Differences between Core and Animal Reminder Disgust Elicitation on a Core Disgust Avoidance Task—A Replication with Modification

By

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ABSTRACT

Differences between Core and Animal Reminder Disgust Elicitation on a Core Disgust Avoidance Task—A Replication with Modification

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Compred to other emotions, there has been a lack of research on disgust as it relates to psychopathology. Of the extant research, disgust has been shown to be implicated in various anxiety disorders and consist of three domains: core, animal-reminder, and contamination disgust. There is evidence that these domains are correlated with disgust-relevant anxiety disorders, and this sensitivity to specific disgust domains have different topographical presentations. This study aims to determine if priming participants with different domain-specific videos (core, animal-reminder, neutral) and then completing a disgust-related behavioral avoidance task that is specific to the core domain, will lead to greater behavioral avoidance to the disgust-related task. The results indicate that those who were exposed to a Domain-Congruent video exhibited greater avoidance and self-reported disgust than those who were exposed to the Domain-Incongruent and Neutral videos. These findings suggest it may be appropriate to add disgust to the exposure paradigm.

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CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

The Role of Disgust in Anxiety Disorders

Despite being one of the primal human emotions, disgust has been the least researched compared to other emotions such as sadness, anger, and fear (Olatunji & McKay, 2009). Yet, this trend has been changing. Over the past 20 years, the role of disgust in psychopathology has been increasingly examined in empirical literature (Mason & Richardson, 2012; Olatunji, Lohr, Smits, Sawchuk, & Patten, 2009). Specifically, disgust has been shown to contribute to the etiology and maintenance of anxiety disorders (Olatunji & McKay, 2009). The expression and sensitivity to disgust has been shown to contribute to behavioral avoidance and distress above and beyond fear alone (Olatunji et al., 2009). While it has been assumed that fear is the primary emotion linked to anxiety disorders, research has shown that disgust and its presentation of anxiety, albeit similar to fear, has evolutionary and functional differences that contribute anxiety (Curtis & Brian, 2001; Cisler, Olatunji, & Lohr, 2009).

Evolutionary Functions of Disgust Avoidance

Though not traditionally conceptualized as contributing to functions of avoidance in anxiety disorders, disgust has been shown to characterize avoidance topographically similar to fear (Woody & Teachman, 2000). Yet this similar avoidance topography may lead to the vastly different presentations in anxiety, and researchers are beginning to understand a variety of disgust-related anxiety disorders (Olatunji & McKay, 2009).

Thus, it is important to discriminate disgust's unique function of avoidance. To do so, one must define disgust in an evolutionary context.

It has taken 150 years of refining definitions to understand disgust. Darwin (1872/1998) first defined the evolutionary function of disgust as a revulsion response to unsavory foods, however. Current conceptualizations of disgust define disgust as a complex function serving to protect the self from physical and psychological harm (Woody & Teachman, 2000). Although this function is similar to fear, the contexts under which the defense mechanism operates are different. Fear serves to protect oneself from situations in which physical harm could occur (Ware, Jain, Burgess, & Davey, 1994; Woody & Teachman, 2000). Humans avoid strangers, animals that can inflict serious harm (i.e., snakes, sharks), small spaces, heights, and the dark to ensure that physical harm or death will not occur. Thus, staying away from dark places where one can be harmed, avoiding falling from high places, suffocating in small, enclosed spaces or being bitten by a poisonous spider is evolutionarily adaptive for survival.

Like fear, the primary function of disgust is to ensure survival, yet disgust has shown to differentiate from fear along dimensions of behavioral intentions, appraisal, and physiological responses (Cisler et al., 2008). Disgust serves as an adaptive function to avoid oral incorporation or contact with noxious or contaminated stimuli (Ware, Jain, Burgess, & Davey, 1994). One can think of disgust as the guardian of the body. Disgust causes responses that ensure that the body does not ingest things that could cause bodily harm (i.e., rotten or decayed food, spoiled or contaminated beverages), and ensures avoidance of body products (e.g., blood, feces, vomit) or contaminated (e.g., dead animals, violations of the body envelope) or potentially contaminated stimuli (e.g.,

contact with a used tissue) that may cause illness. Thus, avoiding unsanitary stimuli, an organism also avoids illness, infection, and possibly death.

The physiological reactions to disgust include feelings of nausea, salvation, and facials reactions (wrinkling of eyes and nose, and reaction of the lips) to defend the body from offensive stimuli or remove a contaminated stimulus that has been ingested (Rozin, Haidt, & McCauley., 2008). The differences between fear and disgust are evident in the sympathetic and parasympathetic nervous system activity. Typically, fear heightens activity in preparation for fight or flight, and disgust suspends activity (Phillips, Fahy, David, & Senior, 1998).

Disgust also encompasses aspects of the self that is not necessarily associated with the body. Rozin and colleagues (2008) proposed that disgust has an "evolutionary pathway" that has allowed this emotion to evolve to the protector of the social self as well. The authors state that this pathway has allowed humans to protect themselves from more complex disgust elicitors that include stimuli that are considered morally or culturally repugnant. Moral or cultural disgust elicitors include culturally determined sexually inappropriate acts (i.e., rape, incest, bestiality, and homosexuality), vulgarity, and various forms of interpersonal disgust (i.e., obesity and racism). It is theorized that humans avoid these situations or individuals considered culturally uncommon or unhealthy to maintain social order and ensure reproduction of our species (Curtis & Biran, 2008).

Disgust in Anxiety Disorders and Other Psychopathology

Fear is considered the chief emotion in phobias and other anxiety disorders. Yet, recent literature has shown that in blood-injection-injury phobia (BII), small animal

phobia, and contamination-related obsessive compulsive disorder (OCD) disgust sensitivity has been a better predictor of distressing symptoms of anxiety compared to fear in nonclinical controls (Olatunji & McKay, 2009; Cisler et al., 2009; Olatunji, Lohr, Sawchuk, & Westendorf, 2005). The next few sections will focus on research that has shown disgust to be a key contributor to onset and maintenance of anxiety disorders and other psychopathology.

Blood-Injection-Injury Phobia. There has been considerable empirical interest in the mediating roles of fear and disgust in phobic responding of BII (Koch, 2002; Olatunji & McKay, 2009; Olatunji et al, 2009). Viar and colleagues (2010) attempted to determine differences in levels of anxiety and disgust for BII individuals and nonfearful participants prior to blood donation. Pre-donation levels of anxiety and disgust was significantly higher for BII individuals compared to nonfearful participants, and disgust sensitivity served as a predictors of vasovagal syncope (fainting) symptoms. These results show that disgust is a key component to the avoidance of BII-relevant stimuli and is consistent with previous research that found that highly disgusted individuals report significantly more fainting symptoms compared to individuals experiencing no disgust during injection (Viar, et al., 2010; Deacon & Abramowitz, 2006).

Research has also looked at behavioral avoidance compared to levels of fear and disgust (Koch, O'Neil, Sawchuk, & Connolly, 2002). Koch and colleagues had BII clinical and nonclinical participants complete a variety of disgust-related behavioral avoidance tasks (BATs). The researchers found that BII individuals expressed significantly greater fear and disgust toward phobia-relevant pictures and BAT stimuli (mutilation, touching bloody gauze, touching a severed deer leg) with disgust levels being

higher than that of fear. Olatunji and colleagues (2009) wanted to determine the differences between fear sensitivity and disgust sensitivity between a clinical sample of individuals with BII phobia and nonclinical controls. The researchers discovered that BII individuals had higher disgust sensitivity than nonclinical controls before and after viewing stimuli related to their fears (i.e., body envelope violations, blood, syringes). Fear sensitivity, conversely, was only slightly higher for the BII individuals than control. Thus, disgust sensitivity was able to differentiate between groups better than fear sensitivity.

Small Animal Phobia. Disgust has been shown to be a key component in small animal phobia, more specifically its role in spider phobia. Olatunji and Deacon (2008) found that participants identified as having high small animal phobia reported greater levels of disgust compared to nonfearful participant when exposed to a realistic-looking, but fake, tarantula (Olatunji & Deacon, 2008). Disgust has also been shown to lead to behavioral avoidance of animal phobic stimuli. Woody, McLean, and Klassen (2005) examined disgust's motivating factors in avoidance of spider-related stimuli through BATs comparing a tarantula, a pen that had come in contact with the spider, and a clean pen. Participants identified as having high spider phobia and low spider phobias were asked to rate their levels of disgust and fear before, during, and after completing one of the BATs. The results found that individuals with high spider fear reported significantly higher levels of disgust and anxiety than low spider fear participants, and peak disgust was the best predictor of avoidance on the spider and "contaminated" pen BATs. Further research has supported the role of disgust in behavioral avoidance and development of

small animal phobia (Davey & Marzillier, 2009; Muris, Jorg, Birgit, & de Vries, 2012; Vernon & Berenbaum; 2008).

