Tables: 1

# Emotion Dysregulation and Threat-Related Attention Bias Variability

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Tables: 1

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**Abstract**

Although theory suggests that a bias for attending to threat information (ABT) may be a biobehavioral process underlying the transdiagnostic vulnerability factor of emotion dysregulation, there is a paucity of empirical evidence showing direct associations between emotion dysregulation and ABT. The purpose of the present study was to examine the relation between ABT and emotion dysregulation. Participants ($N$ = 200) completed a battery of self-report questionnaires and a modified dot-probe task with both neutral and threat stimuli and four stimulus presentation durations. Task response times were used to examine traditionally calculated ABT scores, as well as attention bias variability (ABV). As predicted, those with greater emotion dysregulation exhibited greater ABV. Importantly, emotion dysregulation was not associated with response time variability on trials for which only neutral stimuli were presented, thus increasing confidence that emotion dysregulation-related ABV is specific to the presence of threat stimuli and not merely a function of general variability in response times. Results suggest that those with greater emotion dysregulation exhibit attentional dyscontrol in the presence of perceived threat that is characterized by dynamic shifts between vigilance and avoidance.

*Keywords*: attention, attentional bias, attention bias variability, emotion, emotion regulation, dysregulation

**Emotion Dysregulation and Threat-Related Attention Bias Variability**

The preferential processing of threat information (i.e., attentional bias to threat [ABT]) has been implicated in a number of maladaptive psychological outcomes, especially anxiety-related pathology. ABT has been linked to posttraumatic stress (Bardeen & Orcutt, 2011), generalized anxiety (Mogg & Bradley, 2005), social anxiety (Lee & Telch, 2008), and panic symptomatology (McNally, Riemann, & Kim, 1990). Because evidence and theory suggest that ABT may maintain and exacerbate anxiety and related disorders, several automated attention modification programs have been developed to directly target ABT. Preliminary evidence has provided support for the effectiveness of these programs in treating multiple forms of pathology (for a review, see Beard, Sawyer, & Hofmann, 2012). Some evidence suggests that these modification programs may enhance top-down flexibility of attentional control by training one to more effectively disengage attention from threat stimuli (Heeren, Lievens, & Philippot, 2011). Consistent with this proposition, the flexible use of attentional control to disengage and shift attention away from threat stimuli appears to reduce emotional distress (Bardeen & Read, 2010; Compton, 2000).

Gross's (1998) process model of emotion regulation suggests that the ability to flexibly control attention is essential for maintaining psychological well-being. The ability to temporarily disengage attention from threat-related stimuli may serve to down-regulate sympathetic nervous system arousal, thus increasing the likelihood that one will be able to remain in, and habituate to, the environment in which the distress-provoking stimuli remains present, rather than using more extreme avoidance strategies which do not allow for habituation (e.g., physical escape). Despite theory suggesting a relation between ABT and emotion dysregulation, as well as evidence that disengaging from threat stimuli serves to regulate emotional distress, there is a paucity of empirical research showing direct associations between emotion dysregulation and ABT.

ABT is most often conceptualized as occurring reflexively, or being outside of volitional control (i.e., automatic threat detection; Constans, 2005; Yiend, 2010). With this conceptualization in mind, one might suggest that ABT is not an indicator of emotion regulatory processes, as emotion regulatory processes are often portrayed as being deliberate or goal-directed (i.e., top-down influence on what emotions one experiences and when one experiences them; Gross & Barrett, 2011). However, as described by Todd, Cunningham, Anderson, and Thompson (2012), sensory systems may be “pre-tuned” (top-down, goal-directed) so that specific categories of stimuli are preferentially processed in an attempt to modulate emotional distress. That is, attention deployment strategies that are used frequently may become habitual, thus no longer requiring deliberation (Koole, Webb, & Sheeran, 2015). As such, ABT may be considered a form of emotion regulation. Consistent with this proposition, evidence suggests that it takes less than 200ms for top-down attentional processes to influence the processing of threat information (e.g., Bardeen & Orcutt, 2011; Molholm et al., 2002). Thus, examinations of associations among emotion dysregulation and ABT should account not only for early, more automatic, stages of information processing (i.e., bottom-up or stimulus-driven), but also later stages of information processing which include top-down attentional processes (i.e., overriding the bottom-up attentional capture of salient stimuli through flexible use of the shifting and disengaging functions of executive attention: Cisler & Koster, 2010).

