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AN EXAMINATION OF DISGUST, ITS MEASURES, AND GENDER DIFFERENCES IN THE EXPERIENCE OF DISGUST SENSITIVITY

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AN EXAMINATION OF DISGUST, ITS MEASURES, AND GENDER DIFFERENCES IN THE EXPERIENCE OF DISGUST SENSITIVITY

by

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DEDICATION

I owe more gratitude than I could ever express to my mother. I do not know what the ratio might be for the times I made her proud versus the times I - dare I say - disgusted her. I can only hope it is the antecedent of that ratio that holds the higher value. I believe that if she were still with me while I endeavored to complete this project she would have been proud of my fortitude. I know she would have loved to see me reach the goal of completing my Ph.D., but to say that pales in comparison to how much I would love to still have her here would be a monumental understatement. She was the wind beneath my wings and I love and miss her dearly.

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AN EXAMINATION OF DISGUST, ITS MEASURES, AND GENDER DIFFERENCES IN THE EXPERIENCE OF DISGUST SENSITIVITY

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ABSTRACT

The emotion of disgust is understudied. It has been implicated in various forms of psychopathology, but its overall influence remains unclear. New and improved methods and constructs are required if we are to better understand the relationship of disgust in attitude formation and psychological functioning. This study was an investigation of a measure referred to herein as the Disgust Propensity and Sensitivity Evolutionary Scale (DPSES). A total of 655 participants were recruited from a private university in the southeastern United States to complete a pencil –and-paper version of the measure in exchange for course credit. Exploratory factor analysis revealed an adequate five-factor structure that was further evaluated and supported through confirmatory factor analysis. The five-factor structure of the DPSES was determined to assess properties of disgust propensity, disgust sensitivity, sexual, moral, and pathogen disgust. Women's scores were significantly higher than males' across all subscales (Cohen's d = 0.59 for disgust propensity, d = 0.62 for disgust sensitivity, d = 1.73 for sexual disgust, d = 0.37 for moral disgust, and d =

0.70 for pathogen disgust). Women are repeatedly demonstrated to have stronger reactions to disgust than men, most particularly in relation to sexual associations. A better overall understanding of reactions, gender differences, and ways that maladaptive responses to disgust influence various psychological disorders and dysfunctions increases the potential for advancements in corresponding diagnostic and treatment strategies.

CHAPTER I

Statement of the Problem

Disgust is an emotion for which a limited amount of research has been conducted. A list of basic emotions typically includes anger, fear, happiness, sadness, surprise, and sometimes disgust (e.g. Ekman, 1992) (see Appendix A). Disgust can be recognized as a universal emotion because of the universality in the way it is expressed (Olatunji & McKay, 2009); there is cross-cultural universality in emotional displays, facial expressions, and physiological responses pertaining to disgust (Ortony & Turner, 1990; Tybur, Lieberman, & Griskevicius, 2009). Using an evolutionary perspective, disgust can be characterized as a basic emotion in that it involves an automatic response, it can be noticed in other primates, there are universal responses to preceding events, it has a specific physiology, and it invokes a spontaneous and unwelcome onset that lasts for a brief period of time (Stark, Walter, Schienle, & Vaitl, 2005).

Background

Articles pertaining to disgust that were published prior to 1990 are sparse, to the point of being almost non-existent. People are more apt to refer to that which is averted as a fear or anxiety response rather than an aversion rooted in disgust (Olatunji & McKay, 2009). Other emotions such as anger, fear, and happiness have also been found to be understudied (Olatunji & Sawchuk, 2005), but research on anger is approximately 10 times more common and research on fear is approximately

16 times more common than research on disgust (Haidt, McCauley, & Rozin, 1994). The study of disgust has grown in recent years, but much potential remains within the social and behavioral sciences for research and development of a greater understanding of this emotion (Olatunji & Sawchuk, 2005). If much is to be learned through the study of disgust an operational definition and valid and reliable measuring tools are of paramount importance.

Measures

Most disgust studies are conducted using self-report measures and correlational studies (Deacon & Olatunji, 2007). The two most widely used instruments to measure sensitivity to disgust are the Disgust and Contamination Sensitivity Questionnaire (DSQ or DQ; Rozin, Fallon, & Mandell, 1984) and the Disgust Scale (DS; Haidt, McCauley, & Rozin, 1994), (Muris, van der Heiden, & Rassin, 2008). Other self-report measures include the Disgust Scale Revised (DS-R; Haidt, McCauley, & Rozin, 1994, modified by Olatunji et al. [2007]), the Disgust Emotion Scale (DES; Walls & Kleinknecht, 1996), the Looming of Disgust Questionnaire (LODQ; Williams, Olatunji, Elwood, Connolly, & Lohr, 2006), the Disgust Propensity and Sensitivity Scale (DPSS; Cavanagh & Davey, 2000), and the Three Domain Disgust Scale (TDDS; Tybur et al., 2009).

The Disgust Propensity and Sensitivity Scale (DPSS), developed by Cavanagh and Davey (2000), was designed, in part, to help distinguish disgust propensity (a tendency to react with disgust) from disgust sensitivity (an emotional

effect; the degree to which disgust is experienced as aversive). This measurement consists of 32 items and uses a 5-point Likert scale with 1 representing *never* and 5 representing *always*. Sixteen of the 32 items were designed to assess disgust propensity and 16 items were designed to assess disgust sensitivity. Good internal consistency was found for the 32-item scale (alpha coefficient .92), for the 16-item propensity subscale (alpha coefficient .89), and for the 16-item sensitivity subscale (alpha coefficient .87) (Olatunji & McKay, 2009).

Questions from the DPSS designed to assess disgust propensity include 13) "When I am disgusted, I feel nauseous", 22) "When I am disgusted, my stomach turns", and 24) "Rancid smells distress me". Questions from the DPSS designed to assess disgust sensitivity include 3) "When I feel disgusted, my bodily sensations frighten me", 9) "It scares me when I salivate excessively", and 29) "I worry that I might harm myself trying to avoid something which disgusts me" (See Appendix B for a complete list of questions from the DPSS).

van Overveld, de Jong, Peters, Cavanaugh, and Davey (2006) examined the psychometric properties of the DPSS using a pool of 967 student participants (759 women, 208 men) from the Netherlands. Their findings led them to create a revised version of the DPSS (DPSS-R) that was made up of 16 items rather than 32 (see Appendices C and D). Principal component analysis (PCA) of the DPSS-R supported a two factor model with eight items measuring disgust propensity ($\alpha = .78$; test-retest reliability 0.69) and eight items measuring disgust sensitivity ($\alpha = .77$; test-retest reliability 0.77). Convergent validity was tested and found to be significant between

the two subscales (r = .54). Disgust propensity and disgust sensitivity were found to be significantly correlated with the DQ (r = -.21; r = -.16 respectively), and the DS (r = -.37; r = .29 respectively) (Olatunji & McKay, 2009).

Items that were kept from the original DPSS designed to measure disgust propensity on the revised version include 1) “I avoid disgusting things”, 5) “I feel repulsed”, and 14) “I find something disgusting”. Items kept from the original to the revised version designed to measure disgust sensitivity include 2) “When I feel disgusted I worry that I might pass out”, 3) “It scares me when I feel nauseous”, and 11) “It scares me when I feel faint”.

Olatunji, Cisler, Deacon, Connolly, and Lohr (2007) examined the psychometric properties of the DPSS-R using a sample of 340 American participants. Good reliability was found for the total score (a = .90) as well as for disgust propensity (a = .84) and disgust sensitivity (a = .83), but the item loadings for four items were inconsistent with what had been observed in previous analyses (Olatunji et al., 2007).

Fergus and Valentiner (2009) conducted a study through which the four items from the DPSS-R that were found by Olatunji et al. (2007) to have questionable loadings were determined to be unreliable. These items were numbers 9 (“When I experience disgust, it is an intense feeling”) and 12 (“I become disgusted more easily than other people”), that had previously loaded as relating to disgust propensity, and numbers 4 (“I think disgusting items could cause me illness / infection”) and 13 (“I worry that I might swallow a disgusting thing”), that had previously loaded as

relating to disgust sensitivity. This study by Fergus and Valentiner (2009) used 363 college students from an introductory psychology course who completed the DPSS-R in exchange for course credit. The mean age was 19.7 with a standard deviation of 2.3 years. Females made up 50.4% of the sample that was 66.1% Caucasian. Analysis of the data determined the best fit to be a 12-item version of the DPSS-R with items 4, 9, 12, and 13 removed [χ^2 = 235.80; Satorra-Bentler (SB) χ^2 = 164.91 (*df* = 53, *P* < .01); CFI = 0.95], as opposed to van Overveld et al.'s (2006) [χ^2 = 557.14; Satorra-Bentler (SB) χ^2 = 386.66 (*df* = 103, *P* < .01); CFI = 0.93] or Olatunji et al.'s (2007) [χ^2 = 531.16; Satorra-Bentler (SB) χ^2 = 368.34 (*df* = 103, *P* < .01); CFI = 0.94] 16-item model (Fergus & Valentiner, 2009).

Tybur (2009) examined the structure and properties of the widely used DS and DS-R. He found little to no evidence to support the categorizations of the scales for which alpha coefficients were found to be as low as *a* = .34. Recognizing the need for an improved construct, Tybur and his colleagues created the Three Domain Disgust Scale (TDDS; Tybur et al., 2009). This scale was designed with an underlying evolutionary perspective and influence. Factor analysis supported a three domain structure through which evolutionary mechanisms relating to sexual, moral, and pathogen disgust were determined to be adequately measurable (Tybur et al., 2009).

The TDDS is a 21-item instrument that utilizes a 7-point Likert scale with 0 representing no amount of disgust and 6 representing extreme disgust. The properties of the TDDS were initially tested using 507 undergraduate student participants.

Subsequently a mixed pool of 4,155 participants from nine samples (seven consisted of undergraduate psychology students and two were internet samples) was used. The mean age from this mixed pool sample was 28.2 years (SD = 11.3, range 18-78) and 64% were female. Through confirmatory factor analysis (CFA) internal consistency was found to be good for all domains across both sexes (factor α's ranging from .80 to .87) and the model fit was also found to be good [χ^2=2824.77 (186, N = 4163), p<.01, CFI= .91, RMSEA= .06, SRMR= .05] (Tybur, 2009). When sex differences were tested for (using participants from one of the online studies N = 1496, 71.1% female) factors were found to be invariant, thus providing evidence that the constructs are measured similarly for men and women (Tybur, Bryan, Lieberman, Hooper, & Merriman, 2011). The factor structure of the TDDS was also tested using an exclusively female sample (N = 345, mean age = 25.3, SD = 6.63). CFA revealed acceptable internal reliability (α = .75 for pathogen, .77 for sexual, and .86 for moral domains) and an acceptable model fit [χ^2 = (186) 342.36, p<.01, CFI= 0.92, RMSEA= 0.05, SRMR= 0.06] (DeBruine, Jones, Tybur, Lieberman, & Griskevicius, 2010).

Items on the TDDS (presented in Appendix E) associated with sensitivity to sexual disgust include 2) "Hearing two strangers having sex", and 8) "Watching a pornographic video". Items included in the TDDS associated with moral disgust sensitivity include 7) "A student cheating to get good grades", and 19) "Intentionally lying during a business transaction". Items included in the TDDS associated with

sensitivity to pathogen disgust include 15) “Standing close to a person who has body odor”, and 21) “Accidentally touching a person’s bloody cut”.

Development of the TDDS has helped to demonstrate a) that it may be appropriate to examine disgust through an evolutionary lens and b) that there is an overall significant and unnecessary overlap in measurements of disgust sensitivity. In particular, it can be argued that the DS uses 32 items to measure what the TDDS measures in just seven items (sensitivity to pathogen disgust. Additionally, the DS has been shown to assess elements outside of what it was designed for, such as neuroticism and openness to new experiences (Tybur, 2009).

Although not suggested to be a completely comprehensive measure, the TDDS is predictably a better tool for classifying relevant and distinctive domains of disgust sensitivity than the DS or DS-R. And the TDDS allows for greater ease of interpretability (Tybur et al., 2009).

During development of the TDDS, Tybur et al. (2009) discovered that a positive correlation was evident between pathogen disgust sensitivity and neuroticism, between sexual disgust sensitivity and agreeableness and conscientiousness, and between moral disgust sensitivity and conscientiousness, agreeableness, and extraversion. A negative relationship was found to exist between openness and moral disgust sensitivity. The TDDS was found to correlate with the DS-R in the domains of morality and sexuality, although the DS-R does not measure these constructs specifically. Tybur (2009) found that the DS-R lacked sufficient structure to measure the constructs it purports to. Designed to measure core, animal

reminder, and contamination disgust properties, Tybur (2009) found the DS-R to be predominately a measure of pathogen disgust sensitivity.

Olatunji, et al. (2012) examined the factor structure and psychometric properties of the TDDS. Through exploratory factor analysis (N = 206), using principal components analysis with oblique transformation, a three component structure was supported with the first three eigenvalues accounting for 57.34% of the variance. Each of the three components was made up of seven items with salient loadings ranging from 0.55 to 0.86 with no items loading on more than one component. As with what was found by Tybur et al. (2009), these components were determined to relate to sexual, moral, and pathogen disgust. Adequate internal consistency was determined to exist across the domains with alpha coefficients ranging from .81 to .91 (.86 for sexual disgust, .81 for moral disgust, and .91 for pathogen disgust). Gender differences were examined and found to be most significant for sexual disgust (Cohen's d = 0.97), when comparing the effect size to moral and pathogen disgust (Cohen's d =0.46 and 0.56 respectively) (Olatunji et al., 2012).

Through confirmatory factor analysis (N=406) a three factor structure was further supported based, in part, on a criterion of Chronbach's alpha value >.70 for all latent variables (sexual .90, moral = .88, and pathogen = .85). Consistent with findings from EFA, gender differences were found through CFA to be most significant for sexual disgust (d = 1.41) as compared to moral and pathogen disgust (Cohen's d = 0.20 and 0.83 respectively) (Olatunji et al., 2012).

Olatunji, et al. (2012) pointed out that prior to their analyses of the TDDS in 2012, investigation of this measure had been limited to that which was conducted by the scale's designers. Olatunji et al. (2012) cited limitations of available psychometric data as a problem and made recommendations for additional psychometric evaluation of the TDDS to be conducted.

Objectives

In order to gain a broader understanding of the role disgust may play in psychopathology, as well as in social settings, new and improved methods for studying its construct are required. To date, most of what has been researched relating to this emotion has come by way of self- assessment (Olatunji & Sawchuk, 2005) with measures that hold room for improvement.

This study examined components of disgust using data collected from a non-clinical sample of 655 undergraduate students from the University of Miami who completed a questionnaire in exchange for course credit. The questionnaire contained 12 items taken from the DPSS-R and all 21 items from the TDDS. Four items that had been found by Olatunji et al. (2007) and Fegus and Valentiner (2009) to have problematic factor loadings were eliminated from the DPSS-R portion of this questionnaire for the purpose of this study.

Within this study, the hybrid questionnaire that was created from the TDDS and the updated DPSS-R is referred to as the Disgust Propensity and Sensitivity Evolutionary Scale (DPSES; presented in Appendix F). The updated version of the

DPSS-R with the four abovementioned items removed is hereon in being referred to as the Updated Disgust Propensity and Sensitivity Scale – Revised (UDPSS-R) (see Table 1).

Table 1.

