

Special Issue Article

Hypomanic Personality, Stability of Self-Esteem and Response Styles to Negative Mood

Richard P. Bentall,^{1*} Inez Myin-Germeys,² Angela Smith,³ Rebecca Knowles,³ Steven H. Jones,⁴ Talya Smith³ and Sara J. Tai³

¹Department of Mental Health and Well-being, Institute of Psychology, Health and Society, University of Liverpool, Liverpool, UK

²Department of Psychology and Neuropsychology, University of Maastricht, Maastricht, The Netherlands

³School of Psychological Sciences, University of Manchester, Manchester, UK

⁴The Spectrum Centre for Mental Health Research, School of Health and Medicine, Lancaster University, Lancaster, UK

Objectives: This paper aims to study dysfunctional self-schematic processes, abnormal coping styles, over-responsiveness to reward stimuli (indicative of an over-sensitive behavioural activation system) and stability of self-esteem in relation to subclinical hypomania.

Design: Three cross-sectional studies were conducted on selected students on the basis of their scores on the Hypomanic Personality Scale (HPS) (study 1) and on elevated HPS and Dysfunctional Attitude Scale scores (studies 2 and 3).

Methods: In studies 1 and 2, participants completed questionnaires and kept a self-esteem diary for 6 days. In study 3, the experience sampling method was used to assess momentary self-esteem, emotion and use of different coping styles over a 6-day period.

Results: Study 1 demonstrated that hypomanic traits are associated with high fluctuations in self-esteem. In study 2, high scores on both the HPS and the Dysfunctional Attitude Scale, but not the HPS alone, were associated with bipolar spectrum symptoms. These participants showed more evidence of alcohol and substance abuse, greater self-esteem fluctuation and dysfunctional coping styles (rumination and risk-taking) compared with controls. Changes in self-esteem were related to the use of these strategies.

Conclusions: Vulnerability to bipolar disorder is associated with a combination of depression-related and reward-related processes. Copyright © 2011 John Wiley & Sons, Ltd.

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Bipolar disorder is a severe and debilitating mental health problem that affects approximately 1–1.5% of the population (Bebbington & Ramana, 1995), which involves extreme disruptions of mood, behaviour and cognitive functioning during periods of depression, mania or hypomania. Even during periods of 'remission', substantial subclinical mood symptoms may be experienced (Judd et al., 2002). The consequences of the disorder may be devastating, with negative impacts on occupational functioning, relationships and physical health (Priest & Potter, 1990). It has been estimated that between 25% and 50% of people with bipolar

disorder attempt suicide at least once (Jamison, 2000). Substance abuse is also extremely common (Cassidy, Ahearn, & Carroll, 2001), as are other co-morbid problems such as anxiety disorders (Simon et al., 2003, 2005).

The idea that bipolar symptoms exist on a continuum with normal mood states has a long history (Kretschmer, 1925; Wittman & Sheldon, 1948). Akiskal et al. (2000) estimated that up to 6.4% of the general population experience 'soft symptoms' of the disorder, making the case for a bipolar spectrum (Angst, 2005). Eckblad and Chapman (1986) developed the 48-item Hypomanic Personality Scale (HPS) as a method of identifying people with bipolar spectrum personality characteristics. The authors and subsequent researchers (e.g., Meyer, 2002a; Meyer & Hautzinger, 2003) found that people who scored high on the HPS, compared with those who scored low, had significantly more hypomanic personality characteristics,

*Correspondence to: Richard P. Bentall, Department of Mental, Health and Well-being, Institute of Psychology, Health and Society, University of Liverpool, Waterhouse Building, 1-5 Brownlow Street, Liverpool L69 3GL, UK.
E-mail: Richard.Bentall@liverpool.ac.uk

depression, substance misuse, schizotypal and psychotic-like symptoms, as measured by the adapted Schedule of Affective Disorders and Schizophrenia, Lifetime Version. Kwapił et al. (2000) reported that at 13-year follow-up, the high scorers were more likely to develop bipolar disorder and/or major depressive episodes than the low scorers.

Stability of Self-Esteem and Vulnerability to Bipolar Disorder

Abnormalities of self-representation are evident across the bipolar spectrum. Many of the items on the HPS imply abnormally high self-esteem (e.g., 'There are so many fields I could succeed in that it seems a shame to pick one'; 'I expect that someday I will succeed in several different professions'). Whereas patients often feel worthless during their episodes of depression, they often express grandiose beliefs about themselves during hypomania and mania, and in about half of manic patients, these ideas are of delusional severity (Goodwin & Jamison, 1990).

Ashworth, Blackburn, and McPherson (1982) observed longitudinal changes in perceptions of the self but not perceptions of other people between episodes of depression and mania. Bentall, Kinderman, and Manson (2005) asked manic patients, bipolar depressed patients, bipolar patients in remission and healthy controls to describe themselves, their ideals and also how they believed other people would describe them, finding that bipolar depression was associated with an excessive discrepancy between self-descriptions and ideals (as previously reported in unipolar patients; Scott & O'Hara, 1993; Strauman & Higgins, 1988) but that mania was associated with excessive consistency between these concepts.

These observations raise the possibility that excessive instability of self-esteem may be characteristic of the bipolar spectrum. Knowles et al. (2007) tested this possibility, using a method of assessing self-esteem stability developed by Kernis, Cornell, Sun, Berry, and Harlow (1993). Remitted bipolar, remitted unipolar and healthy participants kept diaries that required them to complete the Rosenberg (1965) 10-item Self-esteem Rating Scale twice daily over a 1-week period. The remitted bipolar patients, but not the remitted unipolar patients, showed greater variation in their self-esteem over time than the healthy controls. Van der Gucht, Morriss, Lancaster, Kinderman, and Bentall (2009), using the same diary method, reported that currently depressed as well as remitted bipolar patients showed extreme fluctuations in self-esteem; in this study, there was also a trend for currently manic patients to show more self-esteem fluctuation than controls, but this difference just failed to reach significance.

Two studies have obtained similar data from high-risk groups. Hofmann and Meyer (2006) reported high fluctuations in positive and negative affects in students who

scored high on the HPS. Jones, Tai, Evershed, Knowles, and Bentall (2006) assessed the stability of self-esteem in children with high genetic risk of bipolar disorder. Consistent with previous studies (Chang, Steiner, & Ketter, 2000; Wals et al., 2001), about half of the index children, aged between 13 and 18 years, showed evidence of marked affective symptoms, although only two of 25 had experienced actual manic episodes. Those who had affective symptoms reported greater fluctuations in self-esteem than either the unaffected index children or the age-matched healthy control children.

