FEAR, DISGUST, AND AVOIDANCE AMONG BLOOD-INJECTION-INJURY PHOBICS EXPOSED TO THREATENING STIMULI

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ABSTRACT

The current study examined the role of fear, disgust, and avoidance of injection and animal reminder disgust stimuli among BII phobics following exposure to fearful and disgusting images. Participants were separated into the Injection, Mutilation, or Control Group, and would view injection, mutilation, or flower images, respectively. Participants engaged in a hypodermic needle BAT and severed deer leg BAT prior to viewing the images and again following exposure. It was hypothesized that fear is most closely linked to the injection stimuli and would decrease with exposure, while disgust is most closely linked to the mutilation stimuli and would decrease with exposure. The hypotheses were not supported and there was no significance found between groups. However, as expected, the phobic group was significantly more afraid of and disgusted with BII relevant stimuli than non-phobics, although the severed deer leg was found to be much more aversive than the hypodermic needle.

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INTRODUCTION

The Construct of a Specific Phobia

Specific phobia is characterized by a marked and persistent fear of a specific object or situation that is excessive and unreasonable (American Psychiatric Association, 2000). In addition, the individual recognizes that their fear of the stimulus is irrational. Exposure to the phobic stimulus typically provokes an immediate anxiety response; in some cases, this response may take the form of a situationally bound panic attack. The diagnosis of a specific phobia is appropriate only if the avoidance, anxious anticipation, or fear of encountering the phobic stimulus interferes significantly with the person's everyday functioning (APA, 2000). Epidemiological studies have shown that an estimated 10% - 12.5% of the people in the United States meet diagnostic criteria for a specific phobia at some point during their lifetime (Olatunji, Sawchuk, Moretz, David, Armstrong, & Ciesielski, 2010; Kessler, Berglund, Demler, Jin, & Walters, 2005).

Blood-Injection-Injury (BII) Phobia

Blood-Injection-Injury phobia is a subtype of a specific phobia that is defined by a fear being cued by seeing blood or an injury, or receiving an injection or other invasive medical procedure (APA, 2000). Like all other specific phobias, those suffering from Blood-Injection-Injury phobia go to great lengths to avoid the feared stimuli, which interferes with one's daily functioning (APA, 2000; Ritz, Meuret, & Ayala, 2010). However, there are grave consequences for BII phobics attempting to avoid the fearful stimuli. Ko (1994) points out individuals will go so far as to refuse

emergency surgery, blood transfusions, and insulin injections. Since BII phobics try to avoid all medical settings, they are less likely to seek psychological treatment, unlike those with other specific phobias.

Although BII phobia is classified as a phobic disorder, one characteristic that sets it apart from most other phobias and anxiety disorders is the likelihood of fainting. Between 30% and 33% of individuals exposed to BII stimuli reported having fainted or almost fainted (Kleinknecht, Thorndike, & Walls, 1996; Kleinknecht, Kleinknecht, & Thorndike, 1997). However, it is important to note that those who experience some faint symptoms *without* loss of consciousness account for 30% - 33% of those classified as "fainters" (Kleinknecht, et al., 1997). In addition, numerous studies have found that women report elevations in BII fears and tend to experience more fainting symptoms than men (Kendlar, Jacobson, Myers, & Prescott, 2002; Kleinknecht, 1988; Kleinknecht, et al., 1997). The emotional fainting, as identified by Page (2001), is a type of fainting that can be described as vasovagal syncope, a term that describes all fainting as the body's reaction to certain triggers. Vasovagal syncope can be triggered by events of an emotional (e.g., blood) and nonemotional nature (e.g., body tilt, anticipation of electric shock; Thyer & Curtis, 1985).

Specific Phobia: Fear Versus Disgust

Fear and disgust have been suggested to be two separate emotions. Fear is believed to be associated with a physiological reaction in the sympathetic system, characterized by an increase in heart rate, blood pressure, respiration, and sweating (Olatunji Connolly, & David, 2008). On the other hand, disgust is associated with

arousal in parasympathetic activity, resulting in decreased heart rate, a drop in one's body temperature, and reduced salivation (Tolin, 1999; Olatunji, Sawchuk, de Jong, & Lohr, 2006). The emotion of fear involves escape and avoidance (Mowrer, 1960) and perceived threats of being attacked and harmed (Hugdahl & Öst, 1985), as opposed to disgust, which serves to prevent contact with or oral incorporation of an undesirable stimulus (Tolin, 1999).

Two types of disgust have been heavily researched in the BII literature: animal reminder disgust and core disgust (Olatunji, Connolly, & David, 2008; Rozin, Haidt, & McCauley, 2008). Core disgust elicitors are characterized by an actual or perceived threat of oral incorporation and a reactive sense of offensiveness, which is often associated with small animals (especially those related to garbage), such as spiders or snakes, and anything related to these animals, such as urine, feces, or food (Rozin et al., 2008; Olatunji, Connolly, & David, 2008). Animal reminder disgust elicitors consist of reminders of our own mortality and anything that reminds us that we are animals, this is most closely associated with blood, injuries, bodily punctures, and mutilations (Rozin & Fallon, 1987; Olatunji, Connolly, & David, 2008). Becker argues that the most important threat to the psyche is death (1973). Rozin, Haidt, and McCauley explain that all humans are animals, but that only human animals know they are inevitably going to die, and only humans feel the need to repress this threat (2008). Body envelope violations and death produce disgust because they are uncomfortable reminders of our animal vulnerability (Rozin Haidt, & McCauley, 2008). Research has shown that BII phobics report greater disgust towards animal

reminder stimuli than core disgust stimuli (Olatunji, Smits, Connolly, Willem, & Lohr, 2007; Olatunji, Williams, Sawchuk, & Lohr, 2004).

The Happiness Hypothesis introduced by Haidt states that individuals are motivated by the fear of death (2006). It is known that all humans are going to die, so individuals go to great lengths to construct systems of meaning that convince these individuals that their lives have more meaning than those of the animals that die around them. The Happiness Hypothesis states that a sudden flash of fear may make you extra vigilant for additional threats (Haidt, 2006). Related to BII phobia, when a phobic individual is exposed to a fearful situation or stimuli (i.e., potential blood draw, mutilation), they suddenly see everything through a filter that only further increases the negative emotion.

Additionally, those that fear Blood-Injection-Injury stimuli and situations may be a result of an evolutionary and learned response. Seligman's Preparedness Theory (1971) states that individuals that fear threats related to survival will live longer and have less difficulty reproducing. For example, it is easier to acquire a fear of spiders or heights, rather than a hamster, because spiders and heights are both potentially life threatening. Consequently, the innate predisposition to fear these threatening stimuli, in particular, becomes an adaptive human trait (Seligman, 1971).