Questions from the Disgust Propensity and Sensitivity Scale (DPSS)

1. I become disgusted more easily than other people
2. I avoid disgusting things
3. When I feel disgusted, my bodily sensations frighten me
4. When I am disgusted, I feel faint
5. I think disgusting things could cause me illness/infection
6. Disgust can really take me over
7. I am uncomfortable handling things others find disgusting
8. When I notice I feel nauseous, I worry about vomiting
9. It scares me when I salivate excessively
10. When I am disgusted I feel like I might be contaminated
11. When I feel disgusted, I worry that I might pass out
12. I feel repulsed
13. When I am disgusted, I feel nauseous
14. I experience disgust
15. I think feeling disgust is bad for me
16. It scares me when I vomit
17. I worry that I might swallow a disgusting thing
18.Disgusting things make my skin crawl
19. It scares me when I feel nauseous
20. Disgusting things make my stomach turn
21. When I am disgusted, I feel sweaty
22. When I am disgusted, my stomach turns
23. When I feel disgusted, it passes quickly
24. Rancid smells distress me
25. I find it easy to ignore feelings of disgust
26. I screw my face in disgust
27. I cannot think clearly when I am disgusted
28. I find something disgusting
29. I worry that I might harm myself trying to avoid something which disgusts me
30. It scares me when I feel faint
31. When I experience disgust, it is an intense feeling
32. It embarrasses me when I feel disgusted

Note: Items from the original DPSS included on the DPSS-R in bold; Items included on the UDPSS-R in bold and italics.

The primary objective of this study was to examine the psychometric properties of a hybrid measure of disgust. Two previously established measures with disparate underpinnings were combined for the purpose of this study in effort to determine the utility of a single, relatively succinct construct for measuring varied components of disgust.

A secondary objective was to further the examination of how disgust reactions vary according to gender. Disgust is believed to play a role in several types of dysfunctions and psychopathologies. Development of a better understanding of differences in how disgust is experienced from men to women is expected to lead to a richer understanding of differences in its manifestations relative to sexual and other dysfunctions and disorders. With this, there is expectation for resultant advancements in diagnostic and treatment approaches to become plausible.

Hypotheses

Hypothesis 1.

This study aims to examine the underlying dimensions of a hybrid measure of disgust in anticipation that an interpretable factor structure will be revealed. It is further anticipated that any factor structure found through EFA will subsequently be able to be supported through confirmatory factor analysis.

Hypothesis 2.

Confirmatory factor analyses of the study data will provide support for utility of the DPSES as a single construct with five distinct domains.

Hypothesis 3.

Women will be measured as having higher levels of disgust reactions across all domains on the DPSES. It is expected that the mean scores for females will be higher than the mean scores for males and that gender differences will be most significant within the sexual disgust domain.

CHAPTER II

Review of the Literature

History and Overview

Charles Darwin (1872) was the first researcher documented to view disgust as a universal and basic emotion (Tybur, 2009). He (1872/1965) described disgust as "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 sense of smell, touch, and even of eyesight" (p. 250).

Etymology of the word disgust can be traced back to 16th century France (Olatunji & Sawchuk, 2005). It is now part of everyday common usage, noticed more prominently in speech than in writing (Olatunji & McKay, 2009). The word disgust has an etymological association with bad taste (Haidt, McCauley, & Rozin, 1994) and it is an emotion theorized to have emerged by way of a rejection to that which tastes bad (Mataix-Cols et al., 2008). Its synonyms include repulsion, aversion, nausea, and revulsion (Olatunji & Sawchuk, 2005).

Although there are many cultural variations in behavioral manifestations of emotions, there are significant commonalities that exist cross-culturally in association with disgust. Disgust elicitors, facial displays in reaction to disgust, and physiological reactions to disgust range from similar to identical across cultures (Biran & Curtis, 2001).

Tybur (2009) conducted a study that was designed to test the relationship of the Five Factor model of personality against the emotion of disgust. He compared attributes of the TDDS with the domains of agreeableness, conscientiousness, extraversion, openness, and neuroticism from the Five Factor model of personality. He followed that with research on political ideology and tests designed to examine sex differences within each factor. Part of this research involved an examination of ways in which political viewpoints may influence sensitivity to disgust, and how gender may play a role in political expression (Tybur, 2009).

Unlike most emotions that involve activation of the sympathetic nervous system, disgust involves activation of the parasympathetic branch of the nervous system (Olatunji & Sawchuk, 2005). Not much is known about how the neural system reacts to trait sensitivity and disgust (Mataix-Cols et al., 2008), but physical responses to disgust are known to include reduced heart rate, blood pressure, respiration rate, and skin temperature, as well as increased salivation and gastrointestinal mobility (Olatunji & Sawchuk, 2005). Physical responses to disgust differ from fear in that fear responses involve preparing the body for fight or flight whereas disgust reactions involve an interruption of activity. An isolated neurological substrate in the anterior insular cortex of the brain has been found through magnetic resonance imaging that becomes activated in relation with exposure to disgust relevant stimuli (Biran & Curtis, 2001).

The most common physical response tendency in reaction to disgust is avoidance, either active or passive. Active avoidance involves creating physical

distance between oneself and a disgust inducing stimulus. Passive avoidance involves the rejection of disgusting stimuli through acts such as averting or closing of the eyes or pinching the nose closed (Olatunji & Sawchuk, 2005). Matters associated with hygiene are known to invoke active and passive avoidant behaviors across cultures (Biran & Curtis, 2001).

Most researchers relate the emotion of disgust in some way to food rejection or food aversion. An exception to this rule was Sigmund Freud, who associated disgust with sex (Haidt et al., 1994). Freud theorized that disgust serves the purpose of limiting sexual thoughts and actions to those that are socially appropriate (Olatunji & Sawchuk, 2005). He postulated that disgust serves to deter youths from engaging in sexual activity altogether and to deter adults from engaging in sex with what might be considered inappropriate or unacceptable partners (Haidt et al., 1994).

Because it is rare for emotions to be experienced independent of other emotions it is difficult to study them as independent entities. Guilt, shame, rejection, avoidance, anger, and fear may be central or underlying emotions that become activated in concert with disgust (Olatunji & Sawchuk, 2005).

A positive correlation has been found to exist between differences on a sensation seeking scale, designed by Zuckerman (1979), and sensitivity to disgust (Haidt, Rozin, McCauley, & Imada, 1997). Individuals with high levels of sensitivity to disgust were found to be generally more cautious, fearful, and guarded than their non-disgust sensitive counterparts (Haidt et al., 1994). Individuals that have been found to be most sensitive to sexual disgust were determined to be lower in open

mindedness, originality, imagination, curiousness, and adventurousness (Tybur, 2009). People who were identified as more sensitive to fear of contamination had significantly higher scores on disgust sensitivity scales (the Disgust Scale and the Disgust Emotion Scale specifically) than their counterparts who were less sensitive to fear of contamination (Olatunji, Williams, Lohr, & Sawchuk, 2003/2005).

Sensitivity to disgust has been found to be unique to humans (Olatunji & McKay, 2009), and disgust responses are known to change in individuals across their life spans (Olatunji & Sawchuk, 2005). Sensitivity to disgust is almost completely absent in young children, is found to develop after the age of three years (Olatunji & McKay, 2009), and generally is not seen until children reach between five to seven years of age (Haidt et al., 1997). There is some evidence that sensitivity to contamination may exist in children as young as four years of age, but most consistently children have been found to lack adequate cognitive resources that would otherwise allow for experiencing disgust until they are somewhere around eight years of age (Olatunji & Sawchuk, 2005; Rozin & Fallon, 1987). Individuals in the age ranges associated with child-bearing have been found to be most disgust sensitive (Curtis, Aunger, & Rabie, 2004b). This is presumably driven by an incentive to protect any potential offspring from harm through contamination.

Not much information exists to help to delineate the factors of disgust that are related to the fear of contamination, but a correlation is known to exist between the two. It is likely that the fear of contamination results not from a specific group of

factors, but from a general set of elicitors with a fear of contagion in common (Olatunji, Sawchuk, Lohr, & de Jong, 2004).

Emotions play an important part in the regulation of thought processes and behaviors (Olatunji & Sawchuk, 2005), and there are patterns of behavior that can be brought about through the emotion of disgust (Olatunji & McKay, 2009). It can been reasoned that because disgust reactions extend past relationships to food that it is an emotion that may serve the purpose of protecting oneself in a much more general manner (Tybur et al., 2009). Facial responses to disgust have been shown to be not only elicited by food avoidance and bad tastes, but also by a perception of being treated unfairly (Rozin, Haidt, & Fincher, 2009), and public service announcements designed to deter cigarette smoking often do so through a manner designed to elicit disgust (Olatunji & Sawchuk, 2005).

There are clear behavioral, cognitive, and physiological components associated with the emotion of disgust that function to protect against contamination and disease (Olatunji et al., 2007; Olatunji & McKay, 2009) that extend beyond food and pathogens.

Categorization

There are many different philosophies in regard to ways to categorize disgust most appropriately. Following international sampling, Biran and Curtis (2001) determined that disgust elicitors fall succinctly into the following five broad categories: *1) bodily excretions and body parts, 2) decay and spoiled food, 3)*

particular living creatures, 4) certain categories of "other people", and 5*) violations of morality or social norms.*

Rozin, Haidt, and McCauley (2008) posited that disgust responses expanded from a starting place of distaste to categories of core, animal nature, interpersonal, to moral and socio-moral disgust. The *core* categorization subsumes food related disgust and concerns relating to disease and contamination. Disparate elicitors such as animals, foods, odors, bodily products, sex, hygiene, and moral violations are often clustered into a category of core or animal nature disgust (Olatunji et al., 2003/2005). Core disgust serves a function to protect the self from contamination (Tybur et al., 2009), relates to elicitors that represent offensiveness or fear of contamination (Olatunji et al., 2003/2005), and is based on caution for what goes into the mouth (Haidt et al., 1994). There are three main components to elicitors of core disgust. First, there must be a real or imagined threat of "oral incorporation", second, there must be some type of aversive reaction, and third, the stimulus must be perceived to be a contaminant (Olatunji & Sawchuk, 2005). Core disgust evolved from that which protected us against contaminants to an emotion that continues to guard against contaminants as well as any suspect history of contamination related to an object (Haidt et al., 1994). It is a product of culture and socialization with numerous universally shared elicitors (Haidt et al., 1997).

The fact that core disgust is elicited by potential contaminants is theorized to be due to the evolutionary mechanism that protects against microbial threats (Haidt et al., 1997). Examples of contaminants are certain types of animals (typically

associated with waste and garbage), some foods (including spoiled food products), body excretions (such as body waste), and garbage (Olatunji, Haidt, McKay, & David, 2008).

Animal nature - also referred to as animal reminder – refers to elicitors that represent the connectedness of humans to animals (Olatunji et al., 2003/2005). It serves to protect humans from associating too closely with animalistic tendencies and a mechanism to avoid thoughts of mortality. It has been demonstrated that when associated with animals that are known to be mortal, humans are more apt to feel compelled to address their own mortality (Haidt et al., 1997). Thoughts and reminders of death may conceivably be dealt with through the avoidant mechanism of disgust (Olatunji & McKay, 2009). Disgust is known to separate humans from their animal nature through its link with abhorrence (Rozin, Haidt, McCauley, Dunlop, & Ashmore, 1999). By distancing oneself from animalistic associations and tendencies, reminders of mortality may be avoided (Rozin et al., 2008).

Elicitors of animal reminder disgust include sex, death, and body envelope violations (such as blood, mutilation, and gore) (Rozin et al., 2008; Tybur et al., 2009). Because disgust is thought of as a “guardian of the mouth” it is not easy to determine why sexual and body envelope violations may also be reacted to with displays of disgust (Haidt et al., 1997).

An irony to the concept of animal reminder disgust is that people are not turned off by many behaviors that are shared by humans and animals (such as walking, yawning, sleeping, and breathing). Animals (such as cats, dogs, ferrets,

hamsters, birds, rabbits, and guinea pigs) may be kept as pets that are welcomed into the homes of humans (Tybur et al., 2009). Humans are also known to oftentimes appreciate behaviors that animals display that are human-like. Parrots may be trained to speak like their owners, monkeys may be trained to engage in many human-like behaviors, and pet owners may dress up their animals in human-like clothing. It is also not uncommon for humans to treat their animal pets as part of the family. Some pet owners are known to have birthday parties for their pets and some even go as far as to have wedding and (or) funeral ceremonies for their pets. Thus, the research that supports the emotion of disgust as having a distinct purpose to keep a widened gap between humans and animals is questionable (Tybur et al., 2009). Further research on this aspect of disgust is clearly warranted.

Most body secretions are considered disgusting by some. This has been hypothesized to be so because of reminders of our animal nature. An exception to this rule is tears. Tears are not considered to be disgusting in most cultures, despite the fact that they too are secreted by animals (Haidt et al., 1997). Biran and Curtis (2001) found that disgust is most commonly elicited by body secretions. They revealed that disgust in reaction to feces was recognized by members from every sample they had collected (Biran & Curtis, 2001). Rozin and Fallon (1987) have conducted extensive research and had also recognized that body secretions are the most common elicitors of disgust with feces being the strongest and most universal. They (Rozin & Fallon, 1987) illuminated inconsistencies and peculiarities with regard to how and when such products take on their disgust properties. For instance,

bodily fluids such as urine, saliva, mucus, and feces are not typically considered disgusting until they are excreted from the body. People swallow their own saliva and chew and swallow food, yet tend to be turned off by spit and chewed up food outside of the mouth (Rozin & Fallon, 1987).

The emotion of disgust is known to play a part in ethical judgments. Interpersonal and socio-moral disgust are two domains that are considered separate from disgust relating to animal nature. These domains of disgust help to preserve culture, social norms, mores, and order (Haidt et al, 1997; Olatunji & McKay, 2009). Elicitors of interpersonal disgust include interaction with others considered to be immoral, unfortunate, or tainted in some other way. Racism can be linked to interpersonal or socio-moral disgust (Haidt et al., 1997; Tybur et al., 2009). Prejudicial and racist tendencies are known to be escalated when targets are perceived to be disgusting (Olatunji & Sawchuk, 2005). For example, during the time of the Nazi regime, there was a tendency for Nazis to treat Holocaust victims more like animals than like humans. The inhumanity with which victims were treated is presumed to have made to have made it easier for perpetrators to have perceived their victims as disgusting, giving further rise to mistreatment, punishment, and executions. Concentration camp prisoners who remained engaged in human rituals such as bathing were recognized to have had higher survival rates than others who would more readily succumb to dehumanization (Olatunji & McKay, 2009).

Interpersonal and socio-moral disgust tend to be molded by law and religion. Over time, responses to core disgust have tended to decrease whereas socio-moral disgust sensitivity has seemingly grown stronger (Olatunji et al., 2008).

Sympathetic magic involves the "law of contagion" which centers on a belief that *once in contact, always in contact,* or always contaminated (Olatunji & McKay, 2009). It relates to a notion that once an object comes into contact with something considered to be disgusting or contaminated that no amount of washing or sterilization can be enough to wash off the offensiveness (Haidt et al., 1994). Research on disgust consistently finds a connection to exist between anxious and avoidant behaviors associated with items coming into contact with what might appear to be a contaminant (i.e., a cookie that had been dropped or placed on the floor) (Deacon & Olatunji, 2007).

Experiments have been conducted through which participants have been asked to do things such as drink apple juice out of a new bedpan or to eat chocolate that is molded to resemble dog feces. The majority of American participants have shown reluctance to engage in these types of activities (Haidt et al., 1997). A tendency exists for people to repudiate objects that merely resemble that which is considered disgusting (Haidt et al., 1994). A thoroughly sterilized cockroach that is dipped into a glass of juice may render the juice undrinkable and a food item that has been in contact with a spider or that is unfamiliar and ethnic may elicit avoidance (Olatunji & Sawchuk, 2005).

