The Effects of Rumination and Relaxation on Flexibility during Cognitive Restructuring

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DISSERTATION

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To my parents, Eric Stevens and Christina DeWaard, and to my love, Nolan: thank you for your

unconditional love and support. You can finally call me "doctor" now!

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
ANCOVA	Analysis of Covariance
BDI-II	Beck Depression Inventory – II
CT	Cognitive Therapy
GAD	Generalized Anxiety Disorder
GAD-Q-IV	Generalized Anxiety Disorder Questionnaire – IV
MANOVA	Multivariate Analysis of Variance
MDD	Major Depressive Disorder
NA	Negative Affect
NE	Negative Emotion
PA	Positive Affect
PANAS	Positive and Negative Affect Schedule
PSWQ	Penn State Worry Questionnaire
RNT	Repetitive Negative Thinking
RS	Response Styles Questionnaire – Rumination Scale
SD	Standard Deviation

SUMMARY

Depressive rumination is elevated among both individuals with major depressive disorder (MDD) and those with generalized anxiety disorder (GAD) and is associated with inflexible cognitive and emotional processes. Several characteristics of rumination-related thought may contribute to its nonadaptive consequences as well as to the comorbidity between MDD and GAD, including its negatively valenced content, abstract level of construal, and passive approach to problem solving. Psychotherapies for MDD (e.g., cognitive therapy, relaxation) promote flexible responding to negative events, perhaps by altering these characteristics. This study examined whether rumination inhibits and/or relaxation enhances flexibility during a cognitive restructuring exercise designed to increase flexibility. Participants ($n = 198$) with elevated or minimal symptoms of MDD and/or GAD were randomly assigned to rumination, relaxation, or neutral thinking prior to generating alternative interpretations for their topics of depressive rumination. We examined the number and believability of alternative interpretations, as well as the valence, level of construal, and passive agency of interpretations. Compared to relaxation and neutral thinking, rumination led to more *concrete* interpretations among individuals with minimal symptoms of GAD, but maintained levels of *abstractness* (versus concreteness) among individuals with elevated symptoms of GAD. In the absence of MDD, individuals with elevated versus minimal symptoms of GAD also generated more passive alternative interpretations. Contrary to hypotheses, relaxation did not enhance cognitive flexibility. These findings suggest that individuals with GAD inflexibly engage in nonadaptive thought processes during and following rumination that may contribute to the maintenance of rumination and symptoms.

1. INTRODUCTION

1.1 <u>Rumination in Major Depression and Generalized Anxiety Disorder</u>

Major depressive disorder (MDD) is one of the leading and most costly causes of mortality (Kessler et al., 2006). MDD is often comorbid with other mental health conditions. For example, 48% of individuals with lifetime MDD also meet criteria for generalized anxiety disorder (GAD), and 72% of individuals with lifetime GAD also meet criteria for MDD (Moffitt et al., 2007). One feature common to MDD and GAD is repetitive negative thinking (RNT), with MDD containing high levels of depressive rumination and GAD containing excessive worry.

Depressive rumination (hereafter referred to as "rumination") is a form of RNT that is characterized by passive reflection upon the causes and consequences of depression, including self-referent negative events or emotions (Nolen-Hoeksema, 1991; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Watkins, 2004). Of the two subtypes of rumination – reflective pondering (i.e., adaptive introspection) and brooding (i.e., passive, self-critical thought) – brooding exhibits stronger associations with symptoms of MDD (Treynor, Gonzalez, & Nolen-Hoeksema, 2003) and GAD (Watkins, 2009). Rumination contributes to the onset, severity, and duration of depressive episodes (Abela & Hankin, 2011; Just & Alloy, 1997; Nolen-Hoeksema, 2000; Spasojecić & Alloy, 2001) and is associated with poorer treatment outcome (Kertz, Koran, Stevens, & Björgvinsson, 2015; Schmaling, Dimidjian, & Katon, 2002). Although rumination and worry share some similarities (Ehring & Watkins, 2008; McEvoy, Mahoney, & Moulds, 2010), rumination also predicts unique variance in concurrent (Watkins, 2009) and prospective (Fresco, Frankel, Mennin, Turk, & Heimberg, 2002) symptoms of anxiety. Ruscio and colleagues (Ruscio et al., 2015) have further proposed that the tendency to ruminate in response to stressful events may contribute to comorbidity between MDD and GAD, given that rumination

is elevated among individuals with GAD and is associated with both GAD- and MDD-relevant characteristics. Although rumination can also serve adaptive, reflective functions (Andrews & Thomson, 2009; Watkins, 2008), it is theorized to be detrimental in MDD because it involves two features of RNT that lead to maladaptive outcomes, namely *negative valence* and an *abstract level of construal* (Ciesla & Roberts, 2007; Robinson & Alloy, 2003; Watkins, 2008).

1.2   **Negative Valence of Rumination**

First, rumination entails negatively valenced content that is generally focused on negative events or emotions (e.g., sadness, guilt, shame) associated with depression. The negative content inherent to rumination may be due in part to information processing biases (for reviews, see Gotlib & Joormann, 2010; Mathews & MacLeod, 2005). Individuals high in trait rumination exhibit a tendency to interpret ambiguous stimuli in a negative manner (Mor, Hertel, Ngo, Shachar, & Redak, 2014), particularly when stimuli are self-relevant (Cowden Hindash & Rottenberg, 2017; Wisco & Nolen-Hoeksema, 2010), and attentional biases toward negative stimuli (Donaldson, Lam, & Mathews, 2007; Joormann, Dkane, & Gotlib, 2006). Such negative content may contribute to negative affect (NA) experienced during and after engaging in rumination (Ehring, Szeimies, & Schaffrick, 2009; McLaughlin, Borkovec, & Sibrava, 2007; Watkins, 2004).

1.3   **Abstract Processing in Rumination**

Second, rumination is characterized by maladaptive *modes* of processing, particularly in that it entails an abstract level of construal. An abstract level of construal is characterized by generalized and cross-situational information, whereas a concrete level of construal is

characterized by specificity and situational context (Stöber, 1998; Trope & Liberman, 2003). Engaging in *abstract* rumination may mitigate emotional distress when recalling past negative events (Moulds, Kandris, Starr, & Wong, 2007; Watkins & Moulds, 2007; Williams et al., 2007), perhaps because it predominantly entails a verbal-linguistic (versus imagery-based) mode of processing (Goldwin & Behar, 2012). Verbal-linguistic processing is associated with reduced vividness of mental activity (Paivio & Marschark, 1991) and is theorized to reduce distress in other types of RNT (e.g., worry; Borkovec, Alcaine, & Behar, 2004). Indeed, rumination is predominantly abstract in nature (Goldwin & Behar, 2012; Goldwin, Behar, & Sibrava, 2013), as is mentation that occurs after engaging in ruminative thinking (Takano & Tanno, 2010). Furthermore, in contrast to concrete thinking, abstract thinking leads to nonadaptive consequences, including more negative global self-judgments (Rimes & Watkins, 2005) and reductions in positive affect following failure experiences (Moberly & Watkins, 2006).

Watkins (2008) postulates that negative valence and abstract level of construal both independently and interactively predict nonadaptive consequences of RNT. Rumination enhances information processing biases, including negative interpretations of ambiguous situations or selective recall of negative material (Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Lyubomirsky & Nolen-Hoeksema, 1995). Rumination has also been found to mediate the relationship between such biases and MDD symptoms (Ciesla & Roberts, 2007; Wisco, Gilbert, & Marroquín, 2014) as well as the relationship between poor attentional control and symptoms of MDD and anxiety (Hsu et al., 2015). Importantly, engaging in abstract processing during rumination facilitates generalization to broader negative schemas (Van Lier, Vervliet, Vanbrabant, Lenaert, & Raes, 2014) and retrieval of overgeneral negative content from memory (Watkins & Teasdale, 2004), both of which are characteristic of MDD. Although thinking about

negative events in an abstract or overgeneral manner is theorized to reduce distress (Williams et al., 2007), it may preclude necessary emotional processing (Greenberg, Elliott, & Foerster, 1990). Thus, rumination, and especially *abstract* rumination, may lead to nonadaptive or inflexible cognitive processes.

1.4   **Ineffective Problem Solving**

One consequence of engaging in rumination is that doing so may inhibit individuals' ability to engage in effective coping or problem solving. Whereas the reflective pondering facet of rumination is associated with positive problem orientation and use of active coping strategies, the brooding facet is associated with avoidance behaviors and use of passive coping strategies (Marroquín, Fontes, Scilletta, & Miranda, 2010; Moulds et al., 2007). In addition, whereas concrete thought is associated with greater problem-solving (Watkins & Moulds, 2005), *abstract* thought has been shown to reduce proactive or goal-directed behavior among dysphoric individuals (Dey, Newell, & Moulds, 2018; Lyubormirsky, Kasri, & Zehm, 2003). Among individuals high in trait rumination, induction of state rumination leads to pessimistic, emotion-focused thinking, which may lead to appraisal of problems as overwhelming, uncontrollable, or difficult to solve (Lyubomirsky, Tucker, Caldwell, & Berg, 1999). Moreover, although these individuals are able to generate adequate (albeit less effective; Donaldson & Lam, 2004) solutions to problems, they report decreased motivation and perceived ability to implement them (Lyubomirsky et al., 1999), possibly due to reduced availability of cognitive resources resulting from rumination (Lyubormirsky et al., 2003) or difficulty inhibiting the content of rumination in order to engage in goal-directed behavior (Joormann, Levens, & Gotlib, 2011). Furthermore, the effects of rumination on behavior may be more detrimental for individuals with comorbid MDD

and GAD than for those with either disorder in isolation (Ruscio et al., 2015). Diminished ability to engage in problem solving may reinforce negative self-efficacy or competence beliefs, thereby reinforcing the tendency to assume a more passive role when thinking about solving problems.

1.5   **Flexible and Inflexible Responding**

Importantly, rumination is associated with *inflexibility* in cognition as well as emotional and physiological responding. During periods of rumination, individuals have difficulty shifting attention away from negative, self-relevant emotional material (Grafton, Southworth, Watkins, & MacLeod, 2016; Joormann & Gotlib, 2008), likely leading to maintenance of negative emotional states (Ehring et al., 2009; Watkins, 2004) as well as continued reductions in attentional flexibility over time (Connolly et al., 2014). Further, Aldao, Mennin, and McLaughlin (2013) found that clinically anxious and/or depressed individuals deployed state rumination to a similar degree across different emotional contexts (e.g., happy, sad, fearful, or neutral) that would otherwise result in different levels of rumination. Several investigations also suggest that rumination is associated with inflexible physiological responding to stressful situations as indexed by reduced heart rate variability (Key, Campbell, Bacon, & Gerin, 2008; Woody, Burkhouse, Birk, & Gibb, 2015). Together, these findings indicate that rumination is associated with multi-systemic inflexibility during processing of negatively valenced material, which may lead to rumination being rigidly utilized as a regulatory strategy (Kato, 2012).

