DISGUST SENSITIVITY AND FEAR OF CONTAGION IN SPECIFIC PHOBIA, SPIDER TYPE AND BLOOD-INJECTION-INJURY TYPE: AN EXPERIMENTAL ANALYSIS

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DEDICATION

This manuscript is dedicated in loving memory to John L. Kellermann III. I will always be inspired by his courage, integrity, and perseverance. I carry his spirit in my heart and promise to work each day to the best of my ability to embody these qualities in my work and in my life.

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ABSTRACT

Disgust sensitivity and concern with contamination have been frequently associated with Spider Phobia and Blood-Injection-Injury (BII) Phobia. Research suggests that the two groups differ in their sensitivity to categories of disgust. Using a sample of 29 non-phobic controls, 25 clinical and subclinical spider phobics, 26 clinical and subclinical BII phobics, and 27 persons who endorsed clinical or subclinical criteria for Spider Phobia and BII Phobia, this study used survey measures and behavioral approach paradigms to assess differences in domain specificity of disgust sensitivity and concern with contamination. Survey data generally supported the domain specificity of disgust sensitivity for the Spider and BII Phobia groups, and suggested that persons with both phobias may be more disgust sensitive than persons with one phobia. The BII Phobia group and the dual phobia group were more avoidant of stimuli from both disgust domains than were the Spider Phobia and control groups. Across phobic groups, core disgust stimuli systematically elicited significantly higher disgust ratings than concern with contamination ratings, and significantly higher concern with contamination ratings than fear ratings. Animal reminder disgust stimuli systematically elicited higher disgust than concern with contamination and fear ratings for spider and BII phobics, but no within-group differences emerged in the 3 emotional response ratings for the dual phobia group. Fear and having Spider Phobia were the only unique predictors of avoidant behavior in the spider-relevant contamination paradigm. Disgust and having BII Phobia were the only unique predictors of avoidant behavior in the BII-relevant contamination paradigm. Treatment implications for Spider and BII Phobia are discussed.

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CHAPTER 1

SPECIFIC PHOBIA AND DISGUST: AN OVERVIEW

To warrant a diagnosis of Specific Phobia, a person must have a combination of fear, anxiety, and avoidance that is intense enough to interfere significantly with his or her daily functioning (DSM-IV-TR, APA, 2000). Specific Phobia is a psychological disorder that is characterized by intense, persistent fear and anxiety in response to a particular stimulus or cluster of stimuli (DSM-IV-TR, APA, 2000). This fear and anxious apprehension—which must occur nearly every time that one encounters the situation or stimulus—results in the avoidance of the phobic stimulus or situation, or in enduring contact with the phobic stimulus with extreme duress. Additional DSM-IV diagnostic criteria for Specific Phobia require that sufferers: 1) recognize that their fear is excessive; 2) experience significant impairment in functioning or severe distress about having the phobia; and 3) have had the problem for a period of at least 6 months. Lastly, phobia sufferers must not have another psychiatric diagnosis that better accounts for their symptoms (DSM-IV-TR, APA, 2000).

What current diagnostic criteria for this disorder fail to incorporate, however, is an additional salient emotional component of a number of Specific Phobia subtypes: disgust. This emotional response—in addition to fear—has been identified as a robust, independent feature of the phobic experience (Olatunji, 2006), and, in some research paradigms, has been demonstrated to eclipse its counterpart in intensity (Olatunji, Lohr, Sawchuk, & Westendorf, 2005; Sawchuk, Lohr, Westendorf, Meunier, & Tolin, 2002). It has also been shown to play an instrumental role in increasing the aversive properties of feared stimuli as a function of contamination concern (Davey, 1993, cited in Woody & Teachman, 2000; de Jong & Muris, 2002; Fallon, Rozin, & Pliner, 1984, cited in Woody & Teachman, 2000; Olatunji, Wolitzky-Taylor, Willems, Lohr, & Armstrong, 2009; Rozin, Markwith, & Nemeroff, 1992, cited in Woody & Teachman, 2000; Woody, McLean, & Klassen, 2005; Woody & Teachman, 2000).

In addition to being overlooked in the diagnosis of certain types of Specific Phobia, until recently, disgust was similarly overlooked in the treatment of this disorder (Olatunji & McKay, 2009). This may be due, in part, to patients' difficulty distinguishing the nuances of their emotional experiences in response to encounters with phobia-relevant stimuli (Olatunji & McKay, 2009). Specifically, patients tend to broadly label their phobia-related distress as "anxiety", yet, in describing their symptoms, report physiological reactions to feared stimuli that are consistent with the disgust response (Olatunji & McKay, 2009). Failure to accurately label this emotional response and to recognize its contribution to the avoidant behavior associated with phobias and other Anxiety Disorders (e.g., Obsessive Compulsive Disorder) may have negative repercussions for treatment outcomes (McKay & Olatunji, 2009; Meunier & Tolin, 2009; Olatunji, Forsyth, & Cherian, 2007; Olatunji & McKay, 2009). If exposure-based treatment interventions for disorders in which disgust plays a prominent role target the fear—but not the disgust—response, this may not only compromise treatment gains, but may potentially contribute to treatment attrition and/or relapse (Olatunji et al., 2007).

Many questions exist regarding the extent to which concern with contamination influences the avoidance of disgust-relevant stimuli for persons with different subtypes of Specific Phobia. It also remains unclear whether or not having a certain subtype of Specific Phobia is associated with sensitivity to a particular category of disgust. Lastly, more research is needed to better delineate the extent to which the fear and disgust responses co-occur in persons with Specific Phobia when they are exposed to disgust-relevant stimuli.

Research suggests that concern with contamination contributes to avoidant behaviors in persons with Specific Phobia (e.g., Davey, Forster, & Mayhew, 1993; Davey & Marzillier, 2009; Woody et al., 2005). Furthermore, findings from a number of studies have suggested that concern with contamination renders the disgust response more robust to habituation than the fear response (Edwards & Salkovskis, 2006; McKay, 2006; Olatunji et al., 2007; Olatunji et al., 2009). If contamination distress operates to exacerbate and/or maintain symptoms of Specific Phobia, then exposure-based treatment interventions must address this particular concern in conjunction with the other cognitive, emotional, and behavioral variables that cause functional impairment for phobia sufferers.

Given the numerous questions surrounding the disgust response in persons with Specific Phobia, the purpose of this research was to experimentally examine the roles of disgust, fear, and concern with contamination in two subtypes of Specific Phobia—Spider Phobia and Blood-Injection-Injury (BII) Phobia—through the use of Behavioral Approach Tasks (BAT's) involving disgust-relevant stimuli. These data were gathered in an effort to further elucidate the relationships between these emotional constructs among persons with Spider and BII Phobia. While there are ample research findings that indicate that the disgust response decays more slowly than the fear response in Specific Phobia and other Anxiety Disorders (i.e., OCD) (McKay, 2006; Olatunji et al., 2007; Olatunji et al., 2009; Olatunji, Smits, Connolly, Willems, & Lohr, 2007; Smits, Telch, & Randall, 2002), there is a dearth of treatment outcome research on disgust-based exposure interventions for the treatment of Specific Phobia. Given the breadth and complexity of the disgust response (McNally, 2002; Rozin, Haidt, & McCauley, 2009), coupled with evidence to suggest that persons with different types of Specific Phobia are sensitive to particular categories of disgust-relevant stimuli (e.g., (de Jong & Merckelbach, 1998; Olatunji, Sawchuk, de Jong, & Lohr, 2006; Sawchuk et al., 2000), it is crucial to gain a better understanding of the specific qualities of this emotion for persons with different phobia types. In turn, increased knowledge of disgust sensitivity and behavioral avoidance among phobic persons will allow clinicians to design more effective exposure-based treatment interventions for Specific Phobia (Olatunji et al., 2007).

Specific Phobia: Spider Type and BII Type

The Diagnostic and Statistical Manual for Mental Disorders (DSM-IV-TR) has grouped Specific Phobia into 4 subtypes: *Animal*, *Natural Environment*, *Situational*, and *Blood-Injection-Injury (BII)* (DSM-IV-TR, APA, 2000). Spider Phobia belongs to the category *Animal Type*, and, as its name suggests, consists of excessive fear and avoidance of spiders. Estimates of the population prevalence of Specific Phobia have suggested that approximately 12.1% of females and 3.3% of males have some type of animal phobia (Fredrikson, Annas, Fischer, & Wik, 1996). BII Phobia, which constitutes its own subtype, consists of excessive fear and avoidance of any or all of the following situations: seeing blood, receiving an injection or other invasive medical procedure, watching surgery, talking about surgical procedures, or

having blood drawn (DSM-IV-TR, APA, 2000; Antony & Barlow, 2002). Epidemiological research suggests that there is little gender discrepancy in the population prevalence of this phobia, with 3.2% of women and 2.7% of men endorsing phobias from this category (Fredrikson et al., 1996).

While both types of Specific Phobia consist of anxious apprehension and avoidance of phobia-relevant stimuli, the somatic symptoms that accompany each subtype differ in notable ways. Upon encountering spiders, spider phobics typically experience the same symptoms of sympathetic nervous system arousal that occur during a Panic Attack (Antony & Barlow, 2002), such as: a racing heart, muscle tension, a desire to run, fast breathing, feeling of impending doom, restlessness, shaking, shortness of breath, cold hands or feet, and pounding in the chest (Thyer & Himle, 1987, cited in Antony & Barlow, 2002). This physiological response in the presence of a phobia-relevant stimulus is common to most persons with Specific Phobia (Antony & Barlow, 2002).

Conversely, while persons with BII Phobia initially experience a similar increase in sympathetic nervous system arousal when exposed to blood, needles, or gore, this arousal is followed by a sudden decrease in heart rate and blood pressure. This abrupt drop in heart rate and blood pressure is precipitated by activity in the vagus nerve, and frequently causes fainting. The vagus nerve, which transmits electro-chemical signals to the abdomen and thorax, contributes to the parasympathetic nervous system response (Antony & Barlow, 2002). It is the role of the parasympathetic nervous system to restore homeostasis to the autonomic nervous system following sympathetic nervous system arousal.

Although the physical concomitants of Spider and BII Phobia differ, the emotional responses of the two phobias are nearly the same. While both groups are widely known to experience fear upon encountering their respective phobia-relevant stimuli, there is evidence to suggest that they also experience disgust (e.g., Tolin, Lohr, Sawchuk, & Lee, 1997). Furthermore, research suggests that, for persons with these phobia types, the disgust response is stronger than the fear response (e.g., Olatunji et al., 2005; Sawchuk et al., 2002), and that it contributes to the avoidant behaviors in which persons with Specific Phobia commonly engage (e.g., Davey, 1993, citied in Woody & Teachman, 2000; Woody, McLean, & Klassen, 2005; Woody & Teachman, 2000).

CHAPTER 2

DISGUST

Disgust was first defined as repugnance at the idea of orally consuming a substance or object that is considered to be revolting (Rozin & Fallon, 1987). These revolting substances were believed to be capable of contaminating foods upon coming into contact with them (Rozin & Fallon, 1987). The construct was later expanded from its original orally derived definition to include repugnance over gore, dismemberment, and sexual acts that are commonly considered revolting (e.g., incest and bestiality) (Haidt, McCauley, & Rozin, 1994). Also included in this definition of disgust are the laws of contagion and similarity. According to the law of contagion, any contact between the disgusting substance and a neutral substance renders the neutral substance "contaminated" even if there is no actual transfer of physical residue between the two substances. According to the law of similarity, any object that resembles a disgusting substance becomes the equivalent of the actual disgusting substance (Haidt et al., 1994). For example, a piece of fudge that is shaped like dog feces would be considered inedible by many based upon its resemblance to actual feces (Rozin et al., 1986 cited in Haidt et al., 1994).

Research by Haidt et al. (1994) suggests that the construct of disgust can be divided into seven principal domains: food, animals, body products, sex, body envelope violations, death, and hygiene. This research also suggests the existence of a magical thinking domain (e.g., "Even if I was hungry, I would not drink a bowl of my favorite soup if it had been stirred by a used but thoroughly washed fly swatter").

Further research has suggested that these seven disgust domains can be consolidated into two factors, which have been labeled core disgust and animal reminder disgust (Rozin, Haidt, McCauley, Dunlop & Ashmore, 1999). Core disgust stimuli include items such as rotten food-based materials, small animals, and body products. All core disgust stimuli have been described as sharing the qualities of general unpleasantness, repulsiveness upon ingestion, and the ability to contaminate neutral materials around them (Rozin, Haidt, & McAuley, 2000).

Animal reminder disgust stimuli, which include blood, veins, and other types of tissue that are common to both animals and humans (Sawchuk, Lohr, Tolin, Lee, & Kleinknecht, 2000), are said to remind people of their commonalities with animals (Rozin et al., 2000). In addition to body envelope violations (e.g., lacerations and mutilations) that would expose the inner tissues of the organism (Sawchuk et al., 2000), this category includes the following stimuli: death reminders (e.g., corpses, bones, and cremated human remains), deviant sexual practices, and poor hygiene. Numerous studies have supported the existence of these two discrete disgust categories (e.g., De Jong & Merckelbach, 1998; De Jong & Muris, 2002; Olatunji, Williams, Lohr, & Sawchuk, 2005; Woody et al., 2005).

Disgust sensitivity and its role in Specific Phobia

Disgust sensitivity refers to the degree to which one experiences revulsion in the presence of situations or stimuli that typically elicit a disgust response (Haidt et al., 1994). Persons whose disgust response is particularly intense are said to be disgust sensitive. Research suggests that persons with Specific Phobia are more disgust sensitive than are non-phobic persons (e.g., Olatunji, 2006; Sawchuk et al., 2002; Sawchuk et al., 2000). Currently, the subtypes of Specific Phobia that have been most frequently associated with disgust sensitivity are Spider Phobia and Blood-Injection-Injury (BII) Phobia (e.g., De Jong & Merckelbach, 1998; De Jong & Muris, 2002; Olatunji 2006; Olatunji, Sawchuk, de Jong, & Lohr, 2006; Sawchuk, Lohr, Tolin, Lee, & Kleinknecht, 2000; Thorpe & Salkovskis, 1998; Woody et al., 2005).

These findings may reflect an increased tendency to experience revulsion among people who suffer from these particular subtypes of Specific Phobia. Conversely, they may reflect the properties of the phobia-relevant stimuli themselves—i.e., spiders and blood products—that are typically considered to be disgusting. It bears mention, however, that disgust sensitivity has also been associated with environmental and situation-specific phobias, such as Acrophobia and Claustrophobia (Davey & Bond, 2005, cited in Davey, Bickerstaffe, & MacDonald, 2006). These findings suggest that disgust sensitivity may be a characteristic shared by all persons with Specific Phobia.

Although is not clear whether or not disgust sensitivity plays a causal role in the development of Specific Phobia, research has proposed that an exaggerated disgust response functions in a couple of important ways in the context of the disorder. Specifically, when controlling for fear, sensitivity to disgust-relevant stimuli has been demonstrated to uniquely predict having Specific Phobia (de Jong & Muris, 2002). Secondly, research suggests that disgust sensitivity contributes to the avoidance of phobia-relevant stimuli as a function of contamination concern (de Jong & Peters, 2007; de Jong & Muris, 2002; Woody et al., 2005; Woody & Teachman, 2000).

Disgust sensitivity as a unique predictor of Specific Phobia and avoidant behavior

Disgust sensitivity has been identified as a unique predictor of membership in a spider phobic group when fear is controlled (de Jong & Peters, 2007; de Jong & Muris, 2002). In the latter half of a two-part study that was conducted on a sample of girls with and without Spider Phobia, participants were asked to read vignettes that described situations in which spiders were present (e.g., in a hotel room). Participants were then asked to rate their degree of belief regarding the likelihood of the occurrence of the following events: being approached by the spider, having physical contact with the spider, and being physically harmed by the spider. They were also asked to complete a measure of disgust sensitivity. Logistic regression analyses conducted on all self-report measures used in this study revealed that the only unique predictor of belonging to the spider phobic group was disgust sensitivity.

Additional behavioral research by de Jong & Peters (2007) corroborates this finding. The authors of this study asked a group of spider fearful and non-fearful women to complete a Behavioral Approach Task (BAT) and an outcome expectancy task. In the BAT, they were asked to approach a common house spider in a series of steps that began with looking at the spider in a sealed jar and culminated in having the spider walk across one of their hands. In the outcome expectancy task, participants were shown slides of maggots (a disgust-relevant stimulus from the core disgust domain), Pitbull terriers (a fear-relevant stimulus), and spiders (a phobia-relevant stimulus). Following the presentation of each slide, participants were asked to indicate which of the following three outcomes they believed that they would experience:

receiving an electrical shock (a frightening outcome), drinking a bad-tasting liquid (a disgusting outcome), or nothing (a neutral outcome). Actual task outcomes following the presentation of each slide were randomly assigned.

In this paradigm, disgust outcome expectancy was the only variable that was found to uniquely predict spider approach/avoidance behavior. Specifically, those who reported believing that a disgusting outcome would ensue following the viewing of each slide exhibited the greatest degree of avoidance of the spider in the BAT. Disgust outcome expectancy was also the only variable that uniquely predicted self-reported spider fear. Lastly, spider fearful women were also more likely to have an initial expectancy for a disgusting outcome than were the non-fearful women. The authors interpreted these findings to suggest that disgust sensitivity and disgust outcome expectancy play a salient role in the emotional experience and avoidant behavior that characterize Spider Phobia.