The dot-probe task is frequently used to assess ABT. During the task, two stimuli appear on a computer screen (threat-related and neutral), the stimuli disappear, and a dot appears in place of one of the stimuli. The participant then indicates the dot's spatial position by pressing one of two directional keys and faster responding when the dot replaces a threat image (versus neutral stimuli) suggests ABT. Although a number of stimulus-response studies have identified associations between ABT and indices of anxiety-related distress, considerable evidence to the contrary also exists (see Kimble, Frueh, & Marks, 2009; Van Bockstaele et al., 2014). These mixed findings may be the result of using task response times to calculate attentional bias scores in a manner that rests on the assumption that the expression of ABT is stable over time (i.e., bias toward, or away, from threat stimuli at a constant rate over time). This method fails to account for the temporal dynamics of ABT. Iacoviello et al. (2014) suggested attention bias variability (ABV; within person variability of attentional bias, both toward and away from threat stimuli) as a better, more ecologically valid, measure of ABT. Specifically, individuals with ABT may exhibit a pattern of monitoring that allows for the constant updating of threat potential by shifting attention from the potential source of threat to other stimuli (i.e., avoidance) and then back to the threat source, thus resulting in greater attentional engagement with the threat stimulus over time. The traditional approach to calculating ABT does not take shifting back and forth between stimulus types into account. As described by Zvielli, Bernstein, and Koster (2015), static methods of calculating ABT may account for (a) the notoriously poor reliability of these scores (Schmukle, 2005), (b) replication inconsistencies, (c) small to moderate effects (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzandoorn, 2007), and (d) limited clarity regarding whether ABT represents faster threat detection or difficulty disengaging from threat stimuli (Weierich, Treat, & Hollingworth, 2008).

To remedy these issues, Zvielli et al. (2015) developed a computational method (the trial-level bias score [TL-BS]) that more accurately models the temporal dynamics of ABT (i.e., rapid continual shifts toward and away from threat stimuli). As predicted, Zvielli et al. (2015) found that the temporal relations of concurrently measured threat-related attention allocation was dynamic rather than static and significantly greater ABV was observed for spider phobics compared to control participants. This effect was statistically significant even after accounting for the effects of static attentional bias scores. In addition, moderately sized significant correlations were observed for the split-half reliabilities of these ABV scores. The superiority of this approach to traditionally calculated ABT, in terms of reliability, has been exhibited in a number of other studies (e.g., Amir, Zvielli, & Bernstein, 2016; Schafer, Bernstein, Zvielli, Hofler, Wittchen, & Schonfeld 2016). These results highlight the importance of using methods to calculate ABT that accurately model the dynamic nature of threat-related attention allocation. The use of calculations that model ABT as a static signal may obscure potentially important effects.

**The Present Study**

Despite theory suggesting a relation between ABT and emotion dysregulation, as well as evidence that flexibly disengaging attention from threat stimuli serves to regulate emotional distress, there is a paucity of empirical research showing direct associations between measures of emotion dysregulation and ABT. As such, the purpose of the present study was to examine ABT in relation to emotion dysregulation. Given the noted limitations of calculating attentional bias as a static score, TL-BSs were calculated to account for the temporal dynamics of ABT (following from Zvielli et al., 2015). We predicted that those with greater emotion dysregulation would exhibit greater TL-BSs compared to those with relatively lower emotion dysregulation. Importantly, we examined emotion dysregulation in relation to response times on trials for which only neutral stimuli were presented to ensure that any observed effects between emotion dysregulation and TL-BSs were specific to the presence of threat stimuli and not merely a function of general variability in response times. In addition, we examined the effect of four stimulus presentation durations, representing early (i.e., subliminal, orienting) and later stages of information processing, on relations between TL-BSs and emotion dysregulation to help clarify the time-course of emotion-regulation related ABV. We predicted that the relation between emotion dysregulation and TL-BS would become stronger as presentation duration increased, as longer presentation durations may provide enough time for top-down attentional processes to influence more automatic bottom-up attentional processes.