Sympathetic magic also relates to a concept known as psychological contamination whereby if something considered to be offensive or contaminated comes in contact with something else, that something else also becomes offensive or contaminated (Rozin et al., 2009). This phenomenon has been illustrated in situations such as when items merely reported to have been touched by Adolf Hitler or another Nazi are reacted to with disgust, as if the spirit or essence of evil were able to be carried on through an inanimate object (Olatunji & McKay, 2009). Disgusting objects that may be contaminating in some way may be believed to contaminate anything that touches them (Rozin et al., 1999).

The emotion of disgust causes us to withdraw from potential threats to the self. Guarding against contaminants may include eye aversion, acts that are cleansing, or selecting safe topics of conversation (Haidt et al., 1997). In his book entitled *The Anatomy of Disgust*, Miller (1997) wrote that "disgust ranges more widely than we may wish, for it judges ugliness and deformity to be moral offenses. It knows no distinction between the moral and the aesthetic, collapsing failures in both into an undifferentiated revulsion". (17)

Evolutionary Perspectives

As identified within the first chapter of this manuscript, the foundation for the TDDS is based on an evolutionary perspective that breaks disgust into moral, pathogen, and sexual domains (Tybur, 2009).

The evolutionary principle of pre-adaptation dictates that a mechanism that was originally designed for one purpose may later be used for a different purpose (Rozin et al., 2009). In accordance with this perspective, disgust may have evolved from a system designed to reject bitter tastes that activated a disgust output system. This output system responds to elaborate cognitive evaluations rather than to a simple sensory input system. This disgust system was first stimulated by food rejection. Over time this evaluation system began to be triggered by reminders of humans' similarities to animals, certain types of individuals or groups, and eventually that which is considered morally offensive (Rozin & Fallon, 1987; Rozin et al., 2009).

Disgust is likely to have been the last of the basic emotions to emerge through evolutionary processes (Olatunji & McKay, 2009). It has been hypothesized to have evolved from a mechanism to reject that which tastes bad (Rozin et al., 1999), and as a tool to protect from contamination; initially from foods that may have been contaminated (Olatunji & McKay, 2009). The word disgust itself translates to bad taste, and the essence of disgust is linked to food origins rather than other properties associated with food (Rozin et al., 1999).

Disgust evolved from a mammalian rejection of bad tastes to an emotion that is activated through disparate stimuli such as animals, body excretions, moral judgments, and bad hygiene. In line with an evolutionary standpoint, disgust associated with pathogens helps in the avoidance of infectious organisms. Disgust associated with sex assists with mate selection and avoidance of that which may be

detrimental to reproduction. Disgust associated with morality helps to protect against association with those that may violate the social norm and helps with the navigation of social interactions (Tybur et al., 2009). Disgust can be said to be a protector not only of one's body, but also of one's soul (Olatunji & McKay, 2009).

Infection has threatened survival and reproduction throughout evolutionary history with parasites posing imminent threat through penetration of body orifices (Biran & Curtis, 2001). Natural selection created favor for those better equipped to protect against infectious microorganisms (Tybur et al., 2009). Human bodies have evolved to develop defenses that include disgust related avoidance (Biran & Curtis, 2001). Disgust sensitivity to pathogens motivates avoidance of sources of potential contamination (Tybur et al., 2009).

Curtis, Aunger, and Rabie (2004a) conducted a web-based survey on the British Broadcasting Corporation (BBC) website that was designed to test an evolutionary adaptation theory of disgust. They (Curtis et al., 2004) hypothesized that if disgust evolved as a mechanism to prevent disease that it would meet the following criteria:

> *(*i) be felt more strongly when faced with a disease-salient stimulus than with a similar stimulus with less salience; (ii) operate similarly across cultures; (iii) be more pronounced in females, since they play a double role in protecting both self and offspring from disease; (iv) become less potent as an individual's reproductive potential declines; and (v) be more strongly evoked

> by contact with strangers than close relatives, because strangers may carry novel pathogens. (S131)

Within their survey, seven pairs of photographs were presented to each participant. One of each of the pairs of photos depicted a disease relevant stimulus and each other photo of the pairs depicted a stimulus that was not relevant to disease (Curtis et al., 2004a).

Over 77,000 surveys were completed of which 39,829 were determined to be valid. Unlike most other samplings, the disparity between female and male respondents was negligible (50.3% female). The majority of responses (78%) came from Europe, 13% of the responses came from North America and Canada, and the remaining 9% came from Asia, Oceana, Africa, and South America. Over 98% of the participants found the disease relevant photographs to be more disgusting than the non-disease relevant pairings. Analysis of the data helped to confirm that disgust evolved to protect humans from infection and disease (Curtis et al., 2004a).

Despite the aversive and avoidant qualities of disgust, individuals have been found to look longer at pictures designed to induce disgust than more innocuous pictures. This may be related to an evolutionary mechanism to gather the most information from scenes that may be threatening, hence providing a possible explanation for the phenomenon known as *rubber necking* (Stark, Walter, Schienle, & Vaitl, 2005).

Sexual disgust might be considered to be more understandable from a pathogen avoidance perspective, as sex involves exchanges of body fluids. However,

it can also help to protect against incompatibleness and inappropriateness (Tybur, 2009), as Freud had proposed (Haidt et al., 1994). Disgust associated with mating partners considered to be too similar or too dissimilar may steer an individual to make choices determined to be most socially acceptable. In most societies it is inappropriate to engage in sexual activity with partners that are considered to be either too much like or too much unlike oneself (Haidt et al., 1997).

Despite the fact that humans can avoid much of the risk of spreading sexually transmitted diseases with the use of condoms, there may remain a disease avoidance response associated with sexual intercourse. This disease avoidance or pathogen disgust response tends to be reduced in proportion to how desirable a sexual partner is felt to be (Tybur, 2009). It seems that disgust defenses are lessened significantly when it comes to copulation and exchanges of body fluids when mates are considered desirable or suitable. As a rule, the more attractive or appropriate a mate appears to be, the more innocuous the exchanges of bodily fluids becomes (Biran & Curtis, 2001).

Child rearing also leads to lessened or suspended disgust responses. Children would not be able to survive were it not for caretakers being able to handle their children's body fluids and excrements. Changing the diaper of an unknown baby is more apt to be considered aversive and to trigger a disgust response over changing the diaper of one's own baby (Biran & Curtis, 2001).

In general, body fluids elicit disgust reactions in concert with how one person regards another. The closer one individual feels to another, the less he or she will be

disgusted by bodily fluid exchanges (Curtis, Aunger, & Rabie, 2004a). There seems to be an unconscious cost-benefit analysis that takes place when it comes to sex, nurturance, and nourishment (Biran & Curtis, 2001).

DeBruine et al. (2010) conducted research through which women were shown to demonstrate a higher preference for men with masculine features. Within their study (N = 345 women, mean = 23.8, S.D. = 5.38), a positive correlation was found between pathogen disgust sensitivity and a preference for masculine facial features. No similar correlation was found for sexual or moral disgust. It has been postulated that men with masculine features may be perceived as having higher levels of heritable health (DeBruine et al., 2010).

While most researchers who study disgust focus on the oral relationship that is known to exist, many also focus on the relationship between morality and disgust. An evolutionary link is believed to exist between disgust and morality (Borg, Lieberman, & Kiehl, 2008).

Studies using fMRI have found an overlap to exist in neural regions of the brain when activated by moral judgment or pathogen disgust. Moral disgust, however, is typically considered more abstract than other forms of disgust (Tybur, 2009).

Commonly Used Measures

The Disgust and Contamination Sensitivity Questionnaire (DSQ or DQ; Rozin, Fallon, & Mandell, 1984) was the first assessment tool mentioned in the

disgust literature, although a scale designed to measure food, animals, body products, and hygiene had been developed in Poland (Wronska, 1990) that predates the DSQ (Haidt et al., 1994). The DSQ was designed to assess for differences in children's and parents' beliefs about certain foods and food contamination. The original version included 24 questions designed to measure disgust sensitivity. It used a 9-point Likert scale rated from 1 (*I do not want to eat at all)* to 9 (*would like to eat very much)* (Olatunji & McKay, 2009). An 18-item version of the DSQ was created with a design intended to concentrate solely on the aspect of food in relation to disgust sensitivity. This modified version of the measure used a 5-point Likert scale with ratings from 1 (*not at all disgusting)* to 5 (*very much disgusting)*. Sample items from both versions include "How disgusting would you find it to eat your favorite soup from a soup bowl, after it had been stirred by a thoroughly washed flyswatter?", and "How disgusting would you find it to eat your favorite cookie, after it had been bitten by a waiter in a restaurant?" (Muris et al., 2008; Olatunji & McKay, 2009).

The DSQ has been used in psychological research of such things as phobias, gender roles, obsessive compulsive disorder (OCD), body image (Tybur, 2009) and eating disorders (Deacon & Olatunji, 2007), and social stigma (Tybur, 2009). It has been used as a tool for investigating subtypes of disgust, for distinguishing between types of disgust, and for examining the role that disgust may play in different types of psychopathology (Olatunji & McKay, 2009).

Widespread use of the DSQ led to discussion and scrutiny of the structure of disgust and its influence in specific psychological disorders. There is, however,

scant information available regarding the reliability and validity of the DSQ. A study conducted by Muris, Merckelbach, Schmidt, and Tierney (1999) using a sample of 189 children (*M* age = 9.67) yielded an alpha coefficient of .91. A study conducted by Merckelback, Muris, de Jong, and de Jongh (1999) using a sample of 166 undergraduate students yielded an alpha coefficient of .96, and a study conducted by van Overveld et al. (2006) using 967 undergraduate students yielded an alpha coefficient of .72 (Olatunji & McKay, 2009).

Recognition of the limited utility of the DSQ due, in large part, to its absolute focus on food and food contamination helped to spawn the development of questionnaires that provide greater utility for research involving more diverse domains (Olatunji & McKay, 2009).

One such development was the Disgust Scale (DS; by Haidt, McCauley, and Rozin, 1994). This measure contained 32 items divided into two sections. The first section was made up of 16 True/False items designed to measure behavioral tendencies toward avoidance of stimuli and reactions to that which might be considered disgusting. This section made no reference to the actual word disgust. The second section was made up of 16 scenarios for which participants were instructed to rate the level of disgust they felt in reaction to each scenario. This section used a 3-point Likert-type scale with 0 representing *no disgust at all* and 2 representing *very disgusting* (Olatunji & McKay, 2009).

The Disgust Scale was originally developed with four items (2 True/False, 2 disgust-rating) specific to seven separate domains: 1) food (considered unacceptable

in some manner), 2) animals (with a slimy texture or associated with dirt), 3) body products (most excrements, excluding tears), 4) body envelope violations (such as open wounds or objects entering into the body), 5) death (and dead bodies), 6) sex (involving deviance), and 7) hygiene. An eighth domain was later added to include four items (2 True/False, 2 disgust-rating) designed to relate to "sympathetic magic", or "magical thinking". Sympathetic magic or magical thinking is based on the notion that once something considered disgusting comes in contact with an something else, that other something remains thought of as contaminated in some way despite any length of time that passes or any amount of sterilization that takes place (e.g. Haidt et al., 1994; Miller, 1997; Muris et al., 2008; Tybur et al., 2009).

Development and use of the DS has helped to further the dialog and research in the areas of how disgust may be an influence in anxiety disorders such as OCD and phobias, as well as ways that disgust may be linked to other emotions and other disorders (Olatunji & McKay, 2009).

The DS has been considered a useful tool that has been translated into several different languages. It has been used to examine disgust in relationship to psychological disorders and symptoms such as with arachnophobia, blood-injection-injury (BII) phobia, eating disorders, and contamination based OCD. A significant correlation was found with anxiety (r = .20), neuroticism (r = .45), food neophobia (r = .30), thrill seeking (r = -.47), and experience seeking (r = -.49) (Olatunji & McKay, 2009). People with higher levels of disgust tolerance, as measured by the DS, were found to be less rigid and more curious, compassionate, and friendly

(Tybur, 2009). Internal consistency has been demonstrated to be strong when considering the total score of the DS (α = .81 through .87), but factor analyses have not explicitly supported eight subscales (alphas ranging from .27 to .64) (Deacon & Olatunji, 2007; Olatunji et al., 2007; Olatunji & McKay, 2009; Tybur et al., 2009).

Despite overall questionable psychometric properties, the DS continues to be used in studies and to show up prevalently in the literature. Additionally, each sub-domain is often treated as being distinct and psychometrically valid (Tybur et al., 2009). The DS has been cited in numerous research articles, including ones that relate to body image, eating disorders, social phobias, and general social issues, and it remains, to date, the single most widely used disgust sensitivity measure (Olatunji et al., 2008).

The original Disgust Scale (Haidt et al., 1994) was revised in 2007 ((The Disgust Scale-Revised (DS-R; Haidt, McCauley, & Rozin, 1994, modified by Olatunji et al. [2007])). With this revision came the discovery that four items on the DS designed to measure reactions to sexual acts did not correspond with the other domains. A decision was made to remove the sexual domain and to essentially disregard any sexual or moral examination (Tybur et al., 2009). Ultimately, seven items that were deemed problematic were removed from the DS in creation of the DS-R, resulting in a 25-item scale (Olatunji et al., 2007). The DS-R was developed with a four domain model in mind (Tybur et al., 2009), but through EFA and CFA the measure was found to only support three domains of disgust. These domains were determined to relate to core, animal reminder, and contamination disgust

(Olatunji et al., 2007; Tybur, 2009).

Chronbach's alpha across the DS-R scale and subscales were all found to exceed .70. The factors were categorized as core, animal-reminder, and contamination-based disgust, as with the original DS (Olatunji et al., 2008). Twelve items on the DS-R relate to core disgust and correspond with aversion and fear of infectivity. Eight items on this scale relate to animal reminder disgust, or the avoidance of that which links our humanness to an animal nature. The remaining five items relate to contamination-based disgust and correspond with a potential for contagion. All three DS-R subscales were found to correlate to the sympathetic-magic domain on the original scale which suggests that there is an underlying component relative to a fear of contamination across all three domains (Olatunji et al., 2007).

Most of the characteristics of the original DS scale were retained in the DS-R, but the succinctness inherent in the reduced number of items and subscales provided for improved psychometrics. The total score uncorrected correlation with the original DS was found to be .89 and the total score corrected correlation .78 when measurement error was accounted for (Olatunji et al., 2007). Sample items that appear on both the original and revised scale include "If I see someone vomit, it makes me sick to my stomach", "Even if I was hungry, I would not drink a bowl of my favorite soup if it had been stirred with a used but thoroughly washed flyswatter", "You discover a friend of yours changes underwear only once a week", "A friend offers you a piece of chocolate shaped like dog-doo". Again there is a

strong similarity inherent in the questions asked by the DS/DS-R and items taken from other measures. Notice the question pertaining to soup being stirred by a flyswatter on the DS “I would not drink a bowl of my favorite soup if it had been stirred with a used but thoroughly washed flyswatter” and its similarity to a question on the DSQ “How disgusting would you find it to eat your favorite soup from a soup bowl, after it had been stirred by a thoroughly washed flyswatter?”. Further modifications and improvements of this scale have been recommended (van Overveld et al., 2011)

The Disgust Emotion Scale (DES) was developed by Walls and Kleinknecht (1996) in response to the poor internal consistency of the domains of the DS. The DES is a 30-item construct that uses a 5-point Likert-type scale to measure sensitivity to disgust across five domains. The response scale ranges from 0, representing *no disgust or repugnance at all* to 4, representing *extreme disgust or repugnance*. Olatunji, Sawchuk, de Jong, and Lohr (2006) examined the psychometric properties of the DES using a sample of 260 students (84% women) from the Netherlands and a separate sample of 307 students (70% women) from the United States. Through exploratory factor analysis a five factor model emerged. Domains were categorized as 1) relating to small animals, 2) injections and blood draws, 3) mutilation and death, 4) rotting foods, and 5) smells (Olatunji et al., 2006). These subscales were thought to provide opportunity for more precise identification of differences in sensitivity to disgust than the DS or DSQ provide. Internal consistency for the DES total score was found to be excellent (αs = between .90 and

.95) and the five subscales have also been shown to have high internal consistency with alpha coefficients ranging from .80 to .90 (Olatunji et al., 2007). Convergent validity of total score has reflected positive correlation s with measurements of BII phobia (r = .68), arachnophobia (r = .24) and contamination-based OCD (r = .43) (Olatunji & McKay, 2009). Sample items from the DES include *a sewer rat* (small animal), *receiving a hypothermic injection in the arm* (injections and blood draws), *a dead person unknown to you* (mutilation and death), *a slice of bread with green mold on it* (rotting foods), and *the smell of a public restroom* (smells).