Disgust sensitivity and concern with contamination in Specific Phobia

Research suggests that concern with contamination—a property of disgust sensitivity (Haidt et al., 1994; Rozin & Fallon, 1987)—also plays a salient role in Specific Phobia (de Jong & Muris, 2002; Sawchuk et al., 2000; Woody et al., 2005; Woody & Teachman, 2000). In addition to identifying disgust sensitivity as a unique predictor of Spider Phobia, the previously referenced study by de Jong & Peters (2007) supports the hypothesis that spiders are perceived by spider phobics as possessing contaminating properties. In the first part of this study, participants were asked to fill out a survey measure of disgust before reading a series of vignettes. The researchers added two questions to this measure to assess participants' perception of the contaminating properties of spiders. Specifically, they asked: "How much would you like to eat your favorite chocolate bar after a spider has walked across the bar when it is still wrapped in its package?" and, "How much would you like to eat your favorite chocolate bar after a spider has walked across the unpacked bar?" The girls were also asked the same two questions involving maggots, which, because of their association with rotten materials, are typically considered to have contaminating properties. To the surprise of the researchers, spider phobic girls showed a trend ($p = .10$) to

report more reluctance to eat the candy bar if it were to come into contact with a spider than with maggots. From these results, the authors inferred that disgust and contamination concern play a prominent role in the avoidant behavior of persons with Spider Phobia.

The research of Woody et al. (2005) also supports the idea that contamination concern—independent of fear—contributes to the avoidance of spiders in persons with Spider Phobia. Using a Behavioral Approach Task (BAT) paradigm, these researchers assessed participants' willingness to approach the following stimuli: a spider, a pen that had been placed on a paper plate in the spider's tank, and a clean pen. It was hoped that by using one task in which the phobia-relevant stimulus (i.e., a large spider) was present, and one task in which the spider was not present, but had been in contact with a previously neutral stimulus (the pen), it could be determined to what extent concern with contamination influenced the avoidance of spiders. The authors found that, in addition to avoiding the spider itself, a significantly greater number of spider fearful participants avoided tasks involving increased contact with the "contaminated" pen than did non-fearful participants (40% versus 20%). These researchers interpreted these results to suggest that disgust (as measured by avoidance of the "contaminated" pen), in addition to fear, motivates spider fearful people to avoid spiders.

Contamination concern has also been associated with BII Phobia, with evidence suggesting that this quality is more intense for BII phobics than for spider phobics (Sawchuk et al., 2000). These researchers compared a group of BII phobics to spider phobics and non-phobic persons on two self-report measures of contamination fears. BII phobics scored higher than both spider phobics and non-phobic persons on both of these measures. Furthermore, contamination fear scales were significantly positively correlated with the BII Phobia measure, but were not correlated with the Spider Phobia measure. The authors of this study suggest that contamination fear is a more salient feature of BII Phobia than of Spider Phobia. While this may be true, it is also possible that these results arose as an artifact of the contamination measures that were used in this research. To assess contamination concern, these researchers used subscales of measures that had been designed to assess contamination obsessions and washing compulsions in Obsessive-Compulsive Disorder. Thus, it is unclear to what extent scores on these measures accurately

reflect contamination concern in Specific Phobia, spider and BII types. The use of a behavioral measure of contamination concern in this study would have helped to better elucidate the associations between contamination beliefs and each phobia type.

CHAPTER 3

CORE DISGUST, ANIMAL REMINDER DISGUST, AND SPECIFIC PHOBIA

Although both types of Specific Phobia sufferers report higher levels of disgust sensitivity than do non-phobic persons, research has suggested that spider and BII phobics are sensitive to different categories of disgusting stimuli (de Jong & Merckelbach, 1998; Olatunji et al., 2006; Sawchuk et al., 2000). Specifically, sensitivity to core disgust stimuli has been associated with Spider Phobia (de Jong & Merckelbach, 1998), while sensitivity to animal reminder disgust stimuli has been associated with BII Phobia (de Jong & Merckelbach, 1998; Olatunji et al., 2006).

In a study that used a survey method of assessment, de Jong & Merckelbach (1998) found that sensitivity to core disgust was positively correlated with scores on a measure of Spider Phobia, but not with scores on a measure of BII Phobia. In contrast, sensitivity to animal reminder disgust was positively correlated with scores on a measure of BII Phobia, but not with scores on a measure of Spider Phobia. The authors of this study administered to their participants one measure of Spider Phobia, one measure of BII Phobia, and the following two disgust measures: the Disgust Scale (Haidt et al., 1994) and the Disgust Questionnaire (Rozin et al., 1984). The former disgust measure assesses sensitivity to both core and animal reminder disgust, whereas the latter scale
only measures sensitivity to core disgust stimuli (e.g., body products, rotting foods, and certain small animals).

These researchers found that BII Phobia (as measured by the scale used in this study) was only significantly correlated with the body envelope violation and death domains of the Disgust Scale, both of which are considered to belong to the category of animal reminder disgust. In contrast, Spider Phobia (also measured by the scale used in this study) was strongly positively correlated with scores on the Disgust Questionnaire. Spider Phobia was also correlated with the animal and death subscales of the Disgust Scale.

Although it was predicted that Spider Phobia would be associated with the animal subscale of the Disgust Scale—a domain that is associated with core disgust—it is unclear as to why Spider Phobia was correlated with the death subscale—a domain that falls under the rubric of animal reminder disgust.

Researchers in a similarly designed study were able to partially replicate these findings (Sawchuk et al., 2000). Also using survey measures of Spider Phobia, BII Phobia, disgust sensitivity, and contamination concerns, they found that BII phobics reported greater sensitivity to animal reminder disgust stimuli on one of the disgust sensitivity measures than did spider phobics, but that no differences emerged between the two groups on either of the measures with regard to core disgust stimuli. BII phobics did, however, score higher than spider phobics on the measures of contamination fear.

Cross-cultural research of BII Phobia lends further support for the domain specificity of disgust sensitivity in BII Phobia (Olatunji et al., 2006). In this study, researchers measured two large samples of American and Dutch undergraduate students on disgust sensitivity and BII Phobia. Factor analyses suggested that in both samples, the latent factor of animal reminder disgust was significantly correlated with the latent factor of BII Phobia, but the latent factor of core disgust was not significantly correlated with BII Phobia. The authors interpreted these findings to suggest that the relationship between BII Phobia and disgust sensitivity was specific to the animal reminder disgust domain.

Behavioral research also corroborates the domain specificity of disgust sensitivity for persons with Specific Phobia (Koch, O'Neill, Sawchuk, & Connolly, 2002; Olatunji, Connolly, & Bieke, 2008). Koch et al. (2002) exposed a group of BII phobics and non-phobic controls to the following stimuli: a bloody piece of gauze, a severed deer leg, a preserved cockroach, and a preserved earthworm. The group of BII Phobics rated the two animal reminder disgust stimuli (i.e., the bloody gauze and the deer leg) as significantly more disgusting and frightening than did the non-phobics. No between-group differences emerged, however, in disgust and fear ratings for the two core disgust stimuli (i.e., the cockroach and the earthworm). The BII phobic group reported significantly less willingness to complete all five of the BAT steps for the two animal reminder disgust stimuli than did the non-phobics, and they were also significantly less likely to complete the latter stages of approach for these two stimuli than were the non-phobics.

In contrast, there were no group differences on fear and disgust ratings for the two core disgust stimuli that were used in this study. BII Phobics reported less willingness to complete only the later approach levels of the BAT for these two stimuli. In terms of actual approach behavior (as opposed to reported willingness to approach the stimuli), there were no between-group differences in the completion of any of the approach stages for the cockroach, and BII phobics were significantly less likely to complete only the two latter approach stages for the earthworm than were the spider phobics. These results provide a combination of behavioral and self-report data to support the hypothesis that persons with BII Phobia are more disgusted by and avoidant of items belonging to the animal reminder disgust domain than to the core disgust domain.

Olatunji et al. (2008) used a similar BAT paradigm with BII phobics and non-phobics using a severed deer leg (animal reminder disgust), a spider (core disgust), and a cookie that had been smeared with mayonnaise (contaminated item). These researchers found that in addition to phobia group membership (BII phobic versus non-phobic) and gender (female versus male), the only predictor that added unique variance to the avoidance of the severed deer leg was the Mutilation/Death Subscale of the disgust measure (i.e., the Disgust Emotion Scale) that was used in this study. For avoidance of the spider, the only variable that added unique variance in addition to phobic status and gender was the Animals subscale of the disgust measure. For the "contaminated cookie" task, neither subscale of the DES explained unique variance in avoidant behavior for either of the two groups.

These findings suggest that sensitivity to animal reminder stimuli is associated with the avoidance of gory stimuli (i.e., a severed deer leg), whereas sensitivity to core disgust stimuli (i.e., a spider) is associated with the avoidance of small animals. Their work supports the existence of two unique disgust factors and suggests that disgust sensitivity contributes to the avoidance of phobia-relevant stimuli. Because this study did not include persons with Spider Phobia, it is difficult to draw conclusions regarding between-group differences in sensitivity to particular disgust domains. Furthermore, the possibility that one particular type of phobic stimulus—independent of a person's Specific Phobia type—may be more strongly associated with contamination concerns than another (e.g., blood/injection/injury-related stimuli vs. spider-related stimuli) must be considered.

None of the studies reviewed herein compared the two types of phobia-relevant stimuli to one another in terms of their ability to elicit contamination concerns in persons with and without Specific Phobia.

Disgust categories and concern with contamination

As previously discussed, concern with contamination appears to play a role in both Spider Phobia (de Jong & Peters, 2007; Woody et al., 2005) and BII Phobia (Sawchuk et al., 2000). There is some discrepancy, however, as to whether or not sensitivity to animal reminder disgust is more strongly associated with fear of contamination than sensitivity to core disgust stimuli, or vice versa. In one study, sensitivity to animal reminder disgust stimuli was demonstrated to be more strongly associated with contamination fear than was sensitivity to core disgust stimuli (Olatunji et al., 2004). In a separate study, however, it was demonstrated that sensitivity to core disgust stimuli was positively associated with contamination ideation and excessive washing tendencies, but that sensitivity to animal reminder disgust stimuli was negatively associated with these constructs (Olatunji et al., 2005). These discrepant findings were unexpected, and the reason for this discrepancy was unclear.

In each of the aforementioned studies, the researchers used the same sample type (i.e., university undergraduate students) and administered the same disgust sensitivity measures. Items on both of the disgust measures that were used in these studies load onto either the core disgust or the animal reminder disgust factor of the disgust construct. The authors interpreted the discrepancy in their findings to suggest that contamination concern is a component of both disgust factors (Olatunji et al., 2004; Olatunji et al., 2005). Based on these results, it remains unclear whether or not contamination concerns are associated with both categories of disgust sensitivity to roughly the same degree, or whether or not they are associated more strongly with one category of disgust than with the other. It must also be noted that neither of these studies included persons with Specific Phobia in their samples. Had phobic samples been used, the results may have differed. Thus, the disparity in these findings may reflect chance variation among persons for whom the disgust response is less strong than it would be for persons with Specific Phobia.

CHAPTER 4

RESEARCH RATIONALE

Taken together, the research reviewed herein suggests that disgust and disgust sensitivity play a salient role in the emotional responses and avoidant behavior of persons with Spider and BII Phobia. Concern with contamination also appears to contribute to the avoidance of phobia-relevant stimuli by these two groups of phobia sufferers. It is less clear, however, whether or not disgust sensitivity is domain-specific—i.e., stronger for core disgust stimuli versus animal reminder disgust stimuli, or vice versa—for each group. It is also unclear whether or not concern with contamination plays a stronger role in BII Phobia or Spider Phobia. This research, by using in-vivo disgust-relevant stimuli and Behavioral Approach Tasks (BAT's), endeavored to answer these questions. It was anticipated that the use of disgust-relevant specimens—as opposed to photographic stimuli—would authentically replicate the types of encounters and reactions that people typically have with disgust-relevant stimuli in their everyday lives, therein increasing the generalizability of the results.

The first question addressed in this study was whether or not sensitivity to specific categories of disgust-relevant stimuli is significantly different for persons with Specific Phobia, Spider Type than for persons with Specific Phobia, BII Type, and for non-phobic controls. Given that disgust has been identified as a prominent emotional response in Spider and BII Phobia, and given that it has been shown to contribute to avoidant behavior in each disorder, gaining a firmer grasp on the nuances in disgust sensitivity for each phobic population would allow for treatment providers to design more comprehensive exposure-based interventions to extinguish fear and disgust in Specific Phobia.

This study partially replicated the behavioral avoidance research conducted by Koch et al. (2002) and Olatunji et al. (2008). Whereas their research compared only BII phobics to non-phobics, however, this research included a group of persons with clinical or sub-clinical Spider Phobia, a group of persons with clinical or subclinical BII Phobia, a control group of non-phobic persons, and a group of persons who endorsed clinical or sub-clinical symptoms of Spider and BII Phobias. By directly comparing these groups

to one another using a combination of survey, behavioral, and self-reported emotional responses, more definitive conclusions can be drawn about the domain specificity of disgust sensitivity and the role of concern with contamination in each type of phobia. Without comparing the groups to one another using multiple methods of data collection, it is difficult to make inferences about the constructs of disgust sensitivity and contamination concern that are specific to each phobia type.

The following hypotheses—which are replications of those supported by findings from previous research on the domain specificity of disgust sensitivity for persons with Spider Phobia and BII Phobia—were tested in this study: 1) Spider phobics would exhibit stronger disgust responses to stimuli in the core disgust category than would BII phobics and non-phobic controls, and BII phobics would exhibit stronger disgust responses to stimuli in this category than would non-phobic controls; 2) BII phobics would exhibit stronger disgust responses to stimuli in the animal reminder disgust category than would spider phobics and non-phobic controls, and spider phobics would exhibit stronger disgust responses to these stimuli than would non-phobics; 3) Spider phobics would exhibit stronger disgust responses to stimuli in the core disgust category than to stimuli in the animal reminder disgust category; 4) BII phobics would exhibit stronger disgust responses to stimuli in the animal reminder disgust category than to stimuli in the core disgust category; 5) Spider phobics would exhibit greater avoidance of stimuli in the core disgust category than would BII phobics and non-phobic controls, and BII phobics would exhibit greater avoidance of these stimuli than would non-phobic controls; 6) BII phobics would exhibit greater avoidance of stimuli in the animal reminder disgust category than would spider phobics and non-phobic controls, and spider phobics would exhibit greater avoidance of these stimuli than would non-phobics; 7) Spider phobics would exhibit greater avoidance of stimuli in the core disgust category than of stimuli in the animal reminder disgust category; 8) BII phobics would exhibit greater avoidance of stimuli in the animal reminder disgust category than in the core disgust category.

Analyses were also conducted to assess the strength of the contaminating properties of stimuli belonging to each disgust category. Given that contamination appears to be associated with both disgust factors, all between-group and within-group comparisons on this outcome variable were tested using non-directional statistical analyses. Similarly, analyses were performed to determine the degree to which

participants experienced fear in addition to disgust and concern with contamination upon exposure to disgust-relevant stimuli. Given that previous research has suggested that the fear response co-occurs with the disgust response in the context of exposure to disgust- and/or phobia-relevant stimuli, but that there is variability with regard to the extent to which it is experienced in conjunction with disgust, all analyses on this self-reported outcome variable were also tested using non-directional statistical tests.

The second construct that was experimentally manipulated and examined in this research was concern with contamination. A behavioral approach paradigm was used to better elucidate the role of this construct in avoidant behaviors in persons with Spider and BII Phobia. This experimental task addressed the following questions: 9) Are contamination concerns stronger for persons with one or both subtypes of Specific Phobia than for non-phobics regardless of the category of phobia-relevant stimuli (i.e., spiders or BII products)?; 10) Are contamination beliefs more strongly associated with one type of phobia-relevant stimuli (i.e., spiders or items related to blood, injections, or injuries) than another, regardless of a person's Specific Phobia subtype?; 11) Do persons with Specific Phobia show stronger contamination concerns with stimuli related to their own phobia subtype than to stimuli that are relevant to a Specific Phobia subtype that is different from their own? ; 12) Independently of disgust, does contamination concern influence the avoidance of "contaminated neutral stimuli" for phobic groups?; 13) Independently of concern with contamination, does disgust influence the avoidance of "contaminated neutral stimuli" for phobic groups?; and 14) Independently of disgust and concern with contamination, does fear influence the avoidance of "contaminated neutral stimuli" for phobic groups?

The primary goal of the contamination paradigm was to tease apart the unique influences of disgust, fear, and concern with contamination on avoidant behavior in persons with Spider Phobia and persons with BII Phobia. If concern with contamination is more salient in one phobia than another, then treatment interventions for that particular phobia must address that concern. It is equally important to delineate the roles that fear and disgust play in phobic avoidance. With this information, clinicians can broaden their understanding of how these variables operate in maintaining symptoms of Specific Phobia, and can conduct more comprehensive functional analyses of phobic responses and their concomitant avoidant behaviors (Meunier & Tolin, 2009).

CHAPTER 5

METHODS

Participants

Participants included: 29 non-phobic controls, 25 persons who met clinical or sub-clinical criteria for Specific Phobia, Spider Type, 26 persons who met clinical or sub-clinical criteria for Specific Phobia, BII Type, and 27 persons who met clinical or sub-clinical criteria for Specific Phobia, Spider Type and for Specific Phobia, BII Type. Participants were recruited directly from undergraduate psychology classes, through campus flyers, and through an ad that was placed on the website of the Department of Psychology. Participants were reimbursed financially or with extra credit points for their courses.

