positively predict C-OCD symptoms and beliefs.

David et al., (2009) investigated disgust as a predictor of OCD symptoms and also

examined the relationship between disgust and OCI-R subscales (washing, hoarding, checking,

obsessing, ordering, and neutralizing). Undergraduates (N = 270) completed self-report measures

assessing OCD symptoms, DS, anxiety sensitivity and negative affectivity. Analyses revealed

DS to be a significant predictor of OCD symptoms when controlling for age, gender, anxiety

sensitivity, and negative affectivity. DS was significantly correlated with all OCI-R subscales

with the strongest relationship exhibited between DS and the washing subscale. In a non-clinical

sample of 330 participants, Thorpe, Patel, and Simonds (2003) assessed the association between

DS, anxiety and obsessions through a series of self-report measures. Similar to David et al.,

(2009), DS was correlated with all the obsessional scales of the OCI (Foa et al., 1998) except

hoarding. DS was also found to be the most important predictor of washing frequency when

controlling for general anxiety and health anxiety. Tolin et al., (2006) further examined the

relationship between OCI-R domains and disgust domains. Undergraduate students (N = 1005)

completed the Disgust Scale, OCI-R, Self-Rated Anxiety Scale, and the Center for

Epidemiological Studies-Depression Scale. Analyses revealed the Washing subscale of the OCI-

R and the Hygiene subscale of the Disgust Scale (Haidt et al., 1994) to be the most strongly correlated. Taken together, these studies suggest the role of DS in a variety of OC presentations, with a stronger relation to contamination fear and C-OCD.

While associations between disgust and OCD have been demonstrated, research suggests disgust may be more relevant to contamination fear and C-OCD. Contamination fear is the key symptom in C-OCD and is characterized by a fear of a perceived threat of becoming ill after contacting a perceived contaminant (Rachman, 2004). Cisler et al. (2007) examined whether anxiety sensitivity interacts with disgust to predict contamination fear in a sample of undergraduate students. Participants (N = 377) completed a number of self-report measures assessing disgust sensitivity, anxiety sensitivity, and contamination fear. Results from a stepwise regression revealed significant main effects and a significant interaction between DS and anxiety sensitivity in predicting contamination fear. This finding demonstrates how individuals with elevated levels of DS and anxiety sensitivity may experience more severe contamination fear, further corroborating the assertion disgust has a key role to play in C-OCD symptomatology.

Research has also focused on the relationship between disgust propensity (DP) and C-OCD symptoms specifically. DP has been characterized as a trait-like unique difference in the frequency and intensity that individuals experience disgust. Olatunji, Moretz, et al., (2010) investigated the association between DS, DP, and C-OCD symptoms in a non-clinical sample. Participants (N = 417) completed a set of self-report measures assessing DS, DP, contamination concerns, negative affect, and depression symptoms. Structural equation modeling revealed that disgust was significantly associated with contamination fear when controlling for negative affect. Furthermore, findings demonstrated DS and disgust propensity were both significant predictors of C-OCD symptoms independent of negative affect.

Disgust propensity has been thought to be related to C-OCD in that individuals with heightened DP are at increased risk for C-OCD. Cisler and colleagues (2010) conducted two studies investigating whether obsessive beliefs increase the effects of DP on contamination fear. The first study used the Padua Inventory contamination subscale as a measure of contamination fear while study two used the Dimensional Obsessive Compulsive Scale, contamination fear subscale. Both studies had a large undergraduate student sample, who completed a number of questionnaires assessing disgust propensity, contamination fear, obsessive beliefs, and negative affect. Analyses indicated both DP and obsessive beliefs were significant predictors of contamination fears (assessed by both measures) when controlling for negative affect and sex. Using a stepwise regression the authors confirmed the hypothesis that obsessive beliefs potentiate the effect of DP on contamination fear. These findings suggest DP is a potential vulnerability factor in the development C-OCD and that individuals who exhibit this trait may engage in more contamination related avoidance.

Melli, Poli, Chiorri, and Olatunji (2019) proposed that disgust may not only be a risk factor for C-OCD symptoms, but also a maintaining factor suggesting that C-OCD may in fact increase DP. Questionnaires assessing DP, contamination-related symptoms, anxiety and depression were completed by a large clinical sample consisting of individuals with and without C-OCD symptoms. Participants were diagnosed with OCD using the Anxiety Disorder Interview Schedule-IV and assigned to the C-OCD (N = 56) or non-contamination group (N = 103) based on the type of symptoms experienced. Participants were asked to complete the disgust propensity questionnaire twice in order to rate both *current* levels of DP and to retrospectively assess levels of DP at *age 18*. Results revealed *current* DP and C-OCD symptoms were significantly correlated, but this relationship was insignificant at age 18. Interestingly, DP levels at *age 18*,

23

which was prior to the onset of OCD, did not differ between C-OCD and NC-OCD groups. However, the C-OCD group reported significantly higher *current* DP than the NC-OCD group. These findings support Melli et al.'s (2019) hypothesis that DP levels increase as C-OCD develops and symptoms increase. Taken together, the reviewed studies indicate disgust may not only be a vulnerability factor in the development of C-OCD, but may also aid in the maintenance of symptoms over time. These studies provide further support that disgust is a key mechanism in a number of areas associated with this disorder.

Gender Differences

While OCD occurs in both men and women, females are twice as likely to develop the disorder (Ruscio et al., 2010). This could in part be due to gender differences in levels of DS with females demonstrating significantly higher sensitivity than males (Haidt, McCauley, & Rozin, 1994; Olatunji, Sawchuk, Arrindell, & Lohr, 2005). Olatunji et al., (2005) examined whether gender differences in contamination fear can be explained by differences in DS. Participants, 259 undergraduate students, completed a set of self-report measures which assessed DS, contamination fear, trait anxiety, and anxiety sensitivity. Analyses found DS significantly predicted contamination fear in both sexes. Not only did females report significantly higher levels of DS, but significant group differences were found between sexes on contamination fear with higher levels of OCD-related contamination fear in females, which is consistent with previous findings by Mancini et al., (2001). Further analyses revealed DS significantly predicted contamination fear in both males and females with DS being a stronger predictor in females compared to their male counterparts. These gender differences can be seen across other disorders such as PTSD. Meta analyses by Tolin and Foa (2006) reported females are twice as likely to be diagnosed with PTSD compared to men, yet men were significantly more likely to experience a

24

potentially traumatic event. It is possible that females' higher level of DS is an important

vulnerability factor in the development of both PTSD and OCD.

Disgust, trauma, and C-OCD

It has been proposed that disgust is a key mechanism in the etiology of both PTSD and

OCD. Numerous studies have demonstrated that these two disorders are often co-occurring

(Badour, Bown, Adams, Bunaciu, & Feldner, 2012; Badour, Feldner, Babson, Blumenthal, &

Dutton, 2013; Ojserkis, 2018; Ruscio et al., 2010; Whitton, Henry, & Grisham, 2014). For

example, Whitton, Henry, and Grisham, (2014) found that 8.7% of their OCD sample also met

criteria for PTSD, while other studies have found that 12.5%-18% of samples of sexual assault

survivors who met diagnostic criteria for PTSD also qualified for a possible diagnoses of OCD

post trauma (Badour et al., 2013; Badour et al., 2012). Additionally, prior research has found that

the onset of PTSD often occurs in the same year as the onset of OCD, with 39.9% of PTSD cases

developing prior to OCD and 39.4% following the onset of OCD (Ruscio et al., 2010). An

explanation as to why this is the case is unknown, but it is possible that the type of trauma may

affect whether PTSD precedes OCD. It is also possible that disgust, specifically contamination

disgust, plays an important role due to the connection between sexual trauma and disgust, and

the association between disgust and OCD.