The Causes of Instability of Self-Esteem in People Vulnerable to Bipolar Disorder

Two psychological theories of bipolar disorder might be evoked to explain this observed instability in self-esteem. Depue and Iacano (1989) argued that mania arises as a consequence of extreme sensitivity of the behavioural activation system (BAS), which mediates response to reward stimuli. Consistent with this account, Johnson et al. (2000) found that there was an excess of life events involving goal attainment in the month prior to a manic episode. Meyer, Johnson and Carver (1999) also showed that college students at apparent risk of bipolar disorder, as indicated by high scores on the General Behaviour Inventory (Depue et al., 1981), also scored high on the BAS subscales of the Behavioural Inhibition System (BIS)/BAS questionnaire by Carver and White (1994). More recently, it was reported that scores on the BAS scales correlated specifically with manic, but not depressive, symptoms in a large sample of bipolar patients (van der Gucht et al., 2009). On this account, the self-esteem fluctuations observed in bipolar patients might be secondary to fluctuations in mood, with periods of elation being followed by extreme positive beliefs about the self.

A second plausible mechanism was first proposed much earlier by the psychoanalyst Karl Abraham (1911/1927), who argued and suggested that although depressive and manic phases of the disorder may appear opposite to each other, 'both phases are dominated by the same complexes, and . . . it is only the patient's attitudes to these complexes that is different. In the depressive state he allows himself to be weighed down by his complex, and sees no other way out of his misery but death; in the manic state he treats the complex with indifference.'

Versions of this depression-avoidance hypothesis formulated in terms of concepts from modern cognitive psychology have more recently been suggested by Neale (1988) and Thomas and Bentall (2002). In fact, all versions can be broken into two main propositions: (a) vulnerability to mania and hypomania is associated with depressogenic psychological processes; and (b) mania and hypomania arise from attempts to avoid a negative emotional state.

There is strong evidence for the first of these propositions from studies measuring depressogenic cognitive styles in both patients and high-risk populations using a range of measures (see Bentall, Tai and Knowles, 2006, for a review). For example, Scott, Stanton, Garland, and Ferrier (2000) administered the Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978), which measures dysfunctional standards of self-evaluation, to remitted bipolar patients. Currently depressed unipolar patients typically score high on this measure, and high scores in remitted unipolar patients have been shown to predict recurrence of depression (Williams, Healy, Teasdale, White, & Paykel, 1990). In the study of Scott et al. (2000), the remitted bipolar patients scored higher on the scale than the healthy controls. Subsequently, Jones et al. (2005) compared large samples of unipolar and bipolar patients on the DAS and found that both samples scored higher than the healthy controls, even when current depressive symptoms were controlled. In their large sample of patients in all three types of bipolar episode (depression, mania and remission), van der Gucht et al. (2009) found that a negative cognitive style, which was assessed using the Personal Style Inventory (conceptually similar to the DAS) of Robins et al. (1994) and the behavioural inhibition subscale of the BIS/BAS questionnaire, was associated with depressive, but not manic, symptoms. Even after symptoms were controlled statistically, negative cognitive style was still elevated in all phases of the condition.

Lam, Wright, and Smith (2004) reported that DAS items that indicated a need for goal attainment discriminated between remitted unipolar and remitted bipolar patients. Although this finding was interpreted as supporting a behavioural activation account of the condition, in which mania is seen as arising from over-responsiveness to reward stimuli (Depue & Iacano, 1989), inspection of the items (e.g., 'I should always have complete control over my feelings', 'I should be happy all the time' and 'A person should be able to control what happens to him') suggests that they might also be interpreted as indicating a strong need to avoid negative mood. Wright, Lam, and Newton-Davis (2005) more recently showed that scores on the DAS are less responsive to mood induction (i.e., that they are more trait-like) in remitted bipolar patients than in remitted unipolar patients, a finding that is consistent with the hypothesis that a depressogenic cognitive style is an important vulnerability factor for the disorder.

Mechanisms of Depression Avoidance

The second part of the depression-avoidance hypothesis has received less attention from researchers. However, Thomas and Bentall (2002) have argued that the response styles theory of Nolen-Hoeksema (1991) suggests a likely mechanism. Nolen-Hoeksema (1991) has shown that the

ways in which people respond to negative mood states influence the duration and intensity of these states, identifying four response styles. The ruminative style is defined in terms of thoughts or behaviours that focus a person's attention on their depressive symptoms and their negative implications. The distraction style involves diverting attention away from the negative emotions and their possible causes and consequences towards pleasant or neutral activities. Risk-taking (sometimes called dangerous activities) is a type of maladaptive distraction that can lead to negative consequences in terms of health and general functioning. Finally, problem solving is defined in terms of planning to do something to relieve negative emotions or to change situational factors that are provoking the negative mood state. In a recent factor analysis of an expanded version of the Nolen-Hoeksema (1991) self-report measure of these strategies, the Response Style Questionnaire (RSQ), Knowles, Bentall, Tai and Christiansen (2005) found a three-factor solution, with problem solving and distraction loading on a single active-coping factor.

Laboratory studies have found that inducing depression-focused rumination worsens depressed mood, whereas facilitating distraction temporarily improves mood (Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Lyubomirsky & Nolen-Hoeksema, 1995; Morrow & Nolen-Hoeksema, 1990). Field studies using the RSQ have also shown rumination to be a fairly stable trait and that people with a ruminative response style experience longer and more severe depressive episodes than people who have a distracting response style (Just & Alloy, 1997; Lyubomirsky & Nolen-Hoeksema, 1993; Nolen-Hoeksema, 1991, 2000; Nolen-Hoeksema, McBride, & Larson, 1997; Nolen-Hoeksema & Morrow, 1991; Treynor, Gonzalez, & Nolen-Hoeksema, 2003).

Hypothesizing that manic and hypomanic symptoms might arise from excessive use of the distraction and risk-taking response styles, Thomas and Bentall (2002) administered an expanded version of the RSQ to a student sample along with the Beck Depression Inventory and the HPS. Consistent with previous findings, depression was strongly associated with rumination. However, hypomanic traits were associated not only with rumination but also with distraction and risk-taking. Thomas, Knowles, Tai, and Bentall (2007) subsequently administered a version of the RSQ by Knowles et al. (2005) to bipolar patients, finding that currently manic patients reported high levels of risk-taking and active coping, whereas currently depressed and especially remitted bipolar patients reported high levels of rumination. Also recently, Jones et al. (2006) administered the scale to a sample of children with high genetic risk of suffering bipolar disorder, finding that all of the children (whether they were currently experiencing affective symptoms) reported higher levels of rumination than the age-matched controls and that those currently experiencing affective symptoms reported

high levels of risk-taking. Overall, these findings suggest a model in which rumination about initial dysphoria sometimes leads to depression but, at other times, promotes vigorous attempts to avoid negative emotion through focusing on neutral, pleasant or even high-risk activities, ultimately leading to excitement, hypomania or even mania. The fluctuations in self-esteem observed in bipolar patients and those at risk of the disorder, on this account, might be a consequence of these coping strategies, rumination provoking a short-term reduction in self-esteem and distraction and risk-taking leading to temporarily elevated self-esteem.

