5-2014

Differential Extinction of Disgust and Anxiety Among Victims of Sexual Traumatization

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in Psychology

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May 2014
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ABSTRACT

Emerging evidence suggests that in addition to fear, traumatic event-related disgust reactions may be integral to understanding the sequelae of sexual traumatization. Importantly, evidence broadly suggests compared to fear, disgust may be resistant to extinction. As such, conditioned disgust reactions may not evidence the same pattern of extinction observed with fear-based reactions. This may have important implications for the treatment of posttraumatic stress disorder (PTSD). As such, the current study sought to fill an important gap in the existing literature by examining specific processes and mechanisms that are likely to affect outcomes of exposure-based interventions following sexual traumatization. Specifically, 72 women with a history of sexual victimization completed a laboratory-based assessment of disgust- and fear-based emotional reactivity in response to repeated exposures to disgust- and fear-focused idiographic scripts of their traumatic event. Results demonstrated that initial disgust responding was significantly greater than anxiety responding. Anxiety declined significantly across the course of exposure while disgust did not. However, comparison of slopes in disgust and anxiety did not result in significant differences. Theoretical and practical implications as well as directions for future research are discussed.

ACKNOWLEDGMENTS

I would first like to thank all the remarkable women who were willing to participate in this study. Without their bravery and commitment to helping others recover from the experience of sexual trauma, none of this research would be possible.

To Dr. Matthew Feldner, my ever-supportive mentor and friend, I would like to thank you for all you have done to tirelessly promote my professional and personal development throughout this project and through all of the hurdles of graduate school. I could not have done this without you. I would further like to thank my colleagues and friends in the Intervention Sciences Laboratory and Arkansas Interdisciplinary Sciences Laboratory for their continuous support and solidarity.

I would like to acknowledge the help and mentorship I have received from the members of my dissertation committee (Dr. Jeffrey Lohr, Dr. Lindsay Ham, and Dr. Denise Beike) and the offsite mentors for my fellowship training (Dr. Bunmi Olatunji and Dr. Candice Monson). I would also like to acknowledge the National Institute of Mental Health for its support in funding this research via a Ruth L. Kirschstein National Research Service Award (F31 MH092994-01).

Last, but most certainly not least, thank you to my family. To my parents for always believing in me and encouraging me to believe nothing is out of my grasp, and to my incredible husband for always being my rock and offering me all the love and encouragement I could ever ask for.

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I. INTRODUCTION

Innumerable personal and societal costs have been linked to posttraumatic stress disorder (PTSD), including the presence of frequent comorbid psychiatric disorders (Keane & Wolfe, 2006), increased suicidality (Kotler, Iancu, Efroni, & Amir, 2001), physical health problems (Boscarino, 2006; Green & Kimerling, 2004), and a host of other dysfunctions (e.g., high school and college drop-out, marital difficulties, unemployment; Kessler, 2000). The annual estimated cost of PTSD-related work impairment in the U.S. exceeds three billion dollars (Kessler, 2000). Accordingly, researchers have sought to identify factors linked to the development of PTSD following exposure to traumatic events.

The vast majority of individuals exposed to a traumatic event manifest a pattern of symptoms following the experience that include intrusive recollections of the event, heightened emotional or physiological arousal, and attempts to avoid reminders of the event (Blanchard & Hickling, 2004; Riggs, Rothbaum, & Foa, 1995; Rothbaum, Foa, Riggs, & Murdock, 1992). While these symptoms remit within approximately three months for the majority of traumatized individuals (American Psychiatric Association [APA], 2000), a substantial group continues to experience these reactions well beyond the occurrence of the traumatic event and report distress and impairment as a result (e.g., Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Kilpatrick & Resnick, 1993). This pattern of symptom non-remittance has led researchers to define PTSD as a disorder of recovery (Foa & Rothbaum, 1998; Gilboa-Schechtman & Foa, 2001; Yehuda & Ledoux, 2007).

Epidemiological studies have identified interpersonal violence (i.e., sexual or nonsexual victimization) as the traumatic event type most likely to lead to problems, including PTSD (Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). Furthermore, wide-scale community

studies have indicated that victims of sexual trauma, and rape specifically, are more likely to develop PTSD than those exposed to any other traumatic event type, including physical assault (Breslau, Davis, Andreski, & Peterson, 1991; Kilpatrick & Resnick, 1993; Norris et al., 1992). Longitudinal research has also identified sexual victimization as being particularly likely to result in the non-remittance of PTSD symptoms (Rothbaum et al., 1992). Finally, both more intense immediate posttraumatic reactions and slower rates of recovery at six months post-assault have been identified among victims of sexual relative to physical assault (Gilboa-Schechtman & Foa, 2001). This evidence converges to suggest that compared to other traumatic events, sexual victimization is likely to be characterized by relatively more pervasive and persistent posttraumatic sequelae, highlighting the importance of identifying factors that may interfere with recovery following this type of experience.

Information processing theories (Foa & Kozak, 1986; Foa & Rothbaum, 1998; Lang, 1979) purport that processes involving both 1) activation of peri-traumatically conditioned fear structures in memory and 2) introduction of fear-incompatible information are critical to recovery following sexual victimization (and other traumatic experiences) whether occurring naturally (e.g., contextually-based safety learning; Foa, 1997) or via exposure treatment (Kozak, Foa, & Steketee, 1988; Lang, Melamed, & Hart, 1970). Similarly, appraisal-based theories suggest fear is a fundamental component of any traumatic experience, as perceptions of threat challenge basic survival goals (Ehlers & Clark, 2000). While the importance of fear is well-recognized, certain traumatic experiences may elicit appraisals beyond those dominated by survival concerns, leading to conditioning of a host of other negative emotional reactions to traumatic event cues (Dalgleish & Power, 2004; Resick & Schnicke, 1992). The role that traumatic event-related negative emotions other than fear might play in influencing the course of

recovery from posttraumatic stress reactions is almost entirely unknown.

Resick and Schnicke (1992) have suggested that activation of traumatic-event related fear structures within a safe context may be sufficient to extinguish conditioned fear by augmenting appraisals of danger, but may not alter appraisals related to the expression of other negative emotions such as guilt, shame, anger, and disgust, which may also be central to information structures encoded into long-term memory. In fact, there is limited evidence that posttraumatic guilt (Jaycox & Foa, 1996) and anger (Feeny, Zoellner, & Foa, 2000; Foa, Riggs, Massie, & Yarczower, 1995), may interfere with adaptive post-event processing of the traumatic experience. However, no study to date, has examined how disgust-based reactions impact engagement with, and processing of, internal representations of sexual trauma.

A range of stimuli frequently present during experiences of sexual victimization might elicit disgust reactions. For example, direct contact with another person who could spread infectious agents (e.g., bodily products) or violations of appraisals of morality may elicit feelings of disgust (Rachman, 2004, 2006). In fact, a growing body of empirical work has linked disgust to sexual victimization. For example, one study found that over 55% of sexually assaulted women reported experiencing ongoing distress related to feelings of self-disgust (Petrak, Doyle, Williams, Buchan, & Forster, 1997). In another study, adult women who voluntarily disclosed experiences of childhood sexual abuse (CSA) either during a clinical interview or during an experimental task displayed a greater magnitude of disgust expression (i.e., frequency, intensity, and duration of expression) compared to both those who do not disclose their CSA experience and non-abused participants (Bonanno et al., 2002). Moreover, adolescents with a history of sexual victimization were six times more likely to endorse the presence of disgust, and they rated their sexual trauma as significantly more disgusting than those who had been physically

assaulted (Feldner, Frala, Badour, Leen-Feldner, & Olatunji, 2010). Finally, women with a history of sexual trauma responded with significantly more disgust in response to reminders of a traumatic experience in the laboratory, as compared to those with a history of physical trauma (Badour, Feldner, Babson, Blumenthal, & Dutton, 2013).

In addition to evidence directly linking sexual victimization to disgust, research has also documented associations between sexual victimization and increased disgust-related phenomena including mental contamination, or persistent perceptions of internal dirtiness (Rachman, 2004, 2006) and compulsive urges to wash (Cougle, Wolitzky-Taylor, Lee, & Telch, 2007; Tolin, Woods, & Abramowitz, 2006). Images of upsetting aspects of a sexual assault (Fairbrother & Rachman, 2004) and images of a nonconsensual kiss scenario elicit feelings of dirtiness and urges to wash (Elliot & Radomsky, 2009; Fairbrother, Newth, & Rachman, 2005; Herba & Rachman, 2007; Radomsky & Elliot, 2009) and elevated washing behavior among women with histories of unwanted sexual contact (Herba & Rachman, 2007). Finally, Fairbrother and Rachman (2004) found that as many as 70% of women report urges to wash following a sexual assault, with a substantial subgroup continuing to experience such urges several months after the event. Mental contamination secondary to sexual assault has been linked to severity of PTSD symptoms (Badour et al., 2013; Fairbrother & Rachman, 2004) even after accounting for depression and trait-anxiety (Olatunji, Elwood, Wiliams, & Lohr, 2008).

Despite this important emerging literature linking disgust and disgust-related phenomena to both the peri- and posttraumatic experience of sexual victimization, there has been no empirical examination of how the presence of disgust-based reactivity might impact engagement with the cognitive-affective network related to this type of experience. This is a critical gap in the literature as such engagement has long been a purported mechanism critical to the process of

both natural recovery (Foa, 1997) and successful exposure-based treatment (e.g., Kozak et al., 1988; Lang et al., 1970). Moreover, this dearth of research is troubling in light of recent evidence suggesting that relative to fear, the emotion of disgust may be resistant to extinction (Baeyens, Crombez, van den Bergh, & Eelen, 1988; Diaz, Ruiz, & Baeyens, 2005; Olatunji, Forsyth, & Cherian, 2007; Olatunji, Smits, Connolly, Willems, & Lohr 2007; Olatunji, Wolitzky-Taylor, Willems, Lohr, & Armstrong, 2009; Smits, Telch, & Randall, 2002; Vansteenwegen, Francken, Vervliet, De Ciercq, & Eelen, 2006).

Basic research suggests disgust is likely acquired as a result of both traditional classical conditioning (Schafe & Bernstein, 1996) and evaluative conditioning, defined as the transfer of hedonic value (e.g., like/dislike, pleasant/unpleasant) of an unconditioned stimulus (UCS) to a previously neutral stimulus (conditioned stimulus [CS]; Olatunji, Forsyth, et al., 2007; Schienle et al., 2001; Woody & Teachman, 2000). Importantly, emotional responses acquired via evaluative conditioning are thought to be more resistant to extinction as compared to those acquired via traditional stimulus-stimulus associations (Baeyens et al., 1988; Diaz et al., 2005; Vansteenwegen et al., 2006). Recent research has supported this more basic work. For example, two studies conducted with healthy participants suggest disgust is relatively more resistant to extinction than fear. Extinction of conditioned disgust- and fear-based reactivity was examined in response to previously neutral words paired with mutilated bodies (a UCS that elicits both emotions; Olatunji, Forsyth et al., 2007). Results suggested that extinction procedures yielded reductions in fearful but not disgust-based reactivity. In a separate investigation, disgust reactions to a CS conditioned in the laboratory did not reduce upon extinction trials despite reductions in CS-UCS associations (as evidenced in signal expectation ratings; Mason & Richardson, 2010).

Studies conducted within the context of specific phobias and obsessive-compulsive (OC) spectrum problems offer evidence that disgust is also more resistant to extinction than fear within the context of psychopathology (Olatunji, Smits et al., 2007; Olatunji, Wolitzky-Taylor, et al., 2009; Smits et al., 2002). For example, among spider phobics, whose reactions to spiders include both fear and disgust (Davey, 1994), 30-mins of *in vivo* exposure resulted in less extinction of disgust than fear after controlling for baseline levels of each (Smits et al., 2002). Similar patterns have emerged among people with blood-injection-injury (BII) phobia and contamination-based OC symptoms (Olatunji, Smits et al., 2007; Olatunji, Wolitzky-Taylor, et al., 2009).

Reviewed above is evidence suggesting disgust-based reactivity is commonly elevated among survivors of sexual victimization, and such reactivity appears to be relatively resistant to extinction. It is important to note that disgust-based reactivity is particularly resistant to extinction among persons who are highly reactive to disgusting stimuli (Mason & Richardson, 2010). For instance, McKay (2006) tested an exposure-based treatment that included presentation of disgusting stimuli followed by fearful stimuli among individuals with different subtypes of obsessive-compulsive disorder (OCD). People suffering from contamination-based OCD, which is specifically associated with disgust-based reactivity (Mancini, Gragnani, & D'Olimio, 2001; Olatunji, Lohr, Sawchuk, & Tolin, 2007; Ware, Jain, Burgess, & Davey, 1994), evidenced less extinction of disgust. This finding, in concert with evidence suggesting survivors of sexual victimization are characterized by elevated disgust-reactivity, underscores the importance of extending research on disgust and fear extinction to a test specific to sexual trauma. Indeed, such a study has the potential to advance well-established exposure-based treatments for posttraumatic stress reactions secondary to sexual victimization by providing

empirical evidence that disgust may need to be targeted directly and intensively rather than assuming disgust-based reactivity will respond to exposure in a fashion comparable to fear. Indeed, adding disgust-focused exposure to treatments targeting fearful reactivity has yielded substantial improvements in the outcomes of exposure for BII phobia both in terms of pathology-specific and global indices of outcome (Hirai et al., 2008).

Multiple limitations to existing research on extinction of disgust- and fear-based reactivity currently preclude definitive statements regarding differential patterns of extinction following sexual victimization. First, no study has examined extinction of reactivity to sexual trauma cues specifically. Given evidence suggesting patterns of extinction in disgust-based reactivity may vary across samples (McKay, 2006), generalizability of existing work to the domain of sexual victimization cannot be assumed. Second, studies comparing disgust and fear extinction in the context of psychopathology have utilized stimuli that are likely to elicit both emotions without directly varying emotion-eliciting content (e.g., exposure to "threat-relevant" content). This lack of specificity represents a crucial gap in our knowledge regarding how extinction procedures targeting one emotion (e.g., fear reactivity) may affect another (e.g., disgust reactivity). Examination of such specificity is critical in the context of sexual victimization given that existing exposure-based interventions do not necessarily directly target sexual trauma-related disgust. Collectively, these limitations seriously constrain our current understanding of the specificity of extinction of disgust- and fear-based reactivity, thereby underscoring the importance of the current project.

