



## Exploring the relationship between positive and negative emotional avoidance and anxiety symptom severity: The moderating role of attentional control



Joseph R. Bardeen<sup>a</sup>, Matthew T. Tull<sup>a,\*</sup>, Erin N. Stevens<sup>b</sup>, Kim L. Gratz<sup>a</sup>

<sup>a</sup> University of Mississippi Medical Center, Jackson, MS, USA

<sup>b</sup> Northern Illinois University, DeKalb, IL, USA

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### ABSTRACT

**Background and objectives:** Emotional avoidance has been found to be associated with higher levels of anxiety. However, no research to date has differentiated between the avoidance of positive and negative emotions in relation to anxiety. Additionally, no studies have examined the extent to which attentional control moderates the relation between the avoidance of emotions and anxiety. Thus, the purpose of this study was to (a) clarify relations between both positive and negative emotional avoidance and anxiety, and (b) examine attentional control as a moderator of the relations between both positive and negative emotional avoidance and anxiety.

**Methods:** A community sample of adults ( $N = 93$ ) completed a series of questionnaires, as well as a laboratory-based measure of attentional control.

**Results:** Greater avoidance of both positive and negative emotions was associated with higher levels of anxiety. Additionally, attentional control moderated the relationship between negative (but not positive) emotional avoidance and anxiety. Specifically, the avoidance of negative emotions was associated with higher levels of anxiety for those with lower attentional control.

**Limitations:** Limitations include a cross-sectional design, use of self-report measures, and the examination of hypotheses within a non-clinical sample.

**Conclusion:** Findings are consistent with a growing body of research demonstrating the moderating role of attentional control in the relation between risk factors and negative outcomes. Findings also suggest that empirically-based treatment approaches that contain attention-based components may be beneficial for emotionally avoidant individuals with poor attentional control abilities.

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### 1. Introduction

According to the National Comorbidity Survey Replication, anxiety disorders are the most commonly occurring psychiatric disorders in the United States, affecting approximately 18% of the general population in a given year (Kessler, Chiu, Demler, & Walters, 2005). In addition to the high level of psychological distress associated with severe levels of anxiety, anxiety disorders result in substantial impairment in social, occupational, and family functioning, as well as poorer physical health and an overall reduced quality of life (Hoffman, Dukes, & Wittchen, 2008). Moreover, the

economic burden (e.g., treatment costs, work performance costs) of anxiety disorders is estimated to be over forty-two billion dollars per year, or more than 1/3 of the total yearly mental health bill of the United States (Kessler & Greenberg, 2002). Given the substantial burden associated with anxiety, considerable effort has been directed toward identifying risk and resiliency factors for the development and maintenance of anxiety pathology.

One factor that has received increasing attention for its role in the development of anxiety is the tendency to avoid emotions (Campbell-Sills & Barlow, 2007; Salters-Pedneault, Tull, & Roemer, 2004; see also Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Although the vast majority of the research in this area has focused exclusively on the avoidance of negative emotions, theoretical and empirical literature suggests that the avoidance of both positive and negative emotions may contribute to anxiety pathology. For example, it has been suggested that individuals at high risk for

\* Corresponding author. Department of Psychiatry and Human Behavior, University of Mississippi Medical Center, 2500 North State Street, Jackson, MS 39216, USA. Tel.: +1 601 815 6518; fax: +1 601 984 4489.

E-mail address: [mtull@umc.edu](mailto:mtull@umc.edu) (M.T. Tull).

problems with anxiety (e.g., individuals high in anxiety sensitivity) may view any internal experience associated with heightened physiological arousal as aversive, including both positive and negative emotions. As a result, these individuals may learn to fear these emotions and be motivated to avoid them (Tull & Roemer, 2007; Williams, Chambless, & Ahrens, 1997). Further, although the avoidance of emotions may result in temporary relief, it tends to have paradoxical effects in the long-term, increasing physiological arousal, worsening emotional distress, and motivating future avoidance (e.g., Campbell-Sills, Barlow, Brown, & Hofmann, 2006; Levitt, Brown, Orsillo, & Barlow, 2004). Moreover, the chronic reliance on emotional avoidance as a regulation strategy may interfere with adaptive cognitive and emotional processing, contributing to the maintenance or worsening of anxiety (Foa & Kozak, 1986).