Purpose of the Present Studies

We conducted three studies with student participants screened for bipolar spectrum characteristics. All three tested our prediction that these characteristics would be associated with highly unstable self-esteem. The depression-avoidance hypothesis suggests that vulnerability to mania and hypomania is associated with depressogenic psychological processes, and in studies 2 and 3, we therefore tested the prediction that individuals who have both hypomanic personality traits, as assessed by the HPS, and psychological vulnerability to depression, as assessed by the DAS, would be especially likely to experience actual bipolar symptoms. Finally, we have hypothesized that abnormal response styles may be responsible for these fluctuations in self-esteem and, more specifically, that ruminative responding will lead to reductions in self-esteem, whereas active coping and risk-taking will lead to increases in self-esteem. These predictions were tested in studies 2 and 3.

STUDY 1

Participants

One hundred and thirty-six Manchester University students participated in the screening phase of the study, completing the Eckblad and Chapman (1986) HPS. Eighty-six participants were female, 50 were male. In the second phase, three groups of participants were invited to participate on the basis of their scores in the upper, lower and mid quintiles of the range of HPS scores. Group 1 (low HPS) displayed low hypomanic traits scoring 0–6 (four male and six female participants; mean age = 20.9 years, standard deviation (SD) = 0.99), group 2 (medium HPS) were in the mid range scoring 16–18 (three male and eight female participants; mean age = 21.0 years, SD = 0.89) and group 3 (high HPS) showed high hypomanic traits, scoring 27–35 (five male and eight female participants; mean age = 21.0 years, SD = 1.29).

Measures

The HPS (Eckblad & Chapman, 1986) is a 48-item self-rated measure of hypomanic traits that has been shown to have good reliability, has been used in previous research by our own research group (e.g., Bentall & Thompson, 1990; Thomas & Bentall, 2002) and by others (Meyer et al., 1999; Meyer & Hautzinger, 2003; Meyer & Keller, 2003) and has been shown to be a long-term predictor of bipolar symptomatology (Kwapil et al., 2000; Meyer & Hautzinger, 2003).

The Beck Depression Inventory is a 21-item questionnaire measure of depressive symptoms that has been extensively used in previous research and has good reliability in both clinical settings (Williams, Barlow, & Agras, 1972) and the normal population (Blumberry, Oliver, & McClure, 1978).

A self-esteem diary constructed according to the guidelines of Greenier et al. (1999) included a modified form of the 10-item Rosenberg (1965) Self-esteem Scale. Participants were asked to complete two Rosenberg (1965) scales each day for a period of 1 week, at approximately 10.00 hours and approximately 22.00 hours. The instructions for each scale stated: 'here is a list of statements about how you feel about yourself RIGHT NOW. Please read each one carefully, and indicate whether you agree or disagree, and to what extent, by circling a number'. The items of each scale and the four-point scoring key (1 = 'strongly agree', 2 = 'agree', 3 = 'disagree' and 4 = 'strongly disagree') were identical to those originally used by Rosenberg (1965). Participants were instructed not to complete the diaries retrospectively, and diary data were excluded from the analyses if more than three self-esteem ratings had been missed. As recommended by Kernis et al. (1993), self-esteem stability was calculated by taking the standard deviation of the scores over the week. Average self-esteem was also calculated.

The second questionnaire for each day was followed by a brief set of life events and attributional questions, in which the participants were asked to write down the most positive event and the most negative event that had happened to them on that day. After each event, participants were asked to rate 'How much effect has this had on you?' (nine-point scale, anchors 1 = 'no effect' and 9 = 'a significant effect'), 'How positive (or negative) was the event?' (five-point scale, anchors 1 = 'not at all positive', 5 = 'very positive') and 'How important was the event for you?' (five-point scale, anchors 0 = 'not important at all' and 4 = 'very important'). Participants also made an internality rating for each event by answering the question 'Do you think the event was more to do with yourself and your own actions, or the actions of others or circumstances?' (five-point scale, anchors 1 = 'completely to do with me' and 5 = 'completely to do with others/circumstances').

RESULTS

Scores on the HPS from the original sample were approximately normally distributed with a mean score of 17.25 ($SD=7.73$). There was no significant difference between the sexes, $t=1.56$, two-tailed $p=0.12$. Group means in the scores on the main dependent measures are shown in Table 1.

One-way analyses of variance revealed no significant group differences for depression, $F(2,31)=1.48$, $p=0.24$, or mean self-esteem, $F(2,31)=0.47$, $p=0.63$. However, there was a highly significant group difference in fluctuations in self-esteem, $F(2,31)=5.36$, $p<0.01$, which was accounted for by differences between the high HPS participants and both the medium HPS participants, Tukey's $p=0.05$, and the low HPS participants, $p<0.02$.

The only group difference in the participants' ratings for daily events, also shown in Table 1, was for the perceived intensity of negative events, $F(2,31)=3.37$, $p<0.05$, which was accounted for by the high scores of the high HPS participants compared with the medium HPS participants, $p<0.05$.

DISCUSSION

The main finding of this study was that individuals with high hypomania scores showed greater fluctuations in self-esteem than individuals with moderate or low scores on the HPS. By contrast, average self-esteem did not discriminate between the groups. The only observed difference in ratings of daily events was for the perceived intensity of negative events.

Table 1. Beck Depression Inventory (BDI), mean self-esteem and self-esteem stability scores for students scoring low, in the mid range or high on the Hypomanic Personality Scale (HPS) in study 1 (standard deviations in parentheses)

	Risk group		
	Low HPS	Medium HPS	High HPS
BDI	5.20 (4.47)	4.41 (2.92)	7.19 (4.61)
Mean Self-esteem	33.5 (0.40)	32.6 (0.37)	32.1 (0.31)
Self-esteem stability	1.88 (1.03)	2.17 (0.86)	3.25 (1.25)
Positive events			
Event effect	5.73 (1.20)	5.68 (1.62)	6.34 (1.06)
Event intensity	3.68 (0.67)	3.78 (0.73)	4.00 (0.59)
Event importance	2.75 (0.31)	2.53 (0.80)	2.69 (0.57)
Causal attribution	2.63 (0.51)	2.87 (0.57)	3.06 (0.59)
Negative events			
Event effect	4.81 (1.12)	4.81 (1.61)	5.88 (1.15)
Event intensity	3.16 (0.54)	2.96 (0.57)	3.56 (0.54)
Event importance	2.11 (0.51)	1.93 (0.85)	2.42 (0.59)
Causal attribution	2.90 (0.55)	2.63 (0.72)	2.87 (0.80)

These findings have a number of limitations. First, the numbers in each group were small, and only about half of those eligible were recruited to the second phase. Second, there was no evidence that self-esteem fluctuations are associated with actual bipolar symptoms. Third, the study has revealed nothing of the mechanisms responsible for the observed fluctuations in self-esteem over time. We have earlier discussed two mechanisms that might be responsible: dysfunctional strategies for avoiding negative mood, specifically the excessive use of distraction and risk-taking (Thomas & Bentall, 2002) or excessive sensitivity to reinforcing events (Depue & Iacano, 1989; Johnson et al., 2000). The absence of abnormal ratings for positive events by the high HPS scorers might be thought inconsistent with the latter account; however, it is possible that participants did not encounter events during the week that were sufficiently reinforcing to be registered as abnormal ratings on the daily diary.