The Looming of Disgust Questionnaire (LODQ) was developed in 2006 by Williams, Olatunji, Elwood, Connolly, and Lohr as a measure of cognitive vulnerability to disgust. It extends to an assessment of susceptibility related to cognitive processing of disgust associated with anxiety disorders. The LODQ was initially created with eight scenarios depicting conditions designed to elicit disgust across domains of rotting foods, contaminated foods, death and envelope violations, and small animals (Olatunji & McKay, 2009). Respondents were asked to "vividly imagine" themselves in each situation and rate on a 5-point Likert scale 1) how disgusted they feel imagining themselves in this situation, 2) the extent chances of having difficulty increase with each passing moment, 3) the extent the threat is of being nauseous, 4) the extent the level of disgust increases with each passing moment, 5) the likelihood that something bad will happen to them, and 6) the extent that they imagine themselves to have the ability to cope with the situation (Williams et al., 2006).

Through principal component analysis (PCA) and principal factor analysis (PFA) (N = 531) Williams, et al. (2006) discovered that one of the scenarios on the measure produced poor factor loadings. That scenario and its associated six Likert response questions were removed and PCA and PAF were conducted again with the reduced item version. The result was a clear five-factor solution for the five-scenario LODQ with the same six Likert-scale response items assigned to each. Internal consistency was found to be strong (α = .96 for the total scale) for the reduced item version (Olatunji et al., 2007; Williams et al., 2006). Sample items from the LODQ include 1) "Imagine that you are going for a walk in the park. You are tired so you sit on a bench to catch your breath. To the side of the bench is a garbage pail with maggots all over it. After sitting for a while you doze off for a minute and as you awake, you realize that some of the maggots from the garbage pail are now crawling up your leg." 2) "Imagine that you are at a party and you decide to introduce yourself to someone that you don't know. You pick someone out in the crowd that is attractive and walk up to them, you see that they are staggering and you realize that they have been drinking. After introducing yourself, they try to speak, but instead they vomit right on your feet." 3) "Imagine that you are very hungry and as you walk into your apartment you see that your roommate is making your favorite soup. You help yourself to a bowl from the large pot on the stove and sit in the living room to watch television. You(r) roommate out of the bedroom and goes into the kitchen and begins stirring the soup with a flyswatter. You look at him in shock, but he tells you that the flyswatter has been thoroughly cleaned." Once again there is notable

similarity in third item sample question from the LODQ and the items noted previously from the DS and DSQ that relate to soup being stirred by a flyswatter (Williams, 2006).

Psychopathology

Research tends to be most focused on the role of disgust in various forms of psychopathology (Olatunji et al., 2007). Through recent research disgust has been implicated as a component in various types of disorders. Reactions to certain stimuli with disgust are likely to lead to an increase in susceptibility to, and acquisition of some anxiety disorders, phobias, sexual dysfunctions, and eating disorders (Olatunji & McKay, 2009). A correlation has been determined to exist between sensitivity to disgust and such psychological syndromes in adults, but evidence to support or refute that the same holds true for children is lacking (Muris et al., 2008). Children have, however, been found to react with fear and anxiety following exposure to disgust-related information about animals (Muris, Mayer, Huijding, & Konings, 2008).

There are patterns of behavior that can be brought about through the emotion of disgust (Olatunji & McKay, 2009). Emotions of fear, sadness, and anger are known to be involved in reactions such as anxiety, depression, and hostility. Although disgust has been recognized as a basic emotion, the role it plays in psychological symptoms and syndromes remains significantly understudied (Olatunji & Sawchuk, 2005). Research has shown that disgust responses tend to be easy to acquire and difficult to extinguish (Olatunji & Deacon, 2007).

For a period of time, disgust was referred to as a “forgotten emotion” in psychological literature (Olatunji & McKay, 2009), but it is coming to be a more widely researched emotion. It has been implicated in the etiology of syndromes such as phobias, eating disorders, and OCD (Olatunji & McKay, 2009) and has been shown to be involved in the development and maintenance of specific fears and phobias (Olatunji, Williams, Lohr, & Sawchuk, 2003/2005). Heightened disgust sensitivity may be a risk factor for certain anxiety disorders and may engender relapse following treatment (Davey, MacDonald, & Brierley, 2008). Disgust has also been implicated in the onset and persistence of sexual disorders, sexual aversions, and post-traumatic stress disorder (PTSD) (Olatunji & Sawchuk, 2005). Disgust sensitivity has been found to be strongly related to neuroticism, negative affectivity, specific phobia, and contamination-based OCD (Olatunji & McKay, 2009). Psychosis has also been linked to disgust and schizophrenic patients with active psychotic symptoms have been found to have greater disgust sensitivity than non-psychotics (Olatunji & Sawchuk, 2005). Typically, the influence of disgust has been found to relate to a variety of disorders in more of a generalized than specific manner (Olatunji et al., 2003/2005).

There is clear evidence that a relationship exists between sensitivity to disgust and symptoms of OCD (Muris et al., 2008). Disgust is a central emotion in OCD (Olatunji & McKay, 2009) and is believed to contribute to the onset and maintenance of this disorder (Deacon & Olatunji, 2007) in a unique way (Olatunji et al., 2003/2005). One of the most prevalent markers of OCD is fear of contamination

(Olatunji, Sawchuk, Arrindell, & Lohr, 2005). It has been proposed that fear of contamination is what underlies the obsessions and compulsions found in OCD. Fear and disgust may compel avoidance of that which is contaminating and diligence for prevention of contamination (Olatunji et al., 2005).

Patients diagnosed with OCD have been found to have a significantly lower tolerance for disgust as compared to individuals found to have low levels of general contamination fear and individuals with OCD have demonstrated higher levels of avoidance to disgusting stimuli than non-anxious controls (Olatunji et al., 2003/2005; Olatunji & Sawchuk, 2005). Studies have implicated disgust as the primary component to predicting washing rituals associated with OCD, independent of symptoms of anxiety and depression (Olatunji et al., 2003/2005). Disgust may play a significant role in the underlying processes in OCD and compulsion rituals (Olatunji et al., 2005).

The study of thought processes involved in magical thinking (once something becomes contaminated it will forever be contaminated, or “once in contact always in contact”) may help to provide a better understanding of OCD (Olatunji & Sawchuk, 2005).

There are apparent links between disgust and fear and disgust and phobia (Olatunji & McKay, 2009). A clear link has been shown to exist between disgust sensitivity and phobias such as small-animal and BII phobias (Muris et al, 2008). Elicitors of core disgust have been implicated in development of arachnophobia and symptoms of OCD. Animal-reminder disgust has been associated with the

development of BII phobia (Olatunji et al., 2008). Pathogen disgust sensitivity is linked with risk for psychological disorders such as OCD, eating disorders, and blood-injury-injection (BII) disorders (Tybur, 2009). In addition, it has been found that a correlation exists between fear of corpses and sensitivity to disgust (Haidt et al., 1997), and Wronska (1990) found a relationship to exist between sensitivity to disgust and neuroticism (Haidt et al., 1994).

Not much information exists to identify the factors of disgust that are relatable to fear of contamination (Olatunji et al., 2003/2005), but a fear of contamination by something disgusting has been found to be a strong predictor of arachnophobia. Arguably the most common phobia, arachnophobia has been found to involve a disgust response (Olatunji & Deacon, 2007). Even though individuals who are spider phobic may describe their reactions to spiders as fearful, a stronger predictor of avoidance of spiders is an expectation of feeling disgusted. Individuals who are spider phobic have been found to respond with disgust and fear to pictures of spiders.

A predisposition to disgust sensitivity has been found to be a potential contributor to fear of spiders. Interestingly, disgust may play a larger role in prediction of spider avoidance than phobia. Disgust has also been found to be a better indicator of subsequent avoidance of spiders than anxiety (Olatunji & Deacon, 2007).

Because disgust seems to be regulated in large part by the parasympathetic nervous system, activation may result in reduced heart rate and blood pressure which

can result in dizziness and fainting. Fainting is a unique reaction within BII that is not known to occur with other phobias or anxiety disorders. An estimated 70-80% of people with BII phobia have reported fainting (in part or fully) when exposed to blood (Olatunji & Sawchuk, 2005). A link is known to exist between BII and general disgust sensitivity in that BII phobies show a stronger reaction to disgust elicitors outside the realm of BII than their non-phobic counterparts (Olatunji & Sawchuk, 2005).

Marzillier and Davey (2005) have demonstrated that there is a unidirectional relationship between anxiety and disgust. They provided evidence to show that reported disgust increases when anxiety is induced, but they found no evidence to suggest that anxiety increases when disgust is induced.

Within the available measures of disgust there is a significant amount of redundancy in measurement of specific experiences of anxiety as they relate to disorders such as obsession based OCD and BII phobia. Meanwhile, some apparent voids remain in regard to items designed to measure other forms of psychopathology that may be disgust relevant (Olatunji et al., 2007) such as sexual dysfunction.

A high rate of comorbidity exists between OCD and sexual dysfunctions and patients with OCD demonstrate higher levels of sexual disgust. Additionally, if it is so that disgust serves a role to distance us from our animalistic tendencies then it seems to make sense that avoidance behaviors associated with sex may be associated with components of disgust (de Jong, Overveld, Schultz, Peters, & Buwalda, 2009).

Dyspareunia involves pain related to sexual activity that leads to personal and interpersonal challenges (de Jong, van Lankveld, Elgersma, & Borg, 2010). Vaginismus involves vaginal spasms that interfere with intercourse. Women who experience such pain and spasms have been found to have heightened levels of overall disgust propensity and potentially contamination sensitivity (de Jong et al., 2009). Heightened disgust propensity, or tendency to experience disgust, increases the likelihood of acquisition of psychological conditions that may be associated with components of disgust (van Overveld, de Jong, Peters, & Schouten, 2011), as in the case of some sexual dysfunctions.

Aside from the cognitive processes that are evident in sexual dysfunction, disgust sensitivity may also play a prominent role. A better understanding of disgust sensitivity and fear of contamination may lead to a better understanding of vaginismus and dyspareunia (de Jong et al., 2010). Categories of disgust that may play a role in sexual dysfunction include pathogen, moral, sex, propensity, and sensitivity.

Women are prone to believe that the vagina is the most vulnerable place for contamination and that the penis of someone unfamiliar to them holds the most considerable level of contamination potential. Similar to retching that may take place when the body responds to disgusting foods, pathogens, or other stimuli, pelvic contractions that take place with vaginismus may provide a defense mechanism from sexual acts that may be perceived as disgusting or from a body part (the penis) that may be perceived as a potential contaminant. If disgust and fear of contamination is

felt strongly toward sexual behaviors or stimuli, then general defense mechanisms such as contraction of the pelvic muscles, as is seen with vaginismus would be reasonable responses (de Jong et al., 2009; de Jong et al., 2010). Additionally, sexual activities and arousal may be disrupted by disgust associated with oral sex, or smells related to sexual encounters that may relate to poor hygiene or disease that may be offensive (van Overveld et al., 2012).

A better understanding of the roles disgust and contamination sensitivity play in sexual dysfunctions may help to improve therapeutic interventions. Current theories and research focus primarily on aspects relating to fear and pain when examining the processes involved in sexual dysfunction (de Jong et al., 2009), and the primary treatment approach is cognitive behavioral therapy (CBT).

It has been estimated that only 18% of patients receiving CBT for the treatment of vaginismus are able to engage in sexual intercourse following treatment. This leaves out a large majority that might otherwise benefit from an alternative conceptualization of this disorder. Accounting for the role disgust may play in sexual dysfunction and aversion may improve treatment options and efficacy. Currently, there is a disparity between the number of people experiencing sexual problems and the number of people seeking help for these issues (de Jong et al., 2010). There is also a lack of epidemiological data on the prevalence rates of sexual disorders. The *Diagnostic and statistical manual of mental disorders* (DSM-IV-TR, American Psychiatric Association, 2000) provides prevalence rates based on the most comprehensive surveys available. They cite estimates for male dyspareunia at 3%,

female dyspareunia at 15%, male orgasm problems at 10%, female orgasm problems at 25%, premature ejaculation at 27%, female hypoactive sexual desire at 33%, male erectile difficulties at 10%, and female arousal problems at 20%.

It has been long held in theories relating to the origin and maintenance of eating disorders that fear and anxiety are the primary contributing factors (Olatunji & Sawchuk, 2005), but there are theorists who have examined and implicated disgust as an additional primary factor. This makes sense in that disgust is highly relatable to food and food is a primary issue for people with eating disorders. Additionally, obese bodies are known to commonly be perceived as disgusting (Mayer, Muris, & Wilschut, 2011) and people with eating disorders tend to see their own bodies as disgusting. Also, certain foods may be associated with vomiting which is also commonly associated with both eating disorders and disgust. Females with eating disorders have been found to have stronger reactions to disgust than males (Olatunji & Sawchuk, 2005) and prevalence rates for eating disorders are higher for women than for men. Anorexia Nervosa and Bulimia Nervosa are approximately 10 times more common in women than men (DSM-IV-TR, American Psychiatric Association, 2000). The relationship between disgust sensitivity and eating disorders, however, remains questionable. Research beyond self-report instruments would be beneficial (Mayer, Muris, Bos, & Suijkerbuijk, 2008).

There is some evidence that disgust may also play a role in hypochondriasis and social phobia, in addition to disorders mentioned above that are more prevalent in the literature (Olatunji et al., 2007). A deficit in the ability to recognize facial

expressions of disgust was found to be more prevalent for patients diagnosed with generalized social anxiety disorder than in control groups. This was speculated to be a potential factor in the development of social phobias (Montagne et al., 2006).

The role that disgust may play in health anxiety disorders such as hypochondriasis has just recently begun to be studied. It stands to reason that the component of disgust associated with fear of contamination may extend to health anxieties. Further research in this area is warranted (Davey & Bond, 2006).

Disgust has also been implicated for having an association with psychopathologies such as agoraphobia, separation anxiety, and claustrophobia that are not known to have components conventionally known to be attached to the emotion of disgust (Davey, Bickerstaffe, & MacDonald, 2006).

Clearly, it is difficult to tease out individual components and emotions when attempting to decipher indices and etiologies relative to psychopathology. Whilst disgust has been implicated as a component of various disorders, confounding variables may have led to overestimated correlations (van Overveld et al., 2011).

The DPSS-R is a unique construct in that it does not include any specific elicitors. As such, the DPSS-R been proven to be a more useful tool for measuring components of psychopathology and for predicting avoidant behaviors than other measures that contain disgust-inducing properties (van Overveld et al., 2011).