All interested participants were screened in-person using the Specific Phobia module of the Anxiety Disorders Interview Schedule for the DSM-IV (ADIS) (Brown, DiNardo, & Barlow, 1994) to verify that they either met, or failed to meet (in the case of control participants), clinical or subclinical criteria to warrant a diagnosis of Specific Phobia, Spider and/or BII Types. Participants were also administered the Obsessive Compulsive Disorder (OCD) module of the ADIS. For the purposes of this study, it was essential to rule-out OCD as a comorbid disorder given that concern with contamination tends to be a salient theme for OCD sufferers (McKay et al., 2004, cited in McKay & Moretz, 2009), and research suggests that disgust sensitivity is associated with contamination ideation and excessive washing (Olatunji, Williams, Lohr, & Sawchuk, 2005). Given the potential of the presence of this disorder to confound the results, persons who met clinical or subclinical criteria for OCD were excluded from participating in this study. All participants were interviewed by graduate students who had received extensive training in administering the ADIS, and who were supervised by a licensed, doctoral level clinical psychologist with over 20 years of experience.

Inclusion Criteria

In order to be included in the Spider Phobia group, participants had to report a fear score of "4" or higher (on a scale of 0-8) on the ADIS question, "Currently, do you fear or feel a need to avoid such things as: animals (e.g., snakes, spiders, dogs, bees/insects)?". For this question, participants needed to specifically indicate that the feared animal was a spider. In order to be included in the BII Phobia group, participants had to report a fear score of "4" or higher on at least one of the situations referenced in the following question on the ADIS, "Currently, do you fear or feel a need to avoid such things as: small cuts (self), receiving injections (self), having blood drawn (self), small cuts (others), receiving injections (others), having blood drawn (others)." In order to be included in the dual phobia (Spider and BII Phobia) group, participants had to report a fear score of "4" or higher in reference to spiders and in reference to at least one of the situations involving blood, injections, or blood draws. Participants who endorsed fear scores of "4" or higher in response to other situations referenced in this ADIS module were also included, provided that their strongest fear was of spiders and/or BII-related stimuli.

For the purpose of this study, participants were not required to meet full clinical criteria for Specific Phobia, as the stringency of these criteria would have greatly limited the sample size. Thus, participants whose phobia scores were "sub-threshold" (i.e., whose fear scores were a "4" or higher, but who may or may not have reported behavioral avoidance scores, life interference scores, or distress scores of "4" or higher on the ADIS) were included in this study. It bears mention that none of the studies referenced thus far used diagnostic instruments to determine membership in a phobia group.

Measures

Anxiety Disorders Interview Schedule for DSM-IV
(*ADIS*; Brown et al., 1994)

The ADIS is a semi-structured clinical interview that is used to assess major Axis I psychiatric disorders, with a particular emphasis on Anxiety Disorders. Each section assesses the presence of symptoms associated with a particular disorder, and the questions in each section correspond to each criterion for the disorder as specified by the DSM-IV-TR (American Psychiatric Association, 2000).

Demographic Survey

This brief survey measure gathered the following information from participants: age, sex, ethnicity, number of years of education, whether or not participants had received treatment for a phobia in the past, whether or not participants were currently receiving treatment for a phobia, and any psychiatric medications that participants were currently taking.

Spider Phobia Questionnaire
(*SPQ;* Klorman, Weerts, Hastings, Melamed, & Lang 1974)

The SPQ is a 31-item true/false instrument that measures fear and avoidance of spiders. Items that indicate absence of fear are reverse-scored. This instrument has been demonstrated to have adequate reliability and validity (Korman et al., 1974). Alpha coefficients for the SPQ range from .83 to .90. In the present study, the Alpha coefficient for this scale was .96.

Multidimensional Blood/Injury Phobia Inventory
(*MBPI*; Wenzel & Holt, 2003)

The MBPI is a 40-item measure that assesses five types of phobic responses (i.e., fear, disgust, fainting, avoidance, and worry) in four types of situations in which BII phobia-relevant stimuli are present (i.e., hospitals, injections, blood, and injuries). The measure also assesses phobic responses with regard to self versus other. Participants are asked to rate the extent to which each statement is typical of them. Items are rated on a 5-point, Likert-type scale with 0 = "very slightly or not at all" and 4 = "extremely". In previous research, the Alpha coefficient for the MBPI was .91. In the present study, the Alpha coefficient for this scale was .97.

Disgust Scale (*DS*; Haidt, McCauley, & Rozin, 1994)

The Disgust Scale is a 32-item instrument that measures sensitivity to disgust-relevant stimuli in seven domains: food, animals, body products, sex, envelope violations, death, and hygiene. There is also an eighth scale that measures endorsement of magical thinking (e.g., "A friend offers you a piece of chocolate shaped like dog-doo."). The DS contains 2 true-false items and 2 rated items for each of the 8

domains. The rated items are scored on a 3-point scale in which 0 = "not disgusting at all", 1 = "slightly disgusting" and 2 = "very disgusting". All answers to the true/false questions are totaled, and answers to the rated questions are totaled and divided by 2. Scores on both sections of the measure are summed to derive a total that ranges from 0 = minimal disgust sensitivity to 31 = maximal disgust sensitivity. In a pilot study that preceded this research, the Alpha coefficient for the DS was .84. In the present study, the Alpha coefficient for this scale was .89.

Disgust Emotion Scale (*DES*; Walls & Kleinknecht, 1996)

The DES is a 30-item measure that assesses disgust sensitivity across five domains of stimuli: animals, injections and blood draws, mutilation and death, rotting foods, and smells. Participants are asked to rate their degree of disgust or repugnance if they were to be exposed to each item. Answers are given on a 5-point, Likert-type scale ranging from 0 = "no disgust or repugnance at all" to 4 = "extreme disgust or repugnance". Alpha coefficients for the five DES subscales range from 0.73 to 0.87 (Sawchuk et al., 2002, cited in Olatunji et al., 2004). In the present study, the Alpha coefficient for the scale was .94.

Emotion rating scales (MDES; Gross & Levenson, 1995)

A modified version of the Differential Emotions Scale was used. Each emotion was preceded by a phrase that pertained to the stage of the experiment during which the emotional response was being measured. For example, the measure given to participants once they had finished a Behavioral Approach Task (BAT) with a particular stimulus read, "During this task I felt…" (1) disgusted, nauseated, repulsed; (2) fearful, scared, afraid. Participants rated the extent to which they experienced this emotional response on a 9-point scale where 0 = "Did not feel the slightest bit of emotion" and 8 = "The most I have ever felt in my life". An additional question was added to determine the extent to which participants believed that they had been contaminated in each BAT, "During this task I felt…like I might be contaminated, infected, or tainted." Participants indicated their degree of belief in this statement on an 8-point scale in which 0 = "totally disagree" and 8 = "totally agree". All Emotion Rating Scales given prior to engaging in a Behavioral Approach Task were preceded by the phrase, "Right now I feel…".

Materials: Experiment 1

For the spider contamination manipulation, an aquarium tank was set up to look as though it housed a tarantula. The goal of this paradigm was to assess the extent to which participants were concerned about becoming contaminated by a surface on which a phobia-relevant stimulus (i.e., a spider) had once been. In keeping with the law of contagion proposed by Rozin & Fallon (1987), disgust sensitive participants should have ostensibly harbored concerns about being contaminated by a neutral stimulus that was put in contact with a "contaminated surface"—i.e., the gravel on which the spider had crawled. The principal investigator researched how to care for tarantulas and then carefully selected items that are used to creating dwellings for spiders in captivity. There was no spider in the tank, but the glass tank contained gravel, a water bottle with a bowl attached, and a few twigs. These materials were arranged such that none of them were touching, and there was no visible matter in the aquarium (e.g., a molted exoskeleton) to indicate that there would be any actual transfer of physical residue to a neutral stimulus. Before the experiment began, the experimenter placed an Oreo cookie (a neutral stimulus) on the gravel in an open area of the tank such that it was not in contact with any of the other objects.

For the BII contamination manipulation, a stainless steel surgical tray was used. Given that blood, syringes, open wounds, and used medical instruments are known carriers of harmful pathogens, it would have been extremely unlikely that participants would have consented to touch or eat anything that had come into contact with such items. Theoretically, however, the law of contagion dictates that once a neutral stimulus has come into contact with a stimulus that has contaminating properties, the neutral stimulus remains "contaminated" even if it has been disinfected (Rozin & Fallon, 1987). For this reason, a surgical tray was selected for use in this task, as it had ostensibly once held bloodied medical materials, items that would be perceived as contaminating. Participants were told that this tray was on loan from a local hospital, and that it had been used in the hospital's operating room to hold used surgical instruments. They were not explicitly told that the tray had been sterilized, but, like the spider tank, the tray showed no visible matter to suggest that there would be any transfer of physical residue to a neutral stimulus if the two were to come in contact. Before the experiment began, the experimenter placed an Oreo cookie in the center of the tray.

Materials: Experiment 2

Participants were invited to view and approach 6 disgust-relevant stimuli that were presented in randomized, counterbalanced order. Three of the stimuli—a dead rat, fake urine (i.e., chicken broth) in a urine specimen jar, and fake mucus (i.e., rubber cement) that had been spread onto a tissue—belong to the core disgust category. The other three stimuli—a preserved pig uterus, a preserved cow's eye, and cremated human remains (which were actually those of a cat)—belong to the animal reminder disgust category. Prior to conducting this study, these stimuli were pilot-tested among non-phobic persons to measure their disgust-eliciting properties. The six stimuli ranged in disgust-eliciting intensity from mild (i.e., fake urine, cremated remains) to moderate (i.e., fake mucus, cow's eye) to severe (i.e., dead rat, pig uterus). Each stimulus was roughly equivalent to its pair in its disgust-eliciting properties. A range of disgust-eliciting stimuli was used to ensure greater variability in responses among participants. Furthermore, it was hoped that the use of a variety of disgust-relevant stimuli would prevent floor and/or ceiling effects. All disgust-relevant stimuli were displayed individually on a wooden desk that was disinfected by the experimenter between presentations of each stimulus.

Experimental Protocol

Participation in this research took approximately 90 minutes. Each participant was run individually with one experimenter—each of whom was a graduate student—present, and each participant was required to read and sign an informed consent form prior to participating in the study. Before engaging in the two sets of Behavioral Approach Tasks, each participant was given the Specific Phobia module and the OCD module, respectively, of the ADIS. Regardless of whether or not participants met criteria for inclusion, all were then asked to fill out the battery of aforementioned survey measures, which had been randomized and counterbalanced. After they had completed these measures, participants who did not meet criteria for inclusion were told the reasons for which they were ineligible for the study and were given the opportunity to ask questions of the experimenter during a debriefing process. All participants who were excluded were compensated for their time, and were given a list of referrals to various local mental health resources.

Participants who met inclusionary criteria were invited to participate in the second part of the study, and if they consented, were given a second informed consent form to read and sign. Those who qualified and consented to participating were asked to engage in the two sets of Behavioral Approach Tasks (BAT's). Before and after completing each BAT, participants were asked to complete an Emotion Rating Scale (ERS). The order of the tasks within each experimental paradigm was counterbalanced. Counterbalancing was performed using a Latin Square procedure such that order effects and carryover effects were evenly distributed across stimuli.

As an additional precaution to reduce carryover effects between the presentations of each stimulus, participants were given a distraction task in which to engage. Specifically, between the presentation of each stimulus, they were given 60 seconds during which to memorize lists of words which had been laminated and placed face-down on the table adjacent to the one in which the participant was seated. Participants were told that the experimenter would be keeping score of the number of words that they were able to memorize from each list, and were thus encouraged to do the best that they could to remember as many items as possible. Each list consisted of 20 different words, all of which had been chosen by the principal investigator of the study.

Experiment 1: Contamination in absence of phobic stimuli paradigm

For this experiment, participants performed two tasks in randomized, counterbalanced order. Before completing each task, participants were read the following script by the experimenter:

"Before we do anything today, I'd like to explain to you a task that I will be having you complete during the times that I am setting up various experimental stimuli." The experimenter then quickly showed the participant the word list that was on top of the stack of lists and said,

"Here is a stack of lists. Each list consists of 20 words. I will be asking you to memorize a new list at various points throughout the experiment. Please try your best to memorize as many words as possible each time you read a list, as I will be keeping score of how many words you remember from each list."

The experimenter then picked up one of the Emotional Response Surveys and read the following to the participant:

"Before we proceed with this experiment, I would also like to show you the surveys that I will be asking you to fill out before and after each stimulus that you view today. These surveys are very brief, and they are intended to give us a sense of how you are feeling before and during each task. Please answer them as carefully and as honestly as you can. We'll start with the first one after I give you some pens."

The experimenter then emptied two boxes of ballpoint pens into one of two empty paper cups, one of which was labeled, "New Pens", and the other of which was labeled, "Used Pens". The experimenter then provided the following instructions to the participant:

"Here are two packs of new pens. I'm going to place them all here in the 'new pens' container. Each time that you are asked to fill out an emotional response survey, I would like for you to take a fresh pen from this container. After you have finished using it, please place the pen in the 'used pens' container. You may now take a fresh pen and complete the first emotional response survey. When you fill out a survey, please use the table on the right, not the left, as we will be using the table on the left to display various specimens throughout the course of the experiment."

Once the participant had completed the first ERS, the experimenter put on a fresh pair of latex gloves from a box that had been placed in the bottom right-hand corner of the table in front of which the participant was seated. Following steps that were similar to those used by Woody et al. (2005), the experimenter then placed the following additional items on the table: a bottle of Purell hand sanitizer, a paper plate, and a package of Oreo cookies. On the table adjacent to the one in front of which the participant was sitting, the experimenter set down two pairs of tongs on a paper plate. Once all of these items had been placed on both tables, the experimenter pointed to the bottle of hand sanitizer and said to the participant, "Before we begin this task, I'd like for you to please sanitize your hands using the Purell solution on the table." While the participant was cleaning his or her hands, the experimenter placed the spider tank on the table in front of the participant.

Once the participant had finishing sanitizing his or her hands, the experimenter sanitized one pair of tongs with a fresh alcohol towelette and handed them to the participant. The experimenter then disposed of the used alcohol towelette and used a fresh one to sanitize the second pair of tongs. After disposing of the second alcohol towelette, the experimenter used the sterilized tongs to remove an Oreo cookie from the package on the table, and then placed the cookie in the center of the spider tank.

Once the experimenter had placed the cookie in the tank, she read aloud the following script, which was adapted from Rozin et al. (1999):

"I'm going to give you a couple of simple tasks, and I just want to find out whether you're willing to do them. Please don't try to imagine what the average person would do; we want to know what *you* are willing to do and how you feel. The point is not to go as far as you can with these things. What we really want to know is the point at which you don't want to continue. We don't want you to do anything you really don't want to do. You may stop whenever you wish. Here is a tank that we typically use to house our lab's tarantula. We took the tarantula out and put it in a different aquarium in another lab so that we could use this one in our experiment today. Now I am going to ask you to perform a series of tasks involving the Oreo cookie that you see inside the tank."

Participants were then asked to engage in the following steps, in sequential order:

1) "Use the tongs to remove the cookie from the (surgical tray/spider tank), and place it on the paper plate in front of you."
2) "Touch the cookie with your finger."
3) "Place the cookie to your lips."
4) "Take a bite out of the cookie."

If the participants responded that she or he was not willing to proceed with any of the steps, then the experimenter said, "Ok, that's fine. That's exactly what we want to know."

Immediately after participants had either completed all of the steps in the task or had decided to stop, they were asked to complete an ERS. While the participant was filling out the ERS, the experimenter removed the tank from the table and placed it into a plastic bin such that it was no longer visible to the participant. Once the participant had completed the ERS, he or she was asked to pick up one of the word lists and to memorize as many words as possible while the experimenter timed him or her for 60 seconds using a stopwatch. While each participant was studying each word list, the experimenter wiped off the table on which the tank had been placed with an anti-bacterial cleaning spray and a fresh paper towel. After 60 seconds had elapsed, the experimenter asked the participant to put down the word list and to recall aloud as many words as possible from the list. As the participant recited the words, the experimenter checked them off on a sheet that was attached to a clipboard.

Before engaging in the second "contaminated cookie" paradigm, the experimenter asked participants to once again sanitize their hands with the Purell solution. The experimental procedure for the cookie paradigm involving the surgical tray was identical to that used in the spider tank paradigm. The

only change that was made to this protocol was the script that the experimenter read to the participant, which read as follows:

"Here is a tray that is used to hold used surgical instruments, like scalpels and surgical syringes, during operations. We got it from a local hospital. Now I am going to ask you to perform a series of tasks involving the Oreo cookie that is inside the surgical tray."

After participants had completed both tasks in the "contaminated cookie" BAT, filled out the corresponding Emotional Response Surveys, and completed the distraction tasks, the experimenter removed the hand sanitizer and Oreo cookies from the table and introduced the second BAT.

Experiment 2: Disgust-relevant Behavioral Avoidance Paradigm

Before commencing with this experiment, participants were read the following script, which was also adapted from Rozin et al. (1999):

"I'm going to give you a number of simple tasks, and I just want to find out whether you're willing to do them. Please don't try to imagine what the average person would do; we want to know what *you* are willing to do and how you feel. The point is not to go as far as you can with these things. What we really want to know is the point at which you don't want to continue. We don't want you to do anything you really don't want to do. You may stop whenever you wish."

As can be seen in the script that was read to each participant, no mention was made of disgust, fear, or concern with contamination. Instead, participants were simply told to stop when they no longer wished to continue. No reference was made to these emotional response in the experimenter's script so as to avoid inadvertently biasing participants' responses to the Emotional Response Surveys. Immediately before and after viewing each specimen, participants were asked to fill out an Emotional Response Survey (ERS). In these surveys, they were asked to indicate the extent to which they had experienced disgust, fear, and concern with contamination—the three emotional constructs that were examined in this research—during each BAT. Following completion of the first ERS that preceded this paradigm the experimenter put on a fresh pair of latex gloves, pointed to a black plastic bin that was located across the room from the participant, and led the participant through each of the following steps for each of the six disgust-relevant stimuli that was presented:

1) "In this box I have a _____. Are you willing to look at it?"
2.) "Are you willing to touch a spot right next to the _____ while wearing a latex glove?"
3.) "Are you willing to touch the specimen with the glove on?"