# Method

## Participants and Procedure

Participants (*N* = 200; 94 female) were recruited from a mass testing pool at a mid-sized Midwestern U.S. university. The average age of the sample was 20.5 years (*SD* = 3.8) and 55% self-identified as White, 24% as Black, 11% as Asian, 1% as American Indian or Alaska Native, 8% endorsed “other”, while 1% preferred not to respond. Additionally, 11% of the sample reported being of Hispanic ethnicity. At a single experimental session, participants were led to a private room where they completed informed consent, a battery of self-report questionnaires, and a stimulus-response task (i.e., dot-probe task). Before leaving, participants were debriefed and given credit for their introductory psychology course. All study procedures were approved by the University’s institutional review board.

## Equipment

Participants completed self-report measures and the dot-probe task on a Dell Dimension 8300 desktop computer with a 19-inch monitor. A chin rest was used during the dot-probe task to maintain the viewing distance at approximately 50 centimeters from the computer monitor. A computer keyboard was used to respond to the task. SSI Web software (Orme, 2005) was used to present self-report measures and DirectRT software (version 2004.1; Jarvis, 2004) was used to present stimuli and record responses during the dot-probe task.

**Dot-Probe Task**

Pictorial stimuli were used because word stimuli require greater semantic processing (Pineles et al., 2009) and are prone to greater subjective familiarity and frequency of use (Bradley et al., 1997). Forty general threat (e.g., man with gun, poisonous snake, plane crash) and 80 neutral images (e.g., ceiling fan, umbrella, mushroom caps) were presented twice over the course of the task. General threat (negative valence and high arousal) and neutral (neither negative nor positive valence and low arousal) stimuli were identified based on ratings of valence ($M$ = 2.17 and 5.12, respectively) and arousal ($M$ = 6.52 and 2.96, respectively) on two 9-point rating scales (International Affective Picture System [IAPS]; Lang et al., 1999).

Each dot-probe trial started with a fixation cross presented in the center of the screen for 1000ms. Next, two images appeared side by side on the screen (i.e., neutral-neutral or threat-neutral) for one of four stimulus presentation durations (i.e., 15ms, 85ms, 150ms, 500ms). Following each stimulus presentation, a dot appeared on the screen in place of one of the images. Prior to starting the dot-probe task, participants were told to press an arrow key (left or right) on the computer keyboard that was consistent with the relative position of a dot that appeared on the computer screen following the presentation of two images. Participants were instructed to respond as quickly and accurately as possible. Participants completed 10 practice trials and then a continuous block of 120 trials (40 neutral-neutral and 80 neutral-threat stimulus pairs). The 80 neutral-threat image pairs consisted of 40 congruent trials (CTs: the probe replaced the threat image) and 40 incongruent trials (ITs: the probe replaced the neutral image). The dot was equally likely to replace the threat and neutral images for threat-neutral pairings. Neutral-neutral image pairs served to reduce expectations that a threat image would be seen in each trial. All presentation conditions were presented for an equal number of trials; the order of conditions was randomized across participants (i.e., timing, image type). Image valence and arousal ratings were balanced across timing conditions.