Psychotherapy for MDD aims to promote adaptive and flexible responding in multiple areas of functioning. In particular, cognitive restructuring, a defining component of cognitive therapy (CT; Beck, 1995), is used to help individuals identify automatic and rigid patterns of thinking regarding distressing events and to generate multiple perspectives about those events,

which is proposed to increase flexible, adaptive emotional responding. Cognitive restructuring is also associated with engagement in active, concrete problem-solving strategies to cope with stressful situations (Showers, 1988). Similarly, relaxation is a component of many interventions for affective disorders. For example, the use of relaxation in anxiety disorders has been shown to promote flexible emotional and physiological responding given its efficacy in reducing state (Hazlett-Stevens & Borkovec, 2001) and trait (Manzoni, Pagnini, Castelnuovo, & Molinari, 2008) anxiety, reducing salivary cortisol (Pawlow & Jones, 2002), and increasing the proportion of parasympathetic to sympathetic nervous system activation (Sakakibara, Takeuchi, & Hayano, 1994; Yang, Yang, & Zhang, 2002). Research indicates that relaxation might have utility in the treatment of MDD, with some investigations finding that relaxation and CT are comparable in their reduction of MDD symptoms (e.g., Murphy, Carney, Knesevich, Wetzel, & Whitworth, 1995). Relaxation has also been shown to increase the vividness of imagery and emotional processing in anxiety (Borkovec & Sides, 1979), both of which are theoretically compromised in MDD (Greenberg et al., 1990). However, although the role of relaxation as a potential facilitator of specific CT interventions has been examined in anxiety, it has not been examined in MDD.

Although rumination is associated with characteristics of thought that may contribute to nonadaptive responding in MDD and GAD (e.g., negatively valenced content, abstract level of construal, passive or ineffectual approach to problem solving) as well as cognitive biases that may be indicative of cognitive inflexibility, few studies have examined whether rumination inhibits flexibility during interventions designed to increase flexible, adaptive responding (e.g., cognitive restructuring). Similarly, although relaxation has beneficial effects on physiological functioning, and although it is thought to be helpful in the treatment of MDD, there is sparse evidence empirically demonstrating that this is the case and, if so, what features of MDD might

be ameliorated by this technique. Additionally, although relaxation has been shown to increase physiological and emotional flexibility, it is unclear whether it might also increase *cognitive* flexibility. It is possible that depressive rumination leads to cognitive rigidity and/or that relaxation leads to enhanced cognitive flexibility during cognitive restructuring.

1.6   **<u>Study Aims and Hypotheses</u>**

In the present study, we first sought to examine whether rumination inhibits and/or whether relaxation enhances cognitive flexibility during a cognitive restructuring exercise in which individuals generated alternative interpretations of their topics of rumination. Cognitive flexibility was defined as alternative interpretations that were characterized by (a) greater number and believability of alternative interpretations, (b) greater positively valenced content, (c) less negatively valenced content, (d) more concrete (versus abstract) level of construal, and (e) greater active (versus passive) agency. We selected participants with elevated or minimal symptoms of MDD and/or GAD to examine the unique and combined contribution of these conditions on these indices. We were interested in examining these indices in GAD given that the effects of rumination are more pronounced for depressed individuals with comorbid GAD (Ruscio et al., 2015) and that, similar to rumination, worry is associated with inflexibility as defined by these indices (Stevens et al., 2017). However, because the impact of GAD symptoms on depressive rumination is understudied, these analyses were exploratory in nature.

First, we hypothesized that compared to individuals who engaged in neutral thinking, those who engaged in prior rumination would exhibit reduced cognitive flexibility and those who engaged in relaxation would exhibit enhanced cognitive flexibility. Second, given that the effects of rumination are more marked for symptomatic individuals (Watkins & Moulds, 2005), we also

hypothesized that the adverse effects of rumination and/or the beneficial effects of relaxation on cognitive flexibility would be greater among individuals with elevated symptoms of MDD and/or GAD. Third, we sought to examine the relationships between these measures of cognitive flexibility. Consistent with previous findings (McGowan et al., 2017), we hypothesized that greater positive content would be associated with concreteness, whereas greater negative content would be associated with abstractness. Furthermore, based on Watkins' (2008) conceptual framework highlighting the contribution of both valence and level of construal to nonadaptive outcomes of RNT, we hypothesized that the effects of experimental manipulations and symptom groups on level of construal would remain after controlling for the valence of interpretations.

2. METHODS

2.1 **Design**

Participants were randomly assigned to engage in either rumination, relaxation, or neutral thinking prior to engaging in a cognitive restructuring exercise.

2.2 **Participants**

Participants ($N = 207$) were recruited from an undergraduate participant pool. Individuals were eligible for the study if during initial screening their scores on the Beck Depression Inventory - II (BDI-II; Beck, Steer, & Brown, 1996) were greater than or equal to 20 (moderate depression) or less than or equal to 13 (minimal depression) *and* their scores on the Generalized Anxiety Disorder Questionnaire - IV (GAD-Q-IV; Newman et al., 2002) were greater than or equal to 5.7 or less than or equal to 1.9. This procedure resulted in four analogue groups of participants: (1) elevated symptoms of MDD and GAD, (2) elevated symptoms of MDD and minimal symptoms of GAD, (3) minimal symptoms of MDD and elevated symptoms of GAD, and (4) healthy controls with minimal symptoms of MDD and GAD. Eight participants completed the cognitive restructuring task incorrectly and were excluded from analyses.

2.3 **Measures**

2.3.1 **Beck Depression Inventory – II**

The BDI-II (Beck et al., 1996) is a 21-item self-report measure of MDD symptoms. Scores below 13 are considered not clinically significant, whereas scores of 20 or greater indicate "moderate" symptoms; these were used as cutoffs to select individuals with minimal or elevated MDD symptoms, respectively. The BDI-II has high internal consistency (α

= .90; Osman et al., 1997) and excellent retest reliability across periods of one to 12 days (rs = .82-1.00; Sprinkle et al., 2002) in undergraduate samples. When using a structured diagnostic interview as the gold standard of comparison, BDI-II scores are highly correlated with number of MDD symptoms, with a cutoff score of 16 discriminating between individuals with versus without MDD with 84% sensitivity and 82% specificity (Sprinkle et al., 2002). In the current sample, internal consistency of the BDI-II was excellent (α = .95).

2.3.2   **Generalized Anxiety Disorder Questionnaire – IV**

The GAD-Q-IV (Newman et al., 2002) is a 9-item self-report measure of GAD symptoms. The GAD-Q-IV evidences good retest reliability for a period of two weeks (k = .64), strong associations with measures of worry, and weaker associations with measures of social anxiety. When using a structured diagnostic interview as the gold standard of comparison, a cutoff score of 5.7 distinguishes between individuals with and without GAD with 89% sensitivity and 83% specificity, and evidences good agreement with interview-assessed diagnosis of GAD (k = .67). Newman et al. (2002) recommend a cutoff score of 1.9 to classify individuals as Non-GAD, based on the mean score of non-anxious individuals in their study. We used these scores to select individuals with minimal or elevated symptoms of GAD. In this sample, internal consistency was good (α = .87).

2.3.3   **Response Styles Questionnaire - Rumination Scale**

The Response Styles Questionnaire – Rumination Scale (RS; Nolen-Hoeksema & Morrow, 1991) is a 22-item self-report measure of the degree to which individuals tend to engage in rumination. The RS evidences good internal consistency (rs = .87-.90), convergent validity with other measures of depression, and discriminant validity with measures of specific phobia and aggression in undergraduate samples (Roelofs, Muris, Huibers, Peeters, & Arntz,

2006). We included the RS to ensure that trait levels of rumination did not differ between experimental conditions. In the present study, internal consistency of the RS was excellent for the total scale ($\alpha = .94$) and good for the brooding ($\alpha = .81$) and reflection ($\alpha = .80$) subscales.

2.3.4 **Penn State Worry Questionnaire**

The Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) is a 16-item self-report measure of the frequency and intensity of worry. The PSWQ evidences high internal consistency ($\alpha = .95$), retest reliability ($\alpha = .92$), and convergent and discriminant validity with measures of anxiety and depression, respectively. A score of 62 correctly identifies individuals with GAD in undergraduate samples with 75% sensitivity and 86% specificity (Behar, Alcaine, Zuellig, & Borkovec, 2003). We included the PSWQ to ensure that trait levels of worry did not differ between experimental conditions. Internal consistency of the PSWQ was excellent in the current sample ($\alpha = .92$).

2.3.5 **Positive and Negative Affect Schedule**

The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) is a 20-item self-report measure that assesses positive affect (PA) and negative affect (NA). The PANAS "Moment" version assesses momentary levels of PA and NA, and evidences good internal consistency (PA $\alpha = .89$, NA $\alpha = .85$) and moderate retest reliability (PA $\alpha = .54$, NA $\alpha = .45$). The PA scale is correlated with indicators of well-being and positive emotional states, whereas the NA scale is correlated with measures of negative emotionality and symptoms of psychopathology. The PA and NA factors also evidence discriminant validity with other measures of general distress and positive engagement, respectively. In this sample, internal consistency was good to excellent for both the PA ($\alpha = .87$-.90) and NA ($\alpha = .83$-91) subscales.

2.3.6 **Relaxed, Anxious, and Depressed Affect**

Single-item 1 ("*not at all*") to 5 ("*extremely*") Likert scales were utilized to provide more specific measures of affective experiences and were also used as manipulation checks to ensure that experimental inductions led to expected affective changes. Such ratings have been employed in other studies utilizing similar experimental manipulations (e.g., Behar et al., 2012; Behar, Zuellig, & Borkovec, 2005; Stevens et al., 2017).

