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Psychological vulnerability in bipolar disorder

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Psychological vulnerability in bipolar disorder

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Thesis submitted to the School of Psychology, Bangor University, in fulfilment of the requirements for the degree of Doctor of Philosophy

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Summary

Background: The current understanding of bipolar disorder attributes a causal role to abnormal psychological processes in its development. However, little research has so far adequately tested this assumption. Two approaches might be employed to do so: (i) longitudinal investigations of psychological processes in patients (with some limitations); (ii) examinations of such processes in high-risk individuals.

Methods: Three cohorts of participants were examined: two different cohorts of adults with bipolar disorder (using secondary data, Chapter 2 and 3), and adolescent offspring of parents with bipolar disorder, in comparison to offspring of control parents (Chapters 4, 5, 6). In adults with bipolar disorder, the associations between self-referential processes and symptoms of depression and mania (Chapter 2), and the inter-relationship between self-esteem, mood and response styles (Chapter 3) were examined longitudinally. In adolescent children, longitudinal relationship between mood, self-esteem and coping style (Chapter 4), abnormal psychological processes (Chapter 5), and explicit and implicit self-esteem and their discrepancies (Chapter 6), were investigated.

Results: In adults with bipolar disorder, symptoms of depression and mania were associated with distinct psychological processes, with self-esteem being the most robust predictor (Chapter 2). However, mood, rather than self-esteem, instigated, and was affected by, an engagement in coping strategies (Chapter 3). In adolescents, index adolescents showed compromised capacity to employ adaptive coping, and employed risk-taking in response to low self-esteem (Chapter 4). Further, no differences in abnormal psychological processes were found, unless children have already met diagnostic criteria for psychiatric disorders (Chapter 5). Despite no differences in explicit and implicit self-esteem, index offspring reported marginally higher level of self-esteem discrepancies. In addition, damaged self-esteem (i.e. low explicit self-esteem and high implicit self-esteem) was related to symptoms of depression, whilst low implicit self-esteem to symptoms of mania.

Conclusions: Early coping abnormalities are important markers of individuals at ultra high risk of bipolar disorder. Further, the relevance of self-esteem in bipolar disorder has been suggested. Implications for future research and psychotherapy are discussed.

Chapter 1

Introduction

Bipolar disorder is a lifelong condition with a severe and recurrent course. On the one hand, it has been associated with greatly inspirational insights, high creativity, productivity, and, historically, with 'being gifted' (Goodwin & Jamison, 2007), on the other, it ranks as one of the major cause of disability (Woods, 2000) with serious personal and professional consequences for the individual, his or her family, and, economically, the society as a whole (Stimmel, 2004). The purpose of this thesis is to examine psychological vulnerability factors for bipolar disorder that would allow for predictions of its course over time, identifications of individuals highly likely to develop the illness, and informing psychological interventions. Before introducing specific hypotheses for the thesis, the background literature on bipolar disorder will be briefly introduced with an emphasis on relevant psychological processes. PubMed and PsycINFO databases were searched for relevant terms in order to identify pertinent literature.

History of diagnostic classification and subtypes of bipolar disorder

Although the term 'bipolar disorder' is relatively new, introduced only in 1957 by Karl Leonard, the medical recognition of the illness, in its essential features, goes back to ancient Greece. One of the first accounts of bipolar disorder has been frequently attributed to Hippocrates and his school in the 4th century BC with their humoral account of the condition (S. W. Jackson, 1986). However, others have denied that Hippocrates described bipolar disorder (Healy, 2011). The condition has not been fully documented until the late 19th century, when the German psychiatrist Emil Kraepelin (1907) distinguished between dementia praecox and manic-depressive illness on the grounds of differences in the outcome, periodicity and familial history.

Later, Karl Leonard divided manic-depressive illness into *bipolar* and *unipolar* disorders in order to differentiate affective disorders that switch polarity from those that do not, consequently leaving out conditions in the interface. This bipolar-unipolar distinction became formally incorporated into the third edition of the Diagnostic and Statistical Manual (American Psychiatric Association, 1980), where bipolar disorder breaks off as an independent illness. As such the diagnostic structure of the manual obscures the recurrent nature of both illnesses and favours polarity over cyclicity (Goodwin & Jamison, 2007).

As one of the first attempts to address the heterogeneous nature of bipolar disorder, Dunner et al. (1976) distinguished two subgroups on the grounds of the severity of mania: bipolar disorder I and II. Bipolar disorder I refers to a condition with mania severe enough to require treatment, usually hospitalization, whilst no history of depression is required (American Psychiatric Association, 1994). In this respect, some controversy exists around the classification of unipolar mania (i.e. mania with no history of depression): recent studies have identified its incidence as 4% - 22 % (Perugi, Passino, Toni, Maremmani, & Angst, 2007; Solomon et al., 2003), and a longitudinal study indicated that seven out of 27 patients with unipolar mania remained depression free over 15 years (Solomon et al., 2003). Methodologically, the diagnosis of unipolar mania may be complicated by unreported history of depression, or not long enough follow-ups (Perugi et al., 2007; Yazici et al., 2002), yet, at the same time such patients may be less treatment seeking. Some controversy also exists around the course and outcome of unipolar mania; whilst Angst and colleagues (2004) reported better course among individuals with pure mania, others have suggested unfavourable outcomes characterised by more chronicity, more congruent psychotic symptoms, and more severe social, familial and work disability (Perugi et al., 2007; Shulman & Tohen, 1994).

By contrast, bipolar II patients present with a history of depression accompanied by episodes of hypomania, defined as elevated mood abnormal for the individual and interfering with his or her functioning. Coryell et al. (1989) has suggested that BD I and BD II remain diagnostically distinct and consistent over time. Also other theorists argued for the recognition of milder and transitory, yet clinically significant forms of affective dysregulation (Akiskal, 1983, 1996; Akiskal, Hantouche, & Lancrenon, 2003; Angst, 1978; Klerman, 1981). Angst and colleagues (1978; 2008) proposed a nomenclature reflecting continua (i) from healthy to ill, and (ii) depressive to manic symptoms. This nomenclature then incorporates mania (M), depression (D), and three bipolar subgroups lying in between (Dm, MD, Md; capital letter denotes episode requiring hospitalisation). Similarly, Klerman (1981) suggested six additional subtypes of bipolar disorder including mania, hypomania, hypomania and mania precipitated by drugs, cyclothymic personality, depression with a family history of bipolar disorder, and mania without depression. Furthermore, Akiskal et al. (1977) validated the concept of cyclothymia, characterised by either depressive and irritable mood, or hyperthymic temperament, on the basis of family history and course. Cyclothymia has been identified in 4 -

6% of the population (Depue et al., 1981; Placidi et al., 1998), and has been found to be higher among offspring of bipolar patients (Depue et al., 1981). Akiskal (1983, 1996) also argued for the recognition of the 'soft' bipolar spectrum including depression with hypomania, cyclothymic and hyperthymic traits, those with familial bipolarity, hypomanic episodes resulting from pharmacotherapy or somatic treatments (BD III).

Of further relevance is the fact that depressive and manic symptoms often co-exist in varying degree (Bauer, Simon, Ludman, & Unutzer, 2005; Cassidy, Forest, Murry, & Carroll, 1998; Goodwin & Jamison, 2007; Johnson et al., 2011). The DSM-IV classification of mixed states require having met *all* of the diagnostic criteria for both depressive and manic episodes for at least one week (American Psychiatric Association, 1994). This has been criticised for being too restrictive, and a topic of much disagreement (Cassidy, Ahearn, Murry, Forest, & Carroll, 2000; McElroy et al., 1992). Some authors have proposed alternative definitions by lowering the number of required symptoms and specifying symptoms with high statistical specificity (Cassidy et al., 2000; V. Singh et al., 2013). As a response to this long-term debate, the DSM V has incorporated a mixed features specifier (MxFS), requiring the presence of at least three, not overlapping, symptoms from the opposite pole. While this relaxation will allow for capture of the symptomatic admixture, it faces the danger of losing prognostic significance or therapeutic benefit (Malhi, 2013).

In summary, the complex and unstable nature of affective disorders introduces a serious conundrum for any attempts to capture its manifestation into firm boundaries and categories. The work of Akiskal and colleagues (Akiskal, 1996; Akiskal & Akiskal, 1988; Akiskal et al., 2003) made a substantial contribution to the more recent concept of *bipolar spectrum*, amalgamating the dimensional approach to classification with the original, categorical approach (Akiskal et al., 2000). The bipolar spectrum concept has implications for the identification of at-risk individuals, evaluation of early interventions as well as stimulating genetic research (Goodwin & Jamison, 2007). In contrast, other authors remain rightly more cautious against broadening of the diagnostic classification, claiming, on methodological grounds, that further dilution of the bipolar concept will compromise the rigour of contemporary research (Baldessarini, 2000). Further criticism of the incorporation of milder forms of BD into the DSM-IV points to the alarmingly high number of false positives (Malhi, 2013; Zimmerman, Ruggero,

Chelminski, & Young, 2008), “selling bipolar disorder” by pharmaceutical companies, and overmedicating patients (Frances & Jones, 2012).

Epidemiology

Epidemiological research is generally challenged by a number of methodological factors, such as the instrument employed, population studied and its sample size, experience of the interviewers, or diagnostic criteria (Goodwin & Jamison, 2007). The first large psychiatric epidemiological study, the Epidemiological Catchment Area study (Robins & Regier, 1991), was carried out in the United States after the development of the Diagnostic Interview Schedule (DIS, Robins, Helzer, Croughan, & Ratcliff, 1981); the DIS was shown to be a reliable instrument allowing for direct comparisons of prevalence rates across regions, and hence it was subsequently employed in a number of epidemiological studies across the world (Orn, Newman, & Bland, 1988; Szadoczky, Papp, Vitrai, Rihmer, & Furedi, 1998; Wittchen, Essau, von Zeressen, Krieg, & Zaudig, 1992). The narrow diagnostic criteria for bipolar disorder in the early epidemiological studies indicated prevalence rates of up to 1.7% (Kessler et al., 1994; Regier et al., 1988; M. M. Weissman et al., 1996).

The Amish study (Egeland & Hotstetter, 1983) is noteworthy owing to the cultural and genetic homogeneity of the population (a highly conservative Protestant sect prohibiting alcohol and drug abuse, and reluctant to avail themselves of the conveniences of the modern world). The identified prevalence rates of bipolar disorder were lower than those reported by other studies: 112 individuals were identified with mental illness, out of which 80% were affective disorders (1% of the Amish population). 34% of those with psychiatric illness were either BD I or BD II, 37% were unipolar depression, and the remaining 9% were diagnosed with minor depression (8%) and hypomania (1%). Furthermore, the ratio between bipolar disorder and unipolar depression in the Amish population was equal, which is in a sharp contrast to findings of up to 10 times higher rates of unipolar depression compared to bipolar disorder in other studies (M. M. Weissman et al., 1996). The authors argued that their estimates might be more accurate due to the early recognition of bipolar symptoms in this closely interacting community. Furthermore, the diagnoses of bipolar disorder and unipolar depression were equally

distributed across males and females. This discrepancy with other reports on the gender distribution of depression (1:2 male:female; Egeland and Hotstetter (1983) may explain the lack of substance abuse and sociopathy in this sample, as these normally mask depression in males.

With a gradual recognition of the bipolar spectrum concept, epidemiological research incorporated broader diagnostic criteria (Akiskal, 1996; Klerman, 1981). The prevalence rates reported range between 2.4 - 8.3% (Angst, 1998; Judd & Akiskal, 2003; Merikangas et al., 2011; Oliver & Simmons, 1985). One of the first studies using the broader definitions (Lewinsohn, Klein, & Seeley, 1995) found that 5.7% of adolescents in the US met criteria for bipolar disorder. In a similar vein, a longitudinal study conducted by Angst (1998) reported a prevalence rate of 5.5% in individuals up to 35 years of age meeting criteria for hypomania/mania, and an additional 2.8% for brief hypomania. Very similar rates were reported in a Hungarian study of individuals between 16-64 years of age (Szadoczky et al., 1998). In the first international multi-site study across 11 countries in the Americas, Europe and Asia (Merikangas et al., 2011), the aggregate lifetime prevalence rates were estimated at 0.6% for bipolar I disorder, 0.4% for bipolar II, and 1.4% for subthreshold bipolar disorder, yielding a total prevalence of 2.4%. There were high rates of comorbidity (particularly with anxiety disorders), comparable levels of impairment across diagnostic groups, and an increasing severity with increasing restrictiveness of diagnostic definitions.

The foregoing epidemiological studies, despite the diagnostic difficulties, provide support for the utility of a broad spectrum of bipolar disorders.

Course and outcome

Age of onset

Most patients report that the illness first presented at adolescence or early adulthood. Studies have investigated age of onset in seeking for more homogeneity of presentation and potentially indications of common underlying aetiology. Goodwin and Jamison (2007) assessed 15 studies between 1990 and 2003, and derived a weighted

mean age of onset, for both males and females, of 22.2 years. Others suggested an earlier onset, falling between 15-19 years of age (Kupfer et al., 2002), supported by epidemiological findings reporting the average age of 18 years (Merikangas et al., 2011); other studies proposed bimodal (Carlson, Bromet, & Sievers, 2000; Patel, Delbello, & Strakowski, 2006; Suppes et al., 2001), or trimodal (Bellivier, Golmard, Henry, Leboyer, & Schurhoff, 2001; Hamshere et al., 2009; Lin et al., 2006; Mick, Biederman, Faraone, Murray, & Wozniak, 2003) distributions of onset age.

The differences between reported ages may be attributable to disparities in the definitions used: whilst some studies used the age of hospitalization, or the first clinical contact, others elicited information about the first symptoms (Egeland, Blumenthal, Nee, Sharpe, & Endicott, 1978), inevitably reporting younger ages. In keeping with this discrepancy, a gap of several years has been identified between experiences of the first symptoms, receiving a diagnosis, and final treatment seeking (Kupfer et al., 2002; Meeks, 1999; Suppes et al., 2001).

Further methodological issues are related to the cohort studies, as the more recent studies report lower age of onset (Chengappa et al., 2003; Kupfer et al., 2002). The most likely explanation for this finding may be changes in the diagnostic criteria (with participants often receiving a diagnosis of schizophrenia rather than bipolar disorder in the earlier studies), or recent increases in the use of psychopharmacological interventions (e.g. stimulant medication) proposed as a possible trigger of mania in children and adolescents (Reichart & Nolen, 2004).

Despite these methodological difficulties, a number of studies have reported that an early age of onset (usually identified in late adolescence) is associated with higher genetic loading (Bellivier et al., 2001), a greater number of episodes (Coryell, Fiedorowicz, Leon, Endicott, & Keller, 2013; Hamshere et al., 2009), rapid cycling (Hamshere et al., 2009; Lin et al., 2006), comorbid anxiety (Schurhoff et al., 2000), psychotic features (Bellivier et al., 2001; Schurhoff et al., 2000), more depressive symptoms (Coryell et al., 2013; Schurhoff et al., 2000) and treatment resistance (Carlson, Bromet, Driessens, Mojtabai, & Schwartz, 2002; Schurhoff et al., 2000). However, McElroy, Strakowski, West, Keck, and McConville (1997) found lower rates of psychotic symptoms in adolescent patients, and other studies have reported comparable, or

better, long-term outcomes in the early onset group (Carlson, Davenport, & Jamison, 1977).

Further inconsistencies surround the question of whether the age of onset is differentially associated with bipolar I and II disorders. Whilst according to some findings there appear to be no such association (Benazzi, 1999; Schurhoff et al., 2000), other studies reported a greater prevalence of bipolar I disorder in early onset individuals (Schulze et al., 2002).

Polarity at onset

Polarity of the initial mood episode has been proposed as another indicator of course of the illness. Although some studies have indicated that a depressive onset of bipolar disorder is most common (Quitkin, Rabkin, & Prien, 1986), this has not been found consistently. Mitchell, Johnston, Corry, Ball, and Malhi (2009) reviewed three large datasets from the Black Dog Institute Bipolar Disorder Clinic (BDI-BDC), Stanley Foundation Bipolar Disorder Network (SFBN, Leverich et al., 2001) and Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD, Sachs et al., 2003), and reported that about half of patients in each dataset had depression as their onset episode, less than 20% identified (hypo)mania, and 23-28% mixed episode at the onset. Further, depressive onset has been associated with more lifetime depressive episodes, whilst elevated onset has been associated with more (hypo)manic episodes (Etain et al., 2012; Forty et al., 2009; Perlis et al., 2005). Depression as a first episode has been also linked to earlier onset, and more frequent and severe subsequent depressive episodes (Forty et al., 2009; Perlis et al., 2005).

Another approach to assessing whether the predominant onset is depressive is by assessing the diagnostic change from major depression to bipolar disorder (reviewed in Angst, 1988). Angst, Sellaro, Stassen, and Gamma (2005) followed patients hospitalized with major depression and, using survival analysis, found that, per year, 1% of them converted to BD I, and 0.5% to BD II. Furthermore, the risk of conversion from BD II to BD I was 2%. Males and patients with an early onset were more likely to convert to BD I, whilst a conversion to BD II was associated with being female, a later onset, and positive family history of mania. Studies investigating risk factors for converting from unipolar to bipolar disorders have suggested an earlier age of onset (Akiskal et

al., 1983), high number of previous episodes (Angst, 1978), or psychotic features (Akiskal et al., 1983; Coryell et al., 1995).

Outcome

A number of large scale studies have evaluated the long-term outcome in bipolar disorder, including the NIMH Collaborative Study on the Psychobiology of Depression (Akiskal et al., 1995; Coryell et al., 1993; Judd, Akiskal, & Schettler, 2003; Judd et al., 2002), the Chicago study (Harrow, Goldberg, Grossman, & Meltzer, 1990), McLean/Harvard studies I & II (Tohen, Waternaux, & Tsuang, 1990; Tohen et al., 2003), the Stanley Foundation Bipolar Network study (Keck et al., 2003; Post et al., 2003), the Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD, Bowden et al., 2012; Perlis et al., 2005; Perlis et al., 2006), Jorvi Bipolar Study (Mantere et al., 2004) and the Zurich study (Angst & Preisig, 1995; Angst et al., 2005). However, reported findings have been variable, and comparisons difficult due to methodological differences in patient populations, the availability of psychopharmacological and psychotherapeutic treatments, or definitions of recurrence.

The Jorvi Bipolar Study (JoBS, Mantere et al., 2004) is notable for its systematic screening for bipolar disorder amongst psychiatric in- and out- patients. The authors reported that, even in a psychiatric setting, bipolar disorders were under-recognized, and rapid cycling and mixed states were as common among BD II as among BD I patients.

The Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD) has been to date one of the largest prospective examinations of outcome in bipolar disorder, with more than 4,000 patients followed from 1999 to 2005 (Bowden et al., 2012; Perlis et al., 2006; Sachs et al., 2003). By including patients with medical and psychiatric comorbidity, and evidence-based treatment guidelines (Sachs et al., 2003), STEP-BD attempted to provide findings that would be highly generalizable. A report relevant to longitudinal course and outcome included 2000 patients who were followed for 24 months (Perlis et al., 2006); out of all included patients, 1500 (75%) patients were symptomatic at study entry. Within the two years, 58.4% achieved recovery (defined as two of fewer syndromal features of mania, hypomania, or depression for at least eight weeks), however, 48.5% of these individuals experienced recurrences. Twice as many patients suffered further depressive episodes (34.7%), as those who suffered

(hypo)manic or mixed episodes (13.8%). Residual depressive symptoms at recovery were the most robust predictors of recurrence, particularly for depression. In contrast, residual manic symptoms appeared to confer risk for both manic and depressive episodes. Similar findings were reported in other longitudinal studies (Bromet et al., 2005; Gitlin, Swendsen, Heller, & Hammen, 1995; Keller et al., 1992; Tohen et al., 2003). The results of the STEP-BD have pointed to the high percentage of recurrence despite guideline-based treatment, and highlighted the need for the development of new interventions (Perlis et al., 2006).

Of relevance, Marwaha, Durrani, and Singh (2013) systematically reviewed available data on employment outcome in bipolar patients, finding that only 40-60% of affected individuals were currently in employment. Further, the diagnosis of bipolar disorder has been associated with a severe stigma, negatively affecting social support, functioning and quality of life (for review see Hawke, Parikh, & Michalak, 2013), whilst higher levels of stigma have been related to greater severity of symptoms and general impairment (Aydemir & Akkaya, 2011; Cerit, Filizer, Tural, & Tufan, 2012).

Genetics

Bipolar disorder has been regarded as a highly heritable¹ illness with heritability estimates of 60 – 85% (Smaller & Finn, 2003). A number of family and twin studies have indicated that the illness aggregates in families with first-degree relatives of patients with bipolar disorder being 10 to 15 times more likely to develop bipolar disorder, but also major depression, than general population (Smaller & Finn, 2003; Tsuang & Faraone, 1990).

Twin studies have been employed to examine the rate of familial aggregation explicable by genes, on the assumption that comparisons of monozygotic and dizygotic twins may allow estimations of the environmental and genetic contributions to the phenotype. Monozygotic twins have been found to be more concordant for bipolar disorder

¹ Heritability is defined as the proportion of variance in trait that is attributable to genetic variation within a population.

than dizygotic twins (Bertelsen, Llaovald, & Hauge, 1977; Kendler, Neale, Kessler, Heath, & Eaves, 1993). Family studies, attempting to define clinical phenotypes, have found that the relatives of probands with bipolar disorder are at a greater risk for range of psychiatric illnesses including schizophrenia, mood disorders, anxiety disorders, alcohol and substance disorders (M. M. Weissman et al., 1984), supported by findings from genome-wide studies. More recently, a large study of 2 million Swedish families has indicated a substantial genetic overlap between bipolar disorder and schizophrenia, (Lichtenstein et al., 2009), challenging the traditional diagnostic distinction between the disorders.

Thus, findings from genetic studies suggest that rather than discrete disorders with specific causes and symptoms, psychiatric problems lie on a continuum with shared genetic and environmental factors (Owen, 2012).

Main psychological models of bipolar disorder

Over the past decades, a number of theoretical models have attempted to explain the etiology, onset, and maintenance of bipolar disorder. The majority of current psychological theories have been derived from the diathesis-stress model based on the observation that psychiatric episodes and exacerbations of symptoms often occur after major negative life events (Mazure & Druss, 1995). However, great variability exists as to who develops psychiatric problems and what kind of problems. Hence, complex interactions between underlying predispositions or vulnerabilities, life stressors, and individual differences in availability of coping strategies are likely to be implicated the expression of psychiatric disorders. Furthermore, clinical observations have pointed to the effect of sensitization, the temporal decrease of the magnitude of stress needed to trigger another episode (Bender & Alloy, 2011; Post, Rubinow, & Ballenger, 1986).

Several theoretical models have conceptualized affective disorders in terms of complex maladaptive psychosocial (and neurobiological) processes, and proposed vulnerability factors, the targeting of which will aid psychotherapeutic interventions. In the following subsection, several theoretical accounts relevant to bipolar disorder will be introduced. The overview will focus on *cognitive vulnerability models* including *manic*

defence theories; the response style model; behavioural activation system (BAS) dysregulation model; and circadian instability model.

Cognitive vulnerability

Cognitive accounts of bipolar disorder (Alloy, Abramson, Smith, Gibb, & Neeren, 2006; Alloy, Reilly-Harrington, Fresco, Whitehouse, & Zechmeister, 1999; Reilly-Harrington, Alloy, Fresco, & Whitehouse, 1999) have drawn on existing approaches to unipolar depression (Abramson, Metalsky, & Alloy, 1989; Beck, 1967, 1976) which posit that individuals who possess negative cognitive style are at increased risk for depression when activated by negative life events. According to *Beck's theory* (Beck, 1967, 1976, 2008), vulnerable individuals possess depressive self-schemata containing dysfunctional attitudes about oneself, world and the future, which leads to a negative style information processing. *The hopelessness theory* (Abramson, Alloy, & Metalsky, 1988; Abramson et al., 1989) emphasizes the way individuals interpret negative life events in terms of their stability (i.e. enduring effect) and generalisability (i.e. affecting other areas of individual's life). Of relevance to bipolar disorder, it has been proposed that vulnerability to episodes of elevated mood is associated with activation of maladaptive *positive* schemata including overly optimistic views about the self, world and future (Beck, 1976). When these schemata are activated by positive events, they might escalate to hypomanic or manic episodes.

In support of the cognitive theories, previous studies have found that individuals with bipolar disorder in a current depressive episode show cognitive style and information processing similar to patients with unipolar depression, characterized by low self-esteem (L. Jones et al., 2005; J. Scott & Pope, 2003), discrepancies between ideal and actual perceptions of the self (Bentall, Kinderman, & Manson, 2005), dysfunctional attitudes (Hollon, Kendall, & Lumry, 1986; Lam, Wright, & Smith, 2004; J. Scott & Pope, 2003), and a negative attributional style (Reilly-Harrington et al., 1999).

However, when in a hypomanic or manic episode, findings vary depending on the type of assessment. For example, in a behavioural high-risk paradigm (i.e. individuals scoring high on a questionnaire measure of hypomania), Bentall and Thompson (1990) found that high-risk students took longer to colour-name depression related words but not the euphoria-related words, a finding consistent with previous report of individuals

with unipolar depression (Ingram, Miranda, & Segal, 1998). A later replication of the study controlling for the effect of anxiety showed parallel results (French, Richards, & Scholfield, 1996). Similarly, in a study of manic, depressed and euthymic patients (Lyon, Startup, & Bentall, 1999), those who were currently manic showed a normal self-serving bias on an explicit measure of attributions, whereas depressed patients attributed more negative events to self than to others. Nevertheless, on implicit measure of attributional style, both groups attributed more negative, events to the self. Further, both manic and depressed individuals showed slowed colour-naming on the emotional Stroop task, and greater recall of negative words, despite the manic group, compared to depressed, endorsed more positive self-descriptive words.

The authors have interpreted their findings in the light of earlier psychoanalytically oriented theories (Abraham, 1911/1927; Neale, 1988) proposing that mania arises as a *defence mechanism* against depressive feelings by keeping distressing thoughts and memories out of consciousness. Rado (1928) further pointed to the narcissistic personality of bipolar individuals and the role of their greatly unstable self-esteem, which is dependent on external evaluations. Whilst the presence of unstable self-esteem (Knowles et al., 2007), and negativity in mania has been well documented (Bauer et al., 2005; Bauer, Whybrow, & Gyulai, 1994; Cassidy, Forest, et al., 1998; Johnson et al., 2011), evidence for the assertion that mania arises as a defence is scarce and inherently difficult to test empirically. Winters and Neal (1985) have based this assertion on their finding that bipolar individuals scored significantly higher on measures of social desirability and self-deception, and that their scores on these measures significantly correlated with self-esteem (.60 and .58, respectively). Here, clearly more work is needed in order to support theorizing with methodologically sound evidence.

Several studies have examined whether cognitive abnormalities are independent of mood episodes, and therefore whether they provide stronger evidence of causality, by employing patients in remission. Here, findings are somewhat variable. Some studies found no differences in self-esteem, attributional style or dysfunctional attitudes towards self-evaluation in remitted bipolar patients in comparison to controls (Hollon et al., 1986; Pardoën, Bauwens, Tracy, & Martin, 1993; Reilly-Harrington et al., 1999); indeed Hollon et al. pointed to the nonspecificity of dysfunctional attitudes, which were found increased across diagnostic groups (1986). Others have identified higher self-criticism, but less dependency in women with bipolar disorder (Rosenfarb, Becker,

Khan, & Mintz, 1998), and higher levels of dysfunctional attitudes, particularly perfectionism and need for approval (Lam, Hayward, Watkins, Wright, & Sham, 2005; J. Scott, Stanton, Garland, & Ferrier, 2000; Wright, Lam, & Newton-Davis, 2005), as well as increased sociotropy and autonomy (van der Gucht, Morriss, Lancaster, Kinderman, & Bentall, 2009). Similarly to manic patients, it has been found that remitted bipolar patients show no differences in attributional style compared to controls on explicit measures, yet they endorse more negative self-concept on implicit measures (Knowles et al., 2007; Winters & Neale, 1985). In their meta-analysis, Nilsson, Jorgensen, Craig, Straarup, and Licht (2010) concluded that remitted bipolar patients display self-esteem significantly lower than controls, but somewhat higher than individuals in remission of major depression. However, the authors included only studies employing explicit assessments of self-esteem. Further, it has been indicated that bipolar individuals show pronounced instability of self-esteem (Knowles et al., 2007; Pavlova, Uher, Dennington, Wright, & Donaldson, 2011) and higher reactivity of self-esteem to experimental success or failure (Pavlova et al., 2011).

An important shortcoming of studies utilizing remitted patients is their inability to disentangle whether identified psychological abnormalities are a consequence of prior episodes or indeed a vulnerability (Just, Abramson, & Alloy, 2001). Of further importance, there has not been a final consensus regarding the definition of a vulnerability factor: whilst some argue that a vulnerability factor needs to have a trait-like quality and must therefore be independent of episodes and symptoms (Ingram et al., 1998), some cognitive theories have defined vulnerability factors as latent until activated by negative events (Beck, Rush, Shaw, & Emery, 1979), which further complicates interpretations of null results (do negative results indicate that cognitive vulnerabilities are not present, have not been activated, or have become latent?). However, surprisingly few studies have assessed negative life events along with participants' cognitive style; those studies that have done so have found that an interaction of relevant life events and a cognitive style (i.e. interpersonal events for individuals scoring high on sociotropy and achievement-related events for those scoring high on autonomy) predicted subsequent severity of symptoms (Francis-Raniere, Alloy, & Abramson, 2006; C. Hammen, Ellicott, & Gitlin, 1992; C. Hammen, Ellicott, Gitlin, & Jamison, 1989). Another limitation of studies on remitted patients is that, despite the evidence of subsyndromal symptoms present during remission (Bauer et al., 2005; Johnson et al., 2011), few studies have statistically

controlled for the level of current symptoms, which obscures whether or not the identified cognitive abnormalities are independent of residual symptoms.

It has been proposed that employing a behavioural high-risk paradigm, where participants are selected based on the presence (and absence) of psychological vulnerability could overcome the limitations faced by studies of remitted patients and allow testing of the cognitive vulnerability hypothesis (Just et al., 2001). In this vein, Bentall et al. (2011) have selected undergraduate participants on the basis of high their scores on the Hypomanic Personality Questionnaire (HPS, Eckblad & Chapman, 1986) and Dysfunctional Attitude Style (DAS, A. N. Weissman & Beck, 1978), and asked them to complete an experience sampling method diary (ESM, Csikszentmihalyi & Larson, 1987), a highly ecologically valid assessment of participants' experiences within the context of their every day life. The high-risk participants showed significantly higher fluctuations of self-esteem, and depression- and reward-related processes. However, one criticism of the high-risk paradigm might be that high-risk participants might already be within the spectrum for mood disorders.

Another approach is a genetic high-risk paradigm; given the evidence that a high percentage of offspring of parents with bipolar disorder will develop mood disorders at certain point in their lives (Delbello & Geller, 2001; Lapalme, Hodgins, & LaRoche, 1997) such paradigms offer a unique opportunity to empirically test relevant theories, and to bring important insights into the developmental trajectory of bipolar disorder. Furthermore, such knowledge will be invaluable in detecting ultra-high-risk individuals, and informing early/preventative interventions. To date, there has been a dearth of studies that have employed this strategy, and within this thesis they will be reviewed in the later section of the Introduction. Yet, the scarcity highlights the need for investigations in this area.

Response style theory

Another theoretical framework of understanding the course of mood disorders is within the response style theory (Nolen-Hoeksema, 1991), which originally aimed to extend the understanding of the course of unipolar depression. Nolen-Hoeksema argued that the way individuals respond to feelings of depressive mood affects the severity and duration of depressive symptoms, and that such style is to large extent *consistent* over

time (Nolen-Hoeksema, 2000; Roberts, Gilboa, & Gotlib, 1998). The four coping style proposed by Nolen-Hoeksema (1991) include *ruminaton*, *distraction*, *problem-solving*, and *dangerous activities*.

Rumination, so far the most investigated response style, has been defined as directing one's attention to one's negative emotional state. As a consequence, it has been argued, ruminating exacerbates low mood (Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Nolen-Hoeksema & Morrow, 1991, 1993; Nolen-Hoeksema, Parker, & Larson, 1994), and, moreover, prevents one from adopting healthier strategies that would help elevate depression (Nolen-Hoeksema, 1991). More recent studies have suggested that engaging in rumination intensifies a variety of negative emotions, including anxiety, fear, and, in bipolar disorder, also positive affect when ruminations engage happy experiences (Johnson, McKenzie, & McMurrich, 2008). Furthermore, Johnson et al. showed that ruminative responses to negative affect were driven by current levels of depression, while ruminative responses to positive affect were driven by current symptoms of mania. Recently, the concept of rumination has been differentiated into two subcategories, brooding and reflective rumination (Treyner, Gonzalez, & Nolen-Hoeksema, 2003); whereas brooding remains closely related to the original definitions of ruminations, reflective rumination has been described as a thinking process, whereby one maintains distance from one's emotions to gain insight and re-evaluate the situation. Hence, reflective rumination has been proposed a potent affect regulating strategy (Kross, Ayduk, & Mischel, 2005).

Another coping style, *distraction*, entails shifting attention away from low mood, towards pleasant and/or engaging tasks, such as talking to a friend, or concentrating on one's work or hobbies. Several cross-sectional and longitudinal studies confirmed the effects of both rumination and distraction on severity and duration of depressive symptoms in both laboratory (Morrow & Nolem-Hoeksema, 1990; Nolen-Hoeksema & Morrow, 1993) and natural conditions (Nolen-Hoeksema & Morrow, 1991). The above definition of distraction entails everyday activities that are healthy and do not pose any danger to the individual, yet, Nolen-Hoeksema has acknowledged that some distracting activities (i.e. violent behaviours, reckless driving, or spending sprees) may be inherently maladaptive, and dangerous to the individual (1991). *Dangerous activities* or *risk-taking* have been conceptualized as a coping style with highly negative consequences, and, although potentially ameliorating depression momentarily,

contributing to its deterioration in the long run (and positively correlating with rumination). Finally, *problem solving* has been defined as a pro-active approach aimed at resolving the cause of one's low mood.

As both dangerous activities and problem-solving have been less well elaborated in the original response style theory (Nolen-Hoeksema, 1991), and also failed to reach acceptable internal consistency as subscales of the Response Style Questionnaire (RSQ; Nolen-Hoeksema, 1991), a factor analytic study (Knowles, Bentall, Tai, & Christiansen, 2005) has re-examined the underlying structure of the questionnaire. The new structure included three, rather than four, factors comprising rumination, risk-taking (or dangerous activities), and active coping (including items related to the original problem solving and distraction).

This revised version of the RSQ (Knowles et al., 2005) has been utilized to examine whether individuals in different phases of bipolar disorder tend to employ different strategies to cope with their depressive symptoms. A number of studies reported an association between increased risk-taking during episodes of mania (Thomas, Knowles, Tai, & Bentall, 2007; van der Gucht et al., 2009), whilst rumination has been reported less distinctly related to discrete phases of bipolar disorder and found present during episodes of depression, mania as well as during remission (van der Gucht et al., 2009). Findings concerning symptoms, rather than episodes, suggested an association between ruminative thinking and symptoms of depression (Knowles et al., 2005; Thomas & Bentall, 2002). In contrast, risk-taking has been related to symptoms of (hypo)mania, and also, consistent with the Nolen-Hoeksema's observation, depression (Knowles et al., 2005; Thomas et al., 2007).