The role of fear and disgust in BII phobia has been examined closely in recent research. Koch, O'Neill, Sawchuk, and Connolly (2002) requested participants examine two types of pictorial stimuli that depict mutilation images (animal reminder disgust), insects (core disgust) and flowers (neutral stimuli). Upon completion of exposure to the pictorial stimuli, participants engaged in four behavioral tasks (bloody

gauze, a severed deer leg, a cockroach, and a worm), which consisted of five steps ranging from looking at the stimulus to touching the stimulus. Upon completion of the BAT, the participant was asked how willing they were to eat a cookie after it had come into brief contact with the threat-relevant stimulus they were exposed to. Results of the study showed that BII phobics expressed significantly greater fear and disgust toward phobia-relevant pictures and BAT stimuli, with disgust being the stronger of the two. Additionally, non-phobics demonstrated less avoidance of the cookie task, confirming the sensitivity that BII phobics have regarding fear of contamination.

Empirical Evidence of the Influence of Fear and Disgust in BII Phobia

Sawchuk, Lohr, Westendorf, Meunier, and Tolin (2002) examined emotional responding toward pictures of spiders, surgical procedures, and two categories of general disgust elicitors (rotting food and body products) among spider phobics, BII phobics, and controls. Spider phobics reported greater fear than disgust when rating spider photos, whereas BII phobics rated the surgical procedure photos to be more disgusting than fearful. Although Sawchuk and colleagues did rate fear and disgust among BII phobics exposed to animal reminder disgust pictorial stimuli, it would be beneficial to examine whether or not the exposure to the disgust relevant pictorial stimuli would have an effect on the fear and/or disgust associated with actual blood-injection-injury stimuli.

Connolly, O'Neill, Flessner, and Olatunji (2006) investigated the relationship between fear, disgust, and fainting symptoms in BII fearful individuals. Participants were classified as either BII fearful or non-BII fearful and were exposed to fear

relevant (body mutilation) and irrelevant (spider, contaminated food) pictorial stimuli. Following exposure to pictorial stimuli, participants were also presented with in vivo fear relevant (mutilation) and fear irrelevant stimuli (spider, contaminated food). As predicted, BII fearful participants reported more fear, disgust, and fainting symptoms toward fear relevant pictorial stimuli and in-vivo stimuli than non-fearful individuals. Connolly and colleagues suggested using other categories of stimuli (injections) in order to properly activate relevant fear networks.

Olatunji, Lohr, Sawchuk, and Patten (2007) discovered the important role that fear plays in this specific phobia by comparing responses of fear and disgust among BII phobic individuals and non-phobic individuals after exposure to BII-related pictorial stimuli that contained images of blood, mutilation, and injections. The results indicated that phobics reported significantly more contamination fears (fears of being dirtied or contaminated) than non-phobic participants, even when controlling for anxiety. These contamination fears, although considered fears, also relate closely to disgust. In addition, BII phobics self-report significantly more fear on all affective dimensions than non-phobics to BII-related stimuli, demonstrating the important role of fear in BII phobia.

A study conducted by Olatunji, Smits, Connolly, Willems, and Lohr (2007) examined the relationship between fear and disgust before, during, and after exposure to threat relevant stimuli in BII phobics. The researchers requested that BII fearful participants participate in 30 minutes of in vivo exposure to threat relevant stimuli. The BAT consisted of 10 tasks of increasing difficulty ranging from standing 15 feet from a display consisting of threat-relevant materials (hypodermic needle, syringe,

alcohol prep wipe, latex medical glove, and a mannequin dressed in a hospital gown with a tourniquet on its left arm) to injecting a mannequin with a hypodermic needle. Olatunji, and colleagues were led to believe these threat-relevant stimuli are considered more fearful than disgusting (2007). Throughout the exposure, their fear and disgust levels were repeatedly assessed to examine if there was a decline in either emotion. Results indicated that exposure led to declines in both fear and disgust; however, the decline in fear was significantly greater than that for disgust, which leads the researchers to assume that disgust may be more resistant to extinction than fear in BII phobia. Another explanation for the significant decline in fear would be the type of stimuli used; threat relevant stimuli is most closely related to fear, which may be the reason disgust did not significantly decline. The current study not only exposes the participant to threat relevant stimuli, but also to animal reminder disgust stimuli, which is important because prior research suggests that there may be differences in the emotional mechanisms that contribute to avoidance of blood and injury stimuli versus that of injection stimuli (Öst, 1992).

Olatunji, Connolly, and David (2008) also conducted a similar experiment to Koch et al. (2002), when they administered a BAT exposing both BII fearful and non-fearful to a severed deer leg (an animal disgust elicitor) and a live tarantula (a core disgust elicitor). They were also asked to participate in the contaminated cookie task, asking participants to touch with their finger, touch to their lips, and then take a bite of the contaminated cookie, which had come into contact with either the severed deer leg or tarantula; fainting symptoms were recorded, as well. For the high BII fearful group, self-reported fainting symptoms were more pronounced during the blood-

injury and spider BAT than during the cookie BAT. Mutilation disgust was significantly associated with self-reported fainting symptoms on the BII task among the high BII fearful group; however, this relationship was not significant when controlling for BII-related fear severity. Results show that individuals that reported high levels of disgust were more likely to engage in behavioral avoidance of the stimuli than those that appear to have reported less disgust.

Olatunji, Lohr, Smits, Sawchuk, and Patten (2009) predicted that the use of neutral facial expressions paired with BII-relevant pictorial stimuli (blood, injections, and injury) would lead phobic participants to evaluate the neutral expressions as more fearful and disgusting than the non-phobics. Results indicate that pre- to posttest increases in fear ratings were only slightly greater for phobics compared to non-phobics. However, increases in disgust from pre- to posttest were much greater for phobics compared to non-phobics. In addition, increases in disgust from pre- to posttest were also greater for neutral expressions that were paired with threat-relevant stimuli compared to neutral expressions not paired with threat-relevant stimuli among phobics. Consistent with other research, BII phobics reported greater disgust sensitivity than non-phobic participants even after controlling for between group differences in anxiety symptoms. Olatunji and colleagues noted that measuring approach/avoidance of fear and disgust would be beneficial to further understand the association between the two emotions.