**Stimulus Presentation Duration**

Four presentation durations (15, 85, 150, and 500 ms) were chosen to provide temporal snapshots of ABV on the continuum from early, more automatic, processing (i.e., subliminal processing, reflexive orienting) to later stage, or more controlled, threat processing. The presentation duration of 500ms provides ample time for one to disengage and shift attention (Mogg & Bradley, 1998). A consistent pattern of attention to threat at 500ms suggests prolonged dwell time on threat stimuli and is consistent with an attention maintenance model of threat-related ABT, which may suggest difficulty disengaging from threat information (Weierich et al., 2008). In addition, 150ms was used in the present study because evidence suggests that this presentation duration provides enough time for top-down attentional processes to influence preferential processing (e.g., Bardeen & Orcutt, 2011). ERP and fMRI research suggests that reflexive attentional orienting occurs in the range of 70-100ms (Boehler et al., 2008; Heinze et al., 1994; Hopfinger et al., 2004; Martinez et al., 2001). Based on this evidence, a presentation duration of 85ms was chosen to capture reflexive orienting of attention to threat stimuli.

A subliminal presentation duration was identified in order to examine ABV at a pre-attentive stage of information processing in which one is not consciously aware of the stimuli being viewed (Luecken, Tartaro, & Applehans, 2004). To determine this presentation duration, it was necessary to conduct a pilot study in which an objective threshold (i.e., the threshold at which a stimulus cannot be identified at better than chance levels) was determined through use of a discrimination task (Snodgrass & Shevrin, 2006). Ten graduate students participated in a pilot study in which IAPS images were presented at eight evenly spaced durations (i.e., 5-40ms). Participants were presented with a block of 10 neutral-threat image pairings and 10 neutral-neutral image pairings for each presentation duration and had to make a forced-choice decision as to whether the image pairing that was previously presented contained neutral or threat information (Snodgrass & Shevrin, 2006). Mean percentage accuracy was calculated for each presentation duration in order to identify the objective threshold (Williams et al., 2004). See below for the results of this pilot study.

**Self-report**

Emotion dysregulation was assessed via the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS consists of 36 items that are summed to create a general emotion dysregulation total score, as well as six dimensions of emotion regulation for which once could experience difficulties, including Nonacceptance of Emotional Responses (Nonacceptance), Difficulty Engaging in Goal-Directed Behavior (Goals), Impulse Control Difficulties (Impulse), Lack of Awareness of Emotions (Awareness), Limited Access to Strategies for Regulation (Strategies), and Lack of Emotional Clarity (Clarity). Items are rated on a 5-point scale based on how often each item is applicable (1 = *almost never* to 5 = *almost always*). Each of the DERS dimensions has evidenced good internal consistency (Gratz & Roemer, 2004). As per Gratz and Roemer (2004), the 36 DERS items were summed to create a total scale score (DERS-Total) with higher scores indicating greater emotion dysregulation.[1] In the present study, the DERS total score ($\alpha$ = .93) and all of the DERS subscales evidenced adequate internal consistency ($\alpha$ values ranging from .76 to .88).

**Results**

**Subliminal Objective Threshold: Pilot Study**

One-sample chi-square tests were conducted for each of eight presentation durations (5-40ms). Performance did not differ significantly from chance at presentation durations of 10ms and 15ms. However, at presentation durations of 20ms, $\chi^2(1, N = 10) = 10.58$, $p < .001$, and higher (i.e., 25-40ms), participants were able to identify the content of IAPS images with statistically significant above-chance accuracy. Thus, 15ms was identified as the subliminal presentation duration.