In addition, examinations of the response styles and affect have indicated that negative mood is related to both rumination and risk-taking, whilst active coping is associated with positive mood (Knowles et al., 2005). Furthermore, in a high-risk study (Bentall et al., 2011), ruminative thinking has been related to lower self-esteem, and distraction with higher self-esteem.

Despite the fact that some of the previous studies (Bentall et al., 2011; van der Gucht et al., 2009) have employed longitudinal assessment in a form of the experience sampling method (ESM, Csikszentmihalyi & Larson, 1987), little knowledge is available as to the temporal relationship between mood, self-esteem and response styles, an important limitation in testing the response style theory. In this direction only one study of undergraduates recruited irrespective of their depressive symptomatology investi-

gated how negative affect and rumination interact over time (Moberly & Watkins, 2008). The group found that, whilst rumination instigated increased negative affect at a subsequent occasion, negative affect also resulted in greater rumination at the following time point. Decomposing rumination further indicated that this effect was driven by brooding, and was independent of reflective rumination.

Thus, the dynamics between coping strategies, affect and self-esteem in bipolar disorder is still to be explained. Furthermore, such investigations in a population at high-genetic risk might bring important indications for therapeutic interventions, and inform understanding of the development of mood disorders.

The behaviour activation systems (BAS) dysregulation model

A more biologically based approach of explaining psychological processes in bipolar disorder is based on Gray's (1982) Reinforcement Sensitivity Theory (RST). It encompasses two motivational systems, the behavioural activation system (BAS) and the behavioural inhibition systems (BIS). Each system is based on distinct neurobiological structures, responds to separated motivational events and facilitates specific behaviours. The behavioural inhibition system (BIS), based on Pavlovian conditioning, becomes activated as a consequence of punishment, threat, or frustrative non-reward, and results in increased arousal and attention as well as in inhibition and withdrawal (Depue & Collins, 1999; J. A. Gray, 1994). On the contrary, the behaviour approach system, sometimes referred to as behaviour activation system (Fowles, 1980), is implicated in approach behaviours instigated by motivational incentives and rewards. The theory has undergone several revisions with refinements as to the number of individual systems, and their interdependencies (for detailed description see Corr, 2008). In the original theory, the two systems were assumed to function independently of each other; nevertheless, due to a lack of empirical support for this assertion, the joint system hypothesis (JSH) was introduced (Corr, 2001). According to this account, the BIS and BAS can act jointly under typical circumstances, whilst independent control over behaviour may occur in extreme conditions or in extreme personality groups. Hence, the two systems are viewed as complementary (Corr, 2001). Individual differences in BAS and BIS sensitivity have been implicated in different patterns of psychopathology (Carver & White, 1994). In relation to bipolar disorder, early adaptations of Gray's (1982) model pro-

posed that psychological abnormalities presented by patients with bipolar mood disorder reflect BAS, rather than BIS, dysregulations (Depue & Iacono, 1989; Depue, Kraus, & Spont, 1987). Thus, extreme positive affect or irritability, goal-directed activity, pressured speech, decreased need for sleep, exaggerated self-confidence in attaining goals arise as a consequence of increased BAS activity (Depue & Iacono, 1989; J. A. Gray, 1994). In contrast, low BAS activation results in disengagement, low energy and mood, anhedonia, and eventually leads to depression (Depue & Iacono, 1989; Depue et al., 1987). According to the BAS dysregulation model, fluctuations and poor regulation of the BAS system in vulnerable individuals then predict episodes of hypomania/mania as well as depression.

Although based on neurobiological dysregulation, BAS abnormalities have been commonly tested by self-report measures such as BAS/BIS scales (Carver & White, 1994), or Sensitivity to Punishment and Sensitivity to Reward Questionnaire (Torrubia, Avila, Molto, & Caseras, 2001). In support of the model, high-risk individuals (Carver, Lawrence, & Scheier, 1999; B. Meyer, Johnson, & Carver, 1999) and those diagnosed with bipolar II disorder and cyclothymia, (Alloy, Abramson, Walshaw, et al., 2006), and bipolar I disorder (B. Meyer, Johnson, & Winters, 2001) show elevated BAS sensitivity on these measures. Furthermore, individuals with bipolar disorder or within the bipolar spectrum show a distinguishable BAS-relevant cognitive style characterized by goal-striving (Lam et al., 2004), perfectionism (Goldberg, Gerstein, Wenze, Welker, & Beck, 2008; J. Scott et al., 2000), and autonomy (Alloy et al., 2009). In this vein, Francis-Raniere and colleagues (2006) found that cognitive style characterized by high self-criticism, and focus on performance interacted with congruent negative and positive events, respectively, to predict an increase in depressive and hypomanic symptoms, respectively. In addition, an attachment-oriented cognitive style (defined by “Attachment concerns” and “Pleasing others/Interpersonal sensitivity” factors) acted as a buffer against depressive episodes.

A number of studies examining BAS relevant life events have reported that goal-attainment (Alloy, Abramson, Walshaw, et al., 2006; Johnson, Cueller, et al., 2008; S. L. Johnson et al., 2000) and goal-striving life events (Nusslock, Abramson, Harmon-Jones, Alloy, & Hogan, 2007), lead to an increase in manic, but not depressive symptoms. Additionally, bipolar individuals continue to strive for a further increase of posi-

tive affect without “coasting”, a relaxation of approach behaviours adopted by healthy individuals in response to indications of goal attainment (Fulford, Johnson, Llabre, & Carver, 2010). However, although, theoretically, negative life events should then deactivate the BAS system and trigger symptoms of depression, findings in this direction are less consistent. Some studies have supported this prediction (C. Hammen & Gitlin, 1997; Johnson, Winett, Meyer, Greenhouse, & Miller, 1999; Swendsen, Hammen, Heller, & Gitlin, 1995), others found no difference in the subsequent onset of bipolar episodes (Hunt, Bruce-Jones, & Silverstone, 1992; Malkoff-Schwartz et al., 1998), and yet another line of studies has linked adverse life events to the onset of manic episodes (Ambelas, 1987; Kennedy, Thompson, Stancer, Roy, & Persad, 1983; Leff, Fisher, & Bertelsen, 1976).

Whilst much support of Depue et al.’s model (1981) has been gathered, several limitations should be addressed. First of all, theoretical inconsistencies exist as to whether both BAS *and* BIS are implicated in the vulnerability to bipolar disorder, as operationalised by the self-report BAS/BIS scale (Carver & White, 1994), or a single vulnerability (BAS), as originally proposed by Depue et al. (1987), is a more valid conceptualisation. Second, recent evidence points to psychological abnormalities that clearly elaborate on the original theoretical account, rather than merely supporting it (e.g. perfectionism), and hence calls for expansions of the model (Urosevic, Abramson, Marmon-Jones, & Alloy, 2008). Third, the model has been criticized for its simplification into binary mechanisms, despite recent advancements in understanding of the functional and neurobiological underpinnings (e.g. Power, 2005).

Circadian instability

Another line of research has focused on the role of circadian rhythms in bipolar disorder (Goodwin & Jamison, 2007). The term “circadian” refers to the 24-hour periodicity observable across species in a number of biological systems including sleep/wake cycle, body temperature and hormonal rhythms. Although the best indicator of circadian functioning is melatonin secretion (Nurnberger et al., 2000), investigations of melatonin remain scarce, and the majority of research on circadian functioning in bipolar disorder has concentrated on sleep patterns and cortisol diurnal secretion. Almost 20-years ago

the American Psychiatric Association (1994) promoted a regime of regular sleeping patterns for effective management of bipolar disorder and findings to date present compelling evidence that all phases of bipolar disorder are tightly link with sleep abnormalities (Cassidy, Murray, Forest, & Carroll, 1998; Goodwin & Jamison, 2007; Hudson et al., 1992; S. H. Jones, 2001; Teicher, 1995). Harvey (2008) reported decreased need for sleep in 69%-99% of manic patients and hypersomnia in 23%-78% of depressed patients. Similar sleep disturbances, characterised by larger variability of sleep duration, night-time wakening, and more fragmentary sleep-wake rhythms have been found in remitted bipolar patients in naturalistic setting using sleep actigraphy (S. H. Jones, Hare, & Evershed, 2005; Millar, Espie, & Scott, 2004).

Several studies examined the effect of sleep manipulation: sleep deprivation has been found effective in short-term improvements of depressive symptoms (Barbini, Bertelli, Colombo, & Smeralsi, 1996; Leibenluft, Albert, Rosenthal, & Wehr, 1996), however, instigated mania in vulnerable individuals (Wehr, 1991; Wehr, Sack, & Rosenthal, 1987).

Of importance, the circadian system is an “open system”, that is sensitive to external cues; disruptions to normal routines directly influence its oscillations (Frank et al., 2005). It has been reported that over 80% of bipolar patients are able to recognize early symptoms of mania, most often disturbances to sleep (A. Jackson, Cavanagh, & Scott, 2003). In this vein, some psychotherapeutic interventions, such as interpersonal and social rhythm therapy (Ashman et al., 1999; Frank et al., 2005; Frank, Swartz, & Kupfer, 2000), or cognitive therapy (J. Scott, Garland, & Moorhead, 2001), have concentrated on circadian rhythm and sleep/wake cycle abnormalities.

The close relationship between circadian functioning and mood has been well documented (Boivin et al., 1997; Murray, Allen, & Trinder, 2002; Murray & Harvey, 2010). However, in relation to bipolar disorder, some theorists have emphasized the role of meta-cognitive interpretations in response to changes in circadian system (Healy & Williams, 1989; S. H. Jones, 2001). For example, according to S. H. Jones (2001), rather than recognizing situational or biological causes, bipolar patients make internal attributions about circadian system disruptions (e.g. “I am back to my intelligent and creative self.”), which instigate further engagement in disruptive behaviours, and exacerbation of symptoms.

The core psychological processes of bipolar dysregulation

The cardinal dysregulations in bipolar disorder pertain to affect and self-esteem, as reflected in the DSM IV-TR (American Psychiatric Association, 1994) diagnostic criteria: a period of abnormally and persistently elevated, expansive mood, and inflated self-esteem or grandiosity define mania, whilst sad, empty mood, and worthlessness characterize periods of depression. Although few studies have recently investigated affect and self-esteem jointly, they suggest a tight link between these two constructs. In this review, affect and self-esteem will first be addressed separately to delineate their definitions and summarize the current research knowledge concerning each.

Affect and its regulation in bipolar disorder

The past decades have witnessed flourishing research on emotion owing to advances in neuroimaging techniques, allowing for better understanding of mechanisms of emotion generation and relevant regulatory mechanisms. However, earlier models of affect are still widely recognized. One example is a discrete model of affect introduced by E. K. Gray and Watson (2007), emphasizing specific types of emotions (i.e. happiness, anger, sadness, and fear). Whilst empirically supported, the model has been critiqued for the high inter-relatedness of affective components of the same valence, and dimensional accounts of affect have been proposed in response (Russell, 1980; Tellegen, Watson, & Clark, 1999). Of relevance to bipolar disorder symptomatology is a Watson and Tellegen (1985); (1999) model. It proposes two orthogonal dimensions, positive activation (PA) and negative activation (NA), reflecting enthusiasm, self-confidence, happiness; and anger, fear and sadness, respectively. Importantly, this account allows for affective states of the opposite valence to be experienced simultaneously, and therefore indicates how symptoms of depression and mania may co-exist.

Further, this account closely relates to the neurobehavioral theory of bipolar disorder (Depue & Iacono, 1989) linking the behaviour approach system (BAS) to positive affect and behavioural inhibition system (BIS) to negative affect, and positing that over-activation in BAS may escalate into a full-blown mania. By definition bipolar disorder

pertains primarily a dysregulation of positive affect (only a history of manic or hypomanic episode is required for the diagnosis of bipolar disorder), and only secondarily a dysregulation of negative affect, and indeed, some researchers have concentrated on investigations of predominantly positive affectivity (e.g. Gruber, Culver, et al., 2009; Gruber & Johnson, 2009). However, there is convincing evidence that the majority of diagnosed bipolar patients have had a history of depression, and that subsyndromal depressive symptoms often predominate across different phases of the illness (Judd et al., 2002; Paykel, Abbott, Morriss, Hayhurst, & Scott, 2006), which warrants investigations of both aspects of affect for a complete account of relevant dysregulations. The present review therefore attempts to include studies examining both positive, as well as negative, affect, whilst differentiating between findings arising from high-risk paradigms, and those arising from studies of remitted versus symptomatic patients.

Affect dysregulation in high-risk individuals

Several studies have examined affect employing high-risk individuals selected as high-scorers on the Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986), or General Behaviour Inventory (GBI; Depue et al., 1981), both well-validated self-reported measures of hypomanic traits used in analogue studies (for exception see Bentall et al. (2011), using a combination of HPS (Eckblad & Chapman, 1986) and DAS (Power, 2005). To investigate the variability of affect over time, some studies have used diary methods, which allow more ecological sampling of affect with relatively little disruption of participants' daily lives. Findings to date have suggested, that mood dysregulation is not restricted to positive affect only, but that also encompasses negative affect (Hofmann & Meyer, 2006). Another study found that, similarly to individuals with intermittent depression, those with cyclothymia reported higher levels of trait and daily negative affect, as well as greater fluctuations of negative affect, than controls (Lovejoy & Steuerwald, 1995). Further, individuals with cyclothymia showed greater fluctuations of positive affect than individuals with intermittent depression, but comparable to control participants. Dysregulation of negative, rather than positive, affect was also supported by a more recent study of comparable design reporting increased negative affect and its fluctuations in high-risk students (Bentall et al., 2011).

Another line of research has employed mood elicitation techniques. For example, Gruber, Johnson, Oveis, and Keltner (2008) examined affect in a high-risk student sample across stimuli (i.e. positive, negative and neutral film clips) and modalities (i.e. subjective self-reported experience, facial expression, and physiological response). High-risk individuals reported increased positive affect, but not negative affect or irritability, across conditions on self-report as well as physiological (i.e. cardiac vagal tone) assessments.

Similar findings have been reported using paradigms pertaining to approach motivation. An earlier study reported that at-risk participants showed an increased confidence in assessing their own abilities (attributed as more internal, stable and global) after a false success feedback (Stern & Berrenberg, 1979). A later study used a Go/Nogo design and found that high-risk participants had higher expectations after success and selected an increased task difficulty (Johnson, Ruggero, & Carver, 2005). T. D. Meyer and Baur (2009) reported increased positive affect in at-risk male participants across all experimental conditions. However, except for a general decrease of negative affect, the group did not find a stronger reaction to success feedback. In another study, a high-risk status was related to reward (joy), and achievement focused (pride) positive emotions and to extrinsic life ambitions (fame, politics), but not to goals oriented to others (family, friends) (Gruber & Johnson, 2009).

In sum, findings related to affect regulation in high-risk participants are highly variable. This might be associated with methodological differences: whilst ESM studies (advantageous for their high ecological validity and elicitation of information inherently relevant to participants' lives) suggest dysregulation of negative affect, less consistent findings emerge from experimental designs.

Affect dysregulation in remitted patients with bipolar disorder

A number of studies have examined affect in remitted individuals diagnosed with bipolar disorder longitudinally employing experience sampling method (ESM; Csikszentmihalyi & Larson, 1987). Two studies (Havermans, Nicolson, Berkhof, & deVries, 2010; van der Gucht et al., 2009) reported higher mean levels of negative affect in participants' daily lives. Whereas Van der Gucht et al. (2009) did not detect any

differences in positive affect, other studies reported lower mean levels (Havermans et al., 2010), and a greater decrease in positive affect in response to daily stress (Myin-Germeys et al., 2003). Employing Kernis et al.'s (1993) diary method where participants were asked to make an entry twice a day, one study reported greater fluctuations in both negative and positive affect in comparison to controls (Knowles et al., 2007). Another study found increased negative affect reactivity to daily hassles only in patients with subsyndromal depressive symptoms (Havermans et al., 2010). Further support for prevailing negativity of affect in remitted patients comes from studies using self-report measurements of affect lability and intensity (Henry et al., 2008), and personality differences particularly pertaining to neuroticism (Hirschfeld, Klerman, Keller, Andreasen, & Clayton, 1986; Solomon et al., 1996), a construct found to be strongly related to negative affect.

A research group focusing on positive emotional processing has examined specific positive emotions in remitted bipolar patients in comparison to controls. (Gruber, Culver, et al., 2009). The group found that bipolar patients displayed lower levels of joy, compassion, love, awe and contentment. However, after controlling for baseline symptoms, joy and amusement (i.e. reward-related positive affect components) predicted increases, whilst compassion predicted a decrease in manic symptoms at 6-months follow-up. In addition, amusement predicted increased severity of depression, while pride predicted decreased. Two studies used autobiographic memories, and multiple output systems (i.e. self-reported affect, physiological and behavioural response) to elicit and assess positive mood (Gruber, Dutra, Eidelman, Johnson, & Harvey, 2011; Gruber, Harvey, & Johnson, 2009). Using reflective compared to ruminative processing in response to happy personal memories, remitted patients showed increased level of positive affect across both conditions (Gruber, Harvey, et al., 2009). Further, Gruber, Dutra, et al. (2011) have examined reactivity of mood to idiographic and normative mood induction (using happy film clips). The patient group showed a greater cardiac vagal tone (putative marker of positive emotionality) in a response to positive mood elicitation, whereas no differences between groups were found on self-report assessments. Another study employed normative mood elicitations using happy, sad and neutral film clips (Gruber, Harvey, & Purcell, 2011), and found that bipolar patients showed increased positive affect on self-report assessments as well as physiological indices of positive mood across all conditions.

Several laboratory studies have examined affect reactivity to false feedback. Pavlova et al. (2011) asked participants to solve ten easy (success condition) and ten difficult (failure condition) word puzzles in two separate sessions one week apart. After each task, participants received a sham feedback. Remitted patients showed an increased response of explicit self-esteem and affect to both positive and negative feedback; furthermore, changes in affect and self-esteem were highly correlated. In addition, more sustained, and increased, positive affect among remitted bipolar patients was reported using Go task paradigms (Johnson et al., 2005), during which participants receive false positive feedback irrespective of their actual performance (Farmer et al., 2006; Roiser et al., 2009). Lastly, remitted patients have been found to rate neutral pictures, but not positive or negative, as more positive compared to control participants, and also exhibited greater starter eyeblink reflex (M'bailara et al., 2009).

In summary, conclusions regarding prevailing affect and its reactivity vary depending on the study design. Similarly to high-risk studies, the prevalence of negative affect in naturalistic longitudinal studies as well as studies of personality traits is noteworthy. In contrast, studies employing approach motivation paradigms have provided evidence of increased positive affect reactivity, and difficulties regulating emotion to its baseline levels² resulting in a tendency to remain in a positively valenced emotional state. The conclusions drawn from comparisons between high-risk and remitted patient studies may be inherently limited by participants' age differences. Besides changes in emotionality emerging with age (Carstensen & Mikels, 2005), the decreased positive affect in remitted patients may also be related to less fortunate circumstances, or lack of opportunities for excitement in patients' everyday life.

Affect dysregulation in symptomatic patients with bipolar disorder

There is a dearth of studies examining affect and its fluctuations in currently symptomatic individuals, reflecting the difficulties of carrying out a research study among this population. Furthermore, findings of studies employing currently sympto-

² Also referred to as emotion recovery (Davidson, 1994), a spontaneous tendency to return to homeostatic state after emotion has reached its peak.

matic individuals might be methodologically limited by the fact that affective experiences of these individuals exceed those experienced by the majority of healthy individuals, and self-report assessment may therefore be an inadequate measurement approach in these circumstances (Johnson, Gruber, & Eisner, 2007).

Only one study employed a diary method over a number of days in symptomatic population; van der Gucht et al. (2009) found that, compared to healthy individuals, both manic and depressed patients reported greater negative affect and its variability, although both were more pronounced in the depressed group. In addition, manic patients also exhibited increased positive affect, whilst no differences in positive affect fluctuations were detected. Further, another longitudinal study found that sensitivity to threat was state-dependent characteristic of depression, whereas responsiveness to reward presented as a trait-like vulnerability (B. Meyer et al., 2001). Bearing some similarities with an earlier study of college students indicating that positive and negative affect are strongly correlated with symptoms of mania and depression respectively (Lovejoy & Steuerwald, 1992), a more recent study of symptomatic bipolar patients (Lozano & Johnson, 2001) reported that high neuroticism was predictive of depressive symptoms, whilst the achievement striving aspect of conscientiousness predicted increases of manic symptoms in a six-month follow-up.

Despite the scarcity of studies directly examining affect in symptomatic individuals, there appears to be convincing evidence for a close relationship between negative affect and depressive symptoms. On the other hand, whilst positive affect also shows a correlation with manic symptoms, reward sensitivity appears less so, yet its potential to trigger manic symptoms has been well documented (Johnson, 2005). Hence, there appears to be compelling evidence for the trajectory from reward sensitivity to positive affect, with the presence of incentives in-between. Further, the conceptualization and ecological validity of incentives may warrant further examination. So far, monetary reward, or false positive feedback, has been used in experimental studies of approach motivation; nevertheless, substantial differences in what one regards as a motivator may appear in the real life. First appearances of more idiosyncratic approach have already occurred, for example in the development of the GOALS program (Johnson & Fulford, 2009), an intervention aimed on regulating goal related behaviours.

The role of self-esteem in bipolar disorder

The concept of self-esteem refers to one's positive and negative evaluations of the self (Rosenberg, 1965), whilst integrating appraisals held by others' with one's own attributional conclusions (Rosenberg, 1979). It has been conceptualized as an affectively based self-referential attitude of self-liking, value and self-acceptance (Brown, 1993; Kernis, 2003; Rosenberg, 1979). Importantly, two facets of self-esteem, explicit and implicit self-esteem, are essential for a thorough understanding of the concept (Bosson, Swann, & Pennebaker, 2000; Kernis, 2003). The relationship between explicit and implicit self-esteem has been addressed within, for example, the Cognitive Experiential Self Theory (CEST; Epstein & Morling, 1995). According to the CEST, people hold two separate but interacting systems, the *cognitive system* operating on a conscious level and prone to cognitive manipulations, and the *experiential system* operating on affective, automatic principles. Explicit and implicit self-esteem then reside in the cognitive and experiential systems, respectively. Furthermore, it has been found that the two aspects of self-esteem are only weakly correlated (Farnham, Greenwald, & Banaji, 1999; Greenwald & Farnham, 2000), and predict different outcomes. In this vein, implicit self-esteem outperforms explicit self-esteem in predicting affectively based responses including negative mood in response to threat (Greenwald & Farnham, 2000).

Of further relevance is the relationship between explicit and implicit self-esteem, referred to as *self-esteem discrepancies*. Two types of self-esteem discrepancies have been described; a combination of high explicit self-esteem but low implicit self-esteem, referred to as *fragile self-esteem*, has been found in narcissistic individuals (Zeigler-Hill, 2006), and in relation to defensiveness and self-enhancement (Bosson, Brown, Zeigler-Hill, & Swann, 2003; Kernis et al., 2005). On the other hand, *damaged self-esteem*, defined by high implicit but low explicit self-esteem, has been associated with negative attributional style and anger suppression (Schröder-Abé, Rudolph, Wiesner, & Schütz, 2007). Notably, individuals diagnosed with major depression have been found to present damaged self-esteem (Valiente et al., 2011; Vazquez, Diez-Alegria, Hernandez-Lloreda, & Moreno, 2008).

Whilst commonly employed self-report measures are processed by the cognitive system, and will therefore be suitable for assessing explicit self-esteem, implicit self-esteem needs to be evaluated by means addressing its automatic, affective nature, independently of conscious self-reflections (Koole, Dijksterhuis, & van Knippenberg, 2001). The most widely used self-report measurement of explicit self-esteem has been the Rosenberg Self-Esteem Scale (Rosenberg, 1965), assessing self-esteem as a unidimensional construct. Some theoretical inconsistencies surround conceptualisation of self-esteem. Although factor analytic studies suggested two independent dimensions comprising positively and negatively worded items (Owens, 1994), other investigations suggested that the proposed subscales might be resulting from the method effects associated with the negative wording of items (Marsh (Marsh, 1996; Spector, VanKatwyk, Brannick, & Chen, 1997), supported by the fact that they have failed to show differentiated association with external concepts (Carmines & Zeller, 1979). Yet, other studies (e.g. J. Scott & Pope, 2003) have distinguished between the two concepts, and showed their differential association with symptoms.

So far, few measures have been available to assess implicit self-esteem, and they all have been based on the assumption that people require less time to process and assign greater value to objects that are closely associated with the self. Tests utilized in research on bipolar disorder have employed, for example, the Pragmatic Inference Task presented as a memory test (Winters & Neale, 1985), an adaption of the Attributional Style Questionnaire (Peterson et al., 1982) and the Name Letter Preference Task (Nuttin, 1987), assessing preferences for initials contained in one's name. However, despite its methodological superiority (Bosson et al., 2000), and relatively common use in major depression research, no study of bipolar disorder has so far utilized the Implicit Association Test (Greenwald & Farnham, 2000).

Despite the theoretical importance of self-esteem in bipolar disorder, the majority of studies have examined only its explicit aspect. A recent meta-analytic report (Nilsson et al., 2010), evaluating 12 studies (Blairy et al., 2004; Daskalopoulou et al., 2002; L. Jones et al., 2005; Knowles et al., 2007; Pardoen et al., 1993; Roy, 1990; J. Scott et al., 2001; Serretti, Olgiati, & Colombo, 2005; Shapira et al., 1999; van der Gucht et al., 2009; Winters & Neale, 1985; Wolf & Muller-Oerlinghausen, 2002) concluded that persons with bipolar disorder in remission show lower self-esteem than

healthy individuals, but higher than those with major depression. The majority of the included studies assessed self-esteem as a uni-dimensional construct, further supported by a large cross-sectional study (Schmitt & Allik, 2005). However, some studies have differentiated between positive and negative subscales of the RSES (Rosenberg, 1965). For example, in a study comparing bipolar individuals in different phases of the illness to individuals with unipolar depression, J. Scott and Pope (2003) reported that greater levels of both positive and negative self-esteem distinguished hypomanic individuals, and that negative self-esteem was the most robust predictor of future depressive episodes.

Another study, not included in Nilsson et al.'s (2010) meta-analysis, found that self-esteem mediated the relationship between social support and depression, i.e. feelings of approval from others contributed to higher self-esteem and hence decreased the risk for depression (Johnson, Meyer, Winett, & Small, 2000). Furthermore, a study of bipolar patients in remission has found increased instability of self-esteem (as well as affect) (Knowles et al., 2007). One experimental study found an increased reactivity of explicit self-esteem in remitted bipolar patients after a mild success and failure feedback, with a more pronounced change in the success condition (Pavlova et al., 2011). Importantly, changes in self-esteem were accompanied by similar responses in affect, indicating a close relatedness of affect and self-esteem. Using the Letter Name Preference Task (Nuttin, 1987), the authors also assessed implicit self-esteem and found a small increase in the success condition in both groups, which did not differ from each other, but a greater decrease in the bipolar group in the failure condition. Nonetheless, due to great variability the difference did not reach significance.

Besides the experimental study by Pavlova et al. (2011), investigations of implicit self-esteem in bipolar disorder, or at-risk persons, are scarce. An earlier study employing the Pragmatic Inference Task, was one of the first to demonstrate empirically the inconsistency between the positive accounts with which patients with bipolar disorder portray themselves, and the negative self-perceptions they hold implicitly (Winters & Neale, 1985). This finding was replicated by later studies employing a combination of explicit and implicit assessments of self-concept (Knowles et al., 2007; Lyon et al., 1999).

An important limitation of much of this research is that, despite some findings on the stability of explicit self-esteem over time, which is potentially an important feature distinguishing bipolar disorder from major depression, similar information is missing entirely in respect to implicit self-esteem. Furthermore, the within-person relationship between explicit and implicit self-esteem has not so far been examined in respect to bipolar disorder.

Offspring at a high genetic risk of bipolar disorder

The most robust risk factor for developing bipolar disorder is a family history of the illness. A recent large population study showed that the risk of bipolar disorder increases from 0.48% for individuals with no family history of bipolar disorder, to 4.4% for those who have one parent with bipolar disorder, and 24.9 % for those with both parents affected (Gottesman, Laursen, Bertelsen, & Mortensen, 2010). Offspring of parents with bipolar disorder comprise a specific population with a combined risk for mental health problems (Goodwin & Jamison, 2007). Besides an increased genetic risk for bipolar disorder (Kendler, Pedersen, Farahmand, & Persson, 1996; Simon et al., 2003), these children are subjected to specific environmental and contextual risk factors related to living with a parent with mental health problems. An association between offspring psychopathology and marital discord, divorce, and the degree of chronicity of illness in the parent (Grigoriu-Serbanescu et al., 1989; LaRoche et al., 1985), or the quality of communication between offspring and parent (Inoff-Germain, Nottelmann, & Radke-Yarrow, 1992), has been well documented. Although findings of high genetic risk studies might not be immediately generalizable to all probands with bipolar disorder, such studies have already brought important insights regarding the developmental pathway of the disorder, and important psychological and behavioural characteristics. The following section offers a brief overview of relevant studies.

Psychopathology

A number of studies have consistently reported an elevated rate of a broad range of psychopathology in the offspring of bipolar parents, including mood disorders, anxiety, attention deficit or substance abuse disorders, and high level of comorbidity (K.

D. Chang, Steiner, & Ketter, 2000; Lapalme et al., 1997; Merikangas, Prusoff, & Weissman, 1988). Nevertheless, the extent of the risk and type of psychopathology has been variable. Some of these inconsistencies may be explained by methodological differences, or age of probands, as supported by longitudinal studies showing that with time psychopathology rates increase and evolve (Duffy, Alda, Hajek, Sherry, & Grof, 2010; Mesman, Nolen, Reichart, Wals, & Hillegers, 2010; Radke-Yarrow, Nottelmann, Martinez, Beth Fox, & Belmont, 1992).

A meta-analysis by Lapalme et al. (1997) included 17 studies published between 1980 and 1992, and reported an overall psychopathology rate of 52%, mood disorders rate of 26%, and bipolar disorder rate of 5.2% for offspring of bipolar patients, in comparison to 29%, 8.3% and 0% in control children, respectively. Similarly, in a review by Delbello and Geller (2001), 5 – 67% of bipolar offspring met criteria for mood disorders, compared to 0 – 38% of offspring of healthy parents, whilst rates for non-mood disorder psychopathology ranged from 5 – 52% in bipolar offspring, and from 0 – 25% in control children. To date, a number of more recent studies, not included in the above reviews, have examined psychopathology in offspring of bipolar parents, and often reported even higher rates (Akdemir & Gökler, 2008; Birmaher et al., 2010; Birmaher et al., 2009; Henin et al., 2005; Hirshfeld-Becker et al., 2006; Nurnberger et al., 2011). For example, M. K. Singh et al. (2007) reported that 78% of high-risk children (mean age 10.2 years), compared to 24% of children of healthy parents, met diagnostic criteria for psychopathology. Furthermore, 16% of bipolar offspring met diagnostic criteria for bipolar I disorder, as compared to none of control children. However, an important limitation of cross-sectional studies is that they provide only a snapshot picture of psychopathology rates at the time of assessment, and are unable to provide insight on how symptomatology evolves.

So far, few studies have provided a comprehensive portrait of the trajectory of psychopathology in high-risk children by following their participants over a number of years. Akiskal et al. (1985) followed clinically referred juvenile offspring or siblings of bipolar probands for, on average, over three years. These individuals presented with anxiety disorders and mood disturbances including cyclothymia and dysthymia, and over the course of the follow-up progressed into major depressive and hypomanic dis-

orders. However, none of these individuals developed mania before the onset of adolescence.

In another longitudinal study of offspring of women diagnosed with major depression, bipolar disorder, medical problems or healthy controls, C. Hammen (1990) compared outcomes up to three years. Offspring of mothers with bipolar disorder tended to develop anxiety and mood disorders, and later in development also showed symptoms of bipolarity. These children, however, presented as better functioning than the children of depressed mothers. Also, no cases of mania were found before puberty.

Three larger cohorts followed the offspring of bipolar parents for more than a decade in the US, Canada, and the Netherlands. The Children and Adolescent Research Evaluation (CARE) study launched in 1994 has followed 115 children of Amish parents with bipolar disorder I for 16 years to identify the pattern of prodromal symptoms related to the onset of bipolar disorder (Egeland et al., 2012; Egeland et al., 2003; Shaw, Egeland, Endicott, Allen, & Hostetter, 2005). The development of symptoms progressed from internalising to externalising problems, as children moved from childhood to puberty. The childhood prodromal features included mood lability, low energy, sleep problems, anxiety/hyper-alertness, attention problems, and somatic complaints; moreover, these problems occurred periodically. With progression, mania-like symptoms, such as sleep decrease, high-energy, or excessive talking, became apparent, although none of the children met the diagnostic criteria for mania. Further, only eight high-risk offspring have developed mania over the course of the follow-up and none of them with prepubescent onset.

Another longitudinal study commenced in 1995 in Canada, and annually followed 207 children (36 children were recruited for the initial study) for up to 15 years (Duffy, Alda, Crawford, Milin, & Grof, 2007; Duffy, Alda, Hajek, & Grof, 2009; Duffy et al., 2010; Duffy & Carlson, 2013). The authors found that by the last assessment 71% of the offspring met diagnostic criteria for DSM-IV Axis 1 psychopathology, 55% for mood disorders, and 16.3% bipolar spectrum disorders with a mean age of onset 17 years ($SD = 4$ years). The heightened risk of onset of major mood episodes started from age 12, and continued throughout the observations. Of relevance, offspring of lithium nonresponders showed increased rate of neurodevelopmental problems including

ADHD or learning disabilities. In addition, children with antecedent anxiety disorder showed a 2.5 fold increase in risk of major mood disorders.

Finally, a Dutch study initiated in 1997 recruited 140 high-risk offspring and reassessed them one, five and 12 years later (Hillegers et al., 2005; Mesman et al., 2010; Reichart et al., 2004; Wals et al., 2001). Of the original sample, 77% was followed for the full 12 years. Over the study period, the percentage of children meeting the diagnostic criteria for DSM-IV Axis I disorder increased from 44% to 72%; for mood disorders 27% to 57%; and for bipolar spectrum disorders from 3% to 13%.

Despite the differences in methods utilized, the findings of the above studies share important similarities. First, they have presented converging evidence of the progression from non-specific problems in childhood to anxiety and minor depressive symptoms during school years, followed by major depressive episodes, with bipolarity emerging a few years later in adolescence. Next, mania was rarely reported before puberty. Of further importance are findings that prodromal non-mood symptoms displayed episodically, rather than persistently.