A study conducted by Olatunji, Ciesielski, Wolitzky-Taylor, Wentworth, and Viar (2012) examined the impact of disgust activation on changes in fear and disgust during repeated video exposure to blood draws among BII phobics. Individuals

classified as phobics were assigned to either disgust (vomit) activation videos or neutral (waterfall) activation videos. After viewing the videos, the participants were then exposed to 14 videotaped blood draws, followed by a BAT consisting of exposure to a threat-relevant stimulus (hypodermic needle and syringe). The BAT was made up of four steps, the first step was to look at the hypodermic needle and the fourth step was to hold the sharp tip of the hypodermic needle close against the skin on their arm. Of the 14 videotaped blood draws, the first and last videos were the same. When comparing disgust and fear ratings between the first and last blood draw clips, it was revealed that both emotions were significantly reduced among both the disgust activation video group and the neutral activation video group. Olatunji and colleagues found that those in the disgust activation group showed greater fear intercept during exposure to the hypodermic needle than those in the neutral activation group. This finding is in agreement with recent research, which shows that experiencing disgust does have a causal influence in some anxious psychopathologies and phobias; this may be mediated by experienced disgust facilitating the experience of fear and anxiety (Davey, MacDonald, & Brierley, 2008; Muris, Mayer, Huijding, & Konings, 2008). Olatunji and colleagues noted the limitation that accompanies the use of videos is that it may only allow for the representation of one specific stimulus and cannot easily be generalized among phobics. While the current study does use pictorial stimuli, it also uses actual BII relevant stimuli, which will allow a more accurate measurement of both fear and disgust.

The Present Study

There have been multiple studies addressing the role that fear and disgust play in BII phobia through exposing participants to only pictorial stimuli or BII relevant stimuli. However, little is known about the effect that being exposed to pictorial stimuli has on the fear and disgust associated with exposure to actual BII relevant stimuli. Exploration of the relationship between BII relevant pictorial stimuli and actual BII stimuli may allow for more diverse Blood-Injection-Injury phobia treatment options.

Research has shown that disgust is easily acquired, but not easily extinguished (Rozin & Fallon, 1987; Olatunji, Smits, Connolly, Willems, & Lohr, 2007) thus the potential role of disgust in BII phobia does raise the question as to whether exposure that reduces fear among the BII-fearful can also reduce disgust. Previous research has examined the solitary role of fear or disgust upon exposure to BII relevant stimuli, but never have they been examined alongside one another. Olatunji, Smits, Connolly, Willems, and Lohr (2007) exposed participants solely to fearful (injection) stimuli, while Olatunji, Connolly, and David (2008) exposed participants only to animal-reminder disgust (blood-injury) stimuli. Additionally, Sawchuk and colleagues (2002) rated fear and disgust among BII phobics exposed to only animal reminder disgust pictorial stimuli, they did not examine whether or not exposure to the disgusting pictorial stimuli would have an impact on the fear and/or disgust associated with actual blood-injection-injury stimuli.

The current study examines the intensity of fear and disgust using self-report measures and behavioral tasks when BII phobics are exposed to either disgusting

pictorial stimuli or fearful pictorial stimuli and whether exposure to either set of images will have an affect on performance of a Behavioral Avoidance Task consisting of an injection stimulus (hypodermic needle) and animal reminder disgust stimulus (severed deer leg). Hypotheses are as follows: (1) phobics exposed to the injection images will experience significantly less avoidance, fear, and disgust of the hypodermic needle in BAT-2 and experience significantly less fear of the severed deer leg BAT-2, (2) phobics exposed to the mutilation images will experience significantly less avoidance, fear, and disgust of the severed deer leg in BAT-2 and experience significantly less disgust of the hypodermic needle BAT-2, and (3) phobics will experience no significant change in avoidance, fear, and disgust to either the hypodermic needle or the severed deer leg in BAT-2 if exposed to the flower images. Researchers did expect to see an insignificant decrease in fear, disgust, and avoidance among all participants due to repeated exposure to the stimuli. Since the injection images are hypothesized to produce more fear than disgust, there is expected to be a decline in fear when participating in the severed deer leg BAT-2. In addition, the mutilation images are hypothesized to produce more disgust than fear, so there is an expectation that a decline in disgust while participating in the hypodermic needle BAT-2 will occur.

CHAPTER 2

METHOD

Participants

The sample includes a total of 104 participants (86 females, 18 males), 40 of which are classified as being BII phobic and 64 of which are classified as non-phobic controls. Participants are made up of mostly Caucasian (72.1%) females (82.7%) with an average age of 20.5. Participants that were interested in the current study and 18 years of age or older were required to complete the Mutilation Questionnaire and Injection Phobia Scale – Anxiety online to determine whether they were BII fearful. They were then administered the Specific Phobia section of the Anxiety Disorders Interview Schedule (ADIS) to determine whether they were classified as BII phobic or non-phobic. The participants were recruited from various undergraduate psychology classes at American University and through flyers posted on American University's campus. Participants were offered 1.0 research credit towards their psychology class or $5 cash. The participants were not eligible for the study if he/she has ever or is currently receiving treatment for a specific phobia because of their familiarity with BII treatment, such as exposure.

Prior to collecting data, a power analysis was conducted and the researchers had a goal of 120 participants, 60 of which would be phobics. Unfortunately, there were a total of 25 participants that were removed from the study. Phobics that completed all 5 of the Hypodermic Needle BAT-1 with fear less than 50 and phobics that completed all 5 of the Severed Deer Leg BAT-1 with disgust less than 50 were removed. Non-phobics that rated their fear as 50 or more during the Hypodermic

Needle BAT-1 and non-phobics that rated their disgust as 100 during the Severed Deer Leg BAT-1 were removed from the study. These phobics were removed due to their low level of fear and/or disgust and the non-phobic individuals were removed due to their high level of fear and/or disgust.

Measures

Mutilation Questionnaire

The Mutilation Questionnaire (MQ, Kleinknecht & Thorndike, 1990) contains thirty true-false items, which are designed to measure the fear related to blood, injury, or mutilation. Past research has found that the MQ has proven to be a reliable assessment of fear and aversion toward blood, injury, and mutilation stimuli (Olatunji et al., 2008; Koch et al., 2002). Higher scores indicate increased BII symptomology. Schienle, Schafer, Walter, Stark, and Vaitl (2005) found the average scores for BII phobic participants was 23.09 with a standard deviation of 3.76. For non-phobic individuals, the average score is 8.25 with a standard deviation of 4.30. The MQ has been shown to have internal consistency (K-R20) coefficients ranging from 0.75 to 0.85 (Kleinknecht & Thorndike, 1990). The MQ has an alpha coefficient of .883 in the current study.

Injection Phobia Scale – Anxiety

The Injection Phobia Scale – Anxiety (IPS-Anx, Öst, Hellstrom, & Kaver, 1992) is an 18-item, 5-point Likert scale measurement in which individuals rate their degree of anxiety if they were to experience a variety of injection and/or venipuncture procedures. The scale ranges from 0 = “no anxiety” to 4 = “maximum anxiety.” The

IPS-Anx was developed exclusively for the assessment of injection phobia and has proven to have adequate reliability (Öst et al., 1992) and validity (Olatunji, Smits, Connolly, Willems, & Lohr, 2007). Previous research has found the alpha coefficient for the IPS-Anx is between .89 and .93 (Olatunji et al., 2007; Olatunji et al., 2009). The IPS-Anx had an alpha coefficient of .953 in the current study. The intercorrelation between the MQ and IPS-Anx among both phobics and non-phobics in the current study is significant, which can be seen in Tables 6 and 7 (Appendix 1).