In summary, sexual traumatization is particularly strongly linked to problems recovering from posttraumatic stress reactions, thereby increasing the likelihood of PTSD development. Although activation and engagement with fear-based representations of the traumatic experience

are critical mechanisms for recovery following a traumatic event, there is increasing recognition that disgust-based reactivity likely plays an important role in recovery from sexual trauma (e.g., Fairbrother & Rachman, 2004; Petrak et al., 1997). The growing recognition that disgust may be an important component of the peri- and posttraumatic reaction to sexual trauma, coupled with emerging evidence that disgust appears relatively resistant to extinction, highlights that understanding differential patterns of extinction in disgust- and fear-based reactivity is likely critical in better understanding and facilitating recovery from these types of experiences. As such, the focus in the current study on examining patterns of extinction of disgust- and fear-based reactions to ideographic cues of sexual trauma, as well as its reliance on real-time assessment in the controlled laboratory setting, represents a timely and important contribution to the extant literature.

A. Study Aims

There were three overarching aims of the study, resulting hypotheses are presented below.

Primary aim. The first aim was to understand within the specific context of traumatic sexual victimization how disgust-based, compared to fear-based, reactivity declines with repeated exposure. Consistent with this aim, the primary hypothesis was that repeated exposure to ideographic sexual trauma cues (both disgust-focused and fear-focused) would result in less extinction of disgust-based reactivity compared to fear-based reactivity (Hypothesis 1).

Secondary aim. The second aim of this project was to examine how features of the exposure design influenced extinction of both disgust-based and fear-based reactivity. Resulting secondary hypotheses pertained to how quantity (Hypothesis 2.1) and order of exposure presentation (Hypothesis 2.2) would influence extinction of disgust-based and fear-based

reactivity. With regards to quantity, it was hypothesized that a greater number of exposure trials would result in more extinction of both disgust-based reactivity (Hypothesis 2.1.a) and fear-based reactivity (Hypothesis 2.1.b). Given the dearth of research in this area, it was unclear how order of exposure presentation (disgust-focused, followed by fear-focused versus fear-focused, followed by disgust-focused) might impact extinction of 1) disgust-based reactivity (Hypothesis 2.2.a [Exploratory]) or 2) fear-based reactivity (Hypothesis 2.2.b [Exploratory]). Although no specific hypotheses were made, the interaction between condition and order of exposure presentation was also examined.

Tertiary aim. The final aim of this study involved examining how disgust- and fear-based reactivity responded to extinction trials involving stimulus content designed to specifically elicit disgust or fear. The examination of change in emotional reactivity as a function of emotion-specific exposure content overcomes limitations of previous designs that utilize only undifferentiated threat-relevant stimuli. This aim begins to address the potential utility of altering the content of exposure in order to target the reduction of specific emotions. Study hypotheses resulting from this aim were as follows: repeated exposure to disgust-focused sexual trauma cues, compared with exposure to fear-focused cues, would result in greater extinction of disgust-based reactivity (Hypothesis 3.1) and repeated exposure to fear-focused sexual trauma cues, compared with exposure to disgust-focused cues, would result in greater extinction of fear-based reactivity (Hypothesis 3.2).

II. METHOD

A. Participants

A total of 88 women presented to the laboratory for participation in the study. Data from three participants were considered pilot data and were not included the final sample based on

significant modifications to the study procedure. Five individuals were excluded during the CAPS interview based on reporting a trauma involving events that were non-sexual in nature as their index event. Four participants were excluded based on having only recovered memories of their sexual trauma experience. Finally, four participants opted to withdraw from the study prior to generating the written narratives of their traumatic events.

The final sample included 72 adult women ranging in age from 18 to 59 years (M_{age} = 31.15, *SD* = 13.17) who endorsed a positive history of at least one instance of sexual victimization that satisfied the definition of a traumatic event as specified in Criterion A of the DSM-IV-TR-definition of PTSD (i.e., an experience involving life threat, threatened or actual serious injury, or threat to one's physical integrity [Criterion A1] that is accompanied by intense feelings of fear, helplessness, or horror [Criterion A2; APA, 2000]). Sexual victimization included experiences involving rape, attempted rape, or any other unwanted or coercive sexual experience occurring during childhood or adulthood. For persons reporting a history of multiple traumatic events, eligibility was contingent upon the index traumatic event (i.e., event perceived as most distressing) involving sexual victimization. Specifically, participants endorsed the following range of non-exclusive acts: exposing of sexual organs (22.2%), touching/fondling of sexual organs (50.0%), vaginal intercourse (36.1%), oral intercourse (19.5%), anal intercourse (4.2%), and other sexual acts (8.3%). Participants' relationship to the assailant included relative (38.9%), intimate partner/spouse (8.3%), date (6.9%), acquaintance (11.1%), friend (9.7%), stranger (12.5%), and other (12.5%). Sixty-one individuals (84.7%) reported a history of multiple sexual trauma experiences.

The ethnic and racial composition of the sample was reflective of the local area. Specifically, 10.0% of participants identified as ethnically Hispanic. Racial composition

included 79.2% of individuals identifying as Caucasian, 9.7% as African American, 4.2% as Asian, 4.2% as bi- or multi-racial, and 2.8% as other. High school or high school equivalent was the highest level of education completed for 11.1% of the sample, 45.8% had completed some college, 20.8% graduated from a 2-year or 4-year college, 12.5% completed some graduate or professional school, and 9.7% completed graduate or professional school. Median annual income for the sample was $13,500 (*M* = $19,612, *SD* = $22,389). Of the entire sample, 18.1% met criteria for a current diagnosis of PTSD.

Participants were excluded from the study based on 1) evidence of limited mental competency and the inability to give informed, voluntary, written consent to participate; 2) current suicidality; or 3) report that memory of the index sexual trauma having occurred was present only as a result of spontaneous or assisted recovery of memory. Participants were also excluded from the study if they experienced any DSM-IV-TR-defined traumatic event during the month prior to participation in the study.

B. Measures

Traumatic event exposure and posttraumatic stress symptoms. The Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995) was used to index details regarding DSM-IV-TR-defined traumatic event exposure (APA, 2000), including most distressing event, time since exposure, as well as frequency and severity of posttraumatic stress symptoms. The CAPS is a semi-structured interview that provides an index of past-month frequency and intensity of 17 posttraumatic stress symptoms as well as a dichotomous index of current PTSD diagnosis per the criteria of the DSM-IV (APA, 1994). This measure has excellent psychometric properties and is considered one of the gold standard interviews in posttraumatic stress assessment (Weathers, Keane, & Davidson, 2001).

Physiological and behavioral response checklist for script-driven imagery. In order to aid in the development of emotion-specific traumatic event scripts, a checklist of physiological and behavioral responses was generated for the purposes of this study that included a number of fear-focused and disgust-focused responses (see Appendices A and B). A pilot study was conducted among an independent sample of 185 (M_{age} = 19.25; 57.8% women) unscreened undergraduate students in order to identify distinct disgust-focused and fear-focused behavioral and physiological response propositions. Participants in the pilot study were randomly assigned to either view a series of 1) 6 emotion-eliciting pictures from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 1995) identified by Mikels and colleagues (2005) as elicitors of discrete feelings of fear (1113, 1930, 5972) or disgust (9330, 9390, 9405; n = 112), or 2) four audio-recorded sentences designed to elicit discrete feelings of fear or disgust (n = 73). Fear-eliciting sentences were identified in previous work (Fridlund, Kenworthy, & Jaffey, 1992), while disgust-eliciting sentences were developed for this study. Of the original four disgust sentences, only two were identified as discrete disgust (i.e., "You see a bowel movement left unflushed in a public toilet.") or fear elicitors (i.e., "You are walking alone at night in a dangerous urban area and have to pass through a darkened alley.") in this sample following methods outlined by Mikels and colleagues (2005).

For the portion of the sample exposed to pictorial stimuli, average ratings for physiological or behavioral responses across the three disgust pictures were compared to average ratings following the fear pictures in order to identify a set of physiological and behavioral responses corresponding to each elicited emotion. For those exposed to sentence emotion elicitors, ratings for physiological or behavioral responses were compared across the single empirically identified disgust and fear sentence. Physiological and behavioral responses found

to distinguish between disgust and fear stimuli (pictorial or sentence elicitors) in terms of non-overlapping 90% confidence intervals (CIs) were considered to be disgust-focused and fear-focused response propositions. These items are highlighted on the resulting Script-Driven Imagery Response Checklist (SDI-RC) used for script development for the primary study (see Appendix B).

Subjective responding to the script-driven imagery procedure. Consistent with previous studies using the script-driven imagery procedure (e.g., Lanius et al., 2003; Olatunji, Babson, Smith, Feldner, & Connolly, 2009; Shin et al., 1999), self-reported disgust and anxiety elicited by the scripts were measured using a visual analog scale (VAS; Freyd, 1923). Participants were asked to report levels of disgust and anxiety prior to each phase of extinction (i.e., baselines) as well as following each script presentation. Ratings were made using a 0 (*no disgust/fear*) to 100 (*extreme disgust/fear*) scale. Ratings of script vividness were also obtained following each script using a 0 (*not at all vivid*) to 100 (*extremely vivid*) scale.

C. Procedure

Female participants were recruited from the University of Arkansas as well as from the Northwest Arkansas community. Specifically, verbal announcements were made in psychology classes and paper and electronic flyers were placed at various locations around campus and in the community. Interested women were given instructions to contact the Intervention Sciences Laboratory, so that an initial screening for eligibility could be conducted by telephone. Women deemed potentially eligible upon the initial phone screening were invited to the laboratory to complete additional measures and potentially (pending eligibility) the experimental procedures. During the laboratory session, participants were first informed of any potential risks associated with the study (e.g., temporary psychological distress associated with the script-driven imagery

procedure) and provided written informed consent before proceeding. Participants then completed the CAPS interview. Any participant ineligible to complete the study at that point received $10 in financial compensation, were debriefed regarding the study, and thanked for their time.

Imagery response training. All participants then completed 15-min of imagery response training designed to orient participants to response propositions while generating mental imagery. This procedure, which has been shown to increase synchrony between self-report and physiological measures of emotional reactivity to ideographic scripts (e.g., Lang, Kozak, Miller, Levin, & McLean, 1980; Lang, Levin, Miller, & Kozak, 1983), involved training participants to focus on their active responses in the imagery scene (e.g., physiological and behavioral responses).

Script generation. In collaboration with the experimenter, participants then generated four idiographic scripts in a manner consistent with previous studies utilizing the script-driven imagery procedure (Pitman, Orr, Forgue, de Jong, & Claiborn, 1987). Specifically, participants generated two neutral scripts followed by two sexual victimization scripts (one disgust-focused, one fear-focused). See Appendix D for a set of example scripts developed to illustrate the procedure.

Neutral scripts. Participants were first asked to identify a single autobiographical experience that they considered to be emotionally neutral. They were provided with a copy of the physiological response section of the SDI-RC and were asked to provide ratings of the degree to which they remembered experiencing each of the physiological sensations listed. From this list, the experimenter generated a list of the highest rated physiological response propositions and instructed the participant to include these in her written narrative of the experience (see

Appendix C for an example). The participant was also asked to focus on incorporating any sensory information, behaviors, thoughts, feelings, or conversations that occurred during the neutral experience. The experimenter then created two 30-second audio-recorded neutral scripts from the written narrative provided by the participant.

Trauma scripts. Participants were then asked to write about the index sexual trauma as identified during the CAPS. They were given a second SDI-RC and were asked to provide ratings of the degree to which they experienced each of the physiological sensations and wanted to engage in any of the behaviors listed (participants were instructed to provide ratings of 10 if they actually engaged in any of the behaviors listed) during the traumatic experience. For the purposes of the primary study an algorithm was developed to identify disgust-focused and fear-focused response propositions on the SDI-RC to be included in the sexual victimization scripts. This algorithm included both idiographic (i.e., participant ratings) and standardized (i.e., degree of disgust/fear differentiation in pilot data) factors to assign weights to each of the physiological and behavioral responses included in the SDI-RC. Highest rated physiological and behavioral disgust-focused and fear-focused propositions were chosen to maximize activation of the trauma-relevant network while maintaining experimental precision in script construction (see Appendix C for an example). In addition to incorporating the identified disgust-focused and fear-focused response propositions, the participant was also asked to include any sensory information, thoughts, feelings, or conversations that occurred during the sexual experience. The experimenter then created two 30-second audio-recorded sexual victimization scripts (one disgust-focused, one fear-focused) from the written narrative provided by the participant.

Randomization and group design. After script generation, participants were randomly assigned to 1 of 4 groups, determining script content for Phases I and II of the extinction protocol

(see Figure 1 for an overview of extinction phases in each group, and "**Extinction phases"** below for a description of the specific extinction procedure). Participants were randomized into one of two experimental groups (Group 1 or 2) or one of two control groups (Group 3 or 4).

Condition. Experimental groups received 8 trauma script trials (4-disgust focused, 4-fear focused) and 2 trials of neutral script content (trials 1-3 [Phase 1, trial 3] and 2-3 [Phase 2, trial 3]). The two control groups received 4 trauma script trials (disgust-focused assessments and fear-focused assessments) and 6 trials of neutral script content (trials 1-2, 1-3, 1-4, 2-2, 2-3, and 2-4). The control conditions offered critical comparisons for testing hypotheses as they provided methodological control for possible effects of repeated assessment and non-specific factors related to attending the laboratory-based session that could explain changes in fear and disgust across the protocol. Moreover, this approach required only two presentations of each emotion-specific sexual victimization script to each group. This amount of trauma-relevant stimulus presentation allowed for a measurement of disgust- and fear-based reactivity to emotion-specific trauma stimuli before and after neutral stimulus presentations, yet was not expected to result in levels of extinction comparable to the full protocol included in the experimental groups.

Order. Order of script presentation was counterbalanced across participants, given that exposure to disgust-focused stimuli may affect responses to fear-focused stimuli and vice-versa. Groups 1 (experimental) and 3 (control) were presented with disgust-focused trauma scripts followed by fear-focused trauma scripts, while Groups 2 (experimental) and 4 (control) were presented with fear-focused trauma scripts, followed by disgust-focused trauma scripts.

Extinction phases. Consistent with prior research demonstrating differential extinction of disgust and fear (Smits et al., 2002, Olatunji, Smits, et al., 2007), each extinction phase included 30-min of extinction (5-min baseline plus 5 extinction trials [approximately 5-min

each]), to maximize the likelihood of detecting differential extinction.