Consistent with this literature (and in support of the relevance of positive emotional avoidance to anxiety as well), Tull and Roemer (2007) found that individuals who had experienced an uncued panic attack within the past year reported greater use of emotionally-avoidant regulation strategies in response to a positive emotion-inducing film clip, relative to individuals with no history of panic attacks. Likewise, Roemer, Litz, Orsillo, and Wagner (2001) found that combat Veterans with (vs. without) posttraumatic stress disorder reported the suppression of both positive and negative emotions. Finally, several studies have demonstrated that the combined avoidance of both positive and negative emotions is associated with anxiety-related pathology (including PTSD symptoms and general anxiety symptoms) in both clinical and nonclinical samples (Naifeh, Tull, & Gratz, 2012; Tull, Hahn, Evans, Salters-Pedneault, & Gratz, 2011; Wildes, Ringham, & Marcus, 2010). Despite increasing support for the role of positive emotional avoidance in anxiety-related pathology, additional research is needed to explore the separate (and potentially unique) roles of positive and negative emotional avoidance in anxiety. Furthermore, additional research is needed that examines factors that may moderate the relation between positive and negative emotional avoidance and anxiety.

One factor that may hold promise in this regard is attentional control (i.e., the skilled control of higher-order executive attention to regulate, or override, more automatic dominant response tendencies). In Gross's (1998) process model of emotion regulation, the ability to flexibly control attention is considered essential for maintaining psychological well-being, with attention deployment theorized to be the gatekeeper of emotion regulation. Indeed, research provides support for attentional control as a protective factor for psychopathology, with lower attentional control associated with negative emotionality, poor social adaptation, and externalizing behaviors (Derryberry & Reed, 2002; Eisenberg, Fabes, Guthrie, & Reiser, 2000) and higher attentional control associated with positive emotionality and faster mood recovery following exposure to a trauma cue (Bardeen & Read, 2010; Derryberry & Reed, 2002). Consistent with Gross' process model, empirical research has shown that anxiety may be maintained and exacerbated through prolonged attentional engagement with threat information (Constans, 2005; Elzinga & Bremner, 2002), and that the flexible use of attentional control to disengage and shift attention away from threat-related stimuli may reduce distress (Bardeen & Orcutt, 2011; Bardeen & Read, 2010). As a result, greater attentional control may allow one to remain in a threatening or anxiety-provoking environment, facilitating habituation rather than the deployment of less adaptive secondary regulation strategies, such as emotional avoidance. Consistent with this premise, recent research provides support for the protective role of attentional control in the relation between putative risk factors for anxiety and anxiety-related pathology. For example, studies have

found that attentional control protects against (a) higher levels of anxiety among individuals prone to using maladaptive and avoidance-oriented coping behaviors (Fergus, Bardeen, & Orcutt, 2012), (b) decrements in speech performance among those with public-speaking anxiety (Jones, Fazio, & Vasey, 2012), and (c) fearful responding to a CO<sub>2</sub> challenge among those with higher levels of trait anxiety (Richey, Keough, & Schmidt, 2012).

Despite increasing support for the moderating role of attentional control in psychopathology, one limitation of the extant research in this area is the primary reliance on self-report measures of attentional control (i.e., Attentional Control Scale; Derryberry & Reed, 2002). Some researchers have suggested that the Attentional Control Scale may measure beliefs about attentional control rather than providing an index of actual attentional control abilities (Spada, Georgiou, & Wells, 2010). Moreover, research has shown that the moderating effect of attentional control processes can take place in as little as 150 ms (Bardeen & Orcutt, 2011); thus, it may be especially difficult for individuals to report on cognitive processes that occur so rapidly. As such, the use of more objective measures of attentional control, such as laboratory-based behavioral tasks, may be an important next step in advancing this line of research.

Extending past research in this area, the goals of the present study were to a) differentiate between the avoidance of positive emotions and negative emotions in relation to anxiety symptom severity and b) examine the moderating role of attentional control (assessed in the laboratory) in these relations. We predicted that both positive and negative emotional avoidance would be uniquely positively associated with anxiety. In addition, we expected that attentional control would moderate the relations between positive and negative emotional avoidance and anxiety, with emotional avoidance evidencing a significant association with anxiety symptoms only among individuals with lower (vs. higher) attentional control.

## 2. Method

### 2.1. Participants

This study was conducted as part of a larger study investigating emotion regulation deficits across a range of clinical disorders. Adult participants (aged 18–60) were recruited via advertisements for a study on “emotional and cognitive functioning” posted online and throughout the community. Participants experiencing “emotional difficulties” were specifically targeted in the advertisements. Exclusion criteria for the larger study focused on the presence of psychopathology that could influence responses to the laboratory tasks, including current (past two weeks) manic, hypomanic, or depressive mood episodes (but not lifetime history of mood disorders), current (past-month) substance dependence, and/or primary psychosis.