The Disease-avoidance model has attempted explained why humans tend to fear animals that should cause little threat (Matchett & Davey, 1991). The common phobias of rats, snakes, insects, and spiders are all animals that humans have little threat of attack, however the disease-avoidance model proposes that we fear and avoid these relatively harmless animals because they are connected to disease and contamination, which evoke feelings of disgust. Empirical support for the role of disgust and fear in this model were discovered by Ware, Jain, Burgess, and Davey (1994). The researchers found that animal fears can be separated into two distinct factors, those that are disgust-relevant and those that are fear relevant. Animals that belong to the disgust-relevant include slugs, maggots, frogs, bats, snakes, and spiders, and animals that belong to the fear-relevant factor include lions, bears, tigers, and sharks. Ware and colleagues tested the factor analysis further and found that there is a significant correlation between levels of disgust and disgust-relevant animal phobias, and that individual difference in disgust levels accounted for a significant amount of variance in fears of animals in the disgust-relevant factor.

Contamination-Related Obsessive Compulsive Disorder. Fear of contamination, a common concern in those with OCD, has been shown to have a more complex relationship with disgust than small animal phobia and BII. While the relationship between disgust aversion of potential sources of contamination or injection seems intuitive and has been supported (see reviews in Olatunji et al., 2005, Olatunji &

McKay, 2009), the relationship has seen mixed results in the literature (Connolly et al, 2009).

Muris and colleagues (2000) examined the role of disgust and different psychopathology in a sample of college students. The results showed that OCD symptoms, specifically cleaning concerns, were significantly related to disgust. The researchers concluded that alleviating disgust through cleaning behaviors negatively reinforce the symptoms of OCD. Mancini, Gregnani, and D'Olimpio (2001) also found strong associations between disgust and OCD symptoms in a nonclinical sample. The authors found that washing and checking behaviors uniquely predicted levels of disgust. Deacon and Olatunji (2007) exposed high and low contamination fearing individuals to three BATs that consisted of a used comb, a cookie on the floor, and a bedpan filled with toilet water. They found that levels of disgust were significantly associated with anxious and avoidant responding on the BATs demonstrating a robust association with contamination concerns associated with individuals with OCD. These results have been supported with implicit measures of disgust sensitivity as well (Nicholson & Barnes-Holmes, 2012).

Contradictory to behavioral research, research on the cognitive processes have shown that there is a covariation bias in contamination fear related to fear specific and disgust specific emotions. Connolly and colleagues (2009) examined this covariation bias associated with contamination stimuli in high contamination fear and low contamination fear individuals. The results revealed that group differences could be found for specific bias toward the over-estimation of fear with the high contamination fearful group exhibited greater bias. Therefore, the high fearful group would overestimate the

probability of exposure to contamination, but would not overestimate feelings of disgust when exposed a contagion. Thus, fear is a greater predictor of cognitive symptoms of OCD than disgust. These results regarding disgust and fear, however, do not necessarily have to be mutually exclusive. The complex relationship of OCD symptoms and emotions may be split along cognitive and behavioral lines. With greater association of the cognitive symptoms of OCD with fear and the behavioral symptoms associated with disgust. Recent research examining cognitive and behavioral components of OCD has supported this theory (Thorpe et al., 2011).

Other Psychopathology. The role of disgust in other psychopathology has been limited in empirical research, but has been shown to be implicated in a variety of disorders. Research has shown advanced forms of disgust (moral and cultural) to be implicated in eating disorders (Griffiths & Troop, 2006), dental anxiety (Mercklebach et al., 1999), sexual dysfunction (de Jong, 2007), post-traumatic stress disorder (Bomyea & Amir, 2012), and even schizophrenia (Schiele, 2003). While relationships for these disorders and disgust are tenuous at best, the paucity of research involving other psychopathology continues to find associations. The abstract nature of these connections is much more difficult to study, and the current study will focus on disgust and psychopathology with strong empirical support.

Disgust Domains

Measures of disgust have undergone substantial refinement over the past four decades. Through this refinement, the construct of disgust sensitivity has been determined to be chief dependent measure in disgust research. Disgust sensitivity is the predisposition to experience disgust in response to a wide array of aversive stimuli (de

Jong & Merckelbach, 1998). Thus, to conceptualize and understand individual differences of disgust, how much disgust someone will feel or experience, one must determine disgust sensitivity.

Disgust Scale. Building upon Rozin, Fallon, and Mandell's original conceptualization of disgust sensitivity in the context of contaminated foods (see the Disgust and Contamination Sensitivity Questionnaire, 1984), Haidt, McCauley, and Rozin (1994) developed The Disgust Scale (DS) to measure a broader range of disgust elicitors. The broader contextual applicationof the DS has made it possible to investigate various domains of disgust. The purpose of the DS is to measure trait disgust as stable differences among individuals in anticipation of repugnant stimuli (Olatunji, et al., 2007). Due to the specific domain measures, compared to other measures of disgust sensitivity (i.e., The Disgust Emotion Scale, Disgust Propensity and Sensitivity Scale, and the Looming of Disgust Scale) the DS is the most widely used in the study of anxiety disorders (Olatunji & Sawchuk, 2005).

Through factor analysis, Haidt and colleagues (1994) found that disgust sensitivity can be measured with 32 questions across eight domains. The first seven domains focus on disgust elicitors and include: *food* (spoiled/fouled or is culturally unacceptable, e.g., eating monkey meat, drinking spoiled milk), *animals* (slimy or living dirty conditions, e.g., seeing a rat or maggots), *body products* (e.g., smelling body odors, seeing feces in a toilet, hearing someone clear mucus out of their throat), *body envelope violations* (injury or mutilation of the body, e.g., missing an eye, seeing exposed organs, severed limbs), *death* (e.g., encountering dead bodies or walking through graveyards), *sex* (acts or sexually deviant behavior, e.g., inflating a condom, incest), and *hygiene*

(unsanitary conditions or violations of culturally expected hygiene practices, e.g., washing underwear only once a week, touching a toilet seat). *Sympathetic magic*, the final domain, is conceptual in nature. Disgust concepts included in this domain involve stimuli without infectious qualities that resemble contaminants (e.g., candy shaped like dog feces) or were once in contact with contaminants (e.g., drinking out of a cup of a previously sick person), this domain is named sympathetic magic because the evaluator must infer that the stimuli were magically contaminated or made disgusting in some way.

The DS is not without its psychometric limitations, and these shortcomings are outlined in the literature (Olatunji et al., 2007; Olatunji & McKay, 2009). First, the sex domain has been found to have the lowest correlation among DS domains and anxiety pathology (Olatunji, et al., 2007). This demonstrates that the sex domain (a more abstract form of disgust) may functionally be different than the other domains in anxiety etiology. While there is evidence for convergent validity of the DS in anxiety research, there are poor reliability estimates for each of the individual domains determined from two independent samples (from food, α=.34 to Envelope Violations, α=.63; Quigley et al., 1997; Druschel & Sherman, 1999). Further research has shown that total scores on the DS report adequate internal consistency, but the internal consistencies of the 8 DS subscales continue to be problematic (all eight below α=.43; Tolin, Woods, & Abramowitz, 2006).

Disgust Scale-Revised. To address the questionable psychometric properties of the DS, Olatunji and colleagues (2007) sought to provide a comprehensive assessment of the adequacy of the 32-item DS and its factor structure. To improve reliability, seven items were eliminated from the DS due to unacceptable lower bound item-to-total

correlations. Items in the sex domain were also eliminated due to a lack of evidence of face validity. The resulting three-domain scale, The Disgust Scale – Revised (DS-R) was shown to provide stronger internal consistencies and a more valid measure of disgust sensitivity in anxiety disorders.

The 27 items of the DS-R has a three-factor model consisting of core, animal-reminder, and contamination disgust. This factor structure is widely recognized, and compared to previous two-factor models proposed by Rozin and Fallon (1987) did not include a contamination disgust factor and provided a superior fit to conceptualize disgust-related anxiety disorders. Further psychometric evaluations of the DS-R have found the measure to be a reliable index to establish Core, Animal Reminder, and Contamination disgust (van Overveld, de Jong, Peters & Schouten, 2011).

