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Attentional Control as a Moderator of the Relationship Between Difficulties Accessing Effective Emotion Regulation Strategies and Distress Tolerance

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Abstract Distress tolerance is inversely associated with a number of negative outcomes, including multiple forms of psychopathology. Research suggests that difficulties accessing effective emotion regulation (ER) strategies may adversely affect the willingness and/or ability to tolerate distress. Additionally, research has shown that attentional control (i.e., the skillful control of higher-order executive attention in regulating bottom-up emotional responses) can be used to effectively regulate distress. Using a community sample of adults (N=93), the present study sought to examine whether attentional control moderates the relationship between difficulties accessing effective ER strategies and distress tolerance. As predicted, difficulties accessing effective ER strategies was inversely related to behaviorally-indexed distress tolerance, but only among individuals with relatively lower attentional control. Results suggest that attentional control may be a protective factor against distress intolerance. Clinically, findings suggest that attention training interventions may be helpful in reducing risk for psychopathology among individuals with less access to effective ER strategies.

Keywords Distress tolerance · Emotion regulation · Emotion regulation self-efficacy · Attentional control · Avoidance

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Introduction

Over the past decade, researchers have paid increased attention to the construct of distress tolerance (DT), defined here as the capacity to withstand aversive psychological states in the service of goal-directed behavior (Leyro et al. 2010; Simons and Gaher 2005). This emerging literature suggests that low levels of DT are associated with a wide range of negative outcomes, including various forms of psychopathology and multiple maladaptive behaviors (e.g., Leyro et al. 2010; Kashdan et al. 2006). Furthermore, DT has been identified as a potentially important mechanism of change in psychological interventions (see Zvolensky et al. 2011).

Despite the clear clinical relevance of DT, however, researchers (e.g., Zvolensky et al. 2011) have emphasized the need for a clearer understanding of the relationship between DT and the related construct of emotion dysregulation. As defined here, emotion dysregulation is a multidimensional construct involving a lack of awareness and understanding of emotions, nonacceptance or avoidance of emotions, an unwillingness to experience negative emotions as part of pursuing desired goals, difficulties controlling behaviors in the face of emotional distress, and deficits in the modulation of emotional arousal, including a lack of access to effective strategies for modulating the intensity or duration of emotions (for reviews, see Gratz and Roemer 2004; Gratz and Tull 2010). Based on this model, Gratz and Roemer (2004) developed the multidimensional Difficulties in Emotion Regulation Scale (DERS). Of particular relevance to the present study, one subscale of this measure assesses difficulties accessing emotion regulation (ER) strategies perceived as effective (DERS-Strategies). By assessing the subjective appraisal of the effectiveness of utilized ER strategies (rather than delineating specific ER strategies, which implies that certain ER strategies are more adaptive than others regardless of context),

this subscale was developed to capture the contextually-dependent nature of adaptive ER strategies (Gratz and Roemer 2004). Of note, this subscale of the DERS overlaps with the construct of ER self-efficacy, which emphasizes the importance of an individual's subjective appraisal of her or his ability to regulate intense emotions to effective ER (e.g., Bandura et al. 2003; Catanzaro & Greenwood 1994; Tamir et al. 2007).

Importantly, difficulties accessing effective ER strategies may directly affect DT. Specifically, individuals who believe that they do not have access to effective strategies for modulating negative emotions may be less willing to tolerate such emotions in the pursuit of goals (evidencing a tendency to avoid or escape emotional distress instead). Supporting this proposition, research has shown that difficulties accessing effective ER strategies are associated with (a) heightened experiential avoidance, or the tendency to avoid or escape uncomfortable internal experiences (e.g., Fergus et al. 2013; Gratz and Roemer 2004), and (b) lower perceived DT (McHugh et al. 2013). Moreover, there is extensive evidence that this particular dimension of emotion dysregulation is associated with numerous forms of psychopathology thought to be characterized by low DT, including chronic worry and generalized anxiety disorder (Salters-Pedneault et al. 2006), posttraumatic stress symptoms (Tull et al. 2007), and disordered eating (Lavender and Anderson 2010).

