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Positive overgeneralization and Behavioral Approach System (BAS) sensitivity interact to predict prospective increases in hypomanic symptoms: A behavioral high-risk design

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ABSTRACT

Recent work has identified Behavioral Approach System (BAS) sensitivity as a risk factor for the first onset and recurrence of mood episodes in bipolar disorder, but little work has evaluated risk factors for the prospective development of hypomanic symptoms in individuals at risk for, but without a history of, bipolar disorder. The present study used a prospective behavioral high-risk design to evaluate the impact of positive overgeneralization, a cognitive correlate of risk for hypomania, on hypomanic symptoms in individuals with high vs. moderate BAS sensitivity, but without a history of mood elevation. Hierarchical linear regressions indicated that upward positive overgeneralization and BAS sensitivity interacted to predict increased levels of hypomanic symptoms at follow-up, controlling for initial hypomanic symptoms. The pattern of this interaction was such that positive overgeneralization predicted higher levels of hypomanic symptoms among high-BAS, but not moderate-BAS, individuals. Thus, the self-reported tendency to experience grandiose increases in confidence following success may confer additional risk for mood elevation among individuals already at risk for developing bipolar disorder. Potential implications for prevention and treatment are discussed.

Bipolar disorder (BD) can be a severe and chronic mood disorder that is characterized by alternating periods of depression and mood elevation or irritability. Bipolar disorders (BDs) encompass a spectrum of severity, with milder forms sometimes progressing to more severe BDs (e.g., Akiskal, Djenderedjian, Rosenthal, & Khani, 1977; Alloy, Urosevic et al., in press; Birmaher et al., 2009). The milder cyclothymic disorder and bipolar II disorder may be characterized by episodes of hypomania, an elevated mood state characterized by persistent elevated or irritable mood, but without functional impairment, whereas full-blown bipolar I disorder is characterized by significantly impairing manic episodes involving more pervasive expansive or irritable mood. BDs occur in approximately 4.4% of the population (Merikangas et al., 2007) and are associated with impairment in many areas of functioning, including poorer academic and work achievement, divorce, substance abuse, and suicide (Angst, Stassen, Clayton, & Angst, 2002; Dilsaver, 2009; Goodwin & Jamison, 2007; Grant et al., 2004; Kessler et al., 2006; Nusslock, Alloy, Abramson, Harmon-Jones, & Hogan, 2007). Onset of BD is generally seen between the ages of 15 and 19 (Alloy, Abramson, Walshaw, Keyser, & Gerstein, 2006; Burke, Burke, Regier, & Rae, 1990; Kennedy et al., 2005; Kessler, Rubinow, Holmes, Abelson, & Zhao, 1997), with earlier onset predicting a greater severity of illness and a more unrelenting course (Alloy, Urosevic et al., in press; Perlis et al., 2004). Thus, it is important to identify those at risk for developing BDs, so that interventions may be designed and implemented to prevent onset or improve prognosis.

One recent theory that helps to account for risk for BDs is the Behavioral Approach System (BAS) hypersensitivity model (Alloy & Abramson, 2010; Alloy, Abramson, Urosevic, Bender, & Wagner, 2009; Depue, Krauss, & Spoont, 1987; Depue & Iacono, 1989; Johnson, 2005; Urosevic, Abramson, Harmon-Jones, & Alloy, 2008). The BAS is a motivational system theorized to regulate approach behavior toward goals and rewards (Gray, 1991). The BAS hypersensitivity model proposes that individuals with BDs have an overly sensitive BAS that leads to the development of hypomanic or

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manic symptoms when the BAS is activated, as well as depressive symptoms when the BAS is deactivated (Alloy & Abramson, 2010; Alloy, Abramson, Urosevic et al., 2009; Urosevic, Abramson, Harmon-Jones & Alloy, 2008). Activation of the BAS is theorized to occur in response to events involving goal-striving or attainment, and extreme or prolonged activation may lead to symptoms of mood elevation and potentially to hypomanic or manic episodes (Depue & Iacono, 1989; Fowles, 1993; Urosevic et al., 2008). Deactivation of the BAS is theorized to occur in response to cues of irreconcilable failure to achieve goals, leading to depressive symptoms such as low mood, anhedonia, lack of energy, and hopelessness (Depue et al., 1987; Fowles, 1988, 1993; Urosevic et al., 2008). People without a hypersensitive BAS are expected to report normal, transient responses to stimuli involving achievement or failure (Urosevic et al., 2008). However, individuals with BD who have this BAS vulnerability are overly responsive to these cues, resulting in the approach system becoming excessively activated or deactivated in such situations. For example, individuals with high BAS sensitivity are highly responsive to rewards (e.g., Depue & Collins, 1999; Gray, 1994), which results in increased motor behavior, positive goal-striving emotions, and incentive-reward motivation, characteristics that parallel hypomania and mania. In sum, individuals with BAS hypersensitivity are prone to experiencing mood elevation in response to BAS-activating events, and to experiencing depressed mood in response to BAS-deactivating events, fluctuations in mood that are characteristic of BD.

