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Reactive and self-regulatory dimensions of temperament: Interactive relations with symptoms of general distress and anhedonia

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ABSTRACT

Converging evidence indicates that shared temperamental diatheses partly underlie the covariance between anxiety and depression. Although developmental psychopathology research suggests that self-regulatory temperament (e.g., effortful control or EC) mitigates reactive risks associated with negative affectivity (NA) and positive affectivity (PA), and their respective counterparts, behavioral inhibition- and activation sensitivity (BIS and BAS), no studies have established EC's protective effects in adulthood. This study examined concurrent relations between temperament and distress symptoms shared by anxiety and depression, and anhedonic symptoms unique to depression, in young adults. Anticipated two- and three-way interactions emerged supporting EC's moderating effect between reactive temperament (i.e., high BIS and low BAS) and both symptom dimensions. However, no interactive relations emerged between symptoms and NA, PA, and EC.

1. Introduction

Given the high prevalence of disorders involving anxiety and depression (Kessler et al., 1994) and their high costs and associated functional impairments (Satcher, 2000), prevention efforts are clearly important (Barrera, Torres, & Muñoz, 2007; Flannery-Schroeder, 2006). The success of such efforts hinges on understanding the risk factors associated with such disorders. Although these factors are undoubtedly diverse, mounting evidence and theory strongly suggest that reactive aspects of temperament play important roles as vulnerabilities to such disorders (Brown, 2007; Clark, Watson, & Mineka, 1994; Kotov, Watson, Robles, & Schmidt, 2007; Muris & Ollendick, 2005; Nigg, 2006), although they also have clear potential to influence their course through pathoplastic and complication effects (see Tackett, 2006). These temperamental factors reflect variations in affective-motivational reactivity that are both inherited and shaped by experience (Rothbart & Posner, 2006).

Two aspects of temperamental reactivity of clear importance are the traits of negative affectivity (NA) and positive affectivity (PA) (Anthony, Lonigan, Hooe, & Phillips, 2002; Clark et al., 1994; Watson, Clark, & Harkness, 1994). NA reflects variability in sensitivity to negative stimuli where elevated levels are characterized by heightened reactivity to negative stimuli associated with behavioral inhibition and displeasurable environmental engagement (Gray, 1994). NA is closely related to both neuroticism and Gray's behavioral inhibition system (BIS; Watson et al., 1994). Heightened BIS activity is associated with nonspecific arousal, inhibition of behavior, and increased attention to conditioned threat stimuli (Gray, 1994), and cognitive processes like rumination and worry (Muris, Roelofs, Rassin, Franken, & Mayer, 2005). Thus, heightened NA/BIS is viewed as a vulnerability to the general distress symptoms that are common to anxiety and depressive disorders (e.g., Brown, Chorpita, & Barlow, 1998; Mineka, Watson, & Clark, 1998).

PA reflects individual differences in reactivity to positive stimuli, where high levels of PA are characterized by pleasurable environmental engagement and attendant feelings of assertiveness, confidence, vigor, and venturesomeness (Tellegen, 1985). PA is linked with extraversion as well as Gray's behavioral activation system (BAS; Watson et al., 1994). Low levels of PA/BAS are typified by cognitive and motor slowing, disinterest, lethargy, low sensitivity to reward, behavioral withdrawal and anhedonia (Gray, 1994) and are thought to confer vulnerability to symptoms that are specific to depression (i.e., anhedonia) and social anxiety (Brown et al., 1998; Mineka et al., 1998).