Emotion Rating Scale

The Emotion Rating Scale (Tolin, Lohr, Sawchuk, & Lee, 1997) examines emotion related to specific stimuli on a scale of 1 to 100. Koch et al. (2002) took one item from Tolin and colleagues' rating scale (i.e., "This picture makes me feel afraid.") and utilized it following exposure to the pictorial stimuli. The wording was changed during the behavioral task to "This item makes me feel afraid." The ratings ranged from 0 = "not at all afraid" to 100 = "most afraid I have ever felt in my life." The disgust ratings for the pictorial stimuli were also extracted from the Tolin et al. rating scale (i.e., "This picture makes me feel disgusted."). The wording was changed during the behavioral task to "This item makes me feel disgusted." (Koch et al., 2002).

Anxiety Disorders Interview Schedule

The Anxiety Disorders Interview Schedule (ADIS-IV, Brown, Di Nardo, & Barlow, 1994) is a semi-structured interview designed to assess for current and past episodes of anxiety disorders, and to permit differential diagnosis among anxiety disorders according to DSM-IV criteria. The researcher interviewed each participant

to determine if the individual was afraid of BII stimuli by only using the Specific Phobia section. The ADIS-IV was scored based on the participant's fear of them receiving an injection or having their blood drawn and their avoidance of these fearful situations and the interference it has in the individual's daily functioning. The interviewer rated the participant's avoidance and daily interference on a scale from 0 to 7. Phobics were classified as a "4" or higher.

Additionally, the demographics section of the ADIS-IV will be used to gather participant information and determine whether or not they have sought treatment in the past or are currently seeking treatment for a specific phobia, in which case they will be excluded. Brown and colleagues examined the inter-rater reliability of diagnostic decisions made using the ADIS-IV (Brown, Di Nardo, Lehman, & Campbell, 2001). The ADIS-IV has demonstrated adequate content and construct validity, good validity, generalization, and excellent clinical utility (Hunsley & Mash, 2008).

Brainteaser

A brainteaser was used between the injection stimulus and animal reminder disgust stimulus presented to the participant in the BAT-1 and the BAT-2. The brainteaser used was a word game where the participant is given fifteen words to memorize in one minute; there were a total of 30 neutral words that were found at random through a random words generator online.

Animal-Reminder Disgust Stimulus: Severed Deer Leg

Olatunji et al. (2008) and Koch et al. (2002) both administered BATs in which the participant was exposed and asked to complete various steps involving a

15” severed deer leg with fur and hoof intact. Both studies found the severed deer leg to be a reliable animal-reminder disgust elicitor. The current study uses a severed deer leg with fur and hoof intact that is approximately 15” long.

Animal-Reminder Disgust Pictorial Stimuli

Connolly et al. (2006) used ten pictures of either blood or injury stimuli (animal reminder disgust elicitors) and rated their fear, disgust, and fainting symptoms. The animal-reminder disgust pictorial stimuli that were used consisted of body envelope violations, severed fingers, legs, and arms. The current study used the same ten pictures that Connolly et al. (2006) and Rusch (2010) used to depict animal-reminder disgust.

Injection Stimulus: Hypodermic Needle and Syringe

A hypodermic needle and syringe has been found to be the primary stimulus that BII phobics fear (Olatunji et al., 2008; Page, 2001; Lilliecreutz, Josefsson, & Sydsjö, 2010). Page (2001) found that phobics with concerns about injections or needles are likely to report more fear in the presence of needles. The hypodermic needle and syringe used in the current study was sterilized and had never been used.

Injection Pictorial Stimuli

Previous studies have used injection and needle pictorial stimuli to primarily represent fear, but also disgust among BII phobics (Tolin et al., 1997; Page, 2001; Olatunji, Lohr, Smits, Sawchuk, & Patten, 2009). The current study used the ten injection images that Olatunji et al. (2009) used.

Control Pictorial Stimuli: Flowers

The ten images used were pictures of various flowers. They were selected from the International Affective Picture System (IAPS) that have been found to be neutral (Lang, Bradley, & Cuthbert, 2008).

Stopwatch

A standard stopwatch was used in order to maintain accuracy while the participant was examining each of the pictures presented to them by the researcher.

Procedure

Participants contacted the experimenter by phone or email with the information provided on the poster or in the class. The participant was emailed a link and asked to complete an online version of the Mutilation Questionnaire (Kleinknecht et al., 1990) and Injection Phobia Scale – Anxiety (Öst et al., 1992), which were posted on the "Survey Monkey" website. After completing the questionnaires, the participant was contacted by the researcher and then invited to the Anxiety Disorders Research Lab to participate in the Anxiety Disorders Interview Schedule (ADIS-IV; Brown et al., 1994) and behavioral tasks. Consent was obtained before completing the online questionnaires and again upon arrival at the Anxiety Disorders Research Lab.

Participants were randomly assigned to one of three groups using http://random.org: (1) Animal Reminder Disgust Group, (2) Injection Group, or (3) Control Group as shown in Figure 1.

Behavioral Avoidance Task 1 (BAT-1)

All participants first participated in the BAT-1, which consists of being exposed to both the animal reminder disgust stimulus (severed deer leg) and the injection stimulus (hypodermic needle) in random order. Upon exposure to each stimulus, the participant was asked to engage in a behavioral task consisting of five steps, a method used by Olatunji et al. (2008). The first step was to look at the stimulus, the second step was to put a glove on one hand and touch a spot next to the stimulus as indicated by a piece of tape on the table, the third step was to touch the actual stimulus with the glove on, the fourth step was to touch the same spot next to the stimulus with no glove on, and the final step was the participant's willingness to touch the stimulus with no glove on. The number of steps completed was the primary dependent variable. Participants were also asked to rate their peak fear and their peak disgust experienced while performing the task. Once the participant completed the animal reminder disgust stimulus behavioral task, they were then asked to complete the same steps for the injection stimulus.

Animal Reminder Disgust Group (1)

The researcher has ten images depicting mutilations and injuries (Connolly et al., 2006). The participant was seated and one picture at a time was placed in front of them for ten seconds each, a method used by Connolly et al. (2006); viewing all of the pictures should take approximately two minutes. The participant was asked to keep their eyes focused on the picture for the entire 10 seconds; the researcher noted if they closed their eyes for a prolonged amount of time. Immediately after viewing each picture, the participant was provided a fear rating and a disgust rating. Once the

participant saw each of the ten photos, the researcher asked the participant to rate their overall fear and disgust related to the pictorial stimuli.