Phase I. Based on published script-driven imagery procedures (e.g., Badour et al., 2011; Olatunji, Wolitzky-Taylor, et al., 2009; Orr et al., 1998; Pitman et al., 2002), Phase I of the extinction protocol consisted of the following three components: 1) 5-min resting baseline, and 2) 5 extinction trials. Each extinction trial consisted of six sections: 1) 30-sec pre VAS ratings, 2) 30-sec baseline period, 3) 30-sec script presentation, 4) 30-sec imaginal rehearsal, 5) 30-sec recovery, and 6) 2-min post VAS ratings and inter-trial-interval. A conservative 2-min inter-trial-interval was selected based on evidence of return to baseline levels in brain activity within 60-sec of exposure to script-driven imagery in those with and without PTSD (Lanius et al., 2002).

Phase II. Participants then completed Phase II of the extinction protocol, which was identical to Phase I with the exception of script content (please see Figure 1 for an overview). During the protocol, participants were sitting alone in the experimental room.

Debriefing and compensation. Upon completion of extinction Phase II, participants were debriefed, provided with referrals to local health care providers, informed about common reactions to traumatic events, and compensated $40.

III. RESULTS

A. Descriptive Statistics

First, group equivalence with regard to baseline characteristics was examined via one-way analysis of variance (ANOVA) to validate the efficacy of random assignment. Groups were not found to differ in terms of age [$F(3, 68) = 2.65$, $p = .05$], annual income [$F(3, 64) = 1.20$, $p = .32$], level of education [$F(3, 68) = .85$, $p = .47$], age at which the index trauma occurred [$F(3, 68) = .25$, $p = .86$], posttraumatic stress symptoms [$F(3, 68) = .93$, $p = .43$], or baseline ratings of

anxiety [$F(3, 68) = 1.56$, $p = .21$] or disgust [$F(3, 67) = .04$, $p = .99$]. Percentage of minority individuals [$\chi^2(3, N= 72) = 2.34$, $p = .51$] or those with a current PTSD diagnosis [$\chi^2(3, N= 72) = 1.05$, $p = .79$] also did not differ as a function group.

As imagery vividness may influence the degree of engagement with the traumatic memory, possible differences in vividness between disgust-focused and fear-focused script content were also examined. An independent samples *t*-test found no differences in terms of script vividness for the first trauma script presentation (trial 1-1) as a function of stimulus type [disgust-focused ($M_{\text{Groups 1 and 3}} = 74.14$, $SD = 23.03$), fear-focused ($M_{\text{Groups 2 and 4}} = 79.66$, $SD = 17.85$), $t = -.87$, $p = .39$].

Raw scores for disgust and anxiety responding for trials 1-1, 1-5, 2-1, and 2-5 (those involving sexual trauma content for all participants) are presented in Table 1.

B. Manipulation Check

Successful manipulation of traumatic event script content into disgust-focused and fear-focused scripts was examined in two ways. First, two research assistants blind to study hypotheses rated all scripts in terms of intensity of disgust and anxiety associated with each script on a 0 – 100 scale. Two paired-sample *t*-tests were used to compare 1) average research assistant ratings of disgust and anxiety in response to presentation of a disgust-focused script at trial 1-1 (groups 1 and 3) and 2) average ratings of disgust and anxiety in response to presentation of a fear-focused script at trial 1-1 (groups 2 and 4). Within this small sample ($N = 2$), *t*-tests did not result in statistically significant differences for ratings in response to the disgust script [$t(2) = -1.66$, $p = .40$] or fear script [$t(2) = 2.71$, $p = .23$]. However, research assistant's average ratings of disgust were 40.44 points higher for disgust-focused scripts ($M_{Groups\ 1\ and\ 3} = 80.67$, $SD = 15.09$) relative to fear-focused scripts ($M_{Groups\ 2\ and\ 4} = 40.23$, $SD = 31.03$) and

ratings of anxiety were 12.2 points higher for fear-focused scripts ($M_{Groups\ 2\ and\ 4}$ =82.39, *SD* = 9.03; relative to disgust-focused scripts $M_{Groups\ 1\ and\ 3}$ =70.19, *SD* = 4.65). Two mixed factor ANOVAs adding research assistant coder as a between-subjects factor with emotion ratings (disgust, anxiety) as within-subjects factors were also examined to offer preliminary evidence regarding inter-rater reliability of emotionality of the scripts. However, this model failed to converge due to power issues.

Second, participant ratings of disgust and anxiety were examined as a function of trial 1-1 script content. Ratings of disgust in response to the first trauma script presentation (trial 1-1) did not differ based on stimulus type [disgust-focused stimuli ($M_{Groups\ 1\ and\ 3}$ =61.74, *SD* = 34.34) versus fear-focused stimuli ($M_{Groups\ 2\ and\ 4}$ =58.53, *SD* = 36.28); *t* = .38, *p* = .71). A similar pattern was observed for ratings of anxiety in response to the first trauma script presentation [disgust-focused stimuli ($M_{Groups\ 1\ and\ 3}$ = 49.23, *SD* = 31.91) versus fear-focused stimuli ($M_{Groups\ 2\ and\ 4}$ = 51.75, *SD* = 31.67); *t* = -.33, *p* = .74].

C. Primary Hypothesis Testing

The primary hypothesis that repeated exposure to traumatic event cues (including both disgust-focused and fear-focused stimuli) would result in less extinction of disgust as compared to anxiety (Hypothesis 1) was tested utilizing a linear mixed modeling approach. Linear mixed modeling is ideal for modeling change, as it allows for estimates of group and individual level change trajectories across time and appropriate modeling of covariance structures when observations are correlated across time (Singer & Willett, 2003). Relative to repeated measures ANOVA or multivariate analysis of variance (MANOVA), linear mixed modeling is a more flexible and powerful analytic approach for modeling individual change trajectories (Bagiella, Sloan, & Heitjan, 2000; Krueger & Tian, 2004; Shek & Ma, 2011). Initial models were

examined using an unstructured covariance matrix. This covariance matrix has the advantage of having no mathematical constraints, allowing each variance and covariance to be estimated uniquely from the data. This model typically results in the best model fit because variance and covariance estimates are most reflective of the actual data when the number of measurement occasions is relatively small (Fitzmaurice, Laird, & Ware, 2011; Shek & Ma, 2011). Alternative covariance structures were also examined 1) within Model 3.a. and 3.b. to compare model fit, and 2) when the use of an unstructured matrix resulted in the failure of model convergence due to the high number of parameter estimates required using this covariance structure (Model 4).

Model 0: Unconditional mean model (null model). Two separate unconditional mean models, or random intercept models, were run to identify estimated mean scores (Model 0.a: disgust, Model 0.b: anxiety) for all participants (intercept) in order to determine the variance within each level of analysis (Level 1: intra-individual, Level 2: inter-individual). The intraclass correlation (ICC) coefficient ρ was used to establish the proportion of variance in the outcome variables attributed to inter-individual differences within the sample. As opposed to traditional repeated measures analysis of variance (ANOVA), the use of multilevel analyses to model individual growth has been recommended for data with an ICC greater than or equal to .25 (Heinrich, & Lynn, 2001; Shek & Ma, 2011).

Model 0.a: Should disgust responding be predicted using multilevel modeling? The unconditional mean model suggested intercepts for disgust varied significantly across individuals ($\beta = 836.74$, Wald $Z = 5.24$, $p < .001$), with significant within-individual variance remaining to be explained ($\beta = 459.07$, Wald $Z = 10.23$, $p < .001$). A total of 64.6% of variance in disgust was found to be due to inter-individual differences ($\rho = .65$), supporting the use of multilevel

modeling to explain variability in intercepts and slopes of disgust across the course of exposure trials.

Model 0.b.: Should anxiety responding be predicted using multilevel modeling? The unconditional mean model suggested intercepts for anxiety varied significantly across individuals ($\beta = 890.96$, Wald $Z = 5.48$, $p < .001$), with significant within-individual variance remaining to be explained ($\beta = 320.79$, Wald $Z = 10.21$, $p < .001$). A total of 73.5% of variance in anxiety was found to be due to inter-individual differences ($\rho = .74$), supporting the use of multilevel modeling to explain variability in intercepts and slopes of anxiety across the course of exposure trials.

Model 1: Unconditional linear growth curve model. Two separate unconditional linear growth models, or random intercept and slope models, were generated to examine individual variation in growth rate across the course of extinction trials delivered to all participants (trials 1-1, 1-5, 2-1, 2-5; Model 1.a.: disgust, Model 1.b.: anxiety). Trials were coded as 0 (initial response), 1, 2, and 3 in the dataset to aid in interpretation of coefficients. A graphic representation of Models 1.a. and 1.b. are presented in Figure 2.

Model 1.a.: Does disgust decline across the course of exposure? Examination of Akaike's Information Criterion (AIC = 2651.41) suggested that including growth in disgust (i.e., positive or negative change) across the course of exposure trials significantly improved the model fit as compared to the unconditional mean model (Model 0.a. AIC = 2675.89). Mean VAS ratings following the first exposure trial (trial 1-1; $\beta_0 = 62.47$, $SE = 4.01$, $p < .001$) suggested the sexual trauma scripts elicited significant initial elevations in disgust across the sample. However, ratings of disgust did not significantly change across the course of exposure trials ($\beta = -2.19$, $SE = 1.50$, $p = .15$). Estimates of covariance parameters suggested that

significant inter-individual variability in initial disgust ratings (Wald Z = 4.90, $p < .001$), and slopes of change in disgust across the course of exposure (Wald Z = 3.65, $p < .001$) remained to be explained. The covariance between the intercept and slope was non-significant (Wald Z = -1.78, $p = .08$).

Model 1.b.: Does anxiety decline across the course of exposure? Examination of AIC values (AIC = 2578.71) suggested that including growth in anxiety across the course of exposure trials significantly improved the model fit as compared to the unconditional mean model (Model 0.b. AIC = 2593.44). Mean VAS ratings following the first exposure trial (trial 1-1; $\beta_0 = 50.20$, $SE = 3.52$, $p < .001$) suggested the sexual trauma scripts elicited significant initial elevations in anxiety across the sample. In addition, ratings of anxiety significantly decreased across the course of exposure trials ($\beta = -2.45$, $SE = 1.11$, $p < .05$). Estimates of covariance parameters suggested that significant inter-individual variability in initial anxiety ratings (Wald Z = 4.74, $p < .001$) and slopes of change in anxiety across the course of exposure (Wald Z = 2.20, $p < .05$) remained to be explained. The covariance between the intercept and slope was non-significant (Wald Z = 1.24, $p = .21$).

Model 2: Unconditional quadratic growth model. Given that previous research suggests growth trajectories are often nonlinear (i.e., rates of change differ across time), the quadratic rate of change was tested by adding a quadratic growth parameter to Model 1 in order to examine whether the rate of growth accelerated or decelerated across trials.

Model 2.a: Is decline in disgust nonlinear across the course of exposure? As the linear growth parameter for disgust was not significant, quadratic changes in individual trajectories were not examined.

Model 2.b.: Is decline in anxiety nonlinear across the course of exposure?

Examination of AIC values (AIC = 2580.47) suggested that including the quadratic growth parameter did not significantly improve model fit as compared to the unconditional linear growth model. Similarly, the quadratic growth parameter was not significant in this model (β = -.47, *SE* = .96, p = .63), suggesting the rate of decline in anxiety did not change across the course of exposure.

Model 3: Examining alternative covariance structures. Alternative covariance structures including compound symmetry and first-order autoregressive matrices were examined for Model 1.a. and 1.b. Likelihood ratio tests were used to compare model fit based on the nested structure of the models.

Model 3.a.: Does an alternative covariance structure improve model fit for predicting change in disgust? Likelihood ratio tests suggested that neither compound symmetry [-2 log likelihood (-2LL) = 2693.15; $\chi^2(2) = 53.74$, $p < .001$] nor first-order autoregressive [-2LL = 2693.15; $\chi^2(2) = 53.74$, $p < .001$] significantly improved model fit as compared to the unstructured matrix (-2LL = 2639.41).

Model 3.b.: Does an alternative covariance structure improve model fit for predicting change in anxiety? Likelihood ratio tests suggested that neither compound symmetry [-2LL = 2627.63; $\chi^2(2) = 60.92$, $p < .001$] nor first-order autoregressive [-2LL = 2627.63; $\chi^2(2) = 60.92$, $p < .001$] improved model fit as compared to the unstructured matrix (-2LL = 2566.71).

Model 4: Doubly multivariate model. Data were submitted to a doubly multivariate linear mixed model (i.e., multivariate outcome [disgust, anxiety] over repeated trials) to examine differences in initial ratings and the relative rate of change in the two dependent measures while accounting for the covariance between the two dependent variables. To test this model, a

dummy-coded outcome variable (disgust versus anxiety) and the interaction of disgust versus anxiety by trial were entered into the model. The initial model using an unstructured Level 1 covariance structure failed to converge, due to the large number of parameter estimates. The model was then rerun using the more restrictive compound symmetry covariance matrix. These results suggested that initial ratings of negative affect (disgust and anxiety) in response to trial 1-1 were significantly greater than zero [$F(2, 123.16) = 163.73$, $p < .001$]. Further examination revealed that initial ratings of disgust (Trial 1-1: $\beta_0 = 62.29$, $SE = 3.49$) were significantly higher than ratings of anxiety ($\beta_0 = 50.32$, $SE = 3.48$; $t = 4.38$, $p < .001$).

In contrast, change in negative affect across the course of exposure did not reach significance within this model [$F(2, 132.08) = 2.22$, $p = .11$]. Growth parameters for individual emotional responses were examined only to directly compare slope trajectories for change in disgust and anxiety (per Hypothesis 1). In contrast with the primary hypothesis, the rate of decline in disgust ($\beta = -2.21$, $SE = 1.42$) was not found to significantly differ from the rate of decline in anxiety ($\beta = -2.36$, $SE = 1.42$; $t = .08$, $p = .94$). Graphic representations of the average individual growth curves for disgust and anxiety across the course of exposure are presented in Figure 3.

Model 4.a. Repeated measures multivariate analysis of variance (MANOVA).