Gender

The role that gender plays in reaction to disgust is also under studied (Druschel & Sherman, 1999) but, not too surprisingly, males are generally found to have a lower level of sensitivity to disgust than females (Rozin et al., 1999). Gender is consistently being found as the strongest indicator of disgust sensitivity. Women reliably score higher on all domains of disgust than men (Olatunji et al., 2007), and have been found to score as much as one full standard deviation higher than adult males on disgust sensitivity measures (Druschel & Sherman, 1999).

Generally, women are believed to experience emotions with a higher level of intensity than their male counterparts (Rohrmann, Hopp, & Quirin, 2008). Individuals shown to experience higher levels of disgust sensitivity have been found to be more likely to be sympathetic, empathic, and interpersonally sensitive to others; traits conventionally more characteristic of women than men (Druschel & Sherman, 1999). Women are also more likely to have food aversions and rejections of food than men; young women are up to two times more likely to report aversions to food than young men (Nordin, Broman, Garvill, & Nyroos, 2004). However, studies designed to determine whether psychophysiological differences exist between men and women have not yet yielded any consistent findings (Rohrmann et al., 2008).

Women's levels of disgust sensitivity were found to be significantly higher than men's on all three domains of the DS-R (Olatunji et al., 2008) and females have

been found to be particularly more sensitive to disgust than males in the areas of magical thinking, animal-reminder, and body products (Nordin et al, 2004). Psychological disorders and traits that have been shown in studies to be associated with the emotion of disgust, such as anorexia and bulimia nervosa, arachnophobia, neuroticism, and obsessiveness are known to be more prevalent in women. Females also have higher prevalence rates for OCD and are found to have significantly higher rates of cleaning compulsions than males (Olatunji et al., 2005).

Time and again it has been found that women are more disgust sensitive than men, and gender differences are more prominent and prevalent in the sexual domain as compared with pathogen and moral domains. Women have been found to be significantly more sensitive to disgust within the sexual domain than men (Tybur et al., 2009). It is speculated that such a differential exists because women bear the brunt of the biological costs for choosing mates that might interfere with development of a healthy offspring. This may have to do with fear of potential disruptions to fetal development (Olatunji et al., 2008). Such findings may support separation of a domain for sexual disgust in measurement of disgust sensitivity, distinct from pathogen or moral disgust (Tybur et al., 2009).

CHAPTER III

Methods

The purpose of this research study was to empirically describe the structure of disgust through use of factor analysis. The primary goals were to examine the factor structure of a hybrid measurement scale, referred to in this study as the Disgust Propensity and Evolutionary Scale (DPSES), using exploratory factor and confirmatory factor analyses, to test the properties of this measure, and to examine gender variances in patterns of response.

Participants

Participants for this study were 655 undergraduate students from the University of Miami who completed the DPSES in exchange for course credit. Students completed a paper- and- pencil version of this measure in a manner similar to how the original underlying measures (the DPSS and TDDS) were given in the norming studies. Of the 655 participants, 528 identified a gender. Of the 528 that identified a gender, 298 (56.5%) identified themselves as female, and 229 (43.5%) identified themselves as male. The ratio of women to men was more negligible than what had been found in the majority of similar studies. Participation was voluntary and the university's standards for protection of human research participants were upheld.

Measures

The measures used for this study were chosen based on their novelty and potentially profound relevance to the disgust literature.

The original DPSS (presented in Appendix B) was a 32 item scale that had been found to have good internal consistency for the total score (alpha coefficient = .92) as well as for its propensity and sensitivity subscales (alpha coefficients of .89 and .87 respectively). A revised version of the DPSS was created that contained 16 items that were extracted from the original version. Referred to as the DPSS-R (presented in Appendix C), this version was found to have excellent reliability for the total score (alpha coefficient = .90), and good reliability for the propensity and sensitivity subscales (alpha coefficients of .84 and .83 respectively) (Olatunji & McCay, 2009). Four items had previously been determined (Fergus & Valentiner, 2009; Olatunji et al., 2007) to have questionable factor loadings on the DPSS-R. Those four items were eliminated from the questionnaire presented to the participants in this study. That portion of the DPSES used in this study is referred to in this document as the Updated Disgust and Propensity Sensitivity Scale – Revised (UDPSS-R).

The items on the UDPSS-R designed to measure disgust propensity are as follows:

1. “I avoid disgusting things.”
4. “I feel repulsed.”

5. “Disgusting things make my stomach turn.”

6. “I screw my face up in disgust.”

8. “I experience disgust.”

10. “I find something disgusting.”

The items on the UDPSS-R designed to measure disgust sensitivity are as follows:

2. “When I feel disgusted, I worry that I might pass out.”

3. “It scares me when I feel nauseous.”

7. “When I notice that I feel nauseous, I worry about vomiting.”

9. “It scares me when I feel faint.”

11. “It embarrasses me when I feel disgusted.”

12. “I think feeling disgust is bad for me.”

The items that were eliminated from the DPSS-R for creation of the UDPSS-R included two that were initially designed to assess disgust propensity (“When I experience disgust, it is an intense feeling.”, and “I become disgusted more easily than other people.”), and two that were initially designed to assess disgust sensitivity (“I think disgusting items could cause me illness / infection.”, and “I worry that I might swallow a disgusting thing.”).

The Three Domain Disgust Scale (TDDS; Tybur, 2009) (see Appendix E) is a 21-item measure that is based on an evolutionary theory of disgust. Through EFA a three-factor structure was determined to be the best fit for this measure. Seven items

loaded on each domain and were categorized as sexual, moral, and pathogen disgust. As of the time of this writing, psychometric information was found to be limited for the TDDS. Tybur (2009) conducted CFA's separately for males and females and found internal consistency to be acceptable (sexual disgust α = .86 for males and .80 for females, moral disgust α = .87 for males and .86 for females, and pathogen disgust α = .81 for both males and females). Cronbach's alpha when considering both sexes combined was .87 for sexual disgust, .84 for moral disgust, and .84 for pathogen disgust (Tybur et al., 2009).

The items on the TDDS found to have factor loadings on the subscale associated with sexual disgust are as follows:

2. "Hearing two strangers having sex"

5. "Performing oral sex"

8. "Watching a pornographic video"

11. "Finding out that someone you don't like has sexual fantasies about you"

14. "Bringing someone you just met back to your room to have sex"

17. "A stranger of the opposite sex intentionally rubbing your thigh in an elevator"

20. "Having anal sex with someone of the opposite sex"

The items on the TDDS found to have factor loadings on the subscale associated with moral disgust are as follows:

1. "Shoplifting a candy bar from a convenience store"

4. "Stealing from a neighbor"

7. “A student cheating to get good grades”

10. “Deceiving a friend”

13. “Forging someone’s signature on a legal document”

16. “Cutting to the front of a line to purchase the last few tickets to a show”

19. “Intentionally lying during a business transaction”

The items on the TDDS found to have factor loadings on the subscale associated with pathogen disgust are as follows:

3. “Stepping on dog poop”

6. “Sitting next to someone who has red sores on their arm”

9. “Shaking hands with a stranger who has sweaty palms”

12. “Seeing some mold on old leftovers in your refrigerator”

15. “Standing close to a person who has body odor”

18. “Seeing a cockroach run across the floor”

21. “Accidentally touching a person’s bloody cut”

The hybrid questionnaire, referred to as the DPSES, used for the purpose of this study was made up of 33 items; the 12 that make up what is being referred to as the UDPSS-R and the 21 that make up the TDDS (see Appendix F).

Preliminary Analysis

The missing value analysis (MVA) module of SPSS, Version 20 (IBM Corp., 2011) was used to determine the number of missing values by variable and participant. Any cases found to have more than 10% of their data missing were to be rejected.

Skew and kurtosis on each individual variable were examined to test for univariate normality. According to Curran, West, and Finch (1996), when univariate skew values are less than |2.0| and kurtosis values are less than |7.0| using a maximum likelihood (ML) estimation becomes permissible.

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) and Bartlett's test of sphericity were run using the Statistical Package for Social Sciences (SPSS) version 21.0 (IBM Corp., 2012) to examine whether correlations among the study variables were adequate for factor analytic procedures.

Multivariate outliers were then investigated using Mahalanobis distance, Cook's distance, leverage, and Mardia's coefficient values

Hypothesis One: Exploratory Factor Structure

This study aimed to examine the underlying dimensions of a hybrid measure of disgust in anticipation that an interpretable factor structure would be revealed. It was further anticipated that any factor structure found through exploratory methods would subsequently be supported through confirmatory techniques.

The DPSES is a unique measure of disgust with no a priori examination known to this researcher. This scale was constructed using one instrument that was designed to measure disgust propensity and disgust sensitivity (UDPSS-R) with a second, relatively new, instrument that was designed to measure sexual, moral, and pathogen domains of disgust (TDDS).

Hypothesis Two: Comparing Theoretical Models

Confirmatory factor analyses of the study data will provide support for utility of the DPSES as a single construct with five distinct domains.

Hypothesis Three: Gender Differences

Women will be measured as having higher levels of disgust reactions across all domains on the DPSES. It is expected that the mean scores for females will be higher than the mean scores for males and that gender differences will be most significant within the sexual disgust domain.

CHAPTER IV

Results

Results progressed in several stages. First, a missing value analysis offered no cases for which ten percent or more of data were missing, so no cases were removed or imputed. Second, univariate skew and kurtosis values were examined. All items fell within an acceptable range of < |2.0| for skew and < |7.0| for kurtosis. Descriptive statistics including the mean, standard deviation, skew, and kurtosis values are provided in table 2.

Table 2.

Descriptive Statistics DPSES

	MEAN	SD	SKEW	KURTOSIS
1.	3.68	1.02	-0.50	-0.40
2.	1.61	0.94	1.59	1.99
3.	2.21	1.21	0.81	-0.33
4.	1.88	0.85	0.83	0.55
5.	2.51	1.12	0.39	-0.70
6.	2.58	1.22	0.27	-0.95
7.	2.72	1.34	0.25	-1.16
8.	2.48	0.96	0.27	-0.35
9.	2.68	1.37	0.25	-1.20
10.	2.69	1.04	0.49	-0.26
11.	1.56	0.90	1.80	2.93
12.	1.85	1.10	1.19	0.54
13.	3.36	1.87	0.40	-0.91
14.	4.14	1.92	-0.12	-1.06
15.	5.29	1.53	-0.67	-0.27
16.	5.09	1.91	-0.89	-0.34
17.	3.17	2.14	0.62	-1.04
18.	3.92	1.74	0.14	-0.87
19.	3.98	1.92	-0.03	-1.15
20.	3.34	2.11	0.48	-1.16
21.	3.60	1.56	0.42	-0.56
22.	5.08	1.72	-0.78	-0.22
23.	4.11	1.97	-0.15	-1.16
24.	4.43	1.80	-0.22	-0.94
25.	3.98	1.96	0.00	-1.19
26.	4.23	2.30	-0.09	-1.54
27.	4.91	1.47	-0.33	-0.61
28.	3.41	1.86	0.29	-1.08
29.	4.58	2.21	-0.37	-1.33
30.	4.09	2.01	-0.00	-1.26
31.	4.32	1.79	-0.30	-0.82
32.	4.62	2.17	-0.37	-1.30
33.	4.69	1.88	-0.38	-1.05

Note: N = 655

Third, the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) and Bartlett's test of sphericity were used to examine whether correlations among the study variables were adequate for factor analysis. All KMO values were good (> .80) and all results on Bartlett's test were significant, so the data were determined to be suitable for factoring (Kaiser, 1974a).

Next, the Mahalanobis distance test statistic was calculated using SPSS, version 21 (IBM Corp., 2012) and evaluated as a check for multivariate outliers. The critical value for Mahalanobis distance was 63.87, based on 33 (number of variables) degrees of freedom. The actual value for the dataset (N=655) was 105.42. Based on recommendations by Byrne (2001), individual cases that reflected a Mahalanobis distance value exceeding the critical value were removed from the dataset. Sixteen such cases met that criterion and were deleted. The Mahalanobis distance value for the revised dataset (n=639) was 65.5, considerably closer to the recommended cutoff critical value of 63.87 than what had been found initially.

Cook's distance and leverage tests were then conducted using SPSS, version 21 (IBM Corp, 2012). Cook's distance value was .01 for the original dataset as well as for the dataset with the 16 outliers removed. The leverage statistic was initially .17 but went down to .11 following removal of the outliers. Neither measure produced results that were outside of recommended norms (e.g. Mecklin & Mumford, 2005).

Mardia's coefficient for multivariate kurtosis was calculated using EQS 6.2. The value was 23.95 when the original data set was tested, and 13.92 with the 16

suspected outliers removed. The Mardia's coefficient measure lacks consistent standards for acceptability and is known to produce inaccurate results in calculations using data that are neither skewed nor kurtotic (Mecklin & Mundfrom, 2004, 2005). It has been reported because it has been recognized as one of the strongest measures for testing multivariate normality, and the improvements in its computed value from the first analysis to the second were determined to be noteworthy.

Ultimately, a determination was made that improvements resulting from deletion of the suspected outliers justified removal of these items from the original dataset. Despite the chance that outliers may have continued to exist in the new dataset, the data were determined to be within a range that allowed for treatment as multivariate normal. An overarching reality is that regardless of where or how data are gathered for studies such as this there will undoubtedly be cases that are statistical outliers that render a dataset nonnormal that are actually the norm in practical theory.

Testing Research Hypotheses

Hypothesis One Results.

The first hypothesis of this study involved an exploratory examination of a hybrid measure with an aim to determine its factor structure and potential utility as a measure of disgust sensitivity, disgust propensity, and sexual, moral and pathogen domains of disgust.

Principal components analyses were run with eigenvalues set to >1 on SPSS version 21.0 (IBM Corp., 2012). The first two eigenvalues on the UDPSS-R accounted for 45.17% of the total variance, the first three eigenvalues on the TDDS accounted for 54.57% of the total variance, and the first five eigenvalues on the DPSES accounted for 51.83% of the total variance.

Parallel analysis is a procedure through which eigenvalues are produced and compared with actual eigenvalues. If the eigenvalues from the actual data file are larger than those corresponding to the 95th percentile from the random data, then the factor is considered to be meaningful and appropriate for retention (Hayton, Allen, & Scarpello, 2004; Piccone, 2009; Ruscio & Roche, 2012). Parallel analysis was used to generate eigenvalues from a random dataset created through a Monte Carlo simulation (with 1000 iterations). When results from the principal components analysis were compared to the results from the parallel analysis, two components on the UDPSS-R, three components on the TDDS, and five components on the DPSES were established as being the most suitable for extraction. Results are presented in table 3.

Table 3.
Parallel Analysis UDPSS-R, TDDS, DPSES

UDPSS-R			TDDS			DPSES		
Item	PCA	PA	Item	PCA	PA	Item	PCA	PA
1	4.01	1.28	1	6.61	1.40	1	7.87	1.51
2	1.41	1.21	2	2.82	1.32	2	3.39	1.43
3	1.11	1.16	3	2.03	1.27	3	2.46	1.39
4	0.96	1.11	4	0.93	1.23	4	1.98	1.35
5	0.78	1.07	5	0.85	1.19	5	1.40	1.31
6	0.67	1.04	6	0.73	1.15	6	1.16	1.28
7	0.64	1.00	7	0.69	1.12	7	1.02	1.25
8	0.60	0.97	8	0.67	1.10	8	0.89	1.22
9	0.51	0.94	9	0.63	1.07	9	0.88	1.19
10	0.47	0.90	10	0.60	1.04	10	0.78	1.16
11	0.44	0.87	11	0.56	1.01	11	0.75	1.14
12	0.41	0.83	12	0.52	0.99	12	0.72	1.12
			13	0.48	0.96	13	0.70	1.09
			14	0.47	0.94	14	0.66	1.07
			15	0.45	0.92	15	0.65	1.05
			16	0.43	0.89	16	0.59	1.02
			17	0.37	0.86	17	0.58	1.00
			18	0.35	0.83	18	0.55	0.98
			19	0.31	0.80	19	0.52	0.96
			20	0.28	0.77	20	0.50	0.94
			21	0.24	0.74	21	0.49	0.92
						22	0.48	0.90
						23	0.45	0.88
						24	0.44	0.86
						25	0.43	0.84
						26	0.42	0.82
						27	0.40	0.80
						28	0.37	0.78
						29	0.36	0.76
						30	0.33	0.73
						31	0.30	0.71
						32	0.27	0.68
						33	0.23	0.66

Note: PCA: Principal Components Analysis with eigenvalues >1; PA: Parallel Analysis, N=639, 1,000 iterations.