These issues are all addressed in study 2, which also addressed a further aspect of the depression-avoidance account. According to this model, psychological factors that confer vulnerability to depression should also confer vulnerability to bipolar disorder, and we have seen that, consistent with this account, remitted bipolar patients show depression-like cognitive styles as assessed by the DAS (Scott et al., 2000; Wright et al., 2005; van der Gucht et al., 2009). It follows that according to the depression-avoidance account, individuals who score high on both the HPS and the DAS should be more vulnerable to bipolar symptoms than individuals who score high on the HPS alone.

STUDY 2

Participants

In an initial screening phase, 528 first-year undergraduate students at the University of Manchester were recruited from introductory lectures in a range of disciplines, including psychology, engineering sciences and life sciences. Approximately 12 months later, participants were approached for further study on the basis of their eligibility for membership in the three risk groups defined in terms of the upper and lower quartiles of the distributions of HPS and DAS scores: (a) low risk ($HPS<16$, $DAS<120$), $n=88$; (b) medium risk ($HPS>21$, $DAS<120$), $n=37$; and (c) high risk ($HPS>21$, $DAS>142$), $n=55$. Of those identified, 71 agreed to take part in the study. Twenty-five (22 female and 3 male participants) fell into the low-risk group, 20 (14 female and 6 male participants) in the intermediate-risk group and 26 (19 female and 7 male participants) in the high-risk group. A further 12 eligible students explicitly refused, five stating that they were no

longer attending the University because of mental health problems (upon unblinding the data, it emerged that all of these were in the high-risk group).

Measures

During the screening phase, participants completed the HPS (Eckblad & Chapman, 1986) and also the following additional measures.

The DAS (Weissman & Beck, 1978) is a 40-item measure of dysfunctional attitudes to self-evaluation. The reliability of the scale is good ($\alpha > 0.80$).

The RSQ developed by Knowles et al. (2005) is an expanded version of the Nolen-Hoeksema (1991) RSQ and has 48 items. A factor analysis of the scale based on these data was reported by Knowles et al. This analysis yielded three subscales: rumination (25 items, $\alpha = 0.91$), active coping (15 items combining distraction and problem-solving items from the original scale, $\alpha = 0.81$) and risk-taking (8 items, $\alpha = 0.68$).

At follow-up, conducted by a researcher (R. K.) who was blind to the group assignment, the participants were interviewed using five modules of the research version of the Structured Clinical Interview for DSM-IV (SCID) (First, Spitzer, Gibbon, & Williams, 1995): (a) mood disorders; (b) psychotic disorders; (c) alcohol and substance abuse screen; (d) anxiety disorders; and (e) axis II personality disorders (screening questions only). In addition to ratings of 'present' and 'absent' for each symptom, the research version allows the interviewer to make a 'subthreshold' rating that enables the diagnosis of a range of subclinical manifestations of symptomatology known as 'soft bipolar symptoms or bipolar spectrum disorders (BSDs). Included in this spectrum are: (a) bipolar disorder I and II; (b) single, recurrent and brief hypomania; (c) cyclothymia; (d) dysthymia; (e) single, recurrent and brief major depression; (f) minor or brief depression with hypomania; and (g) substance-induced mood episodes (Akiskal et al., 2000). R. K. received training in the SCID prior to administration. Tape recordings of 10 interviews were independently rated by a second experienced SCID interviewer; there was complete agreement with the exception of a single item for one patient, which was attributable to an error.

During the following week, participants were asked to keep a daily self-esteem diary modified from that used in study 1. The main change was the addition of the Positive and Negative Affect Scale (Watson, Clark, & Tellegen, 1988), a brief measure of current mood state, which was included to assess affect in daily life. Twenty adjectives are listed, 10 describing positive emotional states (e.g., excited, proud and inspired) and 10 describing negative emotional states (e.g., distressed, jittery and irritable). Participants noted the extent to which they felt each

emotion in the present moment using a numerical scale from 1 to 5. Both subscales have been shown to have excellent internal reliability (positive affect = 0.86–0.90; negative affect = 0.84–0.87), and the whole measure shows good test–retest reliability (Watson et al., 1988).

After returning the diaries, participants were asked to complete the following scale:

The *BIS/BAS inventory* (Carver & White, 1994) measures the extent of behavioural inhibition and activation typical of an individual on four distinct subscales. There is one BIS subscale (seven items measuring apprehensive anticipation) and three BAS subscales: drive (motivation to achieve goals, four items), fun-seeking (four items) and reward responsiveness (the extent to which achieving a goal provides positive reinforcement). The scale has excellent psychometric properties (Jorm, Christensen, Henderson, Jacomb, Korten, & Rodgers, 1999; Ross, Millis, Bonebright, Bailey, 2002).

RESULTS

Structured Clinical Interview for DSM-IV

Table 2 shows the relationship between risk group and lifetime incidence of DSM-IV bipolar spectrum diagnoses. Actual diagnoses of bipolar disorder (five participants) were recorded only for the high-risk group, which also included individuals meeting other broad BSD criteria (two recurrent major depressive episode (MDE), seven cyclothymic disorder, four brief hypomania + mild/brief depression and three brief hypomania + MDE). The incidence of broad BSD was higher in the high-risk and medium-risk groups (one single MDE, two single hypomanic episode, four recurrent brief hypomania, two hyperthymic temperament + MDE and five hyperthymic temperament) compared with the controls (one single

Table 2. Lifetime presence of bipolar spectrum disorder (BSD), consumption of psychotropic medication and substance misuse across the risk groups in study 2 (standard deviations in parentheses)

	Risk group		
	Low HPS, low DAS ($n = 25$)	High HPS, low DAS ($n = 20$)	High HPS, high DAS ($n = 26$)
BSD	5 (20.0%)	14 (70.0%)	21 (81.0%)
Narrow BSD	1 (4.0%)	6 (30.0%)	16 (61.5%)
Psychotropic medication	1 (4.0%)	2 (10.0%)	5 (19.2%)
Substance misuse	3 (12.0%)	4 (20.0%)	13 (50.0%)

DAS = Dysfunctional Attitude Scale. HPS = Hypomanic Personality Scale.