2.4 **Procedure**

The University Institutional Review Board approved all study procedures. Procedures for this study were similar to those of Stevens et al. (2017). Eligible participants who responded to the invitation to participate attended a laboratory session and provided informed consent. Participants were seated at a desk and were asked to complete self-report questionnaires and baseline affect ratings (PANAS; relaxed, anxious, and depressed affect). Next, they were asked to list a topic of depressive rumination, defined as "an event that has already happened to you but continues to cause you to feel sad, guilty, or ashamed when you think of it currently." After the experimenter checked the participant's topic for appropriateness for the study, participants were asked to write down an initial interpretation of their responsibility in that situation (i.e., why they feel sad, guilty, or ashamed about the past event). They were also asked to rate the *believability* of that initial interpretation (i.e., "How probable is it that your explanation is actually true or accurately reflects your responsibility in the scenario?") using a 0-100% scale. Participants then completed post-topic affect ratings.

Next, participants underwent a five-minute experimental induction corresponding to their randomly assigned condition. Participants assigned to the *relaxation condition* were asked to

close their eyes and "relax as deeply and slowly as you can. Just let go of all tension, focusing

your attention on your breathing, breathing from your diaphragm at a slow, comfortable rate."

These instructions were intended to approximate instructions typically utilized by clinicians for

diaphragmatic breathing. Participants assigned to the *rumination condition* were asked to close

their eyes and think about their topic of rumination in the way that they usually do, but as

intensely as they could until the experimenter asked them to stop. These instructions were similar

to rumination inductions utilized in other investigations (e.g., Goldwin & Behar, 2012; Goldwin

et al., 2013). Participants assigned to the *neutral thinking condition* were asked to close their

eyes and count backward by 3s beginning at 900 and to try to be as accurate as possible. They

were told that they would be asked to provide the number on which they ended up, but to

complete the task at their own pace. After five minutes, participants completed post-induction

PANAS and affect ratings, which were used as manipulation checks.

Participants were then asked to write as many alternative interpretations of their topic of

rumination as they could that were different from the initial interpretation they had provided

earlier in the experiment, and to rate the believability of each alternative interpretation (0-100%)

with respect to how accurately they believed it represented their responsibility in the situation.

This exercise was designed to simulate cognitive restructuring as used in CT for MDD (Beck,

1995), but was modified to allow participants to complete the exercise independently (i.e.,

without the help of a therapist). Finally, participants completed final affect ratings.

2.5   **Coding of Initial Interpretation and Alternative Interpretations**

We used a random number generator to place initial and alternative interpretations in

random order across participants and conditions. Three raters who were blind to study condition

and hypotheses rated each interpretation independently, then came to consensus on ratings for each of the coding scales. Only consensus ratings were used in the analyses. Intra-class correlation coefficients (Cronbach's alpha) were used to assess inter-rater reliability.

2.5.1 **Positive content and negative content**

These scales were designed to assess the degree of positively and negatively valenced content on 1 ("*not at all*") to 5 ("*extremely*") scales and were treated as orthogonal constructs (as per Clark & Watson, 1988). Coders assigned ratings based on both the valence of the meaning of individual words as well as the positive or negative implications of participants' interpretations. Ratings of 1 indicated the absence of positive (or negative) content, whereas ratings of 5 were assigned to interpretations that included extreme adjectives (e.g., amazing, infuriated) or situational descriptors (e.g., suicide). Inter-rater reliability was good for both the positive ($\alpha = .79$,) and negative ($\alpha = .86$) content scales.

2.5.2 **Level of construal**

Stöber's (1998) coding system was used to assess the degree of abstractness or concreteness of interpretations and has evidenced adequate inter-rater reliability in prior studies of mental activity during depressive rumination (e.g., $\alpha = .75$-$.81$; Goldwin & Behar, 2012; Goldwin et al., 2013). In this coding system, 1 ("*very abstract*") represents thought that is "vague/indistinct, cross-situational, or aggregated" and includes trait descriptors, whereas 5 ("*very concrete*") represents thought that is "distinct, situationally-specific, clear, or singular" and includes details that specify person, time, place, or means. In this sample, inter-rater reliability was acceptable ($\alpha = .78$).

2.5.3 **Agency**

This coding scale was designed for purposes of this experiment to assess the degree to which interpretations were passive or active in nature. Passivity was defined as external forces acting upon the individual with little to no evidence of the individual's effort to take action, control the situation, or solve the problem (e.g., "My friend is avoiding me"). Activity was defined as the individual's direct or intended action taken upon other individuals or the environment in order to influence a situation or solve a problem (e.g., "I will talk to her and work out the problem"). The scale ranged from 1 ("*very passive*") to 5 ("*very active*"), where a rating of 3 indicated the absence of influence (e.g., a trait descriptor such as "I was young and immature") or equal passivity and activity within the interpretation. In this study, inter-rater reliability was acceptable for the agency scale ($\alpha = .75$)[1].

2.6   **Data Analytic Plan**

First, to ensure that the experimental manipulations produced the expected changes in affect, we conducted 3 (Condition: rumination, relaxation, neutral) X 2 (Time: pre-induction, post-induction) multivariate analyses of variance (MANOVA) on affect ratings (PA, NA; relaxed, anxious, and depressed affect; see below). Second, to examine the unique and interactive effects of condition and symptom group on cognitive flexibility, we conducted a series of 3 (Condition: rumination, relaxation, neutral) X 2 (MDD Status: MDD, Non-MDD) X 2 (GAD Status: GAD, Non-GAD) between-subjects ANOVAs on the (a) number and (b) believability of alternative interpretations generated, and consensus ratings from each of the four coded dimensions for (c) the initial interpretation and (d) alternative interpretations. Finally, to

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[1] Of note, 52.4% of interpretations were coded by only two raters. The inter-rater reliability of these interpretations was lower, but remained acceptable, for positive content ($\alpha = .69$), negative content ($\alpha = .73$), level of construal ($\alpha = .67$), and agency ($\alpha = .71$).

examine the independent contribution of valence, level of construal, and agency to the non-adaptiveness of thought, we conducted two sets of 3 (Condition) X 2 (MDD Status) X 2 (GAD Status) between-subjects ANCOVAs for level of construal and agency, with one model including positive content as a covariate and the other including negative content. All variables were normally distributed except positive content ratings for initial interpretations (skew = 4.36, kurtosis = 17.18). Only nine initial interpretations had positive content ratings greater than 1; because variable transformations would not be appropriate, this variable was omitted from analyses. Bonferroni corrections were employed in follow-up analyses to adjust for multiple comparisons for variables with more than two levels. For analyses that violated assumptions of homogeneity, Greenhouse-Geisser corrected values are reported.

3. RESULTS

3.1 Preliminary Analyses

3.1.1 Data Reduction

To reduce the risk of Type I error and facilitate meaningful interpretation, we explored the magnitude of correlations between dependent measures to determine whether they could be combined into composite indicators and/or could be examined using MANOVA approaches. Cole, Maxwell, Arvey, and Salas (1994) demonstrated that the power of MANOVAs is substantially reduced when there are moderate positive intercorrelations (e.g., $r = .50$) between measures, indicating possible redundancy. For such cases, Maxwell (2001) recommends creating composite or latent variables, whereas variables correlated below approximately $r = .30$ should be analyzed in separate ANOVAs rather than a single MANOVA.

NA, depressed affect, and anxious affect were moderately to strongly intercorrelated (rs = .40 - .68), and the internal consistency of the NA scale was similar when including the anxious and depressed affect ratings (αs = .87-.92). Given the conceptual and statistical overlap between these constructs, we created a composite "negative emotion [NE]" variable by rescaling NA to match the 1 to 5 scale of the other two ratings, then averaging these three scores. Correlations between NE and relaxed affect ($r = -0.40 – -0.52$) were moderate, but correlations between PA and relaxed affect ($r = 0.25 - 0.30$) and NE ($r = -0.09 – -0.19$) were small, suggesting that NE and relaxed affect could be included in a MANOVA but that PA should be analyzed in a separate ANOVA. Finally, scores on the four coded dimensions for initial and alternative interpretations were weakly correlated (rs = -0.28 - 0.18), and were therefore analyzed in separate ANOVAs.

3.1.2   **Equivalence at Baseline**

      We examined whether random assignment successfully produced groups that were equivalent in demographic and clinical characteristics. Chi-square analyses indicated no between-groups differences in gender or ethnicity across conditions ($ps > .256$). One-way (Condition) ANOVAs indicated no between-groups differences on age, BDI-II, GAD-Q-IV, or RS ($ps > .345$). For the PSWQ, there was a main effect of Condition [$F(2, 186) = 4.04$, $p = .019$, $\eta_p^2 = .042$]. Individuals in the neutral condition endorsed greater trait worry than did those in the relaxation condition ($p = .023$), with those in the rumination condition falling nonsignificantly between those in the neutral and relaxation conditions[2] (TABLE I).

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[2] Analyses including PSWQ score as a covariate produced an identical pattern of results to those reported below.

TABLE I. PARTICIPANT DEMOGRAPHIC AND CLINICAL CHARACTERISTICS.

Measure	Rumination ($n = 68$) M (SD)	Relaxation ($n = 67$) M (SD)	Neutral ($n = 61$) M (SD)	Total ($n = 199$) M (SD)
Sex (% Female)	76.8	64.7	74.2	71.9
Age	19.01 (1.28)	19.04 (1.24)	18.98 (1.26)	19.02 (1.25)
Ethnicity[a] (%)				
White	14.5	26.5	25.8	22.1
Black	8.7	8.8	9.7	9.0
Asian	30.4	23.5	21.3	25.9
Hispanic	39.1	30.9	37.7	36.8
Native Am.	1.4	1.5	0.0	1.0
Other	2.8	4.4	4.8	4.0
BDI-II	16.42 (13.34)	15.79 (13.41)	15.72 (11.64)	15.99 (12.79)
GAD-Q-IV	6.24 (4.14)	5.36 (4.10)	5.64 (4.26)	5.75 (4.16)
RRS	46.17 (13.95)	48.48 (14.75)	50.32 (14.62)	48.25 (14.46)
Brooding	11.64 (3.82)	11.49 (3.86)	12.27 (3.93)	11.79 (3.86)
Reflection	9.35 (3.70)	9.96 (3.71)	10.32 (3.77)	9.86 (3.73)
PSWQ	54.31 (12.54)	52.85 (12.44)[b]	57.82 (13.42)[c]	54.92 (12.89)
Baseline Affect				
PA	23.32 (7.80)	24.87 (7.32)	24.59 (7.83)	24.24 (7.64)
NA	13.99 (4.43)	15.16 (6.37)	14.15 (5.08)	14.44 (5.36)
Relaxed	3.28 (0.99)	3.34 (0.92)	3.36 (0.91)	3.32 (0.93)
Anxious	2.16 (1.04)	2.12 (1.18)	2.02 (1.16)	2.10 (1.12)
Depressed	1.49 (0.78)	1.46 (0.90)	1.48 (0.81)	1.47 (0.88)