Injection Group (2)

The procedure for the Injection Group is the same as the Animal Reminder Disgust Group, but the pictorial stimuli used contained injections and needles (Tolin et al., 1997).

Control Group (3)

The procedure for the Control Group is the same as the previous groups, but the pictorial stimuli contained various flowers that have shown to be neutral (Lang et al., 2008).

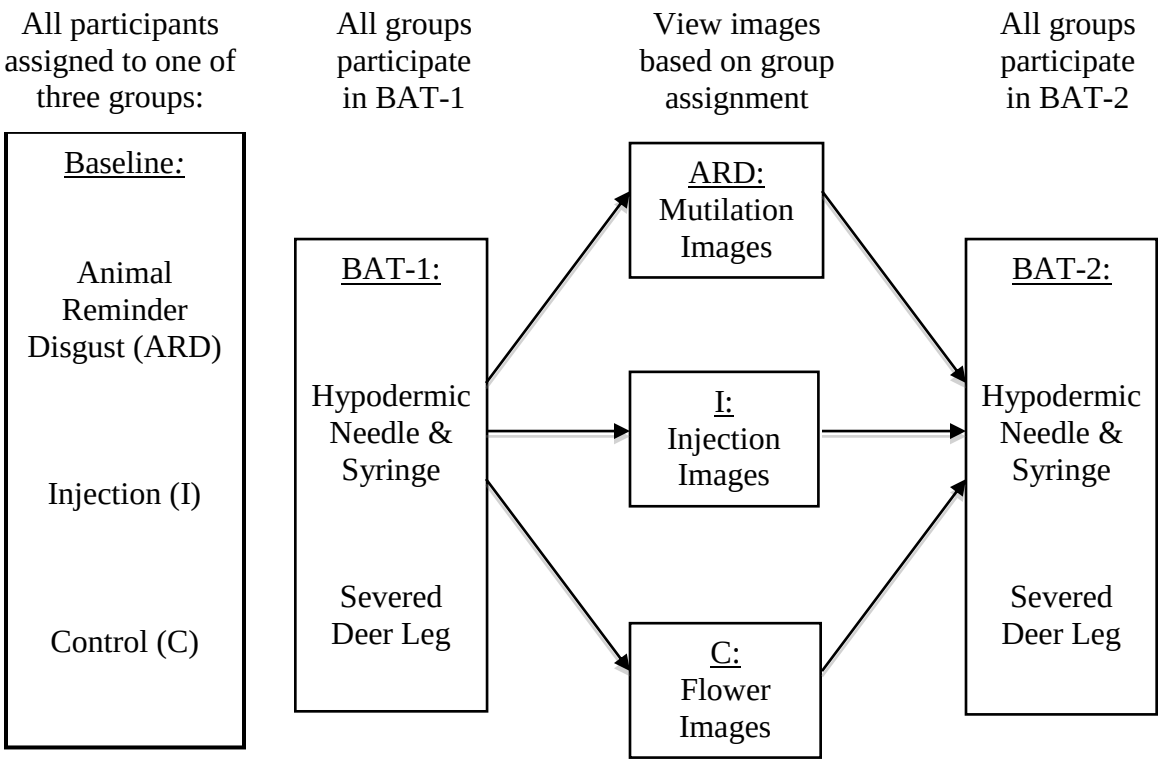

Figure 1
Procedure

Behavioral Avoidance Task 2 (BAT-2)

The BAT-2 is identical to the BAT-1; participants were exposed to both the animal disgust stimulus and the injection stimulus in random order. Upon completion of the BAT-2, the participant was given a debriefing form and class credit for participation.

CHAPTER 3

RESULTS

A chi-square was computed to determine whether there was a significant difference in the gender distribution between phobics and non-phobics. The chi-square calculation demonstrated that there was a greater portion of females classified as phobic than males, X^2 (1)=25.389, $p < .001$. Literature has found that the sex ratio of BII phobia has been mixed. Two studies found higher prevalence in females (female: 4.4 – 6.4%; male: 1.8 – 3.9%; Bienvenu & Eaton, 1998; Beesdo, Knappe, & Pine, 2009) and another found no gender differences for prevalence rates (Fredrikson, Annas, Fischer, & Wik, 1996). An additional chi-square was computed to determine whether there was a significant difference in the ethnicity distribution between phobics and non-phobics. The chi-square indicates there was no significant difference in ethnicity distribution between phobics and non-phobics, $X^2(4)=4.20$, $p=.52$.

An independent samples t-test was computed to determine whether there were any significant differences between phobic and non-phobic groups. As expected, phobic participants had significantly higher MQ scores, $t(102) = 8.738$, $p < .001$, and IPS-Anx scores, $t(102) = 14.629$, $p < .001$. These variables can be seen in Table 1. Results showed several significant correlations between measures for both the phobic participants and non-phobic participants, which can be seen in Tables 6 and 7 (see Appendix A).

The researcher conducted an effect size calculation, which in this case, was a Pearson's r because the data came from a paired-samples t-test. The effect size calculation produced for the MQ is $r = .6611$ and for the IPS-Anx is $r = .8263$. The

hypodermic needle and syringe BAT-1 and BAT-2 effect size is *r* = .336 and *r* = .372, respectively. The severed deer leg BAT-1 and BAT-2 effect size is *r* = .575 and *r* = .466, respectively. Past literature has had a large effect size of .75 when calculated for a similar BAT (Olatunji, et al., 2012); however, the current study expected a smaller effect size.

Table 1
Demographic Information

	Phobics		Non-phobics	
Gender				
Male	7		11	
Female	33		53	
Ethnicity				
Caucasian	32		43	
African-American	2		3	
Asian/Pacific Islander	3		7	
Hispanic	1		3	
Middle Eastern	0		3	
Other	2		5	
	$\bar{x}$	sd	$\bar{x}$	sd
Age	20.15	1.59	20.73	4.21
MQ	19.28[a]	5.16	10.16[b]	5.19
IPS-Anx	46.70[a]	10.41	16.75[b]	9.99
ADIS	4.45[a]	.59	.86[b]	1.23

Note. Differing superscripts indicate $p < .05$.

Phobic Fear and Disgust

Phobic participants completed significantly less steps in both the Hypodermic Needle and Syringe BAT-1, $t(102) = -4.04$, $p < .001$, and Severed Deer Leg BAT-1,

t(102) = -7.593, $p < .001$. As expected, phobics had significantly more fear, t(102) = 17.334, $p < .001$ and disgust, t(102) = 9.343, $p < .001$ when participating in the Hypodermic Needle and Syringe BAT-1 and significantly more fear, t(102) = 6.402, $p < .001$, and disgust, t(102) = 8.806, $p < .05$, when participating in the Severed Deer Leg BAT-1.