**Preparation of Stimulus-Response Data**

Consistent with Zvielli et al. (2015), trials with error responses (0.89% of trials), trials indicating anticipatory responding (response times [RTs] < than 200ms; 0.06% of trials), and outlier trials (RTs > 1500ms [0.14% of trials] or > 3 *SD*s above a participant's mean [1.63% of trials]) were discarded. Approximately 2.7% of responses were either incorrect or fell outside of the above timing guidelines. A traditional total attentional bias score was calculated by subtracting mean latencies on trials where the probe replaced a threat image from mean latencies on trials where the probe replaced a neutral image (IT – CT) in neutral-threat pairings (Frewen et al., 2008; MacLeod, Mathews, & Tata, 1986). Positive scores indicate attention to threat stimuli and negative scores indicate attention to neutral simuli. Next, TL-BSs were calculated to account for the temporal dynamics of threat-related attentional bias (Zvielli et al., 2015). To calculate TL-BSs, RTs of CTs were subtracted from temporally contiguous (matched within 15 trials) ITs (Zvielli et al., 2015) for each of the four presentation durations. For example, if trial #3 was a CT with a presentation duration of 150ms and trial #7 was an IT with a presentation duration of 150ms, the RT of trial #7 would be subtracted by the RT of trial #3 for that pairing. The average distance between matched IT-CT pairs was 5.8 trials. TL-BSs were calculated for each presentation duration by summing all of the resultant absolute values for the temporally contiguous difference scores (IT and CTs were matched on presentation duration), and dividing this sum by the total number of scores (i.e., 20 trials were used for each presentation duration [10 ITs and 10 CTs]). Accordingly, participants whose scores did not change throughout the task for a given presentation duration had relatively low ABV, but participants whose scores fluctuated substantially throughout the task had relatively high ABV. Additionally, we calculated neutral mean (average RT on trials for which only neutral stimuli were presented) to ensure that any observed effects were due to the presence of threat stimuli rather than being a by-product of individual differences in responding more generally (Zvielli et al., 2015).

**Potential Covariates**

Zero-order correlations between demographic (i.e., age, sex, and race/ethnicity [assessed following the National Institute of Health's policy for reporting race and ethnicity]) and outcome variables (i.e., TL-BSs, static ABT scores, Neutral means) were evaluated to determine whether demographic variables warranted inclusion as covariates in our primary analytic models (Tabachnick & Fidell, 2007). Race and ethnicity were collapsed into a single dummy coded variable (coded as Hispanic and/or non-White [$n$ = 97, 48.5%] versus non-Hispanic White [$n$ = 103, 51.5%]). Among potential covariates, sex (0 = male, 1 = female) was significantly associated with TL-BS at one presentation duration (i.e., 500ms, $r$ = .15, $p$ = 04), static ABT at one presentation duration (i.e., 150ms, $r$ = -.15, $p$ = 04), and Neutral mean at three presentation durations (i.e., 15ms [$r$ = .22, $p$ = 002], 150ms [$r$ = .21, $p$ = 003], 500ms [$r$ = .17, $p$ = 02]). Race/ethnicity was significantly associated with all of the Neutral means (i.e., 15ms [$r$ = -.17, $p$ = 02], 85ms [$r$ = -.19, $p$ = 007], 150ms [$r$ = -.16, $p$ = 02], 500ms [$r$ = -.16, $p$ = 03]). Age was not significantly associated with any of the outcome variables. As such, sex and race/ethnicity served as covariates in subsequent analyses.[2]

**Primary Analysis**

Mixed effects linear modeling with autoregressive covariance structures was used to examine emotion dysregulation and presentation duration, as well as their two-way interaction term, as predictors of TL-BS (see Table 1). This approach provides several advantages over traditional repeated-measures ANOVA, including greater flexibility in modeling interactive time effects and the ability to more accurately account for within-participant variance in correlated repeated measures. Sex and race/ethnicity served as covariates in all models. All independent variables of interest were treated as fixed.

Among the covariates, sex was a significant predictor of TL-BS and Neutral mean (*p*s < .05) and race/ethnicity significantly predicted Neutral mean ($p < .05$). Females, compared to males, exhibited greater ABV and both female and Hispanic and/or non-White participants had significantly longer response times (compared to male and non-Hispanic White participants) on trials for which only neutral stimuli were presented. Next we examined the main effects of emotion dysregulation and presentation duration on the outcome variables. As can be seen in Table 2, DERS-Total was a significant predictor of TL-BS ($p < .05$), but did not significantly predict Neutral mean and static ABT. As emotion dysregulation increased, ABV (both toward and away from threat stimuli) increased. Presentation duration was also a significant predictor of TL-BS ($p < .001$) and Neutral RT mean ($p < .01$), but not static ABT. The interaction term (DERS-Total x presentation duration) did not significantly predict any of the outcome variables. A series of pairwise comparisons of means was conducted to identify significant differences in TL-BS and Neutral mean as a function of presentation duration. TL-BS was significantly larger at 15ms than at 85 and 150ms, but not 500ms (*p*s < .05). Neutral mean at 15ms was significantly larger in comparison to all other presentation durations (*p*s < .05). No other comparisons reached statistical significance.