Recent findings have been supportive of the BAS model of BDs. Alloy, Abramson, Walshaw, Cogswell et al. (2006) found that individuals high in BAS sensitivity were six times more likely to have a lifetime bipolar spectrum disorder diagnosis, and were more prone to experiencing hypomanic symptoms, than were individuals with moderate BAS sensitivity. Similarly, Salavert et al. (2007) found that individuals with bipolar I disorder had higher levels of BAS sensitivity than did healthy control participants, even after controlling for concurrent mood symptoms. BAS hypersensitivity has also been found to prospectively predict a shorter time to onset of hypomanic and manic episodes across an average of 33 months of follow-up (Alloy et al., 2008) and to prospectively predict a greater likelihood of progression to bipolar I disorder among individuals with less severe disorders in the bipolar spectrum (Alloy, Urosevic et al., in press). In another prospective study, individuals with high BAS sensitivity were more likely to experience a first onset of a BD compared to those with moderate BAS sensitivity (Alloy, Bender et al., in press). Altogether, much evidence supports the BAS hypersensitivity model of BD.

Although the BAS hypersensitivity theory has been useful in understanding BD, identifying additional factors that contribute to the development of hypomanic symptoms would add to the ability to predict which individuals may be at risk for developing BD. Hypomania is characteristic of the less severe BDs and distinguishes BDs from unipolar depressive disorders. Furthermore, understanding what factors confer risk to hypomania may help us better understand the roots of manic symptoms, as the milder forms of BDs often progress to the more severe (e.g., Alloy, Urosevic et al., in press). Several cognitive correlates of hypomanic symptoms that are relevant to the BAS have been noted in individuals with BDs and among those at risk for BDs, fitting with the goal-directed nature of hypomania. In particular, several studies have shown that BD tends to be characterized by setting overly ambitious goals and striving for success (Alloy, Abramson, Walshaw et al., 2009; Carver & Johnson, 2009; Gruber & Johnson, 2009; Johnson & Carver, 2006; Johnson & Jones, 2009; Johnson, Ruggero, & Carver, 2005; Meyer & Krumm-Merabet, 2003; for a review, see Johnson, 2005). When individuals with BD experience success, they may also experience positive mood and robust increases in confidence. In combination with high trait goal-striving, this likely contributes to excessive pursuit of goals and may precipitate an escalation into mania (Johnson, 2005). Studies have found that those with bipolar I disorder, even while euthymic, have higher trait levels of goal setting, and place higher values on achieving goals than do healthy controls (Lam, Wright, & Smith, 2004; Meyer, Johnson, & Winters, 2001; Scott, Stanton, Garland, & Ferrier, 2000; Spielberger, Parker, & Becker, 1963), and these findings have been replicated among individuals at risk for BD (Johnson & Carver, 2006).

Individuals with BD also may maintain positive emotions by reflecting on their positive thoughts and moods, an effect often called basking (Segerstrom, Stanton, Alden, & Shortridge, 2003). More specifically, researchers have found that individuals with BDs (Johnson, McKenzie, & McMurrich, 2008) as well as those at risk for developing BDs (Feldman, Joormann, & Johnson, 2008) are significantly more likely to respond to positive affect with additional thoughts about their own positive qualities, previous positive experiences, and positive circumstances (termed rumination on positive affect). Furthermore, trait-like levels of positive emotionality and rumination on positive affect have been shown to be correlated with lifetime mania frequency (Gruber, Eidelman, Johnson, Smith, & Harvey, 2011). Similarly, whereas it has been theorized that most individuals tend to reduce effort after progress toward a goal exceeds expectations (Carver, 2003; Carver & Scheier, 1998), individuals with BDs have been shown to be less likely to "coast," and instead actually increase their efforts toward said goal (Fulford, Johnson, Llabre, & Carver, 2010). It is theorized that by increasing actions directed toward goals, these individuals are able to experience increasing amounts of confidence; hence, their lack of goal coasting may be considered another form of basking because strategies are employed in order to maintain positive emotions. Although the lack of goal coasting in BDs needs further investigation, the authors suggested that increases in efforts toward a goal may underlie the goal-directed activity seen in hypomania (Fulford et al., 2010; see Johnson, 2005 for a review). In sum, these forms of basking are thought to be emotion regulation strategies designed to maintain or enhance positive mood states. Positive overgeneralization may be conceived as a cognitive characteristic that results in positive affect maintenance and also leads to increased goal-striving across domains of life following initial perceptions of success.

In addition to engaging in ambitious goal-striving, individuals at risk for BD, as well as those with a BD history, are also thought to have a tendency to respond to success with excessive confidence, and to generalize from the causes of positive events to broader aspects of life (Eisner, Johnson, & Carver, 2008). This positive overgeneralization (POG) is thought to be the positive complement to the negative overgeneralization that is often seen in depressive disorders (Eisner et al., 2008), and may lead to higher levels of goal pursuit or higher aspirations, as is often seen in BD (Johnson, 2005; Johnson & Carver, 2006; Johnson, Eisner, & Carver, 2009). To date, all published reports of POG have been cross-sectional (Carver, Sinclair, & Johnson, 2010; Eisner et al., 2008; Fulford, Johnson, & Carver, 2008; Johnson & Jones, 2009). Although these studies have shown that POG reliably correlates with hypomanic personality, it cannot be concluded from such designs whether elevations on POG confer risk for the development of hypomanic symptoms prospectively.

One of the best study designs to evaluate whether hypothesized risk factors confer vulnerability for the development of mental disorders is the prospective behavioral high-risk design (Riskind & Alloy, 2006). In this design, because behavioral vulnerabilities are thought to create liabilities to mental health problems, participants are recruited who do not meet criteria for the disorder in question