The initial sample of participants included 99 adults. Of these, data from six participants were excluded from analyses due to (a) an inflated error rate on the behavioral measure of attentional control ( $n = 5$ ; i.e.,  $> -2.5$  SD from the mean error rate; as per Ishigami & Klein, 2009), and (b) undue influence on the analytic model ( $n = 1$ ; i.e., multivariate outliers  $> 1$  DFFITS; Cohen, Cohen, West, & Aiken, 2003). The final sample ( $N = 93$ ; 63.4% female) had a mean age of 23.7 years ( $SD = 9.4$ ) and was ethnically/racially diverse (53.8% White; 21.5% Black/African-American; 9.7% Asian/Asian-American; 14.0% other racial/ethnic background).

### 2.2. Measures

#### 2.2.1. Emotional Avoidance Questionnaire (EAQ)

Avoidance of positive and negative emotions was assessed using the Avoidance of Positive Emotions (EAQ-Positive; e.g., “If I start

feeling strong positive emotions, I prefer to leave the situation”) and Avoidance of Negative Emotions (EAQ-Negative; e.g., “When I feel anxious or worried about something, I try to ignore it as much as I can”) subscales of the EAQ (Taylor, Laposa, & Alden, 2004). Each subscale is composed of 5 items. Items are rated on a 5-point scale (1 = not true of me to 5 = very true of me). The EAQ has been found to have adequate psychometric properties in both clinical and non-clinical samples, as well as among college students (Taylor et al., 2004). In the present study, the EAQ-Negative ( $M = 15.19$ ,  $SD = 4.08$ ,  $range = 5–25$ ) and EAQ-Positive ( $M = 8.82$ ,  $SD = 3.58$ ,  $range = 5–18$ ) subscales demonstrated adequate internal consistency ( $\alpha = .75$  and  $.72$ , respectively).

### 2.2.2. Attention Network Test (ANT)

Attentional control was assessed using the executive attentional network index of the Attention Network Test (ANT; Fan, McCandliss, Sommer, Raz, & Posner, 2002), a computer-based task that assesses three distinct attentional networks (i.e., orienting, alerting, and executive attention). The executive attentional network index most closely captures the construct of attentional control as defined here. Participants completed 24 practice trials, with accuracy feedback, followed by 288 experimental trials. With regard to the trial stimuli that are specific to the executive attention scale, participants saw two combinations of arrows on the computer screen: an incongruent condition ( $\leftarrow \leftarrow \rightarrow \leftarrow \leftarrow$ ) and a congruent condition ( $\leftarrow \leftarrow \leftarrow \leftarrow \leftarrow$ ). Participants were told to indicate the direction of the central arrow on the screen as quickly and accurately as possible by pressing the button on the keyboard that corresponded to the direction of the central arrow. The executive attention scale score was calculated by subtracting mean response times (RTs) of the congruent trials from mean RTs of the incongruent trials. Higher scores indicate relatively worse attentional control. A visual depiction of the ANT is presented in Fan et al. (2002). In the present study, the mean executive attention scale score was 151.28 ( $SD = 62.05$ ,  $range = 50–345$ ).

### 2.2.3. Depression, Anxiety, Stress Scales (DASS-21)

The DASS-21 Anxiety Scale (DASS-Anxiety; Lovibond & Lovibond, 1995a) was used as the outcome variable in this study. This scale is comprised of 7 items (e.g., “I felt I was close to panic”) rated on a 4-point scale (0 = Did not apply to me at all to 3 = Applied to me very much, or most of the time). Scores on the DASS-21 Anxiety Scale have been shown to discriminate between individuals with and without anxiety disorder diagnoses (Antony, Bieling, Cox, Enns, & Swinson, 1998), as well as between anxiety and mood pathology (Brown, Chorpita, Korotitsch, & Barlow, 1997). Additionally, the DASS-21 Anxiety Scale has demonstrated good convergent validity with other measures of anxiety (e.g., Beck Anxiety Inventory; Beck & Steer, 1990; Lovibond & Lovibond, 1995b). In the present study, the DASS-21-Anxiety Scale ( $M = 4.58$ ,  $SD = 3.94$ ,  $range = 0–15$ ) demonstrated adequate internal consistency ( $\alpha = .71$ ). Of note, considerable variability in DASS-21 Anxiety Scale scores was observed in this sample, with 48% of participants in this sample reporting anxiety symptoms higher than the “normal” range (i.e., 12% in the “mild” range, 16% in the “moderate” range, 10% in the “severe” range, and 10% in the “extremely severe” range; Lovibond & Lovibond, 1995a).