Table 2
Phobic & Non-Phobic BAT Information

	Phobics		Non-phobics	
	$\bar{x}$	sd	$\bar{x}$	sd
Hypodermic Needle & Syringe				
BAT-1	4.35*	1.17	4.95*	.21
Fear	54.21*	16.61	8.41*	10.36
Disgust	39.59*	29.49	3.82*b	6.76
BAT-2	4.35*	1.17	4.97*	.18
Fear	50.51*	21.62	7.26*	11.14
Disgust	38.60*	29.55	6.28*b	13.23
Severed Deer Leg				
BAT-1	3.00*a	1.50	4.63*	.66
Fear	43.51*	36.27	10.0*	16.67
Disgust	65.15*	26.87	21.60*c	22.98
BAT-2	3.28*a	1.45	4.56*	.92
Fear	42.97*	33.70	8.96*	16.24
Disgust	65.99*	26.34	18.18*c	22.30

Note. Asterisks indicate $p < .05$ significance between phobic and non-phobic groups. Superscripts indicate $p < .05$ significance within group.

When participating in the Hypodermic Needle and Syringe BAT-2, phobic participants had completed significantly less steps than the non-phobic participants,

t(102) = -4.18, $p < .001$. Phobics also reported more fear, t(102) = 13.429, $p < .001$, and disgust, t(102) = 7.62, $p < .001$, while participating in the BAT-2. The phobic participants completed significantly less steps than the non-phobic participants when participating in the Severed Deer Leg BAT-2, t(102) = 5.54, $p < .001$. In addition, fear, t(102) = 6.90, $p < .001$, and disgust, t(102) = 9.91, p .05, were both significantly higher among phobics than non-phobics.

An independent samples t-test was computed to determine whether phobic participants rated the BII relevant images they viewed as more fearful or disgusting than the non-phobics. As expected, phobics rated the images as significantly more fearful, t(102) = 6.25, $p < .001$, and more disgusting, t(102) = 3.61, $p <.001$.

Injection Pictorial Stimuli Group

As shown in Table 3, there were no significant differences found between phobics and non-phobics in the Injection Group. Fear, disgust, and steps completed did not increase or decrease significantly for either the hypodermic needle BAT or severed deer leg BAT.

Mutilation Pictorial Stimuli Group

There was no significance found in steps completed in the Hypodermic Needle BAT when exposed to the mutilation pictorial stimuli for the phobic and non-phobic group. There was no variance between the Hypodermic Needle BAT-1 and BAT—2 among the phobic participants, so an analysis was not conducted. Non-phobics had no significant changes in fear or disgust between the Hypodermic Needle BAT-1 and BAT-2.

Table 3
Injection Group: Injection Images & BAT Information

	Phobics		Non-phobics	
	$\bar{x}$	sd	$\bar{x}$	sd
Injection Images				
Fear	68.61*	17.53	10.50*	17.09
Disgust	68.82*	21.95	18.00*	21.50
Hypodermic Needle & Syringe				
BAT-1	4.20*a	1.08	5.00*	.00
Fear	50.50*	14.23	6.90*	9.29
Disgust	30.83*	23.08	3.72*	6.70
BAT-2	4.20*b	1.08	5.00*	.00
Fear	51.23*	21.83	7.23*	11.40
Disgust	37.98*	27.86	8.20*	16.66
Severed Deer Leg				
BAT-1	2.60*a	1.55	4.52*	.51
Fear	54.45*	35.75	8.75*	12.74
Disgust	70.35*	27.26	18.17*	21.20
BAT-2	2.87*b	1.60	4.43*	.73
Fear	46.44*	35.80	8.20*	13.42
Disgust	69.01*	28.18	17.49*	21.56

Note. Asterisks indicate $p < .05$ significance between phobic and non-phobic groups. Superscripts indicate $p < .05$ significance within group.

The phobic group saw no significant change in fear, disgust, or steps completed between the Severed Deer Leg BAT-1 and BAT-2. Additionally, non-phobics experienced no significant change in steps completed or fear experienced between the Severed Deer Leg BAT-1 and BAT-2. However, non-phobics had a significant decrease in disgust, $t(20) = 2.637$, $p < .05$, when exposed to the severed

deer leg following exposure to the mutilation images. Table 4 can be referenced for the means and standard deviations among phobics and non-phobics in the Mutilation Group.

Table 4
Mutilation Group: Mutilation Images & BAT Information

	Phobics		Non-phobics	
	$\bar{x}$	sd	$\bar{x}$	sd
Mutilation Images				
Fear	59.82*	29.81	15.35*	21.24
Disgust	84.22*	17.87	51.83*	29.10
Hypodermic Needle & Syringe				
BAT-1	5.00[a]	.00	4.95	.22
Fear	62.27*	16.98	8.29*	11.78
Disgust	59.32*	26.25	2.78*	5.59
BAT-2	-	-	5.00	.00
Fear	-	-	6.30*	12.03
Disgust	-	-	5.32*	12.17
Severed Deer Leg				
BAT-1	3.27*[a]	1.55	4.81*	.40
Fear	47.72*	36.46	4.82*	9.99
Disgust	65.28*	25.62	17.60*[b]	17.77
BAT-2	3.45*	1.60	4.86	.36
Fear	48.30*	35.79	3.85	8.69
Disgust	63.89*	24.10	12.32*[b]	17.97

Note. Asterisks indicate $p < .05$ significance between phobic and non-phobic groups. Superscripts indicate $p < .05$ significance within group.

Control Pictorial Stimuli Group

As shown in Table 5, there were no significant differences found among phobics and non-phobics in the Control Group. Fear, disgust, and steps completed did not increase or decrease significantly for either the hypodermic needle BAT or severed deer leg BAT.

Table 5
Control Group: Flower Images & BAT Information

	Phobics		Non-phobics	
	$\bar{x}$	sd	$\bar{x}$	sd
Flower Images				
Fear	.59	2.13	2.24	7.13
Disgust	.06	.16	2.44	7.92
Hypodermic Needle & Syringe				
BAT-1	4.00^{*a}	1.52	4.90^{*b}	.31
Fear	51.85*	17.63	10.29*	10.19
Disgust	33.46*	32.36	5.02*	7.99
BAT-2	4.07*	1.54	4.90^{*c}	.31
Fear	47.71*	22.32	8.30*	10.32
Disgust	31.77*	32.15	5.09*	9.79
Severed Deer Leg				
BAT-1	3.21^{*a}	1.31	4.55^{*b}	.95
Fear	28.48*	33.94	16.86*	23.39
Disgust	59.48*	28.19	29.73*	28.23
BAT-2	3.57	1.28	4.40^{c}	1.39
Fear	35.05*	30.58	15.22*	22.70
Disgust	64.41*	27.61	25.13*	26.10

Note. Asterisks indicate $p < .05$ significance between phobic and non-phobic groups. Superscripts indicate $p < .05$ significance within group.