Rather than being mere variants of the same underlying construct, the bulk of the empirical evidence appears to support the distinction between NA/BIS, PA/BAS and psychopathological symptoms (e.g., Lemery, Essex, & Smider, 2002; Lengua & Kovacs, 2005; Muris & Ollendick, 2005; Rapee & Coplan, 2010). The links between NA/BIS, PA/BAS and symptoms of anxiety and depression have been well-established both cross-sectionally (e.g., Anthony et al., 2002; Lonigan, Hooe, David, & Kistner, 1999; Muris, 2006; Muris, De Jong, & Engelen, 2004; Muris, Meesters, & Blijlevens, 2007; Muris, Meesters, & Spinder, 2003) and longitudinally (e.g., Caspi,

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Henry, McGee, Moffitt, & Silva, 1995; Eisenberg et al., 2005; Hirshfeld et al., 1992; Lonigan, Phillips, & Hooe, 2003). For example, composite measures of NA and PA at age 18 are predictive of later symptoms, such that low PA predicts risk for depression and high NA predicts both anxiety and depression (Krueger, Caspi, Moffit, Silva, & McGee, 1996). Similarly, high NA and low PA are predictive not only of concurrent symptomatology in youth, but they also predict later depression (e.g., Joiner & Lonigan, 2000). Finally, high NA/BIS and low PA/BAS predict more chronic course of anxiety and depression and poorer overall outcome with or without treatment (Andrews, Neilson, Hunt, Stewart, & Kiloh, 1990; Brown, 2007; Duggan, Lee, & Murray, 1990; Kasch, Rottenberg, Arnow, & Gotlib, 2002; Lonigan et al., 2003; McFarland, Shankman, Tenke, Bruder, & Klein, 2006).

Despite evidence linking high NA/BIS and low PA/BAS to risk for anxiety and depressive disorders, these links are not yet fully understood. For example, although high NA/BIS is associated with heightened risk for such disorders, many individuals with this reactive vulnerability do not develop such problems, at least not at clinical levels (Degnan & Fox, 2007; Rapee, 2002). Undoubtedly, there are important factors that serve to mitigate the risks associated with reactive temperamental vulnerability. Recent theories of vulnerability to childhood emotional problems (e.g., Lonigan & Phillips, 2001; Muris & Ollendick, 2005; Nigg, 2006) have emphasized the protective effects of self-regulatory aspects of temperament that enable individuals who are reactively at risk to modulate their emotional, cognitive, and behavioral responses. This self-regulatory dimension of temperament, labeled "effortful control" (EC) by Rothbart (1989), includes the capacity to override or compensate for reactive vulnerability through voluntary inhibitory control, activation control, and attentional control (Posner & Rothbart, 2000; Rothbart & Bates, 1998). Thus, an individual who is high in both NA/BIS and EC can override his/her negative reactive tendencies (e.g., to avoid aversive stimuli or to worry or ruminate) and substitute more adaptive responses (e.g., actively re-engage in the task at hand). Similarly, an individual who is low in PA/BAS but high in EC can override his/her lethargy and approach potentially pleasurable or rewarding situations despite lacking immediate motivation to do so, or having strong avoidance motivation.

The role of EC as a moderator of reactive vulnerability has been considered in a model of risk for childhood anxiety offered initially by Lonigan and Phillips (2001; also see Lonigan, Vasey, Phillips, & Hazen, 2004), which itself is informed by the work of Rothbart and colleagues (e.g., Rothbart, 1989; Rothbart & Bates, 1998). In this model, high NA/BIS is viewed as a necessary but not sufficient condition for the development of the general distress seen in anxiety and depressive disorders. Such reactivity is likely to lead to clinical levels of distress only when paired with low capacity for self-regulation (i.e., low EC). In other words, while a person high in NA/BIS is predisposed toward the experience of intrusive negative thoughts, behavioral inhibition, and cognitive biases favoring negative stimuli, these tendencies can be successfully controlled provided he/she has good capacity for EC. There is growing evidence supporting this view. For example, Lonigan and Vasey (2009) showed that children high in NA and low in EC exhibited a significant attentional bias toward threat cues on a probe detection task whereas those high in NA and high in EC did not differ from low NA controls, who showed no bias toward threat regardless of their level of EC. Derryberry and Reed (2002) reported a similar pattern in adults. Thus, the risk linking high levels of NA/BIS to general distress should be moderated by EC.