MDE, one recurrent MDE, one dysthymic disorder, one recurrent brief hypomania and one hyperthymic temperament), $\chi^2=21.247$, $p<0.0001$. If the definition of BSD was narrowed to those disorders that included hypomanic episodes, this difference remained, $\chi^2=11.70$, $p<0.005$. The high-risk participants also exhibited a significantly elevated rate of alcohol and drug abuse relative to the controls, $F(2,68)=4.661$, $p<0.05$; Tukey's $p<0.01$. Ten of the high-risk participants, one of the medium-risk participants and three of the controls had sought help from a therapist (counsellor, psychologist or psychiatrist) for their symptoms, a difference that was significant, $\chi^2=9.45$, $p<0.01$.

When questionnaire scores were used in binary logistic regression to predict lifetime broad BSD status, both the DAS, $p<0.02$, and the HPS, $p<0.05$, were retained as independent predictors, $\chi^2=20.84$, $p<0.001$. When narrowly defined lifetime BSD was the dependent variable, only HPS scores, $p<0.02$, were retained, $\chi^2=15.21$, $p<0.001$.

Response Style Questionnaire at Screening

A significant difference between the groups on RSQ rumination, $F(2,66)=18.61$, $p<0.001$, was accounted for by the high scores of the high-risk group compared with both the low-risk and medium-risk groups, Tukey's $p<0.001$ for each comparison. The group difference for RSQ risk-taking was also significant, $F(2,678)=9.55$, $p<0.001$, again accounted for the high scores of the high-risk group compared with the others, $p<0.001$, and the low scores of the low-risk group in comparison with the medium-risk group, $p<0.05$. No significant differences were observed for active coping.

Behavioural Inhibition System/Behavioural Activation System

The high-risk students scored higher on the BIS subscale than both the controls and the medium-risk group, $F(2,68)=6.93$, $p<0.005$, Tukey's $p<0.005$ and $p<0.01$, respectively. The low-risk group scored lower than both the intermediate-risk, $p<0.05$, and high-risk students, $p<0.05$, on the BAS drive subscale, $F(2,68)=4.30$, $p<0.05$. Finally, the medium-risk students differed from the controls, $p<0.005$, and high-risk students, $p<0.05$, by having higher scores on the fun-seeking subscale, $F(2,68)=6.47$, $p<0.005$.

Mood, Self-Esteem and Event Appraisal

Diary scores are shown in Table 3. The high-risk students displayed a higher mean level of negative affect than both

Table 3. Diary scores for participants by risk group in study 2 (standard deviations shown in parentheses)

	Risk group		
	Low HPS, low DAS	High HPS, low DAS	High HPS, high DAS
Affect and self-esteem			
Positive affect	23.57 (5.5)	23.95 (5.76)	23.45 (6.54)
Negative affect	12.16 (2.38)	12.57 (3.13)	15.82 (4.28)
Self-esteem	33.07 (2.09)	33.90 (2.44)	30.03 (3.45)
Positive affect stability	5.50 (1.81)	5.76 (2.44)	6.53 (2.31)
Negative affect stability	2.38 (1.97)	3.13 (2.16)	4.28 (2.35)
Self-esteem stability	2.08 (1.23)	2.44 (1.56)	3.55 (1.62)
Positive events			
Effect	5.85 (1.19)	6.09 (0.93)	6.37 (1.33)
Positivity	6.90 (0.93)	7.11 (0.74)	7.10 (1.38)
Importance	6.06 (1.81)	6.13 (1.06)	6.28 (1.40)
Internality	5.89 (0.97)	5.17 (1.28)	5.22 (1.02)
Negative events			
Effect	4.79 (1.24)	5.56 (1.43)	5.78 (1.65)
Negativity	4.94 (1.61)	5.84 (1.37)	5.99 (1.27)
Importance	4.56 (1.43)	5.00 (1.24)	5.36 (1.40)
Internality	5.43 (1.42)	5.26 (1.75)	5.05 (1.78)

DAS = Dysfunctional Attitude Scale. HPS = Hypomanic Personality Scale.

the controls, $F(2,65)=9.56$, $p<0.0001$; Tukey's $p<0.0001$, and the medium-risk students, $p<0.005$, and also reported more variability in negative affect (calculated as the standard deviation of the negative affect scores) than the controls, $F(2,65)=4.78$, $p<0.01$, $p<0.01$. No differences were noted for positive affect. There was a group difference in mean self-esteem, $F(2,65)=4.30$, $p<0.05$, accounted for a marginal difference between the high-risk group and the low-risk group, $p=0.06$, and a significant difference between the high-risk group and the medium-risk group, $p<0.05$. Self-esteem was also found to fluctuate more widely in the high-risk group than in the other two groups, $F(2,65)=6.48$, $p<0.005$, p at least <0.05 for each comparison.

Positive events were rated as being due to more internal factors by the control participants than by the high-risk or medium-risk participants, $F(2,65)=3.20$, $p<0.05$, although none of the *post hoc* differences were significant. Also, there was a trend for negative events to be rated as having more impact for the high-risk participants compared with the controls, $F(2,64)=2.95$, $p=0.06$. Negative events were also rated as being more negative, $F(2,64)=3.72$, $p<0.05$, by the high-risk participants compared with the controls, $p<0.05$. The medium-risk students occupied an intermediate position on both scores.

DISCUSSION

As expected, students scoring high on both the HPS and the DAS were particularly likely to experience actual bipolar symptoms. They also showed other indications of bipolar traits, specifically high levels of risk-taking, rumination and negative affect, and also greater fluctuations in negative affect and self-esteem compared with the other participants. However, it is notable that the medium-risk students, scoring high on the HPS but not the DAS, reported higher levels of fun-seeking compared with the high-risk group.

A limitation of this study is that we were unable to examine whether, as hypothesized from the depression-avoidance account, fluctuations in self-esteem were driven by rumination and risk-taking activities as we had hypothesized. To examine this question, we used experience sampling, a more sophisticated diary methodology.

STUDY 3

Participants

One thousand two hundred and forty-nine Manchester University students from various disciplines were recruited by mass email. These students completed, via the Internet, both the HPS (Eckblad & Chapman, 1986) and the DAS (Weissman & Beck, 1978). In light of the findings from study 2, two groups were selected, a high-risk group with high scores on both scales and a low-risk group with low scores on both scales. Because we had recruited a large sample at screening, we were able to use more exacting cut-offs on the HPS and the DAS to define our high-risk and low-risk groups than in study 2.

One hundred and sixteen students had scores that fell between the boundaries of risk group membership, defined in the case of low-risk participants as $HPS < 11$ and $DAS < 115$ ($n = 60$) and in the case of high-risk participants as $HPS > 27$ and $DAS > 154$ ($n = 56$). Of these students, 47 agreed to take part in the experience sampling method (ESM) study within the time allowed for data collection. Thirty were female participants (74.2% of the sample), and the mean age of the sample was 22.16 years ($SD = 4.78$). Twenty participants fell in the low-risk group (15 female and 5 male participants) with 27 in the high-risk group (15 females and 12 male participants).