Review of the principal components and parallel analyses, review of the scree plots, and explanatory value of the factors led to a determination to retain two factors for the UDPSS-R, three factors for the TDDS, and five factors for the DPSES.

Once the determination was made for the number of factors to keep, principal component analyses were run with the number of factors specified. These analyses were run first using a varimax (orthogonal) rotation, and then followed using an oblimin (oblique) rotation. The former assumes factors are uncorrelated and allows them to remain so, and the latter assumes factors are correlated (Beaumont, 2012). Principal axis factorings with varimax rotation were then conducted so that a comparison of the factor analysis and the principal components analyses could be conducted. These analyses were conducted using SPSS, version 21.0 (IBM Corp., 2012).

The principal components analyses with varimax rotation provided the most interpretable factor structure. Its results are presented in tables 4 through 6. Results from the principal component analyses using oblimin rotation and principal axis factorings are available upon request.

Factors were interpreted using |.40| as a cutoff for determining a meaningful correlation between the factors and the variables (Stevens, 2002). Based on that criterion, seven items (2, 3, 5, 7, 9, 11, and 12) loaded on component I and five items (4, 5, 6, 8, and 10) loaded on component II of the UDPSS-R. One item (#5, “Disgusting things make my stomach turn.”) loaded on more than one component, and one item (#1, “I avoid disgusting things.”) did not load on either component.

Component I was determined to be associated with disgust sensitivity (the emotional effect of experiencing disgust) and component II was determined to be associated with disgust propensity (the frequency of experiences of disgust). In the case of item 5, the communality value (h^2) was acceptable whereas that was not the case with item 1. Item 1 ("I avoid disgusting things".) potentially relates to both the state and trait components of disgust to a greater extent than the other items which may explain its low loadings. State disgust has been postulated to relate to aversion upon exposure of something that elicits disgust. Trait disgust relates to stable differences in an individual's reactions to stimuli associated with disgust (Olatunji et al., 2007). "I avoid disgusting things" may invoke a response based upon the thought of exposure (state response) while tapping into the stable reaction to react with disgust to certain stimuli (trait response), over and above the other items.

Table 4 presents the loadings and communalities (h^2) for the two-component, orthogonally rotated solution of the UDPSS-R. Communalities are the sum of squared loadings for each variable, or squared multiple correlations (Stevens, 2002). They express the proportion of variance on a variable that can be accounted for by the set of factors (Tabachnick & Fidell, 1996). Communality values are unaffected by orthogonal rotations and are to be considered low when $\leq .40$ (Stevens, 2002).

Table 4.

Principal Components Analysis, UDPSS-R; Loadings and Communalities

UDPSS-R Items	DS	DP	h^2
11. It embarrasses me when I feel disgusted.	**.73**	.06	.53
12. I think feeling disgust is bad for me.	**.71**	-.16	.52
3. It scares me when I feel nauseous.	**.67**	.28	.53
9. It scares me when I feel faint.	**.56**	.34	.43
2. When I feel disgusted, I worry that I might pass out.	**.56**	.25	.38
7. When I notice that I feel nauseous, I worry about vomiting.	**.50**	.34	.37
8. I experience disgust.	.08	**.78**	.61
6. I screw my face in disgust.	.18	**.69**	.50
10. I find something disgusting.	.04	**.68**	.46
4. I feel repulsed.	.25	**.63**	.46
5. Disgusting things make my stomach turn.	**.49**	**.49**	.48
1. I avoid disgusting things.	.28	.28	.16

Note: n = 639. Varimax (orthogonal) rotation, two factors specified. Loadings ≥ |.40| are presented in boldface. DS: Disgust Sensitivity, DP: Disgust Propensity. h^2 = communalities

Principal components analysis of the TDDS with three factors specified yielded a seven-item loading on each of three components. Based on the criterion of |.40| as a salient loading, no item loaded on more than one component. Component I was determined to be associated with sexual disgust, component II with moral disgust, and component III with pathogen disgust. Table 5 presents the loadings and communalities (h^2) for the three-component solution of the TDDS.

Table 5.

Principal Components Analysis, TDDS; Loadings and Communalities

	TDDS Items (with corresponding item number on the DPSES)	Sex	Moral	Path	h^2
8.	20. Watching a pornographic video	**.83**	.18	.16	.75
14.	26. Bringing someone you just met back to your room to have sex	**.79**	.22	.13	.70
2.	14. Hearing two strangers have sex	**.77**	.18	.12	.64
5.	17. Performing oral sex	**.76**	.01	.09	.58
17.	29. A stranger of the opposite sex intentionally rubbing your thigh in an elevator	**.72**	.19	.21	.60
20.	32. Having anal sex with someone of the opposite sex	**.68**	.08	.25	.54
11.	23. Finding out someone you don't like has sexual fantasies about you	**.63**	.18	.28	.50
19.	31. Intentionally lying during a business transaction	.14	**.80**	.07	.67
4.	16. Stealing from a neighbor	.08	**.79**	.07	.63
13.	25. Forging someone's signature on a legal document	.15	**.76**	.10	.61
7.	19. A student cheating to get good grades	.24	**.72**	.04	.58
16.	28. Cutting to the front of a line to purchase the last few tickets to a show	.11	**.69**	.00	.49
10.	22. Deceiving a friend	.04	**.69**	.17	.50
1.	13. Shoplifting a candy bar from a convenience store	.16	**.69**	.11	.51
15.	27. Standing close to a person who has body odor	.17	.09	**.71**	.54
12.	24. Seeing some mold on old leftovers in your refrigerator	.05	.09	**.69**	.48
9.	21. Shaking hands with a stranger who has sweaty palms	.20	.05	**.67**	.50
21.	33. Accidentally touching a person's bloody cut	.19	.10	**.65**	.47
18.	30. Seeing a cockroach run across the floor	.07	.07	**.62**	.39
6.	18. Sitting next to someone who has red sores on their arm	.18	.07	**.61**	.41
3.	15. Stepping on dog poop	.14	.03	**.59**	.37

Note: n = 639. Three-component solution, Varimax (orthogonal) rotation. Loadings ≥ |.40| are presented in boldface. Path: Pathogen. h^2 = communalities

Table 6 presents the loadings and communalities (h^2) for the five-component solution of the DPSES. Based on the criterion of |.40| as a salient loading, seven items loaded on each of the first three components (sexual, moral, and pathogen as corresponding with the TDDS), seven items loaded on the fourth component (disgust sensitivity), and five items loaded on the fifth component (disgust propensity). Out of the 33 items comprising the DPSES only one item loaded on more than one component (item 5, “Disgusting things make my stomach turn.”) with a loading of .47 on the disgust sensitivity component and .42 on the disgust propensity component. One item (#1, “I avoid disgusting things.”) failed to load on any component. This item was designed to measure disgust propensity on the original DPSS, but its highest loading was noticed on the pathogen disgust component of the DPSES (.36).

Table 6.

Principal Components Analysis, DPSES; Loadings and Communalities

DPSES Items	Sex	Mor	Path	DS	DP	h^2
20. Watching a pornographic video	**.82**	.17	.17	.15	.01	.75
26. Bringing someone you just met back to your room to have sex	**.80**	.22	.14	.04	.04	.70
14. Hearing two strangers have sex	**.77**	.18	.12	.08	.05	.64
17. Performing oral sex	**.74**	.01	.07	.16	.10	.58
29. A stranger of the opposite sex intentionally rubbing your thigh in an elevator	**.72**	.18	.22	.09	.04	.60
32. Having anal sex with someone of the opposite sex	**.69**	.09	.24	.03	.11	.55
23. Finding out someone you don't like has sexual fantasies about you	**.60**	.16	.26	.18	.03	.49
16. Stealing from a neighbor	.08	**.79**	.06	-.01	.08	.65
31. Intentionally lying during a business transaction	.13	**.80**	.08	.11	.00	.67
25. Forging someone's signature on a legal document	.14	**.76**	.11	.09	-.05	.61
19. A student cheating to get good grades	.23	**.72**	.03	.08	.07	.58
22. Deceiving a friend	.05	**.69**	.16	.01	-.03	.51
13. Shoplifting a candy bar from a convenience store	.17	**.69**	.11	-.05	.04	.52
28. Cutting to the front of a line to purchase the last few tickets to a show	.09	**.68**	-.00	.16	-.03	.48
27. Standing close to a person who has body odor	.17	.08	**.70**	.06	.01	.53
21. Shaking hands with a stranger who has sweaty palms	.19	.04	**.67**	.15	-.03	.51
24. Seeing some mold on old leftovers in your refrigerator	.03	.09	**.67**	.09	.07	.47
33. Accidentally touching a person's bloody cut	.17	.09	**.64**	.05	.12	.46
30. Seeing a cockroach run across the floor	.06	.07	**.60**	.10	.11	.39
18. Sitting next to someone who has red sores on their arm	.17	.06	**.59**	.06	.10	.39
15. Stepping on dog poop	.13	.04	**.57**	.07	.12	.36
11. It embarrasses me when I feel disgusted.	.07	.14	.02	**.71**	.07	.53
12. I think feeling disgust is bad for me.	.07	.13	.00	**.67**	-.14	.48
3. It scares me when I feel nauseous.	.17	.04	.18	**.66**	.20	.54
9. It scares me when I feel faint.	.20	.04	.11	**.57**	.27	.45
2. When I feel disgusted, I worry that I might pass out.	.09	.01	.17	**.56**	.18	.38
7. When I notice that I feel nauseous, I worry about vomiting.	.04	-.01	.14	**.55**	.27	.39
8. I experience disgust.	.06	.04	.03	.12	**.80**	.66
10. I find something disgusting	.02	.02	.11	.06	**.71**	.51
4. I feel repulsed.	.07	.11	.12	.27	**.62**	.49
6. I screw my face in disgust.	.11	-.09	.21	.22	**.62**	.50
5. Disgusting things make my stomach turn.	.09	.05	.24	**.47**	**.42**	.47
1. I avoid disgusting things.	.23	.10	.36	.16	.18	.24

Note: n = 639. Five-component solution. Varimax rotation communalities *(h^2).* Loadings ≥|.40| are presented in boldface.

Hypothesis Two Results.

Internal consistency. Chronbach's alpha (*a*) coefficient was used as a measure of internal consistency. Values are generally considered acceptable at $.70 \leq \alpha < .80$, good at $.80 \leq \alpha < .90$, and excellent at $\alpha \geq .90$ (Nunnally & Bernstein, 1994). According to Clark and Watson (1995), and others, the mean inter-item correlation is a more suitable index for testing the internal consistency of a construct than Chronbach's alpha. The mean inter-item correlation for the DPSES was .27 which falls within a recommended range of .15 to .50 (Clark & Watson, 1995). Results are presented in table 7.

Table 7.

Internal Consistency by Scale and Subscale

	Number of Items	Chronbach's Alpha	Mean	Standard Deviation	Average Inter-Item Correlation
DPSES	33	.90	94.29	18.89	.27
UDPSS-R	12	.81	28.42	7.43	.27
DP	6	.73	15.82	4.01	.31
DS	6	.74	12.59	4.49	.32
TDDS	21	.89	65.87	14.50	.27
Sex	7	.89	21.15	7.49	.54
Moral	7	.87	21.78	6.38	.49
Path	7	.79	22.98	5.23	.36

Note: n=639. DP = Disgust Propensity, DS = Disgust Sensitivity, Path = Pathogen.

Although the overall average inter-item correlation (see table 9) was good, its value on the sexual (.54) subscale fell above the recommended cutoff. Accordingly, individual values were reviewed for cases falling above the recommended cutoff for individual items (.20 to .70) (John & Soto, 2007; Kline, 2005). The largest inter-item correlation on the sexual subscale was .70 for items 26 ("Bringing someone you just met back to your room to have sex"), and 29 ("A stranger of the opposite sex intentionally rubbing your thigh in an elevator") (see table 8).

Table 8.

Inter-Item Correlations for the Sexual Subscale of the DPSES

Item	14	17	20	23	26	29	32
14	1.00						
17	.55	1.00					
20	.64	.64	1.00				
23	.51	.40	.55	1.00			
26	.59	.49	.68	.51	1.00		
29	.53	.40	.60	.51	.70	1.00	
32	.50	.49	.55	.42	.54	.51	1.00

Confirmatory factor analysis. There is widespread disagreement in the literature relating to treatment of measures using Likert scales, methods of estimation, and treatment of missing data (e.g. Allen & Seaman, 2007). Based on recommendations by Brown (2011), Carifio and Perla (2007), and others, the data for this study were treated as interval. Maximum likelihood (ML) was used as the method of estimation and missing listwise was used for treatment of missing data. Maximum likelihood is the most precise method when working with larger sample sizes and when data are multivariate normal (Bentler, 2006).

Fit indices are used to help establish whether a model is a good fit for the data. Classes of fit indices include discrepancy or absolute functions, comparative, non-centrality fit measures, and information or parsimony theory.

Making determinations about if and how models fit data is the crux of confirmatory factor analysis (Yuan, 2005). Considering limitations within each class of fit indices and the potential for redundancy, one fit index was chosen from each class for evaluation of model fit for this study. Criteria for acceptable fit vary and are, at times, relative whereby an improvement in a model in and of itself may signify acceptability (Bollen, 1989).

The discrepancy function fit index chosen for this study was the standardized root mean square residual (SRMR). An SRMR of zero is a perfect fit and less than .08 is typically considered a good fit (Kenny, 2012).

The chi-squared index ($\chi 2$) is one of the most commonly used in confirmatory factor analysis. Results were reported for this study based on

recommendations by Hu and Bentler (1999), Kline (2005), and others. Their recommendations are in spite of widespread criticism for such things as $\chi 2$ lacking universal standards and being too liberal. With samples larger than 200 or models with many parameters $\chi 2$ is nearly always statistically significant (Kenny, 2012). The normed, or relative, chi-square adjusts for sample size, but keeps in common some of the problems inherent in the chi-square index (e.g. Nevitt & Hancock, 2000; Tanaka, 1993).

The Bentler comparative fit index was chosen, as it is known to perform well (Bentler, 1990), and is the comparative index least sensitive to sample size (Hooper et. al, 2008). Traditional guidelines consider .90 (within the range of 0 – 1) to be a good fit.

The Steiger-Lind Root Mean Square of Approximation (RMSEA; Steiger, 1990) was used as the non-centrality index, with < .07 representing adequate fit, and <.03 representing excellent fit (Hooper, 2008; Steiger, 2007).

The index chosen to represent information theory was the Akaike Information Criterion (AIC). Also known as an index of parsimony, this index is commonly used to test and compare nonnested models in order to determine which models in the data are most parsimonious (Hooper, 2008). Although the actual AIC values are not appropriate for direct interpretation, as they do not fall within a normed scale, they can be useful for comparison of different models (whereby lower values are indicative of a better fit) (Hooper, 2008; Kline, 2005).