Although Lonigan et al. (2004) focused primarily on EC's role as a moderator of the relation between NA and anxiety they made it clear that the NA × EC interaction should also hold for depressive symptoms. Further, they noted that EC should also modulate the link between PA and depression (see also Anthony et al., 2002). Specifically, low PA individuals who are high in EC should be able to engage in adaptive, active approach of pleasurable stimuli despite their lack of reactive motivation to do so and, thus, attenuate their risk for depression or reduce its persistence. Thus, the risk linking low levels of PA/BAS to the anhedonic features of depression should also be moderated by EC.

The notion that reactive temperamental vulnerabilities to psychopathology can be moderated by a regulatory trait dimension is consistent with other "dual process" models of cognition and behavior that conceptualize the processing of experience in terms of separate though interacting systems within the human nervous system (e.g., see Carver, Johnson, & Joorman, 2008; Depue & Lenzenweger, 2005). Such models emphasize interactions between primitive, lower-order processing systems on the one hand (mapping onto NA/BIS and PA/BAS in the present context) and a more recently evolved higher-order processing system (which maps onto EC).

In addition to the modulating effects of EC on the risks associated with high NA/BIS and low PA/BAS, there is clear reason to expect an interaction between the two reactive dimensions themselves, in relation to symptoms of anxiety and depression (Fredrickson & Joiner, 2002). A growing number of studies of youth samples have shown that the link between high levels of NA and depressive symptoms is moderated by PA. Specifically, heightened NA predicts elevated depressive symptoms much more strongly at low versus high levels of PA (e.g., Joiner & Lonigan, 2000; Loney, Lima, & Butler, 2006; Wetter & Hankin, 2009). Similar results have been reported for BIS and BAS (e.g., Hundt, Nelson-Gray, Kimbrel, Mitchell, & Kwapil, 2007; Knyazev, Slobodskaya, & Wilson, 2004).

Given that reactive risk appears to be an interactive function of NA/BIS and PA/BAS, we suggest that the focus on 2-way interactions in past studies of the moderating role of EC is insufficient. Instead, the protective role of EC should be considered in the context of the NA/BIS × PA/BAS interaction, wherein risk for symptoms is markedly stronger at the combination of high NA/BIS and low PA/BAS than would be expected if their effects were merely additive. It is in the context of that joint synergistic risk that low levels of EC should be most problematic, thus implying the need to test the NA/BIS × PA/BAS × EC interaction (for a thorough discussion of this 3-way interaction, see Harbaugh et al., 2011). By way of illustration, individuals who are highly reactive to stress (i.e., high NA/BIS), but who also have low approach motivation (i.e., low PA/BAS), are at particular risk for depressive symptoms, because they are not only prone to experience distress but also have little motivation to engage in pleasurable activities that could counteract their distress. This dual, synergistic reactive vulnerability would be particularly strong among those with low EC. However, it should be attenuated among individuals with high EC because they are able to effectively stop, through attention control, the worrisome or ruminative thought processes associated with heightened NA/BIS and to initiate approach behaviors, through activation control, despite their low motivation to do so. Thus, it seems reasonable to hypothesize a three-way interaction between NA/BIS, PA/BAS, and EC. However, to our knowledge, that interaction has not been tested to date.

Although the foregoing discussion underscored the role of EC as a moderator of reactive temperamental vulnerability to anxiety and depression, it should be noted that a main effect of EC is also expected. Studies of youth samples have repeatedly shown that, independent of reactive temperament, deficits in EC are associated with internalizing symptoms, including depression (De Boo & Kolk, 2007; De Boo & Spiering, 2010; Loukas & Robinson, 2004; Muris, van der Pennen, Sigmond, & Mayer, 2008; Muris et al., 2007; Oldehinkel, Hartman, Ferdinand, Verhulst, & Ormel, 2007; Verstraeten, Vasey, Raes, & Bijttebier, 2009). In light of the relevance of effortful self-regulation to everyday domains of behavior that have the