Note: significant differences are denoted by values with different superscripts

[a] Three participants did not report ethnicity

Similarly, a 3 (Condition) X 2 (MDD Status) X 2 (GAD Status) MANOVA on baseline

NE and relaxed affect indicated no multivariate main or interactive effects involving Condition

(ps > .24). There were multivariate main effects of MDD Status [$F(2, 185) = 3.59$, $p = .030$, $\eta_p^2 =$

.037] and GAD Status [$F(2, 185) = 5.68$, $p = .004$, $\eta_p^2 = .058$]. These main effects were qualified

by a multivariate MDD Status X GAD Status interaction [$F(2, 185) = 5.16$, $p = .007$, $\eta_p^2 = .053$],

which was significant at the univariate level for baseline NE [$F(1, 186) = 6.30$, $p = .013$, $\eta_p^2 =$

.033]. To follow up this interaction, we conducted independent samples t-tests to examine the

effects of GAD Status at each level of MDD Status. Among individuals with elevated symptoms

of MDD, those with concurrent elevated symptoms of GAD endorsed higher baseline NE

relative to individuals with minimal symptoms of GAD [$t(47.88 = 4.45$, $p < .001$, $d = 1.01$]. In

contrast, among individuals with minimal symptoms of MDD, those with elevated and minimal

symptoms of GAD endorsed comparable levels of baseline NE [$t(112) = 0.84$, $p = .401$, $d =$

0.16]. The ANOVA on baseline PA indicated no main or interactive effects (ps > .095). Thus,

individuals with elevated MDD and GAD symptoms reported higher levels of NE at baseline.

3.2 **Manipulation Checks**

First, to ensure that participants across experimental conditions responded similarly when

listing their topic of rumination (prior to the induction), we conducted a 3 (Condition) X 2

(Time: baseline, post-topic-listing) repeated measures MANOVA (NE, relaxed affect) and

ANOVA (PA). Results indicated a multivariate main effect of Time [$F(2, 194) = 163.54$, $p <$

.001, $\eta_p^2 = .628$], which was significant at the univariate level for NE [$F(1, 195) = 267.58$ $p <$

.001, $\eta_p^2 = .578$] and relaxed affect [$F(1, 195) = 213.87$, $p < .001$, $\eta_p^2 = .523$]. There was also a

main effect of Time for PA [$F(1, 195) = 236.69$, $p < .001$, $\eta_p^2 = .548$]. Paired samples t-tests

indicated that from baseline to post-topic-listing, relaxed affect [$t(197) = 14.59$, $p < .001$, $d =$

1.04] and PA [$t(196) = 15.38$, $p < .001$, $d = 1.09$] decreased, whereas NE increased [$t(198) = -$

16.34, $p < .001$, $d = 1.13$]. There were no main or interactive effects of Condition (ps > .853).

Second, to ensure that the manipulations had the intended effects on affect, we conducted a 3 (Condition) X 2 (Time: pre-induction, post-induction) repeated measures MANOVA (NE, relaxed affect) and ANOVA (PA). As expected, there were multivariate main effects of Condition [$F(4, 388) = 3.34$, $p = .011$, $\eta_p^2 = .033$] and Time [$F(2, 194) = 62.62$, $p < .001$, $\eta_p^2 = .392$], which were qualified by a multivariate Condition X Time interaction [$F(4, 388) = 20.22$, $p < .001$, $\eta_p^2 = .172$]. This interaction was significant at the univariate level for NE [$F(2, 195) = 40.72$, $p < .001$, $\eta_p^2 = .295$] and relaxed affect [$F(2, 195) = 12.04$, $p < .001$, $\eta_p^2 = .110$]. For PA, there was also a Time X Condition interaction [$F(2, 195) = 4.07$, $p = .019$, $\eta_p^2 = .040$]. From pre- to post-induction, participants in the rumination condition reported decreased PA [$t(68) = 2.00$, $p = .05$, $d = 0.24$], but no change in NE [$t(68) = -1.30$, $p = .198$, $d = 1.03$] or relaxed affect [$t(68) = -1.02$, $p = .313$, $d = 0.12$]. In contrast, participants in the relaxation condition reported increased relaxed affect [$t(67) = -7.09$, $p < .001$, $d = 0.86$] as well as decreased NE [$t(67) = 10.06$, $p < .001$, $d = 0.52$], but no change in PA [$t(67) = -1.11$, $p = .271$, $d = 0.13$]. Finally, participants in the neutral condition reported increased PA [$t(60) = -2.39$, $p = .020$, $d = 0.31$] and relaxed affect [$t(60) = -3.79$, $p < .001$, $d = 0.49$], as well as decreased NE [$t(60) = 7.99$, $p < .001$, $d = 0.37$].

Finally, we conducted an independent samples *t*-test on the proportion of time that participants reported engaging in their assigned induction during the five-minute induction period. Consistent with prior investigations using similar manipulations (Stevens, Behar, & Jendrusina, 2018; Stevens et al., 2017), participants assigned to engage in rumination ($M = 66.12$, $SD = 21.06$) reported engaging in the task to a greater extent than did participants assigned to engage in relaxation[3] ($M = 57.87$, $SD = 26.30$), $t(127.89) = 2.02$, $p = .046$, $d = 0.35$.

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[3] Because the manipulation check for the neutral thinking condition was to write down the last number participants counted rather than the percentage of time engaged in counting, we could not examine the relative level of engagement compared to the other two conditions.

3.3   **<u>Initial Interpretations of Rumination Topics</u>**

To examine characteristics of participants' initial interpretations of their listed topic of rumination, we conducted a series of 3 (Condition) X 2 (MDD Status) X 2 (GAD Status) ANOVAs on the believability rating ascribed to the initial interpretation as well as each coded dimension (negative content, level of construal, agency). For believability ratings, there was a trend-level main effect of GAD Status [$F(1, 182) = 3.03$, $p = .084$, $\eta_p^2 = .016$], such that individuals with elevated symptoms of GAD ($M = 79.42$, $SD = 21.31$) tended to rate their initial interpretation as being less believable than did individuals with minimal symptoms of GAD ($M = 85.39$, $SD = 24.30$; $d = 0.26$), with a small magnitude of effect. There were no main or interactive effects involving MDD Status or Condition ($ps > .119$).

As stated previously, positive content of initial interpretations was omitted from analyses. Results indicated no main or interaction effects for negative content ($ps > .151$) or agency ($ps > .094$). For level of construal, there were no effects involving Condition ($ps > .129$), but there was a significant MDD Status X GAD Status interaction [$F(1, 183) = 4.26$, $p = .040$, $\eta_p^2 = .023$] (TABLE II). We followed up this interaction by examining the effect of GAD Status at each level of MDD Status. Among individuals with minimal symptoms of MDD, there was no difference in level of construal between those with minimal versus elevated symptoms of GAD [$t(111) = 0.96$, $p = .339$, $d = 0.18$]. However, among individuals with elevated symptoms of MDD, those with concurrent elevated symptoms of GAD provided more *concrete* initial interpretations than did those with minimal symptoms of GAD [$t(80) = 2.09$, $p = .042$, $d = 0.49$].

TABLE II. SYMPTOMS AND CHARACTERISTICS OF INTERPRETATIONS ACROSS SYMPTOM GROUPS.

	Control (*n* = 54)	MDD-only (*n* = 20)	GAD-only (*n* = 58)	MDD+GAD (*n* = 63)
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
RS	38.10 (12.08)	44.42 (12.39)	47.67 (12.19)	58.69 (12.04)
Brooding	9.08 (3.25)	10.33 (3.33)	11.92 (3.28)	14.45 (3.24)
Reflection	7.79 (3.43)	9.19 (3.52)	9.73 (3.46)	11.91 (3.42)
PSWQ	45.33 (10.27)	46.40 (10.52)	58.63 (10.34)	63.19 (10.22)
Initial				
Believability	84.35 (21.01)	84.55 (23.56)	80.63 (18.82)	77.78 (21.93)
Positive Content	1.05 (0.23)	1.05 (0.22)	1.05 (0.22)	1.03 (0.18)
Negative Content	2.65 (0.95)	2.75 (1.12)	2.83 (0.82)	3.05 (0.93)
Construal	2.47 (1.03)	2.20 (0.83)[a]	2.29 (0.96)	2.69 (1.14)[b]
Agency	2.84 (1.07)	2.75 (1.16)	2.40 (1.04)	2.85 (1.17)
Alternatives				
Believability	67.74 (21.43)	67.13 (23.68)	70.08 (18.34)	69.61 (19.91)
Positive Content	1.10 (0.20)	1.06 (0.10)	1.08 (0.15)	1.08 (0.17)
Negative Content	2.22 (0.54)	2.25 (0.60)	2.35 (0.57)	2.37 (0.56)
Construal	2.69 (0.66)	2.77 (0.73)	2.33 (0.60)	2.38 (0.65)
Agency	2.76 (0.66)	2.52 (0.43)	2.24 (0.53)	2.73 (0.63)

Note. Several between-groups differences emerged at baseline. For RS-Brooding, individuals with elevated symptoms of MDD ($p <.001$) and individuals with elevated symptoms of GAD ($p <.001$) endorsed greater brooding than did individuals with minimal symptoms of these conditions. Similarly, for RS-Reflection, individuals with elevated symptoms of MDD ($p =.001$) and individuals with elevated symptoms of GAD ($p <.001$) endorsed greater brooding than did individuals with minimal symptoms of these conditions. Finally, for PSWQ, individuals with elevated symptoms of GAD evidenced greater levels of trait worry ($p <.001$) than did individuals with minimal symptoms of GAD.

3.4   **Alternative Interpretations of Rumination Topics**

3.4.1   **Number and Believability**

To examine the impact of inductions on flexibility, we conducted two separate 3 (Condition) X 2 (MDD Status) X 2 (GAD Status) between-subjects ANOVAs on the number of alternative interpretations participants generated and the believability of those interpretations. For the number of alternative interpretations generated, results indicated a marginal main effect of Condition [$F(1, 187) = 2.94$, $p = .056$, $\eta_p^2 = .030$], such that individuals in the neutral condition generated a marginally greater number of alternative interpretations than did individuals in the relaxation condition ($p = .070$, $d = 0.40$), with individuals in the rumination condition falling non-significantly between those in the neutral ($p > .999$, $d = 0.11$) and relaxation ($p = .257$, $d = 0.30$) conditions. For believability of interpretations, no main or interactive effects emerged (ps $> .209$).