This is in a contrast to studies reporting high rates of behavioural problems, ADHD and bipolar I disorder in high-risk offspring (Birmaher et al., 2010; Birmaher et al., 2009; Hirshfeld-Becker et al., 2006; Nurnberger et al., 2011; M. K. Singh et al., 2007). The discrepancies in findings might be related to inconsistencies associated with definition of the diagnosis of mania in children and adolescents, which has been a subject of debate for decades. Next, Duffy et al. (2011) reviewed 11 high-risk studies of life-time psychopathology in high-risk offspring, and suggested that selection criteria and method of clinical assessment might be important determinants in the nature of findings, with studies employing self-referred participants presenting increased rates of psychopathology and more externalising problems including ADHD. Further, in the general population, hypomania and mania-like symptoms have been reported as common in childhood and adolescence, and have not been necessarily associated with a risk for bipolar disorder (Tijssen et al., 2010).

In the light of longitudinal high-risk studies, Duffy has proposed a clinical staging model of the trajectory of development of bipolar disorder in high-risk children (Duffy et al., 2009; Duffy et al., 2010). In addition, findings of longitudinal high-risk

offspring further emphasise the inadequacy of the diagnostic criteria, which currently fail to detect early stages of bipolar disorder, might lead to misdiagnosis, and to an inappropriate treatment. In order to effectively identify individuals at risk of mood disorders at early stages, the diagnostic process should incorporate screening for family history, and the knowledge of developmental trajectories of mood disorders (Duffy & Carlson, 2013).

Personality traits

Personality traits have been defined as stable components of a personality (Costa, Herbst, McCrae, & Siegler, 2000), which are, similarly to mood disorders (Craddock & Jones, 1999; Merikangas & Low, 2004), highly heritable and aggregate in families (Bratko & Marusic, 1997). The link between personality traits and mood disorders has been widely studied (for review see Christensen & Kessing, 2006; Sass & Junemann, 2003). Individuals diagnosed with bipolar disorder previously showed elevated levels of openness and extraversion in comparison to unipolar patients (Bagby et al., 1996). Prospectively, high neuroticism has predicted increases in depressive symptoms, whilst high achievement predicted increases in symptoms of mania over time (Lozano & Johnson, 2001). However, only a few studies have examined personality in children at high-genetic risk, with varied assessment strategies.

Preliminary findings have suggested that children of bipolar parents are more active and aggressive (Decina, Kestenbaum, Farber, & Kron, 1983), and show higher emotional dysregulation (Hirshfeld-Becker et al., 2003). In uncontrolled study, Chang et al. (2003) evaluated temperament using the Dimensions of Temperament Survey-Revised (DOTS-R; Windle & Lerner, 1986), measuring nine temperament characteristics including activity level, sleep, flexibility, approach/withdrawal, rhythmicity, task orientation or mood. Affected children (i.e. meeting criteria for Axis I disorder) presented with lower flexibility, mood and task orientation. As a part of a prospective study, Duffy, Alda, Trinneer, et al. (2007) assessed temperament utilizing the Emotionality, Activity, Sociability and Shyness Temperament Questionnaire (EAS; Buss & Plomin, 1987), life events and psychopathology in children of bipolar parents aged 8 – 25 years. Psychopathology was related to higher number of life events and increased

emotionality (the main characteristic of neuroticism), both of which were found to have increased levels in affected children. However, only emotionality was associated with Axis I psychopathology. Further investigating the same sample, Doucette, Horrocks, Grof, Keown-Stoneman, and Duffy (2013) reported that increased emotionality was predictive of an increased risk of psychopathology and mood disorders, particularly in high-risk offspring, over time. However, the results remained uninformative as to whether or not the identified temperament reflects a premorbid risk factor as some offspring already had a history of mood episodes.

A controlled family study by Rothen et al. (2009) examined both intra-individual and transgenerational associations between mood disorders and personality traits in a cohort of bipolar and unipolar parents and their offspring, compared to healthy controls, employing the Eysenck Personality Questionnaire (EPQ; Eysenk & Eysenk, 1975). In both clinical groups and their offspring, high scores on neuroticism were associated with a history of mood disorders. Furthermore, similarly elevated scores on neuroticism were found in currently remitted patients. In addition, only parents with unipolar depression also showed a negative relationship between extraversion and depressive symptoms, whilst this association did not reach significance in bipolar patients. Nonetheless, no transgenerational effects were identified; that is, personality of offspring did not differ according to mood disorder of parents, nor did the risk for mood disorder in offspring depend on personality traits of parents. Hence, the results were interpreted in keeping with the scar hypothesis suggesting that the history of mood disorders impacts on the psychological characteristics of affected individuals (Klein, Durbin, Shankman, & Santiago, 2002).

Of relevance are studies of the influence of personality style of parents diagnosed with bipolar disorder on the interpersonal functioning in their offspring. In this light, (Ellenbogen & Hodgins, 2004; Ostiguy, Ellenbogen, & Hodgins, 2012) have proposed a model whereby, along with the genetic predisposition for mood disorder expressed in increased oversensitivity to stress, high-risk offspring are also exposed to chaotic and unpredictable environments (Ellenbogen & Hodgins, 2004), with low support and unstructured parenting style (Ellenbogen & Hodgins, 2009). It has been found that high-neuroticism and low agreeableness in parents with affective disorders was associated with increased internalising and externalising problems in their children in

middle childhood (Ellenbogen & Hodgins, 2004), which, in turn, predicted poor interpersonal functioning ten years later (Ostiguy et al., 2012).

The relationship between genetically transmitted vulnerabilities, such as personality traits, and effects of parental diagnosis on family environment is complex, and might not be adequately captured by cross-sectional studies. However, the first promising findings from longitudinal studies indicate that the child-parent dyad interaction may have both detrimental and buffering effects on high-risk offspring, emphasising the need for preventative therapeutic interventions targeted at this population. In this vein, S. Jones et al. (2013) have reported an improvement in high-risk offspring behaviour and perceived parenting as an effect of a web-based positive parenting intervention. The available literature related to parenting style and communication will be covered in more detail in the following section.

Parenting style and communication

Investigations of environmental influences are of relevance as they contribute, both directly and by activating relevant genes, to the development of psychopathology (Walker, Sabuwalla, & Huot, 2004). Findings to date have indicated the impact of parental diagnosis on family environment; for example, divorce rates (e.g. Brodie & Jeff, 1971), perceived burden of upbringing (Chakrabarti, Kulhara, & Verma, 1992), and affective negativity (Inoff-Germain et al., 1992) have all been found to be increased in families of bipolar patients compared to families of healthy individuals. Reports found that family environment of bipolar parents is more often lacking structure and cohesion, and shows increased interpersonal conflict (K. D. Chang et al., 2000; Ellenbogen & Hodgins, 2004). In a recent online study, bipolar parents reported considerable personal difficulties and difficulties raising their children (Calam, Jones, Sanders, Dempsey, & Sadhnani, 2012). Furthermore, the majority of parents described their children as experiencing difficulties with adjustment.

However, few studies have included children's perception of the family environment and parental practices, an important source of information for an adequate assessment. A controlled study by Reichart et al. (2007) found that index and control off-

spring did not differ in their perception of family environments, and that the severity of parent's illness had no effect on offspring's perception of parental rearing. Moreover, bipolar mothers were perceived as more caring and emotionally warm compared to control mothers, whereas fathers were perceived as less emotionally warm, which might be explained by possible higher aggression in bipolar fathers. Importantly, perceived parental rejection was predicted by psychopathology in the offspring. Vance, Jones, Espie, Bentall, and Tai (2008) examined communication style and family relationships assessing both parents and children. While no differences were found between the index and the control group in children's perception of the family environment, parents with bipolar disorder rated the family environment more critically, and endorsed more negative communication style, than well parents. In addition, current symptoms of depression were associated with more negative perception of family environment in index offspring.

Ostiguy et al. (2009) were the first to use a well-validated semi-structured interview (UCLA Life Stress Interview; Adrian & Hammen, 1993; C. Hammen, 1991), to assess chronic and episodic stress in high-risk offspring in comparison to control offspring. Higher levels of interpersonal and non-interpersonal difficulties, particularly in areas of family relationships, finances and personal health were found in the index participants. Nevertheless, in areas of social life, close friendships and intimate relationships, the index children did not differ from children of well parents.

The inconsistencies in findings related to family environment and family practices might be related to the methods employed, with some indications that utilizing semi-structured interviews is a more valid approach (Ostiguy et al., 2009). Whilst including offspring as informants about the family dynamics is important, it might be methodologically complicated by their age and associated response biases.

Behaviour

Another area of research interest with the aim to identify markers for future bipolar psychopathology has been abnormalities in offspring behaviour, commonly assessed by the Child Behaviour Checklist (CBCL; Achenbach, 1991), a dimensional tool

examining behavioural problems and competencies for children 4 – 18 years, based on parental report. Studies have shown that children displaying continuous irritability, affective dysregulation or outbursts of temper are likely to be diagnosed with bipolar disorder later in life (Carlson et al., 2000). Dienes, Chang, Blasey, Aldeman, and Steiner (2002) also reported elevated CBCL scores in the children of bipolar parents, almost 70% of whom also met diagnostic criteria for psychopathology. Other studies have pointed to the role of early disruptive and attention problems (Carlson & Weintraub, 1993; Henin et al., 2005).

In order to disentangle whether the diagnosis of bipolar disorder in the offspring of bipolar parents has a discrete behavioural profile to that of ADHD, Mick et al. (2003) in a meta-analysis, examined seven studies using the CBCL (Achenbach, 1991). They found that the youth with bipolar disorder displayed elevated scores on aggression, attention problems and anxious/depressed subscales of the CBCL. Further, high-risk children with psychiatric diagnoses scored consistently higher on a number of CBCL subscales (e.g. Dienes et al., 2002; Reichart et al., 2004; Wals et al., 2001). In addition, Giles, Delbello, Stanford, and Strakowski (2007) examined the CBCL profile in high-risk offspring with, and without the diagnosis of bipolar disorder, as compared to healthy controls. The affected high-risk offspring, in comparison to the non-affected, displayed elevated scores on attention problems, delinquent behaviour and aggression. In comparison to healthy controls, affected children scored higher on all subscales. Moreover, high-risk children with no history of psychiatric problems showed increased aggression, depression/anxiety, withdrawal, and attention problems than controls. Similar results were reported in a more recent study (Diler et al., 2011).

One recent longitudinal study of offspring of parents with bipolar disorder, major depression or healthy controls, spanning more than a decade, has employed a novel approach of examining the developmental progression of internalising, externalising and thought problems (Klimes-Dougan et al., 2010). Whilst control children displayed low levels of problems throughout the assessment period, high-risk offspring displayed development from externalising problems to internalising and thought problems (in this order), with a more severe progression in offspring of bipolar parents.

Psychological abnormalities

Despite detailed investigations of abnormal psychological processes in adults diagnosed with affective disorders, little comparable information is available in respect to high-risk offspring. Using a behavioural high-risk paradigm, Cooke and Jones (2009) examined behaviour problems and anger in students 16-18 years of age. High levels of hyperactivity, activation, anger and irritability, as well as low emotionality were significantly associated with risk for bipolar disorder (as assessed by the HPS; Eckblad & Chapman, 1986). However, it is questionable whether this sample indeed represented at-risk individuals, given the finding that high HPS scores were associated with negative emotionality (that is feelings of sadness, low mood, nervousness, fearfulness and somatic symptoms of anxiety).

An earlier study (S. H. Jones, Tai, Evershed, Knowles, & Bentall, 2006) examined psychological style in 25 children of bipolar patients matched to children of well parents. Children of bipolar parents displayed increased fluctuations in self-esteem, higher levels of negative affect, and increased rumination. Furthermore, these differences were driven by elevated scores in affected offspring (those meeting diagnostic criteria for Axis I disorders, 56% of the sample). In addition, examinations of circadian functioning indicated dissimilarities in relation to sleep patterns: index children went to sleep more quickly, and their sleep was longer, yet subjectively perceived as inadequate.

In a recent large study employing the Childrens Affective Lability Scale (CALS; Gerson et al., 1996), Birmaher et al. (2013) found that mood lability, mania-like, anxious/depressed and irritability symptoms may be prodromal signs of bipolar disorder in high-risk offspring. Another study of late has examined attributional style, hypomanic cognitions and temperament in high-risk offspring (Espie, Jones, Vance, & Tai, 2012). Despite an increased rate of psychopathology in high-risk children, no differences in cognitive style, except for a trend towards more internalising tendency were found.

The dearth of studies addressing psychological abnormalities limits the extent to which it is possible to attribute causality to cognitive processes in the development of psychopathology. Further, because of the high incidence of psychopathology in this population, it is important that future research identifies targets for preventative interventions.

Aims of the thesis

Several gaps and limitations in our understanding of bipolar disorder have been outlined across the preceding sections of this introduction. First, the fluctuating nature of bipolar disorder makes examination of any psychological processes extremely difficult, and limits generalizability of the findings beyond the point of assessment. Hence, research designs utilizing repeated assessments, adequately accounting for the co-occurrence of symptoms are paramount. Second, in spite of the fact that self-concept abnormalities are in the core of the diagnosis of bipolar disorder, our understanding here is incomplete as to their predictive value, completeness (explicit vs. implicit), and their relationship to other psychological processes and relevant behaviours. Third, little is understood about the developmental pathway to bipolar disorder pertaining to psychological vulnerabilities. This is an extremely important issue in the light of the evidence that psychotherapeutic interventions for bipolar disorder remain limited in their effectiveness (J. Scott, 2006; J. Scott et al., 2006).

This thesis has attempted to address these issues across developmental stages of the disorder (using adults with bipolar disorder and offspring at genetic risk) and range of degrees of pathologies (from healthy individuals to bipolar patients), and by utilizing a variety of methodological tools (explicit as well as implicit assessments) and designs (including longitudinal and cross-sectional).

Chapters 2 & 3 include secondary analyses of existing datasets collected from (i) bipolar patients included in the randomised control trial for bipolar disorder (J. Scott et al., 2006) and (ii) a smaller group of bipolar patients recruited as a part of a previous PhD project (Smith, 2008). Chapters 4, 5 and 6 examine data collected as a part of the current PhD project, that is from adolescent children of parents with bipolar disorder. Chapters 2, 3 and 4 have utilized both cross-sectional and longitudinal designs, whilst chapters 5 & 6 are cross-sectional investigations.

Chapter 2 sets out a macroscopic analysis of psychological processes relevant to bipolar disorder by examining data collected every 24 weeks for 18 months. The data utilized in this chapter were collected for a randomised controlled trial of the effectiveness of cognitive behavioural therapy (CBT) for bipolar disorder against treatment as

usual (TAU), which took place at five cities in the UK (Cambridge, Glasgow, Liverpool, Manchester, and Preston). The findings from the trial suggested that CBT is no more effective than TAU unless employed at early stages of the illness (J. Scott et al., 2006).

In this chapter, relationships between self-referential psychological processes and specific symptoms of depression and mania are examined cross-sectionally, whilst accounting for the co-occurrence of symptoms. In addition, the capacity for self-referential processes to predict symptoms over time is investigated.

Chapter 3 examines data collected in a previous PhD by Smith (2008), but employs novel analytical techniques which were not available at the time the data were collected yielding results that have not been reported previously. Hence, while the data was not collected by the present author, the present author is solely responsible for the present findings. The study takes a more microscopic approach to the dynamics of psychological processes in bipolar disorder by employing the experience sampling method (ESM) diaries. Here, bipolar patients were asked to make a diary entry at quasi-random intervals ten times a day. Using multilevel modelling, the association between self-esteem, affect, response styles, and symptoms are examined cross-sectionally. In addition, whilst accounting for the co-existence of symptoms of depression and mania, longitudinal analyses are utilized to examine the interplay between affect, self-esteem and coping strategies over time. More specifically, we have examined the effect of mood and self-esteem on engagement in coping strategies at a subsequent time point, and, in turn, the effect of behaviours (i.e. coping styles) on subsequent affect and self-esteem.

In Chapter 4, ESM diaries are utilized to investigate similar relationships as explored in Chapter 3 in the offspring of bipolar parents in comparison to control children with the aim to identifying early behavioural markers of bipolar disorder. The data for this study was collected by the present author.

Chapter 5 employs a cross-sectional design to answer the question whether offspring at genetic risk of bipolar disorder present with psychological abnormalities typical of adults diagnosed with bipolar disorder. Self-esteem, sensitivity to reward and punishment, hypomanic personality and cognitions, novelty seeking, domain-specific risk-taking, and response styles are investigated in offspring of bipolar disorder in comparison to offspring of healthy parents.

Finally, Chapter 6 addresses the concept of self-esteem in the same sample, and examines both of its aspects, explicit as well as implicit self-esteem. It seeks to understand

the within-person relationship between these two aspects of self-esteem and their relevance to symptoms of mania and depression.

Chapter 2

Symptom-specific self-referential cognitive processes in bipolar disorder: A longitudinal analysis

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Abstract

Background: Although depression and mania are often assumed to be polar opposites, studies have shown that, in patients with bipolar disorder, they are weakly positively correlated and vary somewhat independently over time. Thus, when investigating relationships between specific psychological processes and specific symptoms (mania and depression), comorbidity between the symptoms and changes over time must be taken into account.

Methods: 253 bipolar disorder patients were assessed every 24 weeks for 18 months using the Hamilton Rating Scale for Depression, the Bech-Refaelson Mania Scale, the Rosenberg Self-Esteem Questionnaire, the Dysfunctional Attitudes Scale (DAS), the Internal, Personal and Situational Attributions Questionnaire (IPSAQ) and the Personal Qualities Questionnaire (PQQ). We calculated multilevel models using the XTREG module of STATA 9.1, with psychological and clinical measures nested within each participant.

Results: Mania and depression were weakly yet significantly associated; each was related to distinct psychological processes. Cross-sectionally, self-esteem showed the most robust associations with depression and mania: depression was associated with low positive and high negative self-esteem, and mania with high positive self-esteem. Depression was significantly associated with most of the other self-referential measures, whilst mania was weakly associated only with the externalizing bias of the IPSAQ and the achievement scale of the DAS. Prospectively, low self-esteem predicted future depression.

Conclusions: The associations between different self-referential thinking processes and different phases of bipolar disorder, and the presence of the negative self-concept in both depression and mania, have implications for therapeutic management, as well as for future directions of research.

Introduction

Bipolar disorder is characterized by abrupt and unpredictable shifts between states of depression and (hypo)mania (American Psychiatric Association, 1994) and carries high personal and economic costs for affected individuals and their families. The development of effective therapies requires investigation of the underlying psychological and neurobiological mechanisms involved in different phases of the disorder. One important target of psychological interventions, such as cognitive behavior therapy, has been self-referential thinking processes (J. Scott & Pope, 2003).

Studies have identified a number of abnormalities in self-referential cognition in bipolar disorder, with marked similarities to unipolar depression (J. Scott et al., 2000), for example increased rumination (Thomas et al., 2007), an implicit pessimistic attributional style (Lyon et al., 1999), low self-esteem (L. Jones et al., 2005), and dysfunctional attitudes towards the self (J. Scott & Pope, 2003). van der Gucht et al. (2009) found that a negative cognitive style, characterized by sociotropy, autonomy, behavioral inhibition and rumination was more evident during depressive than during other types of bipolar episode, but that this style was still evident in euthymic patients, even after current symptoms were controlled for statistically. In contrast to those with unipolar depression, individuals with bipolar disorder have been characterized as having concerns with perfectionism, autonomy and self-criticism (Alloy, Abramson, Smith, et al., 2006) more complex pattern of self-esteem that depend upon phase of illness (J. Scott & Pope, 2003) and by pronounced short-term fluctuations in mood and self-esteem (Knowles et al., 2007), as well as an increased need for social approval (Pardoen et al., 1993).

Another line of research has focused on psychological mechanisms specific to mania, such as behavioral activation and increased sensitivity to reward (Depue & Iacono, 1989) triggered by goal-attainment events (S. L. Johnson et al., 2000), risk-taking (Thomas et al., 2007; van der Gucht et al., 2009), as well as higher-level cognitive appraisals relating to goal-pursuit (Mansell & Pedley, 2008). van der Gucht et al. (2009) study, these processes were specific to manic episodes. However, Mansell, Morrison, Reid, Lowens, and Tai (2007) have recently reported that higher-level appraisals relating to goal-pursuit (which were not measured in the van der Gucht study) are evident in euthymic patients, and predict the future development of mania.

An important complication in examining psychological processes in bipolar disorder concerns the possibility that depression and mania are not simply polar opposites, and that both can be present in an individual at the same time (Dilsaver, Chen, Shoaib, & Swann, 1999; Sato, Bottlender, Kleindienst, & Moller, 2005). In a longitudinal analysis of symptoms of patients studied for about a year, we (Johnson (Johnson et al., 2011) found that there was a small but statistically significant *positive* correlation between depressive and manic symptoms, but that they nonetheless fluctuated fairly independently over time.

It follows that the longitudinal relationships between symptoms of mania and depression must be taken into account when considering self-referential and other psychological processes in bipolar disorder. The aim of this study was, therefore, to extend the work of Johnson et al. (2011) by examining relationships between specific thinking processes related to the self-concept (namely, self-esteem, externalizing bias, dysfunctional attitudes and self-discrepancies, i.e. constructs that are likely to be related to each other) and specific symptoms (mania, depression), whilst taking into account the comorbidity between the symptoms. In addition to investigating these processes in a cross-sectional design, we examine them longitudinally.

Method

Participants

Data were obtained from 253 individuals diagnosed with bipolar disorder according to DSM-IV (American Psychiatric Association, 1994) recruited for a multicenter randomised controlled trial of adjunctive cognitive-behavioural therapy (CBT) for bipolar disorder. Recruitment was conducted at five NHS sites in the UK, namely Cambridge, Glasgow, Liverpool, Manchester and Preston. Participants were randomly assigned to up to 22 sessions of CBT along with treatment as usual (TAU; n=127) or TAU only (n=126), and assessed on the measures reported in this study every 24 weeks for 18 months (i.e. at four time points: at baseline, 24th, 48th and 72nd week). Exclusion criteria were kept to a minimum so that the recruited sample reflected the clinical complexity of the population.

The sample was selected to be as representative as possible of patients with bipolar disorder likely to be considered for psychological intervention. Inclusion criteria

were age ≥ 18 years, diagnosis of bipolar disorder according to DSM-IV (American Psychiatric Association, 1994), at least two episodes of the illness within the last 12 months (i.e. hypomania, mania, depression, mixed state) according to the DSM-IV and contact with mental health services within the last six months. Exclusion criteria were an acute episode of mania (in which case patients were invited to take part once their manic episode had remitted), rapid-cycling bipolar disorder, bipolar disorder secondary to an organic cause, meeting criteria for borderline personality disorder according to the DSM-IV, uncertain primary diagnosis due to substance misuse, current psychological treatment for bipolar disorder and inability to provide written informed consent. Treatment effects are described elsewhere (J. Scott et al., 2006); in brief there was no overall effect of CBT. Johnson et al. (2011) analysis of the relationship between depressive and manic symptoms in the sample was based on LIFE-II (the Longitudinal Interval Follow-up Evaluation-II; Keller et al., 1987) symptom ratings obtained for weekly periods by telephone interview; the analyses reported here pertain to the less frequent MAS and HRDS face-to-face assessments conducted in the same study, that are more fine grained, offer a wider range of scores, and are therefore more suitable for analyses as continuous variables. The sample characteristics, including the proportions of patients in receipt of different kinds of medication at inception into the study (see J. Scott et al., 2006 for more details), are presented in Table 2.1³. Ethics approval was obtained from the UK North East Multicentre Research Ethics Committees.

Table 2.1 Sample characteristics (N = 253)

Characteristic	Mean (SD) or Percentage
Age (years)	41.2 (10.2)
Age at first episode (years)	26.0 (9.1)
Gender (male/female)	89 (35%)/164 (65%)
Married, cohabiting/Single, divorced or separated	102 (40%)/151 (60%)
Employed or student/Unemployed or retired	77 (30%)/ 176 (68%)
Previous psychological treatment/None	70 (27.2%)/183(72%)

³ 95.7% of the dataset was complete.

Bipolar disorder I/Bipolar disorder II	238 (94%)/ 15 (6%)
Mean HAM/MAS score	8.38 (6.46)/ 2.23 (3.07)
On antidepressants	109 (43%)
Antidepressant alone	11 (4.4 %)
Antidepressants and antipsychotics	9 (3.6%)
Antidepressants and mood stabilizers	49 (19.4%)
Antidepressants, mood stabilizers, antipsychotics	40 (15.9%)
On mood stabilizers	213 (84%)
On antipsychotics	127 (50%)

Note: HAM = Hamilton rating scale for depression (cutoff point ≥ 7 indicating relapse); MAS = Bech-Reafalson mania scale.

Clinical Measures

Two clinical measures were administered in face-to-face interviews conducted by trained interviewers (see J. Scott et al., 2006) at inception and then every eight weeks for 18 months. For the purpose of the present analysis we included measures taken every 24 weeks only, coinciding with the administration of the psychological measures.

- 1 The Hamilton rating scale for depression (HAM; Hamilton, 1960) consists of 17 items rated by the interviewer on a 0-4 scale. Scores of 6/7 and lower indicate remission, whilst scores > 14 indicate need for treatment. The HAM shows inter-rater reliability coefficients up to 0.90 (Hamilton, 1960), good validity and reliability (Rehm, 1988).
- 2 The Bech-Refaelson Mania Scale, Modified Version (MAS; Licht & Jensen, 1997) is widely used to assess symptoms of mania and is designed to be administered alongside the HAM. Each of its 11 items is rated on a five-point scale, resulting in a total score ranging between 0-44. The scale shows a high inter-observer reliability and an acceptable level of consistency across items (Bech, Bowlig, Kramp, & Rafaelsen, 1979).

Psychological Measures

The following psychological measures were administered every 24 weeks for 18 months.

1. The Rosenberg Self-Esteem Questionnaire (RSEQ; Rosenberg, 1965) is a 10-item measure assessing trait self-esteem. Each of the two scales (positive self-esteem and negative self-esteem), can range from 5 to 20, with high scores reflecting high positive/negative self-esteem. Previous studies reported high total RSEQ score endorsed by manic/hypomanic and remitted individuals (Lyon et al., 1999; J. Scott & Pope, 2003). In addition, Scott & Pope found that hypomanic patients score high on both the negative and positive RSEQ scales.
2. The 24-item version of the Dysfunctional Attitudes Scale. (DAS; Power et al., 1994) assesses negative cognitive schemas. Each of the three eight-item subscales (achievement, dependency and self-control) can range from 8 to 56 and items are rated on a seven-point scale. Previous studies have shown that, similarly to those with major depression, bipolar I individuals report high levels of dysfunctional attitudes (L. Jones et al., 2005).
3. The Internal, Personal and Situational Attributions Questionnaire (Kinderman & Bentall, 1996a) was modified from the Attributional Style Questionnaire (ASQ; Peterson et al., 1982) and is designed to assess the extent to which individuals attribute negative and positive events to different attributional loci. The scale consists of 32 social vignettes describing 16 positive and 16 negative events. The respondent is asked to generate the most likely cause of each event and to state whether the cause is due to self, other people or circumstances. Six subscale scores are generated (number of positive events attributed to self, other people, and circumstances; and corresponding scores for negative events) and these are used to calculate two composite scores – externalising bias (EB) and personalising bias (PB). EB is the difference between positive and negative events attributed to self (i.e. $EB > 0$ indicates tendency to attribute more positive events than negative events to the self). PB indicates the proportion of negative events attributed to other people as opposed to external situations, and is calculated by dividing the proportion of negative events attributed to others by the sum of all negative events attributed to external causes (i.e. other people and circumstances; $PB > 0.5$ a indicates tendency to attribute negative

events to other people rather than circumstances). The IPSAQ presents acceptable reliability and validity, and has previously been used to assess schizophrenia patients (Kinderman & Bentall, 1996a) but not bipolar patients. However, studies using the ASQ have found that bipolar manic patients show a normal self-serving bias, whereas bipolar depressed patients have a tendency to attribute more negative than positive events to the self (Lyon et al., 1999).

4. The Personal Qualities Questionnaire (PQQ), based on the Selves Questionnaire (Higgins, Bond, Klein, & Strauman, 1986), was used to assess discrepancies between self-concepts. Participants are asked to generate three lists of up to 10 attributes describing: a) themselves (self-actual); b) who they would like to be (self-ideal); and c) how they think other people see them (other-actual). We used the method of L. Scott and O'Hara (1993) to calculate two scores reflecting the consistency/discrepancy between the self-actual and self-ideal domains (self-actual:self-ideal) and between the self-actual and other actual domain (self-actual:other-actual). Using MS Word's thesaurus we identified matches and mismatches between the relevant domains. Matches were identified if the same word or its synonym was used in the corresponding domains and mismatches if antonyms were used in the corresponding domains. Total self-actual:self-ideal and self-actual:other actual discrepancy scores were calculated by subtracting the total number of matches from the total number of mismatches in each domain. Self-actual: self-ideal discrepancies have been shown to be related to depression (Strauman, 1989; Strauman & Higgins, 1988) whereas self-actual:other-actual discrepancies have been shown to be associated with paranoia (Kinderman & Bentall, 1996b). Bentall et al. (2005) reported that, compared to controls, manic patients showed excessive consistency between self-actual and self-ideal domains whereas bipolar-depressed patients showed excessive discrepancy between the domains. They found that bipolar patients showed no evidence of abnormal self-actual:other-actual consistency/discrepancy scores.

Statistical Analyses

The longitudinal structure of these data is likely to lead to violations of the independence of errors assumption underlying standard unilevel regression analyses. Multi-level modelling is the appropriate statistical technique for addressing these issues, as it

allows for the nested nature of the data (repeated measurements nested within individuals) (Twisk, 2006). We calculated two-level models using the XTREG module of STATA 9.1, with psychological and clinical measures nested within each participant. To account for the unbalanced nature of the design (i.e. data missing in the dataset), all analyses were carried out using maximum likelihood estimation (Rabe-Hesketh & Skrondal, 2005). All multilevel models were estimated on all available data. Hence, participants contributed to an analysis even if they had missing data on predictors, but not when they had missing data on the dependent variables (HAM and MAS scores). Firstly, a multilevel model was estimated to examine the bivariate association between depression and mania. In addition, for each psychological predictor considered (self-esteem, externalizing bias, dysfunctional attitudes, and self-discrepancies) separate multilevel models were estimated using symptom scores (HAM and MAS) as the outcome variables. In light of Johnson et al. (2011) observation of a modest correlation between LIFE-II depression and mania scores over time, models of depression were corrected for the confounding effect of mania by adding MAS scores into the equation. Similarly, models of mania were also estimated whilst controlling for depression in the later analysis.

The cross-sectional analyses considered above allow for the investigation of the symptom-specific associations. However these are not informative of the dynamic (and potentially causal) relationship between self-referential processes and symptoms. Therefore, we carried longitudinal multilevel regression analyses to examine whether the psychological variables found to be associated with depression and mania in the previous analyses predicted symptoms longitudinally. Specifically, we examined whether psychological variables at the previous assessment wave predicted current symptoms of depression and mania (i.e. psychological variables at T1 as predictors of outcome variables at T2; psychological variable at T2 as predictors of outcome variables at T3, and predictors at time T3 predict outcomes at time T4). In analyses using depression as the outcome variable, we controlled for the confounding effect of symptoms of depression at the previous assessment as well as current levels of mania. Similar models were estimated for mania as the outcome variable, whilst controlling for the confounding effect of previous mania and current depression. Finally, all analyses were repeated to control for the potentially confounding effects of antidepressant, antipsychotic and mood stabilizing medication.

Results

Group differences on clinical and psychological measures

As the data were drawn from a clinical trial comparing patients assigned to either CBT or TAU, we examined whether scores of the psychological variables and symptom measures (i.e. depression and mania) differed between groups assigned to different treatments. A series of multilevel regression models were estimated using the categorical predictor group as the independent variable. The results from multilevel analyses showed no significant between-group differences for patients assigned to different treatments for any of the psychological variables (i.e., self-esteem, dysfunctional attitudes, attributional style, and discrepancies between self concept) or for the specific symptoms (i.e. depression and mania) considered in this study (all $ps > 0.11$). These results are consistent with the main outcome findings reported elsewhere (Scott et al. 2006). There was a relatively small but significant association between depression and mania ($\beta = .17$, $SE = 0.03$, $p < .001$, 95% CI [-.10 .23]). This finding, using the HAM and MAS ratings, replicates the previous findings of Johnson et al. (2011) using the more frequent LIFE-II ratings obtained from the same participants, and establishes the need to control for this comorbidity in our analyses of the psychological data.

A breakdown of patients' symptoms at each assessment wave is provided in **Table 2.2**. As HAM and MAS ratings are relevant for only a one-week period, LIFE-II ratings for mania and depression are utilized instead. The score for each time point is retrieved as an average of two weekly ratings prior each assessment. Using this classification of episodes experienced across the life of the study, 161 participants (63.4%) were euthymic throughout, 1(0.4%) participant was depressed throughout, and none were hypomanic/manic throughout. 11 (4.3%) experienced both euthymia and hypomania/mania, 76 (29.9%) experienced both euthymia and depression, and none experienced depression and hypomania/mania in the absence of euthymia. Finally, 5 (2.0%) experienced all three types of episodes.

Table 2.2 Breakdown of mood symptoms ratings at each assessment wave.

LIFE-II N (%)	Week 0		Week 24		Week 48		Week 72	
	Depres- sion	Mania	Depres- sion	Mania	Depres- sion	Mania	Depression	Mania
No symptoms	97 (38.3%)	220 (87.0 %)	126 (49.8%)	184 (72.7 %)	116 (45.8%)	174 (68.8%)	100 (39.5%)	146 (57.7%)
Subsyndromal symptoms	114 (45.1%)	30 (11.9 %)	64 (25.3%)	26 (10.3 %)	67 (26.5%)	21 (8.3%)	59 (23.3%)	25 (9.9%)
Clinically symptomatic	42 (16.6%)	3 (1.2%)	25 (9.9%)	5 (2.0%)	17 (6.7%)	5 (2.0%)	17 (6.7%)	5 (2.0%)

Note: LIFE-II = Longitudinal interval follow-up evaluation II: 'No symptoms' = ratings of 1; 'Subsyndromal symptoms' = ratings of 1.5 - 4; 'Clinically symptomatic' = ratings of 4.5 - 6.

The association of the self-esteem scores with depression and mania

The results of analyses of positive and negative self-esteem in relation to current depression and mania are shown in

Table 2.3. Depression was associated with high negative self-esteem and low positive self-esteem and these associations remained significant when controlling for the confounding effect of mania. When similar models were estimated with mania as the dependant variable, high positive self-esteem became significantly associated with mania only after controlling for current levels of depression. By contrast, high negative self-esteem lost statistical significance when current levels of depression were included in the model.