4) “Are you willing to touch a spot next to the specimen without a glove on?”
5) “Are you willing to touch the specimen with no glove on?”

If the participant responded that she or he was not willing to proceed with any of the steps, then the experimenter stated, “Ok, that’s fine. That’s exactly what we want to know.”

Immediately after completing all 5 steps in the BAT, or after declining to proceed further, each participant was asked to fill out an ERS. Upon completion of the ERS, the participant was given instructions to engage in the distraction task, during which time the experimenter sanitized the table with a fresh paper towel and antibacterial spray. Before displaying a new specimen to the participant, the experimenter disposed of her latex gloves and put on a fresh pair.

Once participants had completed both parts of the study, they were thoroughly debriefed and were informed of the deception that was used during various points in the experiment. Participants were given the opportunity to discuss their experience with the experimenter, and to ask any questions that they wished. They were also given the opportunity to withdraw their data from inclusion in the study if they wished. Once they had been debriefed, participants were compensated according to their preference (i.e., financially or with extra credit points). All participants were also given a list of clinical referrals in the area, including the university’s counseling center.

CHAPTER 6

RESULTS

Participant Characteristics

Table 1 lists the characteristics of the complete sample of participants. The study consisted of 107 participants. Means and standard deviations were calculated for the age of participants and frequency data were calculated for the following variables: gender, ethnicity, educational attainment, present treatment status, past treatment status, and medication status. There were no significant differences in age between experimental groups $F(3,100) = 1.13$, $p = .341$. The majority of participants were female (84%). Female participants were roughly equally distributed across all four experimental groups, $\chi^2(3) = .04$, $p = .99$. Because the low number of males who participated in the study violated the Chi Square assumption that the expected number of participants per group must be ≥ 5, a Chi Square test could not be run for this group. The following frequency data were obtained to provide a descriptive breakdown of the numbers and percentages of males per experimental group: non-phobic controls (n = 7, 41%); spider phobics (n = 3, 18%); BII phobics (n = 3, 18%); and spider/BII phobics (n = 4, 24%). As can be seen, the majority of the males who participated in this study were members of the non-phobic control group.

Table 1. Demographic Characteristics (n=107)

	M	sd
Age (years)	20.0	2.2
	n	%
Gender		
Female	90	84
Male	17	16
Ethnicity		
European American	81	76.4
Asian American	8	7.5
Latino/Hispanic	6	5.7
Bi-/Multi-racial	3	2.8
Middle Eastern	2	1.9
International Student: Asian	2	1.9
International Student: Latino	2	1.9
Other	1	0.9
Educational Attainment		
Freshman	35	34.0
Sophomore	29	28.2

Junior	24	23.3
Senior	10	9.7
Some Graduate School	3	2.9
Completed Graduate School	2	1.9

Treatment Status/Treatment History/
Use of Psychotropic Medication

Table two lists participants' psychotherapeutic and medication treatment history. Frequency data were calculated for each of the questions asked regarding treatment history. Nearly all participants (99%) reported that they were not currently receiving treatment for a phobia of any kind at the time that this study was conducted. One person (1.9%) reported that that she was receiving treatment for Social Phobia. Nearly all participants (98.1%) reported that they had never received treatment for a phobia of any kind, and the vast majority of participants (90.4%) reported that they were not taking any psychotropic medication. Participants who reported taking psychotropic medications were not asked to state the reasons for which these medications had been prescribed to them. Four participants did not provide answers to these 3 questions.

Table 2. Participants' Treatment History (n=103)

	n	%
Current Treatment Status		
Not Receiving Psychotherapy	102	99
Receiving Psychotherapy	1	1%
Past Treatment Status		
Never Received Psychotherapy	101	98.1
Received Psychotherapy	2	1.9
Medication History		
Not Taking Psychotropic Medication	93	90.3
Taking Psychotropic Medication	10	9.7

Experimental Groups

Table three provides a breakdown of the number of participants in each of the four experimental groups: non-phobia control participants, spider phobics, BII phobics, and spider/BII phobics. Frequency data were calculated for the number of participants in each experimental group.

Table 3. Participants Per Experimental Group (n=107)

	n	%
Experimental Group		
Non-phobic Controls	29	27.1

Spider Phobics	25	23.4
BII Phobics	26	24.3
Never Fainted	20	76.9
Fainted	6	23.1
Spider/BII Phobics	27	25.2
Never Fainted	16	64
Fainted	9	36

Additional Phobias Reported

Table four lists the total number of phobias that each participant reported having, as measured by the fear and avoidance question on the ADIS. To obtain these values, frequency data were run for these variables on the entire sample.

Table 4. Number of Reported Phobias/Person and Number and Type of Co-Occurring Phobias (n = 107)

	n	%
Number of Reported Phobias/Person		
Zero	29	27.1
One	29	27.1
Two	27	25.2
Three	13	12.1
Four	9	8.4

Types of Co-Occurring Phobias and Number of Times That Co-Occurring Phobias Were Reported

Table 5 lists the types of phobias that participants reported having in addition to Spider and/or BII Phobia, and the frequency with which each of these additional phobias was reported. To obtain these values, frequency data were run for these variables on the sample of people who reported having Spider and/or BII Phobia. The three most commonly reported concomitant phobias were of heights, other insects (i.e., specific types of insects or "insects in general"), and snakes.

Table 5. Type of Co-Occurring Phobias and Number of Times That They Were Reported (n = 78)

	n	%
Co-occurring Phobia Types	16	20.5
Heights	11	14.1
Snakes	7	9
Insects	5	6
Dental/Medical Procedures	4	5
Air Travel	3	4
Mice/Rats	3	4
Thunderstorms	3	4
Vomit	3	4

Cockroaches	2	3
Contracting An Illness	2	3
Driving	2	3
Small, Enclosed Spaces	2	3
Bees	1	1
Crickets	1	1
Feces	1	1
Leeches	1	1

Number of Phobias Per Person Per Experimental Group

Table 6 lists the number of phobias that were reported per person per experimental group, and Table 7 displays the average number of phobias reported by participants in addition to Spider and/or BII Phobia. To obtain these values, frequency data were run for these variables on the entire sample. There were no significant differences between phobic groups with regard to the number of additional phobias reported, all p-values > .10.

Table 6. Number of Phobias Per Person Per Experimental Group (n = 107)

	n	%
Non-Phobic Controls	29	100
Zero	29	100
Spider Phobics	25	100
One	12	48
Two	10	40
Three	2	8
Four	1	4
BII Phobics	26	100
One	17	65.4
Two	6	23.1
Three	0	0
Four	3	11.5
Spider and BII Phobics	27	100
One	0	0
Two	11	40.7
Three	11	40.7
Four	5	18.5

Table 7. Average Number of Phobias Reported in Addition to Spider and/or BII Phobia (n = 107)

	Non-phobic Controls (n=29)		Spider Phobics (n=25)		BII Phobics (n=26)		Spider/BII Phobics (n=27)	
	M	sd	M	sd	M	sd	M	sd
Number of Additional Phobias Reported	0	0	.68	.80	.58	1.0	.78	.75

Types of Co-Occurring Phobias and Number of Times That Each Phobia Was Reported Per Experimental Group

Table 8 displays the types of additional phobias that were reported by members of each experimental group, in addition to the frequency with which each of these phobias was reported per group. To obtain these values, frequency data were run for the types of additional phobias that were reported by members of each experimental group.

Table 8. Types of Co-Occurring Phobias and Number of Times That Each Phobia Was Reported per Experimental Group (n = 53)

	n	%
Spider Phobics	18	72
Driving	2	11
Heights	2	11
Insects	2	11
Mice/rats	2	11
Snakes	2	11
Small, Enclosed Spaces	2	11
Air Travel	1	6
Bees	1	6
Contracting An Illness	1	6
Feces	1	6
Thunderstorms	1	6
Vomit	1	6
BII Phobics	14	53.8
Heights	5	35.7
Air Travel	2	14.3
Vomit	2	14.3
Dental/Medical Procedures	1	7
Dogs	1	7
Insects	1	7
Mice/Rats	1	7
Thunderstorms	1	7
Spider/BII Phobics	21	77.8
Snakes	5	23.8
Heights	4	19
Dental/Medical Procedures	3	14.3
Cockroaches	2	10
Dogs	2	10
Contracting An Illness	1	5
Insects	2	10
Crickets	1	5
Leeches	1	5

In sum, across all 3 phobic groups, a substantial percentage of fears that were reported in addition to the phobia-relevant stimuli (i.e., spiders and/or blood, injections, blood draws, or injury) were triggered by stimuli belonging to the core disgust domain. For the Spider Phobia group, approximately 50% of additional reported fears were triggered by core disgust stimuli. For the BII Phobia group, 35% of additional reported fears were triggered by core disgust stimuli. For the Spider and BII Phobia group, 64% of additional reported fears were triggered by core disgust stimuli. It bears mention, however, that apart from situations involving blood and lacerations that are referenced in the Specific Phobia module of the ADIS, few of the other stimuli or situations belong to the animal reminder disgust domain. For this reason, additional survey measures of disgust sensitivity were administered to all participants to assess for between-group differences in domain-specific (i.e., core versus animal reminder) sensitivity to disgust-relevant stimuli.

Correlation Analyses

Pearson product-moment correlations were conducted for the four survey measures that were administered to all participants in order to identify bivariate relationships between disgust sensitivity, fear of spiders, and fear of blood, injections, blood draws, and/or injury. This information is displayed in Table 9. The two measures of disgust sensitivity (DS and DES) were strongly correlated ($r = .80$, $p < .001$), suggesting that both measures were evaluating sensitivity to the same construct. Scores on the SPQ were also significantly correlated with scores on the DS ($r = .42$, $p < .001$) and the DES ($r = .55$, $p < .001$). Scores on the MBPI were significantly correlated with scores on the DS ($r = .52$, $p < .001$) and the DES ($r = .65$, $p < .001$). There was no statistically significant relationship between scores on the SPQ and the MBPI ($r = .13$, $p = .19$). Taken together, these findings suggest that the more fearful people are of spiders or BII-relevant stimuli, the more disgust-sensitive they are likely to be.

Table 9. Bivariate Associations in Measures of Disgust Sensitivity, Fear of Spiders, and Fear of BII-relevant Stimuli (n = 107)

	1	2	3	4
1. Disgust Scale Total Score		.80***	.42***	.53***

2. Disgust Emotion Scale Total Score	.80***		.55***	.65***
3. Spider Phobia Questionnaire Total Score	.42***	.55***		.13
4. Multi-Dimensional Blood/Injury Phobia Inventory Total Score	.53***	.65***	.13	

*** p<.001

Comparisons of Means on Phobia Measures

Table 10 presents the means and standard deviations for participants' scores on the two phobia-relevant survey measures: the Spider Phobia Questionnaire (SPQ) and the Multidimensional Blood/Injury Phobia Inventory (MBPI).

Table 10. Results of Measures of Fear of Spiders and Fear of BII-relevant Stimuli (n = 107)

	Non-phobic Controls (n=29)		Spider Phobics (n=25)		BII Phobics (n=26)		Spider/BII Phobics (n=27)	
	M	sd	M	sd	M	sd	M	sd
Spider Phobia Questionnaire	3.1	2.1	22.3	4.0	6.9	4.9	20.7	4.4
Multi-dimensional Blood-Injury Phobia Inventory	7.8	7.8	12.2	18.9	58.8	31.6	57.5	25.4

A one-way ANOVA was first conducted on these data with the Spider Phobia Questionnaire (SPQ) as the dependent variable, $F(3,101) = 159.8$, $p < .001$. A priori planned contrasts were used to compare group means on this measure. Results from these contrasts suggest the following: 1) Persons with Spider Phobia reported a stronger fear of spiders and spider-related stimuli than did non-phobic controls, $t(101) = 17.7$, $p < .001$; 2) Persons with Spider Phobia reported a stronger fear of spiders and spider-related stimuli than did persons with BII Phobia, $t(101) = 13.8$, $p < .001$; and 3) Persons with both phobia types (Spider/BII) reported a stronger fear of spiders and spider-related stimuli than did persons with BII Phobia, $t(101) = 12.6$, $p < .001$, but did not differ significantly from persons with Spider Phobia, $t(101) = 1.4$, $p = .15$ on this measure.

A second one-way ANOVA was conducted on these data with the Multi-Dimensional Blood Phobia Inventory (MBPI) as the dependent variable, $F(3,97) = 38.5$, $p < .001$. A priori planned contrasts were used to compare group means on this measure.

Results from these contrasts suggest the following: 1) Persons with BII Phobia reported a stronger fear of blood, injections, injuries, and related stimuli than did non-phobic controls, $t(97) = 8.2$, $p < .001$; 2) Persons with BII Phobia reported a stronger fear of blood, injections, injuries, and related stimuli than persons with Spider Phobia, $t(98) = 7.31$, $p < .001$; and 3) Persons with both phobia types (Spider/BII) reported a stronger fear of fear of blood, injections, injuries, and related stimuli than did persons with Spider Phobia, $t(97) = 7.3$, $p < .001$, but did not differ significantly from persons with BII Phobia, $t(97) = .20$, $p = .84$ on this measure.

Taken together, the results from the SPQ confirm that persons with Spider Phobia are more fearful of spiders and spider-related stimuli than are non-phobic controls and persons with BII Phobia. These results also suggest that persons who have both phobias are more fearful of spiders and spider-related stimuli than are persons with BII Phobia, but that they do not differ significantly from persons Spider Phobia on their reported degree of fear of spiders and spider-related stimuli. The results from the MBPI confirm that persons with BII Phobia are more fearful of blood, injections, injuries, and related stimuli than are non-phobic controls and persons with Spider Phobia. These results also suggest that persons who have both phobias are more fearful of blood, injections, injuries, and related stimuli than are persons with BII phobia on their reported degree of fear of blood, injections, injuries, and related stimuli.

Comparisons of Means on Disgust Sensitivity Survey Measures

Table 11 presents the means and standard deviations for participants' scores on the two survey measures of disgust sensitivity. A one-way ANOVA was first conducted on these data with the Disgust Scale (DS) as the dependent variable, $F(3,100) = 10.8$, $p < .001$. A priori planned contrasts were used to compare group means on this measure. Results from these contrasts suggest the following: 1) All three phobic groups reported stronger disgust sensitivity than did non-phobic controls, $t(100) = -5.0$, $p < .001$, and 2) Participants with both phobia types (Spider/BII) reported stronger disgust sensitivity than did spider phobics, $t(100) = 2.7$, $p = .009$.

There were no significant differences in reported disgust sensitivity between persons with both phobia types and BII phobics, $t(100) = 1.4$, $p = .17$, nor were there differences in reported disgust sensitivity between the Spider Phobia group and the BII phobia group, $t(100) = 1.3$, $p = .20$.

Table 11. Results of Measures of Disgust Sensitivity (n = 107)

	Non-phobic Controls (n=29)		Spider Phobics (n=25)		BII Phobics (n=26)		Spider/BII Phobics (n=27)	
	M	sd	M	sd	M	sd	M	sd
Disgust Scale	12.7	5.9	16.5	5.9	18.4	4.6	20.4	4.2
Disgust Emotion Scale	27.8	14.3	46.5	21.7	53.8	15.3	64.6	16.8

A one-way ANOVA was also conducted on these data with the Disgust Emotion Scale (DES) as the dependent variable, $F(3,100) = 22.9$, $p < .001$. A priori planned contrasts were used to compare group means on this measure. Results from these contrasts suggest the following: 1) All three phobic groups reported stronger disgust sensitivity than did non-phobic controls, $t(100) = -7.2$, $p < .001$; and 2) Participants with both phobia types (Spider/BII) reported stronger disgust sensitivity than did spider phobics, $t(100) = 3.8$, $p < .001$, and BII phobics, $t(100) = 2.3$, $p = .03$. There was no difference in reported disgust sensitivity between the Spider Phobia group and the BII phobia group, $t(100) = 1.5$, $p = .14$.

Core Versus Animal Reminder Disgust: Testing Main Effects and Interactions of Specific Phobia Types and Domains of Disgust

Table 12 presents the mean scores and standard deviations for each experimental group on the core and animal reminder disgust subscales for the DS and the DES. To derive a core disgust score for each measure, the responses of each participant to the questions on each measure pertaining to core disgust were totaled. To derive an animal reminder disgust score for each measure, the responses of each participant to the questions on each measure pertaining to animal reminder disgust were totaled.

Table 12. Results of Measures of Disgust Sensitivity Measure: Core and Animal Reminder Disgust Domains (n = 107)

	Non-phobic Controls (n=29)		Spider Phobics (n=25)		BII Phobics (n=26)		Spider/BII Phobics (n=27)	
	M	sd	M	sd	M	sd	M	sd
Disgust Scale: Core Disgust Items	4.8	2.7	7.1	2.7	6.9	1.9	7.5	2.0
Disgust Scale:	6.7	2.9	8.0	3.5	9.5	2.5	10.4	2.1

Animal Reminder Disgust Items								
Disgust Emotion Scale: Core Disgust Items	16.7	8.7	29.5	13.4	22.4	11.1	32.5	10.6
Disgust Emotion Scale: Animal Reminder Disgust Items	11.2	6.9	17.0	10.2	31.3	8.0	33.2	8.7

To test for main effects and interactions of phobia type (spider vs. BII) and disgust domain (core vs. animal reminder), data for the experimental groups were first dummy-coded to reflect the presence or absence of Spider Phobia and BII Phobia for each of the four groups. In this way, the four experimental groups (i.e., non-phobic controls, spider phobics, BII phobics, and spider/BII phobics) were consolidated into two independent variables: Spider Phobia and BII Phobia. Binary numbers were assigned to each group to indicate whether or not members of the group had each type of phobia (spider and BII). Using this coding method, the four groups were represented in the following way: non-phobic controls = no Spider Phobia (0), no BII Phobia (0); spider phobics = Spider Phobia (1), no BII Phobia (0); BII phobics = no Spider Phobia (0), BII Phobia (1), spider/BII phobics = Spider Phobia (1), BII Phobia (1).