CHAPTER 4

DISCUSSION

The central goal of this study was to further examine the difference between disgust and fear when exposed to injection stimuli and animal reminder disgust stimuli. Previous studies found that both fear and disgust are strong emotions among BII phobics when exposed to phobia-relevant stimuli (Koch, O'Neill, Sawchuk, & Connolly, 2002). As expected, there was significantly more disgust and fear found among the phobic group. The phobic individuals had a significantly higher MQ and IPS-Anx score than the non-phobic individuals; however, the non-phobic participants' MQ score was still relatively high and overall, they would be considered fearful. Koch and colleagues (2002) reported that the average score for phobic individuals was 14.58 and the average score for non-phobic individuals was 4.37. The current study had an average score of 19.28 for phobic participants and 10.16 for non-phobic participants. Additionally, the IPS-Anx score for phobics in the current study is 46.70 and the non-phobics' average score is 16.75, compared to the Olatunji, Lohr, Smits, Sawchuk, and Patten (2009) study, which found the average score of phobics to be 45.50 and non-phobics' average score to be 4.87. While the ADIS did separate the non-phobics from the phobics, there were 20 non-phobic participants scoring either a 2 or 3 on the ADIS, which would qualify them as BII fearful.

When comparing the phobic participants (40) to non-phobic participants (64), the phobics were significantly more fearful, disgusted, and engaged in more avoidant behavior of the BII stimuli. However when examining fear, disgust, and avoidance among the Injection Group, the Mutilation Group, and the Control Group

individually, there was no significance found. It was hypothesized that if the phobic individuals are exposed to the injection pictorial stimuli that they would experience significantly less avoidance, fear, and disgust of the hypodermic needle and syringe BAT-2 and a significant reduction of fear while participating in the severed deer leg BAT-2. There were no changes in steps between the Hypodermic Needle BAT-1 and BAT-2 and there was no significant decrease in fear or disgust. Additionally, there was no significance found in fear, disgust, and avoidance when participating in the Severed Deer Leg BAT-2 following exposure to injection images.

The severed deer leg is certainly more aversive than the hypodermic needle and syringe and induces much more fear and disgust among those exposed. Several studies have used a hypodermic needle and syringe as an appropriate fear inducing stimulus (Olatunji et al., 2008; Page, 2003; Lilliecreutz, Josefsson, & Sydsjö, 2010) and a severed deer leg as a reliable animal-reminder disgust elicitor (Olatunji et al., 2008; Koch et al., 2006); however, it is clear that the tasks do not evoke an equal amount of emotion and future research should increase the intensity of the injection BAT.

The second hypothesis, which was not supported, predicted that BII phobics would experience significantly less avoidance, fear, and disgust of the severed deer leg in BAT-2 and significantly less disgust while participating in the hypodermic needle BAT-2 when exposed to mutilation images. The current study found no decrease in avoidance, fear, or disgust of the severed deer leg in BAT-2. Phobic participants completed all five hypodermic needle BAT-1 steps; so BAT-2 analyses were not computed, since there was no room for improvement. There was a

significant decrease in disgust of the severed deer leg among non-phobics ($p < .05$) after exposure to the mutilation images, which was unexpected. These findings could imply that there is a desensitization that has occurred among non-phobics. While the mutilation images may have kept the anxiety activated for phobics, it has lessened any anxiety the non-phobics may be experiencing and resulted in less disgust of the severed deer leg. Additionally, there were only five BAT steps to complete and viewing all ten of the images took approximately 2 minutes. This is not enough time for habituation to occur and resulted in no significant effect on BAT steps completed.

The third hypothesis of the current study was supported. There were no significant changes in fear, disgust, or avoidance among phobics to either the hypodermic needle or severed deer leg following exposure to the flower images.

There are several limitations to the current study. A recruitment flaw was present in the study. While recruiting participants, the flyer read, "Are you afraid or disgusted by injections, blood draws, or mutilations?" This particular wording appealed especially to either those that are easily disgusted. Although phobics and non-phobics were classified using the Specific Phobia section of the ADIS, the non-phobic sample is made up of several BII fearful participants. These fearful individuals should have been excluded to more accurately depict the separation between the BII phobic and non-phobic individuals.

Additionally, there were a total of 25 participants that were removed from the study due to inconsistencies. There are 15 phobic participants in the Injection group, 11 phobics in the Mutilation group, and 14 phobics in the Control group, which prevents significance from being reached. When a power analysis was conducted

before data collection had begun, the researcher had a goal of running at least 20 participants in each of the six groups. After exclusion of several participants, the power of each test was computed.

While several past studies (Olatunji et al., 2008; Hirai, Cochran, Meyer, Butcher, Vernon, & Meadows, 2008; Lilliecreutz et al., 2010) have considered a hypodermic needle and syringe a BII-relevant stimulus that induces fear and avoidance, the current study showed that a large amount of phobics completed four or five steps while participating in the BAT-1. When comparing the amount of steps completed during the BATs, it was clear that both phobics and non-phobics completed significantly more hypodermic needle and syringe steps than severed deer leg steps. Ideally, the injection stimulus would induce the same amount of emotion that the animal reminder disgust stimulus induces and this was not the case. Future studies should use a more adequate injection stimulus, such as injecting a mannequin with a hypodermic needle or placing a hypodermic needle against the inner part of their arm, which was used by Olatunji and colleagues (2007; 2012). The Happiness Hypothesis may also explain why there were not significantly more steps completed during the severed deer leg BAT-2. According to the Happiness Hypothesis, the exposure to threatening stimuli is hypothesized to make the phobic individuals extra vigilant for additional threats and they continue viewing images and stimuli as increasingly fearful and/or disgusting.

Future studies should consider the research by Page (1994), which describes the heterogeneity among BII phobics when responding with fear, disgust, or a combination of the two. There were three separate groups Page (1994) proposed

among BII phobics: fearful non-fainters (response is primarily with fear), non-fearful fainters (response is primarily with disgust), and a combination of the two, or biphasic responders (response is a combination of both fear and disgust). If the current study were to categorize BII phobic individuals based on the categories proposed by Page (1994), there would be fewer variations among those classified as phobics while participating in the Behavioral Avoidance Tasks and reporting their fear and disgust. Ideally, the images that the phobic participants would be exposed to would be dependent on the predominant emotion experienced by the individual. Phobics that identify as being more fearful of injections would be exposed to injection images, while the phobic participants that identify as being more easily disgusted would be exposed to mutilation images. This separation would allow fewer variations among those classified as phobics while participating in the Behavioral Avoidance Tasks and reporting their fear and disgust.