Core Disgust. Core disgust is believed to be the most primal form of disgust from which other forms of disgust have evolved (Rozin, Haidt, & McCauley, 2008). This form of disgust has shaped how humans protect their body from distasting stimuli and has led to the expansion of a broader range of disgust (i.e., Animal-Reminder and Contamination disgust). The adaptive function of Core disgust is to protect the body from threat of illness or disease through oral incorporation. Core disgust serves as a "guardian of the body" ensuring unusual, noxious, or poisons substances do not enter the body (Rozin, Haidt, & McCauley, 2008). The Core disgust items on the DS-R incorporate the items from the death, body product, and hygiene DS subscales. Disgust elicitors of the Core domain include seeing vomit, hearing mucus being cleared from one's throat, seeing or stepping on small animals (i.e., cockroaches, earthworms, rats), drinking or eating food

that has been contaminated or spoiled, and discovering that someone you know does not have good hygiene.

Animal Reminder. The Animal-Reminder domain of disgust has been consistently found in evolutionary research on disgust (van Overveld, et al., 2011), and is said to have evolved from Core disgust as a defense against a fear of death present in all animals (Rozin, Haidt, & McCauley, 2008). Thus, this domain of disgust reflects a *reminder* of the *animal* origins of humans (Rozin et al., 2008). The Animal Reminder disgust domain on the DS-R includes items from the death and body envelope violations, and sympathetic subscales of the DS. The disgust elicitors for this disgust domain include viewing severed limbs or body part, touching or encountering dead animal or human bodies, or being near areas where death has occurred. Becker (1973) and Rozin (1987) have theorized that Animal Reminder disgust functions as a way to protect the human psyche from the certainty of death, to prevent exposure from contaminated fluids that may result from body envelope violations, and to ensure human differentiation from actions that may be immoral or unsanitary.

Contamination. While very similar to the Core disgust domain, Contamination disgust reactions are based perceived threats of the possible transmission of illness. The differences between Core and Contamination disgust from the individual's cognitive connections made from the disgusting stimuli and transmission of illness. Where Core focuses more on inherently disgusting stimuli whose connections to contamination is direct (i.e., drinking spoiled milk will likely make you sick), Contamination disgust requires a context of contact or exposure to stimuli that have been contaminated by another sourced (i.e., borrowing a book from someone who had the flu while reading it).

This domain consists of eight items from the hygiene, sympathetic magic, and two additional items (walking through a graveyard, and smelling urine) from the DS. Items from this domain consist of disgust elictors such as drinking from the same container that someone else has, inflating an unused condom with your mouth, and touching a toilet seat.

Due to the strong overlap between domain definitions and the necessity to provide context for disgust elicitors, Contamination disgust has shown the weakest reliability among the three domains. And the abstract nature of this domain has made it hard to research, because one must construct a context behind Contamination disgust elicitors to occur. However, recent research has stated that the three factor model is the best fit for conceptualizing disgust, and Contamination disgust is a salient component of disgust sensitivity (van Overveld et al. 2011).

Domain Specificity

There is a paucity of research on the role of disgust in anxiety disorders compared to other emotions (i.e., fear), but the concept of domain specificity has garnered empirical support for disgust-related anxiety disorders. Domain specificity of disgust refers to particular domains of disgust (Core, Animal Reminder, or Contamination) being closely related to symptoms of specific anxiety disorders (Olatunji et al., 2008). Thus, levels of disgust sensitivity for a given domain of disgust would be higher for a certain anxiety disorder compared to others. If domain specificity does not exist, then 1) disgust scores will be similar among clinical and nonclinical individuals, or 2) that individuals with anxiety disorders will simply have higher overall disgust scores than nonclinical patients.

Research in the past ten years has pointed to domain sensitivity among BII, animal phobia, and contamination-related OCD (Olatunji & McKay, 2009).

Koch, O'Neill, Sawchuk, and Connolly (2002) found individuals with BII phobia report higher levels Animal Reminder disgust compared to individuals without BII phobia. Differences were not found between clinical and nonclinical groups on Core and Contamination domains of disgust (based on original DS items that relate to the Core and Contamination domains on the DS-R). These results are consistent with a study by de Jong and Merckelbach (1998), who also found that BII was related to Animal Reminder disgust. de Jong and Merckelbach (1998) also found that individuals with spider fear scored significantly higher on the animal domain of the DS (currently part of the Core domain of DS-R). In research, individuals with spider phobia and BII phobia have consistently scored higher in Core and Animal Reminder disgust sensitivity, respectively (Bianchi, 2012). These studies show that individuals with anxiety disorders who avoid disgust elicitors within that domain (i.e., aversion of Core disgust elicitors such as spiders for individuals with spider phobia) tend to score higher in disgust sensitivity for that domain than would individuals with other anxiety disorders.

The most comprehensive investigation of disgust sensitivity as it relates to anxiety disorders was done by Olatunji and colleagues (2008). The researchers completed a series of studies to determine the differences between DS-R scores on each domain of disgust and measures of anxiety disorder symptoms, physiological responses, and behavioral avoidance. After collecting data on levels of anxiety related to animal phobia, BII phobia, and OCD symptoms, Olatunji and colleagues (2008) found that higher levels of Animal Reminder disgust uniquely predicted BII symptoms (i.e., aversion to body mutilation,

injuries, and death), higher levels of contamination disgust uniquely predicted animal fears and contamination fear observed in OCD, and higher core disgust levels uniquely predicted animal phobia symptoms. The unique contribution to anxiety symptoms of each domain of disgust illustrates that there are specific contributions of different types of disgust and anxiety disorder etiology.

Physiological correlates of the three domains of disgust were also found. The researchers had participants complete the DS-R and collected physiological data while participants watched video clips that were domain specific (a person vomiting into a toilet and core, blood draw for animal-reminder). They found that exposure to the core disgust video was associated with higher core and contamination levels and in turn were related to greater facial tension and elevated heart rate. This is consistent with the theory that core disgust is the guardian of the mouth (Rozin & Fallon, 1987). Exposure to the blood draw video was associated with animal reminder disgust and correlated with lower heart rate. Though it is unclear why animal reminder disgust is associated with this response, one theory is that animal reminder disgust serves as a way to decrease autonomic arousal and blood flow to inhibit further blood loss in body envelope violations (Olatunji et al., 2008).

Each domain also appears to have behavioral correlates (Olatunji et al., 2008). After having students complete the DS-R, Olatunji and colleagues had participants watch a movie related to emotions. They had participants watch three clips (approximately 90 seconds long) featuring core, animal reminder, and contamination disgust elicitors. Following the videos, the participants were asked to complete a disgusting avoidance task that consisted of three steps 1) taking a grape out of a cup, 2) chew the grape and spit it

back into the cup, and 3) drink the contents of the cup. At the end, participants were asked to report how much they avoided each video, and whether they completed the task or not. The results showed that levels of each domain (core, animal reminder, and contamination) significantly predicted visual avoidance of the corresponding video clip. Also, core disgust sensitivity was found to be the only predictor of behavioral avoidance of the grape task (domain congruent). Thus, scoring high on the sensitivity to avoid unsightly foods was related to avoidance of the task corresponding to incorporating an unsightly grape. However, because each video was shown consecutively and the avoidance task followed the viewing of each video, one must consider habituation of disgust leading to avoidance. That is, were there additive effects of disgust on avoidance, or was it domain specificity of the task and video that lead to behavioral avoidance?

Mills (2010) in a replication of Olatunji and colleagues' (2008) study, attempted to address the problem of habituation found in the previous study. Mills and his research team investigated whether participants would avoid a the grape task more often if they had just watched a disgusting video and if the video was related to core disgust (domain congruent to the task) compared to a video of an animal reminder disgust elicitor (domain incongruent to the task). Due to the possibility that common factors may motivate behavioral tendencies on the core and contamination domains, Mills only focused on differences between behavioral avoidance of the core and animal-reminder domains. Before being asked to do the grape task, the participants were randomly chosen to watch core disgust, animal reminder disgust, or a neutral video clip. The results found that the rate of avoidance was similar across all groups, as well as no difference in self-reported disgust on the behavioral task. This suggests that there are no discernible behavioral

differences among domains, and video priming of certain domains of disgust did not affect avoidance or disgust.