Although past research has established a strong relation between difficulties accessing effective ER strategies and avoidance behaviors, theoretical and empirical literature suggest that the tendency to use avoidance to escape uncomfortable internal sensations is likely to be compounded by objective deficits in other abilities central to ER (e.g., Gross and Thompson 2007). One factor that may be particularly important to examine in this regard is the ability to strategically deploy attention (i.e., attentional control, or the skilled control of higher-order executive attention in regulating bottom-up emotional responses). Attentional control has been theorized to be central to adaptive ER (Gross and Thompson 2007). Specifically, the flexible use of attentional control to disengage and shift attention away from emotionally distressing stimuli may result in a reduction in emotional distress, thereby facilitating continued engagement in goal-directed behavior. Moreover, evidence suggests that attentional control may serve to regulate negative emotions, with research linking attentional control to the regulation of both trauma-related distress (Bardeen and Read 2010) and trait anxiety (Derryberry and Reed 2002).

With regard to the interrelations of attentional control, difficulties accessing effective ER strategies, and DT, the ability to selectively control the focus of one's attention may reduce contact with distressing stimuli, thereby allowing individuals with greater difficulties accessing effective ER strategies to remain within a distress-inducing context. Conversely, the inability to disengage attention from distressing stimuli may exacerbate distress, which, for individuals who believe they do not have access to effective strategies for modulating distress, may prompt efforts to avoid or escape that distress (i.e., lower DT).

The purpose of the present study was to examine attentional control as a moderator of the relationship between difficulties accessing effective ER strategies and DT. Based on the aforementioned theory, we predicted that difficulties accessing effective ER strategies would be associated with lower DT, but only among individuals with lower attentional control abilities. Conversely, we expected that higher attentional control abilities would attenuate the effect of difficulties accessing effective ER strategies on DT.

Method

Participants

The initial sample consisted of 99 community adults. Data from five participants were excluded from analyses due to an inflated error rate on the Attention Network Test (i.e., >|2.5| SD from the mean error rate; see Ishigami and Klein 2009). Additionally, one case was removed from analyses because of undue influence on the primary analytic model (i.e., multivariate outliers defined as >1 $DFFITS_i$; Cohen et al. 2003). The majority of the final sample (N=93) was female (63.4 %) and had an annual income of less than $5,000 (58.1 %). The sample had a mean age of 23.7 years (SD=9.4, *range*= 18 to 60) and was ethnically/racially diverse (53.8 % White; 21.5 % Black/African-American; 9.7 % Asian/Asian-American; 14.0 % other racial/ethnic background).

Measures

Difficulties accessing effective ER strategies was assessed using the Strategies subscale of the Difficulties in Emotion Regulation Scale (DERS-Strategies; Gratz and Roemer 2004). This subscale contains 8 items that assess self-reported difficulties accessing effective strategies for regulating negative emotions (e.g., "When I'm upset, I believe that wallowing in it is all I can do"). The DERS-Strategies subscale has been found to demonstrate good test-retest reliability and adequate construct and predictive validity (Gratz and Roemer 2004; Gratz and Tull 2010). In the present sample, internal consistency of the DERS-Strategies subscale was good (α=0.89).

Attentional control was assessed using the executive attentional network index of the Attention Network Test (ANT; Fan et al. 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 (←←→←←) and a congruent condition (←←←←←). 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).

DT was assessed behaviorally using a modified version of the Paced Auditory Serial Addition Task – Computerized (PASAT-C; Lejuez et al. 2003; Gratz et al. 2006). During this task, numbers are sequentially flashed on a computer screen, and participants are instructed to sum the most recent number with the previous number (using the computer mouse to click on the correct answer). After providing each sum, the participant must ignore the sum and add the following number to the most recently presented number. When a correct answer is provided, a point is obtained. If an incorrect answer is provided, or if the participant fails to provide an answer before the next number is presented, an "explosion" sound is played and the score does not change.

The version of the PASAT-C used here consisted of three levels with increasingly shorter latencies between number presentations. Following one minute of the final level, participants were given the opportunity to terminate the task at any time (a measure of the willingness to experience distress). However, participants were informed that: (a) their performance on this task (including the length of time they persisted on it) would determine the amount of time they would receive to work on a subsequent task (i.e., persisting longer and getting a higher score on the task would result in greater time to work on the subsequent task), and (b) their performance on the subsequent task would determine the amount of their reimbursement. Thus, latency in seconds to task termination was used as a measure of DT.

To control for the influence of baseline negative affect (NA) on the observed relations, participants completed the NA scale of the Positive and Negative Affect Schedule (PANAS; Watson et al. 1988), rating the extent to which they were currently experiencing 10 forms of NA on a scale from 1 (*very slightly or not at all*) to 5 (*extremely*). The PANAS has been found to demonstrate adequate psychometric properties (Watson et al. 1988). In the present sample, internal consistency of PANAS-NA was adequate (α=0.71).