Adams, Badour, Cisler, and Feldner (2014) investigated how different forms of

contamination aversion (direct and indirect) and mental pollution relate to post traumatic stress

(PTS) severity. Direct contamination aversion refers to the direct exposure to a contaminant (i.e.,

bodily fluids) while indirect contamination aversion is the avoidance of a perceived contaminant

(i.e., money or a handrail). Mental pollution or mental contamination consists of feelings of

internal dirtiness that are absent of physical contaminants and typically does not dissipate after

physical washing or cleaning. In a sample of 50 adult females who were exposed to either a physical (n = 24) or sexual trauma (n = 26), participants completed two interviews assessing trauma and PTSD symptoms, and also completed self-report measures of contamination and mental pollution (the Vancouver Obsessional Compulsive Inventory; VOCI) to assess for mental pollution, and the Contamination Aversion Scale (CAS) to assess direct and indirect contamination). Results indicated that both direct and indirect contamination aversion, and mental contamination accounted for significant amounts of variance (44% and 51%, respectively) in PTS symptoms of sexual assault survivors, while associations were largely insignificant for physical trauma survivors. These findings suggest that mental contamination and contamination aversion are vulnerability factors unique to sexual trauma which could partially explain increased severity in PTS symptoms.

Olatunji, Elwood, Williams, and Lohr (2008) also examined feelings of mental pollution in survivors of sexual trauma and tested how mental pollution might affect PTSD symptomatology. Female sexual assault survivors (N = 27) completed self-report measures assessing PTSD symptoms, trauma-related cognitions, mental pollution, and symptoms of anxiety and depression. Consistent with previous research, analyses revealed mental pollution was significantly related to PTSD symptoms even when controlling for anxiety and depression in survivors of sexual assault. Further analyses revealed feelings of mental pollution and PTSD symptomatology were mediated by trauma cognitions, suggesting these feelings of mental pollution may provoke negative cognitions leading to the maintenance of trauma symptoms.

Badour et al., (2013) conducted a similar study investigating sensitivity to disgust and mental contamination in survivors of sexual assault. Participants included 40 women who were exposed to a traumatic event, approximately half of whom reported experiencing a trauma which

was sexual in nature. Participants were administered the Clinician-Administered PTSD Scale for DSM-IV and then were given individualized neutral and traumatic events scripts after which they rated levels of disgust, anxiety, and mental contamination. Findings demonstrated that disgust was positively correlated with PTS severity, but no group differences in trauma type were found as elevated levels of DS were seen in both the sexual and non-sexual trauma groups. However, PTS severity significantly predicted levels of mental contamination in the sexual trauma group, along with an increased urge to wash after being exposed to a trauma-related script. These findings were only significant for the sexual trauma group indicating mental contamination may be specific to sexual trauma. Disgust was positively correlated with PTS severity in both the sexual and non-sexual trauma groups. Taken together, these studies provide further support demonstrating contamination concerns in sexual trauma.

Researchers have also investigated whether feelings of mental pollution are associated with trauma symptom severity. Although mental pollution and disgust are separate constructs, there are a number of similarities between the two, and an individual is likely to experience feelings of disgust when experiencing mental pollution. Furthermore, both phenomena can be provoked through memories or images (Fairbrother & Rachman, 2004). It has been suggested that the feeling of mental pollution results from the internalizing of disgust (Olatunji et al., 2008b). Similar to self-disgust, mental pollution can occur when an individual has a repulsive or unwanted sexual image (Fairbrother & Rachman, 2004).

Fairbrother and Rachman (2004) examined mental pollution in a sample of 50 women who had experienced an unwanted, nonconsensual sexual experience. Participants completed two clinical interviews assessing PTS symptom severity and mental pollution followed by self-report measures which assessed sexual assault appraisals and PTSD symptoms. Participants were then

asked to engage in an imaginal exposure exercise which aimed to provoke feelings of mental contamination without physical contact. The experimental procedure consisted of two imaginal exposures: (1) a happy or enjoyable memory, and (2) the most distressing aspect of their sexual trauma. Upon completion of the exposure exercises ratings of anxiety, distress, dirtiness, and urges to wash (yes/no question as an analogue of mental pollution) were recorded. Analyses confirmed the authors hypotheses that sexual trauma survivors would report higher levels of anxiety, distress, dirtiness, and urges to wash after engaging in the trauma related imaginal exposure.

Specifically related to mental pollution in this study, the vast majority of sexual assault survivors reported an urge to clean themselves after their assault, with 95% having this urge within the first 24 hours. One quarter of these women reported an urge to clean for several months after the assault, while approximately 10% reported experiencing this impulse for over a year. Some individuals reported how their everyday behavior changed post trauma, such as washing their hands when coming into contact with others or having the need to shower for longer periods. One participant reported how excessive hand washing had become an issue and was later diagnosed with OCD. While the washing compulsions and feelings of dirtiness diminished over time for the majority of participants, 11.8% of participants reported experiencing these urges for a year or more further supporting the hypothesis that sexual assault can result in C-OCD behaviors (Fairbrother & Rachman, 2004).

Similar contamination-related compulsive behaviors were reported by De Silva and Marks (1999) who examined a number of case studies (N = 8) in which trauma had preceded OCD behaviors. Of these cases, only two participants had experienced a sexual trauma, yet both met diagnostic criteria for PTSD and OCD. One individual experienced more severe PTSD

symptoms in the earlier stages post trauma and was diagnosed with OCD at a later date. She reported feeling 'dirty' post trauma and subsequently spent a significant amount of time washing herself and her belongings. This feeling of mental pollution persisted to the point where she began washing compulsively. The second survivor also engaged in washing compulsions, such as cleaning her hands and home, along with checking compulsions. Overall, these studies illustrate a relation between sexual trauma and C-OCD and indicate that contamination concerns may play a role in this association.

While most sexual assault cases focus on females, Nijdam, Pol, Dekens, Olff, and Denys (2013) described a case study which examined a male who had been sexually abused during childhood and was diagnosed with PTSD, and at a later date, OCD. Remarkably, when the individual's PTS symptoms were resolved, his compulsive behaviors were eradicated, indicating a clear connection between the trauma and his OCD symptoms. As seen in these studies, PTSD and OCD are often co-occurring, specifically when dealing with survivors of sexual assault. Identifying common vulnerabilities such as high levels of disgust could inform future treatment procedures and the overall conceptualization for PTSD, more specifically for survivors of sexual assault.

The Present Study

While literature has reported relations between disgust and PTSD, and between disgust and C-OCD, there is limited research investigating how PTS symptoms, DS and contamination-based OC symptoms may differ in survivors of sexual trauma compared to non-sexual trauma. The current study aimed to investigate how DS relates to symptoms of PTSD and C-OCD in a sample of individuals of sexual and non-sexual trauma. The following were hypothesized:

1) All variables of interest: Disgust sensitivity (specifically the contamination disgust subscale), PTSD symptoms severity, anxiety, and C-OCD symptoms would be significantly correlated in the sexual trauma group and the non-sexual trauma group. Disgust, anxiety, and C-OCD symptoms would be significantly correlated for the non-trauma control group.

2) Those who experienced sexual trauma would demonstrate higher levels of contamination disgust and higher trauma symptom severity than those experiencing non-sexual trauma and non-trauma controls.

3) Those who experienced sexual trauma would evidence greater C-OCD symptomatology than those exposed to other forms of trauma and non-trauma controls.

4) The relationship between PTS severity and C-OCD symptomatology would be mediated by disgust sensitivity.

2. METHOD

Participants

The current study used archival data from an IRB approved study. The sample (N = 206) is comprised of a college-aged population from a southeastern university. Students were recruited through an online recruitment system, SONA, and were awarded course or extra credit in exchange for participating. According to a power analysis using G-power (a = .05, 1-B= .80), a sample size of N = 113 is required to find an effect size of 0.15 for a MANOVA (the analyses requiring the largest sample) containing 3 dependent variables, indicating all proposed analyses were suitably powered.