3.4.2 **Coded Dimensions**

We examined the impact of inductions and symptoms on key characteristics of alternative interpretations generated during the cognitive restructuring exercise by conducting four separate 3 (Condition) X 2 (MDD Status) X 2 (GAD Status) ANOVAs on coded dimensions (positive content, negative content, level of construal, agency).

For positive content, there was a marginal main effect of Condition [$F(1, 184) = 2.75$, $p = .066$, $\eta_p^2 = .029$], such that individuals in the rumination condition had marginally more positive alternative interpretations than did individuals in the neutral condition ($p = .062$, $d = 0.41$), with individuals in the relaxation condition falling non-significantly in between those in the rumination ($p = .962$, $d = 0.17$) and neutral ($p = .433$, $d = 0.26$) conditions. There were no main effects or interactions involving symptom groups (ps $> .385$). For negative content, there were no between-groups differences (ps $> .113$).

For level of construal, there was a significant main effect of GAD Status [$F(1, 184) =$ 14.91, $p < .001$, $\eta_p^2 = .075$] and a marginal main effect of Condition [$F(2, 184) = 2.90$, $p = .058$, $\eta_p^2 = .031$], both of which were qualified by a Condition X GAD Status interaction [$F(2, 184) =$ 2.93, $p = .056$, $\eta_p^2 = .031$]. Among individuals with minimal symptoms of GAD, there was a main effect of Condition [$F(2, 72) = 3.73$, $p = .029$, $\eta_p^2 = .094$] such that individuals who engaged in rumination generated alternative explanations that were more *concrete* than were those generated by individuals in the relaxation condition ($p = .025$; $d = .77$), with individuals in the neutral thinking condition falling non-significantly between those in the rumination ($p =$ .259; $d = .51$) and relaxation ($p > .999$; $d = .25$) conditions. In contrast, among individuals with elevated symptoms of GAD, there were no differences in level of construal across Condition [$F(2, 118) = 0.20$, $p = .816$, $\eta_p^2 = .003$] (Figure 1).
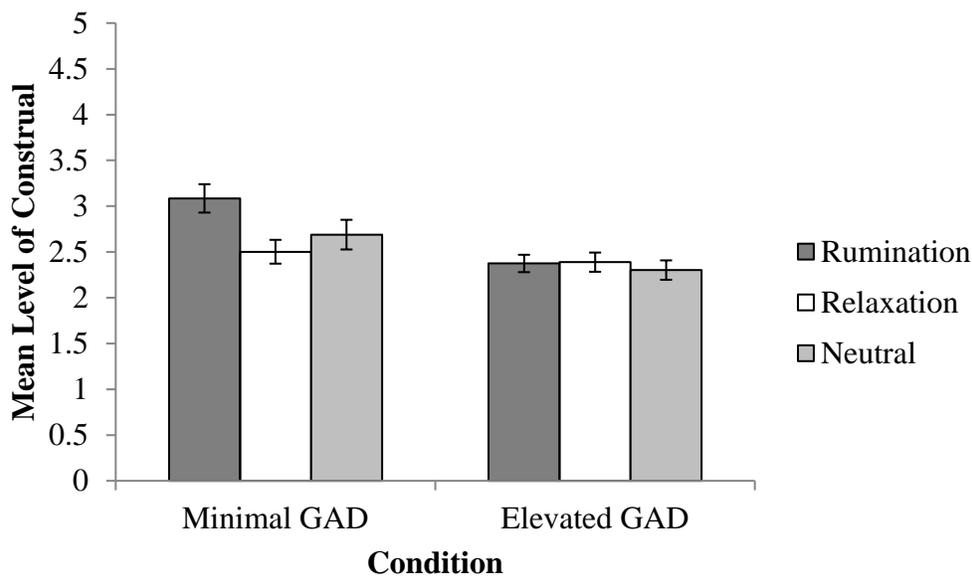
Figure 1. Level of construal of alternative interpretations during simulated cognitive restructuring.

For agency, there was a significant MDD Status X GAD Status interaction [$F(1, 184) = 14.96, p < .001, \eta_p^2 = .075$]. Among individuals with minimal symptoms of MDD, those with elevated symptoms of GAD generated alternative interpretations that were more passive than did individuals with minimal symptoms of GAD [$t(111) = -4.63, p < .001, d = 0.86$]. Among individuals with elevated symptoms of MDD, there was no difference in levels of agency between those with elevated or minimal symptoms of GAD [$t(81) = 1.41, p = .162, d = 0.37$].

4. **DISCUSSION**

The current study examined whether depressive rumination might inhibit and/or relaxation might enhance cognitive flexibility (defined as the number, believability, and adaptive characteristics of alternative interpretations) during a simulated cognitive restructuring exercise among individuals with elevated or minimal symptoms of MDD and/or GAD. In their initial interpretations of their rumination topics, individuals with elevated symptoms of GAD tended to perceive their interpretations as less believable relative to those with minimal symptoms of GAD, although this did not reach significance and had a small magnitude of effect. In addition, individuals with elevated symptoms of MDD and GAD listed interpretations that were more concrete than did individuals with elevated symptoms of only MDD. This suggests that the addition of GAD symptoms to MDD symptoms led to the concretization of interpretations. This is surprising, given evidence that individuals with GAD typically exhibit an abstract level of construal (see Borkovec et al., 2004 for a review), and that individuals with combined MDD and GAD symptoms exhibit higher levels of nonadaptive characteristics than do individuals with either condition in isolation (e.g., Ruscio et al., 2015). One possible explanation is that because individuals in this group evidenced greater tendencies to engage in trait rumination, they may have also habitually engaged in state rumination about their topics. Evidence suggests that when individuals repeatedly simulate a novel future situation, their thinking becomes increasingly detailed and specific (i.e., concrete) over time (Szpunar & Schacter, 2013), and this is true even among individuals with GAD, albeit to a significantly lesser extent than healthy individuals (Wu, Szpunar, Godovich, Schacter, & Hofmann, 2015). Additionally, compared to other forms of RNT such as worry, rumination has been found to contain higher levels of imagery-based content (Goldwin et al., 2013; McLaughlin et al., 2007), which in turn is associated with

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concreteness (McGowan et al., 2017; Stevens et al., 2017). Frequent rumination could over time increase the concreteness of thoughts about a given situation. Still, it remains possible that individuals with a combination of MDD and GAD symptoms exhibit qualitatively different cognitive characteristics that may be nonadaptive via different mechanisms.

An alternative interpretation for this finding is that individuals with elevated symptoms of MDD generated more *abstract* interpretations of their rumination topics. This interpretation is consistent with research demonstrating that individuals who are depressed tend to engage in over-generalization when remembering and interpreting negative events (Rimes & Watkins, 2005; Williams et al., 2007). Such over-generalization may exacerbate or at least perpetuate engagement in abstract, brooding-type rumination (Goldwin & Behar, 2012; Goldwin et al., 2013; Takano & Tanno, 2010). However, it is important to note that the primary observed difference was between individuals with elevated symptoms of MDD and individuals with comorbid MDD and GAD symptoms, not healthy controls, supporting the likelihood that those with concurrent symptoms of MDD and GAD generated particularly concrete interpretations.

Following a period of either rumination, relaxation, or neutral thinking, participants listed alternative interpretations of their topics of rumination. Contrary to our hypotheses, relaxation led to *inhibition* of flexibility in terms of the number of alternative interpretations participants generated relative to those who engaged in neutral thinking. This is surprising given evidence that relaxation enhances physiological flexibility (Sakakibara et al., 1994; Yang et al., 2002) and provides additive benefit to CT (Borkovec & Costello, 1993). However, a previous study similarly showed that relaxation does not enhance *cognitive* flexibility *per se* (Stevens et al., 2018). It is possible that the three conditions resulted in differing states of arousal that led to differential performance on the task. According to the Yerkes-Dodson Law (Yerkes & Dodson,

1908), moderate levels of physiological arousal are associated with better performance, whereas very low or high levels of physiological arousal are associated with poorer performance. Relaxation reduces physiological arousal, and thus may have resulted in reduced engagement in or performance on the cognitive restructuring exercise. Although it did not lead to generation of significantly fewer alternatives relative to the neutral condition, rumination resulted in greater emotional arousal that might have hindered flexibility. Compared to rumination and relaxation, neutral thinking resulted in intermediate changes in affect (i.e., moderate arousal), which may have led to more effective engagement in the cognitive restructuring exercise. Importantly, engagement did not predict more *adaptive* responding. Although individuals in the neutral thinking condition generated the greatest number of alternative interpretations, those interpretations were characterized by less positive content relative to interpretations generated by individuals in the rumination condition.

Interestingly, whereas rumination *increased* concreteness of thoughts among participants with minimal symptoms of GAD, this was not the case for participants with elevated symptoms of GAD. This suggests that for individuals with chronic worry, rumination might *maintain* abstract thought. After engaging in rumination, individuals with elevated symptoms of GAD may be less able to engage in more contextualized ways of thinking about their rumination topic. This is consistent with prior studies demonstrating that rumination is both associated with and comprised of abstract level of construal (Goldwin & Behar, 2012; Goldwin et al., 2013; Watkins, 2008), particularly for symptomatic individuals (Watkins & Moulds, 2005). Notably, this pattern is nearly identical to findings from a study employing similar methods, in which only participants with elevated symptoms of GAD who engaged in worry generated alternative predictions for their worry topic that were characterized by greater abstractness, as well as

greater negative valence (Stevens et al., 2017). Overlap in the way individuals with GAD engage in various forms of RNT may be one mechanism by which they tend to experience high levels of brooding rumination in addition to high levels of worry (Ruscio et al., 2015), and perhaps subsequent comorbid symptoms of depression (Merikangas et al., 2003). That these effects remained even after covarying for the valence of these interpretations indicates that the *process* by which these individuals ruminate or worry may be nonadaptive in addition to the valence of that RNT. More broadly, these findings add to a growing body of evidence suggesting that various forms of RNT share overlapping features that contribute to their non-adaptiveness (Goldwin & Behar, 2012; McEvoy et al., 2010; McGowan et al., 2017) and corroborate the assertion that level of construal is one such important feature (Watkins, 2008).