Procedure

This study received approval by the university's Institutional Review Board. This study was part of a larger study investigating ER difficulties associated with various symptoms of psychopathology. 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 2 weeks) manic, hypomanic, or depressive mood episodes (but not lifetime history of mood disorders), current (past-month) substance dependence, and/or primary psychosis. Individuals interested in participating were instructed to contact research personnel to schedule a study session. Upon arrival to the laboratory, participants were given information about the study and asked to provide written informed consent. After providing written informed consent, participants completed a battery of self-report measures and the two computer tasks described previously. All participants received the same standardized set of instructions for the computer tasks. Once participants confirmed that they understood the instructions, the experimenter left the participants' 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.

Data Analytic Strategy

Bivariate correlations and descriptive statistics for the variables of interest are reported in Table 1. Demographic

Table 1 Descriptive statistics and correlations for study variables

	1	2	3	4
1. PANAS-NA	–			
2. DERS-Strategies	0.35***	–		
3. ANT-Executive	−0.07	−0.07	–	
4. PASAT-C	−0.05	−0.11	−0.11	–
Mean	14.03	21.18	151.28	341.85
Standard Deviation	3.95	7.15	62.05	136.30
Minimum	10.00	9.00	50.00	11.00
Maximum	28.00	40.00	345.00	420.00

N=93. *PANAS-NA* Negative Affect Scale of the Positive and Negative Affect Schedule; *DERS-Strategies* Strategies subscale of the Difficulties in Emotion Regulation Scale, *ANT-Executive* executive attentional network index of the Attention Network Test, *PASAT-C* latency to terminate the computerized Paced Auditory Serial Addition Task (distress tolerance)
***p<0.001

variables (i.e., age, gender [0=female, 1=male], race/ethnicity [0=White, 1=non-White], and income [0=less than $5,000, 1=greater than $5,000]) were not associated with any of the variables of interest and, thus, were not included as covariates in the regression analysis. To test the hypothesis that attentional control would moderate the relation between difficulties accessing effective ER strategies and DT, Aiken and West's (1991) recommendations for testing interaction effects were used. Predictor variables (DERS-Strategies, ANT-Executive) were entered in the first step of the model, along with the covariate (PANAS-NA). The DERS-Strategies×ANT-Executive interaction term was entered in the second step of the model. The DT variable (latency to terminate the PASAT-C) served as the dependent variable. Predictor variables were centered at their means prior to creating interaction terms. Simple slopes analysis was conducted to further investigate the interaction (Aiken and West 1991). More specifically, two simple regression equations were constructed in which the relationship between DERS-Strategies and PASAT-C quit time was tested at both high (+1 *SD*) and low (-1 *SD*) levels of ANT-Executive.

Results

In the first step of the model, no main effects emerged as significant (DERS-Strategies: B=-2.06, β=-0.11, p=0.34; ANT-Executive: B=-0.35, β=-0.12, p=0.27; PANAS-NA: B=-0.76, β=-0.02, p=0.84). As predicted, the interaction of DERS-Strategies and ANT-Executive was significantly associated with DT in the second step of the model (B=-0.07, β=-0.23, p=0.03, ΔR^2=0.05). The interaction effect was small to medium in size (Cohen's f^2=0.054; Aiken and West 1991), accounting for approximately 5 % of the variance in DT. Simple slopes analysis revealed a significant negative association between DERS-Strategies and DT on the PASAT-C for participants with higher ANT-Executive scores (indicative of lower attentional control abilities; B=-7.03, β=-0.37, p=0.03). No association was found for those with lower ANT-Executive scores, or higher attentional control abilities (B=2.12, β=-0.11, p=0.46; see Fig. 1). Thus, difficulties accessing effective ER strategies was associated with lower DT only among individuals with lower attentional control abilities.

Discussion

The results of the present study suggest that strategic attentional deployment (i.e., attentional control) may attenuate the relation between perceived difficulties accessing effective ER strategies and the unwillingness to tolerate emotional distress in the service of goal-directed behavior. Among individuals with greater attentional control abilities, self-reported difficulties accessing effective ER strategies were not significantly associated with DT. These findings provide additional support for the important role of attentional control in ER and related difficulties.