However, like Olatunji and colleagues' (2008) there were research limitations that may have led to inconclusive results regarding domain specificity. Mills (2010) posited that he may have introduced demand characteristics into the study. The participants were asked to complete the task in a one-on-one setting without a means to confidentially complete the task. Thus, Mills and his research team may have inadvertently caused participants to behave in ways that the research team wanted the participants to (i.e., completing the task regardless of group). While the problem of habituation was addressed, this problem was replaced with demand characteristics. Therefore the question of whether domain specific behavioral avoidance is related to domain specific levels of trait disgust sensitivity remains.

Background. To date, the connections between avoidance and trait disgust sensitivity have not been fully investigated. This study attempts to address the limitations of Mills' (2010) study in an attempt to understand behavioral avoidance and domain specific of disgust. Thus, the current study is a replication of Olatunji and colleagues' (2008) behavioral correlates study with modifications to the procedures that Mills (2010) designed. Like Mills' (2010) study the current study attempted to examine the effect of evoking disgust on behavioral avoidance of a disgusting task, then to determine differences between domains on task avoidance. Just as in Mills' (2010) study, participants will be asked to watch a core disgust, animal reminder disgust, or a netural video prior to completing the grape task introduced by Olatunji and colleagues (2008).

Mills (2010) found that all three groups found the grape task to not be a potent disgust elicitor, and worried that the task was not a good representative of the core disgust domain. To determine that the grape task was an adequate measure of core disgust avoidance, 343 participants were surveyed asking level of disgust among various disgust elicitors (i.e., bread, water, jello, saltine cracker, green beans, grapes, ice cream). For each disgust elicitor, the participants were told that they would have to chew, spit into a cup, and eat the questioned disgust elictor. They were told to rate levels of disgust from 0 (not disgusting at all) to 8 (extremely disgusting). It was determined that a grape would provide the most behavioral variability among the participants. Thus, Mills' (2010) worries about floor and ceiling effects were addressed by determining the task to be moderately disgusting. In other words, the grape task was found not to be so disgusting that it would be avoided by most, yet not tame enough that everyone would complete the task. It just so happened, that after further examination the grape task would be adequate enough.

Another limitation to Mills' (2010) study was the possible introduction of demand characteristics. The current study will utilize procedures that will attempt to eliminate the pressure to complete the task and make it clear to the participants that the task can be completed confidentially. With research methodology that is sounder than Olatunji and colleagues (2008) and Mills (2010) this study will further examine differences in behavioral avoidance between the core and animal reminder disgust domains while addressing the limitations the previous studies.

CHAPTER II

METHODS

Participants

A total of 160 undergraduate students enrolled in psychology courses at a Midwestern university participated in this study, and were recruited through the university's online research recruiting system. The students received extra credit for their participation. In order to avoid selection bias, the description of the study made no mention of disgust. In recruiting, the study was named "Reactions to Film clips," and participants were informed that they would be viewing film clips and completing questionnaires.

Materials

Emotion Questionnaire – State/Video/Task (EQ-S/EQ-V/EQ-T; Rottenberg, Ray, & Gross, 2007, modified by Mills, 2010). This measure is a modified version of Rottenberg, Ray and Gross' (2007) Emotion Questionnaire assessing emotional elicitation of film clips. The original questionnaire (Emotion Questionnaire – Video; EQ-V) was used in Mills' (2010) and the current study to assess emotional elictaiton of the film clip that each group will watch. Mill (2010) modified the questionnaire to measure state emotion (EQ-S) and the emotions elicited during the behavioral avoidance task (EQ-T). This will allow the assessment of emotions elicited by the video and the task.

Adaptations of the questionnaire include the following: instead of asking participants to rate, "How you felt while watching the film," they were asked to rate, " How you feel at this moment" or, "How you felt during the second part of the grape

task." The question of whether the participant had viewed the film before on the EQ-V was dropped for the EQ-S and EQ-T. A question asking whether the participant felt that the behavioral task was similar to the video was added to the EQ-T. The EQ-V can be found in appendix A, and the modified questionnaires can be found in Appendix B (EQ-S) and Appendix C (EQ-T).

State-Trait Anxiety Inventory, Trait Version (STAI; Spielberger, Gorsuch, Luschene, Vagg, & Jacobs, 1983). STAI is a questionnaire used to measure state (current and unstable) and trait (average and stable) anxiety. It consists of 40-items, but only 20-items relating to trait anxiety were used, because state emotions were assessed using the EQ-S. The STAI scores items on a 4 point Likert scale from 1 (Almost Never) to 4 (Almost Always) with higher scores indicating greater anxiety. Example items include "I am content" "I have disturbing thoughts," and "I worry too much over something that really doesn't matter." The interaction of disgust and anxiety sensitivities continue to be implicated with one another (see a review in Davey, 2011), therefore the STAI was used to determine if there were any significant group differences in trait anxiety between groups that could affect the level of disgust reported and be a causal factor in behavioral avoidance.

Disgust Scale – Revised (DS-R; Olatunji et al., 2007). The DS-R was the primary measure of overall disgust sensitivity. The factor structure has consistently shown to be stronger and more adequate measure of disgust-related anxiety than the DS (van Overveld et al., 2007). Thus, the revisions to the original DS have been shown to improve its psychometric features, and the authors of the original DS have suggested use of the DS-R to assess disgust sensitivity in anxiety disorders.

The DS-R is a 27-item measure of disgust sensitivity across the disgust domains of core, animal-reminder, and contamination disgust. The items are assess expected levels of disgust to disgust elicitors on a 5-point Likert Scale from 0 (Strongly/Disagree/Very Untrue About Me/ Not Disgusting at All) to 4 (Strongly Agree/Very True About Me/Extremely Disgusting). There are two sections to the DS-R. Items 1-14 ask how much an individual agrees with the following statements, or how true it is about the individual regarding various disgust elicitors (e.g., "If I see vomit, it makes me sick to my stomach," "It would bother me to be in a science class, and to see a human hand preserved in a jar). Items 15-27 inquire about how disgusting an individual would find a certain experience (e.g., "When you are walking through a tunnel under a railroad track, you smell urine," "You take a sip of soda, and you realize that you drank from the glass that an acquaintance of yours had been drinking from").

John Haidt collected normative data from 34,442 participants on YourMorals.com who completed the DS-R (Haidt, 2011, May 30). He found that mean DS-R score for each item are 1.67 (*SD*=.61), mean core subscale item scores of 1.93 (*SD*=.67), mean animal reminder subscale item scores of 1.64 (*SD*=.80), and mean contamination subscale item scores of 1.07 (*SD*=.72).

As van Overveld and colleagues (2011) demonstrated, the psychometrics of the DS-R are sound. The internal consistency of this measure is strong (α=.87). The reliabilities for the core (α=.80) and animal reminder (α=.82) subscales are also strong, while the reliability of the contamination subscale (α=.71) is adequate. The DS-R has shown adequate content validity and the domains have been shown to measure different

constructs. There is also moderate convergent validity with the Disgust Propensity and Sensitivity Scale-Revised (DPSS-R) and the Disgust Emotion Scale (DES).

Disgust-Eliciting Stimulus Videos. The videos used for this study were empirically validated by Rottenberg and colleagues (2007) and elicit high levels of disgust. In order to gain neutral control the researchers also validated a neutral film clip that elicited no emotions. The two videos that Rottenberg and colleagues (2007) suggested are within the domains of core and animal reminder disgust. These two disgust videos, as well as the neutral video, were used for this study.

The core disgust video was a clip from the movie *Pink Flamingos* includes an actress dressed like a clown watching a dog defecate on the ground. When the dog is finished, the actress bends down, picks up the dog feces, and puts it in her mouth. She chews the dog feces while smiling and attempting not to vomit. The animal reminder video includes various stages of a leg amputation. The video consists of incisions being made, blood being visable, the removal of skin, and ends with the cutting through muscle and bone. The neutral video is a simple screen saver shown for a minute. The screen savor consists of various colored rods appearing and disappearing on a black background. Each video did not include sound. Appendix D has still images from each video.

Video Avoidance. Behavioral avoidance on the video clips was collected by researcher observation. From a vantage that would not be obvious to the participant (greater than four feet away, from the side), the researcher was to appear busy as they observed whether the participant averted their gaze or turned their head from the video. Observers were asked to estimate how much of the video the participants had visually avoided (broken into increments of 25%). These estimations were recorded on the

Researcher Observation Form (see Appendix E). The estimated time of avoidance was used for anaylsis of visual avoidance between groups.