Although results of the unconditional means models for disgust and anxiety suggest the data should ideally be modeled using mixed linear modeling, the complexity of the doubly multivariate model to compare trajectories of growth in disgust and anxiety while accounting for the covariance between these factors precluded model convergence using an unstructured covariance matrix. Although Model 3 presents results using the more restrictive compound symmetry structure, these results should be interpreted with caution. A compound symmetric

covariance structure constrains the values in the data such that all pairwise differences of the means for within-subjects data points have identical variances and covariances (consistent with the sphericity assumption; Field, Miles & Field, 2012). Examination of Mauchly's test of sphericity suggests the data for disgust ($\chi^2(5) = 29.65$, $p < .001$), but not anxiety ($\chi^2(5) = 9.99$, $p = .08$), violated the sphericity assumption. As such, these data were rerun using a repeated measures MANOVA (using an unstructured covariance matrix for multivariate tests) while correcting for degrees of freedom when examining the intercept and within-subjects change across trials for disgust-related outcomes via Greenhouse-Geisser estimates of sphericity ($\varepsilon = .75$). Results of the omnibus MANOVA test suggested the intercept for overall negative affect differed significantly from zero [$F(2, 64) = 120.93$, $p < .001$; Wilk's $\Lambda = 0.21$, partial $\eta^2 = .79$], and that overall negative affect changed across the course of exposure [$F(6, 60) = 2.28$, $p < .05$; Wilk's $\Lambda = 0.81$, partial $\eta^2 = .19$]. Consistent with results of the unconditional linear growth models using mixed linear modeling (Model 1.a. and 1.b.), examination of change in individual emotional responses suggested that anxiety [$F(3, 195) = 2.90$, $p < .05$, partial $\eta^2 = .04$] declined across the course of exposure, while disgust did not [$F(2.26, 146.64) = 1.52$, $p = .22$, partial $\eta^2 = .02$]. Graphic representations of the estimated marginal means for disgust and anxiety across the course of exposure are presented in Figure 4.

D. Secondary Hypothesis Testing

Secondary hypotheses were tested to examine whether factors associated with the study design including Condition (experimental versus control; Hypothesis 2.1) and/or Order (disgust-first versus fear-first; Hypothesis 2.2) predicted change in disgust (Model 1.a.) and anxiety ratings (Model 1.b.).

Model 5: Conditional linear growth model. To examine whether characteristics of the study design (i.e., Condition, Order) predicted growth trajectories for disgust or anxiety, 1) Condition (experimental [Groups 1 and 2] versus control [Groups 3 and 4]), 2) Order of exposure (disgust-focused content first [Groups 1 and 3] versus fear-focused content first [Groups 2 and 4]), 3) the interaction of Condition and Order, and 4) the interactions of each of these terms with the linear growth term (Condition by Trial, Order by Trial, Condition by Order by Trial) were added to the model to examine predictors of change in anxiety within the unconditional linear growth model (Model 1).

Model 5.a.: Do experimental condition and stimulus order predict change in disgust? As the linear growth parameter for disgust was not significant, predictors of individual trajectories were not examined for disgust.

Model 5.b.: Do experimental condition and stimulus order predict change in anxiety? Examination of AIC values (AIC = 2586.14) suggested that the inclusion of predictors did not significantly improve model fit as compared to the unconditional linear growth model. Similarly, the predictors of Condition (β = -1.73, *SE* = 3.53, p = .63), Order (β = -.32, *SE* = 3.53, p = .93), Condition by Order (β = -.37, *SE* = 3.53, p = .92), Condition by Trial (β = -.49, *SE* = -.45, p = .65), Order by Trial (β = 1.42, *SE* = 1.08, p = .19), and Condition by Order by Trial (β = -1.63, *SE* = 1.08, p = .14) were all non-significant. Given the number of predictors and limited power to adequately test the model, additional models were tested including only 1) Condition and Condition by Trial, or 2) Order and Order by Trial as predictors. All predictors remained non-significant.

E. Tertiary Hypothesis Testing

In order to provide a relatively pure assessment of responding to emotion-specific traumatic

stimuli, data were only used from Phase I of the extinction procedure (i.e., disgust-focused [Groups 1 and 3] and fear-focused [Groups 2 and 4]) to test tertiary hypotheses regarding change in disgust and anxiety to emotion-specific stimuli (Hypotheses 3.1 and 3.2).

Model 6: Examining change in response to emotion-specific stimuli. To increase power and examine possible differences based on number of exposure trials (i.e., experimental [4 trials in Groups 1 and 2] versus control [2 trials in Groups 3 and 4]), all participants were included in this set of analyses. Given that the first and last trials of Phase I of extinction (e.g., trials 1-1, 1-5) include traumatic event content for all groups in the study, VAS ratings following these two trials were submitted as data points into two separate repeated measures analyses of variance (ANOVAs). This approach was utilized because linear mixed modeling of repeated measures data requires at least three repeated measurements. Models included two between-subjects factors each with two levels (Condition: experimental, control; Stimulus Type: disgust-focused, fear-focused) and one within-subjects factor with two levels (Model 6.a.: disgust VAS ratings [trials 1-1 and 1-5] or Model 6.b.: anxiety VAS ratings [trials 1-1 and 1-5]).

Model 6.a.: Does disgust decline more in response to disgust-focused stimuli as compared to fear-focused stimuli? Examination of within-subjects effects suggested ratings of disgust did not change significantly from trial 1-1 to trial 1-5 [$F(1, 65) = .36$, $p = .55$, partial $\eta^2 = .01$]. This effect was not moderated by Condition [$F(1, 65) = .05$, $p = .82$, partial $\eta^2 = .00$], Stimulus Type [$F(1, 65) = .06$, $p = .81$, partial $\eta^2 = .00$], or the Condition by Stimulus Type interaction [$F(1, 65) = 1.05$, $p = .31$, partial $\eta^2 = .02$].

Model 6.b.: Does anxiety decline more in response to fear-focused stimuli as compared to disgust-focused stimuli? Examination of within-subjects effects suggested ratings of anxiety did not change significantly from trial 1-1 to trial 1-5 [$F(1, 66) = 1.78$, $p = .19$, partial $\eta^2 = .03$].

This effect was not moderated by Condition [$F(1, 66) = .31$, $p = .58$, partial $\eta^2 = .01$], Stimulus Type [$F(1, 66) = 1.27$, $p = .26$, partial $\eta^2 = .02$], or the Condition by Stimulus Type interaction [$F(1, 66) = 1.23$, $p = .27$, partial $\eta^2 = .02$].

IV. DISCUSSION

While leading theories suggest activation and extinction of conditioned fear-based reactions associated with traumatic experiences are central to the reduction of posttraumatic stress symptoms, research has increasingly recognized the importance that other negative emotions may play in this process. In particular, the emotion of disgust appears to be important within the context of posttraumatic stress reactions subsequent to certain traumatic experiences such as those involving sexual trauma (Badour et al., 2013; Fairbrother & Rachman, 2004). Despite this recognition, there has heretofore been an absence of empirical research documenting how persistent disgust reactions associated with sexual traumatization are influenced by exposure-based treatments. This is surprising in light of research documenting a relative resistance to extinction of conditioned disgust-based responding generally (Mason & Richardson, 2010; Olatunji, Forsyth, et al., 2007), and in response to exposure-based treatment for other anxiety psychopathology (Olatunji, Smits, et al., 2007; Olatunji, Wolitzky-Taylor, et al., 2009; Smits et al., 2002). Accordingly, the current study was designed to serve as a preliminary examination of the relative rates of decline in disgust as compared to anxiety in response to repeated exposure to reminders of sexual victimization. In addition, the study aimed to examine the potential utility of modifying content of exposure in order to target the reduction of specific emotions (i.e., disgust, anxiety). This is an important contribution to the literature, as existing exposure-based treatments for posttraumatic stress focus on activation and extinction of

conditioned fear and anxiety associated with traumatic memories. Results of the present study were mixed. Implications for treatment and future research are discussed below.

A. Differences in Initial Activation of Disgust and Anxiety

Although not specifically hypothesized, results demonstrated that initial ratings of disgust in response to the first traumatic event script were significantly higher than ratings of anxiety. This is consistent with prior research documenting higher levels of disgust reactivity as compared to anxiety reactivity in response to sexual trauma reminders within the context of a script-driven imagery paradigm (Badour et al., 2013). This finding may have important implications for treatment, which have not been previously addressed within the PTSD intervention literature. For example, if reminders of sexual trauma, or other traumatic experiences, are indeed associated with initially heightened intensity of conditioned disgust as compared to fear or anxiety, additional exposure may be required to sufficiently extinguish conditioned disgust responding regardless of whether the emotions of disgust and anxiety exhibit differential rates of extinction. This finding is particularly pertinent given that current exposure-based treatment protocols for PTSD call only for the repeated assessment of anxiety/general discomfort ratings in response to exposure exercises (e.g., Foa & Rothbaum, 1998). Thus it is possible in some cases that clinicians may terminate exposure prior to achieving successful extinction of heightened traumatic event-related disgust responding. It is important to note, however, that observed differences in magnitude of initial emotional responding to traumatic event cues may be a function of the relative ease with which the emotion of disgust can be elicited by laboratory stimuli as compared to other negative emotions such as fear and anxiety (Chapman & Anderson, 2012). Additional research is needed to elucidate the relative conditionability and susceptibility to new extinction learning of disgust as compared to fear

within the context of sexual trauma as well as in relation to other traumatic events where disgust may be less central.

B. Differential Extinction of Disgust and Anxiety

When accounting for both initial levels of emotional responding to the first traumatic event script (i.e., individual unconditional linear growth curve models [models 1.a. and 1.b.), and the covariation between disgust and anxiety (i.e., repeated measures MANOVA [model 4.a.]) results demonstrated that ratings of anxiety declined significantly across the course of exposure, while ratings of disgust did not. Although this pattern is consistent with the primary hypothesis regarding relative resistance of extinction in disgust as compared to anxiety, comparison of the two slopes within a single model failed to detect a statistically significant difference in the rates of decline (doubly multivariate linear mixed model [model 4]). Similarly, examination of average individual growth trajectories (Figures 2 and 3) and estimated marginal means (Figure 4), suggest negligible differences in the rates of change in disgust and anxiety within the current sample. While it is possible that traumatic event-related disgust and anxiety do indeed decline at the same rate in response to imaginal exposure, there are several factors associated with the design of the current study that may have contributed to the present pattern of findings.

This study represented the first attempt to employ a script-driven imagery procedure repeatedly within the laboratory to examine extinction of conditioned emotions associated with traumatic experiences. It is possible that adjustments to this method may be required to appropriately model the process of extinction observed within empirically-supported and evidence-based treatments for PTSD. Indeed, the current data demonstrate an average decrease of 14.20% for ratings of anxiety and 9.6% for ratings of disgust from the initial to final extinction trials. This compares with an average decrease (from peak anxiety ratings) ranging

from 28.73% (for treatment non-responders) to 42.68% (for treatment responders) during the first session of imaginal exposure (van Minnen & Hagenaars, 2002) within the context of Prolonged Exposure for PTSD (Foa & Rothbaum, 1998; Foa, Rothbaum, Riggs, & Murdock, 1991). While expected rates of decline in disgust during Prolonged Exposure are not available for comparison due to a dearth of research in this area, differences in rates of decline in anxiety suggest that the exposure paradigm within the current study resulted in a relatively modest degree of change.

There were several methodological considerations within this study that led to deviations from methods of imaginal exposure utilized in therapeutic interventions. This effort to isolate processes associated with extinction of specific conditioned traumatic event-related emotions for study in the laboratory may have resulted in a less potent exposure procedure. For example, within Prolonged Exposure therapy (Foa & Rothbaum, 1998; Foa et al., 1991), patients are provided with a theoretical rationale prior to beginning exposure and are given the opportunity to process with a therapist any emotions and thoughts that emerge during the imaginal exposure process. It is possible that the absence of these aspects of exposure, differences in expectations regarding change in therapy as compared to in a research study, as well as other features of the experimental design such as the brief length of the traumatic event scripts, the effort made to constrain the content of the scripts in order to target certain emotions, and the delivery of mass trials within a single session may have precluded sufficient extinction of conditioned disgust responding, anxiety responding, or both.

In light of these considerations, it is important to proceed with caution when interpreting the current results. Future research should explore alternative approaches to this methodology in order to better investigate differential patterns of extinction within the laboratory. In considering

modifications to the current design, there may be particular incremental utility in adding additional experimental sessions. Indeed, basic learning research suggests the delivery of temporally spaced blocks of trials (cf., massed trials) enhances extinction learning (Baum, Andrus, & Jacobs, 1990; Cain, Blouin & Barad, 2003), and minimizes renewal and spontaneous recovery following successful extinction (Urcelay, Wheeler, & Miller, 2009). Moreover, research suggests between-session decline in conditioned traumatic event-related anxiety is a better predictor of improvement in posttraumatic stress symptoms relative to within-session decline in anxiety during exposure treatment (Jaycox, Foa, & Morral, 1998; van Minnen & Hagnaars, 2002). One possibility here would be to include a follow-up assessment session in which emotional responding to the traumatic event scripts is re-assessed following a pre-determined interval (e.g., one-week, one-month) in order to test whether 1) additional change in either disgust or anxiety responding occurs after the experimental session, or 2) whether the experimental procedure has any lasting effects on posttraumatic stress symptoms. An alternative option would be to include additional extinction sessions in order to maximize the potency of the extinction paradigm and increase the likelihood of observing differential extinction patterns in disgust and anxiety if they are indeed present.

C. Quantity of Exposure Trials

Although anxiety declined significantly across the course of exposure, the number of exposure trials did not moderate this rate of change. When considering modifications to the current procedure, it is noteworthy that the inclusion of four additional traumatic event script presentations in the experimental group did not result in additional extinction of anxiety within the laboratory session. This lends further support to the recommendation that future research in this area considers spacing extinction trials over more than one experimental session.

D. Order of Exposure Trials and Emotion-Specific Extinction Patterns

Prior research did not offer any suggestions regarding whether order of exposure content (disgust-focused first versus fear-focused first) should be expected to impact patterns of extinction for either disgust or anxiety. While presentation order did not significantly moderate the rate of change in anxiety across the course of the exposure in the present study, there are several factors to consider within this domain. First, it is important to note that ratings for both anxiety and disgust failed to decline significantly during Phase I (trial 1-1 through 1-5) of the extinction protocol. This suggests Phase I likely included an insufficient number of emotion-specific trials in order to evaluate patterns of extinction in either disgust or anxiety. This is critical as tests of tertiary hypotheses regarding emotion-specific stimuli included only data from Phase I of the extinction protocol. As such, the absence of a finding regarding stimulus-specific reductions in disgust or anxiety (e.g., disgust declining more in response to disgust-focused stimuli as compared to in response to fear-focused stimuli) should not be interpreted as evidence regarding the absence of this phenomenon.

In addition, although blind ratings of specific emotions associated with the scripts for this sample suggest that the manipulation of script content was successful in differentiating between disgust-focused and fear-focused traumatic event cues, participants reported similarly high initial ratings of disgust and anxiety (trial 1-1) in response to both types of script content. This is consistent with prior research documenting at least some activation of a variety of negative emotions in addition to the target emotion when participants are presented with scripts designed as emotion-specific elicitors (Prkachin, Williams-Avery, Zwaal, & Mills, 1999). This may reflect the degree to which activation of disgust and anxiety are intertwined within the context of responding to traumatic event cues; however, further research is needed to determine whether

emotion-specific patterns in extinction (cf., initial activation) would emerge in response to a sufficient number of disgust-focused or fear-focused trials.