Measures

Anxiety Sensitivity Index-3 (see Appendix A). The Anxiety Sensitivity Index-3 (ASI-3; Taylor et al., 2007) is an 18-item self-report measure used to assess concerns associated with the arousal of anxiety. Items are rated on a 5-point Likert scale from 0 (very little) to 4 (very much) with scores ranging from 0-72 with higher scores indicating higher levels of anxiety sensitivity. The scale consists of three subscales: physical concerns, cognitive concerns, and social concerns, yet research has indicated that the subscales do not provide additional insight beyond a general anxiety sensitivity score (Ebesutani, McLeish, Luberto, Young, & Maack, 2013). The full-scale score has demonstrated sound psychometric properties with good internal consistency (a = .88) (Ebesutani et al., 2013) and good convergent, discriminant, and criterion-related validity (Taylor et al., 2007). Only the total ASI-3 score was used to assess anxiety sensitivity, which acted as a

covariate in the primary analysis. In the current study, the scale demonstrated good internal

consistency (α = .89)

Disgust Scale – Revised (see Appendix B). The Disgust Scale - Revised (DS-R;

Olatunji et al., 2007) is a 25-item self-report measure that assesses the three domains of disgust:

Core disgust, Animal-Reminder disgust, and Contamination disgust. The first 15 items are rated

on a scale of 0 (Strongly disagree) to 4 (Strongly agree), while the remaining are rated on a scale

0 (Not disgusting at all) to 4 (Extremely disgusting). Higher scores indicate higher levels of

disgust sensitivity. The measure is used to assess individual differences in disgust sensitivity and

provides insight into the relationships between the different disgust domains. The measure has

demonstrated good psychometric properties with good overall internal consistency (α = .84), and

satisfactory internal consistency in the three domains (α = .61 - .84) (Olatunji et al., 2007). The

DS-R has also demonstrated good convergent and construct validity (Olatunji et al., 2007). The

contamination domain score was used to examine differences in levels of disgust in the primary

analysis. The overall scale score and subscales scores were used to determine whether the

relationship is specific to contamination disgust or other domains. In the current study, the

overall scale score demonstrated good internal consistency (α = .82), and the three domains

evidenced questionable internal consistency; core disgust (α = .66), animal-reminder disgust (α =

.69), and contamination disgust (α = .67)

Life Events Checklist (see Appendix C). The Life Events Checklist (LEC; Gray, Litz,

Hsu, & Lombardo, 2004) is a 17-item self-report measure that assesses exposure to potentially

traumatic events. The measure assesses events that are classified as traumas and can result in the

development of PTSD. Participants are asked to check one or more of the following responses

for each item: (a) Happened to me, (b) Witnessed it happen, (c) Learned about it (happening to

someone close to you), (d) Not sure (if it applies to you), or (e) Doesn't apply. The measure has demonstrated good test-retest reliability ($r = .82$) and adequate convergent validity with other measures of trauma history such as the Traumatic Life Events Questionnaire (TLEQ). In the current study, the LEC was used to assign participants to one of three trauma groups: sexual trauma, non-sexual trauma, and no trauma control.

Posttraumatic Stress Disorder Checklist (see Appendix D). The PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993) is a 20-item self-report survey that measures the key symptomology of PTSD. The measure assesses how often participants experience symptoms of PTSD (i.e., intrusive thoughts,, hyperarousal, avoidance of trauma related stimuli, etc.) over the past month. Items are rated on a 5-point Likert scale of 1 (Not at all) to 5 (Extremely) with a recommended clinical cut off score of 50 indicating a likely presence of PTSD. The measure has demonstrated excellent internal consistency ($\alpha = .97$) and good test-retest reliability ($r = .96$) It has also demonstrated good convergent (rs = .77 -.93). The scale was used to examine PTS severity in the primary analysis. In the current study, the PCL demonstrated excellent internal consistency ($\alpha = .94$).

Obsessive-Compulsive Inventory – Revised (see Appendix E). The Obsessive-Compulsive Inventory - Revised (OCI-R; Foa et. al., 2002) is an 18-item self-report measure of obsessive-compulsive disorder symptoms. The scale assesses the distress associated with OCD symptoms in six different domains: Checking, Hoarding, Neutralizing, Obsessing, Ordering, and Washing. Participants rate how much a particular experience has bothered or distressed them over the past month. Items are rated on a 5-point Likert scale of 0 (Not at all) to 4 (Extremely) with higher scores indicating increased symptom severity. The recommended clinical cut off score for the presence of OCD is 21 with the mean score for OCD patients being 28. The scale

has demonstrated sound psychometric properties with excellent internal consistency ($\alpha = .90$) and test-retest reliability ($\alpha = .74$-$.91$), along with good convergent validity (Foa et al., 2002). Only the washing subscale scores was used as a measure of C-OCD symptoms in the primary analysis. In the current study, the overall scale demonstrated good internal consistency ($\alpha = .89$), however, the washing subscale evidenced poor internal consistency ($\alpha = .56$).

Procedure

Participants presented to a psychology research lab and provided informed consent. Following consent, participants were given a number of pencil/paper questionnaires including the measures mentioned above as part of a larger overall study. Following study completion, students were awarded course or extra credit for their participation.

3. RESULTS

Preliminary Analyses

All analyses were conducted using SPSS version 26.0 (IBM Corp., 2019). The initial

sample consisted of 240 participants and upon completion of data cleaning, 34 participants were

excluded from the analysis. Of these participants, 26 were removed as they did not complete the

ASI-3 while another six participants were removed for not completing the PCL. After conducting

Mahalanobis distance, two multivariate outliers were identified and removed from the analyses.

Following data cleaning, a normal, linear distribution was demonstrated with no multicollinearity

identified.

The final sample consisted of 206 individuals (153 women, 50 men, 3 unknown), ranging

from age 18 to 36 ($M = 19.07$, $SD = 1.67$). Participants were ethnically diverse with the majority

being White/Caucasian (White/Caucasian 69.9%; Black/African American; 21.4%; Asian 2.4%;

Native American/Alaskan Native 0.5%; Multiracial 4.9%; Hispanic 5.3%).

Primary Analyses

Hypothesis 1. In order to assess the hypothesis that disgust sensitivity (specifically the

contamination disgust subscale), PTSD symptoms severity, anxiety sensitivity, and C-OCD

symptoms would be positively correlated, zero-order correlations were conducted (Table 1).

Results indicated that all primary variables of interest were significantly positively correlated (rs

$= |.14 - .93|$, ps $< .05$). Further zero-order correlations were conducted for each of the three

trauma symptom groups (non-sexual trauma group, trauma group, and control group). In the non-

sexual trauma group (n = 162) all primary variables of interest were significantly positively

correlated (rs = |.15-.93|, ps < .05) (Table 2). However, the core disgust and animal-reminder

disgust domains were not significantly associated with trauma symptom severity, only the

contamination disgust domain was associated. In the sexual trauma group (n = 13), a significant

negative relationship was found between contamination disgust and anxiety sensitivity (rs = -.73,

p < .01), while all other correlations were non-significant (Table 3). In the control group (n =

31), contamination disgust, trauma symptom severity, and C-OCD symptoms were significantly

positively correlated with all primary variables of interest (rs = |.30 - .74|, ps < .05), while core

disgust and animal reminder disgust were not associated with anxiety sensitivity or trauma

symptom severity (Table 4).