A MANOVA was conducted using all 4 subscales as dependent variables, and the dummy-coded experimental groups as independent variables. This multivariate statistic tested for main effects of Spider Phobia and BII Phobia, as well as a Spider x BII Phobia interaction across all four dependent measures. Results from the MANOVA suggested that there were main effects of Spider Phobia, $F(4,95) = 7.1$, $p < .001$ and BII Phobia, $F(4,95) = 35.7$, $p < .001$. The Spider by BII Phobia interaction was non-significant, $F(4,95) = 1.5$, $p = .45$.

The MANOVA was then broken down into four univariate ANOVA's for each of the four dependent measures: DS core disgust subscale, DS animal reminder disgust subscale, DES core disgust subscale, and DES animal reminder disgust subscale. All four univariate ANOVA's were statistically significant. The F-values for each dependent measure were as follows: DS core disgust subscale $F(3,98) = 7.6$, $p < .001$; DS animal reminder subscale $F(3,98) = 8.9$, $p < .001$; DES core disgust subscale $F(3,98) = 11.3$, $p < .001$, DES animal reminder disgust subscale $F(3,98) = 42.7$, $p < .001$.

For the core disgust subscale of the DS, an a priori planned contrast was used as a manipulation check to test the hypothesis that, on average, all three phobic groups have greater sensitivity to core disgust stimuli than do non-phobic controls, $t(103) = -4.5$, $p < .001$. A second a priori planned contrast was used to test the hypothesis that persons with Spider Phobia are more sensitive to core disgust stimuli than are persons with BII Phobia, $t(103) = .30$, $p = .77$. Non-directional, two-tailed, planned orthogonal contrasts were used to test whether or not persons with both phobia types are more sensitive to core disgust stimuli than are persons with Spider Phobia, $t(103) = .33$, $p = .74$ and persons with BII Phobia, $t(103) = .63$, $p = .54$.

For the core disgust subscale of the DES, an a priori planned contrast was used as a manipulation check to test the hypothesis that, on average, all three phobic groups have greater sensitivity to core disgust stimuli than do non-phobic controls, $t(101) = -4.8$, $p < .001$. A second a priori planned contrast was used to test the hypothesis that persons with Spider Phobia are more sensitive to core disgust stimuli than are persons with BII Phobia, $t(101) = 2.2$, $p = .03$. Non-directional, two-tailed, planned orthogonal contrasts were used to test whether or not persons with both phobia types are more sensitive to core disgust stimuli than are persons with Spider Phobia, $t(101) = .81$, $p = .42$ and persons with BII Phobia, $t(101) = 3.1$, $p = .003$

It had been predicted that Spider phobics would exhibit stronger disgust responses to stimuli in the core disgust category than would BII phobics and non-phobic controls, and that BII phobics would exhibit stronger disgust responses to stimuli in this category than would non-phobic controls. Taken together, these findings suggest that all three phobic groups are, on average, more sensitive to core disgust stimuli than are non-phobic controls. The data from the two disgust sensitivity survey measures only partially support the hypothesis that persons with Spider Phobia are more sensitive to core disgust stimuli than are persons with BII Phobia. Results were similarly mixed with regard to differences in sensitivity to core disgust stimuli between persons with both phobias and persons with only one phobia. As will be discussed, this discrepancy is likely attributable, in part, to the psychometric properties of the two disgust sensitivity measures that were used in this study.

For the animal reminder subscale of the DS, an a priori planned contrast was used as a manipulation check to test the hypothesis that, on average, all three phobic groups have greater sensitivity to animal reminder disgust stimuli than do non-phobic controls, $t(101) = -4.2$, $p < .001$. A second a priori planned contrast was used to test the hypothesis that persons with BII Phobia are more sensitive to animal reminder disgust stimuli than are persons with Spider Phobia, $t(101) = 1.9$, $p = .06$. Non-directional, two-tailed, planned orthogonal contrasts were used to test whether or not persons with both phobia types are more sensitive to animal reminder disgust stimuli than are persons with Spider Phobia, $t(101) = 3.1$, $p = .002$ and persons with BII Phobia, $t(101) = 1.3$, $p = .21$.

For the animal reminder subscale of the DES, an a priori planned contrast was used as a manipulation check to test the hypothesis that, on average, all three phobic groups have greater sensitivity to animal reminder disgust stimuli than do non-phobic controls, $t(102) = -8.6$, $p < .001$. A second a priori planned contrast was used to test the hypothesis that persons with BII Phobia are more sensitive to animal reminder disgust stimuli than are persons with Spider Phobia, $t(102) = 5.7$, $p < .001$. Non-directional, two-tailed, planned orthogonal contrasts were used to test whether or not persons with both phobia types are more sensitive to animal reminder disgust stimuli than are persons with Spider Phobia, $t(102) = 6.5$, $p < .001$, but not persons with BII Phobia, $t(102) = .71$, $p = .48$.

Taken together, these findings suggest that, on average, all three phobic groups are more sensitive to animal reminder disgust sensitivity than are non-phobic controls. The results from the animal reminder disgust subscales of the two disgust sensitivity survey measures largely support the hypothesis that persons with BII Phobia are more sensitive to animal reminder disgust stimuli than are persons with BII Phobia. Data from both survey measures suggest that persons with both phobias have greater sensitivity to animal reminder disgust stimuli than do persons with Spider Phobia, but that they do not differ significantly from persons with BII Phobia on their sensitivity to this disgust domain.

Within-Subjects Comparisons of Sensitivity to Core and Animal Reminder Disgust

Paired-samples t-tests were used to analyze differences in sensitivity to core versus animal reminder disgust stimuli within each phobic group. In order to make these within-group comparisons, participants' scores on the core and animal reminder subscales of the DS and the DES were first zero-centered. Table 13 presents the means and standard deviations of these zero-centered scores. To obtain these values, descriptive statistics were run on these data.

Table 13. Zero-Centered Core Disgust and Animal Reminder Disgust Scores on Disgust Sensitivity Measures: Phobic Groups (n = 107)

	Non-phobic Controls (n=29)		Spider Phobics (n=25)		BII Phobics (n=26)		Spider/BII Phobics (n=27)	
	M	sd	M	sd	M	sd	M	sd
Disgust Scale: Core Disgust Items	-1.6	2.7	.66	2.6	.47	1.8	.88	2.2
Disgust Scale: Animal Reminder Disgust Items	-1.9	2.9	-.66	3.5	.82	2.4	1.8	2.1
Disgust Emotion Scale: Core Disgust Items	-8.2	8.7	4.6	13.4	-2.3	10.9	7.0	10.5
Disgust Emotion Scale: Animal Reminder Disgust Items	-11.6	6.9	-5.4	10.2	8.2	8.0	9.9	8.6

The spider phobia group reported greater sensitivity to core disgust stimuli than to animal reminder disgust stimuli on the DS, $t(24) = 2.3$, $p = .03$ and on the DES, $t(23) = 5.1$, $p < .001$. For persons with BII Phobia, there was no significant difference between sensitivity to core and animal reminder disgust stimuli on the DS, $t(25) = -.85$, $p = .41$, but members of this group reported greater sensitivity to animal reminder disgust stimuli than to core disgust stimuli on the DES, $t(23) = -4.5$, $p < .001$. For the dual phobia group, there were no significant differences in sensitivity to stimuli from either disgust domain on either of the disgust sensitivity measures, all p-values > .10.

Core Versus Animal Reminder Disgust:
Comparisons of Group Means on
Behavioral Approach
Tasks (BAT's)

Table 14 presents the mean scores and standard deviations for each experimental group on each of the six Behavioral Approach Tasks (BAT's), and Table 15 presents the mean scores and standard deviations for the BAT core disgust scale and the BAT animal reminder disgust scale that were derived from participants' scores on the BAT's. To obtain the first set of values, descriptive statistics were run for the approach scores of each participant on each of the six stimuli that were used in the BAT's. BAT scale scores were calculated for each participant for the core disgust stimuli (i.e., urine, mucous, and dead rat) and the animal reminder disgust stimuli (i.e., cremated remains, cow's eye, and pig uterus). These scores were obtained by totaling participants' approach scores—as measured by the number of steps that they were willing to complete in the BAT's—for stimuli from each category. In this way, each participant ended up with a BAT core disgust score as well as a BAT animal reminder disgust score. It bears mention that the lower a person's score on each BAT, the more reluctant the participant was to approach the disgust-relevant stimulus in question. Figure 1 presents a graphical depiction of the group means for the BAT's for the core and animal reminder disgust domains.

Table 14. Behavioral Approach Task Scores Per Experimental Group for All Six Disgust-Relevant Stimuli (n = 102)

	Non-phobic Controls (n=27)		Spider Phobics (n=25)		BII Phobics (n=25)		Spider/BII Phobics (n=25)	
	M	sd	M	sd	M	sd	M	sd
Urine	4.8	.39	4.3	1.5	3.7	1.9	4.3	1.6
Mucous	3.9	1.2	3.4	1.6	3.2	1.2	2.8	1.6
Dead Rat	3.4	1.9	2.0	2.2	2.0	2.1	1.9	1.9
Cremated Remains	4.0	1.6	4.1	1.4	2.8	2.0	2.8	2.0
Cow's Eye	4.3	1.3	3.0	1.9	2.9	2.1	2.6	1.8
Pig Uterus	4.3	1.0	3.4	1.7	3.1	2.1	3.5	1.6

Table 15. Behavioral Approach Tasks: Core Disgust and Animal Reminder Disgust Scores Per Experimental Group (n = 102)

	Non-phobic Controls (n=27)		Spider Phobics (n=25)		BII Phobics (n=25)		Spider/BII Phobics (n=25)	
	M	sd	M	sd	M	sd	M	sd
BAT: Core Disgust Scale	12.1	2.9	9.6	3.7	8.9	4.1	9.1	4.3
BAT: Animal Reminder Disgust Scale	12.5	3.1	10.4	4.2	9.1	5.6	8.9	4.3

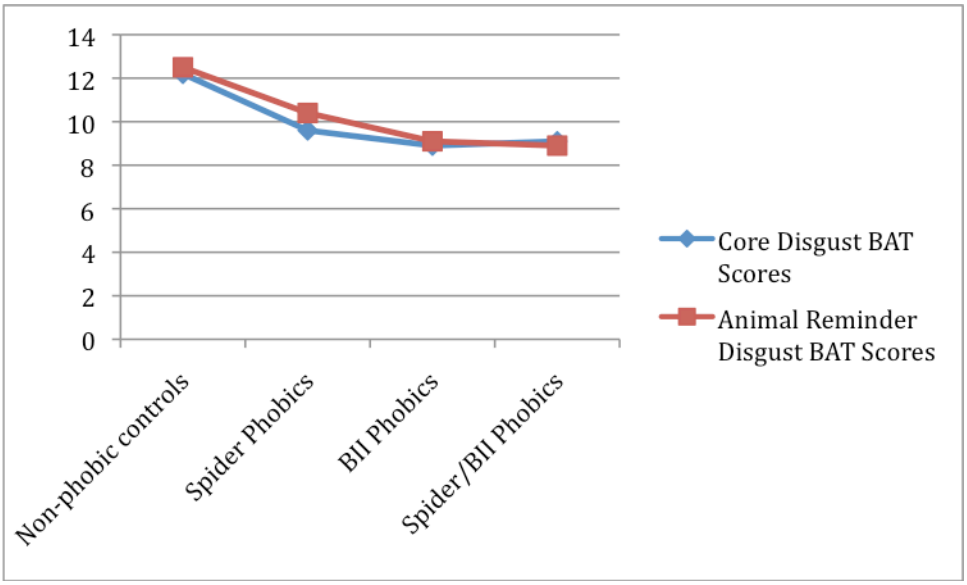

Figure 1. Group Means of BAT Scores for the Core and Animal Reminder Disgust Domains

To test for main effects and interactions of phobia type (spider vs. BII) and disgust domain (core vs. animal reminder), two separate univariate ANOVA's were run for the BAT core disgust scores and the BAT animal reminder disgust scores. The independent variables were the data for the four experimental groups that had been dummy-coded to reflect the presence or absence of Spider Phobia and BII Phobia for each of the four groups. These data, as previously mentioned, had been consolidated into two independent variables: Spider Phobia and BII Phobia.

The univariate ANOVA for the BAT core disgust scale was statistically significant $F(3,99) = 4.2$, $p = .007$. An a priori planned contrast was run as a manipulation check to test the hypothesis that, on average, all three phobic groups exhibit greater avoidance of—and thus may have greater sensitivity to—core disgust stimuli than do non-phobic controls, $t(99) = 3.5$, $p = .001$. There was a main effect of BII Phobia $F(1,99) = 6.5$, $p = .01$, suggesting that persons with BII Phobia (i.e., the BII Phobia group and Spider/BII Phobia group) are more sensitive to core disgust stimuli than are persons who do not have BII Phobia (i.e., the Spider Phobia group and the non-phobic controls). The main effect of Spider Phobia was non-significant, $p > .10$, and the Spider x BII Phobia interaction approached—but did not reach—statistical significance $F(1,99) = 3.4$, $p = .07$.

The univariate ANOVA for the BAT animal reminder disgust scale was statistically significant $F(3,101) = 4.0$, $p = .01$. An a priori planned contrast was run as a manipulation check to test the hypothesis that, on average, all three phobic groups exhibit greater avoidance of—and thus may have greater sensitivity to—animal reminder disgust stimuli than do non-phobic controls, $t(101) = 3.2$, $p = .002$. There was a main effect of BII Phobia, $F(1,99) = 8.7$, $p = .004$, suggesting that persons with BII Phobia (i.e., the BII Phobia group and Spider/BII Phobia group) are more sensitive to animal reminder disgust stimuli than are persons who do not have BII Phobia (i.e., the Spider Phobia group and the non-phobic controls). The main effect of Spider Phobia and the Spider x BII Phobia interaction were non-significant, all p-values > .10.

Within-Subjects Comparisons of Sensitivity to Core and Animal Reminder Disgust: BAT data

Paired-samples t-tests were used to compare differences in avoidance of core and animal reminder disgust within each phobic group by comparing each group's BAT core disgust scores to their BAT animal reminder disgust scores. None of the paired-samples t-tests were statistically significant, all p-values > .10, suggesting that phobic persons are equally avoidant of stimuli from both disgust domains.

Emotional Response Survey Data

Disgust, Fear, and Concern with Contamination Scores: Emotional Response Surveys for Core and Animal Reminder Disgust BAT's

As previously mentioned, following the completion of each BAT for each disgust-relevant stimulus, participants were asked to complete a brief Emotional Response Survey (ERS) measure in which they rated the highest degree of disgust, fear, and concern with contamination that they had experienced while engaging in the task. Each participant was given a separate disgust, fear, and concern with contamination score for their self-report data from the core disgust BAT's (i.e., urine, mucous, dead rat) and the animal reminder disgust BAT's (i.e., cremated remains, cow's eye, pig uterus). These scores were derived by totaling participants' ratings on each of the three questions from each ERS for the three stimuli

from each domain. Table 16 presents the means and standard deviations of each experimental group for their disgust, fear, and concern with contamination scores for the core and animal reminder disgust BAT's. To obtain these values, descriptive statistics were run for these data for each experimental group.

Table 16. Disgust, Fear, and Concern with Contamination Scores: Emotional Response Surveys for Core and Animal Reminder Disgust BAT's (n = 105)

	Non-phobic Controls (n=26)		Spider Phobics (n=24)		BII Phobics (n=25)		Spider/BII Phobics (n=27)	
	M	sd	M	sd	M	sd	M	sd
BAT Core Disgust Stimuli								
Disgust Rating	3.9	3.7	6.7	5.7	6.4	5.7	8.0	4.7
Fear Rating	.88	2.3	2.8	4.9	2.7	4.9	4.0	4.1
Concern with Contamination Rating	2.1	3.4	3.8	5.7	3.5	5.0	6.2	5.3
BAT Animal Reminder Disgust Stimuli								
Disgust Rating	3.1	3.4	6.3	6.0	6.3	5.8	7.0	4.8
Fear Rating	1.0	2.1	2.8	5.2	3.4	5.4	5.6	5.3
Concern with Contamination Rating	1.3	2.6	3.2	5.8	2.7	4.2	5.6	4.7

Disgust, Fear, and Concern with Contamination Scores: Between- and Within-Subjects Comparisons of Means on Emotional Response Surveys for Core and Animal Reminder Disgust BAT's

To analyze between- and within-group differences in emotional responses to stimuli from the core disgust domain, a 2 (Spider Phobia, BII Phobia) x 3 (ERS core disgust stimuli ratings, ERS core disgust fear ratings, ERS core disgust concern with contamination ratings) mixed factorial ANOVA was run. This test was used to test the hypotheses that spider phobics would report stronger disgust responses to stimuli in the core disgust category than would BII phobics and non-phobic controls, and that BII phobics would report stronger disgust responses to stimuli in this category than would non-phobic controls. This mixed factorial ANOVA was also intended to address the open-ended questions regarding the extent to which disgust, fear, and concern with contamination are experienced by phobic persons when exposed to stimuli

from the core disgust domain. In this model, phobia type was analyzed as a between-subjects variable and ERS ratings were analyzed as within-subjects variables.