Given the potential implications associated with targeting exposure-based treatments to reduce specific emotions linked to traumatic experiences, future research should specifically seek to design a study more ideally suited to test these hypotheses. If targeting emotion-specific content of imaginal exposure is indeed found to increase extinction of congruent emotional responding, this has important implications for the ability of clinicians to tailor imaginal exposure to individual patient concerns. Future studies in this area might benefit from employing 1) a within-subjects design with a sufficient number of emotion-specific trials within each phase in order to examine patterns of extinction across the entire study as well as within each phase, or 2) a between-subjects design in which participants receive either exclusively disgust-focused or fear-focused traumatic event stimuli.

E. Study Limitations and Future Directions

In addition to the aforementioned limitations to the study design, there are a number of additional limitations to the current study that warrant attention. First, although the decision to include participants with a range of posttraumatic stress symptoms was supported by research suggesting a dimensional (as opposed to taxonic) nature of posttraumatic stress reactions with PTSD representing the upper end of this continuum (Ruscio, Ruscio, & Keane, 2002), it is possible that extinction of traumatic event-related emotional responding may look different among individuals with more severe symptoms. As such, future research should consider investigating the possibility of differential extinction of traumatic event-related disgust and anxiety among a clinical sample.

Second, the current study included only women, based on research suggesting women disproportionately experience instances of sexual trauma (Tolin & Foa, 2008). However, research also consistently finds differences in disgust responding to laboratory tasks as a function of gender (Curtis, Aunger, & Rabie, 2004; Gross & Levenson, 1995; Rohrmann, Hopp, & Quirin, 2008; Schienle, Schäfer, Stark, Walter, & Vaitl, 2005), including in response to traumatic event-related script-driven imagery (Olatunji, Babson, et al., 2009). Future research should examine whether patterns of initial activation and extinction of conditioned traumatic event-related disgust and anxiety vary as a function of gender.

Third, the current study included only individuals with a history of sexual trauma because of specific links between sexual trauma and heightened disgust responding relative to other traumatic events (Badour et al., 2013; Feldner et al., 2010). However, additional research is needed to understand specific patterns of emotional responding following traumatic events other than sexual trauma. For example, preliminary research points to a role of disgust in posttraumatic stress secondary to combat exposure, even after accounting for fear and anxiety (Engelhard, Olatunji, & de Jong, 2011; Foy, Sipprelle, Rueger, & Carroll, 1984).

Finally, not all individuals suffering from posttraumatic stress reactions are likely to experience difficulties with traumatic event-related disgust. However, identification of persistent feelings of disgust and related phenomenon including mental contamination may inform individualized case conceptualization and intervention delivery for certain subgroups of patients. For example, preliminary work suggests some individuals with PTSD following childhood sexual abuse may benefit from an adjunctive intervention designed to specifically target the reduction of feelings of contamination resulting from their traumatic experience (Jung & Steil, 2012; Steil, Jung, & Stangier, 2011). Moving forward, it will be important to identify whether existing

intervention approaches for alleviating PTSD symptomatology are also successful in reducing disgust and feelings of mental contamination among individuals experiencing these concerns.

F. Conclusion

Taken as a whole, the present findings offer a novel contribution to the emerging body of literature documenting the importance of disgust in understanding the emotional correlates of and recovery from posttraumatic stress reactions secondary to sexual trauma. Although limitations of the study design preclude confident conclusions regarding specific patterns of extinction in disgust and anxiety, these results do converge with previous laboratory research suggesting women with a history of sexual victimization may actually respond to traumatic event reminders with increased feelings of disgust as compared to feelings of anxiety. Thus, regardless of whether disgust and anxiety exhibit differential patterns of extinction, traumatic event-related disgust may still require additional exposure in order to achieve sufficient reduction of this emotion. Additional research is now needed within both the laboratory and clinical settings in order to further elucidate our understanding of disgust and anxiety extinction within the context of posttraumatic stress.

IV. REFERENCES

American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4th Edition – Text Revision). Washington, DC: Author.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th edition). Washington, D.C.: Author.

Badour, C. L., Feldner, M. T., Babson, K. A., Blumenthal, H. & Dutton, C. E. (2013). Disgust, mental contamination, and posttraumatic stress: Unique relations following sexual versus non-sexual assault. *Journal of Anxiety Disorders, 27,* 155-162. doi: 10.1016/j.janxdis.2012.11.002

Badour, C. L., Feldner, M. T., Babson, K. A., Smith, R. C., Blumenthal, H., Trainor, C. D., Bunaciu, L., & Olatunji, B. O. (2011). Differential emotional responding to ideographic cues of traumatic interpersonal violence compared to non-interpersonal traumatic experiences. *Journal of Experimental Psychopathology, 2,* 400-417. doi: 10.5127/jep.014711

Baeyens, F., Crombez, G., van den Bergh, O., & Eelen, P. (1988). Once in contact, always in contact: Evaluative conditioning is resistant to extinction. *Advances in Behaviour Research and Therapy, 15,* 257-277. doi: 10.1016/0146-6402(88)90014-8

Bagiella, E., Sloan, R. P., & Heitjan, D. F. (2000). Mixed-effects models in psychophysiology. *Psychophysiology, 37,* 13-20. doi: 10.1111/1469-8986.3710013

Baum, M., Andrus, T., & Jacobs, W. J. (1990). Extinction of a conditioned emotional response: Massed and distributed exposures. *Behaviour Research and Therapy, 28,* 63-68. doi: 10.1016/0005-7967(90)90055-N

Blake, D. D., Weathers, F. W., Nagy, L. M., Kaloupek, D. G., Gusman, F. D., Charney, D. S., & Keane, T. M. (1995). The development of a clinician-administered PTSD scale. *Journal of Traumatic Stress, 8,* 75-90. doi: 10.1002/jts.2490080106

Blanchard, E. B., & Hickling, E. J. (2004). *After the Crash.* Washington, DC: American Psychological Association.

Bonanno, G. A., Keltner, D., Noll, J. G., Putnam, F. W., Trickett, P. K., LeJeune, J., & Anderson, C. (2002). When the face reveals what the words do not: Facial expressions of emotion, smiling, and the willingness to disclose childhood sexual abuse. *Journal of Personality and Social Psychology, 83,* 94-110. doi: 10.1037/0022-3514.83.1.94

Boscarino, J. (2006). Posttraumatic stress disorder and mortality among U.S. Army veterans 30 years after military service. *Annals of Epidemiology, 16,* 248-256. doi: 10.1016/j.annepidem.2005.03.009

Breslau, N., Davis, G., C., D., Andreski, P., & Peterson, E. (1991). Traumatic events and posttraumatic stress disorder in an urban population of young adults. *Archives of General Psychiatry, 48,* 218-222. doi: 10.1001/archpsyc.1991.01810270028003

Cain, C. K., Blouin, A. M., & Barad, M. (2003). Temporally massed CS presentations generate more fear extinction than spaced presentations. *Journal of Experimental Psychology: Animal Behavior Processes, 29,* 323-333. *doi:* 10.1037/0097-7403.29.4.323

Chapman, H. A., & Anderson, A. K. (2012). Understanding disgust. *Annals of the New York Academy of Sciences, 1251,* 62-76. doi: 10.111/j.1749.6632.2011.0636.x

Cougle, J. R., Wolitzky-Taylor, K. B., Lee, H-J., & Telch, M. J. (2007). Mechanisms of change in ERP treatment of compulsive hand washing: Does primary threat make a difference? *Behaviour Research and Therapy, 45,* 1449-1459. doi: 10.1016/j.brat.2006.12.001

Curtis, V., Aunger, R., & Rabie, T. (2004). Evidence that disgust evolved to protect from risk of disease. *Proceedings of the Royal Society B: Biological Sciences, 271,* S131-S133. doi: 10.1098/rsbl.2003.0144

Dalgleish, T., & Power, M. J. (2004). Emotion-specific and emotion-non-specific components of posttraumatic stress disorder (PTSD): Implications for a taxonomy of related psychopathology. *Behaviour Research and Therapy, 42,* 1069-1088. doi: 10.1016/j.brat.2004.05.001

Davey, G. C. L. (1994). Defining the important theoretical questions to ask about evaluative conditioning: A reply to Martin and Levey (1994). *Behaviour Research and Therapy, 32,* 307-310. doi: 10.1016/0005-7967(94)90126-0

Diaz, E., Ruiz, G., & Baeyens, F. (2005). Resistance to extinction of human evaluative conditioning using a between subjects design. *Cognition and Emotion, 19,* 245-268. doi: 10.1080/02699930441000300

Ehlers, A., & Clark, D.M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy, 38,* 319-345. doi: 10.1016/S0005-7967(99)00123-0

Elliott, C. M. & Radomsky, A. S. (2009). Analyses of mental contamination: Part I, experimental manipulations of morality. *Behaviour Research and Therapy, 47,* 995-1003. doi: 10.1016/j.brat.2009.03.004

Engelhard, I. M., Olatunji, B. O., & de Jong, P. J. (2010). Disgust and the development of posttraumatic stress disorder among soldiers deployed to Afghanistan. *Journal of Anxiety Disorders, 25,* 58-63. doi: 10.1016/j.janxdis.2010.08.003

Fairbrother, N., & Rachman, S. (2004). Feelings of mental pollution subsequent to sexual assault. *Behaviour Research and Therapy, 42,* 173-189. doi: 10.1016/S0005-7967(03)00108-6

Fairbrother, N., Newth, S., & Rachman, S. (2005). Mental Pollution: Feelings of dirtiness without physical contact. *Behaviour Research and Therapy, 43,* 121-130. doi: 10.1016/j.brat.2003.12.005

Feeny, N. C., Zoellner, L. A.., & Foa, E. B. (2000). Anger, dissociation, and posttraumatic stress disorder among female assault victims. *Journal of Traumatic Stress, 13,* 89-100. doi: 10.1023/A:1007725015225

Feldner, M. T., Frala, J., Badour, C., Leen-Feldner, E. W., & Olatunji, B. O. (2010). An empirical test of the association between disgust and sexual assault. *International Journal of Cognitive Therapy, 3*, 11-22. doi: 10.1521/ijct.2010.3.1.11

Field, A., Miles, J., & Field, Z. (2012). *Discovering Statistics Using R.* London: Sage Publications, Ltd.

Fitzmaurice, G. M., Laird, N. M., & Ware, J. H. (2011). *Applied Longitudinal Analysis.* Hoboken, NJ: John Wiley & Sons.

Foa, E. B. (1997). Psychological processes related to recovery from a trauma and an effective treatment for PTSD. In R. Yehuda & A. McFarlane (Eds.), *Psychobiology of PTSD* (pp. 410-424). New York: Plenum.

Foa, E. B., & Kozak, M. J. (1986). Emotional processing of fear: Exposure to corrective information. *Psychological Bulletin, 99,* 20-35. doi: 10.1037/0033-2909.99.1.20

Foa, E. B., & Rothbaum, B. O. (1998). *Treating the trauma of rape: Cognitive behavioral therapy for PTSD.* New York: Guilford Press.

Foa, E. B., Riggs, D. S., Massie, E. D., & Yarczower, M. (1995). The impact of fear activation and anger on the efficacy of exposure treatment for posttraumatic stress disorder. *Behavior Therapy*, *26*(3), 487–499. doi: 10.1016/S0005-7894(05)80096-6

Foa, E. B., Rothbaum, B. O., Riggs, D. S., & Murdock, T. B. (1991). Treatment of posttraumatic stress disorder in rape victims: A comparison between cognitive-behavioral procedures and counseling. *Journal of Consulting and Clinical Psychology, 59,* 715-723. doi: 10.1037/0022-006X.59.5.715

Foy, D. W., Sipprelle, R. C., Rueger, D. B., & Carroll, E. M. (1984). Etiology of posttraumatic stress disorder in Vietnam veterans: Analysis of premilitary, military, and combat exposure influences. *Journal of Consulting and Clinical Psychology, 52,* 79-87. doi: 10.1037//0022-006X.52.1.79

Freyd, M. The graphic rating scale. (1923). *Journal of Educational Psychology, 14*, 83-102. doi:10.1037/h0074329

Fridlund, A. J., Kenworthy, K. G., & Jaffey, A. K. (1992). Audience effects in affective imagery: Replication and extension to dysphoric imagery. *Journal of Nonverbal Behavior, 16,* 191-212. doi: 10.1007/BF00988034

Gilboa-Schechtman, E., & Foa, E. B. (2001). Patterns of recovery from trauma: The use of intraindividual analysis. *Journal of Abnormal Psychology*, 11, 392-400. doi: 10.1037/0021-843X.110.3.392

Green, B. L., & Kimerling, R. (2004). Trauma, posttraumatic stress disorder, and health status. In P. P. Schnurr & B. L. Green (Eds.), *Trauma and Health: Physical Consequences of Exposure to Extreme Stress* (pp. 13-42). Washington, DC: American Psychological Association.

Gross, J. J., & Levenson, R. W. (1995). Emotion elicitation using films. *Cognition and Emotion, 9,* 87-108. doi: 10.1080/02699939508408966

Heinrich, C. J. & Lynn, L. E., Jr. (2001). Means and ends: A comparative study of empirical methods for investigating governance and performance. *Journal of Public Administration Research and Theory, 11,* 109-138. doi: 10.1.1.199.5622

Herba, J. K., & Rachman, S. (2007). Vulnerability to mental contamination. *Behaviour Research and Therapy, 45,* 2804-2812. doi: 10.1016/j.brat.2007.07.010

Hirai, M., Cochra, H. M., Meyer, J. S., Butcher, J. L., Vernon, L. L., & Meadows, E. A. (2008). A preliminary investigation of the efficacy of disgust exposure techniques in a subclinical population with blood and injection fears. *Behaviour Change, 25,* 129-148. doi: 10.1375/bech.25.3.129

Jaycox, L. H., & Foa, E. B. (1996). Obstacles in implementing exposure therapy for PTSD: Case discussions and practical solutions. *Clinical Psychology and Psychotherapy, 3,* 176-184. doi: 10.1002/(SICI)1099-0879(199609)3:3<176::AID-CPP100>3.0.CO;2-1

Jaycox, L. H., Foa, E. B., & Morral, A. R. (1998). Influence of emotional engagement and habituation on exposure therapy for PTSD. *Journal of Consulting and Clinical Psychology, 66,* 185-192. doi: 10.1037/0022-006X.66.1.185

Jung, K., & Steil, R. (2012). The feeling of being contaminated in adult survivors of childhood sexual abuse and its treatment via a two-session program of cognitive restructuring and imagery modification: A case study. *Behavior Modification, 36,* 67-86. doi:dx.doi.org/10.1177/0145445511421436

Keane, T. M., & Wolfe, J. (2006). Comorbidity in post-traumatic stress disorder: An analysis of community and clinical studies. *Journal of Applied Social Psychology, 20,*1776-1788. doi: 10.1111/j.1559-1816.1990.tb01511.x

Kessler, R. C. (2000). Posttraumatic stress disorder: The burden to the individual and to society. *Journal of Clinical Psychiatry, 61,* 4-12.