Behavioral Avoidance Task: Grape Task (Olatunji, Haidt, McKay, & David, 2008; Mills, 2010). The current study uses a modified form from Mills (2010) adapted from Olatunji and colleagues (2008) to assess behavioral avoidance and correlates of the three disgust domains. The grape task consisted of two steps. The first step consisted of instructing the participant to chew a grape without swallowing it, and spit it into an opaque plastic cup. In the second step, participants were instructed to eat the contents of the cup at their discretion. Demand characteristics found in Mills' (2010) study addressed by allowing the participants to anonymously place the opaque cup, with or without the grape in it, into a box containing other cups that had appeared to be used (half the cups with a squished grape, the other half empty) to ensure anonymity. The cup that the particpants used was marked on the bottom so that the researcher would know which cup the participant had used. The first step took place prior to viewing a film clip, and step two was completed immediately following viewing a clip. Before each step, partcipants were instructed that they could stop the task at any time or chose to not complete the task by placing the cup anonymously into the box during step two.

Researcher Observation Form. Research assistants were asked to observe participants while they were in the lab. First, the researchers would record whether the participant completed or did not complete/stopped the first part of the grape task. Following step two of the grape task, researchers also recorded whether they completed or did not complete/stopped the second part of the grape task. Lastly, using a stopwatch, researchers would discretely record how long it took for the participant to complete the

task and place the cup into the anonymity box or how long it took them to refuse and place the cup into the box. The Reseracher Observation Form can be found in Appendix E.

Procedure

Before arriving in the lab, participants were randomly assigned to one of three groups: Domain-Congruent (core disgust video, core disgust task), Domain-Incongruent (animal reminder disgust video, core disgut task), and Neutral (neutral video, core digust task). The only aspect that was different between groups was which video stimulus they watched.

Participants were brought into the Anxiety and Phobia Research Laboraty individually. Participants completed questionnaires and watched the videos on a computer. A research assistant was present at all times throughout the study to obtain informed consent, read directions and answer questions, and debrief the participant when the study was completed.

Questionnaire Packet 1. The first questionnaire packet was completed online through SONA Systems in the research lab, and contained a form collecting demographic data (Appendix F), the EQ-S, STAI (Trait Anxiety Portion), and the DS-R. The purpose of Questionnaire Packet 1 was to gather demographic information, assess current emotions (to contrast with post-video and post-task emotions), and assess their trait disgust sensitivity and trait anxiety.

Grape Task, Step 1. After completing the first set of questionnaires, participants were informed by the researchers that they had an optional task to complete. The participants were then asked to complete the first step of the grape task (chew and spit the

grape into the cup). The cup was then set aside (but in view of the participants, contents not showing) until step two of the grape task. The researchers told the participants that they could refuse/stop the task at any time.

Disgust Exposure. The participants were then informed that they were going to watch a short film clip. The participants were told that they could cover their eyes or look away if they wish, and would later be asked a few questions about their reaction to the clip.

The Domain-Congruent group was shown the video that contained the disgust elicitor that was in the same disgust domain as the grape task (core disgust). This group was assigned to watch the video of the woman eating dog feces. The Domain-Incongruent group was shown the animal reminder elictor video (leg amputation). The Neutral group was shown the neutral elicitor video (screen saver). Researchers discretly observed the participants that were viewing the videos to estimate visual avoidance from a vantage point to the side of the participant more than four feet away. Avoidance was determined by an estimate of how much of the video the participant averted their gaze (looking to the side or turning their head) or closed their eyes while the video was playing.

Grape Task, Step 2. After the video had stopped, the researchers immediately asked the particpants to complete another task. The participants were asked to eat the contents of the cup (using the spoon provided if they wish). Participants were told that the researcher would step away, and allow the participants to complete the task. The researchers stated that, "When you have swallowed the grape, please set the cup anonymously in the [anonymity] box. Remember, this task is completely optional.

Whatever you decide to do let me know when you have placed the cup into the box." During this time, the researchers would step out of the area of the computer, turn away, and discretely record how long it took for the participant to say that they had placed the cup into the box.

Questionnaire Packet 2. Following the step two of the grape task, participants were asked to complete Questionnaire Packet 2 online through SONA Systems. This packet consisted of the EQ-V and EQ-T, assessing levels of various emotions that the participant felt during the video and during the grape task. The end of the EQ-T asked to what degree they felt that the video they had watched and the task they had completed were related. After the questionnaires were complete, the participants were debriefed, thanked for their time, and free to leave. Once the participants left, the researchers checked to see if the participant had completed the task by seeing if the grape was missing from the participant's marked cup in the anonymity box. Completion or refusal on steps one and two, time it took to complete step two, and estimated time of video avoidance was recorded on the Researcher Observation Form.

Hypotheses

Hypothesis 1: Behavioral Avoidance on Grape Task. It was hypothesized that the Domain-Congruent group would have the highest rates of avoidance on the grape task due to the task being domain specific to core disgust. Due to the experience of viewing disgusting video (animal-reminder) it was also hypothesized that the Domain-Incongruent group will have higher rates of avoidance than the Neutral group.

Hypothesis 2: Self-Reported Disgust on Grape Task. As with the previous hypothesis, it was expected that Domain-Congruent participants would rate the grape task

more disgusting on the EQ-T than the Domain-Incongruent or Neutral groups. Again, because the Domain-Incongruent group was also being exposed to a disgusting video, it is believed that this group would rate the grape task as more disgusting than the Neutral group. The expectation is that the Neutral group will have the lowest self-reported disgust.

Hypothesis 3: Latency to Complete Grape Task. The final hypothesis was those who rated the grape task as highly disgusting on the EQ-T would either be in the quickest 33% or the slowest 33% to complete the task (by placing the cup anonymously in the box or by saying "Stop"). Therefore, participants who found the task most disgusting would quickly eat the grape to get the task over with (quick responder), refuse to complete the task quickly (quick responder), or would take time to contemplate completing the task (long responder). It was expected that the group of participants who fell in the middle responder group would rate the task the least disgusting.

CHAPTER III

RESULTS

Sample Characteristics & Questionnaire Packets. To meet criteria to be considered for data analysis, the participants were required to complete step one of the behavioral task or not have seen the video clip that they viewed before. Eight participants were dropped from analysis, with six participants being unable to complete step one and two had viewed the clip that they were exposed to previously. Thus, 152 participants were considered for analysis. After the participants were dropped, the Domain-Congruent group consisted of 53 participants, Domain-Incongruent group consisted of 50 participants, and the Neutral group consisted of 49 participants. A summary of demographic information of this sample is found in Table 1.

The total DS-R score mean was 53.23 (from observed scores of 24-86, and a possible 0-100). An independent samples t-test determined that there were significant differences in DS-R total scores between participants who avoided the grape task (M=57.37, SD=11.63) and those that did not avoid the task (M=50.02, SD= 12.15), t=3.14, p<.01. These results are consistent with past studies looking at behavioral avoidance and disgust (Connolly et. al, 2009; Mills, 2010). Sample DS-R and STAI means are found in Table 2.

A between-groups ANOVA and Tukey's post-hoc analyses determined that there were significant differences between the Domain-Congruent, Domain-Incongruent, and Neutral groups on a variety of emotions on the EQ-V. These significant differences are found in Table 3. Of note, there were significant differences in video disgust, such that

the core disgust video was rated more disgusting than the animal-reminder and neutral videos, and the animal-reminder video was rated as more disgusting than the neutral video. Other emotions that garnered significant differences were amusement, anger, confusion, embarrassment, joy, love, pride, shame, unhappiness, surprise, pleasantness, and unhappiness. These differences are found in Table 3.

Evidence for domain specificity can be found as well, as the Domain-Congruent group reported that the grape task reminded them of the task more than the Domain-Incongruent and Neutral groups. Tukey's post-hoc analysis found that the differences between all of the groups were significant. These findings suggest that the participants believe that the core video and core task are related and thus domain specific. The group differences for this analysis can also be found in Table 3.

Group differences in task emotion ratings on the EQ-T were also found. A between groups ANOVA and Tukey's follow-up analyses determined that participants who watched the neutral video experienced significantly higher levels of happiness, joy, and love than the animal-reminder group during the task. Those who watched the neutral video and core disgust video also showed significantly higher levels of shame during the task than participants who watched the animal-reminder video. These differences are outlined in Table 4.