For the ERS ratings for the core disgust BAT's, there was a between-subjects main effect of Spider Phobia, $F(1,96) = 5.6$, $p = .02$ and of BII Phobia, $F(1,96) = 4.4$, $p = .04$. These findings suggest that persons with phobias reported significantly higher scores on all three ERS items than did non-phobic controls. There was a within-subjects main effect of ERS ratings, $F(2,96) = 57.1$, $p < .001$. A within-subjects contrast suggested that this overarching main effect of ERS ratings $F(1,96) = 51.0$, $p < .001$ was linear in nature. When broken down using paired-samples t-tests, results suggested that regardless of phobia group membership, for the core disgust BAT stimuli, participants reported higher ratings of disgust than concern with contamination $t(99) = 7.1$, $p < .001$, and fear $t(99) = 11.1$, $p < .001$. Participants also reported higher ratings of concern with contamination than fear $t(99) = 3.3$, $p = .001$. Figure 2 presents a graphical depiction of these data.

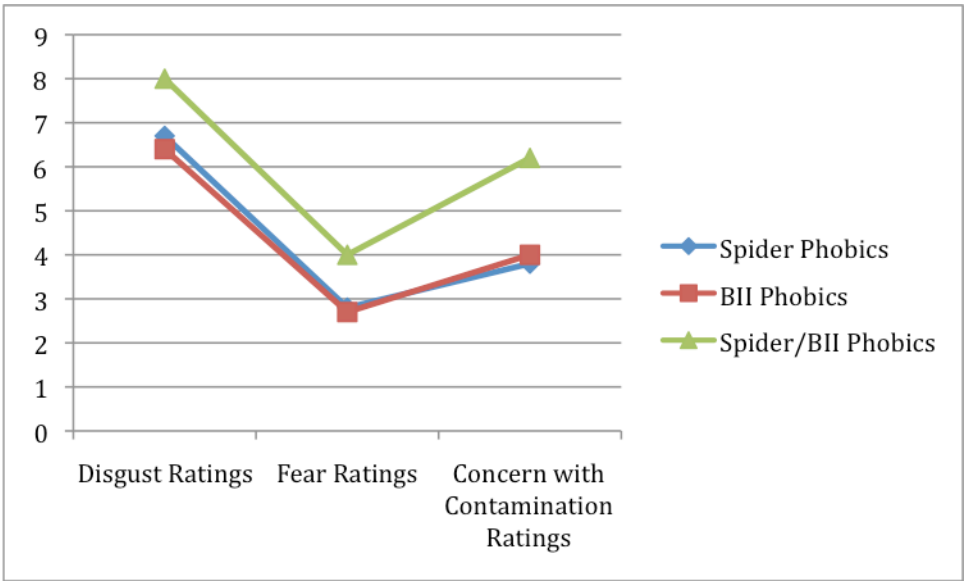

Figure 2. Core Disgust BAT's: Emotional Response Survey Ratings

Similarly, to analyze between- and within-group differences in emotional responses to stimuli from the animal reminder disgust domain, a 2 (Spider Phobia, BII Phobia) x 3 (ERS animal reminder disgust stimuli ratings, ERS animal reminder disgust fear ratings, ERS animal reminder disgust concern with contamination ratings) mixed factorial ANOVA was run to address the hypotheses that BII phobics

would exhibit stronger disgust responses to stimuli in this category than would spider phobics and non-phobic controls, and spider phobics would exhibit stronger disgust responses to these stimuli than would non-phobics. This ANOVA was also intended to address the open-ended questions regarding the extent to which disgust, fear, and concern with contamination are experienced by phobic persons when exposed to stimuli from the animal reminder disgust domain. In this model, phobia type was analyzed as a between-subjects variable and ERS ratings were analyzed as within-subjects variables.

For the ERS ratings for animal reminder disgust stimuli, there was a statistically significant within-subjects main effect of ERS scores, $F(2,99) = 30.1$, $p < .001$. There was also a statistically significant between-/within-subjects 3-way interaction of Spider Phobia x BII Phobia x ERS scores, $F(2,99) = 3.2$, $p = .04$. The 3-way interaction was broken down using one-way ANOVA's and planned orthogonal contrasts. For each of the three one-way ANOVA's, ERS ratings served as the outcome variable and experimental group served as the predictor variable. These results suggested that, for animal reminder disgust stimuli, spider phobics reported higher ratings of disgust than concern with contamination $t(23) = 4.8$, $p < .001$ and fear $t(23) = 4.0$, $p = .001$, but that this group's fear and concern with contamination ratings did not significantly differ from one another $t(23) = .48$, $p = .64$. Similarly, BII phobics reported higher ratings of disgust than concern with contamination $t(23) = 5.0$, $p < .001$ and fear $t(23) = 4.2$, $p < .001$, but their ratings of fear and concern with contamination did not significantly differ from one another $t(23) = 1.1$, $p = .30$ for animal reminder disgust stimuli.

In contrast, for the dual phobia group, there were no significant within-group differences in reported ratings of disgust, fear, and concern with contamination during exposure to animal reminder disgust stimuli, all p-values > .05. Furthermore, although, on average, dual phobics' disgust ratings for these stimuli did not differ significantly from those of spider phobics and BII phobics, $t(99) = .59$, $p = .56$, dual phobics did, on average, report significantly higher fear ratings, $t(99) = 2.3$, $p = .03$ and concern with contamination ratings, $t(99) = 2.5$, $p = .01$ than did spider phobics and the BII phobics. Figure 3 presents a graphical depiction of these data.

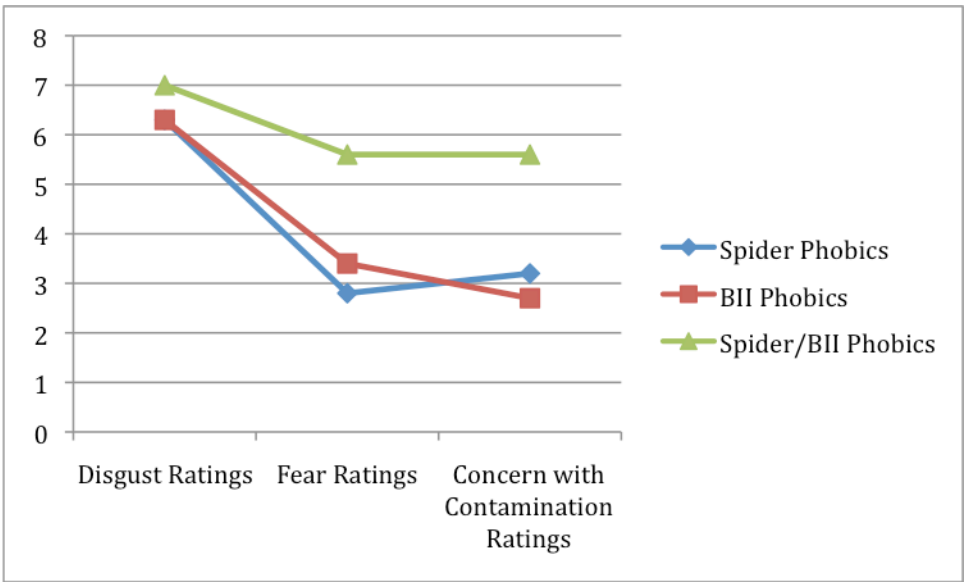

Figure 3. Emotional Response Survey Ratings for BAT's by Phobic Participants: Animal Reminder Disgust Stimuli

Contamination Paradigm: Comparisons of Group Means

Table 17 presents the mean scores and standard deviations for each experimental group on the contaminated cookie paradigm involving the spider tank and the surgical tray. To obtain these values, descriptive statistics were run for the approach scores of each participant for both contamination-based BAT's. A mixed 2x2 factorial ANOVA was run on the BAT scores for the spider tank and surgical tray paradigms, with the dummy-coded experimental group data (Spider Phobia and BII Phobia) as the between subjects predictor variable and phobic stimulus type (spider tank versus surgical tray) as the within-subjects predictor variable.

Table 17. Contaminated Cookie Task: Approach Scores Per Experimental Group for the Spider Tank and Surgical Tray (n = 106)

	Non-phobic Controls (n=28)		Spider Phobics (n=25)		BII Phobics (n=26)		Spider/BII Phobics (n=27)	
	M	sd	M	sd	M	sd	M	sd
Spider Tank: BAT Score	3.6	0.66	2.4	1.1	2.9	1.1	2.3	1.2
Surgical Tray: BAT Score	3.8	0.64	3.6	0.71	3.2	1.1	3.0	1.0

There were between-subjects main effects of Spider Phobia, $F(1,102) = 14.1$, $p < .001$ and of BII Phobia, $F(1,102) = 10.4$, $p < .001$, suggesting that persons with phobias were more reluctant than non-phobic controls to approach the contaminated cookie regardless of the phobic stimulus type (spider tank versus surgical tray). There was a main effect of phobic stimulus type, $F(1,102) = 28.2$, $p < .001$ to suggest that, regardless of phobic status (presence or absence) and phobia type (spider versus BII), participants were more willing to approach the contaminated cookie in the surgical tray than in the spider tank. There was also a statistically significant interaction between stimulus type and spider phobia, $F(1,102) = 10.8$, $p = .001$. An orthogonal contrast suggested that, on average, persons with Spider Phobia (i.e., spider phobics and spider/BII phobics) were significantly more avoidant of the contaminated cookie in the spider tank than were BII phobics $t(102) = 2.4$, $p = .02$. A paired-samples t-test suggested that, for persons with BII Phobia, there was no significant difference in their degree of avoidance of the contaminated cookie in either container, $t(25) = -1.0$, $p = .35$. The interaction between stimulus type and BII Phobia was non-significant, as was the 3-way interaction between stimulus type, Spider Phobia, and BII Phobia, all p-values > .10. Figure 4 presents a graphical depiction of the group means for the contaminated cookie paradigm.

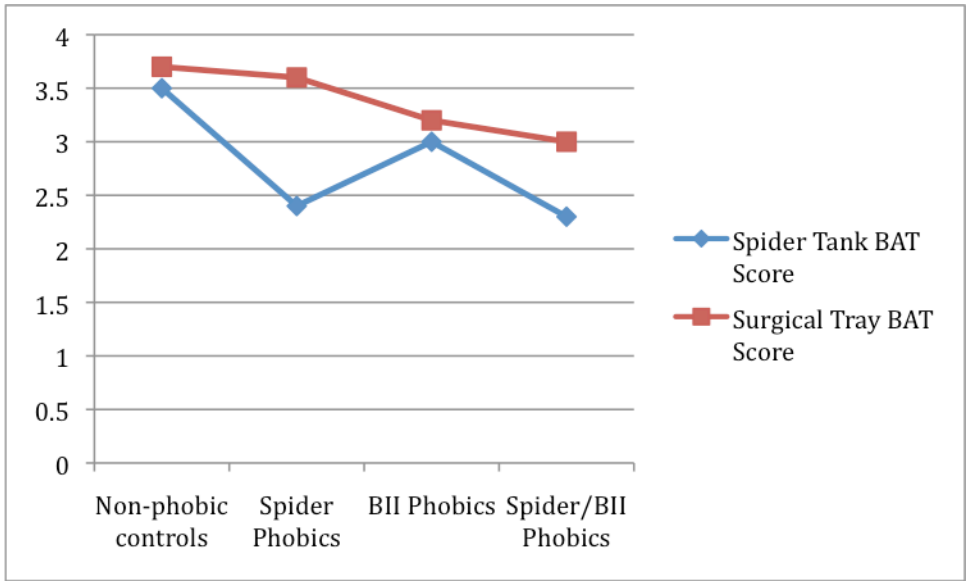

Figure 4. Group Means of BAT Scores for the Contaminated Cookie Paradigm: Spider Tank and Surgical Tray

Disgust, Fear, and Concern with Contamination as Predictors of Avoidant Behavior: Regression Analyses for Contaminated Cookie Paradigms

To address the question of the extent to which disgust, fear, and concern with contamination influenced phobic persons' avoidance of the "contaminated cookie" in the spider tank and the surgical tray BAT's, two separate, stepwise multiple regression analyses were run with the BAT scores for each paradigm (i.e., spider tank and surgical tray) as the outcome variables. For each regression, zero-centered ERS disgust, fear, and concern with contamination scores were entered as the first block of predictor variables, the dummy-coded Spider Phobia group was entered as the next predictor, and the dummy-coded BII Phobia group was entered as the last predictor. Table 18 provides the means and standard deviations of the ERS disgust, fear, and concern with contamination ratings for the spider tank and the surgical tray (prior to being zero-centered). These values were obtained by running descriptive statistics on these data for each experimental group.

Table 18. Contaminated Cookie Task: Emotional Response Ratings (n=103)

	Non-phobic Controls (n=27)		Spider Phobics (n=24)		BII Phobics (n=25)		Spider/BII Phobics (n=27)	
	M	sd	M	sd	M	sd	M	sd
Spider Tank: Disgust Ratings	.74	1.0	2.2	2.0	1.4	1.4	2.6	1.8
Spider Tank: Fear Ratings	.26	.81	2.1	2.1	.76	1.5	2.3	1.6
Spider Tank: Concern with Contamination Ratings	.56	1.1	1.4	1.8	1.0	1.5	2.0	1.8
Surgical Tray: Disgust Ratings	.52	.93	.70	1.1	1.1	1.4	1.7	1.4
Surgical Tray: Fear Ratings	.26	.71	.78	1.2	.84	1.8	1.4	1.4
Surgical Tray: Concern with Contamination Ratings	.60	.97	.87	1.5	1.0	1.4	1.9	1.9

For the spider tank BAT, ERS fear ratings were the only emotional response item that uniquely predicted avoidance of the contaminated cookie, $\beta = -.28$, $t = -2.9$, $p = .005$. Controlling for other variables, there was also a main effect of Spider Phobia, $\beta = -.26$, $t = -2.6$, $p = .009$.

These findings suggest that avoidance of the cookie in the spider tank is primarily driven by fear and by having a phobia of spiders.

For the surgical tray BAT, ERS disgust ratings were the only emotional response item that uniquely predicted avoidance of the contaminated cookie, $\beta = -.48$, $t = -5.3$, $p < .001$. Controlling for other variables, there was a main effect of BII Phobia, $\beta = -.19$, $t = -2.1$, $p = .04$. These findings suggest that avoidance of the cookie in the surgical tray is primarily driven by disgust and by having a phobia of blood/injections/injuries.

CHAPTER 7

DISCUSSION

Co-occurrence of Spider Phobia and BII Phobia

As previously mentioned, the existence of a group of participants with significant co-occurring spider and BII-related fears was unanticipated. Previous research has not included this type of comparison group, nor have research findings alluded to the systematic comorbidity of these two fears in the population of persons with Specific Phobia. In light of the interactive roles of disgust sensitivity, fear, and concern with contamination in phobias (e.g., Davey & Marzillier, 2009; Edwards & Salkovskis, cited in Davey & Marzillier, 2009; Hepburn & Page, cited in Page & Tan, 2009; Woody & Teachman, 2000), there are a couple of cognitive mechanisms that may account for the existence of this group.

The looming vulnerability to threat model of anxiety (Riskind, 1997) suggests that persons with anxiety perceive feared stimuli as "rapidly approaching" (p. 688), and anticipate that their arrival will culminate in negative outcomes. Riskind hypothesized that increasing intensities of stimulus qualities (e.g., velocity, color, sound) would contribute to one's perception of increased vulnerability to threat, and that the "point of entry" of the stimulus activates an automatic "fear script" (p. 697) that leads to a dreaded outcome. This script, coupled with a perceived inability to cope with the aversive outcome, may operate in the acquisition and maintenance of Spider and BII Phobia.

It is relatively intuitive to understand how this model may ostensibly serve as vulnerability factor in the acquisition and development of Spider Phobia, particularly given that research suggests that disgust appraisals include the perception of spreading contamination (Woody & Teachman, 2000), and spiders have been evaluated as possessing contaminating properties (e.g., Davey & Marzillier, 2009; de Jong & Peters, 2007; de Jong & Muris, 2002; Woody et al., 2005). For persons with BII Phobia, in the context of injections and blood draws, syringes approach and ultimately penetrate the body envelope, ultimately culminating in pain, distress, seeing blood products, and, in many cases, fainting. Thus, in keeping with the looming vulnerability to threat model, both phobia types involve stimuli that are objectively known to

move towards individuals. When these stimuli come into contact with phobic persons, they create distress in the form of pain, disgust, somatic symptoms in response to nervous system arousal, and/or concern with contamination. Lastly, the avoidant behavior exhibited by persons with both phobias suggests that they perceive themselves as incapable of adequately coping during encounters with their feared stimuli.

The co-occurrence of these two phobias could also be attributed to the salient and interactive fear and disgust responses that are present in each phobia (Woody & Teachman, 2000). Research suggests that the fear and disgust responses are both present—albeit to varying degrees—in animal phobias (e.g., Thorpe & Salkovsis, cited in Woody & Teachman, 2000) and in BII phobia (e.g., Tolin et al., 1997, cited in Woody & Teachman, 2000). It has also been suggested that the disgust response may magnify the fear response (Woody and Teachman 2000, cited in Page & Tan, 2009).

Findings from this study suggest that persons who have both phobias are generally more sensitive to disgust, and that persons in the dual phobia group find both disgust domains to be roughly equivalent in their disgust-eliciting properties. Thus, it stands to reason that their heightened sensitivity to stimuli from each category may intensify their fear response to spiders and blood-injection-related stimuli. This explanation is particularly compelling given that both spiders and blood/injection/injury stimuli possess sensory qualities that may render them more susceptible to becoming unconditioned fear and disgust stimuli (Woody & Teachman, cited in Sawchuk, 2009).