Table 2.3 Association of the positive and negative scales of the RSEQ with depression (HAM) and mania (MAS)

Model	Dependent variable	Independent variable	β	95% CI
a) Association of positive scale of RSEQ with depression and mania				
1	HAM	SE+	-.50***	-.57 -.44
2	HAM	SE+	-.51***	-.57 -.44
		MAS	.18***	.12 .24
1	MAS	SE+	.00 ns	-.08 .08
2	MAS	SE+	.12**	.04 .21
		HAM	.28	.20 .36
b) Association of negative scale of RSEQ with depression and mania				
1	HAM	SE-	.51***	.44 .57
2	HAM	SE-	.50***	.43 .56
		MAS	.14***	.08 .20
1	MAS	SE-	.12**	.04 .19
2	MAS	SE-	.02 ns	-.07 .10
		HAM	.22 ns	.13 .30

Note. RSEQ = The Rosenberg Self Esteem Questionnaire; SE+ = Positive Self-esteem scale of the RSEQ; SE- = Negative Self-esteem scale of the RSEQ

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

The association of the attributional style with depression and mania

The analyses of attributional style are shown in Table 2.4. Consistent with numerous studies of unipolar patients (Sweeney, Kmiec, & Kupfer, 2000) depression was associated with low externalising bias and this effect remained after including mania into the model. Interestingly, in a model with mania as the outcome variable, an excessive externalising bias reached significance, but only after adding depression into the model. Hence mania, when controlling for depression, was associated with an excessive tendency to assume external causes for negative events. Personalising bias scores, which have been related to paranoia (Kinderman & Bentall, 1996b), were not associated with either of the clinical outcomes.

To more closely study how attributions for negative and positive events were associated with bipolar depression, we carried out a number of multilevel analyses which examined the extent to which positive and negative events were separately attrib-

uted to the three attributional loci: caused by self, caused by others or caused by circumstances (also shown in Table 2.4). We first carried out the analyses with the attributional style scores alone, and in a subsequent step controlled for the effect of mania. Depression was negatively associated with attributing positive events to self and negative events to others, whilst positively associated with attributing negative events to self and positive events to others. All of these effects remained when controlling for mania. By contrast, when we repeated these analyses for mania, we found it was negatively correlated with attributing negative events to self and positively correlated with attributing negative events to others, although both associations were weak. As in the analyses of the attributional composite scores, these findings were only significant when controlling for the confounding effect of depression. Attributions of negative or positive events to circumstances were not predictive of either depression or mania.

Table 2.4 Association of the IPSAQ with depression (HAM) and mania (MAS)

Model	Dependent variable	Independent variable	vari- β	95% CI
i) Examination of externalizing biases				
1	HAM	Externalizing bias	-.22***	-.28 -.15
2	HAM	Externalizing bias	-.23***	-.29 -.16
		MAS	.16***	.10 .23
1	MAS	Externalizing bias	.02 ns	-.00 .05
2	MAS	Externalizing bias	.10 **	.03 .18
		HAM	.25***	.17 .32
ii) Examination of personalizing biases				
1	HAM	Personalizing bias	-.03ns	-.10 .04
2	HAM	Personalizing bias	-.04ns	-.10 .03
		MAS	.15***	.08 .22
1	MAS	Personalizing bias	.05 ns	-.03 .12
2	MAS	Personalizing bias	.05 ns	-.02 .12
		HAM	.23***	.15 .30
iii) Examination of attributing positive events to self				
1	HAM	+Events self	-.14***	-.20 -.07
2	HAM	+Events self	-.14***	-.21 -.07
		MAS	.15***	.08 .22

1	MAS	+Events self	.03 ns	-.05 .10
2	MAS	+Events self	.05 ns	-.02 .12
		HAM	.23***	.16 .31
<hr/>				
iv) Examination of attributing negative events to self				
1	HAM	-Events self	.15***	.08 .22
2	HAM	-Events self	.16***	.09 .23
		MAS	.16***	.09 .23
1	MAS	-Events self	-.06 ns	-.13 .02
2	MAS	-Events self	-.08*	-.15 -.01
		HAM	.23***	.16 .32
<hr/>				
v) Examination of attributing positive events to others				
1	HAM	+Events other	.10**	.03 .17
2	HAM	+Events other	.11**	.04 .17
		MAS	.05***	.03 .07
1	MAS	+Events other	-.00 ns	-.07 .07
2	MAS	+Events other	-.02 ns	-.09 -.05
		HAM	.23***	.15 .31
<hr/>				
vi) Examination of attributing negative events to others				
1	HAM	-Events other	-.11**	-.18 -.04
2	HAM	-Events other	-.12**	-.19 -.05
		MAS	.16***	.09 .22
1	MAS	-Events other	.06 ns	-.01 .14
2	MAS	-Events other	.08*	.01 .15
		HAM	.24***	.16 .31

Note. IPSAQ = The Internal, Personal and Situational Attributions Questionnaire; +Events self = attributing positive events to self ; -Events self = attributing negative events to self; +Events other = attributing positive events to others; -Events other = attributing negative events to others.

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

The association of the dysfunctional attitudes with depression and mania

The analyses of DAS scores are shown in Table 2.5. Consistent with previous research on unipolar depression (Power, Duggan, Lee, & Murray, 1995), total scores were associated with depression, and this effect remained when controlling for mania. In a similar model calculated with mania as the outcome variable, the total scores, which were initially significant, lost significance when depression was added into the model.

To investigate the role of a dysfunctional cognitive style in more detail, we carried out similar analyses with each of the subscale scores (i.e. achievement, dependency and control scales) as independent variables and with depression as the dependent variable. All of the subscales were associated with depression even after controlling for mania. When similar models were calculated with mania as the dependent variable, on the contrary, only achievement and control scores were associated with mania and this effect remained significant only for achievement when depression was added into the model.

Table 2.5 Association of DAS with depression (**HAM**) and mania (**MAS**)

Model	Dependent variable	Independent variable	β	95% CI
i) Examination of total DAS score				
1	HAM	Total	.35***	.28 .43
2	HAM	Total	.33***	.26 .41
		MAS	.13***	.07 .19
1	MAS	Total	.13***	.05 .21
2	MAS	Total	.07ns	-.01 .14
		HAM	.20***	.12 .28
ii) Examination of DAS achievement subscales				
1	HAM	Achievement	.35***	.27 .42
2	HAM	Achievement	.33***	.25 .40
		MAS	.12***	.06 .19
1	MAS	Achievement	.15***	.07 .23
2	MAS	Achievement	.09*	.01 .17
		HAM	.20***	.12 .27
iii) Examination of DAS dependency subscales				
1	HAM	Dependency	.30***	.23 .38
2	HAM	Dependency	.30***	.22 .37

		MAS	.05***	.03 .07
1	MAS	Dependency	.06ns	-.02 .14
2	MAS	Dependency	.00ns	-.07 .08
		HAM	.22***	.15 .30
iv) Examination of DAS control subscales				
1	HAM	Control	.26***	.18 .34
2	HAM	Control	.24***	.17 .32
		MAS	.14***	.08 .20
1	MAS	Control	.10*	.02 .18
2	MAS	Control	.00ns	-.00 .02
		HAM	.21***	.14 .29

Note. DAS = The Dysfunctional Attitudes Scale; Total = DAS Total Scale; Achievement = DAS Achievement subscale; Dependency = DAS Dependency subscale; Control = DAS Control subscale; * $p < .05$, ** $p < .01$, *** $p < .001$.

The association of the self-consistency/self-discrepancy scores with depression and mania

Consistent with previous research with unipolar patients (Strauman, 1989), depression was associated with low self-actual:self-ideal consistency as well as high self-actual:others-actual discrepancy, and these effects remained significant after including mania into the model (see Table 2.6). None of the self-consistency predictors was significantly associated with mania at the first stage. After controlling for depression, the self-actual:self-ideal consistency scores showed a weak positive association with mania, consistent with the previous findings of Bentall et al. (2005).

Table 2.6 Association of PQQ with depression (HAM) and mania (MAS)

Model	Dependent variable	Independent variable	β	95% CI
i) Examination of self-actual:self-ideal consistency				
1	HAM	sa:sid	-.28***	-.35 -.21
2	HAM	sa:sid	-.29***	-.36 -.22
		MAS	.16***	.09 .23
1	MAS	sa:sid	.01ns	-.07 .08
2	MAS	sa:sid	.07*	.00 .15
		HAM	.25***	.17 .33

ii) Examination of self-actual:others-actual consistency				
1	HAM	sa:oa	-.12***	-.19 -.05
2	HAM	sa:oa	-.13***	-.20 -.06
		MAS	.15***	.08 .22
1	MAS	sa:oa	-.01 ns	-.08 .07
2	MAS	sa:oa	.02 ns	-.05 .09
		HAM	.22***	.15 .30

Note. PQQ = The Personal Qualities Questionnaire; sa:sid = self-actual:self-ideal discrepancy; sa:oa = self-actual:others-actual discrepancy; * $p < .05$, ** $p < .01$, *** $p < .001$.

Psychological variables measured at an earlier time point as predictors of current depression and mania

As outlined in our analysis plan, we also attempted to determine whether our psychological variables predicted symptoms at a future assessment point (see Table 2.7). We found that low positive self-esteem and high negative self-esteem at the previous assessment wave were significantly associated with current depression and that this effect remained even after controlling for previous depression and current mania. Similar associations were found when mania was the outcome variable; low positive self-esteem and high negative self-esteem at the previous assessment wave were significant predictors of mania. However, this effect did not remain significant when current levels of depression were added into the model. No other psychological variable significantly predicted future symptoms.

Table 2.7 RSEQ at previous assessment wave as a predictor of current depression (HAM) and mania (MAS)

Model	Dependent variable	Independent variable	β	95% CI
a) Positive self-esteem at previous assessment				
1	HAM	SE+_lag	-.20***	-.29 -.11
2	HAM	SE+_lag	-.12**	-.21 -.04
		HAM_lag	.37***	.28 .45
3	HAM	SE+_lag	-.12**	-.20 -.04
		HAM_lag	.30***	.22 .39
		MAS	.23***	.16 .30
b) Negative self-esteem at previous assessment				

1	HAM	SE-_lag	.17***	.08 .27
2	HAM	SE-_lag	.11*	.02 .19
		HAM _lag	.39***	.30 .47
3	HAM	SE-_lag	.11*	.02 .19
		HAM _lag	.32***	.23 .40
		MAS	.23***	.16 .30
<hr/>				
a) Positive self-esteem at previous assessment				
1	MAS	SE+_lag	-.14***	-.23 -.06
2	MAS	SE+_lag	-.14***	-.22 -.06
		MAS _lag	.25***	.17 .34
3	MAS	SE+_lag	-.06ns	-.14 .02
		MAS _lag	.17***	.09 .26
		HAM	.28***	.19 .37
<hr/>				
b) Negative self-esteem at previous assessment				
1	MAS	SE-_lag	.12*	.03 .21
2	MAS	SE-_lag	.11*	.02 .19
		MAS _lag	.25***	.17 .34
3	MAS	SE-_lag	-.03ns	-.05 .12
		MAS _lag	.17***	.09 .26
		HAM	.29***	.20 .37

Note. RSEQ = The Rosenberg Self Esteem Questionnaire; SE+_lag = Positive self-esteem at previous assessment wave; SE-_lag = Negative self-esteem at previous assessment wave; HAM _lag = depression at previous assessment wave; MAS_lag = mania at previous assessment wave.

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

Controlling for the effects of medication

To rule out any potential confound due to medications, a series of multilevel analyses were carried out to investigate the associations between medication use (i.e. three dichotomous variables representing use of antipsychotic, antidepressant and mood stabilizing medication) and the symptom and psychological variables used in the present analyses. No association was found between the symptom variables and current use of antipsychotics or mood stabilizing medications (all $ps > .05$). However, current use of

antidepressants was significantly related to more severe depressive symptoms ($p < .05$), but no statistically significant association was observed with symptoms of mania ($p > .05$). The use of antidepressants was also significantly related to a number of psychological measures of interest, including lower positive self-esteem, higher negative self-esteem, lower externalizing bias scores, greater self-attributions for negative events, greater other-attributions for positive events and higher DAS dependency scores (all $ps < .05$). Despite these associations, when we re-ran all of the previous analyses on the cross-sectional and prospective relationships between psychological variables and symptoms after controlling for the effect of medication use, all of the findings remained unchanged. These findings suggest that the relationship between negative cognitive style and antidepressant use is confounding by indication, i.e. that negative cognitive styles are related to depressive symptoms that, in turn, lead to use of antidepressants.

Discussion

Bipolar symptoms are inherently unstable over time, presenting special challenges for attempts to understand the underlying mechanisms responsible. A further complication is that depressive and manic symptoms can vary independently over time within the same individual (Johnson et al., 2011), exacerbating the difficulty of identifying which mechanisms are associated with each group of symptoms. We believe this study is the first to investigate how cognitive self-referential processes relate to bipolar symptoms in a way that adequately addresses these difficulties. We examined these relationships, and the predictive properties of the psychological measures, longitudinally, that is in four assessments over a period of 18 months, using robust statistical methods that allow for the interrelatedness of data.

A number of findings require comment and review. Firstly, our cross-sectional analyses show that many of our measures related to the *current symptom status* of the patients participating in the study. Self-esteem, externalizing bias, dysfunctional attitudes and self-discrepancies, were associated with the current severity of depressive symptoms, and these associations remained significant when mania was controlled for in the models. These findings, using robust methods, confirm that, at a psychological level, bipolar depression appears to be very similar to unipolar depression, as observed by previous researchers (e.g. Alloy, Abramson, Smith, et al., 2006; L. Jones et al., 2005; J. Scott et al., 2000).

Consistent with observations of the relationships between goal attainment and goal pursuit (Johnson, 2005; Taylor & Mansell, 2008) current mania was only associated with the achievement subscale of the DAS, once depression had been controlled for. This finding is consistent with Alloy et al. (2009) observation that bipolar individuals score highly on cognitions specifically related to behavioral activation system sensitivity, as proposed by Depue and Iacono (1989) and Depue et al. (1987). Several other self-referential processes became weakly, but significantly, associated with current mania only after controlling for current depression, namely: the self-serving externalizing attributional bias (i.e. avoidance of attributing negative events to self and an inclination to attribute negative events to external causes), and an abnormally low discrepancy between perceptions of the actual self and ideals (similar affects for self-esteem are discussed below). A possible explanation for this observation, in line with psychoanalytic theories beginning with Abraham (1911/1927) is that current mania is associated with a tendency to avoid negative beliefs about the self. Another related interpretation is that bipolar patients have increased need for social approval and desirability (Pardoen et al., 1993).

However, all of these observations concern psychological abnormalities, which are temporarily closely linked to symptoms. Our prospective analyses revealed few associations between our psychological variables and future symptoms, thereby confirming that most of the mechanisms under investigation (for example, dysfunctional attitudes and attributional processes) are tied to current symptom severity. However, self-esteem appeared to be not entirely state-related, predicting depression longitudinally. Interestingly, the observed relationship between self-esteem and mania was different for the cross-sectional versus longitudinal analyses. In our cross-sectional analyses, current mania was significantly associated with high positive self-esteem after controlling for concurrent depression, whereas negative self-esteem no longer reached significance after concurrent levels of depression were included in the model. By contrast, longitudinally, future mania was predicted by low positive and high negative self-esteem, which is the pattern that we found to be associated with current depression cross-sectionally. It is important to note that the predictive properties of self-esteem for mania were not sustained when current depression was added into the model. A possible explanation for this group of findings is that negative self-esteem leads to future depression, which in turn leads to compensatory mechanisms in an attempt to avoid depressive feelings, for example externalizing attributions, thereby provoking manic symptoms.

These findings add to existing evidence about the role of self-esteem and related processes in bipolar disorder. In a meta-analytic study Nilsson et al. (2010) showed that remitted bipolar patients have, in general, lower self-esteem compared to control participants, but slightly higher self-esteem than unipolar depressed patients. Studies comparing patients with bipolar disorder and major depression have found similarities in both groups but only on implicit (rather than explicitly assessed) self-esteem (Corwyn, 2000). In a study comparing bipolar remitted, unipolar and healthy individuals, Knowles et al. (2007) found that remitted bipolar patients showed an apparently contradictory pattern of normal self-esteem when measured explicitly, but highly unstable self-esteem when assessed over a period of a few days, and concluded that the instability was indicative of a negative underlying self-schema. Similarly, J. Scott and Pope (2003) found that high scores on negative self-esteem were predictive of future depressive episodes. In sum, our results support previous evidence that bipolar depression is related to, and predicted by, low self-esteem (S.L. Johnson et al., 2000; J. Scott & Pope, 2003; Staner et al., 1997) using explicit measures and a longitudinal assessment.

Despite the strengths of the present study (a large representative sample, a longitudinal design with repeated assessments, carried out by trained raters) some limitations must be acknowledged. Although we have shown that many of the processes we investigated are associated with current symptoms, the absence of a healthy control group prevented us from determining whether there was a residual negative cognitive style when the patients were euthymic. In a cross-sectional study comparing controls with bipolar patients in different episodes, van der Gucht et al. (2009) reported that negative cognitive processes were most evident during bipolar depression, but were present in an attenuated form even during the euthymic phase. A second limitation concerns the measures employed, which reflected our understanding of bipolar disorder at the time that the study was designed. Hence, the relatively few associations between self-referential processes and mania may, at least partly, be due to the fact that these measures were developed to assess cognitive styles in individuals with unipolar depression, rather than for example reward-seeking, which is now thought to be an important process in mania (Abler, Greenhouse, Ongur, Walter, & Heckers, 2008; Johnson, 2005). In particular, it would have been useful to have employed measures of behavioral activation (van der Gucht et al., 2009) and goal-pursuit related appraisals (Mansell et al., 2007) and these should be included in future studies of this kind.

As noted earlier, we believe this is the first study of psychological processes in bipolar disorder to use robust statistical methods to allow for covariation between symptoms and fluctuations over time. We believe that our approach has implications for, and is applicable to, any condition in which symptom covariation and instability over time is an issue (probably the majority of psychiatric disorders). In terms of clinical implications, the findings accentuate the importance of the therapeutic management of negative self-concept shared by both depression and mania in bipolar disorder.

Chapter 3

The dynamics of mood and coping in bipolar disorder: Longitudinal investigations of the inter-relationship be- tween affect, self-esteem and response styles

Pavlickova, H., Varese, F., Smith, A., Myin-Germeys, I., Turnbull, O.H., Emsley, R., & Bentall, R.P. (2013). The dynamics of mood and coping in bipolar disorder: longitudinal investigations of the inter-relationship between affect, self-esteem and response styles. *Plos One*, 8. doi: 10.1371/journal.pone.0062514

Abstract

Background: Previous research has suggested that the way bipolar patients respond to depressive mood impacts on the future course of the illness, with rumination prolonging depression and risk-taking possibly triggering hypomania. However, the relationship over time between variables such as mood, self-esteem, and response style to negative affect is complex and has not been directly examined in any previous study – an important limitation, which the present study seeks to address.

Methods: In order to maximize ecological validity, individuals diagnosed with bipolar disorder (N = 48) reported mood, self-esteem and response styles to depression, together with contextual information, up to 60 times over a period of six days, using experience sampling diaries. Entries were cued by quasi-random beeps from digital watches. Longitudinal multilevel models were estimated, with mood and self-esteem as predictors of subsequent response styles. Similar models were then estimated with response styles as predictors of subsequent mood and self-esteem. Cross-sectional associations of daily-life correlates with symptoms were also examined.

Results: Cross-sectionally, symptoms of depression as well as mania were significantly related to low mood and self-esteem, and their increased fluctuations. Longitudinally, low mood significantly predicted rumination, and engaging in rumination dampened mood at the subsequent time point. Furthermore, high positive mood (marginally) instigated high risk-taking, and in turn engaging in risk-taking resulted in increased positive mood. Adaptive coping (i.e. problem-solving and distraction) was found to be an effective coping style in improving mood and self-esteem.

Conclusions: This study is the first to directly test the relevance of response style theory, originally developed to explain unipolar depression, to understand symptom changes in bipolar disorder patients. The findings show that response styles significantly impact on subsequent mood but some of these effects are modulated by current mood state. Theoretical and clinical implications are discussed.

Introduction

Attempts to understand the psychological mechanisms underlying bipolar disorder are made difficult by the multidimensional, dynamic and fluctuating nature of the symptoms experienced by patients. For example, although the term ‘bipolar disorder’ implies that depression and mania lie at opposite ends on a spectrum of affect, cross-sectional comparisons indicate that these two groups of symptoms lie on separate dimensions of psychopathology, so that patients can be simultaneously depressed and manic (Bauer et al., 2005), explaining why patients sometimes present with mixed episodes (McElroy et al., 1992). It has been reported that mood in bipolar patients can fluctuate chaotically over short periods of time (Gottschalk, Bauer, & Whybrow, 1995), and longitudinal studies have shown that, within individuals, manic and depressive symptoms vary relatively independently with each other, although with a small but statistically significant positive correlation between them (Johnson et al., 2011), again explaining why mixed episodes are sometimes observed. The implication of these observations is that psychological studies of bipolar patients should ideally be conducted with sophisticated designs that take into account the complex cross-sectional and longitudinal structure of symptoms, so that covariations between symptoms and psychological processes can be adequately detected.

Problems of self-esteem and related processes seem to be particularly evident in bipolar disorder; almost a century ago, Kraepelin (1921) described in detail how manic grandiosity sharply contrasts with low self-esteem and withdrawal during periods of depression. More recent research on the psychological mechanisms in bipolar disorder has focused on self-related cognitive processes already implicated in unipolar depression, for example as proposed in theories by Beck (1987) and by Abramson et al. (1988). These studies have shown that individuals with bipolar disorder often present with a negative attributional (explanatory) style (Lyon et al., 1999), a negative self-concept, and dysfunctional attitudes towards the self (Hollon et al., 1986; L. Jones et al., 2005; J. Scott & Pope, 2003; J. Scott et al., 2000). In contrast to Kraepelin’s earlier observations, cross-sectional comparisons suggest that these pessimistic cognitive biases may be evident across all phases of bipolar disorder (van der Gucht et al., 2009).

However, a somewhat different picture has emerged from studies employing longitudinal designs or studies examining symptoms rather than episodes. These studies have indicated that bipolar disorder is associated with substantial instability in affective

and self-related processes. Pronounced daily fluctuations in self-esteem have been observed in studies of remitted patients (Knowles et al., 2007), those in depressive episode (van der Gucht et al., 2009), and also in studies of individuals assessed by questionnaire measures to be at high-risk of bipolar disorder (Bentall et al., 2011). Further, low self-esteem in persons with bipolar disorder prospectively predicts worsening of affective, particularly depressive, symptoms (S.L. Johnson et al., 2000; J. Scott & Pope, 2003; Staner et al., 1997). In a longitudinal study (Chapter 2,), where patients were assessed every 6 months, although self-esteem correlated positively with current mania and negatively with current depression, negative self-esteem predicted both future depressive and future manic symptoms. Other self-related cognitive measures administered in the study, although correlating with current symptoms, did not predict future symptoms.

In a similar vein, pronounced fluctuations of affect in bipolar disorder have been indicated by studies of high-risk student samples (Bentall et al., 2011; Hofmann & Meyer, 2006), subsyndromal individuals (Lovejoy & Steuerwald, 1995), remitted bipolar patients (Knowles et al., 2007), and those currently in manic and depressive episode (van der Gucht et al., 2009). Notably, affect and self-esteem appear to fluctuate in concert and hence to be tightly linked (Pavlova et al., 2011; Pietromonaco & Barrett, 2009).

One way of examining shifts in mood and self-esteem is in the context of the coping mechanisms or response styles individuals employ as a response to low, or elevated, mood. In her work on unipolar depression, Nolen-Hoeksema (1991) argued that these mechanisms include rumination, problem solving, distraction activities and risk-taking. In a factor-analytic study by Knowles et al. (2005), problem-solving and distraction loaded on a single factor they labeled active coping.

A number of studies have found that rumination predicts onset and severity of depression in unipolar patients (Nolen-Hoeksema, McBride, & Larson, 1997; Nolen-Hoeksema & Morrow, 1993; Nolen-Hoeksema et al., 1994). Expanding on the original theory, Thomas and Bentall (2002) hypothesized that, whilst at times rumination may exacerbate depressive mood in bipolar patients, at other times it may instigate vigorous attempts to avoid negative mood by engaging in high-risk activities resulting, in turn, in hypomania or full-blown mania. Thomas et al. (2007) found high levels of rumination in remitted bipolar patients compared to controls, and high levels of self-reported active coping (problem solving and distraction activities) and risk-taking in manic patients compared to controls. van der Gucht et al. (2009) found high levels of rumination in patients in all phases of bipolar disorder, including remission, but again that self-reported

risk-taking was elevated only in currently manic patients. Only one study has examined response styles in relation to daily life experiences and fluctuations in mood and self-esteem (Bentall et al., 2011). In this experience sampling study of high-risk sample of students selected by questionnaire, higher levels of rumination were associated with lower self-esteem, even though no differences in rumination between the low-risk and high-risk groups were identified.

Insight into the temporal dynamics of response styles in relation to other variable psychological processes such as mood and self-esteem has been precluded by the cross-sectional designs employed in most previous studies of bipolar disorder.

Therefore, the aim of the present study was to examine processes specific to bipolar disorder. First, we investigated cross-sectional associations between symptoms of depression and mania with daily life correlates (i.e. affect and self-esteem) and coping styles (rumination, risk-taking and adaptive coping). We predicted that symptoms of depression would be associated with low mood and self-esteem, and more pronounced fluctuations of both. In addition, we expected depressive symptoms to be related to increased levels of rumination. As to symptoms of mania, we predicted associations with increased mood, self-esteem, and their fluctuations. Furthermore, mania was expected to be associated with risk-taking.

Second, this study sought to examine prospective associations between mood, self-esteem and response styles in two ways: a) whether mood and self-esteem at time T-1 predict engagement in response styles at the subsequent time point. We expected that low mood and self-esteem at time T-1 would predict increased levels of rumination at time T. In turn, high mood and self-esteem would predict increased risk-taking at time T; b) whether engaging in coping styles at time T-1 influences mood and self-esteem at time T. We expected that engaging in rumination would lead to decreased mood and self-esteem, whilst engaging in risk-taking would improve mood and self-esteem.

Methods

Participants

Ethical approval was obtained from the Leeds (East) Research Ethics Committee and the University of Manchester Senate Ethics Committee. Inclusion criteria for inception into the study were a) diagnosis of bipolar affective disorder, b) currently receiving

outpatient care, c) ability to speak/read English, and d) ability to complete the self-report measures independently. Participants were excluded from the study if they met diagnostic criteria for schizophrenia, schizoaffective disorder, primary substance misuse disorder, or had a history of post-natal depression with no hypomania/mania according to DSM-IV (American Psychiatric Association, 1994). Potential participants were approached via secondary care and self-help groups: 129 covering letters were posted by consultant psychiatrists, resulting in 40 responses, out of which 7 individuals withdrew prior to interview, 5 after receiving further information. Out of the 28 participants commencing the study, 5 dropped out, and 23 completed the study. In addition, consultant psychiatrists approached prospective participants during clinics (N unknown), out of which 3 withdrew after gaining further information, and 24 completed the study. Only one participant was recruited via self-help groups. A total of 48 participants diagnosed with bipolar disorder provided written informed consent and were included into the study⁴: 28 were in a remission⁴, 12 were currently depressed and 8 currently hypomanic. Participants' characteristics are described in Table 3.1. All participants completed the Structured Clinical Interview for Axis I DSM-IV Disorders (First, Spitzer, Gibbon, & Williams, 1995).

Table 3.1 Sample characteristics (N = 48)

Characteristic	Mean (SD) or Percentage
Age (years)	45.42 (10.83)
Age at first episode (years)	27.20 (9.71)
Gender (male/female)	14 (29%) / 34 (71%)
Married, cohabiting/Single, divorced or separated	21 (44%) / 27 (56%)
Employed/Unemployed/Retired	24 (50%) / 18 (38%) / 6 (12%)
On antidepressants	65%
On mood stabilizers	71%
On antipsychotics	17%
Remitted	28 (57%)
Hypomanic	8 (17%)
Depressed	12 (26%)

⁴ 78.4% of the dataset was complete.

HAM	4.16 (5.13)
MAS	2.50 (4.26)

Note: HAM = The Hamilton rating scale for depression; MAS = The Bech-Refaelson mania scale.

Clinical measures

To assess symptom levels at the beginning of the study, participants completed two clinical measures in a face-to-face interview.

1. The Hamilton rating scale for depression (HAM, Hamilton, 1960) consists of 17 items rated by the interviewer on a 0-4 scale with higher scores indicating more severe depressive symptomatology. The HAM shows inter-rater reliability coefficients up to 0.90 (Hamilton, 1960), and good validity and reliability (Rehm, 1988).

2. The Bech-Refaelson Mania Scale, Modified Version (MAS, Bech et al., 1979) is widely used to assess symptoms of mania and designed to be administered alongside the HAM. Each of its 11 items is rated on a five-point scale, resulting in a total score ranging between 0-44. The scale shows a high inter-observer reliability and an acceptable level of consistency across items (Bech et al., 1979).

Psychological measures

All variables pertaining to the psychological processes of concern in this study were derived from experience sampling method (ESM) diaries that participants were asked to complete over a six-day period.

Experience sampling method

The experience sampling method (ESM, Csikszentmihalyi & Larson, 1987) is a repeated self-assessment procedure completed in participants' natural environments and thus advantageous over classically administered self-report questionnaires for its high ecological validity (Hurlbert, 1997). Its validity, reliability and feasibility have been demonstrated in a number of clinical populations, such as in samples of individuals with diagnosis of schizophrenia (Myin-Germeys, Delespaul, & deVries, 2000; Myin-

Germeys & van Os, 2007), depression (Myin-Germeys et al., 2003; Peeters, Nicolson, Delespaul, deVries, & Berkhof, 2003), panic disorder (Dijkman-Caes & deVries, 1991) and bipolar disorder (Havermans et al., 2010; Kwapil et al., 2011; Walsh, Royal, Brown, Barrantes-Vidal, & Kwapil, 2012).

Participants received a pre-programmed digital wristwatch emitting 10 beeps a day in quasi-random intervals (between 7.30 a.m. and 10.30 p.m.) and six pocket-size diaries to be completed over the period of six days (i.e. one diary to be completed per each study day). The diary booklet consisted of 10 self-report forms (one per beep), and each comprised scales assessing mood, self-esteem, and styles of coping with depressive mood. Participants received a thorough explanation of the method during a briefing session. To ensure that participants understood the method, they were asked to fill in one form in a trial booklet during the briefing. During the 6-day study period, participants were contacted by telephone to ascertain that they had managed to comply with the procedure, and were thoroughly debriefed after completion of the study. Only participants who completed more than 20 valid responses (i.e. an entry between 5 minutes prior and 15 minutes after the beep) were included in the analyses (Delespaul, 1995). This resulted in exclusion of two participants (both females, mean age 59, with depression ratings of 0, 0 and mania ratings of 1 and 2).

Experience Sampling Method Variables

The items included in the ESM self-assessment forms were all rated on 7-point Likert scales and used to define the following variables:

1. Momentary self-esteem and self-esteem fluctuations: Four items in the self-report form assessed momentary self-esteem (i.e. “I am a failure”, “I am ashamed of myself”, “I like myself”, and “I am a good person”). Using the Kaiser criterion, principal component analysis (PCA) on the raw within-participant scores revealed one factor accounting for 63% of the total variance. Both negative and positive items showed a strong loading on the factor (positive items < -.68; negative items > .80) and high internal consistency after reversing the two negative items scores (Cronbach’s $\alpha = .79$). The momentary self-esteem (SE) score was defined as the mean score of the four items. Each fluctuation in self-esteem was defined as the absolute difference in the ratings of self-esteem be-

tween consecutive time points, with higher scores reflecting more intense fluctuations.

2. Positive and negative affect, and mood fluctuations: Nine items assessing momentary positive (e.g. “I feel cheerful”) and negative (e.g. “I feel sad”) affect were used. PCA confirmed two separate factors (eigenvalues > 1) together accounting for 66% of variance. The positive affect (PA) factor consisted of four items (“cheerful”, “excited”, “relaxed” and “satisfied”; Cronbach’s $\alpha = .82$) and the negative affect (NA) factor incorporated five items (“lonely”, “anxious”, “sad”, “irritated” and “guilty”; Cronbach’s $\alpha = .86$). Fluctuation in mood was defined as the absolute moment-to-moment change in ratings of a) positive mood, and b) negative mood; that is, at each time point two variables were obtained, fluctuation in positive mood and fluctuation in negative mood; higher values reflected more pronounced fluctuations.

3. Assessment of responses to depression

Based on the revised version of Nolen-Hoeksema’s Response Style Questionnaire (Knowles et al., 2005; Nolen-Hoeksema, 1991), the self-assessment forms contained eight items evaluating participants’ coping and response strategies for depression (e.g. “Since the last bleep I have thought about the bad things that have happened to me.”) rated on a 7-point Likert scale ranging from -3 (Disagree) to +3 (Agree). Due to bimodal distribution of the scores suggesting that a portion of participants misunderstood the scale as 0 indicating ‘no engagement’, we have recoded all responses rated negatively (i.e. -3, -2, and -1) as 0. Consistent with previous studies (Knowles et al., 2005; van der Gucht et al., 2009), PCA confirmed three independent factors accounting for 72% of the variance: rumination (2 items with loadings $> .90$; Cronbach’s $\alpha = .82$), adaptive coping (4 distraction and problem-solving items with loadings $> .59$; Cronbach’s $\alpha = .72$) and risk-taking (2 items with loadings $> .91$; Cronbach’s $\alpha = .84$).

Data analyses

The structure of ESM data allows for the investigation of longitudinal associations between ESM variables using regression methods, i.e. testing whether ESM vari-

ables at a given beep (i.e. T) are predicted by responses at the previous beep (T-1). The longitudinal nature of these data implies that ESM data have a hierarchical structure (i.e. ESM entries at each beep are clustered within participants); therefore the assumption of the independence of residuals required for linear models is violated. Multilevel models adequately account for this type of violations (Hox, 2010; Schwartz & Stone, 1998; Twisk, 2006). Data were analyzed with the XTREG module of STATA version 12.0 using maximum likelihood estimation. As a number of variables (i.e. symptoms of depression and mania, and all response styles) were severely positively skewed, bootstrapping (1000 iterations) was utilized, the recommended procedure when the assumptions of normality are violated (Mooney & Duval, 1993).

Multilevel regression models were employed as follows:

- i. We investigated the daily life correlates of depressive and manic symptoms measured at baseline. Separate multilevel regression models were estimated for the following dependent variables: PA, NA, SE, fluctuations of PA, fluctuations of NA, fluctuations of SE, rumination, active-copying and risk-taking. For each model, symptoms of depression and mania were entered as independent variables.
- ii. We examined whether PA, NA and SE predicted subsequent response style behaviors. Response style items were phrased “Since the last beep...” in the diary booklets and as such, assessed coping behaviours between successive time points T-1 and T. For the purpose of the present analyses they were treated as time T items. Separate multilevel regression models were estimated for each independent variable (i.e. PA, NA and SE) as measured at T-1 and response styles (i.e. rumination, adaptive coping and risk-taking) at time T were entered into the models as dependent variables. We controlled for the confounding effect of response style at the previous time point (T-1), as well as for the baseline symptoms of depression and mania.
- iii. We tested whether response styles predicted subsequent levels of PA, NA, and SE. Separate multilevel regression models were estimated for each dependent variable (i.e. PA, NA and SE) at time T with response styles (rumination, adaptive copying, and risk-taking) at time T-1 as predictors. We controlled for the confounding effect of PA, NA and SE at the previous beep, and symptoms of depression and mania measured at a baseline.

Results

Are symptoms of depression (HAM) and mania (MAS) associated?