We also found that among participants with minimal symptoms of MDD, those with elevated symptoms of GAD generated interpretations that were more passive (versus active) in nature than did those with minimal symptoms of GAD. This is consistent with the nonadaptive problem-solving orientation observed among individuals with GAD (and MDD) (Koerner & Dugas, 2006; Ladouceur, Blais, Freeston, & Dugas, 1998; Watkins & Moulds, 2005). Furthermore, this finding remained even after covarying for the positive or negative content of interpretations, indicating that these effects were independent of valence. This could reflect such individuals' hopelessness or helplessness beliefs in addition to negative interpretations of events (Abramson, Metalsky, & Alloy, 1989), which together may reduce the likelihood of resolving these problems and consequently perpetuate rumination about them. It is noteworthy that we did not observe a general effect of either GAD or MDD for agency, in part because individuals with concurrent elevated symptoms of MDD and GAD exhibited less passive interpretations than did individuals with either set of symptoms in isolation. It is possible that the more concrete initial

interpretations generated by individuals with concurrent symptoms allowed them to engage in more effective problem solving, leading to their generation of subsequent alternative interpretations with greater active agency.

Finally, we examined the relationships between various dimensions of thought that may contribute to their non-adaptiveness. Whereas positive valence was associated with concreteness (consistent with McGowan et al., 2017 and Stevens et al., 2017), negative valence was associated with passive agency, but not with level of construal. In our previous study examining flexibility of alternative predictions for worry topics (Stevens et al., 2017), negative valence was associated with abstractness; this finding was not replicated in the present study ($r = -0.49$ versus 0.13). Similarly, Stevens et al. (2017) reported a stronger correlation between positive valence and concreteness ($r = 0.46$ versus 0.18). It is possible that because mentation about rumination topics is more negative and/or more concrete than mentation about worry topics (but see Goldwin & Behar, 2012), the associations between negative content and level of construal may differ. Rumination contains less verbal-linguistic and greater imagery-based mentation than does worry (Goldwin & Behar, 2012), and given its past temporal orientation, may also contain more specific detail (McGowan et al., 2017). Alternatively, because participants were often describing past problems they experienced, the negative content in their interpretations may have been more related to their active or passive approach to the problem rather than to the event itself.

Together, these findings broadly support assertions that individuals with GAD evidence reduced cognitive flexibility (Hirsch & Mathews, 2012) in terms of both a reduced ability to strongly consider various interpretations of scenarios about which they tend to ruminate, as well as nonadaptive characteristics of thought that may contribute to inflexible thinking, particularly after engaging in rumination. In response to negative affective content, individuals with elevated

symptoms of GAD exhibit reduced *explanatory flexibility* (Fresco, Mennin, Moore, Heimberg, & Hambrick, 2014), defined as the ability to consider different situations contextually (Fresco, Rytwinski, & Craighead, 2007). In our study, eliciting a potent topic of rumination increased negative affect across participants, but for individuals with elevated symptoms of GAD this may additionally reduce the flexibility with which they can consider possible explanations in context.

4.1 **<u>Limitations</u>**

Our results should be interpreted in light of several limitations. First, our subsample of participants with elevated symptoms of MDD and minimal symptoms of GAD was small, potentially limiting power to detect effects involving this group. Second, although we employed well-validated symptom measures and empirically derived cutoff scores to recruit participants, the sample was comprised of undergraduate students, which may limit generalizability to other populations. Additionally, our use of cutoff scores may have excluded individuals who do experience high levels of rumination and/or worry but who do not meet the specific symptom criteria or severity for inclusion in our sample. Given the high rates of comorbidity between MDD and GAD (Moffitt et al., 2007) and the dimensional nature of these conditions (Ruscio, Borkovec, & Ruscio, 2001; Ruscio & Ruscio, 2002), it may be important for future studies to also include individuals with mild symptoms of one or both disorders. Finally, the manipulations and cognitive restructuring exercise used in this study were relatively short and modified so that participants could complete them with minimal experimenter assistance, and thus were different from procedures implemented in formal treatment packages such as CT and progressive muscle relaxation. A different pattern of effects may have emerged if trained therapists had assisted participants in the exercises or had relaxation been administered over multiple sessions.

5. **CONCLUSION**

In summary, the present study found that relaxation did not enhance cognitive flexibility regarding rumination topics during a simulated cognitive restructuring exercise, and in fact may have inhibited generation of multiple alternative interpretations although it did not adversely impact theoretically important characteristics of interpretations. In addition, although rumination did not inhibit flexibility in terms of the number of alternative interpretations generated, it did lead to maintenance of nonadaptive abstractness among individuals with elevated symptoms of GAD, and such abstractness was associated with reduced positive content. Furthermore, among individuals with minimal symptoms of MDD, those with elevated symptoms of GAD generated more passive alternative interpretations, which was associated with greater negative content. This suggests that individuals with GAD have greater difficulty flexibly shifting from nonadaptive (e.g., abstractness, passive agency) to more adaptive modes of processing when interpreting past distressing events. Furthermore, these findings add to evidence indicating that, similar to worry, depressive rumination may lead to nonadaptive consequences for symptomatic individuals by inhibiting flexible shifting from nonadaptive to adaptive modes of processing.

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<p style="text-align:center;">**CURRICULUM VITA**</p>

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EDUCATION

2018 – Present   **VA Puget Sound Healthcare System, Seattle Division**
Clinical Psychology Doctoral Internship (APA Accredited)
Director of Training: Stephen McCutcheon, Ph.D.

2012 – Present   **University of Illinois at Chicago**
Ph.D., Clinical Psychology (Expected May 2019; APA Accredited)
   Dissertation: *The Effects of Rumination and Relaxation on Flexibility during Cognitive Restructuring* (Defended 10/26/18)
M.A., Clinical Psychology (Conferred 2015)
Mentors: Evelyn Behar, Ph.D.; Stewart Shankman, Ph.D.

2008 – 2012   **University of Virginia**
B.A., Psychology, Magna cum Laude
Minor: Sociology

FELLOWSHIPS AND ACADEMIC APPOINTMENTS

2014   Psychology Department Summer Research Assistantship, Clinical ($5,328)
2012 – 2013   UIC College of Liberal Arts and Sciences Graduate Fellowship ($20,500)

CLINICAL EXPERIENCE

2018 – Present   **VA Puget Sound Healthcare System, Seattle Division**
Psychology Intern

Primary Care/Mental Health Integration and Women's Health Clinic
Supervisors: Nicola De Paul, Ph.D.; Craig Santerre, Ph.D.

PTSD Outpatient Clinic and Mental Health Clinic
Supervisors: Scott Michael, Ph.D.; Catherine Wallace, Ph.D.

Addictions Treatment Center
Supervisors: Josie Tracy, Ph.D.; Gail Rowe, Ph.D.

2016 – 2017   **Edward Hines, Jr. VA Hospital: Trauma Services Program**
Clinical Psychology Extern
   Received VA rollout training in Cognitive Processing Therapy and formal training in administering the Clinician-Administered PTSD Scale.
Supervisors: Kurtis Noblett, Ph.D.; Barbara Pamp, Ph.D.
CPT Consultant: Kelly Phipps Maieritsch, Ph.D.

2015 – 2016	**University of Chicago Medical Center: Cognitive-Behavioral Therapy Program**
	Clinical Psychology Extern
	Supervisors: Shona Vas, Ph.D.; Pooja Dave, Ph.D.; Shana Franklin, M.A.
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2013 – 2018	**University of Illinois at Chicago: Office of Applied Psychological Services**
	Psychotherapy Practicum Clinical Trainee; Graduate Supervisor
	Provided individual, group, and couple therapy. Provided vertical supervision to junior graduate student trainees.
	Supervisors: Gloria Balague, Ph.D.; Nancy Dasoff, Ph.D.; Michelle Kaufmann, Ph.D.; Amanda Lorenz, Ph.D.; Jenna Rowen, Ph.D.

2012 – 2015	**University of Illinois at Chicago: Office of Applied Psychological Services**
	Assessment Practicum, Clinical Trainee
	Supervisors: Amanda Lorenz, Ph.D.; Ellen Herbener, Ph.D.

PEER REVIEWED PUBLICATIONS

1. **Stevens, E. S.**, Lieberman, L., Funkhouser, C., Correa, K. A., & Shankman, S. A. (*in press*). Startle during threat longitudinally predicts functional impairment independent of *DSM* diagnoses. *Psychiatry Research*. doi:10.1016/j.psychres.2019.02.072

2. **Stevens, E. S.,** Behar, E, & Jendrusina, A. A. (2018). Enhancing the efficacy of cognitive bias modification for social anxiety. *Behavior Therapy, 49*(6)*,* 995-1007. doi:10.1016/j.beth.2018.02.004

3. **Stevens, E. S.**, Weinberg, A., Nelson, B. D., Meissel, E. E. E., & Shankman, S. A. (2018). The effect of panic disorder versus anxiety sensitivity on event-related potentials during anticipation of threat. *Journal of Anxiety Disorders, 54,* 1-10. doi:10.1016/j.janxdis.2017.12.001

4. **Stevens, E. S.,** Jendrusina, A. A., Legrand, A. C., Nahin, E. R., Kaufman, M. G., Borkovec, T. D., & Behar, E. (2017). The effects of worry and relaxation on flexibility during cognitive restructuring. *Behavior Modification*, *42*(6), 838-863. doi:10.1177/0145445517732272

5. Lieberman, L., **Stevens, E. S.**, Funkhouser, C. J., Weinberg. A., Sarapas, C., Huggins, A. A. & Shankman, S. A. (2017). How many blinks are necessary for a reliable startle response? A test using the NPU-threat task. *International Journal of Psychophysiology*, *114*, 24-30. doi:10.1016/j.ijpsycho.2017.01.012

6. Liu, H., Lieberman, L. N., **Stevens, E. S.,** Auerbach, R., Shankman, S. A. (2017). Using a cultural and RDoC framework to conceptualize anxiety in Asian Americans. *Journal of Anxiety Disorders, 48,* 63-69. doi:10.1016/j.janxdis.2016.09.006

7. McGowan, S. K., **Stevens, E. S.,** Behar, E., Judah, M. R., Mills, A. C., & Grant, D. M. (2017). Concreteness of idiographic worry and anticipatory processing. *Journal of Behavior Therapy and Experimental Psychiatry*, *54*, 195-203. doi:10.1016/j.jbtep.2016.08.005

8. Jorstad-Stein, E. C., Stolley, M. R., Behar, E., & **Stevens, E. S.** (2015). Mindfulness-based interventions targeting quality of life and biopsychosocial outcomes for cancer patients and survivors: a systematic review and meta-analysis. *PROSPERO*.doi:10.15124/CRD42015017939

9. Clerkin, E. M., Cody, M. W., **Stevens, E. S.**, Gasser, M. L., Pasciuti, M. L., & Teachman, B. A. (2014). Social anxiety disorder and global/local performance on a visuospatial processing task. *Journal of Experimental Psychopathology*, 5, 83-96. doi:10.5127/jep.035013

MANUSCRIPTS UNDER REVIEW

10. Norr, A. M., Bourrassa, K. J., **Stevens, E. S.,** Hawrilenko, M. J., Michael, S. T., & Reger, G. M. (under review). Relationship between change in in-vivo exposure distress and PTSD symptoms during exposure therapy for active duty soldiers.