Hypothesis 2 and 3. To assess the hypotheses that the sexual trauma group would

demonstrate higher levels of contamination disgust, trauma symptom severity, and C-OCD

symptoms, a MANOVA was conducted to compare group differences (sexual vs non-sexual

trauma vs control). The multivariate effect was significant by trauma type, $F(6, 402)= 2.21$, $p <$

.05. Univariate tests revealed the groups did not differ significantly on contamination disgust,

trauma symptom severity, or C-OCD symptoms. A LSD post-hoc test was conducted which

revealed significant group differences on trauma symptom severity, in that the sexual trauma

group (M = 33.62) reported significantly higher PTSD symptom severity compared to both the

non-sexual trauma group (M = 26.01) and control group (M = 24.69). However, mean

differences were not significant between the non-sexual trauma group and the control group ($p =$

.57). In relation to contamination disgust [$F(2, 203) = .001$, $p = .999$] and C-OCD symptoms

[$F(2, 203) = 1.65$, $p = .20$] no significant group differences were identified.

Further analyses were conducted in order to examine differences in the sexual trauma group by comparing individuals who endorsed experiencing 'rape' and 'other unwanted or uncomfortable sexual experiences'. A MANOVA was conducted which compared these groups on contamination disgust, trauma symptom severity, and C-OCD symptoms. The multivariate effect was not significant by type of trauma, $F(3, 9) = 1.39$, $p = .31$.

Hypothesis 4. Finally, in order to assess the hypothesis that contamination disgust mediates the relationship between trauma symptom severity and C-OCD symptoms while controlling for anxiety sensitivity, a simple mediation analysis was conducted using the Hayes' PROCESS (Figure 1). The outcome variable for this analysis was C-OCD symptoms, the predictor variable was trauma symptom severity, and contamination disgust input as the potential mediator. Unstandardized indirect effects were computed for each of 5,000 bootstrapped samples. The hypothesis was not supported (i.e. no mediation) as the indirect effect of trauma symptom severity on C-OCD symptoms was insignificant (Indirect effect = .0065, SE = .0054, 95% CI [-.0036, .0180]).

4. DISCUSSION

Disgust sensitivity has been shown to be associated with both PTSD and OCD, with strong relationships found between disgust and sexual trauma, and disgust and C-OCD (Araneo & Celozzi, 2014; Brake et al., 2017; Olatunji, Ebesutani, Haidt, & Sawchuk, 2014; Thorpe, Patel, & Simonds, 2003; Tolin et al., 2006; Woody & Tolin, 2002). Given the high rates of comorbidity between PTSD and OCD, research has suggested that disgust may be a likely link between these disorders. However, research has yet to examine the role of contamination disgust in the relation of these disorders. Therefore, the purpose of the current study was to examine the relation between contamination disgust, trauma symptom severity, and C-OCD symptoms in a sample of sexual and non-sexual trauma survivors.

Relationships between study variables

Not surprising, overall all study variables (disgust sensitivity; DS), contamination disgust, animal-reminder disgust, core disgust, anxiety sensitivity, PTSD symptom severity, and C-OCD symptoms) were significantly and positively correlated. Such findings replicate previous results in samples similar to the current study (Cisler et al., 2007; Tolin et al., 2006), as well as in military personnel (Engelhard et al., 2011), clinical samples (Finucane et al., 2012; Olatunji, Babson, et al., 2009), and community samples (Badour, Bown, Adams, Bunaciu, & Feldner, 2012).

However, when the sample was broken down into the different trauma groups (non-sexual trauma, sexual trauma), only the non-sexual trauma group demonstrated the expected relations.

Specifically, in the sexual trauma group, overall disgust was *unrelated* to anxiety sensitivity, trauma symptoms, and C-OCD symptoms. In fact, the only significant relation seen from the disgust subdomains was a *negative* association seen between contamination disgust and anxiety sensitivity (AS). This was surprising given that the sexual trauma group reported elevated levels of contamination disgust ($M = 9.23$) compared to non-clinical samples ($M = 5.35$), but fewer anxiety symptoms. It may be that these sexual trauma survivors were experiencing high levels of contamination disgust as a result of the trauma, but no longer experiencing significant psychological distress associated with that disgust. Additionally, with the poor internal consistency noted in this sample's responses in both the C-OCD measure, as well as questionable consistency in the disgust sub-domains, concerns of what constructs were actually assessed by the measures in this sample are warranted. These results conflict with previous research, as studies have found that increases in disgust are associated with increases in anxiety, and vice versa (Badour, Bown, Adams, Bunaciu, & Feldner, 2012; Cisler et al., 2007). While prior research has demonstrated a significant association between AS and total disgust scores, limited research has examined the relation between AS and contamination disgust. While Olatunji et al., (2014) found a significant positive correlation between these variables, these differences could be attributed to discrepancies in participant scores. For example, their participants demonstrated higher ASI scores ($M = 15.4$) compared to the current sexual trauma sample ($M = 9.92$) who experienced significantly fewer concerns associated with the arousal of anxiety. Ebesutani and colleagues (2013) found the mean ASI-3 score to be 16.74 in a sample of non-clinical undergraduate students. Both the control group ($M = 13.38$) and non-sexual trauma group ($M = 12.11$) reported higher levels of AS compared to the sexual trauma group ($M = 9.92$), indicating this sample of sexual trauma survivors did not experience significant internal distress related to

anxiety. However, the expected relations between disgust and AS were found in the non-sexual trauma group who did not demonstrate significantly higher AS or disgust scores, suggesting that the limited sample size in the sexual trauma group may have been a factor which lead to the insignificant findings.

Both DS and anxiety have also been linked to increased PTSD symptom severity, but contrary to the hypothesis these associations were insignificant in the sexual trauma group. Prior studies have demonstrated that individuals who experience trauma, specifically assaultive trauma, report high levels of disgust sensitivity as well as increased trauma symptom severity (Araneo & Celozzi, 2014; Engelhard et al., 2011; Olatunji, Babson, et al., 2009). In the current sample, a larger number of the sexual trauma group (38%) scored above the recommended clinical cut-off for PTSD (PCL cutoff = 30; Bliese et al., 2008), compared to the control group (16%) and non-sexual trauma group (21%), but no significant associations were found between DS and trauma symptoms severity. This may be due to the overall sample reporting high levels of DS ($M = 59.60$) with each group scoring greater than one standard deviation from the mean disgust score ($M = 41.75$, SD = 15.13), however, the majority of participants scored below the PTSD cut-off, indicating low PTS severity. These contrasts in findings may also be due to differences in measurement between the studies (i.e. questionnaires vs SUDS), as well as the use of trauma-related scripts (as research has demonstrated how scripts can evoke a heightened disgust response; Olatunji et al., 2009). Increases in peritraumatic disgust have been associated with trauma symptom severity (Badour, Ojserkis, McKay, & Feldner, 2014), therefore procedures such as trauma-related scripts may elicit an increased disgust response when reminded of trauma-related stimuli.

Similarly, the insignificant relationship between disgust sensitivity, anxiety sensitivity, and C-OCD symptoms is inconsistent with previous findings. Again, the poor internal consistency related to the DS and C-OCD measures likely affected these findings. One potential explanation is that the sexual trauma group demonstrated lower levels of AS as well as fewer C-OCD symptoms (sexual trauma group; M = 0.54) compared to the overall sample (M = 1.67), the control group (M = 1.71), and the non-sexual trauma group (M = 1.75). This was a surprising finding given that anxiety sensitivity has been shown to be a predictor of contamination fear (Cisler et al., 2007), a key symptom of C-OCD, while disgust has been shown to be associated with the washing subscale of the OCI-R in a number of undergraduate samples (David et al., 2009; Thorpe, Patel, and Simonds, 2003; Tolin et al., 2006). However, Tolin and colleagues (2006) had a significantly larger college sample (N = 1005) and the correlations between the disgust domains and the OCI-R subscales were relatively weak (r = .12 -.28). Furthermore, participants in these studies completed the original disgust scale (DS; Haidt et al., 1994) which has a number of different domains, potentially yielding different results. That being said, it appears that the sexual trauma group in the current sample may be experiencing less psychological distress in relation to anxiety and C-OCD symptoms.