Measures

Participants completed the BIS/BAS inventory (Carver & White, 1994), the modified version of the RSQ (Knowles et al., 2005) and the ESM diary.

The ESM is a within-day momentary self-assessment technique. Previous applications of ESM have demonstrated

the feasibility, validity and reliability of the method in general population samples and in samples of psychiatric patients (Myin-Germeys, Delespaul, & van Os, 2003; Myin-Germeys, Delespaul, & deVries, 2000; Myin-Germeys, van Os, Schwartz, Stone, & Delespaul, 2001; van Eck, Berkhof, Nicolson, & Sulin, 1996). The participants were briefed thoroughly on the ESM procedure before receiving a preprogrammed digital wristwatch and a set of six ESM booklets containing the diary forms, one booklet for each day. On 10 occasions per day, for six consecutive days, they were cued at random, unpredictable times between 07.30 hours and 22.30 hours by a bleep from their watch. Upon hearing the signal, participants were asked to stop what they were doing and to immediately fill in an assessment sheet in the diary booklet. To ensure that participants complied with this instruction, the time they noted that they had completed the booklet was compared with the actual time that the wristwatch was programmed to bleep. In accordance with standard procedures, responses that were completed more than 5 min before, or 15 min after this signal were excluded from the subsequent analysis, and participants who completed less than 20 valid reports were excluded from the entire analysis. Additionally, on each morning of the study, participants were asked to complete a sleep inventory, and every evening, they completed a daily self-esteem assessment just before retiring (results not reported here). Upon completion of the study, participants were thoroughly debriefed and offered £20 to compensate them for their time and expenses.

The ESM diary used a number of subscales to gather emotional and contextual information. Mood states were assessed by nine ESM items and rated on seven-point Likert scales. Factor analysis on the raw within-subject scores (principal components, with varimax rotation) confirmed that there were two separate factors with eigenvalues greater than 1 that together accounted for 66% of the total variance. The positive affect scale consisted of four mood adjectives (cheerful, excited, relaxed and satisfied: $\alpha = 0.77$), and the negative affect scale consisted of five mood adjectives (lonely, anxious, sad, irritated and guilty: $\alpha = 0.88$).

Self-esteem was assessed using four items, rated on seven-point Likert scales: 'I like myself', 'I'm ashamed of myself', 'I'm a failure' and 'I'm a good person' (items 2 and 3 were reverse-scored in the final analysis: $\alpha = 0.88$). Factor analysis on the raw within-subject scores confirmed that there was just one factor with an eigenvalue greater than 1, accounting for 74% of the variance.

Contextual information was gathered for events: participants reported the most important thing that had happened to them between the present and previous reports and rated how pleasant this event was on a seven-point bipolar scale from -3 ('very unpleasant') to 3 ('very

pleasant'). These were reverse-scored in the final analysis, so that high scores indicated unpleasant experiences. Participants reported the activity they were currently engaged in and rated this activity on three items ('I'd prefer to be doing something else', 'This activity is a challenge' and 'I'm skilled at it', $\alpha = 0.55$; item 3 reverse-scored) also measured on seven-point Likert scales. These were summed in the final analysis so that high scores reflected greater activity-related stress. Participants were asked to evaluate social context using two items ('I like this company' and 'I prefer to be alone', $\alpha = 0.70$; item 1 reverse-scored) rated on seven-point Likert scales. In the final analysis, the items were summed so that high scores reflected greater social stress. These stress questions have been used successfully in previous ESM studies with clinical groups (e.g., Collip et al., 2011).

Coping strategies were examined by asking participants to report whether they had engaged in rumination (two items, averaged to obtain a mean rumination score: $\alpha = 0.84$), distraction (two items, averaged to obtain a mean distraction score: $\alpha = 0.87$), problem solving (two items, averaged to obtain a mean problem-solving score: $\alpha = 0.77$) or risk-taking (two items, averaged to obtain a mean risk-taking score: $\alpha = 0.89$) between the current and previous bleeps.

The ESM data have a hierarchical structure with multiple observations nested within participants. Initial pairwise comparisons were performed on participant averages of self-esteem, negative affect and positive affect. Comparisons were also made for participant averages of social and activity-related stress and for the reported use of rumination, problem solving, distraction and risk-taking coping strategies using *t*-tests. To estimate the effect of mood, context variables and coping strategies on self-esteem, multilinear (maximum likelihood estimation) regression models were employed. These models are optimal for analyzing ESM data because they take into account that residuals for the same participant may be correlated, as observations from one participant will be more similar than observations from other participants; additionally, observations that are closer in time will be more similar than observations that are further apart (Malkoff-Schwartz et al., 1998). The statistics gathered may be interpreted in the same way as linear regression, the β statistic representing the fixed regression coefficient.

The multilevel analyses were conducted with the standardized self-esteem scale (self-esteem/SD of self-esteem over the whole group) as the dependent variable. The effects of the independent variables (group, stress and coping strategies) were expressed as SD units of the dependent variable. Interactions between the independent variables (stress \times group; coping style \times group) were examined using the low-risk group as the reference category.

RESULTS

Questionnaire Measures

The high-risk group had significantly elevated scores on each of the BIS, $t = 2.22$, $p < 0.05$, drive, $t = 4.68$, $p < 0.0005$, fun-seeking, $t = 4.35$, $p < 0.005$, and reward responsiveness subscales, $t = 2.72$, $p < 0.01$, of the BIS/BAS scales. On the RSQ, the high-risk group scored significantly higher on the rumination, $t = 5.59$, $p < 0.0001$, and risk-taking subscales, $t = 4.05$, $p < 0.001$, although no significant differences emerged for active coping.

Experience Sampling Method Data on Overall Self-Esteem and Mood Intensity

Three of the high-risk participants and two low-risk participants completed less than 20 valid reports and were therefore excluded from the analysis of the ESM data. The final study sample therefore comprised 18 low-risk and 24 high-risk participants.

Mean scores for self-esteem, negative affect and positive affect were calculated for each participant, and the group means for these are shown in Table 4. The high-risk group reported lower self-esteem, $t = 3.23$, $p < 0.005$, and greater negative affect, $t = 2.75$, $p < 0.01$, than the low-risk group. No significant differences were observed for positive affect.