The greater degree of disgust sensitivity endorsed by persons with both phobia types also has direct clinical implications. Specifically, when treatment providers encounter patients with these co-occurring phobias, they must design treatments to extinguish both the fear and disgust responses that maintain the symptoms of both phobias. Given that it has been demonstrated that the disgust response decays more slowly than the fear response in exposure-based interventions (McKay, 2006; Olatunji et al., 2007; Olatunji et al., 2007; Olatunji et al., 2009; Smits et al., 2002), more time must be allowed in-session in order for disgust habituation to occur, and clinicians should gather ample information about the particular disgust-evoking qualities of the feared stimuli so as to design more effective exposure tasks (Meunier & Tolin, 2009).

Between-Group Comparisons of Overall Disgust Sensitivity

Previous research has not compared persons with Spider Phobia and persons with BII Phobia to one another on their degree of disgust sensitivity using behavioral approach paradigms, nor has previous research included a dual spider/BII phobia group for comparison on this construct. In order to make more accurate inferences regarding the similarities and differences between the two groups with regard to disgust sensitivity, it is imperative that the two groups be compared to one another using the same measures and behavioral tasks. Failure to directly compare the two groups using the same experimental paradigms compromises the generalizability of conclusions drawn about the domain specificity of disgust sensitivity for either group when members of the group are only compared to non-phobic controls.

Taken together, the disgust sensitivity survey data suggest that persons with Spider Phobia do not differ significantly from persons with BII Phobia on their overall degree of disgust sensitivity. Generally speaking, findings from these measures suggest that persons with both phobia types are more disgust sensitive than are persons with Spider Phobia and persons with BII Phobia. Although a statistically significant discrepancy between the dual phobia group and the BII Phobia group was found for only one of two disgust sensitivity scales (the DES), the dual phobia group showed a trend towards being more disgust sensitive than persons with BII Phobia on the other disgust sensitivity measure (the DS). That the dual phobia group reported significantly greater disgust sensitivity than did spider and BII phobics on the DES than on the DS suggests that the DES may be a more sensitive measure of disgust sensitivity than the DS (Olatunji & Cisler, 2009).

Given that no significant differences were found between phobic groups on the number of phobias reported in addition to Spider and BII Phobia, these findings do not necessarily suggest that the more phobias one endorses, the more disgust sensitive they are likely to be. Instead, it appears that persons who have co-morbid phobias of spiders and of blood/injections/blood draws/injuries are more sensitive to disgust-relevant stimuli than are persons who report only one of these stimuli as their primary fear trigger.

It stands to reason that if one is more sensitive to disgust—a construct that has been shown to consist of the categories of core and animal reminder domains—one might be more vulnerable to developing phobias of stimuli belonging to each category (e.g., spiders and BII-related stimuli).

Again, it bears mention that both spiders and blood/injection/injury stimuli possess sensory attributes (e.g., visual repulsiveness and the creation of uncomfortable physical sensations when in contact with the skin) that may render them more susceptible to becoming unconditioned fear and disgust stimuli (Woody & Teachman, cited in Sawchuk, 2009). Furthermore, research suggests that evaluative conditioning—a non-cognitive learning process in which a conditioned stimulus (CS) does not signal the pending approach of the unconditioned stimulus (UCS), but rather elicits the same affective response as the UCS (e.g., "like/dislike"; "good/bad", p. 821) (De Houwer, Thomas, & Baeyens, 2001, cited in Olatunji et al., 2007)—may be another mechanism that contributes to the development of these particular phobias (Olatunji et al., 2007). These "primitive" (p. 821, Martin & Levey, 1987, cited in Olatunji et al., 2007) emotional responses have been shown to mediate phobic avoidance (e.g., Olatunji et al., 2005, cited in Olatunji et al., 2007). Given that spiders and injections/venipuncture procedures/blood products/mutilations possess properties that are considered objectively repugnant by most people, it is easy to understand how, regardless of whether or not these stimuli have ever culminated in actual negative outcomes (UCRs) for persons with both phobias, these items could be easily conditioned to elicit robust aversion and avoidance in this subset of phobics given their heightened disgust sensitivity.

Domain Specificity in Disgust Sensitivity between Phobic Groups: Survey Data

As anticipated, on the DES, Spider phobics reported stronger disgust responses to items belonging to the core disgust category than did BII phobics, and BII phobics reported stronger disgust responses to items belonging to the animal reminder disgust category than did spider phobics. Furthermore, results from the DES suggest that persons with both phobia types reported greater sensitivity to items belonging to the core disgust category than did BII phobics, but that they did not differ significantly from spider phobics on their reported sensitivity to stimuli from this disgust domain. Similarly, on the DES, persons with both phobia types reported greater sensitivity to items belonging to the animal reminder disgust category than

did spider phobics, but did not differ significantly from BII phobics on their reported sensitivity to this disgust domain. These results were only partially replicated in participants' responses to the DS. The disparity in these findings between measures suggests that the DES may be a more sensitive measure of domain-specific differences in disgust sensitivity than is the DS (Olatunji & Cisler, 2009).

These findings replicate those that have been found in previous research on the domain specificity of disgust sensitivity for persons with Spider Phobia and BII Phobia. They also highlight the greater degree of disgust sensitivity of the dual phobia group. Given the consistency with which each group has been shown to be systematically more sensitive to one disgust domain than another, exposure interventions designed to extinguish the disgust response in persons with each phobia could be enhanced by incorporating stimuli from the disgust category to which they are most sensitive. Exposure interventions for persons with both phobias should likewise incorporate stimuli from both categories. The addition of disgust eliciting, non-phobia-relevant stimuli to exposure interventions in the treatment of Specific Phobia may decrease the overall disgust sensitivity of phobic persons, therein reducing their vulnerability to relapse and/or to developing additional phobias of items that commonly elicit a disgust response (e.g., vomit).

Within-Group Differences in Sensitivity to Core and Animal Reminder Disgust: Survey Data

Findings from the two disgust sensitivity survey measures used in this study suggest that persons with Spider Phobia are more sensitive to core disgust stimuli than to animal reminder disgust stimuli, but only partially support the hypothesis that persons with BII Phobia report stronger disgust responses to stimuli in the animal reminder disgust category than the core disgust category. For the dual phobia group, there were no significant differences in sensitivity to either disgust domain, suggesting that members of this group perceive stimuli from each category as roughly equivalent in their disgust-eliciting properties.

The disparity in within-group group sensitivity to animal reminder disgust stimuli across measures for the BII Phobia group may be attributed to the fact that the Disgust Emotion Scale (Walls & Kleinknecht, 1996) contains an injections and blood draws subscale, while the Disgust Scale (Haidt et al.,

1994) does not. It could be argued that the inclusion of these items on the DES increases its sensitivity in detecting domain-specific differences in disgust sensitivity. This speculation is supported by within-subjects' comparisons of means that were conducted by this researcher when items from the injections and blood draws subscale had been excluded from the DES. Specifically, when this subscale was deleted from the DES, there was no longer a statistically significant within-subjects' difference in sensitivity to core and animal reminder disgust stimuli for the BII Phobia group. Furthermore, members of the dual phobia group reported significantly greater sensitivity to core disgust items on the DES than to animal reminder disgust items when these items were excluded. When this subscale had been included in the aforementioned statistical analyses, no within-group differences in domain-specific disgust sensitivity had emerged for the dual phobia group on either disgust sensitivity survey measure.

Again, generally speaking, these findings lend support to the domain specificity of disgust sensitivity for persons with Spider Phobia and persons with BII Phobia. As previously mentioned, knowing that persons with each phobia type are differentially sensitive to stimuli from each disgust category, it would be helpful for clinicians to design hierarchies for exposure-based treatment of disgust using items from the category to which members of each phobic group are particularly sensitive. For patients with both phobias, items from both categories could be selected and incorporated into hierarchies that can then be used in exposure tasks for the purpose of extinguishing the disgust response.

Between-Group Differences in Avoidance of Core and Animal Reminder Disgust Stimuli: Behavioral Data

Taken together, findings from the data for both BAT paradigms suggest that persons with BII Phobia (i.e., BII phobics and Spider/BII phoics) are more avoidant of core and animal reminder disgust stimuli than are persons who do not have BII Phobia (i.e., spider phobics and non-phobic controls). The main effect of BII Phobia for core and animal reminder disgust stimuli suggests that avoidance of these stimuli by members of the Spider/BII phobia group may be driven by their having BII Phobia. These results suggest that, with regard to disgust-relevant stimuli, persons with BII Phobia and Spider/BII Phobia are more behaviorally avoidant than are persons with only Spider Phobia. If this is true, then clinicians

must take greater care to functionally analyze the avoidant behavior of these subsets of patients with Specific Phobia (Meunier & Tolin, 2009). Furthermore, clinicians must not overlook the contribution of the disgust response in behavioral avoidance, and should educate their patients about this emotional response such that phobia sufferers can more accurately label it as they learn to conduct functional analyses of their own behavior. Lastly, clinicians should prepare their patients for the lengthier and more frequent exposure trials that will be necessary to extinguish the disgust response.

Within-Group Differences in Avoidance of Core and Animal Reminder Disgust Stimuli: Behavioral Data

The behavioral avoidance data collected in this research suggests that phobic persons—regardless of phobia type—are roughly equally avoidant of stimuli from the core and animal reminder disgust domains. This finding is inconsistent with the domain specificity of disgust sensitivity that emerged in the survey data. Given that it remains unclear whether or not this domain specificity generalizes to phobic persons' everyday encounters with disgust-relevant stimuli, when assessing disgust sensitivity, clinicians should gather information regarding sensitivity to stimuli from both disgust categories. In this way, they can better determine which disgust triggers are most potent for each patient, and can, in turn, use this information to strategically design exposure tasks for disgust reduction in Specific Phobia.

Between- and Within-Group Comparisons of Emotional Responses During Exposure to Disgust-Relevant Stimuli: Survey Data

An additional goal of this research was to determine the degree to which phobic participants experienced disgust, fear, and concern with contamination when exposed to disgust-relevant stimuli from each disgust domain. It was found that, regardless of phobia group membership, participants systematically reported disgust as the strongest emotional response to core disgust stimuli, followed by concern with contamination, and lastly by fear. Given that the items from the core disgust domain—e.g., body products, rotting foods, and small animals that have revolting properties and/or may carry disease—have been associated with the orally based definition of disgust (e.g., Haidt et al., 1994; Rozin et al., 2000; Rozin et

al., 2009; Rozin & Fallon, 1987), it is fairly unsurprising that disgust superseded the other self-reported emotional responses, and it is equally unsurprising that concern with contamination eclipsed fear in intensity for these stimuli. Knowing that sensitivity to core disgust stimuli is likely to elicit a potent disgust response as well as concern with contamination, clinicians should assess the extent to which patients with Spider and/or BII Phobia endorse these symptoms, and should use this information to inform their treatment plans. If a purely exposure-based strategy is not completely effective in diminishing concern with contamination, then cognitive restructuring may be a beneficial adjunct in the reduction of contamination beliefs (Meunier & Tolin, 2009).

A somewhat different pattern emerged in the self-report data for the animal reminder disgust BAT's. Specifically, when exposed to stimuli from the animal reminder disgust domain, spider phobics and BII phobics reported systematically higher disgust ratings than fear and concern with contamination ratings, but neither group's within-subjects' fear and concern with contamination ratings for these stimuli differed significantly. In contrast, for the dual phobia group, ratings of disgust, fear, and concern with contamination were roughly equivalent. Furthermore, although dual phobics' disgust ratings did not differ significantly from those of spider phobics and BII phobics, the dual phobia group reported significantly higher fear ratings and concern with contamination ratings for these stimuli.

It is unclear why there was variability between- and within-groups on disgust, fear, and concern with contamination ratings for animal reminder disgust stimuli. It is possible that these discrepancies simply reflect chance variation. It is also possible that, despite demonstrating excellent internal consistency reliability, the Emotional Response Surveys may not be valid measures of the emotions that were studied in this research. It has been suggested that persons with Specific Phobia have tended to mislabel fear and disgust in both clinical and research settings, particularly if these emotions are experienced in moderate intensity (Vrana, 1993, cited in Woody & Teachman, 2000; Woody & Teachman, 2000).

If, however, animal reminder disgust stimuli elicit equally potent disgust responses, fear responses, and concern with contamination for persons with comorbid Spider and BII Phobias, then all three factors must be addressed in treatment. It should first be determined which animal reminder disgust stimuli are most evocative of these responses. These stimuli can then be used to supplement traditional

exposure-based treatment for these phobias. It can be anticipated that, of the three emotional constructs, the fear response will most quickly diminish with repeated exposure tasks. For this subset of phobic patients, however, more time and repetitions will be required both in-session and in the *in vivo* exposure tasks that are assigned for homework to ensure full habituation to disgust and contamination concern.

Concern with Contamination: Between- and Within-Group Differences in Behavioral Avoidance

Taken together, these findings suggest that persons with Spider Phobia (i.e., spider phobics and dual phobics) are more concerned about becoming contaminated by stimuli that are relevant to Spider Phobia than by stimuli that are relevant to BII phobia, whereas persons whose primary fear is of BII-related cues do not perceive stimuli that are relevant to their phobia type as having greater contaminating properties than do spider-related stimuli. The finding that spider phobic and spider/BII phobic participants were more avoidant of the cookie in the spider tank than of the cookie in the surgical tray suggests that members of these groups perceive spiders as having stronger contaminating properties than do BII-relevant stimuli.

These results may be interpreted to indicate that contamination concern is a more salient emotional component of the phobic experience for persons with Spider Phobia than for persons with BII Phobia. That said, although spiders are perceived as possessing contaminating properties, they are not known to be carriers of disease like insects such as cockroaches, mosquitoes, and ticks. Thus, the perception that spiders are capable of contaminating neutral objects within which they come into contact is somewhat irrational. When treating persons with Spider Phobia, clinicians should work to alter this belief using a combination of behaviorally based exposure tasks along with cognitive restructuring (Meunier & Tolin, 2009).

It is not entirely clear why the BII Phobia group did not exhibit a significant within-group difference in their avoidance of the contaminated cookies in each container. In part, it may be that they were less concerned about contamination by spiders than were the Spider and Spider/BII Phobia groups, as spiders are not relevant to their phobia type. It also possible, however, that all phobics' overall greater

willingness to approach the cookie in the surgical tray arose as a function of an inadvertent methodological confound. Specifically, although the script that was read to participants prior to their engaging in the contaminated cookie paradigm with the surgical tray did not state that the tray had been sterilized, it is probable that participants inferred that it had been sterilized prior to being used in the experiment. This assumption likely rendered them more willing to eat the cookie in the surgical tray than in the spider tank.

Emotional Responses as Predictors of Avoidance of "Contaminated" Neutral Stimuli

Regression results for the spider tank paradigm suggest that avoidance of the cookie in the spider tank was primarily driven by fear and by having a phobia of spiders. Similarly, regression results for the surgical tray suggest that avoidance of the cookie in the surgical tray is primarily driven by having a phobia of blood/injections/injuries, but that disgust—as opposed to fear—is the emotional response that contributes most strongly to avoidant behavior of this stimulus.

It is unsurprising that endorsement of the phobia type (i.e., spider or BII) that was congruent with the stimulus used in each contaminated cookie BAT uniquely predicted avoidance of the cookie in each respective paradigm, as each stimulus used (i.e., the spider tank and surgical tray) was intended to remind participants of their primary fear triggers (e.g., spiders and blood products/injuries). It is less clear why fear was the only self-reported emotional response that uniquely predicted avoidance of the cookie in the spider tank, whereas disgust was the only self-reported emotional response that uniquely predicted avoidance of the cookie in the surgical tray.

The emergence of only one type of emotional response as a unique predictor of avoidance of the contaminated cookie in each container may be attributed to participants' mislabeling of emotional responses, a phenomenon that has been observed in persons with phobias (Olatunji & McKay, 2009; Vrana, 1993, cited in Woody & Teachman, 2000; Woody & Teachman, 2000). Given that previous research has documented this tendency in persons with Specific Phobia, in treatment settings, clinicians should gather as much data as possible—via self-report and using behavioral approach tasks in-session—to identify the nature and intensity of the emotions and cognitions that contribute to the avoidance of phobic stimuli.

In turn, they can assist their patients in accurately labeling their emotional experiences, and can design treatment interventions to address the emotional responses and avoidant behaviors that contribute most significantly to functional impairment.

For both paradigms, mean ratings of disgust, fear, and concern with contamination were roughly equivalent within groups despite differing somewhat across groups. That mean responses were so similar across self-reported emotions during exposure to "contaminated" stimuli may suggest that the 3 items on the ERS measures for each cookie task are not measuring discrete emotions, but rather, a general "disgust experience" that consists of disgust, fear, and concern with contamination. Conversely, the within-subjects similarity of emotional responses may reflect a response bias wherein participants within each group provided roughly similar emotional response ratings for each contaminated cookie task. For this reason, the possibility that the Emotional Response Surveys may not be valid measures of the emotions studied in this research must again be considered.

Limitations

One significant limitation of this research was the inability of the disgust-relevant stimuli used in the BAT's to systematically detect domain-specific differences in disgust sensitivity between phobic groups. It is possible that the use of only 3 stimuli to represent each disgust category limited the sensitivity of this behavioral paradigm. The use of a broader selection of disgust-relevant items from each domain may have yielded the same domain-specific differences in disgust sensitivity between phobic groups that were detected on a multi-item survey with reliable and valid psychometric properties (i.e., the DES).