The present findings also raise an important question regarding the degree of volitional control involved when executive attentional processes are used to regulate negative emotions. Although executive attentional processes are typically considered to be strategic (i.e., volitional and controllable), researchers have suggested that automatic and controlled attentional processing occur on a continuum rather than being dichotomous in nature (Cohen et al. 2004). With this in mind, it has been proposed that attentional processes that are typically thought of as strategic (e.g., disengagement, shifting, refocusing) may eventually become almost automatic responses to bottom-up sensory input (e.g., stress, anxious-arousal, frustration; Metcalfe and Mischel 1999), taking place in as little as 150 milliseconds (Bardeen and Orcutt 2011). Thus, it may be that little conscious effort is expended in using

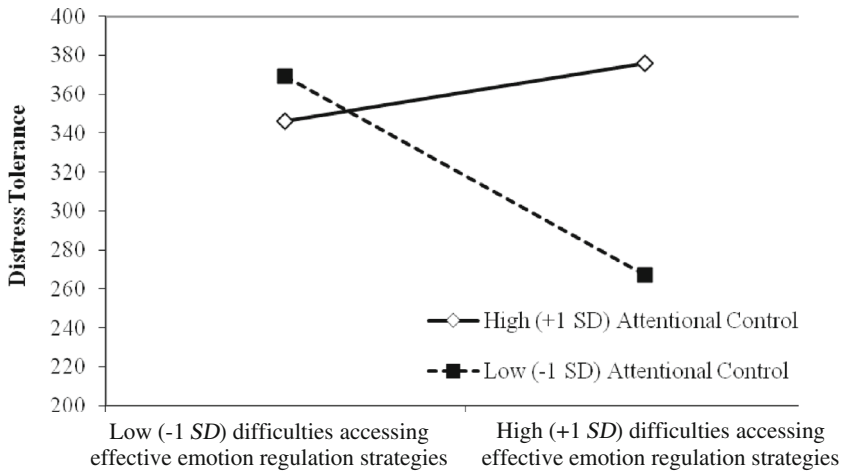

Fig. 1 Interaction of DERS-Strategies and ANT-Executive on latency to terminate the PASAT-C

attentional control to regulate emotional distress among those with higher levels of executive attentional abilities.

Results of this study must be evaluated in light of the study's limitations. First, because this study utilized a sample of participants recruited from the community, results may not generalize to clinical populations. Thus, future studies should attempt to replicate findings in different patient populations that have been found to exhibit ER difficulties and low DT (e.g., patients with borderline personality disorder, posttraumatic stress disorder, and substance use disorders; see Gratz and Tull 2010; Zvolensky et al. 2011). In addition, given that: (a) behavioral and self-report indices of DT are not significantly related (McHugh et al. 2011), and (b) distinct dimensions of a higher-order DT construct have been identified (e.g., intolerance of uncertainty, discomfort intolerance; Bardeen et al. 2013), future research is needed to examine the moderating role of attentional control in the relations between difficulties accessing effective ER strategies and various self-report and behavioral measures of DT. Furthermore, the cross-sectional and correlational nature of our data precludes determination of the precise nature and direction of the relations of interest. Future studies would benefit from the use of longitudinal designs to clarify the temporal relations among study variables. Finally, the interaction effect explained only modest unique variance in DT (i.e., 5 %); however, this percentage of variance is well above the threshold considered meaningful (i.e., at least 1 %; Evans 1985).

Despite limitations, the present study has some potential clinical implications. Although researchers have identified access to effective ER strategies as an important target of psychological interventions (Berking et al. 2008), the present findings suggest that it may also be worthwhile to focus on the enhancement of attentional control abilities. Indeed, research indicates that is possible to increase the use of higher level executive attention to regulate automatic emotional responses through clinical intervention (e.g., Jha et al. 2007). Additionally, mindfulness training techniques have been shown to increase attentional control abilities (e.g., Zylowska et al. 2008). Thus, empirically-supported treatment approaches that contain attention-based components (e.g., Acceptance and Commitment Therapy; Hayes et al. 1999) may be of benefit to individuals with difficulties accessing effective ER strategies and low DT. Moreover, institutional implementation of programs designed to enhance attentional control (e.g., in school or vocational settings) may have public health significance by reducing the risk for psychopathology among individuals with difficulties accessing effective ER strategies.

Conflict of Interest The authors have no conflicts of interest to declare.

Experiment Participants This study received approval by the university's Institutional Review Board.

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