Kessler, R., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52*, 1048-1060.

Kilpatrick, D. G., & Resnick, H. S. (1993). Posttraumatic stress disorder associated with exposure to criminal victimization in clinical and community populations. In: J. R. T. Davidson & E. B. Foa (Eds.), *Posttraumatic stress disorder: DSM-IV and beyond*. Washington, DC: American Psychiatric press, 113-143.

Kotler, M., Iancu, I., Efroni, R., & Amir, M. (2001). Anger, impulsivity, social support, and suicide risk in patients with posttraumatic stress disorder. *The Journal of Nervous and Mental Disease, 189,* 162-167. doi: 10.1097/00005053-200103000-00004

Kozak, M. I., Foa, E. B., & Steketee, G. (1988). Process and outcome of exposure treatment with obsessive-compulsives: Psychophysiological indicators of emotional processing. *Behavior Therapy, 19,* 157-169. doi: 10.1016/S0005-7894(88)80039-X

Krueger, C., & Tian, L. (2004). A comparison of the general linear mixed model and repeated measures ANOVA using a dataset with multiple missing data points. *Biological Research for Nursing, 6,* 151-157. doi: 10.1177/1099800404267682

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1995). *International Affective Picture System (IAPS): Technical manual and affective ratings.* Gainesville: University of Florida, Center for Research in Psychophysiology.

Lang, P. J., Kozak, M. J., Miller, G. A., Levin, D. N., & McLean, A., Jr. (1980). Emotional imagery: Conceptual structure and pattern of somato-visceral response. *Psychophysiology, 17,* 179-192. doi: 10.1111/j.1469-8986.1980.tb00133.x

Lang, P. J., Levin, D. N., Miller, G. A., & Kozak, M. J. (1983). Fear behavior, fear imagery, and the psychophysiology of emotion: The problem of affective response integration. *Journal of Abnormal Psychology, 92,* 276-306. doi: 10.1037//0021-843X.92.3.276

Lang, P., J., Melamed, B. G., & Hart, J. (1970). A psychophysiological analysis of fear modification using an automated desensitization procedure. *Journal of Abnormal Psychology, 76,* 220-234. doi: 10.1037/h0029875

Lang. P. J. (1979). A bio-informational theory of emotional imagery. *Psychophysiology, 16,* 495-512. doi: 10.1111/j.1469-8986.1979.tb01511.x

Lanius, R. A., Williamson, P. C., Boksman, K., Densmore, M., Gupta, M., Neufeld, R. W. J., Gati, J. S., & Menon, R. S. (2002). Brain activation during *script-driven imagery* induced dissociative responses in PTSD: A functional magnetic resonance imaging investigation. *Biological Psychiatry, 52,* 305-311. doi: 10.1016/S0006-3223(02)01367-7

Lanius, R. A., Williamson, P. C., Hopper, J., Densmore, M., Boksman, K., Gupta, M. A.,…Menon, R. S. (2003). Recall of emotional states in posttraumatic stress disorder: An fMRI investigation. *Biological Psychiatry, 53,* 204-210. doi: 10.1016/S0006-3223(02)01466-X

Mancini, F., Gragnani, A., & D'Olimio, F. (2001). The connection between disgust and obsession and compulsions in a non-clinical sample. *Personality and Individual Differences, 31,* 1173-1180. doi: 10.1016/S0191-8869(00)00215-4

Mason, E. C., & Richardson, R. (2010). Looking beyond fear: The extinction of other emotions implicated in anxiety disorders. *Journal of Anxiety Disorders, 24,* 63-70. doi: 10.1016/j.janxdis.2009.08.007

McKay, D. (2006). Treating disgust reactions in contamination-based obsessive–compulsive disorder. *Journal of Behavior Therapy and Experimental Psychiatry, 37,* 53−59. doi: 10.1016/j.jbtep.2005.09.005

Mikels, J. A., Fredrickson, B. L., Larkin, G. R., Lindberg, C. M., Maglio, S. J., & Reuter-Lorenz, P. A. (2005). Emotional category data on images form the International Affective Picture System. *Behavior Research Methods, 37,* 626-630. doi: 10.3758/BF03192732

Norris, F. (1992). Epidemiology of trauma: Frequency and impact of different potentially traumatic events on different demographic groups. *Journal of Consulting and Clinical Psychology, 60,* 409-418. doi: 10.1037/0022-006X.60.3.409

Olatunji, B, O., Elwood, L., Williams, N., & Lohr, J. M. (2008). Feelings of mental pollution and PTSD symptoms in victims of sexual assault. The mediating role of trauma-related cognitions. *Journal of Cognitive Psychotherapy, 22,* 37-47. doi: 10.1891/0889.8391.22.1.37

Olatunji, B. O., Babson, K. A., Smith, R. C., Feldner, M. T., & Connolly, K. M. (2009). Gender as a moderator of the relation between PTSD and disgust: A laboratory test employing individualized script-driven imagery. *Journal of Anxiety Disorders, 23,* 1091-1097. doi: 10.1016/j.janxdis.2009.07.012

Olatunji, B. O., Forsyth, J. P., Cherian, A. (2007). Evaluative conditioning of disgust: A sticky form of relational learning that is resistant to extinction. *Journal of Anxiety Disorders, 21,* 820-834. doi: 10.1016/j.janxdis.2006.11.004

Olatunji, B. O., Lohr, J. M., Sawchuk, C. N., & Tolin, D. F. (2007). Multimodal assessment of disgust in contamination-related obsessive-compulsive disorder. *Behaviour Research and Therapy, 45,* 263-276. doi: 10.1016/j.brat.2006.03.004

Olatunji, B. O., Smits, J. A., Connolly, K. M., Willems, J., & Lohr, J. M. (2007). Examination of the rate of decline in fear and disgust during exposure to threat-relevant stimuli in blood-injection-injury phobia. *Journal of Anxiety Disorders, 21*, 445-455. doi: 10.1016/j.janxdis.2006.05.001

Olatunji, B. O., Wolitzky-Taylor, K. B., Willems, J., Lohr, J. M., & Armstrong, T. (2009). Differential habituation of fear and disgust during exposure to threat-relevant stimuli in contamination-based OCD: An analogue study. *Journal of Anxiety Disorders, 23,* 118-123. doi: 10.1016/j.janxdis.2008.04.006

Orr, S. P., Lasko, N. B., Metzger, L. J., Berry, N. J., Ahern, C. E., & Pitman, R. K. (1998). Psychophysiologic assessment of women with posttraumatic stress disorder resulting from childhood sexual abuse. *Journal of Consulting and Clinical Psychology,* 66, 906-913. doi: 10.1037/0022-006X.66.6.906

Petrak, J., Doyle, A., Williams, L., Buchan, L., & Forster, G. (1997). The psychological impact of sexual assault: A study of female attenders of a sexual health psychology service. *Sexual and Marital Therapy, 12*, 339-345. doi: 10.1080/02674659808408177

Pitman, R. K., Orr, S. P., Forgue, D. F., de Jong, J. B., & Claiborn, J. M. (1987). Psychophysiologic assessment of posttraumatic stress disorder imagery in Vietnam combat veterans. *Archives of General Psychiatry, 44,* 970-975. doi:10.1001/archpsyc.1987.01800230050009

Pitman, R. K., Sanders, K. M., Zusman, R. M., Healy, A. R., Cheema, F., Lasko, N. B., Cahill, L., & Orr, S. P. (2002). Pilot study of secondary prevention of posttraumatic stress disorder with propranolol. *Biological Psychiatry, 51,* 189-192. doi: 10.1016/S0006-3223(01)01279-3

Prkachin, K. M., Williams-Avery, R. M., Zwaal, C., & Mills, D. E. (1999). Cardiovascular changes during induced emotion: An application of Lang's theory of emotional imagery. *Journal of Psychosomatic Research, 47,* 255-267. doi: 10.1016/S0022-3999(99)00036-7

Rachman, S. (2004). Fear of contamination. *Behaviour Research and Therapy, 42,* 1227-1255. 10.1016/j.brat.2003.10.009

Rachman, S. (2006). *Fear of contamination: Assessment and treatment*. Oxford University Press, Oxford, UK.

Radomsky, A. S., & Elliott, C. (2009). Analyses of mental contamination: Part II, individual differences. *Behaviour Research and Therapy, 47,* 1004-1011. doi: 10.1016/j.brat.2009.08.004

Resick, P. A., & Schnicke, M. K. (1992). Cognitive processing therapy for sexual assault victims. *Journal of Consulting and Clinical Psychology, 60,* 748-756. doi: 10.1037/0022-006X.60.5.748

Resnick, H. S., Kilpatrick, D. G., Dansky, B. S., Saunders, B. E., & Best, C. L. (1993). Prevalence of civilian trauma and posttraumatic stress disorder in a representative national sample of women. *Journal of Consulting and Clinical Psychology, 61,* 984-991. doi: 10.1037//0022-006X.61.6.984

Riggs, D. S., Rothbaum, B. O., & Foa, E. B. (1995). A prospective examination of symptoms of posttraumatic stress disorder in victims of nonsexual assault. *Journal of Interpersonal Violence, 10,* 210-214. doi: 10.1177/0886260595010002005

Rohrmann, S., Hopp, H., & Quirin, M. (2008). Gender differences in psychophysiological responses to disgust. *Journal of Psychophysiology, 22,* 65-75. doi: 10.1027/0269-8803.22.2.65

Rothbaum, B. O., Foa, E. D., Riggs, D. S., & Murdock, T. (1992). A prospective examination of post-traumatic stress disorder in rape victims. *Journal of Traumatic Stress, 5,* 455-475. doi: 10.1007/BF00977239

Ruscio, A. M., Ruscio, J., & Keane, T. M. (2002). The latent structure of posttraumatic stress disorder: A taxometric investigation of reactions to extreme stress. *Journal of Abnormal Psychology, 111,* 290-301. doi: 10.1037/0021-843X.111.2.290

Schafe, G. E., & Bernstein, I. L. (1996). Taste aversion learning. In E. D. Capaldi (Ed.), *Why we eat what we eat* (pp. 31-51). Washington DC: American Psychological Association.

Schienle, A., Schäfer, A., Stark, R., Walter, B., & Vaitl, D. (2005). Gender differences in the processing of disgust- and fear-inducing pictures: an fMRI study. *Neuroreport, 16,* 277-280. doi: 10.1097/00001756-200502280-00015

Schienle, A., Stark, R., & Vaitl, D. (2001). Evaluative conditioning: A possible explanation for the acquisition of disgust responses? *Learning and Motivation, 32,* 65-83. doi: 10.1006/lmot.2000.1067

Shek, D. T. L., & Ma, C. M. S. (2011). Longitudinal data analyses using linear mixed models in SPSS: Concepts, procedures, and illustrations. *The Scientific World Journal, 11,* 42-76. doi: 10.1100tsw.2011.2

Shin, L. M., McNally, R. J., Kosslyn, S. M., Thompson, W. L., Rauch, S. L., Alpert, N. M.,…Pitman, R. K. (1999). Regional cerebral blood flow during script-driven imagery in childhood sexual abuse-related PTSD: A PET investigation. *American Journal of Psychiatry, 156,* 575-584. doi: 10.1.1.130.9717

Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence.* New York, NY: Oxford University Press.

Smits, J. A., Telch, M. J., & Randall, P. K. (2002). An examination of the decline in fear and disgust during exposure-based treatment. *Behaviour Research and Therapy, 40,* 1243-1253. doi: 10.1016/S0005-7967(01)00094-8

Steil, R., Jung, K., & Stangier, U. (2011). Efficacy of a two-session program of cognitive restructuring and imagery modification to reduce the feeling of being contaminated in adult survivors of childhood sexual abuse: A pilot study. *Journal of Behavior Therapy and Experimental Psychiatry, 42,* 325-329. doi: 10.1016/j.jbtep.2011.01.008

Tolin, D. F., & Foa, E. B (2008). Sex differences in trauma and posttraumatic stress disorder: A quantitative review of 25 years of research. *Psychological Trauma: Theory, Research, Practice, and Policy, 1,* 37-85. doi: 10.1037/1942-9681.S.1.37

Tolin, D. F., Woods, C. M., & Abramowitz, J. S. (2006). Disgust sensitivity and obsessive-compulsive symptoms in a non-clinical sample. *Journal of Behavior Therapy and Experimental Psychiatry, 37,* 30-40. doi: 10.1016/j.jbtep.2005.09.003

Urcelay, G. P., Wheeler, D. S., & Miller, R. R. (2009). Spacing extinction trials alleviates renewal and spontaneous recovery. *Learning & Behavior, 37,* 60-73. doi: 10.3758/LB.37.1.60

van Minnen, A., & Hagenaars, M. (2002). Fear activation and habituation patterns as early process predictors of response to prolonged exposure treatment in PTSD. *Journal of Traumatic Stress, 15,* 359-367. doi: 10.1023/A:1020177023209

Vansteenwegen, D., Francken, G., Vervliet, B., De Ciercq, A., & Eelen, P. (2006). Resistance to extinction in evaluative conditioning. *Journal of Experimental Psychology: Animal Behavior Processes, 32,* 71-79. doi: 10.1037/0097-7403.32.1.71

Ware, J., Jain, K., Burgess, I., & Davey, G. C. (1994). Disease-avoidance model: Factor analysis of common animal fears. *Behaviour Research and Therapy, 32, 57-63.* doi: 10.1016/0005-7967(94)90084-1

Weathers, F. W., Keane, T. M., & Davidson, J. R. T. (2001). Clinician-administered PTSD Scale: A review of the first ten years. *Depression and Anxiety, 13,.* 132-156. doi: 10.1002/da.1029

Woody, S. R., & Teachman, B. A. (2000). Intersection of disgust and fear: Normative and pathological views. *Clinical Psychology: Science and Practice, 7,* 291−311. doi: 10.1093/clipsy.7.3.291

Yehuda, R. & LeDoux, J. (2007). Response variation following trauma: A translational neuroscience approach to understanding PTSD. *Neuron, 56,* 19-32. doi: 10.1016/j.neuron.2007.09.006

Table 1.

Raw Scores for Disgust and Anxiety on Trials Including Sexual Trauma Content For All Participants.