This limitation in the research design of this study is one that generalizes to the field of disgust research. At present, there is a dearth of research on behavioral measures of disgust sensitivity. To date, no behavioral paradigm has been established as a standard, valid, and reliable measure of disgust sensitivity. The development of a standardized behavioral measure of disgust sensitivity to be used in disgust research would help to better elucidate the relationships between disgust sensitivity and psychopathology (Olatunji & Cisler, 2009; Woody & Teachman, 2000).

As previously mentioned, a second limitation of this research lies in the possibility that an inadvertent confound influenced behavioral avoidance of the "contaminated cookie" in the surgical tray. Specifically, despite their not having been explicitly told as much, it is possible that participants inferred that the surgical tray had been sterilized prior to its use in this study. This phenomenon again highlights the importance of developing standardized behavioral measures of disgust sensitivity.

A related limitation lies in the possibility that the spider tank and the surgical tray were not comparable in their perceived contaminating properties for persons from each phobic group. Specifically, the surgical tray may not have been perceived by the BII Phobia group to be as potent a source of contamination as the spider tank was by the Spider Phobia group. That said, the non-phobic control group did not exhibit significant differences in their willingness to eat the Oreo cookie in either vessel, suggesting that, generally speaking, both stimuli were perceived by a non-phobic population as being roughly equivalent in their contaminating properties. Although these two stimuli had not been pilot-tested beforehand by non-phobic controls in the way that the disgust-relevant stimuli had been, it could be argued that the similar responses to each shown by non-phobic participants serves as a manipulation check regarding the equivalence of these stimuli in their ability to elicit contamination concerns.

A fourth limitation of this research lies in the questionable validity of the Emotional Response Surveys as measures of the emotions that were studied in this research. Although these measures demonstrated excellent reliability, it cannot be ruled out that they contributed to a response bias among participants. Specifically, in the "contaminated cookie" paradigms, participants provided roughly equivalent within-group ratings for each emotion studied. Thus, it is unclear whether or not these questions were accurate measures of each emotion.

A fifth limitation of this research is the small sample size of each phobic group. Given that research on domain-specific differences in disgust sensitivity for phobic persons is still in its beginning stages, large effect sizes were not anticipated for the experimental manipulations performed in this study. The inclusion of more phobic/fearful persons per cell would have increased the power of this study to detect small effects. Similarly, the fact that participants in the phobic groups were not homogeneous in terms of the degree of fear and interference in life functioning that they experienced as a function of their

phobias. While a substantial number of participants met full clinical criteria to merit a diagnosis of Specific Phobia, many participants reported sub-threshold symptoms. This limitation was intrinsic to the population from which data were collected (i.e., university students), and was thus unavoidable. Nonetheless, the use of pure clinically phobic samples would have likely created less within-group variability on all outcome measures, thereby increasing the power of the study.

A final limitation lies in the small number of males who participated in the study, particularly those that belonged to one of the phobic groups. The female to male ratio of spider phobics in this study was nearly twice as large as that estimated in the general population, and, contrary to the relatively equivalent gender distribution seen in the general population of persons with BII Phobia, the female to male ratio of BII phobics in this study was nearly 9:1. Therefore, it remains unclear to what extent these results can be generalized to the populations of persons with each phobia type—in particular to the male members of each phobic population. Given the logistic constraints of using a convenience sample, these discrepancies could not be avoided. In the interest of increasing the generalizability of findings from studies on Specific Phobia and disgust sensitivity, however, future research should aim to match the female to male ratio of their samples to the base-rate estimates of these ratios in the general population.

Directions for Future Research

This research employed multiple methods of data collection to measure disgust sensitivity in phobic persons, including clinical interviews, survey measures, behavioral approach tasks, and real-time self-reporting of emotional experiences. Furthermore, in contrast to previous research on domain-specific differences in disgust sensitivity among phobic persons, this study used a dual phobic sample to which to compare spider and BII phobics on this construct. So as to better understand the disgust construct, future research should continue to include multiple measures of disgust sensitivity. Given the questionable nature of the validity of the self-report measures of emotional responses that were used in this study, future research would benefit from including more objective physiological measures of fear and disgust responses (Olatunji & Cisler, 2009; Woody & Teachman, 2000). Lastly, it is widely recognized that the widespread use of university student samples in the study of disgust sensitivity limits the external validity of studies in

this area. To remedy this issue, future studies on disgust sensitivity in phobic persons should endeavor to measure this construct in clinical settings in which the population sampled would best represent persons with diagnoses of Specific Phobia (Olatunji & Cisler, 2009).

APPENDIX

QUESTIONNAIRE

Demographic Survey

Age:

Sex:

Ethnicity: (circle one)

African American/Black American Indian/Alaska Native Asian American

European American/White Hispanic/Latino/a Middle Eastern

Biracial/Multi-racial Other

Years of education:

Have you ever received treatment for a phobia in the past?

Are you currently being treated for a phobia?

Please list any psychiatric medications that you currently taking:

Spider Phobia Questionnaire (SPQ)

Answer each of the following statements either True or False as you feel they generally apply to you. If the statement is true most of the time or mostly true for you, you should answer **true**. If it is mostly false or false most of the time, mark it **false**. Indicate your answer by placing a mark (**X**) in the appropriate column.

TRUE	FALSE	
_____	_____	1. I avoid going to parks or on camping trips because there may be spiders around.
_____	_____	2. I would feel some anxiety holding a toy spider in my hand.

_____ _____ 3. If a picture of spider crawling on a person appears on the screen during a motion picture, I turn my head away.

_____ _____ 4. I dislike looking at pictures of spiders in a magazine.

_____ _____ 5. If there is a spider on the ceiling over my bed, I cannot go to sleep unless someone kills it for me.

_____ _____ 6. I enjoy watching spiders build webs.

_____ _____ 7. I am terrified by the thought of touching a harmless spider.

_____ _____ 8. If someone says that there are spiders anywhere about, I become alert and on edge.

_____ _____ 9. I would not go down to the basement to get something if I thought there might be spiders down there.

_____ _____ 10. I would feel uncomfortable if a spider crawled out of my shoe as I took it out of the closet to put it on.

_____ _____ 11. When I see a spider, I feel tense and restless.

_____ _____ 12. I enjoy reading articles about spiders.

_____ _____ 13. I feel sick when I see a spider.

_____ _____ 14. Spiders are sometimes useful.

_____ _____ 15. I shudder when I think of spiders.

_____ _____ 16. I don't mind being near a harmless spider if there is someone there in whom I have confidence.

_____ _____ 17. Some spiders are very attractive to look at.

_____ _____ 18. I don't believe anyone could hold a spider without some fear.

_____ _____ 19. The way spiders move is repulsive.

_____ _____ 20. It wouldn't bother me much to touch a dead spider with a long stick.

_____ _____ 21. If I came upon a spider while cleaning the attic I would probably run.

_____ _____ 22. I'm more afraid of spiders than any other animal.

_____ _____ 23. I would not want to travel to Mexico or Central America because of the greater prevalence of tarantulas.

_____ _____ 24. I am cautious when buying fruit because bananas may attract spiders.

_____ _____ 25. I have no fear of non-poisonous spiders.

_____ _____ 26. I wouldn't take a course in biology if I thought I might have to handle live spiders.

_____ _____ 27. Spider webs are very artistic.

_____ _____ 28. I think that I'm no more afraid of spiders than the average person.

_____ _____ 29. I would prefer not to finish a story if something about spiders was introduced into the plot.

_____ _____ 30. Even if I was late for a very important appointment, the thought of spiders would stop me from taking a shortcut through an underpass.

_____ _____ 31. Not only am I afraid of spiders, but millipedes and caterpillars make me feel anxious.

MBPI

Please read each statement carefully and rate the extent to which the following statements are typical of you. Record your choices on the answer sheet provided.

0----------1----------2----------3----------4

Very Slightly or Not at All	**A Little**	**Moderately**	**Quite a Bit**	**Extremely**

1. I am afraid of the sight of my own blood.	0	1	2	3	4
2. I avoid seeing others receive injections.	0	1	2	3	4
3. I faint when I go to the hospital.	0	1	2	3	4
4. I feel disgusted when I see others get injured.	0	1	2	3	4
5. I worry about the possibility of seeing the blood of others.	0	1	2	3	4
6. I avoid situations in which I might get injured.	0	1	2	3	4
7. I am afraid to receive injections.	0	1	2	3	4
8. I avoid going to the hospital.	0	1	2	3	4
9. I feel disgusted when I receive injections.	0	1	2	3	4
10. I faint when I see others get injured.	0	1	2	3	4
11. I am afraid to see others in the hospital.	0	1	2	3	4
12. I feel disgusted when I see the blood of others.	0	1	2	3	4

13. I worry about the possibility of having to go to the hospital.	0	1	2	3	4
14. I worry about the possibility of seeing others receive injections.	0	1	2	3	4
15. I faint when I see others receive injections.	0	1	2	3	4
16. I feel disgusted when I see my own blood.	0	1	2	3	4
17. I avoid seeing others in the hospital.	0	1	2	3	4
18. I am afraid to get injured.	0	1	2	3	4
19. I worry about the possibility of seeing others get injured.	0	1	2	3	4
20. I faint when I see the blood of others.	0	1	2	3	4
21. I faint when I receive injections.	0	1	2	3	4
22. I feel disgusted when I am in a hospital.	0	1	2	3	4
23. I am afraid to see others get injured.	0	1	2	3	4
24. I am afraid of the sight of the blood of others.	0	1	2	3	4
25. I worry about the possibility of having to see others in the hospital.	0	1	2	3	4
26. I avoid looking at the blood of others.	0	1	2	3	4
27. I feel disgusted when I see others in the hospital.	0	1	2	3	4
28. I avoid receiving injections.	0	1	2	3	4
29. I feel disgusted when I get injured.	0	1	2	3	4
30. I worry about the possibility of seeing my own blood.	0	1	2	3	4
31. I avoid situations in which I might see others get injured.	0	1	2	3	4
32. I feel disgusted when I see others receive injections.	0	1	2	3	4
33. I faint when I see my own blood.	0	1	2	3	4
34. I am afraid to go to the hospital.	0	1	2	3	4
35. I worry about the possibility of having to receive injections.	0	1	2	3	4
36. I worry about the possibility of getting injured.	0	1	2	3	4
37. I faint when I see others in the hospital.	0	1	2	3	4
38. I am afraid to see others receive injections.	0	1	2	3	4

39. I faint when I get injured.	0	1	2	3	4
40. I avoid looking at my own blood.	0	1	2	3	4

Disgust Scale (DS)

Part I: Please circle true or false	*Scaling*	
1. I might be willing to try eating monkey meat, under some circumstances.	False	True
2. It bothers me to see someone in a restaurant eating messy food with his fingers.	False	True
3. It would bother me to see a rat run across my path in a park.	False	True
4. Seeing a cockroach in someone else's house doesn't bother me.	False	True
5. It bothers me to hear someone clear a throat full of mucus.	False	True
6. If I see someone vomit, it makes me sick to my stomach.	False	True
7. I think it is immoral for someone to seek sexual pleasure from animals.	False	True
8. It would bother me to be in a science class, and see a human hand preserved in a jar.	False	True
9. It would not upset me at all to watch a person with a glass eye take the eye out of the socket.	False	True
10. It would bother me tremendously to touch a dead body.	False	True
11. I would go out of my way to avoid walking through a graveyard.	False	True
12. I never let any part of my body touch the toilet seat in a public washroom.	False	True
13. I probably would not go to my favorite restaurant if I found out that the cook had a cold.	False	True
14. 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.	False	True
15. It would bother me to sleep in a nice hotel room if I knew that a man had died of a heart attack in that room the night before.	False	True

Part II: Please rate how disgusting you would find the following experiences

16. If you see someone put ketchup on vanilla ice cream and eat it.	Not	Slightly	Very
17. You are about to drink a glass of milk when you smell that it is spoiled.	Not	Slightly	Very
18. You see maggots on a piece of meat in an outdoor garbage pail.	Not	Slightly	Very
19. You are walking barefoot on concrete and step on an earthworm.	Not	Slightly	Very
20. You see a bowel movement left unflushed in a public bathroom.	Not	Slightly	Very
21. While you are walking through a tunnel under a railroad track, you smell urine.	Not	Slightly	Very
22. You hear about an adult woman who has sex with her father.	Not	Slightly	Very
23. You hear about a 30-year-old man who seeks sexual relationships with 80-year-old women.	Not	Slightly	Very
24. You see someone accidentally stick a fishing hook through his finger.	Not	Slightly	Very
25. You see a man with his intestines exposed after an accident.	Not	Slightly	Very
26. Your friend's pet cat dies and you have to pick up the dead body with your bare hands.	Not	Slightly	Very
27. You accidentally touch the ashes of a person who has been cremated.	Not	Slightly	Very
28. You take a sip of soda and realize that you drank from the glass that an acquaintance of yours had been drinking from.	Not	Slightly	Very
29. You discover that a friend of yours changes underwear only once a week.	Not	Slightly	Very
30. A friend offers you a piece of chocolate shaped like dog-doo.	Not	Slightly	Very
31. As part of a sex education class, you are required to inflate a new lubricated condom, using your mouth.	Not	Slightly	Very

DISGUST EMOTION SCALE

The following situations are known to cause some people to experience disgust, revulsion, or repugnance. Please rate for each situation listed, how much **disgust** or **repugnance** you would experience if you were exposed to that situation at this time.

Use the following scale to evaluate each situation and place a mark (X) in the space corresponding to how much disgust or repugnance you would experience in the listed situation.

0 = **NO disgust** or **repugnance** at all
1 = **MILD disgust** or **repugnance**
2 = **CONSIDERABLE disgust** or **repugnance**
3 = **INTENSE disgust** or **repugnance**
4 = **EXTREME disgust** or **repugnance**

HOW MUCH DISGUST OR REPUGNANCE WOULD YOU EXPERIENCE FROM BEING EXPOSED DIRECTLY TO:		0	1	2	3	4
1.	A slice of bread with green mold on it……..	____	____	____	____	____
2.	The smell of a public rest room……	____	____	____	____	____
3.	Having blood drawn from your arm……..	____	____	____	____	____
4.	Observing an amputation operation……..	____	____	____	____	____
5.	An alley cat……	____	____	____	____	____
6.	A glass of spoiled milk…….	____	____	____	____	____
7.	The smell of human feces…….	____	____	____	____	____
8.	A snake…….	____	____	____	____	____
9.	A bottle of your blood……..	____	____	____	____	____
10.	The mutilated body of a dog that had been run over by a car……	____	____	____	____	____
11.	The smell of vomit……	____	____	____	____	____
12	A package of hamburger turned green with age…….	____	____	____	____	____
13.	The sight of a large slug……	____	____	____	____	____
14.	Receiving a hypodermic injection in the arm……..	____	____	____	____	____
15.	A dead person unknown to you……	____	____	____	____	____

16.	A pile of rotting lettuce…….	____	____	____	____	____
17.	The smell of a city dump……..	____	____	____	____	____
18.	People injured in an auto accident……	____	____	____	____	____
19.	Handling a hypodermic needle…….	____	____	____	____	____
20.	An old cup of coffee with mold in it……	____	____	____	____	____
21.	The sight of a house mouse…….	____	____	____	____	____
22.	Photos of wounded soldiers…….	____	____	____	____	____
23.	Receiving an anesthetic injection in the mouth…….	____	____	____	____	____
24.	A piece of rotting steak……	____	____	____	____	____
25.	The smell of body odor……	____	____	____	____	____
26.	A sewer rat……..	____	____	____	____	____
27.	A decaying animal on the road……	____	____	____	____	____
28.	The smell of urine……	____	____	____	____	____
29.	The sight of a spider……	____	____	____	____	____
30.	A small vial of your blood……..	____	____	____	____	____

(Kleinknecht, 8/1995)

Modified Differential Emotions Scale

Please indicate the extent to which you feel each of the following emotions ***right now***. Rate the strength of your emotions on the following 9-point scale, where 0 = "DO NOT FEEL THE SLIGHTEST BIT OF THE EMOTION" and 8 = "THE MOST I HAVE EVER FELT IN MY LIFE." Circle the number which best describes the greatest amount of each emotion you feel ***right now***. Please complete all three categories.

RIGHT NOW, I FEEL:

1.) Disgusted, nauseated, repulsed	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8
2.) Fearful, scared, afraid	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 – 8
3.) Like I might be contaminated, infected, or tainted	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8

Modified Differential Emotions Scale

Please described the emotional reaction that you had during this task involving the Oreo cookie. Use the following 9-point scale, where 0 = "DID NOT FEEL THE SLIGHTEST BIT OF THE EMOTION" and 8 = "FELT THE MOST I HAVE EVER FELT IN MY LIFE." Circle the number which best describes the greatest amount of each emotion you felt at any time during this task. Please complete all three categories.

DURING THIS TASK, I FELT:

1.) Disgusted, nauseated, repulsed	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8
2.) Fearful, scared, afraid	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 – 8
3.) Like I might be contaminated, infected, or tainted	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 – 8

Modified Differential Emotions Scale

Please indicate your emotional response(s) to the stimulus that you just viewed and handled. Rate the strength of your emotional reaction to the stimulus on the following 9-point scale, where 0 = "DID NOT FEEL THE SLIGHTEST BIT OF THE EMOTION" and 8 = "THE MOST I HAVE EVER FELT IN MY LIFE." Circle the number which best describes the greatest amount of each emotion you felt at any time while looking at the stimulus. Please complete all three categories.

WHILE LOOKING AT AND HANDLING THE STIMULUS, I FELT:

1.) Disgusted, nauseated, repulsed	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8
2.) Fearful, scared, afraid	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 – 8
3.) Like I might be contaminated, infected, or tainted	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8

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