It is important to continue exploring the relationship between disgust and fear when exposed to both injection stimuli and animal reminder disgust stimuli. Future research should continue examining whether there is a relationship between BII pictorial stimuli and actual BII stimuli. By understanding this relationship better, it could be used in treatment, either by one method replacing the other or as additional steps while participating in a habituation task. Furthermore, future assessment of fear and disgust with phobic individuals should incorporate additional assessment methods (i.e., monitoring blood pressure) instead of relying solely on self-report to get a more thorough understanding of each particular emotion.

APPENDIX A

CORRELATION TABLES

Table 6: Correlations – Non-Phobic Participants

	MQ Total	IPS-Anx Total	Injection Steps A	Injection Steps B	ARD Steps A	ARD Steps B	Avg Injection Fear A	Avg Injection Fear B	Avg Injection Disgust A	Avg Injection Disgust B	Avg ARD Fear A	Avg ARD Fear B	Avg ARD Disgust A	Avg ARD Disgust B
MQ Total														
Pearson Corr.	--													
Significance														
IPS-Anx Total														
Pearson Corr.	.563**	--												
Significance	**.000**													
Injection Steps A														
Pearson Corr.	-.166	-.020	--											
Significance	**.**191	.872												
Injection Steps B														
Pearson Corr.	-.169	.059	-.040	--										
Significance	.182	.644	.755											
ARD Steps A														
Pearson Corr.	-.366**	-.184	-.014	.449**	--									
Significance	**.003**	.145	.911	**.000**										
ARD Steps B														
Pearson Corr.	-.241	-.077	-.025	.698**	.722**	--								
Significance	.055	.957	.843	**.000**	**.000**									
Avg Injection Fear A														
Pearson Corr.	.391**	.357**	-.095	-.126	-.030	-.047	--							
Significance	**.001**	**.004**	.457	.321	.816	.713								
Avg Injection Fear B														
Pearson Corr.	.515**	.349**	-.019	-.237	-.246	-.199	.833**	--						
Significance	**.000**	**.005**	.882	.059	.050	.114	**.000**							
Avg Injection Disgust A														
Pearson Corr.	.500**	.258*	.045	-.417**	-.222	-.231	.688**	.724**	--					
Significance	**.000**	**.040**	.726	**.001**	.078	.066	**.000**	**.000**						
Avg Injection Disgust B														
Pearson Corr.	.585**	.284*	.075	-.239	-.264*	-.247*	.618**	.848**	.797**	--				
Significance	**.000**	**.023**	.558	.057	**.035**	**.049**	**.000**	**.000**	**.000**					
Avg ARD Fear A														
Pearson Corr.	.482**	.217	-.007	-.265*	-.171	-.100	.460**	.561**	.691**	.589**	--			
Significance	**.000**	.086	.955	**.034**	.177	.430	**.000**	**.000**	**.000**	**.000**				
Avg ARD Fear B														
Pearson Corr.	.495**	.250*	.089	-.257*	-.213	-.128	.516**	.711**	.723**	.708**	.919**	--		
Significance	**.000**	**.046**	.484	**.041**	.090	.315	**.000**	**.000**	**.000**	**.000**	**.000**			
Avg ARD Disgust A														
Pearson Corr.	.479**	.299*	-.030	-.179	-.118	-.036	.582**	.663**	.686**	.642**	.849**	.837**	--	
Significance	**.000**	**.016**	.815	.156	.355	.776	**.000**	**.000**	**.000**	**.000**	**.000**	**.000**		
Avg ARD Disgust B														
Pearson Corr.	.496**	.307	.075	-.128	-.109	-.081	.529**	.697**	.637**	.719**	.733	.823**	.904**	--
Significance	**.000**	**.014**	.554	.312	**.**389	.052	**.000**	**.000**	**.000**	**.000**	**.000**	**.000**	**.000**	

Table 7: Correlations – Phobic Participants

	MQ Total	IPS-Anx Total	Injection Steps A	Injection Steps B	ARD Steps A	ARD Steps B	Avg Injection Fear A	Avg Injection Fear B	Avg Injection Disgust A	Avg Injection Disgust B	Avg ARD Fear A	Avg ARD Fear B	Avg ARD Disgust A	Avg ARD Disgust B
MQ Total Pearson Corr. Significance	--													
IPS-Anx Total Pearson Corr. Significance	.452** **.003**	--												
Injection Steps A Pearson Corr. Significance	.337* **.034**	.063 .701	--											
Injection Steps B Pearson Corr. Significance	.260 .105	.026 .875	.962** **.000**	--										
ARD Steps A Pearson Corr. Significance	-.245 .128	.200 .216	.263 .101	.234 .146	--									
ARD Steps B Pearson Corr. Significance	-.260 .105	.179 .268	.214 .184	.184 .255	.836** **.000**	--								
Avg Injection Fear A Pearson Corr. Significance	.105 .519	.212 .189	-.137 .400	-.155 .340	-.009 .957	.007 .968	--							
Avg Injection Fear B Pearson Corr. Significance	-.036 .827	.153 .345	-.358* **.023**	-.359* **.023**	.047 .772	-.047 .773	.633** **.000**	--						
Avg Injection Disgust A Pearson Corr. Significance	.276 .085	.012 .943	.052 .752	-.014 .934	.005 .976	-.047 .773	.459 **.003**	.254 .114	--					
Avg Injection Disgust B Pearson Corr. Significance	.131 .422	.029 .859	-.234 .146	-.285 .075	-.135 .405	-.275 .086	.439** **.005**	.555** **.000**	.728** **.000**	--				
Avg ARD Fear A Pearson Corr. Significance	.251 .119	-.163 .315	.032 .843	.072 .660	-.705** **.000**	-.704** **.000**	.125 .443	.125 .443	.118 .468	.335* **.034**	--			
Avg ARD Fear B Pearson Corr. Significance	.221 .171	-.037 .822	.129 .429	.129 .429	-.596** **.000**	-.575** **.000**	.039 .809	.167 .302	.098 .548	.295 .065	.798** **.000**	--		
Avg ARD Disgust A Pearson Corr. Significance	.270 .092	-.110 .499	-.160 .325	-.108 .507	.738** **.000**	-.712** **.000**	.130 .422	.176 .279	.126 .437	.335* **.035**	.808** **.000**	.615** **.000**	--	
Avg ARD Disgust B Pearson Corr. Significance	.223 .166	-.073 .654	-.208 .198	-.150 .355	-.705** **.000**	-.722** **.000**	.184 .256	.264 .100	.118 .469	.345* **.029**	.726** **.000**	.657** **.000**	.915** **.000**	--

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