### 2.3. Procedure

This study received approval by the university’s Institutional Review Board. After providing written informed consent, participants completed a battery of self-report measures and the ANT. Participants received standardized instructions for the ANT. Once participants confirmed that they understood the instructions, the

experimenter left the participant room for the rest of the study. An intercom between the two rooms allowed the experimenter and participants to communicate as needed. Following completion of the laboratory tasks, participants were debriefed and compensated \$30 for their time.

### 2.4. Data analytic strategy

Descriptive statistics were examined and bivariate correlations among the study variables were calculated to ensure that no two predictor variables were so highly correlated as to raise concerns regarding multicollinearity in the regression analysis. Next, a hierarchical regression analysis was conducted to test study hypotheses. Specifically, following Aiken and West’s (1991) recommendations for testing interaction effects, predictor variables (EAQ-Positive, EAQ-Negative, and ANT-Attentional Control) were mean centered and entered into the first step of the model. The interaction terms of attentional control with both positive and negative emotional avoidance (i.e., EAQ-Positive  $\times$  ANT-Attentional Control; EAQ-Negative  $\times$  ANT-Attentional Control) were then entered in the second step of the model. Anxiety symptom severity (i.e., DASS-Anxiety) served as the dependent variable. Significant interactions were probed using simple slopes analysis; specifically, the relation between the predictor (EAQ-Negative) and outcome variable (DASS-Anxiety) was tested at both high and low levels (i.e., +1 and –1 SD) of the moderating variable (ANT-Attentional Control) to determine whether the slopes of the regression lines differed significantly from zero at high and low levels of the moderator (consistent with guidelines described by Aiken and West [1991]).

### 3. Results

An examination of bivariate correlations revealed only two significant associations among the primary study variables (i.e., DASS-Anxiety, EAQ-Positive, EAQ-Negative, and ANT-Attentional Control). Specifically, DASS-Anxiety was significantly positively associated with both EAQ-Negative ( $r = .29$ ,  $p = .005$ ) and EAQ-Positive ( $r = .28$ ,  $p = .007$ ). Of note, EAQ-Positive and EAQ-Negative were not significantly associated with one another ( $r = -.08$ ,  $p = .48$ ), thus allaying concerns regarding the potential for multicollinearity in the regression analysis.

Results of a hierarchical regression analysis revealed that both EAQ-Positive and EAQ-Negative were significantly positively associated with DASS-Anxiety in Step 1 of the model (see Table 1). Moreover, the interaction of EAQ-Negative and ANT-Attentional Control was significant in Step 2 of the model. The interaction

**Table 1**  
Hierarchical multiple regression analysis predicting DASS-21-Anxiety Scale ( $N = 93$ ).

Predictor	B	$\beta$	$\Delta R^2$
Step 1			
ANT-AC	-.01	-.05	.18***
EAQ-Negative	.31	.32***	
EAQ-Positive	.33	.30**	
Step 2			
ANT-AC	-.01	-.09	.07*
EAQ-Negative	.31	.33***	
EAQ-Positive	.28	.26**	
EAQ-Negative $\times$ ANT-AC	.01	.25*	
EAQ-Positive $\times$ ANT-AC	-.00	-.14	

Note. DASS-21 = Depression, Anxiety, Stress Scales; ANT-AC = Attention Network Test-Attentional Control Scale; EAQ = Emotional Avoidance Questionnaire; EAQ-Negative = EAQ scale assessing avoidance of negative emotions; EAQ-Positive = EAQ scale assessing avoidance of positive emotions.

\*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ .

effect was small to medium in size (Cohen's  $f^2 = .08$ ; Aiken & West, 1991), accounting for approximately 7% of the variance in anxiety symptoms. As shown in Fig. 1, results of the simple slopes analysis revealed a significant positive association between EAQ-Negative and DASS-Anxiety among participants with low attentional control (indicated by higher scores on this ANT subscale;  $B = .56$ ,  $\beta = .59$ ,  $p < .001$ ); among participants with high attentional control, however, EAQ-Negative was not significantly associated with DASS-Anxiety ( $B = .07$ ,  $\beta = .07$ ,  $p = .63$ ).

#### 4. Discussion

The present study sought to examine the unique relations of both positive and negative emotional avoidance to anxiety symptom severity. As predicted, greater avoidance of both positive and negative emotions was associated with more severe anxiety symptoms. This finding is consistent with theoretical and empirical literature suggesting that the avoidance of both positive and negative emotions may contribute to the development and maintenance of anxiety (e.g., Roemer et al., 2001; Salters-Pedneault et al., 2004; Tull & Roemer, 2007; Williams et al., 1997). Moreover, because the avoidance of positive emotions and negative emotions were each uniquely associated with anxiety symptoms, the present findings highlight the importance of differentiating between these two forms of emotional avoidance when examining their associations with negative outcomes.