In the non-trauma control group, it was hypothesized that significant positive relationships would be found between disgust sensitivity, contamination disgust, anxiety sensitivity, and C-OCD symptoms. All variables were related to disgust with the exception of AS. Interestingly, the non-trauma control group displayed similar scores to the non-sexual trauma group, in that they displayed low PTS severity scores, yet their PTS severity scores were associated with overall disgust, contamination disgust, and C-OCD symptoms. These findings indicate that both groups were experiencing relatively low levels of internal distress. The high

levels of disgust in these groups may be explained by operating under the assumption that a number of participants may be experiencing symptoms related to disorders other than PTSD, such as OCD, health anxiety, or specific phobias. Several studies have demonstrated how individuals with these disorders experience higher levels of DS and AS (Cisler, Olatunji, & Lohr, 2009b, 2009a).

Group Differences

In assessing group differences in trauma symptom severity, contamination disgust, and C-OCD symptoms the study hypotheses were partially supported. As expected, group differences were found on trauma symptom severity, such that the sexual trauma group reported higher levels compared to both the non-sexual trauma group and the non-trauma control group. This finding is consistent with prior research suggesting sexual trauma survivors have a higher conditional risk of developing PTSD (Atwoli, Stein, Koenen, & McLaughlin, 2015; Breslau, Chilcoat, Kessler, Peterson, & Lucia, 1999). However, no group differences were found between contamination disgust or C-OCD symptoms. Limited research has directly investigated the role of contamination disgust in sexual trauma. Prior research has examined the role of similar constructs (i.e. mental pollution/contamination and contamination aversion) and found them to be unique risk factors in sexual trauma survivors (Adams et al., 2014; Badour et al., 2013; Fairbrother & Rachman, 2004; Olatunji, Elwood, Williams, & Lohr, 2008a). This lack of variance between groups could be attributed to each group having elevated contamination disgust scores. Each group had scores ranging from 9.23-9.28 which is approximately one standard deviation above the average score in a nonclinical sample ($M = 5.35$, $SD = 3.61$). It is possible that contamination disgust is not only linked to sexual trauma but all assaultive traumas, which may explain elevated scores in the non-sexual trauma group. In relation to the control group, as

previously mentioned, contamination disgust is associated with a range of disorders that were not controlled for in the present study. Another potential explanation for inconsistent findings could be due to methodological differences, such as Fairbrother and Rachman's (2004) use of imaginal exposure to evoke a more intense emotional response resulting in higher mental pollution scores. In contrast, it is plausible that contamination disgust does not have as strong a link with sexual trauma compared to other constructs such as mental pollution or self-disgust. While there are a number of similarities between contamination disgust and mental pollution, (i.e. feelings of revulsion, can be evoked without actual contact of contaminant/dirt, is not properly responsive to washing), these differences in findings may be due to mental pollution having the added emotional or moral quality (Fairbrother & Rachman, 2004). Sexual trauma survivors often experience feelings of shame and contamination disgust may not induce feelings of shame to the same extent as mental pollution.

In relation to C-OCD symptoms, several studies have demonstrated how PTSD and OCD are often co-occurring (Badour et al., 2012, 2013; Ojserkis, 2018; Ruscio et al., 2010; Whitton et al., 2014), therefore it was surprising that no differences were found between the trauma groups and the non-trauma control group on C-OCD symptoms. This could in part be due to the trauma groups reporting relatively low PTSD severity, as the non-sexual trauma group's mean score ($M = 26.01$) was below the recommended clinical cut-off of 30 on the PCL. While the sexual trauma group's mean score ($M = 33.62$) was above the cutoff, 62% of this group scored below 30 on the PCL, indicating that the majority of this group is experiencing minimal to mild symptoms. In a National Comorbidity Survey, Kessler et al., (2005) found that severity is strongly associated with comorbidity, therefore, the lack of C-OCD symptoms may be due to the lessened severity in PTS symptoms.

Further analyses were conducted that compared two different forms of sexual trauma, 'rape' and 'other unwanted or uncomfortable sexual experience' on each of the primary variables. Given that sexual assault can range greatly from rape (penetration) to other forms (i.e. sexual contact without penetration), a separate MANOVA was conducted to examine differences in trauma symptom severity, contamination disgust, and C-OCD symptoms. No significant differences were found between these groups and this certainly could be attributed to the limited sample size in this analysis (rape, n = 8; Other unwanted or uncomfortable sexual experience, n = 5). However, it could in part be due to the lack of a clear definition of "rape" and "other unwanted or uncomfortable sexual experience" in the current study. As Fairbrother and Rachman (2004) have outlined, sexual assault definitions vary greatly between studies, with some not distinguishing between penetrative and non-penetrative rape, but instead focusing on the lack of consent as a primary factor. Whether individuals have experienced physical assault versus verbal abuse may also be and important aspect to identify given that PTSD is more likely to occur from a physical trauma. Based on this analysis, it is unclear as to whether different forms of sexual trauma result in different levels of distress ,and therefore, an increase in power as well as clearer definitions may result in more reliable findings.

Mediation

Although in line with theory, the finding that contamination disgust did not mediate the relation between trauma symptom severity and C-OCD symptoms, while controlling for anxiety sensitivity was surprising. While no research has examined the relationship between these specific variables together, numerous studies have demonstrated a link between trauma symptom severity and disgust, and C-OCD symptoms and disgust (Brake et al., 2017; David et al., 2009; Engelhard, Olatunji, & de Jong, 2011; Mancini, Gragnani, & D'Olimpio, 2001; Olatunji,

Babson, Smith, Feldner, & Connolly, 2009; Olatunji, Ebesutani, Haidt, & Sawchuk, 2014; Thorpe, Patel, & Simonds, 2003; Tolin et al., 2006; Woody & Tolin, 2002). While the primary variables of interest (PTS severity, contamination disgust, and C-OCD) were correlated in the non-sexual trauma group, insignificant associations as well as negative associations were found in the sexual trauma group. Given the lack of a relationship between variables in the sexual trauma group, the likelihood of finding a significant mediation was relatively low. As previously mentioned, these insignificant associations may be due to low levels of distress, particularly PTS severity, as this relationship may only be present in those with moderate to severe PTSD. The sexual trauma group ($M = .54$) also reported C-OCD scores which were significantly below those of clinical OC samples ($M = 4.31$) and non-anxious controls ($M = 2.41$), and the non-sexual trauma group ($M = 1.75$) also displayed relatively few C-OCD symptoms (Foa et al., 2002). Therefore, given the low levels of PTSD and OCD-related symptoms present in the trauma groups, it was unlikely that contamination disgust would have a significant role in this relationship. This insignificant finding may be partly due to the limited number of assaultive traumas in this sample. Individuals who experience assaultive traumas, such as sexual or physical abuse, often report feelings of dirtiness and urges to clean (Fairbrother and Rachman, 2004) which are associated with contamination disgust. The majority of participants included in this analysis (n = 144) experienced non-assaultive traumas which have not been associated with disgust. Additionally, the poor internal consistency found on the disgust sub-domains and C-OCD measure raise the question as to whether contamination disgust and C-OCD symptoms were accurately assessed in this sample. This could potentially be a major factor as to why a significant relationship was not found between these variables. Based on previous research, it is likely that contamination disgust has a role to play in the relationship between these disorders,

however, it is also possible that similar constructs such as mental contamination could mediate this relationship.

Limitations and future directions

The findings from this study must be considered in the context of some limitations. First, the unequal and small sample sizes (i.e. 13 in the sexual trauma group) likely impacted the overall findings of this study. The limited number of sexual trauma survivors in this sample and the lack of rape survivors made it difficult to conduct adequately powered comparisons between groups on a number of study variables. Secondly, the use of a non-clinical sample is another limitation, given that the symptoms associated with two clinical disorders, PTSD and C-OCD, were the primary focus of this study. A clinical sample may have produced more specific and generalizable findings given that only 21% of the current sample met the recommended clinical cut-off for PTSD, demonstrating a lack of individuals experiencing marked clinical distress associated with trauma. Furthermore, the sample consisted of primarily white, college-aged females, and this lack of diversity limits the generalizability of these findings. While this leads to generalizability concerns, this population is in line with the demographics of the Southeastern university where the data were collected.