## Discussion

Recently, there has been a surge of enthusiasm in psychological science toward identifying biobehavioral processes that may underlie transdiagnostic pathology-related vulnerability factors. Toward this end, we examined threat-related attentional biases in relation to emotion dysregulation, a well-documented transdiagnostic vulnerability factor. As predicted, those with greater emotion dysregulation exhibited greater ABV compared to those with relatively lower emotion dysregulation. Importantly, emotion dysregulation was not associated with response time variability on task trials for which only neutral stimuli were presented, thus increasing confidence that emotion dysregulation-related ABV is specific to the presence of threat stimuli and not merely a function of general variability in response times. Instead, the present results suggest that those with greater emotion dysregulation exhibit attentional dyscontrol in the presence of perceived threat that is characterized by dynamic shifts between vigilance and avoidance. This pattern may be indicative of difficulties in cognitive disengagement from threat stimuli. That is, once threat stimuli are detected, it may be especially difficult to disengage from such stimuli in favor of goal relevant behaviors. Instead, these individuals appear to avoid and then return their attention to the potential threat, exhibiting a pattern of monitoring that may allow for the constant updating of threat potential.

We predicted that differences in ABV, based on level of emotion dysregulation, would be largest at longer presentation durations. This prediction was based on the rationale that longer presentation durations would provide those with better regulatory abilities the necessary time to use top-down attentional control processes to regulate bottom-up reactivity and pursue task-relevant goals. However, our measure of ABV did not differentially relate to emotion dysregulation as a function of presentation duration. As described, some have suggested that emotion regulation strategies (e.g., attention deployment) that are used frequently may become habitual, and thus, require little, if any, top-down oversight and direction (Koole et al., 2015; Todd et al., 2012). It is also possible that emotion dysregulation-related differences in ABV, as a function of presentation duration, would have been observed had we accounted for attention control in our analysis. Although emotion dysregulation and attentional control are strongly related, they are distinct constructs that may interact to influence threat-related attention dysregulation. Among those with higher emotion dysregulation, those with relatively better (versus worse) attentional control may exhibit significantly less threat-related ABV, especially at later stages of information processing that provide time for attentional control processes to influence the ABV/ emotion dysregulation relationship. It will be important to test this hypothesis in future research.

Also of note, emotion dysregulation did not predict static attentional bias scores. This finding is not surprising given the poor reliability of traditionally calculated ABT scores and general difficulty in replicating findings when these scores are used. However, it is does highlight the importance of assessing ABT using a method that accounts for the temporal dynamics of this phenomenon. Failure to do so may obscure potentially important results, as would be the case here had we not assessed ABT via TL-BS.

Study limitations must be acknowledged. The sample consisted solely of undergraduate students. Emotion dysregulation is often examined in the context of psychopathology and clinical samples; thus, it will be important to replicate study findings in samples with relatively high levels of psychopathology. Additionally, although our method of examining ABT (i.e., TL-BS) greatly increases our confidence in study findings, it may be beneficial to use eye-tracking equipment in future research to provide a continuous measure of the time-course of emotion dysregulation-related ABV. Additionally, although some evidence indicates that relatively few dot-probe trials are required to ensure score stability when other design features are accounted for (Price et al., 2015), we suggest using more than twenty trials per TL-BS in future research to alleviate score stability concerns. Finally, given our cross-sectional study design, we are unable to make causal inferences regarding the nature of the relationship between emotion dysregulation and ABV. Given prospective evidence that emotion dysregulation acts as a risk factor for psychopathology (e.g., Bardeen, Kumpula, & Orcutt, 2013), it will be important in future research to determine whether threat-related attention dysregulation precedes emotion dysregulation, and whether or not they are causally related.