	Total Sample (N =72)		Group 1 (n = 19)		Group 2 (n = 17)		Group 3 (n = 20)		Group 4 (n =16)	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Trial 1-1										
Disgust	60.27	35.02	62.74	34.05	50.53	37.22	60.74	35.53	67.74	35.53
Anxiety	50.37	31.60	48.53	35.67	49.77	30.61	49.90	28.80	54.00	33.77
Trial 1-5										
Disgust	62.94	35.54	60.94	37.76	54.59	36.88	67.65	34.54	68.19	34.25
Anxiety	46.45	33.86	42.33	40.45	43.88	38.39	54.40	27.62	43.88	28.94
Trial 2-1										
Disgust	57.71	35.91	52.44	38.92	62.12	33.50	58.00	36.35	58.63	37.12
Anxiety	47.96	35.79	42.22	39.40	46.65	32.31	59.74	36.38	41.81	34.27
Trial 2-5										
Disgust	54.43	38.02	43.06	43.45	53.29	35.75	60.53	37.81	61.19	34.35
Anxiety	43.22	38.75	39.76	40.91	39.29	42.16	55.44	39.12	37.31	32.32

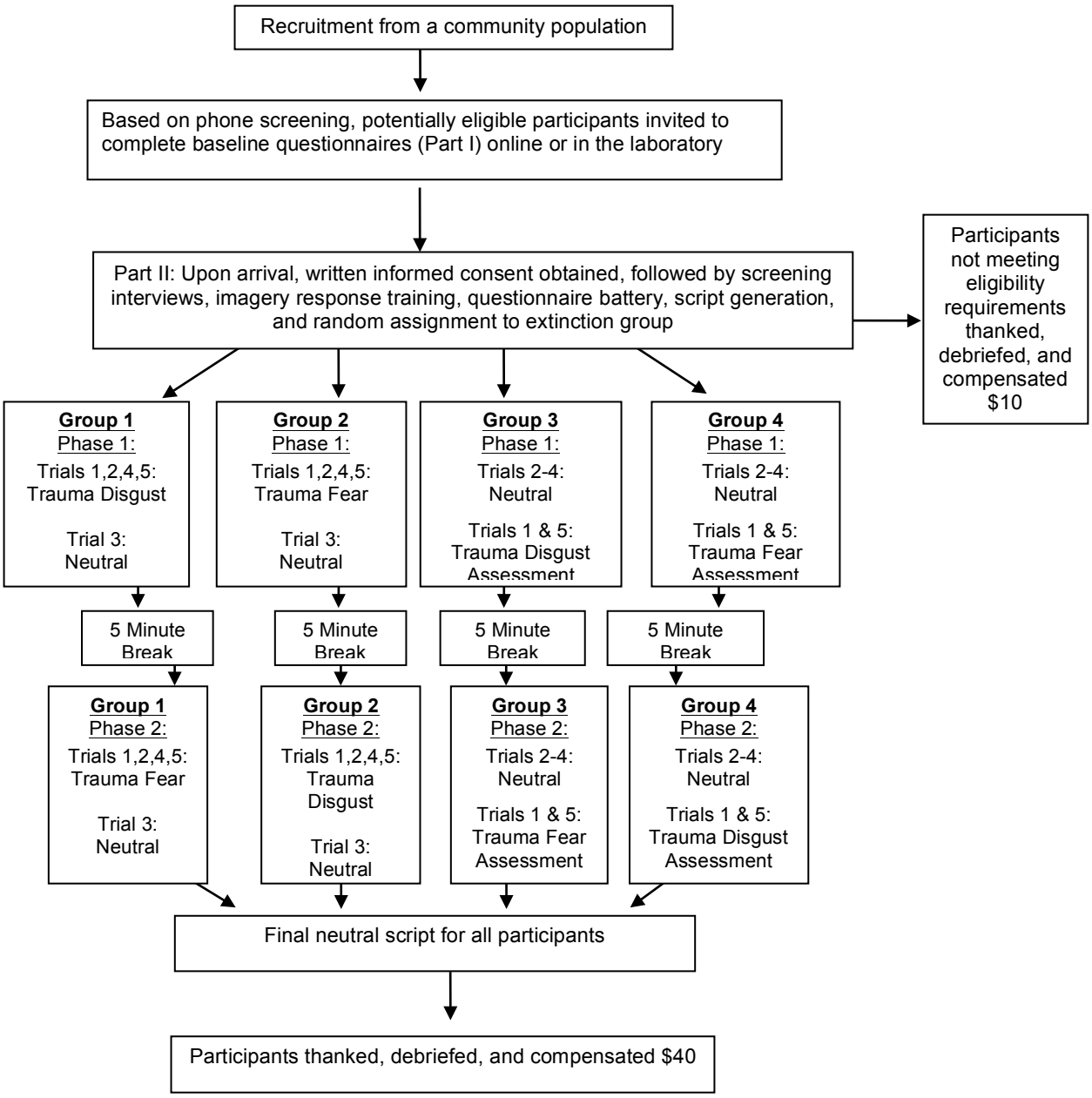

Figure 1. Graphic representation of procedures utilized with participants.

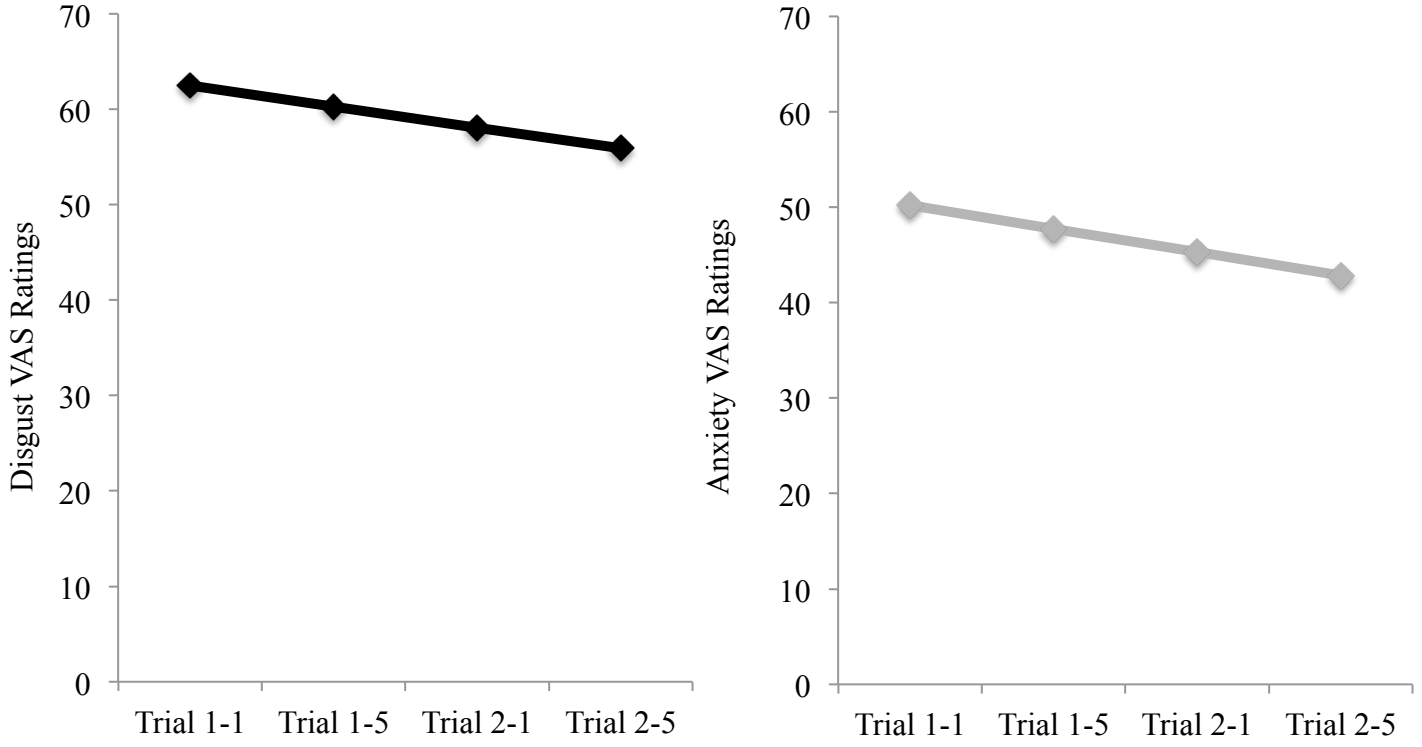

Figure 2. Rate of decline in disgust and anxiety ratings across the course of exposure (Model 1.a. and 1.b: Average individual growth trajectory via linear mixed modeling).

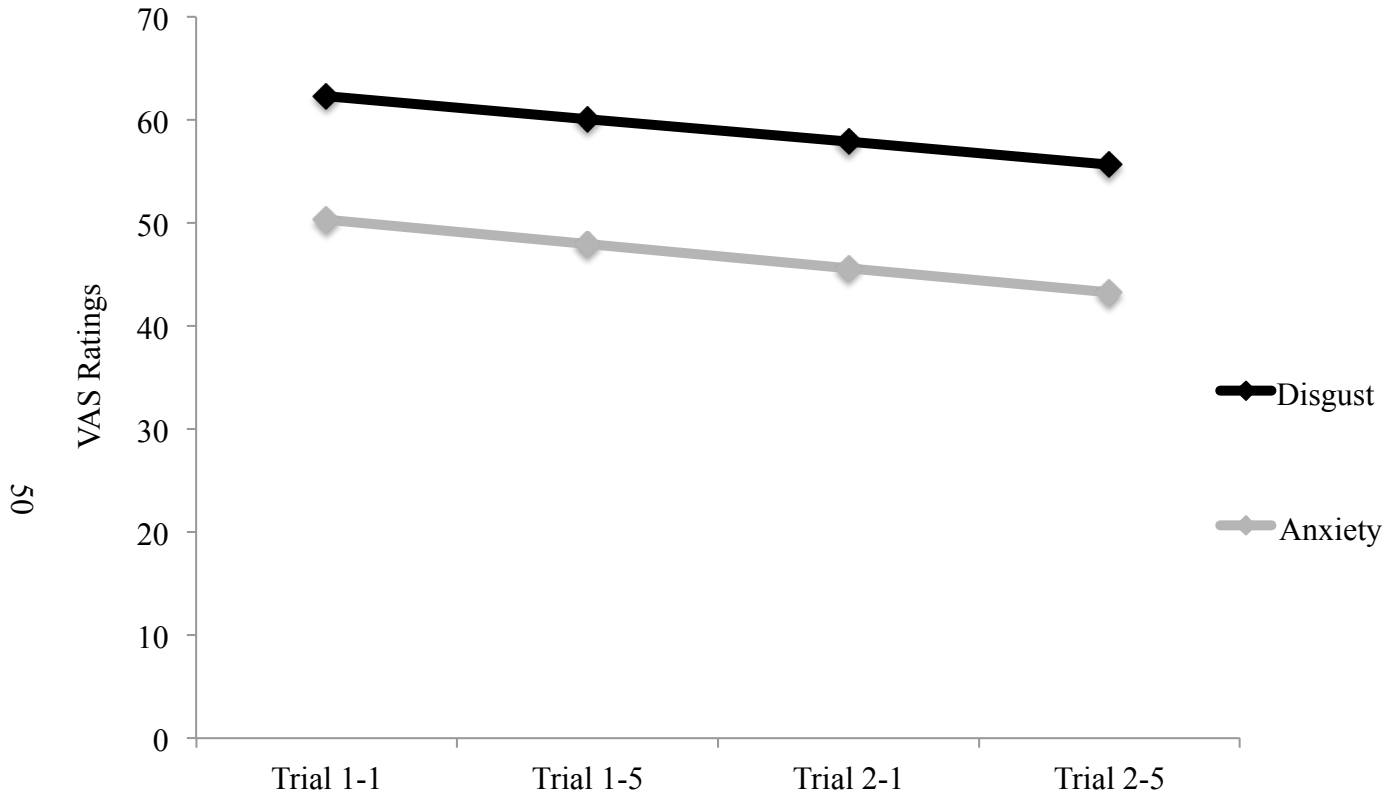

Figure 3. Rate of decline in disgust ratings versus decline in anxiety ratings across the course of exposure after accounting for covariance between the two dependent variables (Model 4: Average individual growth trajectory via linear mixed modeling).

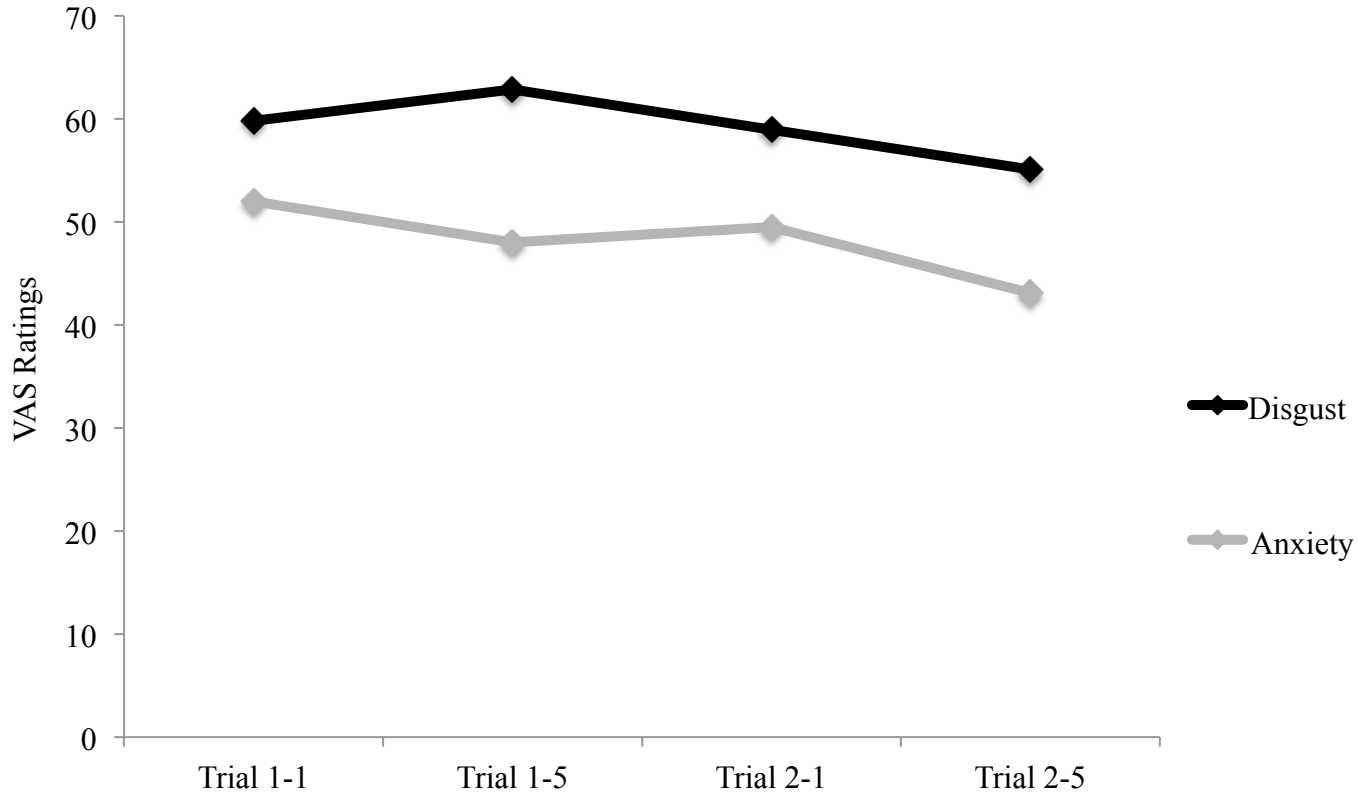

Figure 4. Rate of decline in disgust ratings versus decline in anxiety ratings across the course of exposure after accounting for covariance between the two dependent variables (Model 4.a.: MANOVA Estimated Marginal Means).