11. Bourrassa, K. J., Norr, A. M., **Stevens, E. S.**, Katz, A. C., & Reger, G. M. (in preparation). Differences in resting heart rate and heart rate reactivity among active duty service members with PTSD undergoing prolonged exposure therapy.

12. Jendrusina, A. A., **Stevens, E. S.**, Nahin, E. R., Legrand, A. C., & Behar, E. (under review). Concreteness of thoughts and images during suppression and expression of worry.

13. Meissel, E. E. E., Liu, H., **Stevens, E. S.**, Evans, T. C., Britton, J. & Shankman, S. A. (submitted). Reliability and validity of response-based measures of attention bias.

14. Jorstad-Stein, E. C., Behar, E., **Stevens, E. S.**, & Stolley, M. R. (submitted). Protocol for a systematic review and meta-analysis of mindfulness-based interventions targeting quality of life and biopsychosocial outcomes for cancer patients and survivors.

BOOK CHAPTERS

1. **Stevens, E. S.,** & Shankman, S. A. (2017). Diagnosis. In *The SAGE Encyclopedia of Abnormal and Clinical Psychology*.

2. Behar, E., & **Stevens, E. S.** (2017). Dismantling research designs. In *The SAGE Encyclopedia of Abnormal and Clinical Psychology*.

3. **Stevens, E. S.,** Jendrusina, A. A., Sarapas, C., & Behar, E. (2013). Generalized Anxiety Disorder. In T. Ehring & P. Emmelkamp (Ed.) *The Wiley handbook of anxiety disorders: Theory, research, and practice* (pp. 378-423). Chichester, UK: John Wiley & Sons, Ltd.

MANUSCRIPTS IN PREPARATION

1. **Stevens, E. S.**, Jendrusina, A. A., Fortune, M. R., Legrand, A. C., Nahin, E. R., Kaufman, M. G., Borkovec, T. D., & Behar, E. (in preparation). Stuck in the past: Rumination reduces flexibility during cognitive restructuring.

2. **Stevens, E. S.**, Siev, J., & Behar, E. (in preparation). Anxiety and disgust sensitivity predict attentional bias in dental phobia.

3. **Stevens, E. S.**, Weinberg, A., Olino, T., & Shankman, S. A. (in preparation). Measuring the "Trait-ness" of RDoC constructs: Using latent state-trait-occasion modeling to determine the contribution of trait and state factors in reward processing.

4. **Stevens, E. S.**, Grant, D. M., Mills, A. C., Sibrava, N., Kaufman, M. G., & Behar, E. (in preparation). Temporal orientation of repetitive negative thought.

5. **Stevens, E. S.**, Norr, A., Bourassa, K., Katz, A. C., & Reger, G. M. (in preparation). Structure of PTSD symptom clusters during virtual reality or prolonged exposure therapy.

6. **Stevens, E. S.**, Norr, A., & Reger, G. M. (in preparation). Rumination in post-traumatic stress disorder: An integrated review.

7. Weinberg, A., **Stevens, E. S.**, Correa, K. A., & Shankman, S. A. (in preparation). Trait negative and positive affect predict trait neural responses to emotional images.

8. Jendrusina, A. A., **Stevens, E. S.**, & Behar, E. (in preparation). Investigating the role of intolerance of uncertainty in GAD using a probe discrimination task.

9. **Stevens, E. S.**, Funkhouser, C. J., Auerbach, R., Talati, A., Kaiser, J., Weisman, M., & Shankman, S. A. (in preparation). Inhibition predicts the course of anxiety symptoms: The moderating effect of familial risk.

PROFESSIONAL PRESENTATIONS

1. Jendrusina, A. A., Behar, E., & **Stevens, E. S.** (2018, November). Examining uncertainty-related attentional bias using a probe detection paradigm. In E. Behar and R. Ranney (Co-Chairs) *Intolerance of uncertainty: Evidence from experimental and laboratory tasks*. Symposium conducted at the 52nd annual meeting of the Association for Behavioral and Cognitive Therapies, Washington, D. C.

2. Meissel, E. E. E., **Stevens, E. S.**, Liu, H., Evans, T. C., & Shankman, S. A. (2017, November). The reliability and validity of novel measures of attentional bias in a family study. In N. Amir (Chair) *Toward the clinical application of cognitive bias modification: Addressing the psychometric properties of measure*. Symposium conducted at the 51st annual meeting of the Association for Behavioral and Cognitive Therapies, San Diego, CA.

3. Shankman, S. A., **Stevens, E. S.**, Lieberman, L., & Funkhouser, C. J. (2017, October). Function follows form: Startle to unpredictable threat predicts functional impairment at one-year follow-up. In A. Macnamara (Chair), *Neural indicators of cognitive and emotional functioning*. Symposium conducted at the 57th annual meeting of the Society for Psychophysiological Research, Vienna, Austria.

4. Shankman, S. A., Lieberman, L., Gorka, S. M., Funkhouser, C. J., & **Stevens, E. S.** (2017, October). Association between specific posttraumatic stress symptom clusters and frontal EEG asymmetry during the anticipation of reward. In K Brinkmann (Chair), *Impaired processing of rewards and punishments in affective disorders during anticipation and consummation*. Symposium conducted at the 57th annual meeting of the Society for Psychophysiological Research, Vienna, Austria.

5. **Stevens, E. S.**, Jendrusina, A. A., Kargol, J., Tomchek, A., & Behar, E. (2016, October). Believing is behaving? The effect of cognitive bias modification on exposure performance in social anxiety disorder. In J. Siev and E. Behar (Co-chairs), *Examining the generalization of effects of cognitive bias modification to other domains of functioning*. Symposium conducted at the 50th annual meeting of the Association for Behavioral and Cognitive Therapies, New York, NY.

6. **Stevens, E. S.**, Jendrusina, A. A., Anemone, C., Dunn, N., Tahara-Eckl, L., and Behar, E. (2014, November). The effects of relaxation on cognitive bias modification training in social anxiety disorder. In A. Srivastav (Chair), *Assessing and modifying anxiety disorder-related attention and interpretive biases in adults*. Symposium conducted at the 48th annual meeting of the Association for Behavioral and Cognitive Therapies, Philadelphia, PA.

7. Jendrusina, A. A., **Stevens, E. S.**, Legrand, A., Skubic, D., & Behar, E. (November, 2014). Investigating the relationship between intolerance of uncertainty and GAD using a probe detection task. In A. Srivastav (Chair), *Assessing and modifying anxiety disorder-related attention and interpretive biases in adults*. Symposium given at the 48th annual meeting of Association for Behavioral and Cognitive Therapies, Philadelphia, PA.

INVITED LOCAL PRESENTATIONS

8. **Stevens, E. S.** (2017, March). *Cognitive bias modification approaches to treating PTSD*. Presented at the Edward Hines, Jr., VA Trauma Services Program didactic.

9. **Stevens, E. S.** (2016, April). *Cognitive bias modification for anxiety-related disorders*. Oral presentation at the University of Chicago Department of Psychiatry and Behavioral Sciences, Anxiety Clinic team meeting.

CONFERENCE POSTER PRESENTATIONS

1. **Stevens, E. S.**, Schlaudt, V. A., Fortune, M. R., Siev, J., & Behar, E. (2018, November). *Anxiety, disgust sensitivity, and enhanced attentional bias in dental phobia*. Poster to be presented at the 52nd annual meeting of the Association for Behavioral and Cognitive Therapies, Washington, D.C.

2. Carrillo, V., **Stevens, E. S.**, Funkhouser, C., Kujawa, A., Weinberg, A. Auerbach, R., & Shankman, S. A. (2018, April). *Abnormal reactivity to social feedback in remitted depression: An event-related potential study*. Poster presented at the 38th annual meeting of the Anxiety and Depression Association of America, Washington, D. C.

3. **Stevens, E. S.**, Jendrusina, A. A., Legrand, A. C., Nahin, E. R., Fortune, M. R., Kaufman, M. G., & Behar, E. (2017, November). *Stuck in the past: The effects of rumination and relaxation on flexibility during cognitive restructuring*. Poster presented at the 51st annual meeting of the Association for Behavioral and Cognitive Therapies, San Diego, CA.

4. **Stevens, E. S.**, Weinberg, A., Olino, T. M., & Shankman, S. A. (2017, October). *Variability and vulnerability: Examining the trait and state variance in reward responding using trait-state-occasion modeling*. Poster presented at the 57th annual meeting of the Society for Psychophysiological Research, Vienna, Austria.

5. Correa, K. A., Lieberman, L., **Stevens, E. S.**, Shankman, S. A. (2017, October). *Do ERP measures of predictable and unpredictable threat responding run in families?* Poster presented at the 57th annual meeting of the Society for Psychophysiological Research, Vienna, Austria.

6. Meissel, E. E. E., **Stevens, E. S**., Evans, T., & Shankman, S. A. (2017, April). *Do people with a family history of anxiety have heightened attentional biases to threat?* Poster presented at the 37th annual meeting of the Anxiety and Depression Association of America, San Francisco, CA.

7. Liu, H., Sarapas, C., Lieberman, L., **Stevens, E. S.**, & Shankman, S. A. (2017, February). *Relationships between emotion regulation and executive functions.* Poster presented at the 45th annual meeting of the International Neuropsychological Society, New Orleans, LA.