Results also provided partial support for the hypothesized moderating role of attentional control in the relation between emotional avoidance and anxiety symptom severity. Specifically, attentional control emerged as a significant moderator of the relation between emotional avoidance and anxiety symptom severity for only the avoidance of negative emotions, not positive emotions. These findings are consistent with the growing body of research demonstrating the moderating role of attentional control in the relation between psychopathology risk factors and psychopathology more broadly. Study findings also fill an important gap in this area of research by employing a laboratory-based behavioral assessment of attentional control rather than self-report.

Nonetheless, an important question that remains unanswered is, why does attentional control moderate the relation between emotional avoidance and anxiety symptoms for only negative (vs. positive) emotions? As discussed previously, research provides

strong support for an attentional bias for threat information among those with higher levels of anxiety (see Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007), with recent findings suggesting that attentional control may be used to disengage and shift attention from threat-related stimuli in as little as 150 ms (Bardeen & Orcutt, 2011), thus resulting in reduced distress (Bardeen & Read, 2010). Given past research showing that high intensity emotions are associated with greater emotionally avoidant tendencies (e.g., Lynch, Robins, Morse, & Krause, 2001), reductions in emotional arousal that occur as a result of the ability to flexibly control one's attention may prevent more extreme avoidance strategies (e.g., behavioral avoidance) that would interfere with habituation to anxiety-provoking stimuli. For example, Rinck, Kwakkenbos, Dotsch, Wigboldus, and Becker (2010) found that individuals with a fear of spiders, compared to a non-fearful control group, allocated significantly more attention to, and exhibited significantly more behavioral avoidance of, spider stimuli in a virtual environment. Furthermore, considering that high intensity negative emotions may interfere with exposure (see Jaycox & Foa, 1996), greater attentional control may reduce negative emotional arousal, facilitating individual's engagement with and habituation to anxiety-provoking stimuli.

Conversely, and consistent with both attentional control theory (Eysenck, Derakshan, Santos, & Calvo, 2007) and empirical literature (Graydon & Eysenck, 1989; Lavie, Hirst, de Fockert, & Viding, 2004), it is important to note that both distress in general and anxiety in particular may impair the inhibition and shifting functions of top-down attention control. Thus, individuals experiencing extreme states of anxious arousal may have greater difficulty using attentional control to alleviate distress, especially if they have relatively lower levels of attentional control at baseline. Nonetheless, studies have also found that individuals with relatively high levels of anxiety can use attentional control to inhibit dominant/bottom-up tendencies and alleviate distress if they have relatively high levels of attentional control at baseline (Bardeen & Orcutt, 2011; Derryberry & Reed, 2002). Thus, it will be important for future research to determine the degree to which individuals who are prone to negative emotional avoidance can use attentional control to alleviate distress. Laboratory based experimental designs may be particularly well-suited for this type of investigation.

In contrast to the early attentional bias for negative stimuli observed in those with higher anxiety, an early attentional bias for positive stimuli does not appear to be commonly observed among those with higher anxiety (for a review, see Ruiz-Caballero & Bermudez, 1997). The differential relevance of early attentional bias to threat-related versus positive stimuli makes sense from an evolutionary standpoint, as early threat detection was essential for survival, whereas early detection of positively perceived stimuli may have been less urgent. However, such findings also suggest that positive stimuli may be perceived at a later stage of processing than threat-related stimuli – a stage at which attention redeployment may be a less effective option for reducing emotional arousal or emotion-related distress (requiring the use of more overt avoidance strategies). Although this hypothesis seems plausible, it will be important for future research to examine the mechanism(s) and context(s) through which the avoidance of positive emotions leads to higher levels of anxiety. Additionally, the use of longitudinal and experimental designs may help to clarify the nature of the temporal relations between both positive and negative emotional avoidance and anxiety.

Study limitations must be acknowledged. Although the use of a community sample may be considered a strength of the present study, findings may not generalize to clinical populations. It will be especially important in future research to replicate these findings in a sample of individuals with anxiety disorder diagnoses.