In preliminary analyses, we first examined the distributions of depression (HAM) and mania (MAS) scores, and their associations. As previous studies found a weak, but significant correlation between symptoms of depression and mania (Johnson et al., 2011; Chapter 3), we first examined the relatedness of the two scores. Correlation analyses in the present study did not reach statistical significance, $r_s = 0.18$, $p = .23$. Nevertheless, in the following analyses both symptoms were controlled for simultaneously.

i. Are symptoms of depression and mania associated with daily life correlates?

Although our main goal was to investigate the longitudinal relationship between variables, the cross-sectional associations were examined first, see Table 3.2. First, we investigated whether positive and negative mood, and self-esteem were related to symptom ratings. Statistical analyses were carried out for momentary level of each variable (i.e. PA, NA, SE) as well as their fluctuations. We found that both depression and mania were associated with higher momentary negative affect ($p < .001$), lower momentary positive affect ($p < .001$), and lower momentary self-esteem ($p < .01$), as well as with more pronounced fluctuations of all variables (all $ps < .001$).

We also examined the associations between symptom ratings and response style scores (i.e. rumination, adaptive coping, and risk-taking). Depression was significantly associated with higher levels of rumination, adaptive coping and risk-taking (all $ps < .001$), whilst mania was significantly associated only with increased levels of risk-taking ($p < .001$).

Table 3.2 Regression estimates (β) and bias corrected 95% CI for the cross-sectional effects of depression (HAM) and mania (MAS) on momentary levels of negative (NA) and positive affect (PA) and self-esteem (SE), and their fluctuations over time, and on response styles (rumination, adaptive-coping and risk-taking).

Predictor	β (SE)	95% CI	β (SE)	95% CI	β (SE)	95% CI
	Momentary levels of NA		Fluctuations in NA			
HAM	.12 (.00)***	[.12 .13]	.04(.01)***	[.03 .04]		
MAS	.02 (.00)***	[.01 .03]	.01(.00)**	[.00 .02]		
	Momentary levels of PA		Fluctuations in PA			

HAM	-.12(.00)***	[-.13 -.11]	.01(.00)***	[.01 .02]		
MAS	-.02(.01)***	[-.03 -.01]	.01(.00)***	[.01 .02]		
	Momentary levels of SE		Fluctuations in SE			
HAM	-.12(.00)***	[-.12 -.11]	.03(.00)***	[.02 .04]		
MAS	-.01(.00) **	[-.02 -.00]	.02(.00)***	[.01 .02]		
	Rumination		Adaptive coping		Risk-taking	
HAM	.05(.00)***	[.04 .06]	.02(.00)***	[.01 .02]	.01(.00)***	[.00 .01]
MAS	-.01(.00)ns	[-.01 .00]	-.00(.00) ns	[-.01 .05]	.02(.01)***	[.01 .02]

Note: HAM = The Hamilton rating scale for depression; MAS = The Bech-Refaelson mania scale; ** $p < .01$; *** $p < .001$; ns = not significant. ¶ denotes $p = .075$;

ii. Does affect and self-esteem at time T-1 predict response styles at time T?

The main aim of the present study was to examine associations between affect, self-esteem, and response styles over time. We first examined how affect and self-esteem influenced the way individuals engaged in response styles, and then (in the next section), how response styles affected subsequent mood and self-esteem.

First, the predictive properties of each affect and self-esteem variable at each time point (T-1) on rumination at the subsequent time point (T) was investigated (Table 3, upper rows). Multilevel regression analyses revealed that negative affect was associated with increased rumination ($p < .001$), whereas positive affect ($p < .001$) and self-esteem ($p < .001$) were associated with decreases in ruminative thinking at the subsequent time point. When all predictors were entered into the model simultaneously, only affect remained a significant predictor of subsequent rumination: positive affect was associated with a decrease ($p < .01$), whilst negative affect with an increase ($p < .001$) of rumination (Table 3.3 lower rows).

None of the independent variables was significantly associated with adaptive coping (all $ps = ns$; Table 3.3).

Finally, we examined whether affect and self-esteem at time T-1 predicted risk-taking at time T (Table 3, upper rows). Risk-taking was significantly predicted by high positive ($p < .01$), and low negative mood ($p < .01$) at the previous time point, but only positive affect ($p = .071$) remained marginally associated with risk-taking when all predictors were entered into the model simultaneously (Table 3.3, lower rows).

Table 3.3 Regression estimates (β) and bias corrected 95% CI for the longitudinal effect of PA, NA, and SE at time T-1 on response styles at time T.

Predictor	β (SE)	95% CI	β (SE)	95% CI	β (SE)	95% CI
	Rumination		Adaptive coping		Risk-taking	
PA ^a	-.10(0.02)***	[-.13 -.07]	0.01(0.02) ns	[-.02 .04]	0.20(0.08) *	[.03 .12]
NA ^a	0.14(0.02) **	[.10 .17]	-0.01(0.02)ns	[-.04 .03]	-0.07(0.03) *	[-.13 -.02]
SE ^a	-.15(0.03)***	[-.19 -.10]	0.01(0.02) ns	[-.02 .05]	0.02(0.01) ns	[-.01 .05]
PA ^b	-0.05(0.02)*	[-.09 -.01]	0.02(0.01) ns	[-.04 .05]	0.03(0.02) ¶	[-.00 .06]
NA ^b	0.08(0.02)**	[.03 .14]	0.01(0.01) ns	[-.03 .05]	-0.02(0.02) ns	[-.05 .01]
SE ^b	-0.06(0.04)ns	[-.13 .01]	0.01(0.02) ns	[-.04 .05]	-0.02(0.03) ns	[-.07 .03]

Note: PA = positive affect; NA = negative affect; SE = self-esteem. *** = $p < .001$; ** $p < .01$, ns = non-significant; a = entered into model as a separate predictor; β = entered into model simultaneously. ¶ denotes $p = .071$

iii. Do response styles assessed at T-1 predict affect and self-esteem at T?

Multilevel regression models were estimated to examine whether response styles to depression predicted changes in positive affect, negative affect and self-esteem at subsequent time points. When separate models were estimated for a model with positive affect as the dependent variable, adaptive coping ($p < .05$), and risk taking ($p < .01$) at the previous time point significantly predicted an increase in positive affect (both $ps < .05$), whilst rumination significantly predicted a decrease in self-esteem, and only marginally in positive affect ($p = .05$). All predictors were significantly associated with positive affect when entered into the model simultaneously (all $ps < .05$, Table 3.4).

When separate models were estimated with negative affect as the outcome variable, no significant associations were revealed. Nevertheless, in a model with all response styles entered into the model simultaneously, a marginally significant relationship between rumination at time T-1 and negative affect at the subsequent time point was found ($p = .079$).

In a model with self-esteem as the dependent variable, no significant associations with response styles at the previous time point were revealed. When all predictors were entered into the model simultaneously, adaptive coping at time T-1 significantly predicted an increase in self-esteem at time T ($p < .05$).

Table 3.4 Regression estimates (β) and bias corrected 95% CI for the longitudinal effect of rumination, adaptive coping and risk-taking at time T-1 on momentary levels of PA, NA, and SE at time T1.

Predictor	β (SE)	95% CI	β (SE)	95% CI	β (SE)	95% CI
	PA		NA		S-E	
Rumination ^a	-0.07(0.03) \P	[-.14 -.00]	0.05(0.03)ns	[-.01 .12]	-0.23(0.03) ^{***}	[-.29 -.16]
Adaptive coping ^a	0.10(0.05)*	[.00 .19]	-0.03(0.04)ns	[-.11 .05]	0.12 (0.03)ns	[-.01 .13]
Risk-taking ^a	0.13(0.04) ^{**}	[.04 .21]	-0.03(0.04)ns	[-.10 .04]	0.05(0.04)ns	[-.03 .13]
Rumination ^b	-0.10(0.03) ^{**}	[-.17 -.03]	0.02(0.03) $\P\P$	[-.01 .12]	-0.05(0.03)ns	[-.11 .00]
Adaptive coping ^b	0.12(0.05)*	[.03 .22]	-0.05(0.04)ns	[-.13 .03]	0.07(0.03)*	[.01 .11]
Risk-taking ^b	0.13(0.06) *	[.01 .24]	-0.02(0.04)ns	[-.10 .07]	0.04(0.04)ns	[-.02 .11]

Note:PA = positive affect; NA = negative affect; S-E = self-esteem. ^{***} = $p < .001$; ^{**} $p < .01$, ns = non-significant; **a** = entered into model as a separate predictor; **b** = entered into model simultaneously. \P denotes $p = 0.050$; $\P\P$ denotes = .079

iv. *Follow-up analyses.*

In order to examine whether any of the identified relationships were moderated by symptoms of depression or mania, an interaction term between each predictor and symptoms was added into each of the models described in ii) and iii) above with all relevant predictors entered simultaneously. Each model was calculated twice, first with interactions between symptoms of depression and the predictors, followed by a similar model with interactions between symptoms of mania and the predictors. For example, in the case of the model with positive affect as a dependent variable and all three response styles as predictors, three interaction terms were added (between each response style and ratings of depression). A similar model was then calculated with interaction terms between each response style and ratings of mania.

Only one model yielded a significant baseline symptom x predictor interaction. A significant interaction term between symptoms of mania and levels of rumination ($\beta = 0.02$, SE = 0.01, $p < .01$, CI [.01 .04]), was found when positive affect was the dependent variable. Additional analyses indicated that rumination led to a decrease in positive affect in individuals with low symptoms of mania at baseline ($\beta = -.27$, SE =

.04, $p < .001$, CI [-.35 -.19]) but not in those with high symptoms of mania at baseline. No other significant interaction terms were identified (all $ps > .05$).

Discussion

The present study is a novel investigation of the prospective relationships between affect, self-esteem and response styles in individuals diagnosed with bipolar disorder. It tests Nolen-Hoeksema's (1991) response style theory and its later adaptations (Knowles et al., 2005; Thomas & Bentall, 2002), originally formulated to explain the course of unipolar depression using longitudinal data from bipolar patients to examine the impact of psychological variables on response styles and, subsequently, the effect of response styles on psychological variables. The experience sampling method employed in this study allowed the capture of these dynamic relationships, which cannot be assessed using more conventional cross-sectional designs.

Before reviewing the main results, we will comment first on the observed cross-sectional relationships between mood and self-esteem in daily life and baseline symptoms of depression and mania. It was expected that low self-esteem and high negative affect would be associated with symptoms of depression, whereas high positive affect and self-esteem would relate to symptoms of mania. Further, we predicted that increased fluctuations of these processes would be related to both symptoms. Our expectations regarding associations with depression were confirmed, and in line with previous literature. Here, associations between depression and negative mood, as well as its instability, have been consistently reported in studies of high risk students (Hofmann & Meyer, 2006; Knowles et al., 2005; Lovejoy & Steuerwald, 1992), subclinical samples (Lovejoy & Steuerwald, 1995) and bipolar patients (Henry et al., 2008; van der Gucht et al., 2009). Similarly, previous findings have indicated an association between depression and self-esteem (S.L. Johnson et al., 2000), as well as instability of self-esteem in high risk student (Bentall et al., 2011) and patient studies (Knowles et al., 2007).

Contrary to our expectations, symptoms of mania showed similar associations with mood and self-esteem as depression (i.e. mania was associated with low mood and self-esteem, and their increased instability), although the effect found was smaller. In contrast to our findings, previous studies have found mania to be related to *high* mood (Lovejoy & Steuerwald, 1992), and self-esteem comparable to that of controls (van der Gucht et al., 2009). Yet, our findings are not the first of its kind. An earlier factor ana-

lytic study suggested dysphoria to be the strongest component of mania (Cassidy, Forest, et al., 1998), and underlying negativity of affect and self-concept during mania have been suggested by studies employing implicit assessments (Knowles et al., 2007; Winters & Neale, 1985).

The discrepancy between the present study and previous reports, both employing explicit assessments, might be related to methodological differences. For example, a number of studies employed comparisons of different phases of bipolar disorder, rather than investigating associations of psychological measures with symptoms (e.g. van der Gucht et al., 2009), an approach complicated by frequent co-existence of depressive and manic symptoms. Another explanation might be related to age differences between examined populations. Several previous studies employed high-risk student populations, and it is likely that personal context of students is considerably different to that of adults with a history of severe mental illness. Although both kinds of studies may be tapping the same underlying vulnerabilities, their expression might be changing across the course of life. The present study is methodologically advantageous in that it has employed patients, representative of bipolar phenomenology, and utilized a longitudinal and ecologically valid assessment and robust statistical methods controlling for covariation of symptoms and non-normality of data.

The increased fluctuations in affect and self-esteem seen in relation to symptoms of depression and mania in the present study suggests that the fluctuations we have observed in remitted patients in previous studies (Knowles et al., 2005; van der Gucht et al., 2009) may have been the consequence of subsyndromal symptoms.

In respect of associations between symptoms and response styles, we expected that rumination would be associated with depression, and risk-taking with mania. Indeed, symptoms of depression were related to increased rumination, an observation that is consistent with Nolen-Hoeksema's (1991) original response style theory, and with findings from bipolar high-risk (Johnson, McKenzie, et al., 2008; Knowles et al., 2005; Thomas & Bentall, 2002), and patient studies (Thomas et al., 2007; van der Gucht et al., 2009). The association observed between depressive symptoms and adaptive coping was unexpected, as an earlier patient study found adaptive coping to be related to mania rather than depression (Thomas et al., 2007). The disparity might reflect the differences between the retrospective questionnaire assessments employed by Thomas et al. (2007) and the more ecologically valid experience sampling method utilized in the current study. Finally, risk-taking was positively associated with symptoms of depression as

well as mania. Although we did not predict an association between depression and risk-taking, similar cross-sectional relationships have been reported previously (Knowles et al., 2005; Knowles et al., 2007; Thomas et al., 2007).

The main aim of the present study was to examine the unique associations between momentary mood, self-esteem and coping styles, and vice versa, whilst controlling for symptoms of depression and mania. To our knowledge, this is the first study to prospectively investigate Nolen-Hoeksema's (1991) response style hypothesis, utilizing measures of response styles in daily life. It was predicted that both low mood and low self-esteem would prompt rumination at a subsequent time point, whilst positive mood and high self-esteem might trigger risky behaviors. The hypotheses were mostly confirmed, with a number of implications requiring comment. As noted, previous cross-sectional studies reported an association between rumination and symptoms of depression. The present findings suggest that high levels of negative, and low levels of positive affect instigate the subsequent engagement in rumination and that, in turn, rumination impacts most robustly via the dampening of positive mood. Furthermore, rumination led to decrease in positive affect only in individuals with few symptoms of mania, whilst no effect was found in those with manic symptoms. These findings are in line with Nolen-Hoeksema's notion that rumination as such does not *cause* depression, but rather moderates already depressive mood (Morrow & Nolen-Hoeksema, 1990). The null finding regarding the causal role of self-esteem potentially points to the precedence of affect over cognitive psychological processes in affective disorders, but further investigations are warranted, and this conjecture should be viewed with caution.

The findings regarding risk-taking have both theoretical and clinical implications. Although risk-taking have been found to be related to symptoms of depression and mania cross-sectionally, in a prospective design, positive, rather than negative, mood led to greater risk taking when controlling for the effect of symptoms (although the association reached only marginal significance). In turn, engaging in risk-taking resulted in improvements of mood. In a similar vein, Thomas et al. (2007) and Van der Gucht (2009) reported higher levels of risk-taking, as measured by questionnaire, in manic participants compared to controls. The failure to detect an association between risk-taking and negative affect, then, implies that this response style might not necessarily act as a defense against low mood as proposed previously (Thomas & Bentall, 2002), but rather is associated with an increased emotional and behavioral reactivity to

reward stimuli as proposed by the behavioural activation theory of mania (Depue & Iacono, 1989; Johnson, 2005; Urosevic et al., 2008). This account is consistent with recent neuroimaging studies, which have pointed to the abnormal processing of reward stimuli in bipolar patients and at-risk samples (Abler et al., 2008; Mason, O'Sullivan, Blackburn, Bentall, & El-Deredy, 2012; O'Sullivan, Szczepanowski, El-Deredy, Mason, & Bentall, 2011).

In her original theory, Nolen-Hoeksema (1991) suggested that engaging in distraction (which, along with problem-solving, was incorporated into adaptive coping in this and some previous studies) ameliorates depressive symptoms. Moreover, Nolen-Hoeksema argued that employing healthy coping strategies such as problem solving may be prevented by rumination. Our findings support these hypotheses only partially. Although in the current study neither mood, nor self-esteem instigated subsequent engagement in adaptive coping, employing this coping style led to substantial improvements in mood and self-esteem at the following time point. Furthermore, adaptive coping was found to be an effective strategy even when controlling for other coping strategies. Hence, adaptive coping appears to be a top-down strategy, that can be deliberately employed to improve one's affective state, an observation that is consistent with earlier studies showing its effectiveness in natural and laboratory conditions (Morrow & Nolen-Hoeksema, 1990; Nolen-Hoeksema & Morrow, 1993).

A number of limitations should be acknowledged. Despite methodological advantages of experience sampling method over classical self-report assessments (Delespaul, 1995), some authors have raised concerns regarding participants' compliance with, and hence reliability of, the pencil-and-paper protocol of experience sampling, favoring the use of electronic diaries (Broderick & Schwartz, 2003; A. A. Stone, Shiffman, Schwartz, Broderick, & Hufford, 2002; A.A. Stone, Shiffman, Schwartz, Broderick, & Hufford, 2003). Whilst this might be an important limitation in studies employing predetermined entries, previous studies have demonstrated comparable, and relatively high, compliance in electronic and paper diary studies, when using a random-entry design (Bolger, ShROUT, Green, Rafaeli, & Reis, 2006; Green, Rafaeli, Bolger, ShROUT, & Reis, 2006; Jacobs et al., 2005), also employed in the present study. Further, it is possible that utilizing different time lags in the predictive analyses would have led to different results.

The findings have a number of clinical implications. Various psychotherapies operate by means of modifying coping strategies – though often using different methods

(for review, see Roth & Fonagy, 2005); the response style theory has been found to provide a useful framework for understanding the utility of coping styles. Our findings highlight the importance of therapeutic strategies to ameliorate rumination in bipolar patients, and also the potential value of psychoeducational methods of reducing risk taking in response to incipient manic symptoms. The observation that risk-taking prompted by positive affect leads to a further escalation of affect points to the need to interrupt this cycle during the earliest phase of a hypomanic episode. Existing cognitive behavior therapy strategies which have been shown to be effective already address these issues to some degree (Colom et al., 2009). The results regarding adaptive coping are promising as they imply that individuals with severe illness retain some ability to effectively regulate their mood.

Chapter 4

The dynamics of mood, self-esteem and response styles in adolescent offspring of bipolar parents: An experience sampling study

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The inter-relationship between mood, self-esteem and response styles in adolescent offspring of bipolar parents: An experience sampling study.

Abstract

Objectives: The response styles theory to depression (Nolen-Hoeksema, 1991) proposes three main strategies individuals employ in response to low mood: rumination, active coping (distraction and problem-solving) and risk taking. Although recent research has suggested this theory has utility in understanding the symptoms of bipolar disorder (BD), the role of these processes in conferring vulnerability to the condition is poorly understood.

Methods: Twenty-three adolescent children of patients with BD and 25 offspring of well parents completed the Experience Sampling Method (ESM; Csikszentmihalyi & Larson, 1987) diary for six days. Longitudinal analyses were carried out to examine inter-relationships between mood, self-esteem and response styles.

Results: Increased negative as well as positive mood resulted in greater rumination in both groups. Low self-esteem triggered greater risk-taking at the subsequent time point in the at-risk group, while negative affect instigated increased active coping in the control group. In both groups, engagement in risk-taking improved mood at the subsequent time point, whilst rumination dampened self-esteem.

Conclusions: Differential longitudinal associations between mood, self-esteem and response styles between at-risk and control children suggest early psychological vulnerability in the offspring of BD parents, with important indications for early intervention.

Introduction

Instability of affect and intense shifts in self-concepts are core domains of psychological dysregulation during episodes of depression and mania in bipolar disorder (APA, 2000). Patients' inability to regulate these processes has serious and long-term consequences for their personal and professional lives. Several theories have proposed potential psychological mechanisms that might drive such fluctuations, including negative cognitive style (Alloy, Abramson, Smith, et al., 2006; Beck, 1976) and its differential reactivity (Teasdale, 1988), dysregulation of the behavioral activation (Depue & Iacono, 1989) and circadian systems (Goodwin & Jamison, 2007), or, in more recent accounts, extreme interpretations of internal states (Mansell et al., 2007). Specific mechanisms implicated in the psychological abnormalities vary across theories. However, they all point to an increased sensitivity to external or/and internal stimuli, leading to a vicious circle of pathological behavior and increasingly severe symptoms.

One way of investigating behavioral oversensitivity in bipolar disorder (BD) is within the context of *response style theory* (Nolen-Hoeksema, 1991), which proposes that individuals differ in the way they respond to feelings of negative affect, with serious consequences for the duration and severity of depressive or other kinds of dysphoric episodes. Four coping strategies have been described within this framework. First, (i) *rumination* has been defined as passively directing one's attention and thoughts to current depressive feelings, to its causes and effects. In contrast, (ii) *distraction* has been described as directing one's attention away from depressive symptoms by engaging in pleasant activities. (iii) *Problem-solving* involves an active effort to relieve symptoms. Finally, (iv) *Risk-taking*, which is particularly important in the context of BD, involves engaging in dangerous behaviours without regard to the consequences. Factor analytic evidence suggests that distraction and problem-solving can be conceived as belonging to a single strategy of *active coping* (Knowles et al., 2005). Substantial research has supported the role of response styles in the onset (Just & Alloy, 1997; Nolen-Hoeksema, 2000) and maintenance of unipolar depression (Nolen-Hoeksema & Morrow, 1991, 1993), and this theoretical account has been recently employed in investigations of the maintenance of symptoms in BD with promising results.

The role of rumination in bipolar depression has been reported in student (E. C. Chang, 2004; Knowles et al., 2005; Robinson & Alloy, 2003; Thomas & Bentall, 2002), and patient studies (Chapter 3, Johnson, McKenzie, et al., 2008; van der Gucht et al.,

2009). It has also been reported that young non-medicated adults, diagnosed with BD, showed increased rumination in response to both negative and positive affect (Johnson, McKenzie, et al., 2008). In contrast to studies on major depression, depressive symptoms have been also significantly related to risk-taking (Knowles et al., 2005; Chapter 3; Thomas & Bentall, 2002). In this vein, it has been proposed that bipolar patients employ risk-taking as a strategy to deal with low mood (Thomas & Bentall, 2002; Thomas et al., 2007), an account consistent with earlier models by psychoanalysts (Abraham, 1911/1927; Neale, 1988) who argued that mania arises from dysfunctional strategies for avoiding depression.

Only one recent study has employed a longitudinal design in order to parse out the interrelationship between daily life correlates, and symptoms, in a cohort of bipolar patients (Chapter 3). In this study, which used the experience sampling method to record response styles and other data from bipolar patients ten times a day over six days, depression at the start of the study was associated with high levels of all three response styles whereas manic symptoms were associated with high levels of risk taking. Longitudinally, negative affect triggered subsequent rumination, which was associated with a subsequent increase in negative mood and decrease in positive mood, but the decrease in positive mood was less marked in those showing manic symptoms at baseline. Contrary to what had been predicted, positive rather than negative affect was associated with subsequent risk-taking. One limitation of the study was the lack of comparison groups, limiting the extent to which these processes can be judged as intensified, or compromised. Another limitation is related to the inherent characteristics of patient studies, including long-term use of medication and severe recurrence of episodes, which may confound or otherwise affect the findings. The impact of both on self-concept and mood has been well documented (Gibbs, Baudts, Spencer, & David, 2007; Harmer et al., 2009). One promising way of circumventing these limitations is to study individuals with increased likelihood of developing the disorder, yet who are currently healthy.

It has been well documented that children of parents with BD, in comparison to offspring of control parents, have an increased risk of psychiatric disorders. A meta-analytic study has reported that 26.5% of bipolar offspring meet diagnostic criteria for affective disorders, compared to 8.3% of control children (Lapalme et al., 1997). However, little research has been done on the psychological characteristics associated with the familial risk for BD. A few studies have employed the Child Behavior Checklist (Achenbach, 1991), a dimensional assessment tool examining behavioral problems and

competencies. In these studies at-risk children with psychiatric diagnoses scored consistently higher on a number of subscales (Dienes et al., 2002; Giles et al., 2007; Reichart & Nolen, 2004; Wals et al., 2001). Furthermore, Giles and colleagues (2007) found that at-risk children with no history of psychiatric problems show increased aggression, depression/anxiety, withdrawal, and attention problems. Other studies have pointed to the role of early disruptive and attention problems (Carlson & Weintraub, 1993; Henin et al., 2005), high emotional lability (Birmaher et al., 2013; Doucette et al., 2013), and poor social functioning (Whitney et al., 2013).

However, studies on psychological processes typical of individuals with diagnosed mood disorder are rare. In this direction, a study employing a behavioral high-risk paradigm (with participants selected using questionnaire measures) indicated that increased anger, hyperactivity and lower emotional symptoms were associated with hypomanic personality characteristics (Cooke & Jones, 2009). Also using a behavioral high-risk paradigm, Bentall et al. (2011) found that, in individuals with hypomanic personality characteristics compared to controls, both rumination and risk-taking led to a greater decrease in self-esteem whereas, in the high risk group only, active coping led to an increase in self-esteem. However, to our knowledge, only one study has so far examined psychological processes typical of individuals with BD in adolescent children of bipolar parents (S. H. Jones et al., 2006). The findings indicated fluctuating self-esteem, increased rumination and negative affect in the at-risk children, but only in those children who had current or lifetime mood diagnoses.

The aim of the present study was to examine the interplay between affect, self-esteem and response styles in a population of adolescents at genetic risk of BD, versus offspring of control parents, using the experience sampling method. The study aimed, firstly, to identify early behavioral abnormalities in response to changes in mood and self-esteem; secondly, to examine whether at-risk children show an increased sensitivity to the engagement in BD relevant behaviors (i.e. response styles).

More specifically, on the basis that response styles might be a risk factor for future affective disorder, we hypothesized that low mood would lead to greater engagement in rumination in the at-risk offspring at a subsequent time point, whilst high mood would lead to a greater engagement in risk-taking. Second, on the same basis, we expected that rumination would lead to more pronounced decreases in mood and self-esteem in the at-risk children, whilst risk-taking would lead to a greater increase in mood and self-esteem.

Method

Participants

Thirty adolescent children between 13 and 19 years of age, who had parents with BD, and 30 children of control parents participated in the study; of these only 22 index children and 25 control children completed the ESM protocol (see below)⁵. Recruitment of participants was carried out in two stages. First, adults with diagnosis of BD who have children between 13-19 years of age were approached via a number of venues: self-help groups (including advertisements in self-help group newsletters and websites), community mental health teams and psychiatric services in Wales and England. A researcher explained the protocol to interested parents, and provided them with an information sheet to give to their children. Informed consent was obtained from both parents and child before the commencement of the study. The inclusion criteria for index children were: a) age between 13-19 years, and b) having a biological parent diagnosed with BD. The only exclusion criterion was an insufficient command of English language.

Control participants were recruited via snowballing from index participants (in one case), from the Bangor University Community Panel, and by word of mouth. Control children were matched for age, gender and level of education of parents. The inclusion criteria for control children were a) age between 13-19 years, and b) having a parent with no history of mental illness. Insufficient command of English was the only exclusion criterion. The study was conducted in accordance with the Helsinki Declaration as revised in 1989, and ethical approval was obtained from a National Health Service research ethic panel. Parental diagnosis, or no history of BD in case of control parents, was confirmed by completing the Structured Clinical Diagnostic Interview for DSM-IV Axis I Disorder (First et al., 1995). Only one parent per family was assessed and, therefore, the history of mental health problems in the other parent cannot be ruled out. Adolescents were interviewed with the Schedule for Affective Disorders and Schizophrenia

⁵ 69.33% of the dataset in the index group and 71.4% in the control group was complete

for School-Aged (K-SADS; Kaufman et al., 1997). Participants received monetary compensation for their time and effort (£30).

Clinical measures

All offspring completed two face-to-face interviews in order to assess their current level of mood symptoms.

1. *The Hamilton rating scale for depression (Hamilton, 1960)* A shortened, 11-item form was used ($\alpha = .66$ in this sample). Each item is rated on a Likert scale ranging from 0 (i.e. 'not present at all') to 4 (i.e. 'severe') with a maximum score of 44.

1. *The Bech-Refaelson Mania Scale, Modified Version (MAS; Licht & Jensen, 1997)* is widely used to assess symptoms of mania and is designed to be administered alongside the HAM. Each of its 11 items is rated on a five-point scale, resulting in a total score ranging between 0-44. The scale has high inter-observer reliability (Bech et al., 1979) and adequate internal consistency ($\alpha = .79$ in this sample).

Psychological Measures

Experience sampling method (ESM, Csikszentmihalyi & Larson, 1987) is a longitudinal self-report assessment of participants' experiences within the context of their every day life. A pen-and-paper version of the assessment was utilized in the present study: each participant received six pocketsize diaries, one diary to be completed each day, and a digital wristwatch pre-programmed to emit 10 beeps a day in pseudo-random intervals between 7.30 am and 10.30 pm. Each diary comprised of 10 self-report assessment forms with items rated on a 7-point Likert scale ranging from 0 (i.e. 'not at all') to 7 (i.e. 'very much'). Participants were required to note the exact time of entry at the end of each form.

The procedure was explained to adolescent participants and to their parents to ensure the understanding of the procedure. Children were further asked to complete one practice form in a trial diary during the briefing session. The researcher arranged to contact participants by phone during the six days to ascertain compliance with the procedure.

To ensure reliability of the data reports entered 5 mins before or 15 mins after the pre-programmed time indications were removed from analyses (Delespaul, 1995). Participants who failed to enter more than 20 valid reports were excluded from the analyses. Thirty participants commenced the study in each group but four index and two control participants dropped out of the study. In addition, four participants in the index and three in the control group were excluded due to insufficient number of valid entries. A total of 22 index and 25 control participants completed the study.

ESM variables:

1. Positive and negative affect: twelve items were utilized to assess momentary mood. Principal component analyses with varimax rotation was utilized on the raw within-participant scores. Two items ('relaxed' and 'satisfied') were removed due to insufficient loadings. Finally, two separate factors (eigenvalues > 1) were yielded, together accounting for 57% of variance. Both factors consisted of five items: the positive mood (PA) factor included 'cheerful', 'excited', 'optimistic', 'confident', and 'energetic', whilst the negative affect (NA) factor included, 'lonely', 'anxious', 'irritated', 'sad', and 'guilty'. Both factors had adequate Cronbach's α s (.86 and .71, respectively). Final scores of PA and NA were calculated as mean values of respective items.
2. Self-esteem. Three items were included in the self-report diaries to assess self-esteem: 'I like myself', 'I am ashamed of myself', and 'I am doubting myself'. Employing principal component analyses with varimax rotation, one factor, accounting for 57% of variance was found (Cronbach's $\alpha = .50$). Two negatively valenced items were recoded so that high scores on the composite variable reflect high self-esteem.
3. Mood and self-esteem fluctuations were calculated as the absolute difference between two subsequent scores of mood and self-esteem. Fluctuations for positive and negative affect were calculated separately. Higher scores reflected more pronounced fluctuations.
4. Response styles. Each response style (i.e. rumination, active coping, and risk taking) was assessed by one item introduced with a statement "Since the last

bleep ... ”. Rumination was assessed as “I have spent time worrying about my life”; active coping as “I have tried to cheer myself up”; and risk-taking as “I have acted impulsively without regard to the consequences”. All three items were rated on a Likert scale ranging from 0 (anchored ‘Disagree’) to 7 (anchored ‘Agree’).

Data analyses

The longitudinal nature of the ESM data with repeated observations from individuals nested within groups violates the assumption of independence of errors required for linear models. Multilevel modelling was therefore utilized (Hox, 2010; Schwartz & Stone, 1998). Data were analyzed with XTREG module of STATA version 12.1 using maximum likelihood estimation. Due to highly skewed variables (symptoms of depression and mania, as well as negative affect and response styles), non-parametric bootstrapping (1000 iterations) was employed (Mooney & Duval, 1993).

Results

No differences were found on any of the demographic variables including age, gender race and home environment (Table 4.1).

Table 4.1 Demographic information for index and control children

		Index offspring (N = 22) M (SD)	Control offspring (N = 25) M (SD)	
Age		16.04 (1.79)	16.18 (1.97)	$t(45) = -.26, p = .797$
Gender	female	14 (63.6%)	15 (60.0%)	$\chi^2(1)=0.07, p = .798$
	male	8 (36.4%)	10 (40.0%)	
Race	Caucasian	22 (100%)	24 (96.0%)	$\chi^2(2)=0.90, p = .343$
	Oriental	0 (0%)	1 (4.0%)	
Home environment				$\chi^2(3)=0.07, p = .798$
Living with both parents		18 (81.8%)	18 (72.0%)	
	Living with mother	3 (13.6%)	7 (28.0%)	
	Living alone	1 (4.6%)	0 (0%)	

Symptoms			
Depressive	3.14 (1.37)	1.04 (1.37)	*Z = -2.70, p = .007
Hypomanic	1.91 (2.83)	0.64 (1.19)	*Z = -1.65, p = .099
Major depression			
lifetime	1 (4.6%)	0	
current	2 (9.1%)	0	
Overgeneralised anxiety disorder			
lifetime	1 (4.6%)	0	
current	1 (4.6%)	0	
Panic disorder			
lifetime	3 (13.6%)	0	
current	3 (13.6%)	0	
Separation anxiety			
lifetime	1 (4.6%)	0	
Suicidal attempt			
lifetime	1 (4.6%)	0	
PTSD			
current	1 (4.6%)	1 (3.3%)	
Diagnosed participants	5 (22.7%)	1 (3.3%)	$\chi^2(1)=46.00, p < .001$

Note: * denotes Mann-Whitney U test.

Cross sectional analyses: comparisons between groups

In interviews conducted before commencing the ESM study, index offspring reported significantly more symptoms of depression (although symptom levels were relatively low), and more of them met diagnostic criteria for psychiatric disorders. (Table 4.1).

Descriptive statistics for the ESM variables are reported in Table 2. No significant differences between groups were found in mean levels of self-esteem ($p = .262$). However, index children showed lower variability in self-esteem ($\beta = -.13, SE = .06, p = .018, CI [-0.24 -0.02]$). Furthermore, the index children reported significantly lower mean levels of PA ($\beta = -.14, SE = .04, p < .001, CI [-0.22 -0.07]$), but no differences in PA fluctuation ($p = .915$), and higher levels of mean NA ($\beta = .12, SE = .03, p < .001, CI [0.07 0.17]$) as well as higher levels of NA fluctuation ($\beta = .16, SE = .05, p = .004, CI [0.05 0.27]$). These group differences disappeared once baseline symptoms of

depression and mania were controlled for (all p s > .05), which resulted in a significant effect for group for mean levels of self-esteem, which were higher in the index children ($\beta = .25$, $SE = .04$, $p = < .000$, $CI [0.17\ 0.34]$) who also showed lower self-esteem fluctuations ($\beta = -.28$, $SE = .06$, $p = < .000$, $CI [-0.39\ -0.16]$).