A confirmatory factor analysis was conducted in EQS 6.2 to test the five-factor solution revealed through exploratory procedures. A maximum likelihood estimation and listwise deletion of missing cases were used. Based on guidelines set by Kline (2005) and others, the variable from each factor with the highest regression weight was constrained with a fixed value of 1 while the remaining variables were left as free parameters. A one-factor solution was also tested in EQS 6.2 to determine if disgust might be better measured as a unitary construct. Results, presented in table 10, demonstrate that this is clearly not the case. The five-factor model provides a significantly better fit of the data.

Table 9.

Goodness of Fit Indices DPSES

	SRMR	x^2	df	x^2/df	CFI	RMSEA	AIC
One-factor model	.24	8270.17	528	15.66	.00	.15	7214.17
Five-factor model	.03	979.80	363	2.70	.92	.05	253.80

Note: Maximum likelihood estimation with cases missing listwise. SRMR: Standardized root mean square residual; x^2 /df: relative chi-square; CFI: Bentler Comparative Fit Index; RMSEA: Root mean-square error of approximation. AIC: Akaike Information Criterion.

Post hoc tests were performed in EQS 6.2 to determine if modifications to the model would provide a better or more parsimonious fit. The Lagrange multiplier test offered no evidence to suggest that adding parameters would improve the model fit, and the Wald test offered no evidence that would support removal of any model parameters.

Hypothesis Three Results.

To determine if the DPSES measures the same constructs in the same way across the sexes, standardized factor loadings were obtained separately for females and males, using EQS 6.2. Each item was constrained to load on the factor it was hypothesized to load on. Factor loadings were similar across the sexes with only a few exceptions. The most significant departures from equivalent loadings were found with items 7 (“When I notice that I feel nauseous, I worry about vomiting.”), and 33 (“Accidentally touching a person’s bloody cut.”). Overall, support was provided only for partial measurement invariance between women and men. Results from these analyses are presented in tables 10 through 14.

Table 10.

Standardized Factor Loadings by Gender, DPSES: Disgust Propensity

	Loadings		Std. Error		R^2	
	F	M	F	M	F	M
1. I avoid disgusting things.	.39	.28	.92	.96	.15	.08
4. I feel repulsed.	.61	.63	.80	.78	.37	.40
5. Disgusting things make my stomach turn.	.65	.60	.76	.80	.42	.35
6. I screw my face in disgust.	.56	.55	.83	.84	.32	.30
8. I experience disgust.	.57	.71	.82	.71	.32	.50
10. I find something disgusting	.45	.59	.89	.81	.20	.35

Note: Maximum likelihood estimation, cases missing listwise. F: females, n = 292. M: males, n = 222. R^2 = squared multiple correlation.

Table 11.

Standardized Factor Loadings by Gender, DPSES: Disgust Sensitivity

	Loadings		Std. Error		R^2	
	F	M	F	M	F	M
2. When I feel disgusted, I worry that I might pass out.	.53	.52	.85	.86	.29	.27
3. It scares me when I feel nauseous.	.65	.66	.72	.75	.42	.44
7. When I notice that I feel nauseous, I worry about vomiting.	.61	.37	.79	.93	.37	.13
9. It scares me when I feel faint.	.59	.50	.81	.87	.35	.25
11. It embarrasses me when I feel disgusted.	.52	.63	.85	.77	.28	.40
12. I think feeling disgust is bad for me.	.46	.53	.89	.85	.21	.28

Note: Maximum likelihood estimation, cases missing listwise. F: females, n = 292. M: males, n = 222. R^2 = squared multiple correlation.

Table 12.

Standardized Factor Loadings by Gender, DPSES: Moral Disgust

	Loadings		Std. Error		R^2	
	F	M	F	M	F	M
13. Shoplifting a candy bar from a convenience store	.61	.72	.79	.70	.37	.52
16. Stealing from a neighbor	.76	.76	.66	.65	.57	.58
19. A student cheating to get good grades	.68	.78	.73	.63	.46	.61
22. Deceiving a friend	.66	.63	.75	.77	.44	.40
25. Forging someone's signature on a legal document	.70	.80	.71	.60	.49	.64
28. Cutting to the front of a line to purchase the last few tickets to a show	.65	.63	.76	.77	.42	.40
31. Intentionally lying during a business transaction	.82	.80	.58	.60	.67	.64

Note: Maximum likelihood estimation, cases missing listwise. F: females, n = 292. M: males, n = 222. R^2 = squared multiple correlation.

Table 13.

Standardized Factor Loadings by Gender, DPSES: Sexual Disgust

	Loadings		Std. Error		R^2	
	F	M	F	M	F	M
14. Hearing two strangers have sex	.70	.72	.71	.69	.49	.52
17. Performing oral sex	.64	.56	.77	.83	.41	.31
20. Watching a pornographic video	.81	.79	.59	.62	.66	.62
23. Finding out someone you don't like has sexual fantasies about you	.59	.51	.81	.86	.35	.26
26. Bringing someone you just met back to your room to have sex	.58	.76	.81	.65	.34	.58
29. A stranger of the opposite sex intentionally rubbing your thigh in an elevator	.53	.61	.85	.79	.28	.37
32. Having anal sex with someone of the opposite sex	.55	.56	.84	.83	.30	.31

Note: Maximum likelihood estimation, cases missing listwise. F: females, n = 292. M: males, n = 222. R^2 = squared multiple correlation.

Table 14.

Standardized Factor Loadings by Gender, DPSES: Pathogen Disgust

	Loadings		Std. Error		R^2	
	F	M	F	M	F	M
15. Stepping on dog poop	.54	.46	.84	.89	.29	.21
18. Sitting next to someone who has red sores on their arm	.54	.55	.84	.83	.29	.31
21. Shaking hands with a stranger who has sweaty palms	.66	.61	.75	.79	.44	.38
24. Seeing some mold on old leftovers in your refrigerator	.58	.65	.81	.76	.34	.42
27. Standing close to a person who has body odor	.70	.65	.72	.76	.48	.42
30. Seeing a cockroach run across the floor	.48	.48	.88	.88	.23	.23
33. Accidentally touching a person's bloody cut	.43	.66	.54	.75	.84	.44

Note: Maximum likelihood estimation, cases missing listwise. F: females, n = 292. M: males, n = 222. R^2 = squared multiple correlation.

Internal consistency, as measured by Chronbach's alpha and rho, was good and goodness of fit indices were similar for females and males. Results have been provided in table 15.

Table 15.

Goodness of Fit Indices DPSES; Females versus Males

	a	rho	SRMR	x^2	df	x^2/df	CFI	RMSEA	AIC
Females	.87	.90	.07	950.30	485	1.96	.84	.06	-19.70
Males	.87	.91	.08	804.31	485	1.66	.87	.06	-165.69

Note: a = Chronbach's alpha. Maximum Likelihood estimation, cases missing listwise. SRMR: Standardized root mean square residual; x^2 /df: relative chi-square; CFI: Bentler Comparative Fit Index; RMSEA: Root mean-square error of approximation; AIC: model Akaike Information Criterion

The means for females and males were compared to determine whether mean variance in the structure existed. Mean differences that are one-directional allow for one-sided independent *t*-tests to be performed. Cohen's *d* was used to measure the effect sizes in order to ascertain the statistical significance of results. Cohen's *d* values are considered to have a small effect at |.20|, a medium effect at |.50|, and a large effect at |.80|. These tests were conducted using SPSS, version 21 (IBM Corp., 2012).

Higher means were discovered to exist for women over men on the full DPSES (M = 129.18, SD = 22.12; M = 100.04, SD = 22.21, respectively) and each of its subscales. Accordingly, one-sided (one-tailed) *t*-tests for measuring differences in means were conducted, based on the hypothesis that differences would be one-directional.

There was a significant effect for gender on the total DPSES scale, $t(460) = -14.54$, $p < .001$, $d = -1.32$, and all of its subscales, with women producing higher scores than men in all cases. Means, *F*, *t*, and Cohen's *d* values for the DPSES subscales have been provided in table 16.

Table 16.

Sample Means for Females and Males and Effect Size Statistics for Gender, DPSES Subscales

	Females		Males						
	Mean	SD	Mean	SD	*F*	df*	*t*	df	*d*
DP	16.88	3.88	14.62	3.85	42.69	497	6.52	476	0.59
DS	13.78	4.66	11.14	3.76	46.63	497	7.12	510	0.62
Sex	34.49	8.92	19.17	8.78	380.38	497	19.38	472	1.73
Moral	30.70	9.31	27.09	10.23	15.88	497	4.15	508	0.37
Path	33.27	7.74	27.92	7.54	59.06	497	7.86	513	0.70

Note: DP: disgust propensity; DS: disgust sensitivity; Path: pathogen. SD = standard deviation. df * = error degrees of freedom. F values were computed using alpha = .05. Significance values for t were $p < .001$. All F and t values were significant at their respective levels.

CHAPTER V

Discussion

According to psychoevolutionary theory, basic emotions involve universal, automatic, adaptive responses (Plutchik, 1980; Stark et al., 2005). Disgust is an emotion that is known to have evolved as a protective mechanism against contaminants into an emotion that serves to protect across a wide range of disparate elicitors that include moral and sexual transgressions (Tybur et al., 2009). Although not consistently included on lists of basic emotions, disgust is known to meet the criteria established by several theorists for what constitutes a *basic* emotion (e.g. Ekman, 1992; Plutchik, 1980). Some of the mechanisms that disgust shares with emotions theorized to be basic are universality in its displays, automatic responses with varying degrees of intensity, shared features across species, and similarities across cultures (e.g. Olatunji & McKay, 2009; Stark, et al., 2005; Tybur et al., 2009).

To date, there is no clear consensus as to what factors might best represent the underlying properties of disgust responses. Most of the research that has been conducted thus far has involved self-report measures with limited utility and questionable properties from samples that do not generalize well to the overall population (e.g. Fergus & Valentiner, 2009; Olatunji & McKay, 2009; Olatunji et al., 2012). That holds true for the most widely used measures, the Disgust Scale (DS) and the Disgust and Contamination Sensitivity Scale (DSQ) (Olatunji & McKay, 2009).

Research on the Disgust Scale includes norming studies conducted by Haidt et al. (1994). They used samples of 251 and 454 undergraduate college students through which internal consistency, as measured by Chronbach's alpha was found to be good (.81 and .84 respectively) for the total scale. Internal consistency estimates for the subscales, however, were found to be poor, ranging from .27 to .63. In a later and larger study (N = 1,005), Tolin et al. (2006) found similar internal consistency estimates for the DS (*a* = .83) and its subscales (*a* = .36 to .65) (Olatunji & McKay, 2009).

Research on the DSQ includes studies conducted by Merckelbach et al. (1999), Muris et al. (1999; 2000), and van Overveld et al. (2006). Merckelbach et al. (1999) used a sample of 36 patients with blood-injection-injury (BII) phobia for one study, and 44 and 166 undergraduate students for two other studies. Muris et al. (1999) conducted a study using a sample of 189 children with a mean age of 9.7, and Muris et al. (2000) used a sample of 173 undergraduate students in a separate study. Collectively, their examinations yielded strong alpha coefficients, ranging from .91 (N = 189 children) to .97 (N = 36 with BII phobia). van Overveld et al. (2006) conducted studies using a much larger sample (N=967) through which the alpha coefficient was not found to be as strong (*a* = .72). Overall, most of the studies involving the DSQ include an examination of specific fears and phobias at some level (Olatunji & McKay, 2009).

Advancing research on disgust is necessary to better understand the role this emotion plays in attitude formation, personality, and psychopathology etiology.

Valid and reliable measuring tools are essential for any further advancement of knowledge on this subject to be possible.

Objectives and Findings

This present study examined the psychometric properties of a hybrid measure of disgust made up of questions from the Disgust Propensity and Sensitivity Scale (DPSS) and the Three Domain Disgust Scale (TDDS). Hence, a scale designed to measure disgust propensity and disgust sensitivity was merged with a scale that was designed based on an evolutionary perspective. Whilst other scales had already been developed to measure constructs similar to the DPSS, prior to emergence of the TDDS no instruments were available that had been designed to assess adaptive evolutionary disgust responses. One of the key differences between these two underlying measures is that the UDPSS-R is stimulus independent whereas the TDDS is not. That is, there are no specific elicitors referenced on the UDPSS-R while this is not the case with the TDDS.

Consistent with prior research, results of this study demonstrated that a three-factor model is the most appropriate fit for the TDDS. A two factor-model was found to be the most appropriate fit for the UDPSS-R, and a five-factor model was found to be most appropriate for the DPSES. Factor loadings and gender differences were discovered to be similar to what had been reported previously for the TDDS and the original scale from which the UDPSS-R was derived.

Tests of internal consistency are designed to measure the interrelatedness of items on a scale. Internal consistency, as measured by Chronbach's alpha was excellent for the DPSES, and good for the UDPSS-R, and TDDS. An interesting finding was that the DPSES was found to have a higher alpha coefficient (a = .90) than either the UDPSS-R (a = .81) or TDDS (a = .89) independently.

Pearson mean inter-item correlations were within recommended guidelines (between .15 and .50) (Clark & Watson, 1995) for the full scale (.21), the UDPSS-R (.27) and its disgust propensity and sensitivity subscales (.31 and .32 respectively), and the TDDS (.28), and its pathogen subscale (.37). The Pearson mean inter-item correlation on the sexual subscale (.54) fell above the recommended cutoff range, so individual inter-item correlations were reviewed, accordingly. Two items on the sexual subscale had an inter-item correlation of .70 ("Bringing someone you just met back to your room to have sex", and "A stranger of the opposite sex intentionally rubbing your thigh in an elevator"), which falls on the uppermost recommended cutoff (.20 to .70) recommended by Kline (2005) and others (e.g. John & Soto, 2007). This high correlation is likely a result of the redundant nature of these items, as both reference sexual encounters with strangers. All other individual inter-item correlations fell within acceptable limits on the sexual subscale (from .40 to .68).

Tybur et al. (2009) identified an expectation that disgust sensitivity could be adequately measured within the pathogen domain of the TDDS. Examination of the factor loadings and correlations between the subscales of the DPSES revealed that disgust sensitivity is more adequately measured as a separate construct from

pathogen disgust. Overall, evidence was found that the DPSES measures separate constructs that provide complimentary rather than overlapping content. On both theory and quantitative analysis, a five-factor model was determined to be the best fit for the data in this study.

Gender differences in disgust response patterns were of particular interest within this study. Confirmatory factor analysis demonstrated acceptable and similar model fit and similar factor loadings for females and males. Evidence for factorial invariance for gender was expected, yet only partial invariance was found. In most cases the factor loadings were comparable; however there were items for which the factor loadings on the DPSES were found to be substantially different when female and male samples were evaluated separately.

As was anticipated, mean scores were higher for women, and a significant effect was found for gender across all scales and subscales. The largest effect size $d = 1.73$, was on the sexual domain. These findings are consistent with what has been found by other researchers. In example, Olatunji et al., (2012) tested gender differences in response patterns on the TDDS using a sample of 206 undergraduate student participants. They found significant main effects of gender, F (1, 194) = 44.78, $p < .01$, partial $\eta^2 = .18$, and the TDDS, F (2, 388) = 5.57, $p < .01$, partial $\eta^2 = .03$. They also found the largest gender differences to be on the sexual subscale, $t(196) = 6.78$, $p < .01$, over the pathogen, $t(197) = 3.93$, $p < .01$, and moral, $t(195) = 3.21$, $p < .01$ subscales.