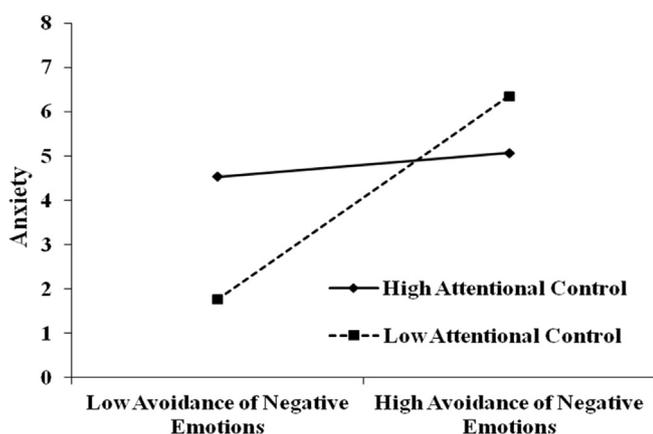


Fig. 1. Interaction effect (EAQ-Negative  $\times$  Attentional Control) was a significant predictor of anxiety (i.e., DASS-21-Anxiety Scale),  $\beta = .25$ ,  $p < .05$ . Simple slopes analysis revealed that, among participants with lower attentional control, those with higher avoidance of negative emotions reported significantly higher levels of anxiety than those with lower avoidance of negative emotions. There was not a significant association between avoidance of negative emotions and anxiety for those with higher attentional control.

Additionally, our use of a general measure of anxiety symptom severity precludes conclusions regarding the relevance of emotional avoidance and attentional control to specific forms of anxiety pathology. The observed relations may generalize across a range of anxiety-related pathology or be disorder-specific. Future research should examine the extent to which these findings apply to specific anxiety disorders. An additional limitation is the exclusive reliance on a self-report measure of emotional avoidance. Specifically, responding may be influenced by an individual's willingness and/or ability to report accurately on emotional experiences (Tull, Bornovalova, Patterson, Hopko, & Lejuez, 2008). Thus, future studies would benefit from the inclusion of behavioral measures of emotional avoidance as well (e.g., Gratz, Bornovalova, Delany-Brumsey, Nick, & Lejuez, 2007). Finally, the observed interaction effect accounted for only a modest amount of unique variance in anxiety symptoms (i.e., 7%). However, the statistical constraints on the magnitude of effect sizes of interactions when using non-experimental study designs have been well documented (e.g., McClelland & Judd, 1993) and the amount of variance in anxiety symptoms that was accounted for by this interaction is well above the threshold considered to be meaningful (i.e., at least 1%; Evans, 1985).

These limitations notwithstanding, the present study is the first to provide evidence that attentional control moderates the relation between the avoidance of negative emotions and anxiety symptom severity. Specifically, avoidance of negative emotions were associated with higher levels of anxiety, but only for those who lacked relatively higher attentional control abilities. Although preliminary, these findings suggest that empirically-based treatment approaches that contain attention-based components, such as Acceptance and Commitment Therapy (Hayes, Luoma, Bond, Masuda, & Lillis, 2006) and Dialectical Behavior Therapy (Linehan, 1993), may be beneficial for emotionally avoidant individuals with poor attentional control abilities. Importantly, empirical research has shown that attentional control abilities can be significantly improved through clinical intervention (Jha, Krompinger, & Baime, 2007) and mindfulness training techniques specifically (Bherer et al., 2008; Zylowska et al., 2008). Moreover, computerized attention training programs have been shown to be effective in reducing anxiety among individuals with both social anxiety disorder (Schmidt, Richey, Buckner, & Timpano, 2009) and generalized anxiety disorder (Amir, Beard, Burns, & Bomyea, 2009); consequently, these interventions may be usefully applied to individuals with heightened emotional avoidance as well. The portability and cost-effectiveness of these computerized attention training interventions may be especially appealing in geographic locations where mental health resources are limited.