In terms of mean scores for response styles, significant group differences were found only for risk-taking ($\beta = .31$, $SE = .04$, $p = < .000$, $CI [0.22\ 0.39]$), with greater scores for the index offspring. When baseline symptoms were controlled for, the effect of group on risk-taking decreased, but remained significant ($\beta = .17$, $SE = .04$, $p = < .000$, $CI [0.08\ 0.26]$). In addition, after controlling for baseline symptoms, significant differences were found for both mean rumination scores ($\beta = -.22$, $SE = .04$, $p = < .000$, $CI [-0.30\ -0.14]$) and mean active coping scores ($\beta = -.23$, $SE = .04$, $p = < .000$, $CI [-0.30\ -0.16]$), which were reported less by the index group (Table 4.2).

Table 4.2 Descriptive statistics of symptoms, mood, self-esteem and response styles.

	Index	Control
	Mean (SD)	Mean (SD)
SE	4.71 (0.78)	4.75 (0.93)
SE fluctuations	0.55 (.25)	0.64 (0.34)
PA	4.01 (0.67)	4.17 (0.74)
PA fluctuations	0.72 (0.34)	0.74 (0.28)
NA	1.52 (0.47)	1.40 (0.41)
NA fluctuations	0.35 (0.23)	0.27 (0.20)
Rumination	1.64 (0.89)	1.61 (0.77)
Active coping	1.86 (1.02)	1.83 (1.20)
Risk-taking	1.61 (0.83)	1.31 (0.65)

Cross sectional analyses: Associations between baseline symptoms of depression and mania and daily life correlates

Symptoms of depression and mania showed similar patterns of associations. Both symptoms were positively associated with mean negative mood, and inversely

with mean self-esteem. Mean positive affect was negatively associated with baseline depression, whilst no significant relationship was revealed for mania. In terms of mood instability, both baseline symptoms were associated with increased fluctuations of negative affect but no associations with fluctuations in positive affect were found. Only depression showed a positive association with instability of self-esteem. Both baseline symptom scores were positively associated with mean rumination and risk-taking scores, and depression was also positively associated with mean active coping scores. The relationship between mania and active coping was inverse (Table 4.3).

Table 4.3 Regression estimates (β) and bias corrected 95% CI for the cross-sectional effects of depression (HAM) and mania (MAS) on momentary levels of negative (NA) and positive affect (PA) and their fluctuations over time, and on response styles (rumination, adaptive-coping and risk-taking).

Predictor	β (SE)	95% CI	β (SE)	95% CI	β (SE)	95% CI
	Momentary levels of NA		Fluctuations in NA			
HAM	.13 (.02)***	.08 .18	.10 (.04)**	.03 .17		
MAS	.13 (.02)***	.09 .17	.07 (.03)*	.02 .13		
	Momentary levels of PA		Fluctuations in PA			
HAM	-.10(.025)***	-.15 -.05	.05 (.04)	-.02 .12		
MAS	-.01 (.03)	-.06 .04	.01 (.03)	-.05 .07		
	Momentary levels of SE		Fluctuations in SE			
HAM	-.22(.03)***	-.27 -.17	.09 (.04)*	.01 .17		
MAS	-.08 (.02)***	-.12 -.04	.02 (.03)	-.04 .09		
	Rumination		Adaptive coping		Risk-taking	
HAM	.16 (.03)***	.09 .22	.29 (.03)***	.23 .35	.11 (.03)**	.04 .18
MAS	.10 (.02)***	.05 .14	-.09(.02)***	-.13 -.04	.10 (.03)***	.05 .15

Note: HAM = The Hamilton rating scale for depression; MAS = The Bech-Refaelson mania scale; ** $p < .01$; *** $p < .001$; ns = not significant.

Longitudinal analyses:

i) Are there differences in longitudinal associations between mood and self-esteem at time T-1 and response styles at subsequent time point T?

For each response style (i.e. rumination, active coping and risk-taking) as a dependent variable, a multilevel regression model was estimated with standardized PA, NA, SE (using SD of the whole sample) entered as independent variables. Next, a

model including interaction terms (PA x group; NA x group; SE x group) with the control group used as a reference category was calculated. The confounding effect of symptom levels and the respective response style ratings at the previous time point were controlled for.

Mood and self-esteem at time T-1 as predictors of subsequent rumination: Significant positive associations between NA ($\beta = .09$, SE = .04, $p = .023$, CI [.01 .17]) and PA ($\beta = .07$, SE = .03, $p = .009$, CI [.02 .13]) and rumination at the subsequent time point were found. The absence of significant interactions with group indicated that the effects were similar in both groups (Figure 4-1).

Mood and self-esteem at time T-1 as predictors of subsequent active coping: A significant effect was found only for NA as a predictor of active coping ($\beta = .08$, SE = .04, $p = .036$, CI [.01 .16]). Furthermore, a marginally significant interaction term between NA and group was revealed ($\beta = -.16$, SE = .08, $p = .052$, CI [-.32 .00]). Additional analyses indicated that NA at T-1 resulted in a marginal increase in active coping only in the control group ($\beta = .11$, SE = .07, $p = .100$, CI [-.02 .25]), whereas no effect was found in the index children ($p = .358$; Figure 4-1)

Mood and self-esteem at time T-1 as predictors of subsequent risk taking: Despite no significant main effect of self-esteem or affect at previous time point on the subsequent risk-taking, a significant interaction term between self-esteem and group ($\beta = -.20$, SE = .09, $p = .025$, CI [-.37 -.02]) was found. Follow-up analyses revealed that low self-esteem resulted in a marginal increase in risk-taking at the subsequent time point in the index offspring ($\beta = -.12$, SE = .08, $p = .112$, CI [-.28 .03]), but no association between the two variables was found in the control offspring ($p = .324$;

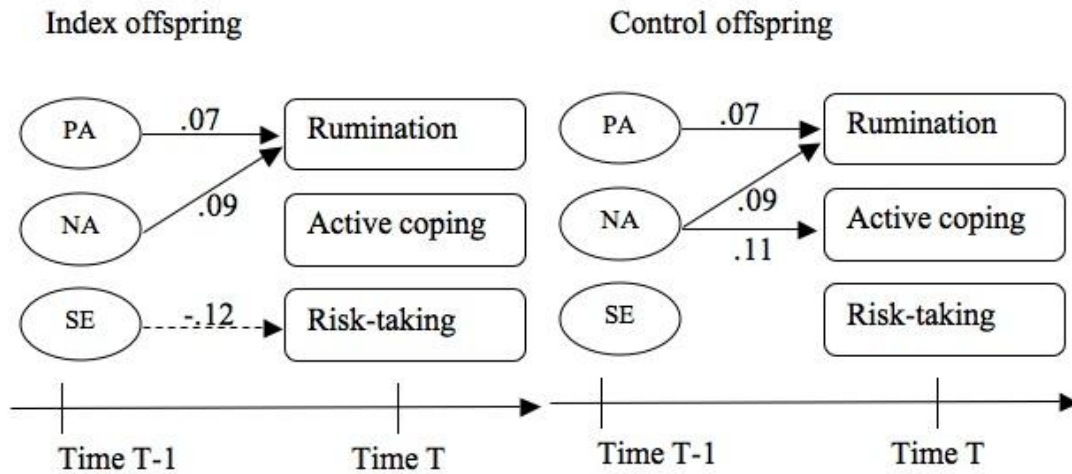


Figure 4-1 Effect (β) of mood and self-esteem on response styles at the subsequent time point in index and control offspring. Full line indicates positive relationship, dashed line indicates negative relationship. PA = positive affect; NA = negative affect; SE = Self-esteem.

ii) *Are there differences in longitudinal associations between response styles at time T-1 and mood and self-esteem at subsequent time point T?*

Figure 4-2 illustrates the significant relationships observed when the effects of response styles on subsequent mood and self-esteem were modeled. None of these effects differed between the groups.

Effect of response styles at time T-1 on positive mood at the subsequent time point: A significant effect of risk-taking was found ($\beta = .06$, $SE = .03$, $p = .030$, $CI [.01 .11]$), and the non-significant interaction term indicated that the effect was similar in both groups.

Effect of response styles at time T-1 on negative mood at a subsequent time point: No significant main or interaction effects were found.

Effect of response styles at time T-1 on self-esteem at a subsequent time point: A significant main effect of rumination was revealed ($\beta = -.07$, $SE = .03$, $p = .024$, $CI [-.13 -.01]$) indicating decreases in self-esteem as a result of rumination. The non-significant interaction term suggested that this effect was similar in both groups.

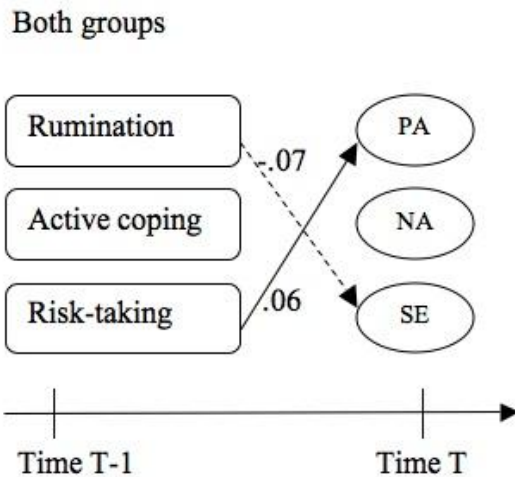


Figure 4-2 Effect (β) of response styles on mood and self-esteem at the subsequent time point in both groups. Full line indicates positive relationship, dashed line indicates negative relationship. PA = positive affect; NA = negative affect; SE = Self-esteem.

Discussion

The present study is unique in examining longitudinal relationships between affect, self-esteem and response styles in a population of adolescents at high genetic risk for BD who, in the majority of cases, were currently well. The study therefore provides insights into both behavioral and affective sensitivity implicated in vulnerability to BD, with implications for theoretical models of the condition as well as for early psychotherapeutical interventions.

When associations between symptoms and daily life correlates were examined, both depression and mania were associated with negative mood and low self-esteem, and also with greater instability of negative, but not positive, affect. Only symptoms of depression, but not mania, were associated with increased fluctuations of self-esteem. These findings are in line with previous studies reporting associations between depression and negative affect (Havermans et al., 2010; van der Gucht et al., 2009), as well as self-esteem (S.L. Johnson et al., 2000; Knowles et al., 2007). Although one correlational study has reported associations between mania and positive affect (Lovejoy & Steuerwald, 1992), other lines of research have reported increased negativity during (hypo)mania, including factor analytic (Cassidy, Forest, et al., 1998; Dilsaver et al., 1999; Gupta, Sinha, Praharaj, & Gandotra, 2011), cross-sectional (Bauer et al., 2005; Cassidy, Murray, et al., 1998), and longitudinal studies (Gottschalk et al., 1995;

Johnson et al., 2011; Paykel et al., 2006). Further, evidence of underlying negative self-concepts has been reported in studies using implicit assessments of manic (Bentall & Thompson, 1990; Lyon et al., 1999) and euthymic bipolar patients (Knowles et al., 2007; Winters & Neale, 1985).

Our findings are also consistent with previous literature regarding increased variability of negative affect in subsyndromal individuals (Hofmann & Meyer, 2006; Lovejoy & Steuerwald, 1995), and remitted bipolar patients in studies employing cross-sectional design (Henry et al., 2008) and experience sampling diaries (Havermans et al., 2010).

Although we found less self-esteem fluctuation in index children, possibly reflecting response-bias tendencies in the index offspring, lower self-esteem and its increased fluctuations were related to symptoms of depression. This is in line with previous reports of greater fluctuations of self-esteem in bipolar patients (Knowles et al., 2007; van der Gucht et al., 2009) as well as affected children of parents with BD (S. H. Jones et al., 2006). Notably, our previous experience sampling study investigating these processes in bipolar patients found that such effects were driven by depression (Chapter 3), as has been confirmed by the present study. However, in the previous patient study, fluctuations also included positive affect and self-esteem, and showed associations to symptoms of depression as well as mania. Whether these differences are indicative of the developmental pathway specific for BD or reflect general affective dysregulations needs to be addressed in future research.

In addition, in the present study both depressive and manic symptoms were significantly associated with engagement in coping strategies (i.e. rumination, active-coping and risk-taking): whilst mania showed negative associations with active coping, depression was positively related to it. Again, in terms of depression these results are consistent with our previous patient report (Chapter 3). In this vein, previous research has pointed to the protective effect of active coping (or distraction) in ameliorating depression (Lam, Smith, Checkele, Rijdsdijk, & Sham, 2003; Lyubomirsky & Nolen-Hoeksema, 1995; Morrow & Nolen-Hoeksema, 1990). Nevertheless, in contrast to the present findings, our previous ESM study found that mania was associated only with risk-taking, but not with the other response styles.

The main goal of the present study was to investigate differences between index and control offspring in the longitudinal inter-relationship between mood, self-esteem and response styles. Our hypotheses were only partially supported. As expected, in-

creased negative affect resulted in increased rumination, but no differences between the groups were observed. The association between increased positive affect and rumination in both groups was unexpected, and it may be speculated this could be a consequence of the age of the sample, and whether the period of adolescence is associated with increased pondering about life in general. Furthermore, rumination led to decreases in self-esteem, rather than affect, at the subsequent time point, with no differences between groups. This is contrasting our previous findings in patients with bipolar disorder (Chapter 3), where rumination dampened affect, but was unrelated to self-esteem. It is possible that these findings reflect differential relationship between cognition and affect, changing as a function of the capacity of top-down emotion regulation, decreasing with severity of the illness (Creswell, Baldwin, Eisenberger, & Lieberman, 2007).

Further, the present study has identified some group specific associations: increased active coping in response to negative affect was found in the control, but not the index group. This is partially in contrast with our previous findings, where although active coping was not triggered by low mood, it was employed by bipolar patients in order to improve their mood and affect (Chapter 3). However, whether the use of this strategy was impaired in comparison to healthy individuals could not be determined. In a similar vein, previous studies have indicated an increased risk for mood and anxiety disorders in behaviourally inhibited adolescents (Biederman, Rosenbaum, Chaloff, & Kagan, 1995; Kagan, 1994). One possible explanation is that increased vulnerability to mood disorders is related to a compromised capacity to effectively deal with low mood; however, this interpretation needs to be confirmed by future studies.

Another important finding relates to risk-taking. While risk-taking increased positive mood at the subsequent time point in both groups, only index, but not control, offspring showed an increased engagement in risk-taking as a response to low self-esteem. This finding is in line with previous studies of manic patients (Lyon et al., 1999; Winters & Neale, 1985), and have been previously explained in the context of the manic defense mechanism (Abraham, 1911/1927; Thomas & Bentall, 2002). Given that no bipolar offspring in the current sample met diagnostic criteria for BD, this finding might indicate early behavioral dysregulation specific for vulnerability for BD, with important implications for early psychotherapeutic interventions. These might include addressing low self-esteem issues and adaptive techniques of coping.

This study had a number of limitations that should be acknowledged. Despite robust statistical methods employed, the findings were limited by the small sample size reflecting difficulties with recruitment of this difficult to reach cohort. It is possible that there has been some bias in both the recruitment of the sample and attritions during the study, possibly with more affected children being less likely to put themselves forward and also being less likely to complete the protocol. Most likely, such biases would have led to type-2 errors. Second, although the language in our measures have been amended to reflect participants' age and experience, utilizing standardized measures for children and adolescents could have improved the validity of our assessment. Thirdly, it could be argued that the present findings were driven by unwell participants. However, in order to address this issue, all of our statistical models included current symptoms as covariates. In addition, compliance with the research protocol is a crucial element of this research method. Some authors have cast doubt on compliance in paper-and-pencil ESM studies and preferred the use of electronic devices (A.A. Stone et al., 2003). However, two studies in which paper-and-pencil diary and electronic diary data were collected using comparable procedures, suggested good compliance rates with the time protocol and demonstrated that both methods yielded data comparable in terms of both psychometric features and research findings (Green et al., 2006; Jacobs et al., 2005).

In sum, the present findings indicate that psychological vulnerability to BD may involve an inability to employ adaptive coping strategies to deal with low mood. Moreover, low self-esteem in these individuals triggers engagement in risk-taking, a process that has been hypothesized to lead to an ascent into manic states (Thomas et al., 2007).

Chapter 5

Cognitive vulnerability to bipolar disorder in offspring of parents with bipolar disorder

Pavlickova, H., Turnbull, O., & Bentall, R. P. (in submission). Cognitive vulnerability in offspring of parents with bipolar disorder.

Abstract

Background: Bipolar disorder is highly heritable illness, with a positive family history robustly predictive of its onset. It follows that studying biological children of parents with bipolar disorder (bipolar offspring) may provide information about developmental pathways to the disorder. Moreover, such studies may serve as a useful test of theories that attribute a causal role in the development of mood disorders to psychological processes.

Method: Psychological style (including self-esteem, coping style with depression, domain-specific risk-taking, sensation seeking, sensitivity to reward and punishment, hypomanic personality and cognition) was assessed in 30 bipolar offspring and 30 children of well parents. Parents of both child groups completed identical assessments.

Results: Whilst expected differences between parents with bipolar disorder and well parents were detected (such as low self-esteem, increased rumination, high sensitivity to reward and punishment), offspring of bipolar parents were, as a group, not significantly different from well offspring, apart from a modest trend towards lower adaptive coping. When divided into affected and non-affected subgroups, both groups of index children showed lower novelty seeking. Only *affected* index children showed lower self-esteem, increased rumination, sensitivity to punishment and hypomanic cognitions. Notably, these processes were associated with symptoms of depression.

Limitations: A longitudinal assessments of this high-risk population would greatly enhance our understanding of the role of psychological processes in bipolar disorder.

Conclusion: Psychological abnormalities in index offspring were associated with having met diagnostic criteria for psychiatric illnesses and the presence of mood symptoms, rather than *preceding* them. Implications of the present findings for our understanding of the development of bipolar disorder, as well as for informing early interventions are discussed.

Introduction

Bipolar disorder is one of the most serious of psychiatric disorders, often with a life-long impact on affected individuals and their families. Heritability has been estimated between 65-85%, and positive family history in first-degree relatives has remains the strongest predictor of future illness (Duffy, 2000; Merikangas et al., 1988).

A number of studies have indicated increased rates of general psychopathology as well as mood disorders in the offspring of bipolar parents compared to children of well parents (for review see Delbello & Geller, 2001; Lapalme et al., 1997). A meta-analytic study by Lapalme et al. (1997), evaluating 17 studies of children aged 7 – 25 years, indicated that 52% of bipolar offspring met criteria for psychopathology, 26% for mood disorder, and 5.4% of the group met the criteria for bipolar disorder. In turn, longitudinal studies have been informative in respect to the prodromal features and the developmental pathway of the disorder (Duffy, Alda, Crawford, et al., 2007; Duffy et al., 2010; Egeland et al., 2003; Shaw et al., 2005) providing compelling evidence of increasing psychopathology in high-risk offspring over time. Further, a sequence of clinical stages has been proposed: from non-mood nonspecific problems (including sleep disturbances and anxiety), to minor depressive symptoms and depressive episodes, followed by features of (hypo)mania, usually in late adolescence (Duffy, Alda, Crawford, et al., 2007; Duffy et al., 2010). In this vein, a study of Amish bipolar offspring has reported episodic, rather than chronic, symptom clusters including sleep disruptions, somatic problems, anxiety, depressive symptoms, behavioral problems and functional impairment at a baseline assessment (Egeland et al., 2003). Additional mania-like features, including decreased sleep, high energy, and excessive talking, were reported at a follow-up assessment three years later (Shaw et al., 2005).

However, little work has been carried out in this high-risk population on the role of psychological processes in the development of bipolar disorder. This is surprising, given a plethora of recent research on the psychological aspects of bipolar disorder, based on the premise of cognitive vulnerability to depression (Abramson et al., 1999; Beck, 1967, 1976, 1987), which has attributed a causal role to negative self-related cognitive contents. In this vein, studies on an adult population with bipolar disorder, both currently symptomatic and remitted, have by now identified a psychological profile of affected individuals, with a number of similarities to that found in individuals diagnosed with unipolar depression. Examples include low self-esteem (for meta-analysis see

Nilsson et al., 2010), with pronounced instability over time (Knowles et al., 2007), abnormal coping strategies with low mood (Chapter 3; Thomas et al., 2007; van der Gucht et al., 2009), negative attributional style (Winters & Neale, 1985), and dysfunctional attitudes towards one's self and others (Lam et al., 2004; J. Scott & Pope, 2003). However, there are a number of limitations to studies on already diagnosed adults, for example a failure to disentangle whether psychological abnormalities are indeed causal, or rather a consequence of the illness (i.e. 'a scar') (for critique see Just et al., 2001).

Only one study to date has examined the psychological processes in the offspring of bipolar parents (S. H. Jones et al., 2006), with findings indicating fluctuating self-esteem, high negative affect and ruminations, and subjectively worse quality of sleep, in bipolar children. However, when the child groups were divided into affected and non-affected subgroups, based on past or current psychopathology, the reported abnormalities were associated with already-affected children of bipolar parents, whereas no differences were found between unaffected index offspring and well control children.

The aim of the present study was to examine a broader range of psychological processes in bipolar offspring compared to well offspring, including negative psychological style as well as hypomanic cognitions. In addition, the same measures are examined in parents diagnosed with bipolar disorder, by comparison to well parents.

Method

Participants

Parents diagnosed with bipolar disorder with children aged 13-19 years were recruited from self-help groups, CMHTs, and psychiatric services in Wales and England. In eight cases, parents had two children who were included in the study. Inclusion criteria for the index parents were a) history of bipolar disorder, and b) having a biological child/children between 13-19 years of age willing to participate in the study. The exclusion criteria comprised a) current episode of mania or depression, b) insufficient command of English, and c) current involvement in another research project. The inclusion criteria for index children were a) age between 13-19 years, and b) having a biological parent diagnosed with bipolar disorder. The exclusion criteria were a) insufficient command of English language, and b) current involvement in ongoing research. Control

participants matched for gender and age were identified through the Bangor University Community Panel, snowballing from index participants, and word of mouth. Six of the control parents had two children who were recruited to the study. Inclusion criteria entailed a) no history of severe psychiatric disorder, and b) having a child between 13-19 years of age. The inclusion criteria for control children were a) age between 13-19 years, and b) having a parent with no history of mental illness. The exclusion criteria for both control groups were identical to those of index children.

The study only proceeded when both parents and a child/children agreed to take part in the research project, and informed written consent was obtained from both parents and child/children. Adolescents received £30 and their parents £20 for their time and effort. Ethical approval for the study was obtained from a National Health Service research ethics panel and research was conducted in accordance with the Helsinki Declaration as revised 1989.

Parents completed the Structured Clinical Diagnostic Interview for DSM-IV Axis I Disorder (First et al., 1995) to confirm the diagnosis of bipolar disorder in case of the index parents and the absence of a history of severe mental illness in case of control parents (i.e. only one parent per family was assessed and, therefore, the history of mental health problems in the other parent cannot be ruled out). After completion of the study, participants received monetary compensation for their time and effort. Adolescent offspring completed the Schedule for Affective Disorders and Schizophrenia for School-Aged Children/Present and Lifetime version (K-SADS-PL) (Kaufman et al., 1997), a semi-structured interview that ascertains lifetime as well as current diagnostic status based on the DSM-IV criteria.

Clinical measures

Adolescent participants completed two face-to-face interviews assessing symptoms of depression and mania, and a clinical diagnostic interview.

1. *The Hamilton rating scale for depression* (HAM, Hamilton, 1960) A shortened, 11-item form was used ($\alpha = .66$ in this sample). Each item is rated on a Likert scale ranging from 0 (i.e. 'not present at all') to 4 (i.e. 'severe') with a maximum score of 44.

2. *The Bech-Refaelson Mania Scale, Modified Version* (MAS, Licht & Jensen, 1997) is widely used to assess symptoms of mania and is designed to be administered alongside the HAM. Each of its 11 items is rated on a five-point scale, resulting in a total score ranging between 0-44. The scale has high inter-observer reliability (Bech et al., 1979) and internal consistency ($\alpha = .78$ in this sample).

Psychological measures

All participants completed the following psychological measures during the first interview.

1. *The Self-Esteem Rating Scale – Short Form* (SERS-SF, Lecomte, Corbiere, & Laisne, 2006; Nugent & Thomas, 1993) is a widely used instrument assessing explicit self-esteem. Each of the 20 items is rated on a Likert scale ranging from 1 to 7. High composite score reflects high explicit self-esteem. The SERS-SF shows high validity, and good test-retest reliability and internal consistency (Lecomte et al., 2006).
2. *The Revised Nolen-Hoeksema's Response Styles questionnaire* (RSQ; Nolen-Hoeksema, 1991); revised by (Knowles et al., 2005) is a 48-item self-report measure assessing ways of coping with depressed mood. It consists of three scales, a 25-item Rumination scale, a 15-item Active coping (problem solving and distraction) scale, and a 8-item Risk-taking scale. Items are rated between 0 = 'Almost never' and 3 = 'Almost always'. The questionnaire has acceptable internal consistency with alphas of 0.91 (Rumination), 0.82 (Active copying), and 0.68 (Risk-taking) (Knowles et al., 2005).
3. *The Domain-Specific Risk-Taking* (Weber, Blais, & Betz, 2002) is a 40-item self-report measure evaluating risk-taking intentions in five different domains of life (i.e. recreational, social, ethical, health/safety and financial risks). Each item is rated using a 5-point Likert scale ranging from 1 = 'extremely unlikely' to 5 = 'extremely likely'. The financial scale can be broken down into gambling and investment subscales, the latter was omitted in the present study as it did not apply to our population. The measure has been widely used and validated. Weber et al. (2002) reported adequate test-retest reliability, good internal consistency (from .70 to .84), and acceptable construct validity.

4. *The Arnett Inventory of Sensation Seeking* (AISS, Arnett, 1994) is a 20-item self-report assessment evaluating the desire for novelty and intensity of sensory experience as a personality trait reflected in a variety of behaviors without explicitly referring to risk-taking. It comprises two 10-item Likert-based subscales, novelty and intensity, with item scores ranging from 1 = ‘does not describe me at all’ to 4 = ‘describes me very well’. Six of the items are reversed. Higher scores on the AISS have been reported in adolescents compared to adults, and males compared to females (Arnett, 1994). The measure has good internal reliability (Arnett, 1994).
5. *The Sensitivity to Punishment and Sensitivity to Reward Questionnaire* (SPSR, Torrubia et al., 2001) comprises two 24-item scales with items rated either “yes” or “no”. The sensitivity to punishment scale (SP) measures functions associated with the behavioural inhibition system (BIS). The sensitivity to reward scale (SR) assesses attitudes related to the behavioral approach system (BAS). The questionnaire has acceptable reliability with alphas of 0.75 (SR) and 0.83 (SP); (Torrubia et al., 2001).
6. *The 20-item Hypomanic Personality Scale* (HPS 20; Meads & Bentall, 2008), is derived from the original 48-item scale developed by Eckblad and Chapman (1986), and assesses hypomanic personality characteristics as a unidimensional construct, with good reliability, $\alpha = 0.80$. Items are responded “true” or “false”.
7. *The Abridged Hypomanic Attitudes and Positive Predictions Inventory* (Dodd, Mansell, Morrison, & Tai, 2011; Dodd, Mansell, Sadhnani, Morrison, & Tai, 2010; Mansell, 2006) is a 29-item self-report measure based on the Hypomanic Attitudes and Positive Predictions Inventory (HAPPI; Mansell, 2006). It assesses hypomania-related cognitions and beliefs about internal states, and comprises 6 subscales labelled social self-criticism (3 items), increasing activation to avoid failure (6 items), success activation and triumph over fear (4 items), loss of control (3 items), grandiose appraisals of ideation (4 items) and regaining autonomy (3 items). Participants were asked to indicate how much they agreed with each of the 29 statements by intersecting a line between 0% and 100%. Due to high inter-correlations between the subscales, principal component analysis was applied. Only one factor was retrieved with loadings on all of the subscales, and accounting for 72% of the variance; hence the derived factor score was utilized in all analyses. The original questionnaire, from

which the new, abridged version was derived, has good validity and reliability (Mansell & Jones, 2006).

Procedure

After providing informed consent, both index and control parents completed the clinical diagnostic interview (SCID). All children of index parents then completed the K-SADS to screen for lifelong or current diagnoses. All participants were asked to complete the self-report questionnaires. Other tasks, reported elsewhere, were part of the testing session(s), lasting in total about 3-4 hours, typically spread over several meetings according to the wishes of the participants.

Statistical analyses

Prior to statistical analyses, the data were inspected for assumptions of normality. Non-normally distributed data were transformed using log or cube-root transformations depending on the severity of the skew (Howell, 2007; Tabachnick & Fidell, 2007); alternatively statistical tests for non-parametric data were utilized. Participants (i.e. index vs. control parents, and index vs. control children) were compared on socioeconomic variables using t-test or chi-square statistics.

To examine whether index vs. control parents, and index vs. control children, differed on psychological measures, 2 (positive family history vs. no family history) by 2 (parent vs. child status) factorial analysis of variance was utilized. Significant main and interaction terms were followed by simple effects analyses.

Results

Group demographics

Demographic profiles of the samples along with bipolar status specifications are shown in Table 2.1 and Table 5.2. No differences in age, sex or education were identified between groups (all $ps > .05$). However, chi-square statistics revealed a significant difference between the parents' employment status, $\chi^2(3) = 10.26$, $p = .016$.

Table 5.1 Demographic information for index and control parents.

	Index parents (N = 21) M (SD)	Control parents (N = 23) M (SD)	
Age	48.86 (7.12)	48.00 (6.67)	$t(42) = .79, p = .434$
Sex			$\chi^2(1) = 2.37, p = .179$
	female 13 (61.9%)	19 (82.6%)	
	male 8 (38.1%)	4 (17.4%)	
Education			$\chi^2(3) = 1.67, p = .149$
	GCSE 5 (23.8%)	7 (30.4%)	
	A-levels 6 (28.6%)	3 (13.0%)	
	Degree 5 (23.8%)	7 (30.4%)	
	Postgraduate 5 (23.8%)	6 (26.1%)	
Employment			$\chi^2(3) = 10.26, p = .016$
	Unemployed 10 (47.6%)	2 (8.7%)	
	Employed 9 (42.9%)	18 (78.3%)	
	Retired 1 (4.8%)	0 (0%)	
	Other 1 (4.8%)	3 (13%)	
Lifetime diagnosis			
	BD-I/ 14 (66.7%)	na	
	BDII 7 (33.3%)		
Current episode		na	
	none 14 (66.7%)		
	depressive 4 (19.0%)		
	(hypo)manic 3 (14.3%)		
Age of onset	25.62 (8.73)	na	
Duration of illness	23.24 (7.45)	na	
Medication		na	
	Antidepressants 10 (47.6%)		
	Mood stabilisers 17 (81.0%)		
	Antipsychotics 12 (57.1%)		
	Benzodiazepines 1 (5%)		

Table 5.2 Demographic information for index and control children.

	Index offspring (N = 30) M (SD)	Control offspring (N = 30) M (SD)	
Age	15.90 (1.92)	16.07 (1.70)	$t(58) = -.36, p = .466$
Gender			$\chi^2(1) = 0.27, p = .598$
	female 17 (56.7%)	19 (63.3%)	
	male 13 (43.3%)	11 (36.7%)	
Race			$\chi^2(2) = 4.07, p = .131$
	Caucasian 29 (96.7%)	27 (90.6%)	
	Oriental 0 (0%)	3 (10.0%)	

	Biracial	1 (3.3%)	0 (0%)	
Home environment				$\chi^2(3)=5.36, p = .147$
Living with both parents	24 (80.0%)		22 (73.3%)	
Living with mother	3 (10.0%)		8 (26.7%)	
Foster care	2 (6.7%)		0 (0%)	
Living alone	1 (3.3%)		0 (0%)	
Symptoms				
Depressive	2.93 (2.97)		1.03 (1.32)	$t(51.91) = 2.98, p = .004$
Hypomanic	1.9 (2.82)		0.60 (1.10)	$t(53.78) = 2.13, p = .038$
Major depression				
lifetime	2 (6.7%)		0	
current	3 (10.0%)		0	
Overgeneralised anxiety disorder				
lifetime	1 (3.3%)		0	
current	1 (3.3%)		0	
Panic disorder				
lifetime	4 (13.3%)		0	$\chi^2(1)=4.29, p = .038$
current	4 (13.3%)		0	$\chi^2(1)=4.29, p = .038$
Separation anxiety				
lifetime	1 (3.2%)		0	
Hallucinations			0	
lifetime	1 (3.2%)			
current	1 (3.2%)		0	
Suicidal attempt				
lifetime	2 (6.7%)		0	
PTSD				
current	1 (3.4%)		1 (3.3%)	
Diagnosed participants	7 (23.3%)		1 (3.3%)*	$\chi^2(1)=5.19, p = .023$

Note: * $p < .05$, ** $p < 0.01$.

Do adults and children with bipolar status differ from controls?

Mean scores of the psychological measures for each group are presented in Table 5.3.

Self-esteem: There was a significant main effect for family history status ($F(1, 99) = 13.24, p < .001$) and a significant interaction term ($F(1, 99) = 14.85, p < .001$). Follow-up simple effects analyses indicated that index parents had significantly lower self-esteem than control parents ($F(1,99) = 24.48, p < .001$); no differences between index and control children were found ($p = .870$).

Sensitivity to reward and punishment: first, the *reward subscale* was used as a dependent variable. A significant main effect of parent status ($F(1, 100) = 12.13, p = .001$), and interaction term ($F(1, 100) = 6.56, p = .012$) were found. Follow-up simple effect analyses revealed that index parents endorsed significantly higher scores than control parents ($F(1,100) = 5.67, p = 0.019$). In parallel analyses with the *punishment subscale* of the SRSP, significant effects for family history status ($F(1, 100) = 8.68, p =$

.004) and the interaction ($F(1, 100) = 8.68, p = .004$) were found. Index parents show increased sensitivity to punishment ($F(1, 100) = 15.03, p < .001$); no significant differences between index and control children were identified for either subscale (all $ps > .05$).

Novelty seeking: No significant main, or interaction effects were found (all $ps > .05$) for the novelty subscale. For the intensity subscale, only parent status was significant ($F(1, 99) = 7.43, p = .008$), indicating increased seeking for intensity of experience in adolescents.

Hypomanic personality: A significant effect of family history status ($F(1,100) = 14.98, p < .001$) and an interaction term ($F(1,100) = 14.98, p < .001$) were found. Simple effects analyses revealed higher scores from index parents compared to control parents ($F(1,100) = 25.93, p < .001$); no difference between children's scores was found ($p = 1.00$).

Risk-taking: The only significant differences on the DOSPERT subscales were in relation to the recreational and gambling subscale. A significant main effect for parent versus child status ($F(1,100) = 8.83, p = .004$), indicated that parents were involved in recreational risk-taking less than children. Non-parametric tests were used with the gambling subscale as a DV due to its non-normal distribution; the Mann-Whitney test indicated that index parents engaged in gambling more than control parents ($U = 160.00, z = -2.43, p = .014, r = .36$), whilst no differences were found between index and control children ($p = 0.925$).