Another limitation was the sole use of self-report measures. The incorporation of behavioral measures, such as trauma-related scripts or imaginal exposures, may provide a more in-depth understanding of the relationship between the study variables. Assessing individuals before, during, and after being exposed to trauma-related stimuli may provide further insight into their experience, and also allow the assessment of trait and state disgust, anxiety, etc.. Moreover, the inclusion of more specific trauma-related questions and structured clinical interviews (i.e. CAPS; Clinician Administered PTSD Scale) may have provided further explanations in relation

to group differences. For example, specifying the type of sexual-trauma experienced by participants may be an important factor, as the level of unwanted contact may evoke different levels of disgust. As previously stated, "Other unwanted or uncomfortable sexual experience" can encompass a broad range of behaviors, ranging from unwanted verbal abuse to non-penetrative physical contact.

Future research in this area may benefit from examining the role of self-disgust in relation to these variables. Clarke, Simpson, and Varese (2018) conducted a systematic review of the utility of self-disgust, which indicated a link between self-disgust, mental contamination, and PTSD symptomatology, particularly in samples of childhood sexual abuse survivors. It is possible that contamination disgust elicits feelings of disgust towards the traumatic event, while self-disgust better captures the feeling of "internal dirtiness" which is often reported by sexual trauma victims. However, research in this area is sparse and effects sizes ranged greatly between studies, indicating a need for increased research in this area. Another construct that could potentially play a role in this relationship is moral disgust. Feelings of guilt and shame are often associated with sexual trauma and there appears to be a moral component to constructs, such as mental pollution, that are related to increases trauma symptom severity. Further investigation into the moral quality of sexual trauma may provide insight into the increased distress associated with the type of trauma. Moral disgust has gained increased interest in recent years, but a psychometrically valid scale has yet to be constructed. Therefore, the development of a valid and reliable scale could provide a vital insight into the role of disgust in a number of disorders.

Conclusion

The goal of the current study was to investigate a potential link in the comorbidity of PSTD and C-OCD. Previous studies have found disgust sensitivity to be a positive predictor of

both trauma symptom severity and C-OCD (Cisler et al., 2009a; Engelhard et al., 2011; Olatunji, Babson, et al., 2009), but research had not yet examined the role of contamination disgust as a link between sexual trauma and C-OCD. The current study aimed to add to the existing literature by examining how disgust sensitivity relates to trauma symptom severity and C-OCD in a sample of sexual and non-sexual trauma survivors. Findings support previous research that sexual trauma survivors experience heightened posttraumatic symptom severity. Significant associations were found between PTS symptom severity and C-OCD symptoms indicating a relationship between PTSD and C-OCD. However, given the study's findings, future research is needed to further understand the role of contamination disgust in this relationship, as well as examine the potential contribution of other transdiagnostic variables, such as self-disgust, moral disgust, and mental contamination.

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LIST OF APPENDICES

Table 1. *Descriptive Statistics and Correlations Among Primary Variables and Possible Covariates for Overall Sample.*

		M	*SD*	1.	2.	3.	4.	5.	6.	7.
1.	**Disgust Sensitivity (DS-R)**	59.60	18.31	---	.93***	.86***	.70***	.28***	.20**	.33***
2.	**Core Disgust**	30.44	9.10		---	.68***	.55***	.21**	.14*	.25***
3.	**Animal-reminder Disgust**	19.88	7.64			---	.39***	.23***	.17*	.23***
4.	**Contamination Disgust**	9.27	4.76				---	.29***	.21**	.41***
5.	**Anxiety Sensitivity (ASI-3)**	12.16	10.49					---	47.***	.30***
6.	**PTSD Symptom Severity (PCL)**	26.29	11.87						---	.31***
7.	**C-OCD Symptoms (OCI-R wash)**	1.67	2.32							---

*Note: *p < .05; **p < .01; ***p < .001. DS-R = Disgust Scale-Revised. ASI-3 = Anxiety Sensitivity Index-3. PCL = PTSD Checklist. OCI-R = Obsessive Compulsive Inventory-Revised.*

Table 2. *Descriptive Statistics and Correlations Among Primary Variables and Possible Covariates for Non-sexual Trauma Group.*

		M	*SD*	1.	2.	3.	4.	5.	6.	7.
1.	**Disgust Sensitivity (DS-R)**	59.69	18.87	---	.93***	.86***	.71***	.27***	.16*	.30***
2.	**Core Disgust**	30.75	9.39		---	.68***	.57***	.21**	.11	.21**
3.	**Animal-reminder Disgust**	19.66	7.87			---	.42***	.23**	.15	.22**
4.	**Contamination Disgust**	9.28	4.79				---	.29***	.18*	.40***
5.	**Anxiety Sensitivity (ASI-3)**	12.11	9.98					---	.50***	.31***
6.	**PTSD Symptom Severity (PCL)**	26.01	11.67						---	.30***
7.	**C-OCD Symptoms (OCI-R wash)**	1.75	2.37							---

*Note: *p < .05; **p < .01; ***p < .001. DS-R = Disgust Scale-Revised. ASI-3 = Anxiety Sensitivity Index-3. PCL = PTSD Checklist. OCI-R = Obsessive Compulsive Inventory-Revised.*

Table 3. *Descriptive Statistics and Correlations Among Primary Variables and Possible Covariates for Sexual Trauma Group.*

		M	*SD*	1.	2.	3.	4.	5.	6.	7.
1.	**Disgust Sensitivity (DS-R)**	60.62	13.87	---	.87***	.91***	.25	.27	.35	-.08
2.	**Core Disgust**	30.31	7.10		---	.67*	-.04	.46	.31	-.06
3.	**Animal-reminder Disgust**	21.08	7.63			---	.08	.36	.17	-.15
4.	**Contamination Disgust**	9.23	3.11				---	-.73**	.41	.15
5.	**Anxiety Sensitivity (ASI-3)**	9.92	10.02					---	.02	-.167
6.	**PTSD Symptom Severity (PCL)**	33.62	16.32						---	.34
7.	**C-OCD Symptoms (OCI-R wash)**	.54	.97							---

*Note: *p < .05; **p < .01; ***p < .001. DS-R = Disgust Scale-Revised. ASI-3 = Anxiety Sensitivity Index-3. PCL = PTSD Checklist. OCI-R = Obsessive Compulsive Inventory-Revised.*

Table 4. *Descriptive Statistics and Correlations Among Primary Variables and Possible Covariates for the Non-Trauma Control Group*