Hypothesis 1: Behavioral Avoidance. The first hypothesis stated that the Domain-Congruent group would have the highest rate of avoidance on the grape task, followed by the Domain-Incongruent group, and the Neutral group would have the least amount of avoidance. There is support for this hypothesis, as the results of a Chi-Square (group by step 2 completion) test indicates that there are significant differences in rates of

behavioral avoidance between groups, χ^2 (2) = 6.24, p<.05. The Domain-Congruent group had the highest rate of avoidance, followed by the Domain-Incongruent group, and then the neutral group with the least amount of avoidance. There were no significant differences between the Domain-Incongruent group and the neutral group. A visual representation of these differences is found in Figure 1. There were no significant differences between groups and visual avoidance to the video.

Hypothesis 2: Self-Reported Disgust on Grape Task. A one-way ANOVA found that there were significant differences between groups in self-reported task disgust, F (2, 149) =6.59, p<.01. Tukey's post-hoc analysis determined that the Domain-Congruent group (M=4.66, SD= 2.70) rated the task significantly more disgusting than both the Domain-Incongruent (M=3.06, SD=2.78) and Neutral groups (M=2.88, SD=2.75). These findings are consistent with the hypothesis. There were no significant differences between the Domain-Incongruent and Neutral groups. These findings are visually displayed in Figure 2.

Interestingly, a one-way ANOVA found that there were no significant differences between males (M=3.41, SD=3.08) and females (M=3.61, SD=2.78) in self-reported task disgust, F (1, 149) =0.12, p=n.s. This finding is not consistent with existing disgust literature that has shown that females tend to exhibit higher disgust sensitivity than males (Olatunji & Mckay, 2009).

Hypothesis 3: Latency of Step 2 on Grape Task. Participants were split into Quick (0 to 4.00 seconds), Medium (4.10 to 7.40 seconds), and Slow (7.50 seconds and longer) groups. Though the Slow responders (M=3.86, SD=2.81) rated the task most disgusting, followed by Medium (M=3.64, SD=2.63), and Slow responders the least

disgusting (*M*=3.21, *SD*=3.07), a 3 (latency group) by 1 (task disgust) ANOVA did not find significant differences between the groups, F (2, 148)= 0.71, p = n.s.

CHAPTER IV

DISCUSSION

The purpose of the present study was to determine if priming nonclinical participants with different domain-related disgust videos would lead to differences in behavioral avoidance between the core and animal-reminder disgust domains, while accounting for the previous limitations of Olatunji and colleagues' (2008) and Mills' (2010) studies. This was accomplished by addressing possible habituation to disgust by designating experimental groups that viewed a disgust eliciting video that was either Domain-Congruent (core video, core task), Domain-Incongruent (animal-reminder video, core task), or Neutral. To ensure that there were no demand characteristics, the participants were reassured multiple times during the study that the grape task was optional, and that they could choose to stop the task at any time. Whether the participants chose to complete the task or not, he/she was allowed to place the cup that may or may not contain a grape into a box of anonymity. The researchers gave the participants a uniquely numbered cup to perform the task, turned away from the participant, and had the participant place his/her cup into the box of anonymity full of other used and unused cups. Thus, the participant's perception of the need to comply with the task was diminished as much as possible. Prior to completing the current study, it was determined that the grape task was indeed potent enough to yield enough variability in disgust responses.

After accounting for these limitations, it was determined that the Domain-Congruent group (39.6%) had significantly higher rates of behavioral avoidance ($p<.05$)

on the grape task compared to the Domain-Incongruent (24.0%) and Neutral groups (18.4%). Thus, priming participants with a core disgust video would lead to greater rates of avoidance on a core disgust task. Significant group differences on self-reported disgust of the grape task were also found ($p<.01$), such that the Domain-Congruent group reported greater levels of disgust on the task than the Domain-Incongruent and Neutral groups. This suggests evidence for domain specificity in the behaviors we may elicit when faced with disgusting stimuli. In particular, different rates of behavioral avoidance on the core task points to Rozin and Fallon's (1987) theory that states core disgust serves as the guardian of the mouth, serving to protect humans from ingesting possible contaminating agents. In other words, this study provides evidence that suggests that there are different behavioral repertoires involved with specific domains of disgust consistent with previous research (Olatunji et al., 2008).

Most importantly, the findings of this study add to the extant disgust literature by demonstrating that priming individuals with potent disgust elicitors will have an effect on behavioral avoidance and experiences of disgust. This suggests that the mechanisms avoidance are related to distinct domains of disgust, such that a core-disgust prime leads to behavioral avoidance on a core-disgust task. These findings have clinical significance as well, and demonstrate that disgust should be considered in the exposure paradigm. It may be appropriate for a clinician to target specific disgust-elicitors for clients with corresponding disgust-related avoidance.

Like Rozin, Haidt, and McCauley (2008) point out, we live in a disgusting world and may not recognize the dynamics of avoidance unless it is brought to an individual's attention (i.e., light switches may not be inherently disgusting unless someone who had

just sneezed reaches for one). As this study shows, individuals that had recognized or viewed images of disgusting stimuli elicited higher levels disgust. For individuals with small-animal phobias, BII phobias, and contamination-related OCD, creating treatments that focus on exposure to disgust-relevant stimuli, along with fear, may lead to decreased behavioral avoidance of these relevant stimuli. These treatments could include imaginal exposure of disgust-related stimuli that after habituation to disgusting stimuli may lead to decreases in behavioral avoidance of feared stimuli and anxiety. Thus, by understanding the role of disgust in anxiety disorders, clinicians can further conceptualize how behavioral avoidance is maintained. Future research should examine the clinical implications of including disgust in the exposure paradigm. For example, a study could utilize single-case design in determining how appropriate the use of systematic desensitization or imaginal exposure to disgust elicitors might lead to a decrease in anxiety for individuals who are not responding to typical fear-based exposure therapies.

Contrary to what was expected, significant differences between Quick, Medium, and Slow responders on the task were not found on task-related disgust. In other words, there was a lack of variability between these groups in who found the act of swallowing a previously chewed grape disgusting. This suggests that latency to completing a task does not have an effect on how disgusting people perceive the task to be.

This study also serves as a testament to replication and systematic research in psychology. In an attempt to better understand the behavioral correlates of different disgust domains, this study controlled aspects of habituation and demand characters that were found to be limitations in previous studies of disgust elicitors. In other words, by addressing the limitations of the previous study (Mills, 2010), this modification study

found support for the original study that investigated behavioral correlates of disgust domains (Olatunji et al., 2008). Replication has been seen as a "must" for scientific advancement of psychology (Yehuda & Irit, 1990), and this study has given more validity to the theory that different disgust domains elicit different rates of behavioral avoidance and levels of disgust related to a domain specific task.

Limitations/Future Directions

The aim of this study was to determine the relationship of priming disgust-related videos on behavioral avoidance. However, compared to Olatunji and colleagues (2008), this study was not attempting to determine if DS-R scores (total or domain-specific) predicted grape task avoidance. Also, though the findings of this study showed significantly higher rates of avoidance for the Domain-Congruent group (39.6%), Olatunji and colleagues reported that nearly 60% of his participants avoided the task. While this study was conducted in a lab with one participant completing the study at a time, Olatunji and colleagues used an introductory psychology class room with 89 students watching the disgust-eliciting videos at the same time. Therefore, the elevated rates of avoidance reported in Olatunji et al. (2008) could be due to the Social Contagion Theory (Jones & Jones, 1995). This theory states that emotions expressed (i.e., joy, sadness, disgust) are amplified in the presence of others. Thus, the variability in behavioral avoidance could be due to the fact that participants in this study were not in the presence of others while viewing the disgust-related video. Future studies should address the differences that may be found in behavioral avoidance as it relates to disgust and the presence of other people viewing disgusting stimuli or completing disgusting tasks.

Compared to Mills' (2010) study, this study did not utilize as rigorous video avoidance or latency recording. Mills (2010) used a webcam to record the participants while they watched the priming video. In order to not be as invasive, this study simply utilized researcher observation done from a distance that would not be noticeable to the participant. This certainly would have resulted in a less accurate measure of visual avoidance to the video. Determining whether greater levels of disgust or disgust sensitivity could potentially lead to video avoidance should be evaluated with further research.