Response style: Both family history status ($F(1, 100) = 23.81, p < .001$) and the interaction term ($F(1, 100) = 19.10, p < .001$) were significant in a model with *rumination* as DV. The simple effect analyses yielded significant differences between index and control parents ($F(1, 100) = 37.04, p < .001$); no differences between children were identified ($p = .696$). When *active coping* was the DV, a significant effect of bipolar status ($F(1, 100) = 13.24, p < .001$) was revealed. Simple effects analyses revealed lower levels of active coping in bipolar compared to control parents ($F(1, 100) = 10.71, p = .001$), and also a borderline significant difference in children, with index children reporting lower levels of active coping ($F(1, 100) = 3.14, p = 0.079$). Lastly, the Mann-Whitney test indicated significant differences in *risk-taking* between index and control parents ($U = 103.00, z = -3.36, p = .001, r = .50$), but no difference was found between children ($p = .342$).

Hypomanic cognitions: A significant main effect of family history status ($F(1, 100) = 17.89, p < .001$) and an interaction term was found ($F(1, 100) = 18.04, p < .001$). Simple effects analyses revealed significantly higher scores for index compared to control parents ($F(1, 100) = 31.11, p < .001$), with no significant differences between the children's scores ($p = .989$).

Table 5.3 Descriptive statistics and group differences in psychological measures.

	Index children (N = 30) M (SD)	Control children (N = 30) M (SD)	Index parents (N = 21) M (SD)	Control parents (N = 23) M (SD)
<i>Explicit self-esteem</i>	24.62 (15.78)	23.97 (15.90)	13.10 (18.68) ^b	35.87 (8.92) ^{b***}
<i>Sensitivity to reward and punishment</i>				
Reward	10.30 (4.62)	11.57 (4.33)	9.52 (4.70) ^b	6.63 (2.92) ^{b*}
Punishment	10.77 (5.05)	10.76 (5.60)	11.76 (4.30) ^b	6.04 (4.73) ^{b***}
<i>Novelty seeking</i>				
Novelty	24.63 (4.06)	26.97 (3.41)	27.29 (5.47)	26.82 (4.10)
Intensity	26.20 (6.81)	24.83 (5.02)	23.62 (5.12)	21.36 (4.64)
<i>Hypomanic personality</i>	7.27 (3.97)	7.27 (4.26)	11.00 (5.37) ^b	4.34 (3.77) ^{b***}
<i>Domain specific risk-taking</i>				
Social	25.40 (5.09)	26.03 (4.19)	25.09 (5.07)	25.70 (5.47)
Ethical	14.57 (5.52)	14.03 (4.14)	15.14 (7.61)	12.17 (4.34)
Health	18.50 (6.06)	19.20 (5.65)	18.43 (6.64)	16.26 (4.93)
Recreational	20.10 (7.06)	23.37 (7.49)	18.62 (7.10)	16.39 (6.91)
Gambling	6.33 (3.59)	5.60 (2.04)	6.76 (4.57)	4.22 (0.67) ^{**}
<i>Response styles</i>				
Rumination	21.00 (15.80)	19.70 (12.70)	35.81 (13.69) ^b	12.17 (6.32) ^{b***}
Active coping	17.93 (5.00) ^a	21.00 (7.77) ^{a¶}	15.38 (7.82) ^b	22.00 (5.99) ^{b***}
Risk-taking	3.27 (3.81)	2.13 (2.45)	3.52 (3.25) ^b	0.87 (1.20) ^{b***}
<i>Hypomanic cognitions</i>				
Total HAPPI	0.00 (0.97)	0.00 (0.75)	0.70 (1.12) ^b	-0.79 (0.66) ^{b***}

Note: ^{*} $p < .05$; ^{**} $p < .01$; ^{***} $p < .001$; [¶] $p = .074$.

Is psychopathology in children associated with psychological abnormalities?

S. H. Jones et al. (2006) have previously reported psychological differences between children of bipolar patients who had affective symptoms and those who did not have affective symptoms. One-way ANOVAs were therefore carried out to examine differences between the children in the present study who met the criteria for any diagnosis on the K-SADS, the non-affected offspring of bipolar parents and the unaffected children of well parents. These results must be interpreted with caution because of the low numbers involved.

Symptoms of depression and mania: Significant differences between groups were revealed for symptoms of depression ($p = .001$), and planned contrasts indicated that affected ($t(56) = 3.94, p < .001, \omega = .47$) as well as unaffected bipolar children ($t(56) = 2.31, p = .024, \omega = .29$) reported significantly higher symptoms than control children, and also that affected children reported higher levels of symptoms than non-affected bipolar children ($t(56) = 2.34, p = .023, \omega = .30$). Significant between group differences were also found for symptoms of mania ($p = .022$), with affected children showing higher scores than control children ($t(56) = 2.35, p = .023, \omega = .30$).

Self-esteem: Marginally significant difference between groups were revealed ($p = .092$); the affected children showed significantly lower self-esteem than the non-affected children of bipolar parents ($t(56) = 2.19, p = .033, \omega = .28$), and marginally lower self-esteem than the control children ($t(56) = -1.98, p = .052, \omega = .26$).

Sensitivity to reward and punishment: Significant differences were found for sensitivity to punishment subscale ($p = .054$); planned contrasts indicated that affected offspring reported significantly more sensitivity to punishment than both the non-affected children ($t(56) = -2.45, p = .017, \omega = .31$), and the children of well parents ($t(56) = 2.15, p = .036, \omega = .28$), who did not differ from each other.

Novelty seeking: On the novelty seeking subscale, group differences were revealed ($p = .027$); control children reported significantly higher novelty seeking than both affected children ($t(56) = -2.14, p = .037, \omega = .27$), and non-affected children ($t(56) = -2.31, p = .025, \omega = .29$), who did not differ from each other.

Response styles: Marginally significant differences were found between the groups on the rumination subscale ($p = .069$), and planned contrasts indicated that the affected children ruminated significantly more than both the non-affected children ($t(56) = -2.30, p = .025, \omega = .29$), and the children of well parents ($t(56) = 2.15, p = .035, \omega = .28$).

Hypomanic cognitions: Finally, marginal significant between group differences were indicated for hypomanic cognitions ($p = .062$); affected children scored significantly higher than non-affected children ($t(56) = -2.42, p = .019, \omega = .31$), and, marginally, the control children ($t(56) = 1.86, p = .068, \omega = .24$).

No other psychological processes showed significant differences between groups (all $ps > .05$; Table 5.4).

Table 5.4 Descriptive statistics and group differences in psychological measures between affected, non-affected bipolar offspring, and non-affected control offspring

	Index Children		Control children	F	Planned contrasts
	Affected (N = 7) M (SD)	Non-affected (N = 23) M (SD)	Non-affected (N = 29) M (SD)		
<i>Explicit self-esteem</i>	10.25 (29.87)	26.30 (12.08)	23.55 (16.18)	2.42*	AC<NAC*, AC<CC [¶]
<i>Sensitivity to reward and punishment</i>					
Reward	12.42 (4.35)	9.65 (4.59)	11.55 (4.40)	1.61	
Punishment	14.71 (5.77)	9.57 (4.25)	10.31 (5.09)	3.07 [¶]	AC>NAC*, AC>CC*
<i>Novelty seeking</i>					
Novelty	23.57 (4.82)	24.96 (3.87)	26.97 (3.30)	3.83*	AC<CC*, NAC< CC*
Intensity	23.57 (5.56)	27.00 (7.06)	24.79 (5.10)	1.28	
<i>Hypomanic personality</i>	8.29 (3.68)	6.96 (4.08)	7.31 (4.11)	0.27	
<i>Domain specific risk-taking</i>					
Social	25.14 (5.01)	25.48 (5.22)	26.14 (4.66)	0.19	
Ethical	16.14 (5.14)	14.08 (5.64)	13.82 (4.05)	0.65	
Health	21.29 (4.92)	17.65 (6.21)	19.21 (5.75)	1.42	
Recreational	17.14 (6.89)	21.00 (7.00)	23.13 (7.55)	2.07	
Gambling	6.14 (2.41)	6.39 (3.93)	5.66 (2.93)	0.51 ^H	
<i>Response styles</i>					
Rumination	31.43 (17.68)	17.83 (14.10)	19.00 (12.32)	2.77 [¶]	AC>NAC*, AC>CC*
Active coping	18.00 (5.39)	17.92 (5.00)	21.48 (7.43)	2.28	
Risk-taking	4.43 (4.31)	2.91 (3.68)	2.10 (2.41)	0.82 ^H	
<i>Hypomanic cognitions</i>					
Total HAPPI	.69 (.78)	-.21 (.95)	.03 (.75)	2.92 [¶]	AC >NAC*, AC >CC [¶]
<i>Symptoms of depression and mania</i>					
HAM	1.59 (0.80)	0.92 (0.76)	0.50 (0.52)	8.48**	AC>NAC*, AC>CC***, NAC > CC*
MAS	1.02 (1.03)	0.71 (0.67)	0.37 (0.53)	3.54*	AC>CC*, NAC>CC [¶]

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; [¶] denotes marginal significance; ^H denotes Kruskal-Wallis test.

Discussion

An abundance of research on cognitive vulnerability to bipolar mood disorder has been carried out on both remitted and at-risk populations. Nevertheless, such de-

signs have been criticized for their inherent methodological limitations, such as an inability to disentangle whether psychological abnormalities are a cause, or a consequence of mood episodes (Just et al., 2001). In this context, the present study sought to circumvent these limitations by examining relevant psychological processes in individuals at increased risk for bipolar disorder, who have not yet developed the illness.

A number of findings deserve comment and review. First, the overall psychopathology rate in the bipolar offspring was 23% (7 out of 30) compared to 3% (1 out of 30) in children of well parents. This is substantially lower than previous reports. For example, in their meta-analysis, Lapalme et al. (1997) found an overall psychopathology rate of 52%, and even higher rates were reported in more recent studies (e.g. 75%, Akdemir & Gökler, 2008). Nonetheless, similar levels of psychopathology to our findings have been reported in the past (LaRoche et al., 1985; LaRoche, Sheiner, & Lester, 1987; Wals et al., 2001). The variability in reported rates across studies may be associated with differences in recruitment strategies (Duffy et al., 2011; Wals et al., 2001).

Contrary to our predictions, comparisons between bipolar and control offspring did not suggest any psychological abnormalities in the bipolar group, with the only minor difference being lower levels of active coping in bipolar children. We have previously shown that active coping is preserved, and indeed deliberately utilized, in adults with bipolar disorder (Chapter 3), though the report did not include comparisons with healthy individuals. It has also been shown in laboratory conditions that active coping is effective in alleviating depressive mood (Morrow & Nolem-Hoeksema, 1990). It is therefore possible that decreased resources in this domain may be associated with lower psychological resistance, and a potentially greater susceptibility to depressive symptoms.

In contrast to the absence of substantial effects when comparing the index offspring with controls, a number of psychological differences were found when the index offspring were divided into affected and non-affected subgroups. Affected children, in comparison to both non-affected index and control children, showed significantly lower self-esteem, increased sensitivity to punishment, ruminations and hypomanic cognitions. Furthermore, these psychological processes were associated with symptoms of depression. Similar findings (i.e. increased rumination, fluctuation of self-esteem, increased negative affect in *affected* bipolar children) have previously been reported by S. H. Jones et al. (2006).

Only one psychological measure, novelty seeking, was significantly lower in both affected as well as non-affected bipolar groups. As novelty seeking refers to a proactive engagement in new experiences (not necessarily involving risk-taking), these findings are unexpected in the light of BAS dysregulation theory, which suggests increased approach behaviours in bipolar and high-risk individuals (Johnson, 2005). Nevertheless, this finding is in keeping with the '*clinical stages*' approach proposed by Duffy and colleagues (Duffy, Alda, Crawford, et al., 2007; Duffy et al., 2010; Duffy & Carlson, 2013). In that view, psychopathology in vulnerable children initially presents as non-mood behaviour problems, followed by anxiety and minor depressive symptoms, culminating in mania-like signs a few years later. Consistent with this, the majority of the affected bipolar offspring in our study (71%) reported a history of anxiety disorders. In further support of this view, research on human and non-human animals have suggested that behavioural withdrawal, and a tendency to avoid novel situations, is associated with an increased risk of developing anxiety disorders and major depression (Fox, Henderson, Marshall, Nichols, & Ghera, 2005).

Whilst this study is advantageous in employing a genetically high-risk population, it has several limitations. First, the study has a small sample size, which reflects difficulties associated with the recruitment of the participants, and impacts on the power of statistical tests to detect significant effect. Next, recruitment strategies employed in the study might have contributed in a possible selection bias. It is possible that, given the large number of tests employed, children with mental health problems may have been deterred from taking part. A further limitation relates to the cross-sectional design of the study. Employing longitudinal psychological assessments would allow for mapping of changes in participants' psychological patterns; future studies in this direction are warranted.

In summary, psychological abnormalities identified in the present study showed an association with *having already met* diagnostic criteria for psychological disorders, rather than *preceding* them. As such, our results, in line with those of S. H. Jones et al. (2006), do not directly support the cognitive vulnerability theories (Beck, 1976). Along with the finding that psychological abnormalities were significantly associated with mood, our results suggest these to be a consequence of mood dysregulation, as proposed by, for example, the differential activation theory of (Teasdale, 1988) according to which depressive symptoms activate negative thought patterns and information processing, which, in turn, leads to increases in depressive symptoms. Future studies need to con-

sider the dynamic relationships between symptoms and psychological processes in the very earliest stages of the developmental trajectories that lead to mood disorders, but such an approach will present considerable methodological challenges.

Chapter 6

Discrepancies between explicit and implicit self-esteem and their relationship to symptoms of depression and mania

Pavlickova, H., Turnbull, O., & Bentall, R. P. (2013). Discrepancies between explicit and implicit self-esteem and their relationship to symptom of depression and mania. *Psychology and Psychotherapy: Theory, Research and Practice.*

Abstract

Objective: Self-esteem is a key feature of bipolar symptomatology. However, so far no study has examined the interaction between explicit and implicit self-esteem in individuals vulnerable to bipolar disorder.

Methods: Thirty children of parents with bipolar disorder and 30 offspring of control parents completed Hamilton Rating Scale for Depression, the Bech-Rafaelson Mania Scale, the Self-esteem Rating Scale and the Implicit Association Test.

Results: No differences between groups were revealed in levels of explicit or implicit self-esteem. However, bipolar offspring showed increased levels of symptoms of depression and mania. Furthermore, depressive symptoms were associated with low explicit self-esteem, whilst symptoms of mania were associated with low implicit self-esteem. When self-esteem discrepancies were examined, damaged self-esteem (i.e. low explicit but high implicit self-esteem) was associated with depression, whilst no associations between mania and self-esteem discrepancies were found.

Conclusions: Not only explicit, but also implicit self-esteem, and the interactions between the two are of relevance in bipolar symptoms. Clinical implications and future research directions are discussed.

Introduction

In bipolar disorder (BD), feelings of worthlessness and self-reproach are prominent during depression, alternating with grandiosity during periods of mania, implying that one of the central themes of the disorder is a shifting sense of self-esteem.

The importance of self-esteem (SE) in the condition has been indicated by numerous studies. For example, we have found discrepancies between actual and ideal self in BD depressed patients but abnormal consistency between these constructs when patients are manic (Bentall et al., 2005) and, like others (J. Scott & Pope, 2003), that self-esteem predicts future episodes more than other self-referential processes (Chapter 2). A recent meta-analytic study indicated that, even between episodes, bipolar patients show lower self-esteem than control subjects (Nilsson et al., 2010). Self-esteem has also been found to be highly unstable over time in bipolar patients (Henry et al., 2008; Knowles et al., 2007; van der Gucht et al., 2009) but also in individuals at risk of the disorder (Bentall et al., 2011).

Self-esteem is usually assumed to be an affective phenomenon, consisting of self-directed emotional judgments of worthiness, acceptance, value, and liking (Brown, 1993; Kernis, 2003). However, in psychological research it has typically been assessed by self-report measures, limiting our ability to capture the complexity of the relevant processes (Kernis, 2003; Kernis & Paradise, 2002). A key issue is that self-report assessments can, by definition, capture only explicit psychological phenomena. In the last few decades, we have seen an increased understanding that psychological phenomena reflect two separate, but interacting, systems *the cognitive/rational system*, which is accessible to conscious evaluation, and an unconscious, *experiential system*, based on an affective experience and principles of automaticity (Epstein, 1994; Epstein & Morling, 1995; Wilson, Lindsey, & Schooler, 2000). Whilst explicit self-esteem may be assessed using self-report measures, implicit self-esteem is best evaluated by tapping into more automatic processes.

Despite the possible clinical and theoretical relevance of this distinction to bipolar disorder, implicit self-esteem has hardly been assessed in bipolar patients or vulnerable persons. Two studies using the Pragmatic Inference Task, an implicit attributional measure, have reported implicit negative self-esteem in remitted bipolar (Winters & Neale, 1985) and currently manic bipolar patients (Lyon et al., 1999). In one recent study, remitted bipolar patients showed excessive reactivity of explicit self-esteem to an

experimental stressor, but implicit self-esteem, assessed by the Name Letter Preference Task, was not abnormally reactive (Pavlova et al., 2011). However, despite its methodological superiority over other measures of implicit self-esteem (Bosson et al., 2000), to our knowledge, no study has so far utilized the Implicit Association Test (Greenwald, McGhee, & Schwartz, 1998), to assess bipolar patients or vulnerable persons.

Also, to our knowledge no previous study has examined *discrepancies* between implicit and explicit self-esteem in relation to bipolar disorder using any measure. This is an unfortunate omission, because self-esteem discrepancies, in *either* direction, appear to be maladaptive and related to a range of psychological problems, even in those with no clinical diagnosis (Bosson et al., 2003; Jordan, Spencer, Zana, Hoshino-Browne, & Correll, 2003; Schröder-Abé, Rudolph, & Schütz, 2007). Self-esteem discrepancies can take the form of *fragile self-esteem* (i.e. high explicit and low implicit), or *damaged self-esteem* (i.e. high implicit and low explicit). So far, research has mostly examined fragile self-esteem and its relations to defensiveness and self-enhancement (Bosson et al., 2003; Kernis et al., 2005), or narcissism (Zeigler-Hill, 2006). However, damaged self-esteem has been associated with negative attributional style and anger suppression in healthy individuals (Schröder-Abé, Rudolph, & Schütz, 2007), and consistently reported in patients with major depression (Kesting, Mehl, Rief, Lindenmeyer, & Lincoln, 2011; Valiente et al., 2011; Vazquez et al., 2008).

The goal of the present study was therefore to examine self-esteem discrepancies in a cohort of adolescent children who have parents with bipolar disorder compared to children of control parents. It has previously been shown that bipolar offspring show no psychological differences on explicitly assessed psychological measures including self-esteem, unless they show evidence of mood disorder, in which case explicit self-esteem is low and highly unstable (S. H. Jones et al., 2006). In this study we therefore aimed, for the first time, (i) to assess differences in both explicit and implicit self-esteem in adolescent children at genetic risk of bipolar disorder; (ii) to examine whether explicit and implicit self-esteem, or their discrepancies, are associated with symptoms of depression and mania in this at-risk sample. We hypothesized that index offspring would show no differences in explicit self-esteem, but their implicit self-esteem would be lower. In addition, we predicted that symptoms of depression would be associated with damaged self-esteem (i.e. low explicit but high implicit self-esteem), whilst symptoms

of mania would be associated with fragile self-esteem (i.e. high explicit but low implicit self-esteem).

Further, exploratory analyses using a discrepancy index were carried out following the procedure of Briñol, Petty, and Wheeler (2006). We predicted that more index offspring would show self-esteem discrepancies, and symptoms of depression would be related to negative discrepancy index (reflecting low explicit but high implicit self-esteem, denoting damaged self-esteem as described above), whilst symptoms of mania would be related to positive discrepancy index (reflecting high explicit but low implicit self-esteem, denoted fragile self-esteem above).

Methods

Participants

Recruitment of participants was carried out in two stages. First, adults diagnosed with bipolar disorder who have children between 13-19 years of age were approached via self-help groups, community mental health teams and psychiatric services in Wales and England. Further, the study was advertised in self-help group newsletters (e.g. Pendulum) and websites. Parents interested in the study met with a researcher, who explained the protocol, and provided them with an information sheet to give to their children. The family was included into the study only when parents as well as children separately consented to participate. History of bipolar disorder in the parent was confirmed by the Structured Clinical Diagnostic Interview for DSM-IV Axis I Disorder (SCID, First et al., 1995) (this report examines child ratings only; only one parent per family was assessed and, therefore, the history of mental health problems in the other parent cannot be ruled out). The inclusion criteria for index children were: a) age between 13-19 years, and b) having a biological parent diagnosed with bipolar disorder. The only exclusion criterion was an insufficient command of English language.

Control families were recruited via snowballing from index families (in one case), via the Bangor University Community Panel, and by word of mouth. Control parents were screened for no history of affective disorders using SCID (First et al., 1995). The inclusion criteria for control children were a) age between 13-19 years, and b) having a parent with no history of mental illness. Insufficient command of English was an exclusion criterion. Both control and index offspring completed the Schedule for Affec-

tive Disorders and Schizophrenia for School-Aged Children/Present and Lifetime version (K-SADS-PL Kaufman et al., 1997)

The method of recruitment and inception of the index and control families was approved by a National Health Service research ethics committee and by NHS research governance committees in the relevant geographical areas (REC: 10/WN01/35). All participants provided written informed consent, and at the end of the study received monetary compensation. Research was conducted in accordance with the Helsinki Declaration as revised in 1989. Participants received monetary compensation for their time and effort.

Clinical measures

Face-to-face interviews were conducted to assess symptoms of depression and mania.

2. *Hamilton Rating Scale for Depression* (HAM, Hamilton, 1960). A shortened, 11-item form was used ($\alpha = .66$ in this sample). Each item is rated on a Likert scale ranging from 0 (i.e. 'not present at all') to 4 (i.e. 'severe') with a maximum score of 44.

3. *Bech-Rafealson Mania Scale* (MAS, Bech, Rafaelson, Kramp, & Bolwig, 1978) consists of 11 items rated on a Likert scale ranging from 0 (i.e. 'not present at all') to 4 (i.e. 'severe'). Hence, the maximum score was 44. It is a widely used assessment of severity of mania administered alongside the Hamilton rating scale for depression. The scale has good inter-observer reliability (Bech et al., 1979) and internal consistency ($\alpha = .78$ in this sample).

Psychological measures

1. *The Self-Esteem Rating Scale – Short Form* (SERS-SF, Lecomte et al., 2006; Nugent & Thomas, 1993) is a widely used assessment of self-esteem. It consists of 20 items rated on a Likert scale ranging from 1 to 7. High total score reflects high explicit self-esteem. The scale shows adequate test-retest reliability and convergent validity, and good internal consistency (Lecomte et al., 2006).

2. *Implicit Association Test* (IAT, Greenwald et al., 1998) is a computerised

speeded task measuring the strength of associations between dimensions ‘me’ vs. ‘others’ and ‘positive’ vs. ‘negative’; differences in reaction times in sorting words to categories between congruent (‘me’ paired with positive words) and incongruent conditions (‘me’ paired with negative words) are interpreted as indicators of implicit self-esteem (Banaji, 2000). We employed a modified version of the IAT created by Greenwald and Farnham (Greenwald & Farnham, 2000), with good validity and test-retest reliability (Bosson et al., 2000). The IAT has been widely employed in social research (Nosek, Greenwald, & Banaji, 2005). The IAT score (D) was calculated using an improved algorithm as proposed by Greenwald et al. (Greenwald, Nosek, & Banaji, 2003). A higher IAT effect reflects higher implicit self-esteem.

The IAT was administered on researcher's laptop (see Figure 6-1). Prior to testing, participants were reassured that they were not obliged to enter items that they felt uncomfortable about, that all information provided by them was confidential, and that no personal data would be stored. To create the ‘me’ category, participants were required to enter a number of personal details, such as ‘gender’, ‘name or nickname’, ‘middle name’, ‘family name’, ‘month and day of birthday’, ‘city’, ‘region or county’, ‘country’, ‘ethnicity’, and ‘religious identity’. In addition, participants were required to generate the ‘others’ category. To do so, they were presented with lists of possible ‘not me’ responses, and asked to select items. Greenwald and Farnham’s items were utilised for the ‘good’ and ‘bad’ categories: the ‘good’ category contained the words ‘marvellous’, ‘superb’, ‘pleasure’, ‘beautiful’, ‘joyful’, ‘glorious’, ‘lovely’, and ‘wonderful’; the ‘bad’ category included ‘tragic’, ‘horrible’, ‘agony’, ‘painful’, ‘terrible’, ‘awful’, ‘humiliate’, and ‘nasty’.

The IAT task consisted of eight blocks. During the first four blocks participants practiced sorting stimulus words into categories. The following four blocks were test blocks. Across all blocks, stimulus words were presented in the middle of the screen, and participants were required to sort them as fast as they could into categories positioned in the top-right and -left corners of the screen (by pressing a key on the corresponding side of the keyboard). A red cross appeared in the middle of the screen after an erroneous answer (e.g. if a word from the ‘good’ category was assigned to the ‘bad’ category), and this had to be corrected. The first two blocks served as practice blocks for sorting words into ‘me’ and ‘others’ categories. The categories swapped sides after the first block. Blocks three and four were practice blocks for sorting words into cate-

gories ‘good’ and ‘bad’; again, the position of categories swapped sides after the third block.

In the last four blocks, participants were asked to sort both categories at the same time, i.e. a stimulus word from either category appeared in the middle of the screen. In two blocks, ‘me’ and ‘good’ categories were on one side of the computer screen and ‘others’ and ‘bad’ categories on the other side (congruent condition, see Figure 6-1; the positions changed after the first of these blocks). In the remaining two blocks, ‘me’ and ‘bad’ categories were positioned on one side and ‘others’ and ‘good’ on the other side (incongruent condition; categories swapped after the first of these blocks). The order of the congruent and incongruent conditions was been counterbalanced across participants, so that half of the participants received the congruent blocks first and the other half received the incongruent blocks first.

Data from the last four combined blocks were used to compute the IAT scores (D) applying an improved algorithm as proposed by Greenwald et al. (2003). Latencies larger than 10,000 ms were removed from the analyses and error latencies replaced with penalty values. The IAT effect was computed by subtracting mean reaction times of congruent conditions from the mean reaction time of incongruent conditions. This difference was then divided by the individual standard deviation derived from response times across all combined tasks. Higher IAT effect reflects higher implicit self-esteem.

Self-esteem Discrepancies

No association between ratings of explicit and implicit self-esteem was found, even when controlling for symptoms (Table 3). Following the procedure of Briñol et al. (2006), self-esteem discrepancies were calculated as the difference (only considered when larger than 1 SD) between the standardised values of explicit and implicit self-esteem, hence reflecting participants’ scores in relation to the distribution of the whole sample. A positive self-discrepancy index then indicates fragile self-esteem (i.e. high explicit but low implicit self-esteem) and a negative self-discrepancy index reflects damaged self-esteem (i.e. high implicit but low explicit self-esteem). A discrepancy of zero indicates that both self-esteem measures were placed equally (irrespective of whether low, medium or high) in the distribution of both scores in the sample. Note that this is a categorical classification.



Figure 6-1 A screen shot of the IAT task during the congruent condition.

Statistical analyses

Stata 12.1 was used to carry out all statistical analyses. Data were examined using Spearman's correlations, χ^2 analysis and multiple linear regressions as appropriate. Due to the non-normal distribution of symptoms, the nonparametric bootstrapping method was applied to regression analyses (iteration (1000) (Mooney & Duval, 1993).

Results

Group demographics

Demographic profiles of index and control participants, along with their current and lifetime symptomatology, are provided in Table 6.1. No demographic differences between groups were identified; however, index children showed significantly more

symptoms of depression and mania, and significantly more of them reported a history of psychiatric diagnosis.

Table 6.1 Demographic and clinical information for index and control children

	Index offspring	Control offspring	
	(N = 30)	(N = 30)	
	M (SD)	M (SD)	
Age	15.90 (1.92)	16.07 (1.70)	$t(58) = -.36, p = .466$
Gender			$\chi^2(1)=0.27, p = .598$
female	17 (56.7%)	19 (63.3%)	
male	13 (43.3%)	11 (36.7%)	
Ethnicity			$\chi^2(2)=4.07, p = .131$
Caucasian	29 (96.7%)	27 (90.6%)	
Oriental	0 (0%)	3 (10.0%)	
Biracial	1 (3.3%)	0 (0%)	
Home environment			$\chi^2(3)=5.36, p = .147$
Living with both par- ents	24 (80.0%) 3 (10.0%)	22 (73.3%) 8 (26.7%)	
Living with mother	2 (6.7%)	0 (0%)	
Foster care	1 (3.3%)	0 (0%)	
Living alone			
Symptoms			
Depressive	2.93 (2.97)	1.03 (1.32)	$t(51.91) = 2.98, p = .004$
Hypomanic	1.9 (2.82)	0.60 (1.10)	$t(53.78) = 2.13, p = .038$
Major depression			
lifetime	2 (6.7%)	0	
current	3 (10.0%)	0	
Overgeneralised anxiety disorder			
lifetime	1 (3.3%)	0	
current	1 (3.3%)	0	
Panic disorder			
lifetime	4 (13.3%)	0	
current	4 (13.3%)	0	

Separation anxiety			
lifetime	1 (3.2%)	0	
Hallucinations		0	
lifetime	1 (3.2%)		
current	1 (3.2%)	0	
Suicidal attempt			
lifetime	2 (6.7%)	0	
PTSD			
current	1 (3.4%)	1 (3.3%)	
Diagnosed participants	7 (23.3%)	1 (3.3%)	$\chi^2(1)=5.19, p = .023$

Between group differences

Descriptive statistics are presented in Table 6.2. No between group differences were found in explicit or implicit self-esteem. However, a marginally higher number of bipolar offspring showed self-esteem discrepancies.

Table 6.2 Descriptive statistics and group differences in psychological measures

	Index chil- dren (N = 30)†	Control children (N = 30)	t	p	d/w	d 95%CI
Self-esteem						
Explicit	24.62 (15.78)	23.97(15.90)	.16	.875	0.04	-3.90 3.98
Implicit	.60 (.28)	.59 (.24)	.06	.950	0.04	-0.03 0.11
Self-esteem discrepancies			4.40	.073*	.28	
Damaged self- esteem	7 (25.0%)	4 (13.3%)				
Fragile self-esteem	7 (25.0%)	4 (13.3%)				
Low discrepancy	13 (46.4%)	22 (73.3%)				

Note: † 27 index children completed implicit self-esteem assessment; * denotes one-tailed χ^2 test; d & w denote effect size.

Are symptoms of depression and mania related to explicit and implicit self-esteem, or their discrepancies?

Zero order and partial correlational analyses between study variables are reported in Table 6.3. A significant negative relationship between symptoms of depression and explicit self-esteem was revealed, and this association remained when controlling for symptoms of mania. Symptoms of mania were negatively associated with both explicit and implicit self-esteem in the zero order analysis. Nevertheless, only the relationship with implicit self-esteem remained significant when controlling for symptoms of depression. When partial correlational analyses were carried out separately for each group, symptoms of depression were found to be significantly negatively associated with explicit self-esteem in both groups, but a significant negative association between mania ratings and implicit self-esteem was found only in the index group (Table 6.3).

Table 6.3 Zero order and partial correlations between explicit and implicit self-esteem, and symptoms of depression and mania

	Zero order		Partial correlations (controlling for HAM)		Partial correlations (controlling for MAS)	
	Explicit SE	Implicit SE	Explicit SE	Implicit SE	Explicit SE	Implicit SE
Both groups						
Implicit SE	.06 ns	-	-.03ns	-	.04ns	-
HAM	-.47***	-.05ns	-	-	-.39**	.20ns
MAS	-.30*	-.30*	.02ns	-.35**	-	-
Index offspring						
Implicit SE	-.10ns	-	-0.06ns	-	-.17ns	-
HAM	-.50**	.10ns	-	-	-.47*	.34***
MAS	-.21ns	-.29ns	.10ns	-.42*	-	-
Control offspring						

	Explicit SE	Implicit SE	Explicit SE	Implicit SE	Explicit SE	Implicit SE
Implicit SE	.23 ns	-	.08ns	-	.09ns	-
HAM	-.56**	-.31ns	-	-	-.39*	-.09ns
MAS	-.44*	-.35 ¶	-.08ns	-.21ns	-	-

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; ¶ denotes $p = .052$; ¶¶ denotes $p = .094$.

To determine whether symptoms were differentially associated with explicit and implicit self-esteem, multiple regression models were estimated with each symptom as a dependent variable and ratings of explicit and implicit self-esteem, as well as their interaction term as independent variables, whilst controlling for the confounding effect of the alternative symptom ratings (i.e. in a model with depression as dependent variable, the confounding effect of mania was controlled for). Variables in the present models were standardised, and hence reflecting effect sizes. These analyses are shown in Table 6.4. In the model with ratings of depression as a dependent variable ($R^2 = .52$) explicit self-esteem was significantly negatively associated with depression, whilst no effect was found for implicit self-esteem or the interaction term. In the model with mania as a dependent variable ($R^2 = .54$), a negative and significant relationship between implicit self-esteem and symptoms of mania was revealed, whilst no effect for explicit self-esteem or the interaction was found.

In addition, self-esteem discrepancy was further examined using a discrepancy index, a method adopted from previous studies (Briñol et al., 2006; Schröder-Abé, Rudolph, & Schütz, 2007). In our sample, more than a half of index children showed discrepant self-esteem (i.e. 7 had damaged self-esteem, whilst 7 showed fragile self-esteem) in comparison to 27% of control children (4 had damaged self-esteem, and 4 fragile, Table 2). Therefore regression models were estimated with each symptom rating as a dependent variable, and the absolute magnitude of the discrepancy (i.e. discrepancy index), the direction of the discrepancy (i.e. negative or positive, dummy coded), and their interaction were included as independent variables (whilst controlling for the confounding effect of the co-occurring symptom). In the model with depression as a dependent variable ($R^2 = .52$), a marginally significant main effect of a discrepancy index

($\beta = .34$, $SE = .19$, $p = .068$, 95%CI [-.03 .71]), a nonsignificant main effect of the direction of discrepancy ($\beta = .02$, $SE = .22$, $p = .941$, 95%CI [-.41 .43]), and a significant interaction term ($\beta = -.47$, $SE = .22$, $p = .041$, 95%CI [-.92 -.01]) were revealed. Those results indicate that only individuals with a negative discrepancy, i.e. low explicit and high implicit self-esteem, show more symptoms of depression, and that this effect is more pronounced as the discrepancy increases (Figure 6-2).