8. **Stevens, E. S.,** Jendrusina, A. A., Nahin, E. R., Legrand, A. C., & Behar, E. (2016, October). *The effect of relaxation on cognitive flexibility and adaptive characteristics of worry-related thought.* Poster presented at the 50th annual meeting of the Association for Behavioral and Cognitive Therapies, New York, NY.

9. Jendrusina, A. A., **Stevens, E. S.,** Legrand, A. C., Nahin, E. R., & Behar, E. (2016, October). *Abstractness and concreteness during thought- and imagery-based mentation about worrisome and neutral topics.* Poster presented at the 50th annual meeting of the Association for Behavioral and Cognitive Therapies, New York, NY.

10. Jendrusina, A. A., **Stevens, E. S.**, Fortune, M.R., Ranney, R. M., Bednarczyk, E., Reina, L., & Behar, E. (2016, October). *Moderators of attentional threat bias using a probe discrimination task.* Poster presented at the 50th annual meeting of the Association for Behavioral and Cognitive Therapies, New York, NY.

11. **Stevens, E. S.,** Weinberg, A., & Shankman, S. A. (2016, September). *Trait negative and positive affect predicts trait neural response to emotional images: Evidence from the LPP.* Poster presented at the 30th annual meeting of the Society for Research in Psychopathology, Baltimore, MD.

12. Meissel, E. E. E., Katz, A., **Stevens, E. S.**, Lieberman, L., Weinberg, A., Shankman, S. A. (2016, April). *Habituation of Habituation: Investigating the time-course of startle habituation.* Poster presented at the annual meeting of the Anxiety and Depression Association of America, Philadelphia, PA.

13. Sarapas, C., Liu, H., Lieberman, L., **Stevens, E. S.**, & Shankman, S. A. (2016, February). *Relationships between attention and anxiety in low- and high-stress contexts.* Poster presented at 44th annual meeting of the International Neuropsychological Society, Boston, MA.

14. **Stevens, E. S.,** Jendrusina, A. A., Fortune, M. R., Ranney, R. M., & Behar, E. (2015, November). *Trajectories of learning in cognitive bias modification: Comparison with typical bias assessment methods.* Poster presented at the 49th annual meeting of the Association for Behavioral and Cognitive Therapies, Chicago, IL.

15. Fortune, M.R., **Stevens, E.S.,** Jendrusina, A.A., Ranney, R.M., & Behar, E. (2015, November). *Evaluating emotional control as a moderator of the relationship between stressful life events and GAD symptom severity.* Poster presented at the 49th annual meeting of the Association for Behavioral and Cognitive Therapies, Chicago, IL

16. Ranney, R. M., Bartoszek, G., Fortune, M. R., Jendrusina, A.A., **Stevens, E. S.,** & Behar, E. (2015, November). *Information-seeking in individuals intolerant of uncertainty: the maintenance of worry through attempts to limit uncertainty.* Poster presented at the 49th annual meeting of the Association for Behavioral and Cognitive Therapies, Chicago, IL.

17. **Stevens, E. S.,** Weinberg, A., & Shankman, S. A. (2015, October). *Did I do that? The association between the neural response to errors and intolerance of uncertainty.* Poster presented at the 29th annual meeting of the Society for Research in Psychopathology, New Orleans, LA.

18. Katz, A., Liu, H., **Stevens, E. S**., & Shankman, S. A. (2015, October). *The expression of aberrant salience in daily life*. Poster presented at the 29th annual meeting of the Society for Research in Psychopathology, New Orleans, LA.

19. **Stevens, E. S.,** Goldwin, M., Jendrusina, A. A., Nahin, E., Legrand, A., & Behar, E. (2013, November). *The effect of a period of relaxation on the content of worry*. Poster presented at the 47th annual meeting of the Association for Behavioral and Cognitive Therapies, Nashville, TN.

20. Jendrusina, A. A., **Stevens, E. S.,** Legrand, A., Nahin, E., & Behar, E. (2013, November). *Concreteness of thoughts and images about worrisome and neutral stimuli*. Poster presented at the 47th annual meeting of the Association for Behavioral and Cognitive Therapies, Nashville, TN.

21. Goldwin, M., **Stevens, E. S.,** Conybeare, D., Bohacz, B., Wolff, J., & Behar, E (2012, November). *The effects of relaxation on cognitive flexibility in individuals with elevated symptoms of generalized anxiety disorder and/or major depressive disorder*. Poster presented at the 46th annual meeting of the Association for Behavioral and Cognitive Therapies, Washington, D.C.

22. Cody, M. W., Pasciuti, M. L., Gasser, M. L., **Stevens, E. S.**, & Teachman, B. A. (2011, November). *Moderators of true and false memories using the DRM paradigm in social phobia*. Poster presented at the 45th annual meeting of the Association for Behavioral and Cognitive Therapies, Toronto, Canada.

RESEARCH EXPERIENCE

2018 – Present **VA Puget Sound Healthcare System, Seattle Division**
Psychology Intern, Research Study Therapist
Principal Investigator: Greg Reger, Ph.D.
Collaborated on projects investigating the efficacy of exposure treatments for PTSD and relationship to cognitive, emotional, and psychophysiological aspects of PTSD. Served as a study therapist on a pilot investigation of the PE Coach App as an adjunct to prolonged exposure therapy

2012 – Present **Laboratory for Emotion and Anxiety Disorders, University of Illinois at Chicago**
Graduate Researcher
Principal Investigator: Evelyn Behar, Ph.D.
Designed and conducted independent research projects. Designed and implemented coding system for measuring characteristics of worry and rumination. Trained and supervised research assistants on study protocols and coding systems.

2013 – Present **Chicago Laboratory for Emotion and Physiology, University of Illinois at Chicago**
Graduate Research Assistant, Project Manager
Principal Investigator: Stewart Shankman, Ph.D.; Fellow: Anna Weinberg, Ph.D.
Psychophysiological data processing (ERP, EEG, EMG), analysis, and manuscript and grant preparation on NIH-funded (R01 MH098093) family study of risk for internalizing disorders. Conducted diagnostic screenings. Managed five-session study of vulnerability markers of internalizing psychopathology. Trained and supervised research assistants in administering study and processing data.

2010 – 2012	**Program for Anxiety, Cognition, & Treatment, University of Virginia**

2010 – 2012   **Program for Anxiety, Cognition, & Treatment, University of Virginia**
Undergraduate Research Assistant
Principal Investigator: Bethany Teachman, Ph.D.; Mentors: Meghan Cody, Jennifer Green, Eugenia Gorlin
> Administered diagnostic, cognitive bias, behavioral avoidance, eye-tracking, and neuropsychological tests. Assisted with literature reviews and presentations.

2011 – 2012   **Cognitive Aging Laboratory, University of Virginia**
Assistant Lab Coordinator, Research Assistant
Principal Investigator: Timothy Salthouse, Ph.D.
> Trained in administering and scoring the Wechsler Adult Intelligence Scales, Wechsler Memory Scales, and other cognitive tasks. Managed lab administration and logistics: supervised RAs, communicated with Procurement, managed longitudinal database.

SUPPLEMENTAL CLINICAL TRAINING

2018, August   **VA Rollout Training in Tele-Mental Health/Clinical Video Teleconference**
Completed 8-hour training with certified national trainer. Currently completing the consultation program and requirements for certification in telehealth provision.
Leader: Megan McGinn, Ph.D.
Tele-Mental Health Consultant: Sari Gold, Ph.D.

2016, August   **Prolonged Exposure Therapy Training**
Two-day workshop with a certified national rollout trainer. Received ongoing supervision in provision of prolonged exposure.
PE Trainer: Kurtis Noblett, Ph.D.

2016, July   **VA Rollout Training in Cognitive Processing Therapy (CPT)**
Three-day workshop with a certified national rollout trainer. Completed the consultation program and requirements for Provider status, pending licensure.
CPT Consultant: Kelly Maieritsch, Ph.D.

2016, July   **Clinician Administered PTSD Scale (CAPS-5)**
Half-day workshop. Trained to reliability on the CAPS-5.
Leader: Kristy Watters, Ph.D.

2016, April   **The Beck Institute: Cognitive Behavioral Therapy (Intermediate)**
Two-day intensive workshop at the University of Chicago Medical Center.
Leader: Robert Hindman, Ph.D.

2014, March   **Motivational Interviewing**
Four session workshop at the University of Illinois at Chicago
Leader: Kelly Walker Lowry, Ph.D., Motivational Interviewing Network of Trainers certified trainer

TEACHING EXPERIENCE

2013 – 2018   **PSCH 270: Abnormal Psychology**
Teaching Assistant, 6 semesters

2014   **PSCH 242: Research Methods**
Teaching Assistant, 1 semester

EDITORIAL EXPERIENCE (AD HOC REVIEWS)

International Journal of Behavioral Medicine
Journal of Consulting and Clinical Psychology
Psychiatry Research

PROFESSIONAL SERVICE

2018 – Present   **VA Psychology Training Council**
Trainee Representative, Administrative Committee

2018 – Present   **VA Puget Sound Healthcare System, Seattle Division**
Intern Representative, Psychology Internship Seminar Planning Committee

2018 – Present   **Association for Behavioral and Cognitive Therapies**
Member, Student Committee

2015 – 2018   **University of Illinois at Chicago**
Graduate Student Mentor

2011 – 2012   **University of Virginia Psychological Society**
Co-founder, Secretary
Organized educational and professional development events for psychology majors.

2010 – 2012   **Madison House HELP Line, University of Virginia**
Crisis Hotline Volunteer – 2hrs/week
Trained in crisis intervention and suicide/risk assessment; provided peer supervision

AWARDS AND HONORS

2018, February   UIC Graduate College Student Presenter Award ($200)
2017, November   UIC Graduate Student Council Travel Award ($275)
2016 – 2018   Psychology Department Graduate Student Travel Award ($600)
2015, October   Psychology Department Graduate Student Travel Award ($800)
2014, January   UIC Graduate Student Council Travel Award ($275)
2012 – 2014   UIC College of Liberal Arts and Sciences Travel Award ($500)
2010   Women's Leadership Development Program, University of Virginia
2008 – 2012   Echols Scholar, University of Virginia
2008   Howard Hughes Medical Institute Future Health Professional Scholarship ($7,500)

MEMBERSHIPS AND PROFESSIONAL AFFILIATIONS

Association for Behavioral and Cognitive Therapies
Society for Research in Psychopathology
Anxiety and Depression Association of America
Society for Psychophysiological Research
National Network of Depression Centers
Psi Chi National Psychology Honor Society
Phi Eta Sigma National Honor Society