APPENDIX A: PHYSIOLOGICAL AND BEHAVIORAL CHECKLISTS DEVELOPED FOR PILOT STUDY

Listed below are a number of bodily sensations that people may experience in various situations. Please rate on the following scale the degree to which you *experienced* or *would experience* each of the responses below when faced with the situation you just viewed/heard.

0……1……2……3……4……5……6……7……8……9……10

Not at all **Extremely Strong**

Face/Head

_____EARS RINGING
_____HEAD POUNDING
_____TEARING UP/CRYING
_____FEEL DIZZY
_____TUNNEL VISION
_____BLOOD RUSHING TO HEAD
_____BLUSHING
_____EYES FLINCH
_____LIP CURLS
_____FLUSHED FACE
_____NOSE WRINKLES
_____EYES CLOSE
_____EYES WIDE OPEN
_____TIGHTNESS IN MY FACE
_____TENSION IN FOREHEAD
_____CLENCHED JAW
_____FROWNING
_____SMILING

Mouth/Throat

_____LUMP IN MY THROAT
_____MOUTH FEELS DRY
_____MOUTH WATERS
_____GAGGING
_____GRITTING MY TEETH
_____CHOKING

Chest-Cardiovascular

_____HEART BEATS STEADILY
_____HEART BEATS SLOWER
_____HEART POUNDS
_____HEART RACES
_____HEART SKIPS A BEAT
_____HEART STOPS

Chest-Respiratory

_____EVEN BREATHING
_____CHEST TIGHTENS
_____DEEP BREATHING
_____HOLDING BREATH
_____BREATHING FASTER
_____BREATHING SLOWER
_____GASPING FOR AIR
_____SHALLOW BREATHING

Stomach

_____PIT IN STOMACH
_____BUTTERFLIES IN MY STOMACH
_____FEEL NAUSEAOUS
_____STOMACH IS IN A KNOT
_____STOMACH CHURNS

Arms/Legs

_____ARMS AND LEGS WARM AND RELAXED
_____LIMBS FEEL WEAK
_____CLENCHED FISTS
_____LIMBS TREMBLING
_____TINGLING IN MY LIMBS
_____LIMBS FEEL HEAVY

Skin

_____FEEL SWEATY
_____PALMS ARE CLAMMY
_____SKIN CRAWLING
_____COLD SWEAT

Other/Whole Body

_____FEEL NUMB
_____FEEL CALM
_____FEEL RELAXED ALL OVER
_____FEEL COLD
_____FEEL HOT
_____BLOOD RUSHING THOUGH MY BODY
_____FEEL LIKE FAINTING
_____WHOLE BODY FLINCHES
_____BODY TREMBLING
_____JITTERY
_____FEEL LIKE I CAN'T MOVE
_____FEEL RESTLESS
_____FEEL TENSE ALL OVER

Listed below are a number of behaviors that people may engage in or want to engage in during various situations. Please rate on the following scale the degree to which you *do* or *would want to do* each of the following behaviors listed below when faced with the situation you just viewed/heard.

0……1……2……3……4……5……6……7……8……9……10
Not at all **Extremely**

_____SCREAM

_____SMASH SOMETHING

_____RUN AWAY

_____WASH YOUR HANDS

_____TAKE A SHOWER

_____SAY SOMETHING NASTY

_____VOMIT

_____HIT SOMEONE OR SOMETHING

_____HURT SOMEONE

_____GET RID OF SOMETHING

_____DO NOTHING

_____SEEK COMFORT

_____RECOVER SOMETHING

_____CRY OUT

_____ESCAPE

_____SEEK FORGIVENESS

_____MAKE UP FOR WHAT YOU HAVE DONE

_____DISAPPEAR

_____APOLOGIZE

_____YELL

_____CALL OUT FOR HELP

_____PUSH SOMETHING OR SOMEONE AWAY

_____GET TO A SAFE PLACE

_____TURN AWAY

_____CLOSE YOUR EYES

_____LIE DOWN

_____ASK FOR HELP

_____FIGHT

_____MAKE SOMETHING OR SOMEONE STOP

_____MAKE SOMEONE LEAVE

_____HIDE

_____ LASH OUT

_____ BEG

_____ WALK AWAY

_____ SPIT

_____ SOB

_____ EXPLODE

APPENDIX B: SCRIPT-DRIVEN IMAGERY RESPONSE CHECKLIST (SDI-RC) USED IN PRIMARY STUDY

Listed below are a number of bodily sensations that people may experience in various situations. Please rate on the following scale the degree to which you *experienced* each of the responses below during the event you are describing.

0……1……2……3……4……5……6……7……8……9……10

Not at all **Extremely Strong**

Face/Head

_____EARS RINGING **(fear)**
_____HEAD POUNDING **(fear)**
_____TEARING UP/CRYING
_____FEEL DIZZY
_____TUNNEL VISION **(fear)**
_____BLOOD RUSHING TO HEAD
_____BLUSHING
_____EYES FLINCH
_____LIP CURLS
_____FLUSHED FACE
_____NOSE WRINKLES **(disgust)**
_____EYES CLOSE **(disgust)**
_____EYES WIDE OPEN **(fear)**
_____TIGHTNESS IN MY FACE
_____TENSION IN FOREHEAD **(fear)**
_____CLENCHED JAW **(fear)**
_____FROWNING
_____SMILING

Mouth/Throat

_____LUMP IN MY THROAT **(fear)**
_____MOUTH FEELS DRY **(fear)**
_____MOUTH WATERS
_____GAGGING **(disgust)**
_____GRITTING MY TEETH
_____CHOKING

Chest-Cardiovascular

_____HEART BEATS STEADILY
_____HEART BEATS SLOWER
_____HEART POUNDS **(fear)**
_____HEART RACES **(fear)**
_____HEART SKIPS A BEAT
_____HEART STOPS

Chest-Respiratory

_____EVEN BREATHING
_____CHEST TIGHTENS **(fear)**
_____DEEP BREATHING **(fear)**
_____HOLDING BREATH
_____BREATHING FASTER **(fear)**
_____BREATHING SLOWER
_____GASPING FOR AIR
_____SHALLOW BREATHING **(fear)**

Stomach

_____PIT IN STOMACH **(fear)**
_____BUTTERFLIES IN MY STOMACH **(fear)**
_____FEEL NAUSEAOUS
_____STOMACH IS IN A KNOT
_____STOMACH CHURNS

Arms/Legs

_____ARMS AND LEGS WARM AND RELAXED
_____LIMBS FEEL WEAK **(fear)**
_____CLENCHED FISTS **(fear)**
_____LIMBS TREMBLING **(fear)**
_____TINGLING IN MY LIMBS **(fear)**
_____LIMBS FEEL HEAVY

Skin

_____FEEL SWEATY **(fear)**
_____PALMS ARE CLAMMY **(fear)**
_____SKIN CRAWLING
_____COLD SWEAT

Other/Whole Body

_____FEEL NUMB
_____FEEL CALM
_____FEEL RELAXED ALL OVER
_____FEEL COLD **(fear)**
_____FEEL HOT
_____BLOOD RUSHING THOUGH MY BODY **(fear)**
_____FEEL LIKE FAINTING
_____WHOLE BODY FLINCHES **(fear)**
_____BODY TREMBLING **(fear)**
_____JITTERY **(fear)**
_____FEEL LIKE I CAN'T MOVE **(fear)**
_____FEEL RESTLESS **(fear)**
_____FEEL TENSE ALL OVER **(fear)**

Other (please list and rate)

_____ (list)_____ _____ (list)_____

Listed below are a number of behaviors that people may engage in or want to engage in during various situations. Please rate on the following scale the degree to which you *wanted to do* each of the following behaviors listed below. If you did engage in any of these behaviors, please circle them.

0……1……2……3……4……5……6……7……8……9……10
Not at all **Extremely**

_____SCREAM **(fear)**

_____SMASH SOMETHING

_____RUN AWAY **(fear)**

_____WASH YOUR HANDS **(disgust)**

_____TAKE A SHOWER **(disgust)**

_____SAY SOMETHING NASTY **(disgust)**

_____VOMIT **(disgust)**

_____HIT SOMEONE OR SOMETHING **(fear)**

_____HURT SOMEONE

_____GET RID OF SOMETHING **(disgust)**

_____DO NOTHING

_____SEEK COMFORT **(fear)**

_____RECOVER SOMETHING

_____CRY OUT **(fear)**

_____ESCAPE **(fear)**

_____SEEK FORGIVENESS

_____MAKE UP FOR WHAT YOU HAVE DONE

_____DISAPPEAR **(fear)**

_____APOLOGIZE

_____YELL **(fear)**

_____CALL OUT FOR HELP **(fear)**

_____PUSH SOMETHING OR SOMEONE AWAY

_____GET TO A SAFE PLACE **(fear)**

_____TURN AWAY **(disgust)**

_____CLOSE YOUR EYES **(disgust)**

_____LIE DOWN

_____ASK FOR HELP **(fear)**

_____FIGHT **(fear)**

_____MAKE SOMETHING OR SOMEONE STOP

_____MAKE SOMEONE LEAVE

_____HIDE **(fear)**

_____ LASH OUT **(fear)**

_____ BEG

_____ WALK AWAY

_____ SPIT

_____ SOB

_____ EXPLODE

Other (Please list and rate)

_____ (list)_____

_____ (list)_____

_____ (list)_____

_____ (list)_____

APPENDIX C: EXAMPLE OF IDEOGRAPHIC PHYSIOLOGICAL AND BEHAVIORAL RESPONSE INFORMATION PROVIDED TO PARTICIPANTS TO AID IN SCRIPT GENERATION

When generating your scripts please make sure to include the following physiological sensations and behaviors (or desired behaviors) in your story. Also include any others that you experienced that will help generate a vivid image of what happened. Some of these may have occurred at different points in time, so make sure to include the kinds of things that led to these feelings or behaviors.

Example:
I feel the sweat drip down my face as the sun beats down. As I walk inside I shiver at the burst of cold air. (Without context, sweat dripping and shivering may not seem to go together).

Neutral Script:

Bodily sensations
Heart beats steadily
Breathing is even
Feel relaxed all over
Feel calm

Unwanted Sexual Experience Script:

Bodily Sensations	**Behaviors (did or wanted to do)**
Heart pounds **(fear)**	Vomit **(disgust)**
Gagging **(disgust)**	Turn away **(disgust)**
Mouth is dry **(fear)**	Escape **(fear)**
Chest tightens (**fear**)	Call out for help **(fear)**
Eyes close (**disgust)**	Take a shower **(disgust)**

APPENDIX D: EXAMPLE SET OF SCRIPTS

Neutral 1:
You open your eyes and look over to see the sun streaming through the window. You lift your arms and legs into a big stretch and roll over onto your side. You are feeling calm and relaxed as you throw back the covers, sit up, place your feet on the floor, and prepare to begin your day. Your heart beats steadily in your chest as you walk across the room to collect your towel before heading into the bathroom. You open the shower curtain and turn the faucet to the left. You listen to the sound of water pouring into the tub.

Neutral 2:
As you step into the shower, you notice your breathing is calm and even. You enjoy the feeling of water streaming down on your skin. You close your eyes and surrender yourself to the warmth of the water. You begin to feel the muscles in your neck and shoulders relaxing. You fill your palm with shampoo and begin running your fingers through your hair. When your hair is fully lathered, you tip your head back into the water and rinse out all the shampoo. As you pick up the conditioner you contemplate what you need to get done today.

Fear-Focused:
Your chest tightens when you hear his footsteps down the hall approaching your bedroom door. You know what is going to happen. You feel like you can't move and you pretend to be asleep, hoping he will leave you alone this time. Your mouth feels dry and you try to plan how you can escape when you feel his weight on the bed next to you. Your heart begins pounding in your chest when you feel his hand slip into your pants. You want to call out for help, but you know that no one will come to help you.

Disgust-Focused:
When you hear his footsteps coming down the hall toward your bedroom door you notice that familiar feeling rising in your stomach, like you are going to throw up. You know what is going to happen. You pretend to be asleep, hoping he will leave you alone this time. You try to turn away when you feel his weight on the bed next to you. You have to hold yourself back from gagging when you feel his hand slip down into your pants. You close your eyes tightly and just wait for it to be over so you can take a shower.

APPENDIX E: INSTITUTIONAL REVIEW BOARD APPROVAL FOR RESEARCH

120 Ozark Hall • Fayetteville, Arkansas 72701 • (479) 575-2208 • (479) 575-3846 (FAX)
Email: irb@uark.edu

Research Support and Sponsored Programs
Institutional Review Board

August 23, 2010

MEMORANDUM

TO:	Christal Badour Matthew Feldner
FROM:	Ro Windwalker IRB Coordinator
RE:	New Protocol Approval
IRB Protocol #:	10-07-017
Protocol Title:	*A Study of the Relation between Unwanted Sexual Experiences and Emotion*
Review Type:	☐ EXEMPT ☐ EXPEDITED ☒ FULL IRB
Approved Project Period:	Start Date: 08/23/2010 Expiration Date: 08/22/2011

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Compliance website (http://www.uark.edu/admin/rsspinfo/compliance/index.html). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

If you wish to make *any* modifications in the approved protocol, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 120 Ozark Hall, 5-2208, or irb@uark.edu.