Table 4. Experience sampling method data from study 3 (standard deviations (SDs) in parentheses), showing mean levels of affect and self-esteem, as well as two measures of fluctuation of affect and self-esteem (within-subject SDs for scores and averaged absolute differences between consecutive moments) over the 6-day sampling period

	Risk group	
	Low HPS, low DAS	High HPS, high DAS
Mean level		
Self-esteem	5.93 (0.74)	4.87 (1.25)
Negative affect	1.80 (0.86)	2.75 (1.25)
Positive affect	3.68 (0.70)	3.68 (0.64)
Fluctuations (SD)		
Self-esteem	0.29 (0.21)	0.65 (31)
Negative affect	0.50 (0.29)	0.82 (0.35)
Positive affect	0.88 (0.20)	1.03 (0.36)
Fluctuations (moment to moment)		
Self-esteem	0.22 (0.19)	0.50 (0.30)
Negative affect	0.38 (0.25)	0.65 (0.29)
Positive affect	0.70 (0.19)	0.85 (0.33)

DAS = Dysfunctional Attitude Scale. HPS = Hypomanic Personality Scale.

Fluctuations in Self-Esteem and Mood

From the ESM data, we calculated two separate measures of fluctuation. Within-participant standard deviations, as used by Kernis et al. (1993) and in studies 1 and 2, are shown in Table 4. On this measure, the high-risk group had significantly greater fluctuations in self-esteem, $t = 4.22$, $p < 0.0001$, and negative affect, $t = 3.14$, $p < 0.005$, but there was no difference for fluctuations in positive affect, $t = 1.50$, $p = 0.14$. Table 4 also shows the moment-to-moment variance scores, a more sensitive measure derived by averaging the absolute values of the changes from one watch beep to the next. On this measure, significant differences were observed for fluctuations in self-esteem, $t = 3.44$, $p < 0.005$, and fluctuations in negative affect, $t = 3.21$, $p < 0.005$, and the effect for stability of positive affect just failed to reach significance, $t = 1.82$, $p = 0.08$.

Stress-Related and Response Style Variables

Scores for the stress-related variables and for response styles recorded in the ESM diaries are shown in Table 5. There were no significant group differences in mean levels of pleasantness of the current activity or in activity-related stress; however, the high-risk group reported significantly higher mean levels of social stress (scored only when they reported that another person was present) than the low-risk group, $t = 4.10$, $p < 0.0005$. The high-risk group also reported greater use of distraction, $t = 3.69$, $p < 0.001$, and risk-taking, $t = 2.38$, $p < 0.02$, response styles than the low-risk group. However, no significant between-group differences were found for rumination or problem-solving coping strategies.

Initial scores on the RSQ rumination scale correlated with rumination as recorded in the ESM diary, $r^2 = 0.55$, $p < 0.001$, and a similar relationship was found between the

two measures of risk-taking, $r^2 = 0.47$, $p < 0.002$. However, the expected associations between the RSQ active-coping measure and the ESM distraction, $r^2 = -0.26$, $p = 0.09$, and problem-solving scores, $r^2 = -0.05$, $p = 0.73$, were not significant.

Association between Self-Esteem, Environmental Stress and Response Styles

Multilevel linear regression analyses confirmed that all of the environmental stress measures were significantly associated with self-esteem, with greater stress associated with reduced self-esteem (activity: $\beta = -0.05$ (standard error (SE) = 0.01), $p < 0.0005$; pleasantness: $\beta = -0.05$ (SE = 0.01), $p < 0.0005$; social: $\beta = -0.12$ (SE = 0.01), $p < 0.0005$). Significant interactions were found between the high-risk group and all three stress measures, indicating that the high-risk participants showed greater fluctuations in self-esteem in response to environmental stress compared with the low-risk group (Table 6).

Similar analyses, shown in Table 7, confirmed that rumination was significantly associated with low self-esteem (rumination: $\beta = -0.15$ (SE = 0.01), $p < 0.0005$). Significant interactions were found between the high-risk group and rumination, with self-esteem in the high-risk group being more adversely affected when using this coping strategy. Distraction was not found to be a significant predictor of self-esteem in the low-risk group, but each unit change in distraction resulted in a 0.07 SD increase in self-esteem in the high-risk group. Finally, each unit change in risk-taking resulted in a 0.10 SD decrease in self-esteem in the low-risk group, but a similar effect was not evident in the high-risk group.

DISCUSSION

Substantial research now suggests that a sizeable minority of the healthy population experiences subclinical bipolar symptoms (Akiskal et al., 2000). Previous studies attempting to identify individuals at high risk of the disorder from amongst student samples have typically employed the HPS (Meyer, 2002a, 2002b; Meyer & Hautzinger, 2001, 2003; Meyer & Keller, 2003) or the GBI (Meyer et al., 1999) (which correlates highly with the HPS).

Vulnerability to Bipolar Symptoms

We hypothesized that a combination of HPS and DAS scores would identify a group at particular high risk: (a) because elevated DAS scores have been reported in remitted bipolar patients (Lam et al., 2004; Scott et al., 2000; Wright et al., 2005; van der Gucht et al., 2009); and (b) because there is substantial evidence of an association

Table 5. Means of experience sampling method stress ratings and response styles in study 3 (standard deviations in parentheses)

	Risk group	
	Low HPS, low DAS	High HPS, high DAS
Stress ratings		
Activity-related	3.17 (0.53)	3.13 (0.57)
Social	1.85 (0.60)	2.86 (0.92)
Pleasantness of event	1.18 (0.62)	1.11 (0.71)
Response styles		
Distraction	0.28 (0.32)	0.82 (0.11)
Risk-taking	0.08 (0.08)	0.37 (0.51)
Rumination	0.41 (0.37)	0.67 (0.10)
Problem solving	0.62 (0.47)	0.78 (0.51)

DAS = Dysfunctional Attitude Scale. HPS = Hypomanic Personality Scale.

Table 6. Multilevel model estimates of the effects of stress on self-esteem in study 3 (standard error (SE) in parentheses)

Stress measure	Interaction effect	<i>p</i>	Effect on low-risk group	<i>p</i>	Effect on high-risk group	<i>p</i>
Pleasantness of current activity	−0.05 (0.01)	<0.0005	−0.02 (0.01)	<0.0005	−0.07 (0.01)	<0.0005
Stress of current activity	−0.03 (0.01)	<0.005	−0.03 (0.01)	<0.0005	−0.06 (0.01)	<0.0005
Social stress	−0.06 (0.02)	<0.05	−0.09 (0.02)	<0.0005	−0.14 (0.02)	<0.0005

One thousand seven hundred thirty-seven observations for activity-related stress, 843 observations for social stress and 1625 observations for event-related stress. The smaller *n* for social stress reflects the fact that this measure was only scored when the participant was in the presence of others. Estimated effects in the model: $SE = \beta_0 + \beta_1.STRESS + \beta_2.GROUP + \beta_3.STRESS*GROUP$.