The present study is the first to our knowledge to provide evidence of associations between emotion dysregulation and ABV. Preliminary evidence has provided support for attention training programs as an effective approach to treating anxiety and related pathology (for a review, see Beard, Sawyer, & Hofmann, 2012). The majority of these training programs are designed to train attention away from threat. Findings from the present study, as well as other recent empirical research (e.g., Amir et al., 2016; Bardeen, Tull, Daniel, Evenden, & Stevens, 2016; Schafer et al., 2016; Zvielli et al., 2015), suggest the possibility that clients may be better served by attention retraining approaches that are designed to reduce threat-related attentional dyscontrol (rapid shifts both toward and away from threat) by balancing attention allocation rather than training individuals to attend away from threat stimuli (e.g., Badura-Brack et al., 2015). In addition, results from the present study are in line with the possibility that emotion dysregulation may be the mechanism through which threat-related ABV leads to psychopathology. As noted, this hypothesis can only be examined via future prospective and experimental research designs. However, should this hypothesis be correct, threat-related ABV may someday be used as a measure to identify those most at risk for the development of emotion dysregulation and subsequent psychopathology.

**Conflict of Interest**

The authors declare no conflicts of interest regarding this submission.

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**Footnote**

[1]Some evidence suggests that six items of the DERS representing a lack of awareness of emotions may not belong to the same higher-order construct as the remaining 30 items (Bardeen, Fergus, & Orcutt, 2012, Fowler et al., 2014). As noted by Clark and Watson (1995), when deciding whether to use an overall score versus subscale scores it is important to “establish that all of the items – regardless of how they are placed in the various subscales – define a single general factor” (p. 318). As such, we repeated our analyses with a modified DERS total score (i.e., removing items from the Awareness subscale from the total score) as recommended by Bardeen et al. (2012). Results were consistent with our initial analysis; statistically significant findings remained significant and nonsignificant findings were unchanged.

[2]Regarding our examination of potential covariates, some potentially interested significant correlations were observed. Females, compared to males, exhibited greater ABV at the 500ms stimulus presentation duration, whereas males exhibited greater attention to threat (static ABT) at the earlier presentation duration of 150ms. In addition, both female and Hispanic and/or non-White participants had significantly longer response times (compared to male and non-Hispanic White participants) on trials for which only neutral stimuli were presented.

Table 1

Tests of Fixed Effects for Response Time Variables

| | TL-BS | Static ABT | Neutral RT |
|---|---|---|---|
| | *F*(df) | *F*(df) | *F*(df) |
| Sex | 5.72 (1, 189.09)* | 3.20 (1, 281.26) | 6.20 (1, 195.94)* |
| Race/Ethnicity | 0.57 (1, 189.01) | 0.48 (1, 281.26) | 4.10 (1, 195.94)* |
| DERS | 4.58 (1, 188.45)* | 1.28 (1, 282.52) | 2.08 (1, 196.21) |
| Timing | 3.36 (3, 377.85)* | 1.18 (3, 533.19) | 4.29 (3, 322.68)** |
| Interact | 0.95 (3, 376.89) | 0.07 (3, 533.19) | 0.15 (3, 322.68) |

Note. $N = 200$. TL-BS = trial level bias score; Static ABT = traditional attentional bias score; Neutral RT = average response time on trials for which only neutral stimuli were presented; Sex = (0 = male, 1 = female); Race/Ethnicity = (0 = Hispanic and/or non-White, 1 = non-Hispanic White); DERS = Difficulties in Emotion Regulation total score; Timing = Stimulus presentation durations (i.e., 15ms, 85ms, 150ms, 500ms); Interaction = DERS by Timing interaction term.

* $p < .05$. ** $p < .01$.