There are some similarities as well as some differences in regards to methods and results in this study as compared with what had been conducted by Olatunji et al. (2012). Some of the similarities include the examination of the TDDS, the use of an undergraduate student population, and the overall results when differences between women and men were evaluated. Some of the differences include the sample size (more than three times larger in the present study), the merger of the UDPSS-R with the TDDS in the present study, and the percentage of females over men (73% women in Olatunji et al.'s sample, 57% female in present study's sample).

Prior to Olatunji et al. (2012), the only known evaluations of the TDDS were conducted by the scale's designers (Tybur, 2009; Tybur et al., 2009, 2011), and the only known evaluations since are presented in this manuscript. So, despite any overlap, this and further evaluations are merited.

Limitations of the Study

This study used a non-clinical sample which limits the scope of study as it relates to psychopathology. Future research would benefit from utilization of the DPSES with a clinical sample in order to broaden the spectrum of knowledge relating to the clinical implications. With that noted, disgust is an emotion that is experienced by the general population and the majority of the norming on its measures has been done utilizing non-clinical samples. Therefore, using a non-clinical sample was neither impractical nor imprudent.

The role that gender plays was an important dimension of this research project. In this study, there were a significant number of cases (128) for which a gender identification was unavailable (19.5%). This hindered the ability to optimize statistical analyses relative to gender differences for the entire sample.

Cross-cultural validation studies were not conducted that would have otherwise provided information to support or refute generalizability of the DPSES. The sample used in this study was garnered from a pool of undergraduate students from a single university in a specific geographic region. Although that specific region (Miami) is known to be one that is culturally diverse, no racial or ethnic demographic information was provided for this study's sample. Future research would benefit from improved demographic data collection, and sampling outside of a university setting would allow for better overall generalizability.

Implications for Practice and Future Research

Much remains to be learned about the interplay of disgust and overall psychological functioning. Disgust reactions evolved through protective mechanisms, but there is an apparent threshold that when passed over leads to increased susceptibility for dysfunction. Fear of contagion or contamination may manifest in compulsive cleaning rituals, blood injection phobias, or avoidant behaviors (e.g. Curtis et al., 2004).

Disgust is believed to have an influence in attitude formation and overall constitution relative to sex that is potentially profound (de Jong, et al., 2010).

Development of a better understanding of that influence and differences in the way disgust is experienced from men to women opens up potential for focal clinical implications. To that end, improved diagnostic capabilities and better treatment strategies for sexual difficulties, dysfunctions and psychopathologies are anticipated.

Women bear greater risks and responsibility to protect their unborn children. The protective mechanisms at the core of women's disgust responses are likely to be derived from an instinctual drive to nurture and protect their living and yet to be born offspring from harm. Each component on the DPSES taps into those drives at some level. Sexual contacts and indiscretions have moral implications and carry risks of disease and contamination. Biological and learned nurturing tendencies are clearly stronger for women than for men, so it stands to reason that women's levels of state and trait reactions, as measured on the propensity and sensitivity, would be higher than men's. A downside to the drive that leads to avoidant reactions is that if a balance is not struck between what is necessary and what is excessive, vulnerability for dysfunction ensues. Disparities in prevalence rates between women and men for dysfunctions and disorders with disgust related associations might be explained, at least in part, by the disparities in how disgust is experienced by each group (e.g. Tybur et al., 2011).

The Disgust Scale remains the most widely used disgust measure as of the time of this study, despite having been demonstrated to lack adequate reliability (Tybur, 2009). As improved measures are introduced it is expected that the use of inferior scales will diminish.

Results from the analyses within this study support reliability and validity of the DPSES as a tool to measure disgust. This hybrid scale allows for state and trait characteristics, as intended by the original DPSS, and evolutionary constructs, as intended by the TDDS, to be measured in a relatively parsimonious manner. There was, however, an apparent lack of measurement equivalence on the DPSES between the sexes and there were items that were found to have inconsistent loadings. Further investigation is warranted to determine what modifications might be made to eliminate any potential redundancy or gender bias from this measure as a whole.

While the goal of advancing knowledge was accomplished with this study, there remains an incredible lack of understanding of this basic emotion. There is little to no agreement in the literature as to what the underpinnings of disgust are, why there are so many disparate elicitors (ranging from pathogen avoidance and body excrements to moral indiscretions), how best to measure its constructs, or how its myriad components relate to one another. No known studies were conducted a priori on what is being referred to in this document as the DPSES, and limited research has been conducted on the underlying scales that make up this measure. Future researchers are encouraged to pick up on where this and other studies have left off when exploring the practical implications of disgust research.

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Appendix A: PLUTCHIK'S THEORY AND TABLE OF BASIC EMOTIONS

Plutchik's (1980) psychoevolutionary theory of basic emotions has ten postulates.

1. The concept of emotion is applicable to all evolutionary levels and applies to animals as well as to humans.
2. Emotions have an evolutionary history and have evolved various forms of expression in different species.
3. Emotions served an adaptive role in helping organisms deal with key survival issues posed by the environment.
4. Despite different forms of expression of emotions in different species, there are certain common elements, or prototype patterns, that can be identified.
5. There is a small number of basic, primary, or prototype emotions.
6. All other emotions are mixed or derivative states; that is, they occur as combinations, mixtures, or compounds of the primary emotions.
7. Primary emotions are hypothetical constructs or idealized states whose properties and characteristics can only be inferred from various kinds of evidence.
8. Primary emotions can be conceptualized in terms of pairs of polar opposites.
9. All emotions vary in their degree of similarity to one another.
10. Each emotion can exist in varying degrees of intensity or levels of arousal.

	Basic Emotions	Basis for Inclusion
Plutchik	Acceptance, anger, anticipation, disgust, joy, fear, sadness, surprise	Relation to adaptive biological processes
Arnold	Anger, aversion, courage, dejection, desire, despair, fear, hate, hope, love, sadness	Relation to action tendencies
Ekman, Friesen, and Ellsworth	Anger, disgust, fear, joy, sadness, surprise	Universal facial expressions
Frijda	Desire, happiness, interest, surprise, wonder, sorrow	Forms of action readiness
Gray	Rage and terror, anxiety, joy	Hardwired
Izard	Anger, contempt, disgust, distress, fear, guilt, interest, joy, shame, surprise	Hardwired
James	Fear, grief, love, rage	Bodily involvement
McDougall	Anger, disgust, elation, fear, subjection, tender-emotion, wonder	Relation to instincts
Oatley and Johnson-Laird	Anger, disgust, anxiety, happiness, sadness	Do not require propositional content
Panksepp	Expectancy, fear, rage, panic	Hardwired
Tomkins	Anger, interest, contempt, disgust, distress, fear, joy, shame, surprise	Density of neural firing
Watson	Fear, love, rage	Hardwired
Weiner and Graham	Happiness, sadness	Attribution independent

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Appendix B: QUESTIONS FROM THE ORIGINAL DPSS

1. I become disgusted more easily than other people
2. I avoid disgusting things
3. When I feel disgusted, my bodily sensations frighten me
4. When I am disgusted, I feel faint
5. I think disgusting items could cause me illness/infection
6. Disgust can really take me over
7. I am comfortable handling things others find disgusting
8. When I notice that I feel nauseous, I worry about vomiting
9. It scares me when I salivate excessively
10. When I am disgusted I feel like I might be contaminated
11. When I feel disgusted, I worry that I might pass out
12. I feel repulsed
13. When I am disgusted, I feel nauseous
14. I experience disgust
15. I think feeling disgust is bad for me
16. It scares me when I vomit
17. I worry that I might swallow a disgusting thing
18. Disgusting things make my skin crawl
19. It scares me when I feel nauseous
20. Disgusting things make my stomach turn
21. When I am disgusted, I feel sweaty
22. When I am disgusted, my stomach turns
23. When I feel disgusted, it passes quickly
24. Rancid smells distress me
25. I find it easy to ignore feelings of disgust
26. I screw up my face in disgust
27. I cannot think clearly when I am disgusted
28. I find something disgusting
29. I worry that I might harm myself trying to avoid something
30. It scares me when I feel faint
31. When I experience disgust, it is an intense feeling
32. It embarrasses me when I feel disgusted

Appendix C: THE DISGUST PROPENSITY AND SENSITIVITY SCALE – REVISED (DPSS-R)

Instructions: this questionnaire consists of 16 statements about disgust. Please read each statement and think how often it is true for you, then place a 'x' in the box that is closest to this.

		Never	Rarely	Some times	Often	Always
1	I avoid disgusting things.					
2	When I feel disgusted, I worry that I might pass out.					
3	It scares me when I feel nauseous.					
4	I think disgusting items could cause me illness / infection.					
5	I feel repulsed.					
6	Disgusting things make my stomach turn.					
7	I screw up my face in disgust.					
8	When I notice that I feel nauseous, I worry about vomiting					
9	When I experience disgust, it is an intense feeling.					
10	I experience disgust.					
11	It scares me when I feel faint.					
12	I become disgusted more easily than other people.					
13	I worry that I might swallow a disgusting thing.					
14	I find something disgusting.					
15	It embarrasses me when I feel disgusted.					
16	I think feeling disgust is bad for me.					

Thank you for your time in completing this questionnaire!
Scoring key: Never = 1, Rarely = 2, Sometimes = 3, Often = 4, Always = 5.
Disgust Propensity: sum of items 1, 5, 6, 7, 9, 10, 12, 14.
Disgust Sensitivity: sum of items 2, 3, 4, 8, 11, 13, 15, 16.

Appendix D. FACTOR LOADINGS FOR THE ORIGINAL DPSS / DPSS-R

	Included on the DPSS-R	**DP**	**DS**
1.	I become disgusted more easily than other people	.49	-.06
2.	I avoid disgusting things	.45	-.05
5.	I think disgusting items could cause me illness/infection	.01	.53
8.	When I notice that I feel nauseous, I worry about vomiting	.25	.34
11.	When I feel disgusted, I worry that I might pass out	.04	.62
12.	I feel repulsed	.64	-.06
14.	I experience disgust	.66	-.06
15.	I think feeling disgust is bad for me	-.02	.57
17.	I worry that I might swallow a disgusting thing	.07	.50
19.	It scares me when I feel nauseous	.10	.68
20.	Disgusting things make my stomach turn	.68	.11
26.	I screw up my face in disgust	.71	-.22
28.	I find something disgusting	.65	-.09
30.	It scares me when I feel faint	-.02	.68
31.	When I experience disgust, it is an intense feeling	.52	.22
32.	It embarrasses me when I feel disgusted	.06	.50
	Excluded from the DPSS-R		
3.	When I feel disgusted, my bodily sensations frighten me	.02	.65
4.	When I am disgusted, I feel faint	.31	.35
6.	Disgust can really take me over	.25	.38
7.	I am comfortable handling things others find disgusting	.27	-.05
9.	It scares me when I salivate excessively	.01	.57
10.	When I am disgusted I feel like I might be contaminated	-.07	.62
13.	When I am disgusted, I feel nauseous	.48	.26
16.	It scares me when I vomit	.01	.64
18.	Disgusting things make my skin crawl	.49	.19
21.	When I am disgusted, I feel sweaty	.45	.28
22.	When I am disgusted, my stomach turns	.65	.11
23.	When I feel disgusted, it passes quickly	.21	.23
24.	Rancid smells distress me	.37	.14
25.	I find it easy to ignore feelings of disgust	.44	.14
27.	I cannot think clearly when I am disgusted	.39	.26
29.	I worry that I might harm myself trying to avoid something which disgusts me	-.15	.67

Source: van Overveld et al. (2006)
DPSS: All items; DPSS-R: Included Items; DP: Disgust Propensity, DS: Disgust Sensitivity

Appendix E. THE THREE DOMAIN DISGUST SCALE

The following items describe a variety of concepts. Please rate how *disgusting* you find the concepts described in the items, where 0 means that you do not find the concept disgusting at all, and 6 means that you find the concept extremely disgusting.

	not at all disgusting						extremely disgusting
1. Shoplifting a candy bar from a convenience store	0	1	2	3	4	5	6
2. Hearing two strangers having sex	0	1	2	3	4	5	6
3. Stepping on dog poop	0	1	2	3	4	5	6
4. Stealing from a neighbor	0	1	2	3	4	5	6
5. Performing oral sex	0	1	2	3	4	5	6
6. Sitting next to someone who has red sores on their arm	0	1	2	3	4	5	6
7. A student cheating to get good grades	0	1	2	3	4	5	6
8. Watching a pornographic video	0	1	2	3	4	5	6
9. Shaking hands with a stranger who has sweaty palms	0	1	2	3	4	5	6
10. Deceiving a friend	0	1	2	3	4	5	6
11. Finding out that someone you don't like has sexual fantasies about you	0	1	2	3	4	5	6
12. Seeing some mold on old leftovers in your refrigerator	0	1	2	3	4	5	6
13. Forging someone's signature on a legal document	0	1	2	3	4	5	6
14. Bringing someone you just met back to your room to have sex	0	1	2	3	4	5	6
15. Standing close to a person who has body odor	0	1	2	3	4	5	6
16. Cutting to the front of a line to purchase the last few tickets to a show	0	1	2	3	4	5	6
17. A stranger of the opposite sex intentionally rubbing your thigh in an elevator	0	1	2	3	4	5	6
18. Seeing a cockroach run across the floor	0	1	2	3	4	5	6
19. Intentionally lying during a business transaction	0	1	2	3	4	5	6
20. Having anal sex with someone of the opposite sex	0	1	2	3	4	5	6
21. Accidentally touching a person's bloody cut	0	1	2	3	4	5	6

Appendix F: HYBRID QUESTIONNAIRE: THE DISGUST PROPENSITY AND SENSIVITY EVOLUTIONARY SCALE (DPSES)

Please make sure your name is on the scan form. Read the instructions for each section and mark your answers on the scan form. Do not mark on this sheet.

Part 1: Please indicate the number on the scale that seems to fit you the best. Record your answer on the scan form.

1	2	3	4	5
Never				Always

1. I avoid disgusting things.
2. When I feel disgusted, I worry that I might pass out.
3. It scares me when I feel nauseous.
4. I feel repulsed.
5. Disgusting things make my stomach turn.
6. I screw my face in disgust.
7. When I notice that I feel nauseous, I worry about vomiting.
8. I experience disgust.
9. It scares me when I feel faint.
10. I find something disgusting.
11. It embarrasses me when I feel disgusted.
12. I think feeling disgust is bad for me.

Part 2: The following items describe a variety of concepts. Please rate how *disgusting* you find the concepts described in the items. Record your responses on the scan form.

1	2	3	4	5	6	7
Not disgusting at all			Moderately disgusting			Extremely disgusting

13. Shoplifting a candy bar from a convenience store
14. Hearing two strangers having sex
15. Stepping on dog poop
16. Stealing from a neighbor
17. Performing oral sex
18. Sitting next to someone who has red sores on their arm
19. A student cheating to get good grades
20. Watching a pornographic video
21. Shaking hands with a stranger who has sweaty palms
22. Deceiving a friend
23. Finding out that someone you don't like has sexual fantasies about you
24. Seeing some mold on old leftovers in your refrigerator
25. Forging someone's signature on a legal document
26. Bringing someone you just met back to your room to have sex

27. Standing close to a person who has body odor
28. Cutting to the front of a line to purchase the last few tickets to a show
29. A stranger of the opposite sex intentionally rubbing your thigh in an elevator
30. Seeing a cockroach run across the floor
31. Intentionally lying during a business transaction
32. Having anal sex with someone of the opposite sex
33. Accidentally touching a person's bloody cut

Items deleted from the DPSS-R:

4. I think disgusting things could cause me illness / infection.
9. When I experience disgust, it is an intense feeling.
12. I become disgusted more easily than other people.
13. I worry that I might swallow a disgusting thing.