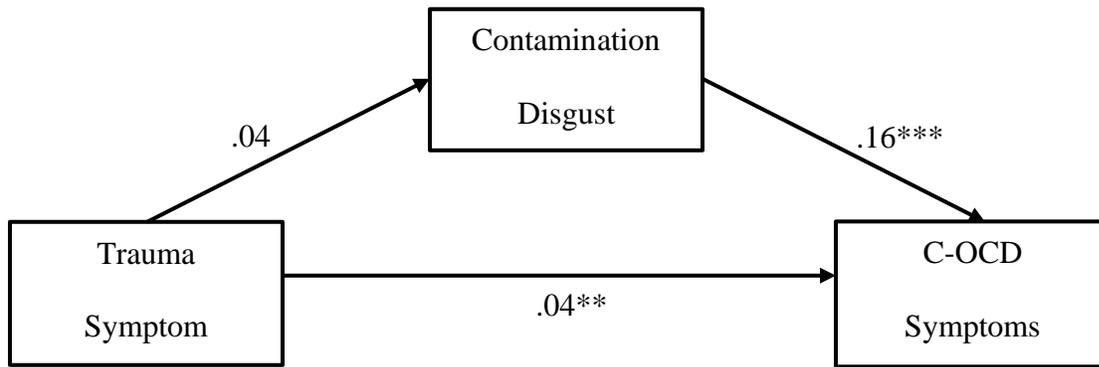|		*M*	*SD*	1.	2.	3.	4.	5.	6.	7.
1.	**Disgust Sensitivity (DS-R)**	58.66	17.31	---	.95***	.86***	.74***	.31	.36*	.57***
2.	**Core Disgust**	28.87	8.31		---	.77***	.61***	.21	.28	.52**
3.	**Animal-reminder Disgust**	20.53	6.43			---	.37*	.20	.29	.45*
4.	**Contamination Disgust**	9.26	5.27				---	.47**	.39*	.50**
5.	**Anxiety Sensitivity (ASI-3)**	13.38	13.19					---	.47***	.30***
6.	**PTSD Symptom Severity (PCL)**	24.69	9.96						---	.66***
7.	**C-OCD Symptoms (OCI-R wash)**	1.71	2.38							---

*Note: *p < .05; **p < .01; ***p < .001. DS-R = Disgust Scale-Revised. ASI-3 = Anxiety Sensitivity Index-3. PCL = PTSD Checklist. OCI-R = Obsessive Compulsive Inventory-Revised.*

Figure 1. *Results of Mediation Model*


```
                    ┌─────────────────┐
                    │  Contamination  │
                    │                 │
                    │     Disgust     │
                    └─────────────────┘
         .04      ↗                   ↘   .16***
┌──────────────┐                      ┌──────────────┐
│   Trauma     │        .04**         │    C-OCD     │
│              │ ───────────────────→ │              │
│   Symptom    │                      │   Symptoms   │
└──────────────┘                      └──────────────┘
```

*Note: *p < .05; **p < .01; ***p <*

APPENDIX A: ANXIETY SENSITIVITY INDEX-3 (ASI-3)

Please rate each item by selecting one of the five answers for each question. Please answer each statement by circling the number that best applies to you.

	Very Little	A little	Some	Much	Very much
1. It is important for me not to appear nervous.	0	1	2	3	4
2. When I cannot keep my mind on a task, I worry that I might be going crazy.	0	1	2	3	4
3. It scares me when my heart beats rapidly.	0	1	2	3	4
4. When my stomach is upset, I worry that I might be seriously ill.	0	1	2	3	4
5. It scares me when I am unable to keep my mind on a task.	0	1	2	3	4
6. When I tremble in the presence of others, I fear what people might think of me.	0	1	2	3	4
7. When my chest feels tight, I get scared that I won't be able to breathe properly.	0	1	2	3	4
8. When I feel pain in my chest, I worry that I am going to have a heart attack.	0	1	2	3	4
9. I worry that other people will notice my anxiety.	0	1	2	3	4
10. When I feel "spacey" or spaced out I worry that I may be mentally ill.	0	1	2	3	4
11. It scares me when I blush in front of people.	0	1	2	3	4
12. When I notice my heart skipping a beat, I worry that there is something seriously wrong with me.	0	1	2	3.	4
13. When I begin to sweat in a social situation, I fear people will think negatively of me.	0	1	2	3	4
14. When my thoughts seem to speed up, I worry that I might be going crazy.	0	1	2	3	4
15. When my throat feels tight, I worry that I could choke to death.	0	1	2	3	4
16. When I have trouble thinking clearly, I worry that there is something wrong with me.	0	1	2	3	4
17. I think it would be horrible for me to faint in public.	0	1	2	3	4
18. When my mind goes blank, I worry there is something terribly wrong with me.	0	1	2	3	4

APPENDIX B: DISGUST SCALE-REVISED (DS-R)

Please indicate how much you agree with each of the following statements, or how true it is about you. Please write a number (0-4) to indicate your answer:

    0 = Strongly disagree (very untrue about me)
      1 = Mildly disagree (somewhat untrue about me)
        2 = Neither agree nor disagree
          3 = Mildly agree (somewhat true about me)
            4 = Strongly agree (very true about me)

____1. I might be willing to try eating monkey meat, under some circumstances.
____2. It would bother me to be in a science class, and to see a human hand preserved in a jar.
____3. It bothers me to hear someone clear a throat full of mucous.
____4. I never let any part of my body touch the toilet seat in public restrooms.
____5. I would go out of my way to avoid walking through a graveyard.
____6. Seeing a cockroach in someone else's house doesn't bother me.
____7. It would bother me tremendously to touch a dead body.
____8. If I see someone vomit, it makes me sick to my stomach.
____9. I probably would not go to my favorite restaurant if I found out that the cook had a cold.
____10. It would not upset me at all to watch a person with a glass eye take the eye
        out of the socket.
____11. It would bother me to see a rat run across my path in a park.
____12. I would rather eat a piece of fruit than a piece of paper
____13. Even if I was hungry, I would not drink a bowl of my favorite soup if it had been
        stirred by a used but thoroughly washed flyswatter.
____14. It would bother me to sleep in a nice hotel room if I knew that a man had died of a
        heart attack in that room the night before.

How disgusting would you find each of the following experiences? Please write a number (0-4) to indicate your answer:

    0 = Not disgusting at all
      1 = Slightly disgusting
        2 = Moderately disgusting
          3 = Very disgusting
             4 = Extremely disgusting

____15. You see maggots on a piece of meat in an outdoor garbage pail.
____16. You see a person eating an apple with a knife and fork
____17. While you are walking through a tunnel under a railroad track, you smell urine.
____18. You take a sip of soda, and then realize that you drank from the glass that an
        acquaintance of yours had been drinking from.
____19. Your friend's pet cat dies, and you have to pick up the dead body with your bare hands.
____20. You see someone put ketchup on vanilla ice cream, and eat it.
____21. You see a man with his intestines exposed after an accident.
____22. You discover that a friend of yours changes underwear only once a week.
____23. A friend offers you a piece of chocolate shaped like dog-doo.
____24. You accidentally touch the ashes of a person who has been cremated.
____25. You are about to drink a glass of milk when you smell that it is spoiled.
____26. As part of a sex education class, you are required to inflate a new unlubricated
        condom, using your mouth.
____27. You are walking barefoot on concrete, and you step on an earthworm.

APPENDIX C: LIFE EVENTS CHECKLIST

Listed below are a number of difficult or stressful things that sometimes happen to people. For each event check one or more of the boxes to the right to indicate that: (a) it *happened to you* personally, (b) you *witnessed it* happen to someone else, (c) you *learned about it* happening to someone close to you, (d) you're *not sure* if it fits, or (e) it *doesn't apply* to you.

Be sure to consider your *entire life* (growing up as well as adulthood) as you go through the list of events.

No.	Response	Happened to me	Witnessed it	Learned about it	Not sure	Doesn't apply
1	Natural disaster (for example, flood, hurricane, tornado, earthquake)					
2	Fire or Explosion					
3	Transportation accident (for example, car accident, boat accident, train wreck, plane crash)					
4	Serious accident at work, home, or during recreational activity					
5	Exposure to toxic substance (for example, dangerous chemicals, radiation)					
6	Physical assault (for example, being					
7	Assault with a weapon (for example, being shot, stabbed, threatened with a knife, gun, bomb)					
8	Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat of harm)					
9	Other unwanted or uncomfortable sexual experience					
10	Combat or exposure to a war-zone (in the military or as a civilian)					
11	Captivity (for example, being kidnapped, abducted, held hostage, prisoner of war)					
12	Life-threatening illness or injury					
13	Severe human suffering					
14	Sudden, violent death (for example, homicide, suicide)					
15	Sudden, unexpected death of someone close to you					
16	Serious injury, harm, or death you caused to someone else					
17	Any other very stressful event or experience					

APPENDIX D: POSTTRAUMATIC STRESS CHECKLIST

Instruction to patient: Below is a list of problems and complaints that veterans sometimes have in response to stressful life experiences. Please read each one carefully, put an "X" in the box to indicate how much you have been bothered by that problem *in the last month*.