## References

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Amir, N., Beard, C., Burns, M., & Bomyea, J. (2009). Attention modification program in individuals with generalized anxiety disorder. *Journal of Abnormal Psychology, 118*, 28–33.
- Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment, 10*, 176.
- Bardeen, J. R., & Orcutt, H. K. (2011). Attentional control as a moderator of the relationship between posttraumatic stress symptoms and attentional threat bias. *Journal of Anxiety Disorders, 25*, 1008–1018.
- Bardeen, J. R., & Read, J. P. (2010). Attentional control, trauma, and affect regulation: a preliminary investigation. *Traumatology, 16*, 11–18.
- Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2007). Threat-related attentional bias in anxious and non-anxious individuals: a meta-analytic study. *Psychological Bulletin, 133*, 1–24.
- Beck, A. T., & Steer, R. A. (1990). *Manual for the Beck Anxiety Inventory*. San Antonio, Tex: The Psychological Corporation.
- Bherer, L., Kramer, A. F., Peterson, M. S., Colcombe, S., Erickson, K., & Becic, E. (2008). Transfer effects in task-set cost and dual-task training in older and younger adults: further evidence for cognitive plasticity in attentional control in late adulthood. *Experimental Aging Research, 34*, 188–219.
- Brown, T. A., Chorpita, B. F., Korotitsch, W., & Barlow, D. H. (1997). Psychometric properties of the Depression Anxiety Stress Scales (DASS) in clinical samples. *Behaviour Research and Therapy, 35*, 79–89.
- Campbell-Sills, L., & Barlow, D. H. (2007). Incorporating emotion regulation into conceptualizations and treatments of anxiety and mood disorders. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 542–559). New York: Guilford Press.
- Campbell-Sills, L., Barlow, D. H., Brown, T. A., & Hofmann, S. G. (2006). Effects of suppression and acceptance on emotional responses on individuals with anxiety and mood disorders. *Behaviour Research and Therapy, 44*, 1251–1263.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. A. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Constans, J. I. (2005). Information-processing bias in PTSD. In J. J. Vasterling, & C. R. Brewin (Eds.), *Neuropsychology of PTSD: Biological, cognitive, and clinical perspectives* (pp. 105–130). New York: The Guilford Press.
- Derryberry, D., & Reed, M. A. (2002). Anxiety-related attentional biases and their regulation by attentional control. *Journal of Abnormal Psychology, 111*, 225–236.
- Eisenberg, N., Fabes, R. A., Guthrie, I. K., & Reiser, M. (2000). Dispositional emotionality and regulation: their role in predicting quality of social functioning. *Journal of Personality and Social Psychology, 78*, 136–157.
- Elzinga, B. M., & Bremner, J. D. (2002). Are the neural substrates of memory the final common pathway in posttraumatic stress disorder (PTSD)? *Journal of Affective Disorders, 70*, 1–17.
- Evans, M. G. (1985). A Monte Carlo study of the effects of correlated method variance in moderated multiple regression analysis. *Organizational Behavior and Human Decision Processes, 36*, 305–323.
- Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: attentional control theory. *Emotion, 7*, 336–353.
- Fan, J., McCandliss, B. D., Sommer, T., Raz, M., & Posner, M. I. (2002). Testing the efficiency and independence of attentional networks. *Journal of Cognitive Neuroscience, 14*, 340–347.
- Fergus, T. A., Bardeen, J. B., & Orcutt, H. K. (2012). Attentional control moderates the relationship between activation of the cognitive attentional syndrome and symptoms of psychopathology. *Personality and Individual Differences, 53*, 213–217.
- Foa, E. B., & Kozak, M. J. (1986). Emotional processing of fear: exposure to corrective information. *Psychological Bulletin, 99*, 20–35.
- Gratz, K. L., Bornovalova, M. A., Delany-Brumsey, A., Nick, B., & Lejuez, C. W. (2007). A laboratory-based study of the relationship between childhood abuse and experiential avoidance among inner-city substance users: the role of emotional nonacceptance. *Behavior Therapy, 38*, 256–268.
- Graydon, J., & Eysenck, M. W. (1989). Distraction and cognitive performance. *European Journal of Cognitive Psychology, 1*, 161–179.
- Gross, J. J. (1998). The emerging field of emotion regulation: an integrative review. *Review of General Psychology, 2*, 271–299.
- Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: model, processes and outcomes. *Behaviour Research and Therapy, 44*, 1–25.
- Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: a functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology, 64*, 1152–1168.
- Hoffman, D. L., Dukes, E. M., & Wittchen, H. U. (2008). Human and economic burden of generalized anxiety disorder. *Depression and Anxiety, 25*, 72–90.
- Ishigami, Y., & Klein, R. M. (2009). Are individual differences in absentmindedness correlated with individual differences in attention? *Journal of Individual Differences, 30*, 220–237.
- Jaycox, L. H., & Foa, E. B. (1996). Obstacles in implementing exposure therapy for PTSD: case discussions and practical solutions. *Clinical Psychology and Psychotherapy, 3*, 176–184.
- Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies sub-systems of attention. *Cognitive, Affective, & Behavioral Neuroscience, 7*, 109–119.
- Jones, C. R., Fazio, R. H., & Vasey, M. W. (2012). Attentional control buffers the effect of public-speaking anxiety on performance. *Social, Psychological, and Personality Science, 3*, 556–561.
- Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry, 62*, 617–627.
- Kessler, R. C., & Greenberg, P. E. (2002). The economic burden of anxiety and stress disorders. In K. Davis (Ed.), *Neuropsychopharmacology: The fifth generation of progress*. Baltimore, MD: American College of Neuropsychopharmacology and Lippincott Williams & Son.
- Lavie, N., Hirst, A., de Fockert, J. W., & Viding, E. (2004). Load theory of selective attention and cognitive control. *Journal of Experimental Psychology: General, 133*, 339–354.
- Levitt, J. T., Brown, T. A., Orsillo, S. M., & Barlow, D. H. (2004). The effects of acceptance versus suppression of emotion on subjective and psychophysiological response to carbon dioxide challenge in patients with panic disorder. *Behavior Therapy, 35*, 747–766.
- Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York, NY: Guilford Press.