Table 7. Multilevel model estimates of the effects of coping strategies on self-esteem in study 3 (standard error (SE) in parentheses)

Response style	Interaction effect	<i>p</i>	Effect on low-risk group	<i>p</i>	Effect on high-risk group	<i>p</i>
Rumination	−0.07 (0.03)	<0.01	−0.10 (0.01)	<0.0005	−0.17 (0.02)	<0.0005
Problem solving	0.001 (0.03)	NS	−0.03 (0.01)	<0.01	−0.03 (0.02)	NS
Distraction	0.07 (0.03)	<0.02	0.03 (0.02)	NS	0.07 (0.02)	0.0005
Risk-taking	0.12 (0.05)	<0.02	−0.10 (0.03)	<0.0005	0.02 (0.03)	NS

One thousand seven hundred forty-one observations for rumination, 1738 observations for problem solving, 1740 observations for distraction and 1740 observations for risk-taking. Estimated effects in the model: $SE = \beta_0 + \beta_1.COPING\ STRATEGY + \beta_2.GROUP + \beta_3.COPING\ STRATEGY*GROUP$.

between DAS scores and vulnerability to depressive symptoms (e.g., Williams et al., 1990), which, of course, is an important feature of bipolar disorder (Goodwin & Jamison, 1990) even in the manic phase (Cassidy, Forest, Murry, & Carroll, 1998). Consistent with this prediction, in Study 2 we found higher levels of actual bipolar symptoms, blind-assessed using a standard clinical interview, in students scoring high on both scales than on the HPS alone. Our hypothesis that a combination of high DAS and high HPS scores identifies a particularly vulnerable group was further corroborated by the results from our self-esteem, BIS/BAS and response styles data.

Self-Esteem and Mood Fluctuation

High levels of self-esteem fluctuation have previously been observed in remitted bipolar patients (Knowles et al., 2007), in bipolar patients who are currently depressed (van der Gucht et al., 2009) and in the children of patients with bipolar disorder (Jones et al., 2006). Hofmann and Meyer (2006) have also reported high fluctuations in positive and negative affects in students scoring high on the HPS. In all three of the present studies, which employed two different methodologies (diaries as used by Kernis et al. (1993) and experience sampling as developed by Myin-Germeys et al. (2003)), high fluctuations in self-esteem and negative affect, but not positive affect, were observed in the high-risk groups. In study 2, in which students scoring high on the HPS alone were compared with students scoring high on both the HPS and the DAS, these fluctuations were most evident in

the group scoring high on both scales. It seems reasonable to conclude that vulnerability to bipolar symptoms is robustly associated with unstable self-esteem. The more extreme differences in self-esteem and related measures observed in different phases of the disorder (Ashworth et al., 1982; Bentall et al., 2005) suggest that these changing perceptions of the self are a core feature of the condition.

Mechanisms Responsible for Self-Esteem Fluctuation

At the outset, we considered two possible psychological mechanisms that might be responsible for the observed changes in self-esteem. According to the behavioural activation theory account (Depue & Iacano, 1989), the primary driver of symptom changes during the course of bipolar disorder is over-responsiveness to reward stimuli. The most important evidence for this account has emerged from a study showing that manic episodes are often preceded by goal attainment life events (Johnson et al., 2000), but it has also been reported that students vulnerable to bipolar disorder show high scores on the BAS scales of the Carver and White (1994) BIS/BAS self-report scale (Meyer et al., 1999).

In study 2, the high-risk and medium-risk students both scored higher than the low-risk students on the BAS drive subscale, and the medium-risk students also scored higher than the low-risk students on the fun-seeking subscale; the absence of this latter affect in the high-risk group may possibly reflect the high vulnerability to depressive symptoms in this group, as indicated by their SCID data and their elevated scores on the BIS subscale. In study 3,

which employed slightly different cut-offs than study 2, the high-risk students scored higher than the controls on all BIS/BAS measures. Overall, these observations concur with previous findings, suggesting a relationship between BAS regulation and bipolar traits. However, the diary and ESM measures employed in the present studies might be thought to provide more ecologically valid measures of affective functioning than retrospective questionnaires. In contrast to the findings obtained by Hofmann and Meyer (2006), there was no evidence of elevated positive affect or extreme fluctuations in positive affect in the high-risk groups, as might be expected from the BAS model. One possible interpretation of this finding is that excessive responsiveness to actual rewarding stimuli only occurs during clinical mania or its prodrome. Consistent with this, van der Gucht et al. (2009) found elevated BAS scores only in those bipolar patients who were actually experiencing manic symptoms; in contrast, negative cognitive style was elevated in depressed, manic and remitted patients.

Abnormal response styles to negative mood have previously been observed in both students scoring high on the HPS (Thomas & Bentall, 2002) and bipolar patients (Thomas et al., 2007). In studies 2 and 3, we also observed high scores for rumination and risk-taking in our high-risk groups, but not for active coping, as we had previously found. However, the RSQ is a retrospective measure that suffers from the same limitations of the BIS/BAS scale. In this context, it is notable that in study 3, RSQ scores for rumination and risk-taking correlated with actual rumination and risk-taking behaviours recorded by ESM, whereas RSQ scores for active coping were not associated with actual behaviour. Nonetheless, higher levels of distraction (an active-coping strategy) were observed in the high-risk students, along with higher levels of risk-taking. Multilevel analyses of these data supported relationships between response styles and risk-taking that were broadly predicted, with some evidence of group differences in these effects. Thus, rumination was associated with decreases in self-esteem in both groups, with the high-risk group being more affected. Distraction was associated with increases in self-esteem in the high-risk group only. Finally, risk-taking caused a decrease in self-esteem in the low-risk group but not in the high-risk group. Hence, although the present and previous researches (Thomas & Bentall, 2002; Thomas et al., 2007) have reported much greater use of the risk-taking coping style in people vulnerable to bipolar disorder and actual patients, the current findings suggest that it is an ineffective self-regulation strategy for this group. Overall, despite some minor inconsistencies between the three studies, our findings support our hypothesis of a complex dynamic relationship between response styles to depressed mood and self-esteem changes in bipolar spectrum conditions.

Limitations

The internal replications reported in this paper, together with consistencies with previous research on high-risk groups and actual bipolar patients, suggest that our findings are robust. Nonetheless, a number of limitations of the present research should be acknowledged. In study 2, we did not include a group scoring high on the DAS but not on the HPS. Although this might be thought of as desirable for the sake of completeness, it was not necessary in order to test our hypothesis that a combination of high DAS and high HPS scores would identify a group at particularly high risk of bipolar symptoms. There are no agreed cut-offs for the HPS, which tends to be approximately normally distributed, or indeed for DAS scores when used for the present purposes, and for pragmatic reasons (mainly to ensure sufficient samples), we employed different cut-offs to select high-risk participants in the three studies. In the case of normally distributed dimensional traits, the choice of cut-offs must inevitably be arbitrary, and the consistency of findings across the three studies indicates that this source of variation between them has not undermined our findings. Finally, it is possible that more robust evidence in favour of the behavioural activation account would be obtained by behavioural or physiological measures, and we have recently begun to explore fMRI and evoked potential measures for this purpose.

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