Mills (2010) also found those who completed the second part of the grape task quickest rated the task to be most disgusting. The current study found no significant differences in disgust ratings and latency to complete the second part of the grape task. This could be due to how latency to complete the task was measured. Mills (2010) objectively measured latency by starting a timer and viewing when the participant picked up the cup with a grape in it and stopping the timer when the participant set it back down or said, "Stop." The current study measured latency by starting a timer when the participant picked up the cup with a grape in it, turned away from the participant to let them decide whether they wanted to complete the task, and stopped the timer when participant had stated that they had placed the cup into the box of anonymity or said, "Stop." Thus, latency to the task was less objective, relying on the participant to notify the researcher that they had completed the task to stop the timer. These experimental differences could have attributed to the lack of similar findings between the two studies.

Future research should also attempt to replicate these findings across other domains. For instance, one could determine whether priming participants with an animal-

reminder video (e.g. viewing an amputation) could affect behavioral avoidance on an animal-reminder task (e.g. an animal dissection). This would further validate previous literature that has found behavioral avoidance on a disgusting task is domain specific. Not only replicating these findings, further research should evaluate cognitive and physiological factors that are related to different types of disgust elicitors related to specific domains.

Finally, a major limitation to consider was that this was a convenience sample consisting of undergraduate students that were mostly female, Caucasian, and either juniors or seniors. Future studies could attempt to recruit more diverse samples. In particular, researchers should focus on clinical BII, animal phobia, or contamination-related OCD samples to determine whether generalized heighted disgust sensitivity leads to avoidance or whether it is disgust sensitivity related to core, animal-reminder, or contamination that is leading to behavioral avoidance of disgusting stimuli.

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Table 1

Sample Demographics

	N (%)
Gender	
Male	34 (22.4%)
Female	118 (77.6%)
Ethnicity	
Caucasian	120 (78.9%)
African American	13 (8.6%)
Other	11 (7.2%)
Asian American	4 (2.6%)
Latino/a	2 (1.3%)
Year in School	
Freshman	15 (9.9%)
Sophomore	27 (17.8%)
Junior	48 (31.6%)
Senior	58 (38.2%)
Graduate Student	3 (2.0%)

Note. *N*=152

Table 2

Demographics, EQ-S, STAI , and DS-R Means

		Range	
	Mean (SD)	Observed	Possible
Age	21.80 (3.90)	18 - 45	N/A
Psychology Courses Taken	5.48 (4.41)	0 – 18	N/A
DS-R Total Score	52.34 (12.36)	24 – 86	0 - 100
Core	25.22 (6.25)	9 - 40	0 – 48
Animal Reminder	16.81 (5.29)	4 – 30	0 – 32
Contamination	6.39 (3.36)	0 – 15	0 - 20
STAI Trait Score	47.02 (4.07)	37 – 60	20 - 80

Table 3

Group Differences in Video Emotion Ratings

	Mean Rating (SD)		
	Core	AR	Neutral
Disgust***	6.68 (1.57)[a]	4.62 (2.53)[b]	1.06 (1.84)[c]
Embarrassment***	2.17 (2.18)[a]	0.36 (1.05)[b]	0.78 (1.39)[b]
Happiness***	1.55 (1.78)[b]	0.74 (1.35)[b]	2.59 (2.20)[a]
Shame***	1.40 (1.69)[a]	0.34 (0.96)[b]	0.31 (0.71)[b]
Surprise***	6.13 (2.11)[a]	3.44 (2.15)[b]	3.24 (2.29)[b]
Pride***	0.77 (1.60)[b]	0.28 (0.73)[b]	1.49 (1.88)[a]
Love***	0.53 (1.40)[b]	0.06 (0.24)[b]	1.35 (1.81)[a]
Pleasantness***	1.49 (1.56)$_b$	2.20 (1.83)[b]	3.80 (2.30)[a]
Joy***	1.15 (1.82)[b]	0.46 (1.21)[b]	2.16 (2.22)[a]
Task remind you of the video?***	3.98 (2.80)[a]	1.88 (2.25)[b]	0.57 (1.47)[c]
Unhappiness**	2.38 (2.39)[a]	2.16 (2.36)[a]	0.88 (1.54)[b]
Amusement**	3.06 (2.61)[a]	1.84 (2.34)[b]	3.29 (2.53)[a]
Anger*	1.15 (2.21)[a]	0.35 (1.03)[b]	0.65 (1.35)
Confusion*	4.94 (2.58)[a]	3.46 (2.38)[b]	4.43 (2.61)

Note. N=53 for Core, N=50 for Animal-Reminder, and N=49 for Neutral groups. For each emotion, the superscripted letter denotes a significant difference in values for that emotion. [a] is a value significantly higher than [b]. [b] is significantly higher than [c]. A value that does not have a superscript letter next to it does is not significantly different than any other values for that emotion. *p<.05. **p<.01. ***p<.001.

Table 4

Group Differences in Task Emotion Ratings

	Mean Rating (SD)		
	Core	AR	Neutral
Disgust**	4.66 (2.70)[a]	3.06 (2.78)[b]	2.88 (2.75)[b]
Happiness**	1.75 (2.08)	1.12 (1.87)[b]	2.49 (2.27)[a]
Joy**	1.13 (1.89)	0.53 (1.26)[b]	1.71 (2.14)[a]
Love***	0.43 (1.20)	0.00 (0.00)[b]	0.98 (1.64)[a]
Shame*	1.45 (1.91)[a]	0.65 (1.38)[b]	1.35 (1.74)[a]

Note. N=53 for Core, N=50 for Animal-Reminder, and N=49 for Neutral groups. For each emotion, the superscripted letter denotes a significant difference in values for that emotion. [a] is a value significantly higher than [b]. A value that does not have a superscript letter next to it does is not significantly different than any other values for that emotion. *p<.05. **p<.01. ***p<.001.

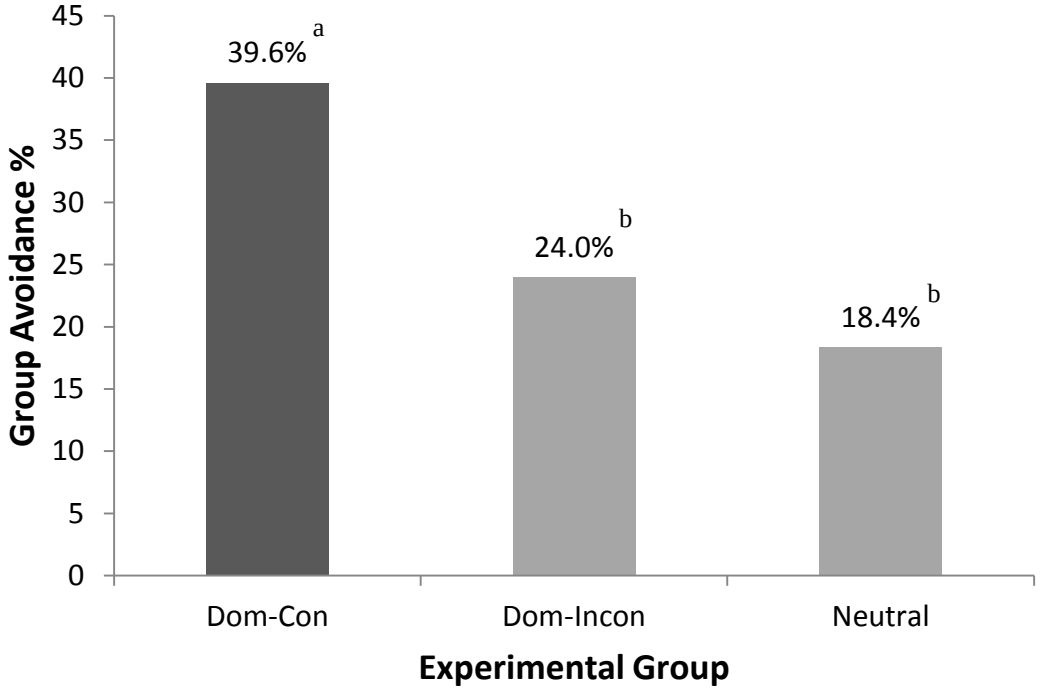


Figure 1. Percentage of avoidance on the second step of the grape task. a and b superscripts indicate significant group differences. Significant differences were found between the Domain-Congruent and the Domain-Incongruent groups in rates of avoidance of step 2 of the grape task. Significant differences in rates of responding were also found between the Domain-Congruent and the Neutral groups. There were no significant differences in rates of avoidance between the Domain-Incongruent and Neutral groups.