- Lovibond, S. H., & Lovibond, P. F. (1995a). *Manual for the Depression Anxiety Stress Scales* (2nd. ed.). Sydney: Psychology Foundation.
- Lovibond, P. F., & Lovibond, S. H. (1995b). The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy*, 33, 335–343.
- Lynch, T. R., Robins, C. J., Morse, J. Q., & Krause, E. D. (2001). A mediational model relating affect intensity, emotion inhibition, and psychological distress. *Behavior Therapy*, 32, 519–536.
- McClelland, G. H., & Judd, C. M. (1993). Statistical difficulties of detecting interactions and moderator effects. *Psychological Bulletin*, 114, 376–390.
- Naifeh, J. A., Tull, M. T., & Gratz, K. L. (2012). Anxiety sensitivity, emotional avoidance, and PTSD symptom severity among crack/cocaine dependent patients in residential treatment. *Cognitive Therapy and Research*, 36, 247–257.
- Richey, J. A., Keough, M. E., & Schmidt, N. B. (2012). Attentional control moderates fearful responding to a 35% CO<sub>2</sub> Challenge. *Behavior Therapy*, 43, 285–299.
- Rinck, M., Kwakkenbos, L., Dotsch, R., Wigboldus, H. J., & Becker, E. S. (2010). Attentional and behavioural responses of spider fearfuls to virtual spiders. *Cognition and Emotion*, 24, 1199–1206.
- Roemer, L., Litz, B. T., Orsillo, S. M., & Wagner, A. W. (2001). A preliminary investigation of the role of strategic withholding of emotions in PTSD. *Journal of Traumatic Stress*, 14, 149–156.
- Ruiz-Caballero, J. A., & Bermudez, J. (1997). Anxiety and attention: is there an attentional bias for positive emotional stimuli? *Journal of General Psychology*, 124, 194–211.
- Salters-Pedneault, K., Tull, M. T., & Roemer, L. (2004). The role of avoidance of emotional material in the anxiety disorders. *Applied and Preventive Psychology*, 11, 95–114.
- Schmidt, N. B., Richey, J. A., Buckner, J. D., & Timpano, K. R. (2009). Attention training for generalized social anxiety disorder. *Journal of Abnormal Psychology*, 118, 5–14.
- Spada, M. M., Georgiou, G. A., & Wells, A. (2010). The relationship among meta-cognitions, attentional control, and state anxiety. *Cognitive Behaviour Therapy*, 39, 64–71.
- Taylor, C. T., Laposa, J. M., & Alden, L. E. (2004). Is avoidant personality disorder more than just social avoidance? *Journal of Personality Disorders*, 18, 571–594.
- Tull, M. T., Bornovalova, M. A., Patterson, R., Hopko, D. R., & Lejuez, C. W. (2008). Analogue research methods. In D. McKay (Ed.), *Handbook of research methods in abnormal and clinical psychology* (pp. 61–78). Thousand Oaks, CA: Sage.
- Tull, M. T., Hahn, K. S., Evans, S. D., Salters-Pedneault, K., & Gratz, K. L. (2011). Examining the role of emotional avoidance in the relationship between post-traumatic stress disorder symptom severity and worry. *Cognitive Behaviour Therapy*, 40, 5–14.
- Tull, M. T., & Roemer, L. (2007). Emotion regulation difficulties associated with the experience of uncued panic attacks: evidence of experiential avoidance, emotional non-acceptance, and decreased emotional clarity. *Behavior Therapy*, 38, 378–391.
- Wildes, J. E., Ringham, R. M., & Marcus, M. D. (2010). Emotion avoidance in patients with anorexia nervosa: Initial test of a functional model. *International Journal of Eating Disorders*, 43, 398–404.
- Williams, K. E., Chambless, D. L., & Ahrens, A. H. (1997). Are emotions frightening? an extension of the fear of fear concept. *Behaviour Research and Therapy*, 35, 239–248.
- Zylowska, L., Ackerman, D. L., Yang, M. H., Futrell, J. L., Horton, N. L., Hale, T. S., et al. (2008). Mindfulness meditation training in adults and adolescents with ADHD: a feasibility study. *Journal of Attention Disorders*, 11, 737–746.