No.	Response	Not at all	A little bit	Moderately	Quite a bit	Extremely
1	Repeated, disturbing *memories, thoughts, or images* of a stressful experience from the past?					
2	Repeated, disturbing *dreams* of a stressful experience from the past?					
3	Suddenly *acting* or *feeling* as if a stressful experience *were happening again* (as if you were reliving it)?					
4	Feeling *very upset* when *something reminded* you of a stressful experience from the past?					
5	Having *physical reactions* (e.g., heart pounding, trouble breathing, or sweating) when *something reminded* you of a stressful experience from the past?					
6	Avoid *thinking about* or *talking about* a stressful experience from the past or avoid *having feelings* related to it?					
7	Avoid *activities* or *situations* because they *remind you* of a stressful experience from the past?					
8	Trouble *remembering important parts* of a stressful experience from the past?					
9	Loss of *interest in things that you used to enjoy?*					
10	Feeling *distant* or *cut* off from other people?					
11	Feeling *emotionally numb* or being unable to have loving feelings for those close to you?					
12	Feeling as if your *future* will somehow be *cut short*?					
13	Trouble *falling* or *staying asleep*?					
14	Feeling *irritable* or having *angry outbursts*?					
15	Having *difficulty concentrating*?					
16	Being *"super alert"* or watchful on guard?					
17	Feeling *jumpy* or easily startled?					

APPENDIX E: OBSESSIVE COMPULSIVE INVENTORY-REVISED

The following statements refer to experiences that many people have in their everyday lives. Circle the number that best describes **HOW MUCH** that experience has **DISTRESSED or BOTHERED you during the PAST MONTH.**

No.	Response	Not at all	A little bit	Moderately	Quite a bit	Extremely
1	I have saved up so many things that they get in the way.	0	1	2	3	4
2	I check things more often than necessary.	0	1	2	3	4
3	I get upset if objects are not arranged properly.	0	1	2	3	4
4	I feel compelled to count while I am doing things.	0	1	2	3	4
5	I find it difficult to touch an object when I know it has been touched by strangers or certain people.	0	1	2	3	4
6	I find it difficult to control my own thoughts.	0	1	2	3	4
7	I collect things I don't need.	0	1	2	3	4
8	I repeatedly check doors, windows, drawers, etc.	0	1	2	3	4
9	I get upset if others change the way I have arranged things.	0	1	2	3	4
10	I feel I have to repeat certain numbers.	0	1	2	3	4
11	I sometimes have to wash or clean myself simply because I feel contaminated.	0	1	2	3	4
12	I am upset by unpleasant thoughts that come into my mind against my will.	0	1	2	3	4
13	I avoid throwing things away because I am afraid I might need them later.	0	1	2	3	4
14	I repeatedly check gas, water taps and light switches after turning them off.	0	1	2	3	4
15	I need things to be arranged in a particular way.	0	1	2	3	4
16	I feel that there are good and bad numbers.	0	1	2	3	4
17	I wash my hands more often and longer than necessary.	0	1	2	3	4
18	I frequently get nasty thoughts and have difficulty in getting rid of them.	0	1	2	3	4

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PROFESSIONAL RESEARCH PRESENTATIONS

1. **Murtagh, J.,** (2019, November). *Making science matter: Climbing down from our Ivory Towers.* Paper presented at the annual Three Minute Thesis competition, Oxford, MS.

2. **Murtagh, J.,** & Maack, D. J. (2019, September). *Post-traumatic stress symptoms in sexual and non-sexual trauma: Comparisons on trauma severity and disgust sensitivity.* Paper presented at the Mississippi Psychological Association's 70th Annual Convention, Biloxi, MS.

3. Carter, C. B., **Murtagh, J.,** & Maack, D. J. (2019, April*). Socioeconomic Factors Association with Depressive and Anxiety Symptoms during Pregnancy.* Poster presented at the 6th Annual University of Mississippi Conference on Psychological Science, Oxford, MS.

4. **Murtagh, J.,** (2018, November). *The role of disgust and contamination fear in sexual trauma.* Paper presented at the annual Three Minute Thesis competition, Oxford, MS.

AWARDS AND HONORS

2019   *Three Minute Thesis Finalist*
University of Mississippi

2019   *Student Travel Scholarship*
Mississippi Psychological Association

2018   *Graduate Research Assistantship*
University of Mississippi

2018   *Outstanding Senior in Psychology Award*
Department of Psychology, Indiana State University

2018   *Presidential Scholar Athlete Award*
Indiana State University

2018   *NCAA Postgraduate Scholarship* ($7,500)
National Collegiate Athletic Association

2018   *MVC Postgraduate Scholarship ($5,000)*
Missouri Valley Conference

| 2016-2018 | *NCAA All-Academic Athlete* |
| | National Collegiate Athletic Association |

| 2016-2018 | *Dean's List* |
| | Indiana State University |

RESEARCH POSITIONS

August 2018-present	**Graduate Research Assistant**
	Anxiety, Depression, Emotion, Personality, and Temperament (ADEPT) Lab
	University of Mississippi
	Supervisor: Danielle J. Maack, Ph.D.

Jan 2017- May 2018	**Undergraduate Research Assistant**
	Social/Environmental Psychology Lab
	Indiana State University
	Supervisor: Virgil Sheets, Ph.D

Aug 2015- May 2016	**Undergraduate Research Assistant**
	Cognitive Developmental Lab
	Indiana State University
	Supervisor: Caitlin Brez, Ph.D.

RELEVANT TRAININGS AND WORKSHOPS ATTENDED

1. Dixon, L. (2020, August – December). *Dialectical Behavior Therapy seminar*. Seminar conducted at the University of Mississippi, University, MS.

2. Pentheny, C (2020, October). *ALLIES (LGBTQ+) training*. Training presented by the Center for Inclusion and Cross Cultural Engagement at the University of Mississippi.

3. Maheu, M. (2020, March). *Telepscyhology Best Practice 101 Series*. Training presented by APA Office of Continuing education in Psychology.

4. Young, J. (2019, August – December). *Evidence-based services seminar*. Seminar conducted at the University of Mississippi, University, MS.

5. Weber, M. C., Liberto, A. K., Polk. A. N., Boullion, G. Q., & Pineau, D. J. (2019, September). *Administration and scoring of the Woodcock Johnson – Fourth Edition (WJIV) Tests of Achievement, Cognitive Abilities, and Oral Language.* Workshop presented to graduate students in the Clinical Psychology Ph.D. Program at the University of Mississippi, University, MS.

TEACHING AND MENTORING

2018-2019   **Research Assistant Training Supervisor**
ADEPT Lab, University of Mississippi

Fall 2018   **Teaching Assistant**
University of Mississippi
Course: Abnormal Psychology
Instructor: Danielle J. Maack, Ph.D.

Fall 2018   **Guest Lecturer**
"Depression and Anti-depressants"
Course: Abnormal Psychology
Instructor: Danielle J. Maack, Ph.D.

Fall 2018   **Guest Lecturer**
"Science and Pseudoscience in Abnormal Psychology"
Course: Abnormal Psychology
Instructor: Danielle J. Maack, Ph.D.

Fall 2018   **Guest Lecturer**
"Posttraumatic Stress Disorder"
Course: Abnormal Psychology
Instructor: Danielle J. Maack, Ph.D.

AFFILIATIONS

Mississippi Psychological Association, Student Member

REFERENCES

References available upon request.