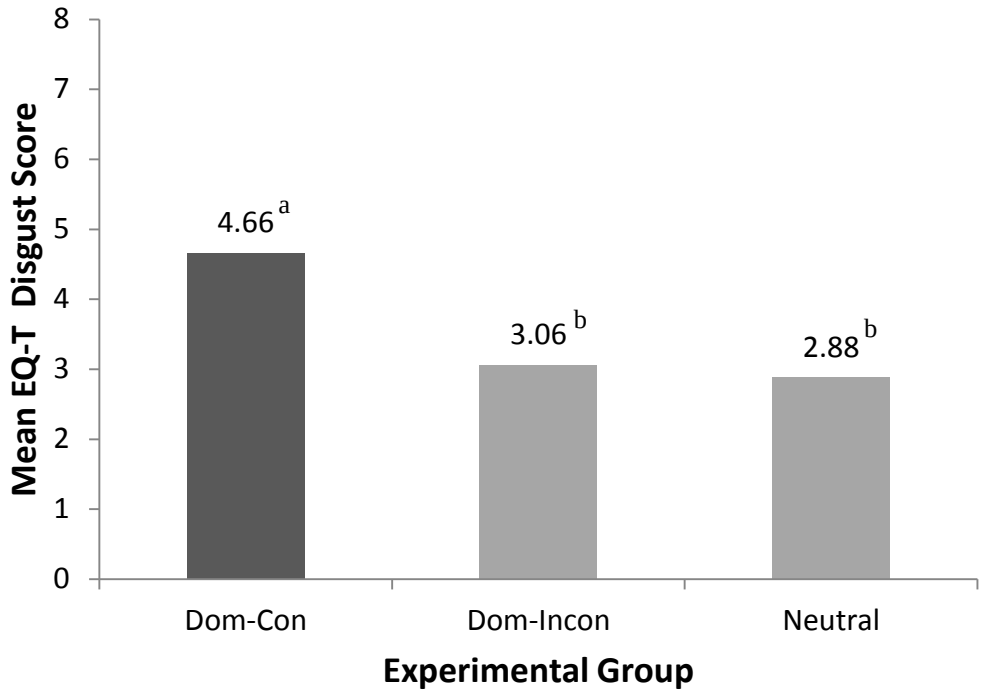


Figure 2. Group differences in self-reported task disgust. a and b superscripts indicate significant group differences. The Domain-Congruent group reported significantly higher levels of disgust on the task than both the Domain-Incongruent and Neutral groups. There were no significant differences between the Domain-Incongruent and Neutral groups.

Appendix A

Emotion Questionnaire – Video (EQ-V; Rottenberg et al., 2007)

The following questions refer to how you felt ***while watching the film***.

0	1	2	3	4	5	6	7	8
not at all/ none				somewhat/ some				extremely/ a great deal

Using the scale above, please indicate the greatest amount of EACH emotion you experienced while watching the film.

_____ amusement	_____ embarrassment	_____ love
_____ anger	_____ fear	_____ pride
_____ anxiety	_____ guilt	_____ sadness
_____ confusion	_____ happiness	_____ shame
_____ contempt	_____ interest	_____ surprise
_____ disgust	_____ joy	_____ unhappiness

Did you feel any other emotion during the film? ☐ No ☐ Yes

If so, what was the emotion? _____

How much of the emotion did you feel? _____

Please use the following pleasantness scale to rate the feelings you had during the film. Circle your answer.

0	1	2	3	4	5	6	7	8
unpleasant								pleasant

Have you seen this film before? ☐ No ☐ Yes

How much of the film did you watch?

0	1	2	3	4	5	6	7	8
none of the film				half of the film				all of the film

Appendix B

Emotion Questionnaire – State

(Based on Rottenberg et al., 2007; modified by Mills, 2010)

The following questions refer to how you feel *right now.*

0	1	2	3	4	5	6	7	8
not at all/ none			somewhat/ some					extremely/ a great deal

Using the scale above, please indicate the greatest amount of EACH emotion you are experiencing <u>at this moment</u>.

_____ amusement	_____ embarrassment	_____ love
_____anger	_____ fear	_____ pride
_____ anxiety	_____ guilt	_____ sadness
_____ confusion	_____ happiness	_____ shame
_____ contempt	_____ interest	_____ surprise
_____ disgust	_____ joy	_____ unhappiness

Do you feel any other emotion at the moment? □ No □ Yes
If so, what is the emotion? _____
How much of the emotion do you feel? _____

Please use the following pleasantness scale to rate the feelings you have right now. Circle your answer.

0	1	2	3	4	5	6	7	8
unpleasant								pleasant

Appendix C

Emotion Questionnaire – Task

(Based on Rottenberg et al., 2007; modified by Mills, 2010)

The following questions refer to how you felt *during the task.*

0	1	2	3	4	5	6	7	8
not at all/ none				somewhat/ some				extremely/ a great deal

Using the scale above, please indicate the greatest amount of EACH emotion you experienced during the task.

_____ amusement	_____ embarrassment	_____ love
_____ anger	_____ fear	_____ pride
_____ anxiety	_____ guilt	_____ sadness
_____ confusion	_____ happiness	_____ shame
_____ contempt	_____ interest	_____ surprise
_____ disgust	_____ joy	_____ unhappiness

Did you feel any other emotion during the task? ☐ No ☐ Yes

If so, what was the emotion? _____

How much of the emotion did you feel? _____

Please use the following pleasantness scale to rate the feelings you had during the task. Circle your answer.

0	1	2	3	4	5	6	7	8
unpleasant								pleasant

How much did the task remind you of what you saw in the film?

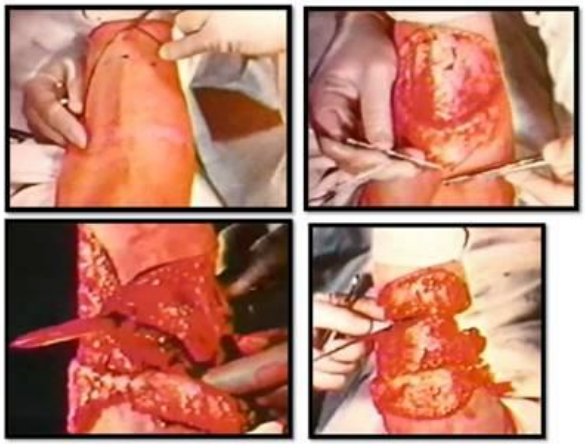
0	1	2	3	4	5	6	7	8
not at all				some-what				extremely / a great deal

Appendix D

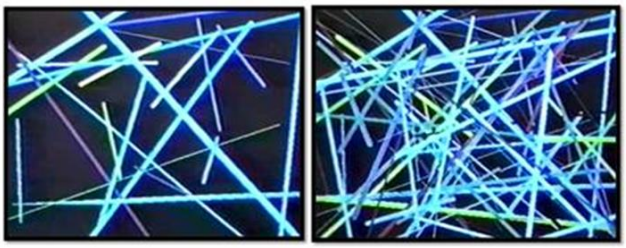
Images from Each Film

Domain Congruent Group (Core Disgust) - *Pink Flamingos,* "Dog Scene"

Domain-Incongruent Group (Animal Reminder Disgust) - Leg Amputation



Neutral Group – Sticks Screensaver



Appendix E

Researcher Observation Form

Grape Task

	Step 1 (Chew & Spit)	**Step 2 (Eat contents)**
Task completion* (Yes/No)		
Time to complete task (seconds)		

Make sure they do not start task before you tell them "begin." Start the stopwatch as you say "begin" and stop when they hand you the cup or say "stop."

* Task completion definitions

Step 1

- Yes: Chewed up grape is now in the cup
- No: They say "stop" at any point or swallow grape

Step 2

- Yes: They put cup contents into mouth, swallow, and set the empty cup down
- No: They say "stop" at any point, they do not attempt to put contents in their mouth, they spit grape back into cup before swallowing

---

Video Task

Right after participant finishes video:

What is your best estimation about how much of the clip they AVOIDED/DID NOT WATCH? Circle an option.

0% **25%** **50%** **75%** **100%**

Appendix F

Demographic Data Questionnaire

1. Gender: Male Female

2. Age: _____

3. Are you a citizen of the United States?
   - ☐ Yes
   - ☐ No

4. Ethnicity:
   - ☐ Caucasian
   - ☐ Latino/a
   - ☐ African American
   - ☐ Asian American
   - ☐ Indian American
   - ☐ Other (please specify)

5. Year in School:
   - ☐ Freshman
   - ☐ Sophomore
   - ☐ Junior
   - ☐ Senior
   - ☐ Graduate Student

6. Major(s):_____

7. Minor(s):_____

8. Number of psychology courses taken (estimate):_____