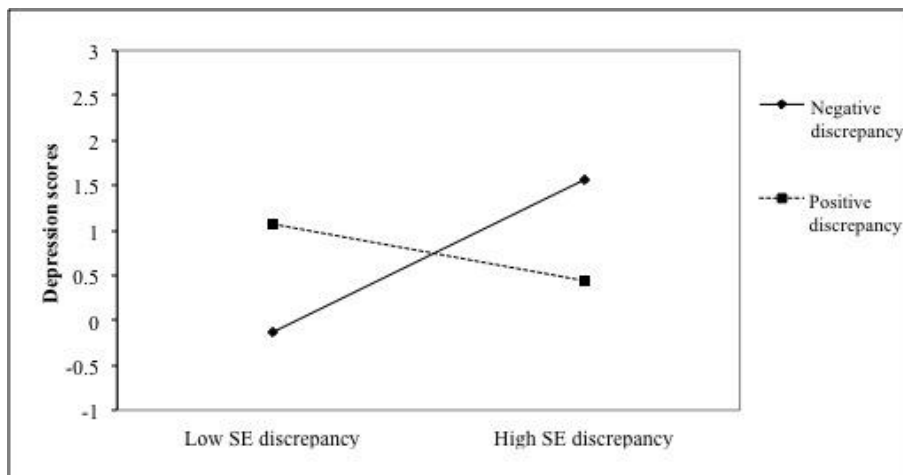


Figure 6-2 Depression scores as a function of a magnitude of self-esteem discrepancy

No significant main effect for the magnitude of discrepancy ($\beta = -.20$, $SE = .14$, $p = .162$, 95%CI [-.48 .08]), or the interaction term ($\beta = .30$, $SE = .20$, $p = .129$, 95%CI [-.08 .69]), and a marginally significant effect for the direction of the discrepancy ($\beta = .05$, $SE = .25$, $p = .083$, 95%CI [-.43 .53]) were identified in the model with mania as the dependent variable ($R^2 = .47$). The marginal effect indicates that increased scores for mania are associated with positive discrepancy (i.e. high explicit, but low implicit self-esteem).

Table 6.4 Regression coefficients (β) and bias corrected 95% CI for explicit and implicit self-esteem as predictors for symptoms of depression and mania (whilst controlling for co-occurring symptoms).

Depression	$R^2 = .52$	Mania	$R^2 = .54$
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	β	S.E.	p	95% CI	β	S.E.	p	95% CI
HAM/MAS	.69	.21	.001	.28 1.10	.56	.14	<.001	.29 .83
Explicit SE	-.26	.10	.013	-.46 -.05	-.03	.09	.706	-.21 .14
Implicit SE	.17	.11	.110	-.04 .39	-.26	.11	.019	-.47 -.04
Exp x Imp	-.07	.10	.979	-.22 .21	.18	.10	.087	-.03 .38

Note: HAM = Hamilton rating scale for depression; MAS = Bech-Rafaelson mania scale; SE = self-esteem; Exp x Impl denotes the interaction term between explicit and implicit self-esteem; R^2 denotes R-Squared.

Discussion

The present study sought to investigate two important aspects of self-esteem, explicit and implicit self-esteem, in relation to symptoms of depression and mania in a sample of children at genetic risk of bipolar disorder. This is the first study to investigate self-esteem discrepancies in relation to bipolar symptomatology.

Our hypotheses were only partly supported. The offspring of bipolar parents showed increased levels of symptom ratings in comparison to control offspring with no differences between groups in levels of explicit or implicit self-esteem. Further, there was only a marginal difference in self-esteem discrepancies (using a one-tailed p value). However, when we examined the associations between symptoms, explicit and implicit self-esteem, and their discrepancies, symptoms of depression appeared to be negatively associated with explicit self-esteem, but were not associated with implicit self-esteem.

Further investigations employing a discrepancy index (i.e. the absolute difference between standardized values of explicit and implicit self-esteem) revealed that symptoms of depression were associated with increased discrepancy only when self-esteem was ‘damaged’, i.e. when explicit self-esteem was low, whilst implicit self-esteem was high.

This finding is consistent with previous studies indicating an association between damaged self-esteem and negative attributional style, which is an index of depressogenic cognition (Schrüber-Abé, Rudolph, & Schütz, 2007). It is also consistent with studies of major depression in which patients were found to show low explicit self-esteem, whilst their implicit self-esteem was not challenged (De Raedt, Schacht, Franck, & De Houwer, 2006; Franck, De Raedt, & De Houwer, 2008; Franck, De Raedt, & De

Houwer, 2007), and remained comparable to controls even after negative mood induction (Franck et al., 2008). Only one study has reported impaired implicit self-esteem in currently depressed patients with recurrent depression (Risch et al., 2010). These findings are surprising, as cognitive vulnerability theories place latent, or unconscious, negative self-concepts at the centre of the depressive vulnerability (Abramson et al., 1999; Abramson et al., 1989; Beck, 1987).

Our second finding concerns symptoms of mania, which, unlike depression, were associated with low implicit self-esteem. The examinations of self-esteem discrepancy indicated a marginal effect, that is symptoms of mania were associated with positive discrepancy (high explicit, and low implicit self-esteem).

Comparable observations have been reported in a previous literature dating back to psychoanalytic theorists (Abraham, 1911/1927; Neale, 1988). Here, despite the positive self-regard endorsed by manic or remitted patients when assessed by self-report measures (i.e. explicitly), negative self-concepts have been reported as assessed by implicit methods (Knowles et al., 2007; Lyon et al., 1999; Winters & Neale, 1985). These findings were previously interpreted in the context of Abraham's account of manic defence mechanisms, arguing that some individuals develop grandiose beliefs to cope with experiences that threaten self-esteem.

Taken together, and assuming that our findings can be generalised to patients with bipolar disorder, our results suggest that the clinical presentation of patients with bipolar symptoms may depend on the relation between explicit and implicit self-esteem. Further, because these symptoms, and in particular the symptoms of mania, tend to fluctuate over time, we would expect implicit self-esteem also to be unstable. Given the developmental origin of implicit self-esteem (Epstein & Morling, 1995), the issue of its instability is intriguing and warrants future investigation, with potential implications for our understanding of the etymology of bipolar symptoms, yet, these results should be viewed as preliminary.

Several limitations of this study need to be noted. In particular, the sample sizes were small due to the difficulty in recruiting at-risk children, and there may have been a self-selection bias in agreeing to enter the study. (Our index children showed less evidence of psychopathology than index children in our previous study; S. H. Jones et al., 2006). The small sample size had the consequence of a decreased capacity to detect other than large effects, and raises the risk of reporting inflated effect sizes (Button et al., 2013). For example, our chi-square test had only 60% chance of detecting an effect.

Whilst our regression analyses showed better power (over .90), their interpretation remains limited by pooling the data across the two samples. Therefore, although the present findings are promising, they need to be replicated utilizing larger sample sizes.

Further research is required to investigate both implicit and explicit self-esteem in both at-risk and bipolar samples. Future research should also address some related clinical questions. Some psychotherapeutic approaches may be more suitable for one kind of self-esteem challenge than the other, which may perhaps help to explain why some psychotherapies are not consistently successful in the treatment of bipolar patients (Miklowitz & Scott, 2009). For example, a large trial of conventional cognitive therapy, which addresses explicit self-esteem directly, failed to yield benefits for patients, except perhaps those in the earliest stages of illness (J. Scott et al., 2006). One possible avenue of future research would be to try and develop interventions for bipolar patients that specifically target implicit self-esteem.

Chapter 7

Discussion

Whilst a family history remains the strongest predictor of the future onset of bipolar disorder, whom amongst those who carry this risk who will actually develop the illness remains unclear. The main aim of the thesis was to enhance our understanding of the psychological processes associated with vulnerability to, and the development of, bipolar disorder. Such knowledge could be utilized to identify individuals at ultra high-risk of the illness, and guide early, ideally even preventative, interventions.

In doing so three different samples were employed: (i) a large heterogeneous, and highly representative, sample of adults diagnosed with bipolar disorder, recruited for a randomized controlled trial (J. Scott et al., 2006); (ii) a smaller sample of adult bipolar patients, currently in remitted, depressive or hypomanic phases of the illness (recruited as a part of a previous PhD project); and (iii) biological offspring of parents diagnosed with bipolar disorder, as well as offspring of parents with no mental health problems (recruited for the purposes of this PhD).

One of the main methodological advances made in the present thesis is an endeavor to overcome difficulties associated with the fluctuating nature of bipolar disorder. Where possible, repeated assessments such as the experience sampling method (ESM, Csikszentmihalyi & Larson, 1987) were employed, a method valued for its ecological superiority over other commonly used questionnaire methods. Further, robust statistical methods, including statistical control for current symptoms and nonparametric bootstrapping, were utilized. The first empirical part of the thesis was a patient study including four assessment waves six months apart over a period of 18 months. The following two chapters utilized a more microscopic approach by examining changes in psychological processes recorded ten times a day (roughly every 1.5 hours in a quasi-random interval) for a period of six days. The final two chapters are cross-sectional investigations.

A number of important similarities in the findings have emerged across the studies, despite the different methodological approaches and populations employed; and some of these findings are novel and presented for the first time. First, it has been demonstrated that psychological processes are dependent on the severity of relevant symptoms. Notably, in Chapter 5 investigating psychological vulnerability in children of bipolar parents, psychological abnormalities (i.e. lower self-esteem, increased rumination, sensitivity to punishment, and hypomanic cognitions) were present only in those children already affected, although these differences were often only marginal, indicating the need of replication utilizing larger sample sizes.

Second, using longitudinal assessment and robust statistical methods, the role of negative affect in mania has been demonstrated. This is in line with earlier studies (Bauer et al., 2005; Cassidy, Forest, et al., 1998; Winters & Neale, 1985) and supports the assertion that symptoms of mania and depression are not polar opposites, but independent, yet related phenomena (Johnson et al., 2011).

A third important finding occurring across studies was the significance of self-esteem in bipolar disorder. In Chapter 2 (the study of trial), self-esteem, but not other self-referential processes, predicted symptom changes six months later. In Chapter 4 (the ESM study of at-risk children), low self-esteem was the triggering force for subsequent risk-taking in the index, but not control, offspring. Chapter 6 has demonstrated the importance of incorporating explicit *and implicit* aspects of self-esteem in order to gain a more complete understanding of these processes, and its relevance to symptoms.

Fourth, Chapters 4 & 5, using longitudinal and cross-sectional design, showed that offspring of parents with bipolar disorder showed decreased active coping.

In the following part of the discussion, each empirical chapter will be discussed in more detail and links between chapters will be made when appropriate. Finally, methodological limitations and directions for further research will be outlined.

Review of the key findings

Chapter 2 *Specific self-referential processes in bipolar disorder: A longitudinal analysis*

The main aim of Chapter 2 was to examine self-referential psychological processes in relation to symptoms of depression and mania, using a large representative sample of patients with bipolar disorder. Four assessment waves six months apart were utilized, evaluating both symptoms and psychological processes at each wave. The co-existence of symptoms was adequately accounted for, and relevant associations were examined cross-sectionally, as well as longitudinally.

One important finding pertains to the fact that cross-sectionally, symptoms of depression and mania appeared to be related to distinct state-dependent psychological processes, with self-esteem showing the most robust associations. Depression was associated with low positive and high negative self-esteem, and the majority of other self-referential processes (i.e. low externalizing bias indicating a tendency to attribute more

negative events than positive events to the self, high dysfunctional attitudes, and high levels of self-discrepancies). In contrast, mania was related to high self-esteem, externalizing bias, and achievement subscale of the DAS. These findings support the evidence that bipolar depression appears to be very similar to unipolar depression (Alloy, Abramson, Smith, et al., 2006; L. Jones et al., 2005), whilst mania is associated with behavior activation system (BAS) relevant processes (Alloy et al., 2009).

However, when examined longitudinally, uniquely self-esteem (both positive and negative) was found to be not entirely state-dependent, and was predictive of both symptoms. Notably, low, rather than high, self-esteem at the previous time point was associated with symptoms of mania as well as depression, although the association between low self-esteem and mania did not retain significance after controlling for symptoms of depression. The fact that only self-esteem, but not other self-referential processes, was not entirely state-dependent deserves a further discussion. One possibility is that self-esteem is an affectively based phenomenon, while other self-referential processes in the present study require more cognitively-based processing and evaluation. The following chapters examined further both self-esteem as well as affect in bipolar disorder, and their role in the developmental pathway of bipolar disorder will be further discussed.

As this study entailed a secondary analyses of dataset collected for purposes of a randomized control trial (J. Scott et al., 2006), some methodological differences to other parts of the thesis should be acknowledged. There are disparities in the way self-esteem has been assessed in the extant literature, as to questionnaires employed and underlying factors utilized. This chapter distinguished between positive and negative self-esteem using the Rosenberg self-esteem questionnaire (Rosenberg, 1965), in line with a previous study of bipolar patients by the trial principle investigator (J. Scott & Pope, 2003), although some controversy exists to the validity of this approach (Greenberg, Chen, Dmitrieva, & Farraggia, 2003). It might be possible that a unidimensional account of self-esteem would have been a better approach, and this has been utilized in the later chapters of the present thesis. However, it is unlikely that a change in the methodology would have resulted in substantial alterations of the findings of the study.

Second, despite the fact that robust statistical methods have been employed in this study, the present analyses might have benefited from an additional application of nonparametric bootstrapping (Mooney & Duval, 1993) to address skewness in some of

the variables, which in this study was addressed by converting them to binary variables. This is a method recently developed in context of multilevel modeling, which was not available at the time that this study was carried out, but it was utilized in the following studies, when appropriate, to improve statistical rigor.

Chapter 3 *The dynamics of mood and coping in bipolar disorder: Longitudinal investigations of the inter-relationship between affect, self-esteem and response style*

Chapter 4 *The interrelationship between mood, self-esteem and response styles in adolescent offspring of bipolar disorder: An experience sampling study*

The two studies described in Chapters 3 & 4 will be discussed jointly, as they both have sought to examine behavioral sensitivity in bipolar disorder by investigating the dynamics between affect, self-esteem and response styles. Whilst Chapter 3 employed adults diagnosed with bipolar disorder (currently remitted, hypomanic or depressed), Chapter 4 has compared offspring at high genetic risk to offspring of healthy control parents. Utilizing these two populations offers an insight into the changes in behavioral sensitivity between a high-risk status and a fully developed illness.

Some similarities, as well as differences, in the psychological processes in the two populations have been found. In both studies, cross-sectionally, symptoms of depression and mania were associated with low mood (i.e. high negative affect, low positive affect), low self-esteem, and also greater fluctuations of negative affect. However, mania showed a negative relationship to positive affect only in patients, and no associations were found in offspring. Furthermore, in the patient group symptoms of depression and mania were also related to fluctuations of positive affect and self-esteem, whereas, in the offspring sample, only a relationship between instability of self-esteem and depression was observed.

These findings suggest that vulnerability to bipolar disorder entail dysregulations of negative, rather than positive, mood, whilst more advanced stages, or a full-blown illness involve also positive affect dysregulation. This is in line with the clinical stages proposed by Duffy and colleagues (Duffy et al., 2010; Duffy & Carlson, 2013), where depressive dysregulation precedes mania-like symptoms.

Longitudinally, both studies have found evidence that negative affect triggers rumination at the subsequent time point. Nevertheless, in contrast to our predictions, no

differences in the magnitude of rumination were found between index and control children. Furthermore, positive affect in patients instigated (although only marginally) increased risk-taking at the subsequent time point; however, index offspring engaged in risk-taking as a response to low self-esteem, rather than mood, a relationship that was not found in control children. Moreover, whilst control children responded to low affect by active coping at the subsequent time point, this has not been observed in the index offspring.

In regards to the effect of response styles on the subsequent mood and self-esteem, both studies illustrated that rumination dampens positive affect (in patients, this effect was evident only for patients endorsing low mania ratings), whilst risk-taking increases it. The effect sizes found were stronger for the patient group, and no differences in the effect were observed between the child groups.

These findings support Nolen-Hoeksema's theory (1991), and the theory by testing relevant relationships in bipolar spectrum population.

The present findings potentially have important theoretical and clinical implications (clearly replications are needed as some of the findings were only marginal). First, vulnerability to bipolar disorder appears to be associated with a decreased ability to cope with low mood and increased risk-taking. Importantly, whilst increased risk-taking was found in patient, as well as high-risk groups, different triggering mechanisms were observed: in patients, risk-taking was instigated by positive affect, in line with the BAS dysregulation theory (Alloy, Abramson, Walshaw, et al., 2006), whilst in offspring this strategy was observed as a response to low self-esteem, in line with the manic defense theory (Abraham, 1911/1927; Thomas & Bentall, 2002). These changes may be associated with the developmental pathway of the illness. Whilst risk-taking might initially be instigated by an underlying negativity impacting on self-esteem, repeated risky behaviors might gradually activate mania-relevant neurobiological processes, leading to increased sensitivity of the system. As a consequence, BAS-relevant behaviors, e.g. goal striving, then become sufficient to trigger episodes of hypomania and mania, and an underlying negativity is no longer required as a triggering force (although still present as demonstrated by a number of studies). A similar account, although based on cross-sectional observations, has been suggested in the past by Thomas and Bentall (2002), but the present findings place this account within a developmental framework.

The difference between self-esteem and affect being the triggering factor for risk-taking may be of further relevance. Although self-esteem, by definition, is an affective phenomenon, cognitive self-evaluations and comparisons to others become integrated into the concept (Kernis, 2003; Kernis, Cornell, Sun, Berry, & Harlow, 1993); self-esteem might therefore be bridging affect and cognition. Hence, it is likely that with increasing severity of the illness, and diminishing ability to regulate affect, psychological processes with strong affective component might take precedence over those that are cognitively based.

Finally, it is of relevance that, despite increased negative affect and depressive symptoms in the index offspring, no increased engagement in rumination has been found. This is in line with our cross-sectional findings (Chapter 5) and that of others (Jones et al., 2006). Similarly, in patients, rumination dampened positive, but not negative mood. These findings suggest that negative thinking might be a consequence of symptoms rather than their cause.

In summary, compromised ability to utilize active strategies to cope with low mood, and risk-taking might serve as hallmarks for the detection of individuals at ultra high-risk for bipolar disorder.

Chapter 5 Cognitive vulnerability to bipolar disorder in offspring of parents with bipolar disorder

The main goal of Chapter 5 was to address the issue of cognitive vulnerability to bipolar disorder. To do so, psychological processes typical for patients with bipolar disorder were examined in the offspring of parents with bipolar disorder in comparison to offspring of healthy controls.

There are two main findings of the present study, in line with a previous study examining psychological processes in this high-risk population (S. H. Jones et al., 2006): (i) psychological abnormalities (i.e. increased rumination, sensitivity to punishment, and hypomanic cognitions) were apparent only in affected offspring, and, further (ii) were tied to symptoms. Furthermore, in keeping with the previous ESM study (Chapter 4), the present findings indicate that (iii) index offspring displayed lower active coping and novelty seeking (although some of the differences were marginal).

These processes might be utilized in the identification of ultra high-risk individuals, and serve as targets for early therapeutic interventions.

Chapter 6 *Discrepancies between explicit and implicit self-esteem and their relationship to symptoms of depression and mania*

This study is the first study to investigate the explicit and implicit aspects of self-esteem, and their relationships to symptoms of depression and mania in bipolar disorder. In doing so, a methodologically robust method of implicit self-esteem assessment was employed (the IAT; Greenwald et al., 1998).

Two important findings have emerged. First, damaged self-esteem, i.e. low explicit but high implicit self-esteem), was associated with symptoms of depression. Second, symptoms of mania, in contrast, were related to low implicit self-esteem, whilst no relation to explicit self-esteem has been observed. These findings fit our previous observations (Chapter 2, 3, 4), and are in line with previous studies, which show that negative affective processes are present in mania (Knowles et al., 2007; Lyon et al., 1999; Winters & Neale, 1985). In addition, the present findings suggest that the negativity associated with mania appears to be qualitatively different to that of depression, and operates on a largely affective level (accessible by only implicit methods).

Limitations

A number of limitations should be acknowledged. First, the present thesis is limited by small sample sizes of the adolescent groups. Our initial sample size calculations based on data from preceding published and pilot work indicated that a sample size of 50 participants per group would be needed (e.g. a previous study by Jones et al (2006) found instability of self-esteem scores of 3.27 (SD = 1.36) for index children and 2.49 (SD = 1.02) for control children with alpha = 0.01 and power = 0.80). However, this population of participants proved extremely difficult to identify limiting statistical power to identify significant effects.

Furthermore, it is possible that our recruitment procedures have resulted in a selection bias, with more affected offspring unwilling to take part in the study. In addition, it is possible that the low rate of disorders in Index children was partly influenced by the researcher's tendency not to 'overdiagnose' participants.

Further, it is possible that more stringent criteria in participants' identification, such as inclusion of parents with only BD I diagnosis, diagnostic interviews with both parents, or comorbidity assessment would allow for greater homogeneity of the sam-

ple. However, such stringencies would be beyond the capacity of one PhD project. On the other hand, it might be argued that the heterogeneity of the present sample is more representative of the population of individuals with bipolar disorder. This methodological issue could be addressed in the future by recruiting a large sample of patients and their children to allow for comparisons of child subgroups according to parental diagnosis.

Further, whilst in the present work emphasis has been put on a longitudinal assessment, two chapters have utilized cross-sectional designs; longitudinal investigations with these measures could have brought richer insight into the complexity of the processes. Next, it is also possible that utilizing different time lags would have resulted in different relationships between variables. Also, both of the present ESM studies employed paper-and-pencil diaries, and we have argued for comparable validity to more state-of-the-art versions. Nevertheless, utilizing electronic devices, such as smart phones, might have been associated with an improved attrition rate and compliance with the protocol (i.e. participants might have found using electronic devices less stigmatizing/embarrassing), particularly in the adolescent groups.

In terms of secondary analyses employed in Chapters 2 & 3, some methodological dissimilarities exist compared to the sample recruited for the present PhD. As noted in Chapter 2, the definition of self-esteem has been different to the rest of the thesis, in which self-esteem has been conceptualized as a unidimensional phenomenon. However, it is unlikely that this discrepancy had a major impact on the findings.

In addition, in chapters employing patients, most findings were related to symptoms of depression rather than mania, reflecting the fact that our samples were mainly depressed.

Finally, results should be interpreted with caution where multiple comparisons were employed.

Future Research

The present thesis has suggested a number of early psychological abnormalities that might be present in the development of bipolar disorder, including increased risk-taking in response to low self-esteem, inability to employ active coping strategies, or signs of withdrawal, and these findings warrant further investigation. Although the present research has demonstrated advantages of a longitudinal design (e.g. overcoming problems associated with fluctuations of psychological processes in bipolar disorder,

and, notably, allowing for investigations of the dynamics between variables that are precluded in cross-sectional designs), the present investigations span over a brief period of time.

Future research should employ longitudinal designs and follow participants over several years of the critical developmental period, i.e. from childhood to early adulthood. In addition, following a *large cohort* of high-risk individuals could further allow for comparisons based on parental diagnosis (as alluded to under the *Limitations* subsection), and provide important knowledge regarding the specificity of psychological abnormalities related to different diagnoses. In this direction, astonishingly little research has been carried out, and few such abnormalities have been identified (Hollon et al., 1986; Myin-Germeys et al., 2003). For example, comparing patients diagnosed with major depression, bipolar disorder, substance abuse disorder, generic psychiatric disorders (including schizophrenia, OCD, and Briquet's syndrome), medical problems and healthy individuals, Hollon et al. found that both the Dysfunctional Attitudes Scale (DAS, A. N. Weissman & Beck, 1978) and Automatic Thoughts Questionnaire (ATQ, Hollon & Kendall, 1980) covaried with symptoms of depression rather than nosological groups, and that only the ATQ differentiated between those with mood disorders from other patient groups. Addressing such questions has implications for theoretical accounts of psychological disorders as well as for directions of psychotherapeutic interventions.

In addition, future examinations should address the effect of environmental influences, such as family dynamics, on the development of abnormal psychological processes and symptoms. The relevance of family environment in bipolar disorder has already been indicated (Calam et al., 2012; Vance et al., 2008), especially lower warmth and support provided by bipolar parents (Reichart et al., 2007). Moreover, it has been proposed that parenting style may act as a buffer against mental health problems (Ellenbogen & Hodgins, 2009). Moreover, a recent study has shown that behavior and symptoms in offspring have improved after an online parenting support provided to parents diagnosed with bipolar disorder (S. Jones et al., 2013). The benefits of addressing inter-relational factors in mental health have been also demonstrated by work on acute psychosis carried out in Finland. Here, using the open dialogue need-adapted approach conceptualizing psychosis as a relationship problem, over 80% of patients with early psychosis recovered without residual symptoms, and returned to full-time employment (Seikkula, 2011; Seikkula, Alakare, & Aaltonen, 2011).

Such investigations could explicate our findings regarding explicit and implicit self-esteem, and their discrepancies. So far, little is known about the origins and development of implicit self-esteem, with some suggestions that implicit self-esteem becomes established in early childhood (Epstein & Morling, 1995). In a similar vein, it has been suggested that young adult children raised by nurturing parents scoring low on overprotection, show higher implicit self-esteem (DeHart, Pelham, & Tennen, 2006). Further, the fact that symptoms of mania fluctuate over time suggests that implicit self-esteem might also be unstable in vulnerable individuals. However, no research in this area, to our knowledge, exists. Finally, the type of intervention most suitable for challenged implicit self-esteem, or how implicit self-esteem improves in response to psychotherapeutic (or pharmacological) interventions needs to be elucidated.

Answering these questions might bring a more complete understanding of the developmental trajectory of psychiatric disorders, and, in turn, enhance the effectiveness of psychotherapeutic interventions.

Conclusion

In summary, this thesis has addressed a number of psychological abnormalities relevant to bipolar disorder symptomatology in three different cohorts. The main aim of the thesis was to enhance our knowledge of early psychological disturbances, and by comparing them to those of adult patients, also gain knowledge of how psychological processes change with the progress of the illness.

The thesis has provided a number of important findings. First, it has been observed that many psychological abnormalities are tied to the severity of symptoms, a finding revealed in both patients and high-risk individuals. However, self-esteem has been found to be, to some extent, independent of symptoms, and its dysregulation present in relatively healthy high-risk individuals. Further examinations of the explicit and implicit aspects of self-esteem and self-esteem discrepancies indicated important differences in their association with symptoms of depression and mania.

Another important finding pertains to abnormal coping strategies utilized by patients and high-risk offspring. Notably, risk-taking has been found to be employed by both patients as well as high-risk children, however the triggering factors varied. This difference between processes instigating risk-taking is likely to be associated with the developmental pathway of bipolar disorder. In addition, a limited capacity to utilize ac-

tive coping displayed by high-risk offspring, a finding confirmed by two different methodologies (ESM diaries, and questionnaire assessment) offers another targets for early interventions.

Although more research is clearly warranted to further investigate these processes and their role in the development of bipolar disorder, the present findings are one of the first indications of psychological dysregulation in offspring of bipolar disorder. The use of these findings to develop early psychological therapies may benefit individuals at genetic risk of the illness.

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Appendices

Appendix A Ethical Approval

10/WNo01/35

Page 1



Pwyllgor Moseg Ymchwil Gogledd Cymru (Y Orllewin)
North Wales Research Ethics Committee (West)

PRIVATE & CONFIDENTIAL

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04 June 2010

Dear Ms Pavlickova

Study Title: Identification of psychological and biological vulnerability markers in adolescents at genetic risk of bipolar disorder
REC reference number: 10/WNo01/35
Protocol number: 1

Thank you for your letter of 25 May 2010, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chairman of the REC.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

For NHS research sites, management permission for research ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>.

Where the only involvement of the NHS organisation is as a Participant Identification Centre, management permission for research is not required but the R&D office should be notified of the study. Guidance should be sought from the R&D office where necessary.

Sponsors are not required to notify the Committee of approvals from host organisations. It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
REC application 37380/118912/1/678		10 May 2010
Response to Request for Further Information		25 May 2010
Protocol	1	09 March 2010
Letter of invitation to participant (CMHT)	2	09 March 2010
Letter of invitation to participant (Cardiff)	2	09 March 2010
Letter of invitation to participant (controls)	2	09 March 2010
Advertisement (Preventing Bipolar Disorder) superseded	2	09 March 2010
Advertisement (Preventing Bipolar Disorder)	3	25 May 2010
Participant Information Sheet (index children) superseded	2	09 March 2010
Participant Information Sheet (index children)	3	25 May 2010
Participant Information Sheet (index parents) superseded	2	09 March 2010
Participant Information Sheet (index parents)	3	25 May 2010
Participant Information Sheet (control children) superseded	2	09 March 2010
Participant Information Sheet (control children)	3	25 May 2010
Participant Information Sheet (control parents) superseded	2	09 March 2010
Participant Information Sheet (control parents)	3	25 May 2010
Participant Consent Form (children) superseded	1	09 March 2010
Participant Consent Form (parents) superseded	1	09 March 2010
Participant Consent Form (index children)	2	25 May 2010
Participant Consent Form (index parents)	2	25 May 2010
Participant Consent Form (control children)	1	25 May 2010
Participant Consent Form (control parents)	1	25 May 2010
GP/Consultant Information Sheets (children)	1	09 March 2010
GP/Consultant Information Sheets (parents)	1	09 March 2010
Questionnaire: HPS 20		
Questionnaire: The Bech-Raphaelsen Mania Scale superseded		
Questionnaire: The Bech-Rafaelsen Mania Scale	revised	
Questionnaire: Self-Esteem Rating Scale		
Questionnaire: The Relationship Questionnaire		
Questionnaire: Responses to Depression Questionnaire		
Questionnaire: Hamilton Rating Scale for Depression		
Questionnaire: SPSRQ		
Questionnaire: AISS		
Questionnaire: DOSPERT		
Investigator CV		14 March 2010
Supervisor CV		01 April 2010
Evidence of insurance or indemnity	UMAL	01 August 2009

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document "*After ethical review – guidance for researchers*" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

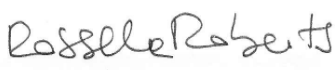

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

10/WNo01/35

Please quote this number on all correspondence
--

Yours sincerely


 **Mr David Owen**
Chair

Enclosures: "After ethical review – guidance for researchers".

Copy to: *Academic Supervisor: Prof Richard Bentall, Bangor University*
Sponsor's Representative: Prof Oliver Turnbull, Bangor University
R&D Department for BCUHB - West

Chairman/Cadeirydd – Mr David Owen, CBE, QPM

Appendix B Consent forms

Ysgol Seicoleg Prifysgol Cymru,
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Tel:(01248) 382211 - Fax:(01248)
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e-mail: psychology@bangor.ac.uk
www.psychology.bangor.ac.uk

Participant Identification Number for this study:

Consent Form
(**Index Children**, Version 2, May 2010)

Title of project: Adolescent children who have a parent with bipolar disorder

Names of Researcher: Hana Pavlickova

1. I confirm that I have read and understand the Information Sheet dated for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason, without my medical care or rights being affected.
3. I agree to my General Practitioner (GP) being informed of my participation in the study.
4. I agree to take part in the above study.

Name of Participant	Date	Signature
Name of Person taking consent	Date	Signature

Ysgol Seicoleg Prifysgol Cymru,
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Participant Identification Number for this study:

Consent Form

(Index Parents, Version 2, May 2010)

Title of project: Adolescent children who have a parent with bipolar disorder

Names of Researcher: Hana Pavlickova

1. I confirm that I have read and understand the Information Sheet dated for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason, without my medical care or rights being affected.

3. I agree to my child's General Practitioner (GP) and mine being informed of my participation in the study.

4. I agree to take part in the above study.

5. I and my spouse,, agree that our child (children) participate(s) in the study, and can be approached by the researcher and decide by themselves if they wish to give an informed consent to take part.

Name of Participant	Date	Signature
Name of Participant's Spouse	Date	Signature
Name of Person taking consent	Date	Signature

Ysgol Seicoleg Prifysgol Cymru,
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Participant Identification Number for this study:

Consent Form
(Control Children, Version1, May 2010)

Title of project: Adolescent children who have a parent with bipolar disorder

Names of Researcher: Hana Pavlickova

1. I confirm that I have read and understand the Information Sheet dated for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason, without my medical care or rights being affected.

3. I agree to take part in the above study.

_____ Name of Participant	_____ Date	_____ Signature
_____ Name of Person taking consent	_____ Date	_____ Signature

**Ysgol Seicoleg Prifysgol Cymru,
Bangor**

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(Control Parents, Version1, May 2010)

Title of project: Adolescent children who have a parent with bipolar disorder

Names of Researcher: Hana Pavlickova

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2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason, without my medical care or rights being affected.

3. I agree to take part in the above study.

4. I and my spouse,, agree that our child (children) participate(s) in the study, can be approached by the researcher and decide by themselves if they wish to give an informed consent to take part.

_____ Name of Participant	_____ Date	_____ Signature
_____ Name of Participant's Spouse	_____ Date	_____ Signature
_____ Name of Person taking consent	_____ Date	_____ Signature

Appendix C Participant Information Sheets

**Ysgol Seicoleg Prifysgol Cymru,
Bangor**

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www.psychology.bangor.ac.uk

Participant Information Sheet
(Index children, version 4, Dec 2010)

Study title: Adolescent children who have a parent with bipolar disorder

Introduction

We would like to invite you to participate in our research study. Before you decide we would like you to understand why we are carrying out this research and what it will involve for you. Our researcher will go through the information sheet with you and answer any questions you have. We suggest this should take about 30 minutes. Feel free to talk about the study to others if you wish. Ask us if anything is not clear.

This study is being carried out as a part of Hana Pavlickova's PhD training. It has also been designed to extend our understanding of about mental illness. The aim of the study is to find ways of recognising when children are at risk of developing bipolar disorder. We will measure various aspects of personality, changes in mood, and also the stress hormone cortisol. Cortisol can be measured from saliva samples collected at various points in the day.

Why have you been invited?

You have been invited to participate in the study because one of your parents has been diagnosed with bipolar disorder in the past. We expect that, in total, about 100 parents and 100 children will take part in the study. Half of the children will have a parent with a history of bipolar disorder.

Do I have to take part?

It is up to you to decide if you want to join the study. If you agree, we will describe the study and go through this information sheet with you. The information sheet will then be given to you to keep. We will then ask you to sign a consent form. Even if you agree to take part, you will be free to withdraw from the study at any time. You do not have to give us a reason why.

What will happen to me if I take part?

If you agree to take part, you and your parent will be asked to meet with the researcher at a place suitable for you on three separate occasions. That might be NHS premises, the university, or your home.

During the *first meeting* we will first talk to your parent and find out if he or she is suitable to be included in the study. If so, we will explain the study to you and ask you to give informed consent. This means that you will be asked to sign a form to confirm that you understand the study and agree to take part in it.

The *second meeting* will last for about an hour and a half. The researcher will conduct an interview with you and then will ask you as well as your parent, to fill in several questionnaires. The questionnaires will ask you to express your views about yourself and other people, your attitudes towards taking risks and about how you compare yourself to other people.

We will ask you to keep a brief diary for six days after the meeting. We will provide a digital watch for you to wear. The watch will beep ten times a day to remind you to record how you are feeling in the diary. We will also ask you to provide saliva samples by chewing on a cotton wad and placing it in a plastic container that we will give to you. This needs to be done at regular intervals during the first hour after waking in the morning and then also in the afternoon, two days during the week. We will explain exactly how to do this. We will ring you during the week to provide help and encouragement.

The *third meeting* will take place after you have collected saliva samples and completed the diaries, i.e. in about one week. During this meeting you and your parent will be asked to complete several more questionnaires. The questionnaires will ask how you feel about rewards and punishments and about the way you deal with unpleasant events. You will also be asked to take a test on a computer, which assesses how you feel about yourself and other people. We will then present you three brief film clips and ask you to rate how emotional you feel about them. Lastly, we would like to ask you about how you feel about taking part in the study or if you feel it has affected you in any way. We expect this third meeting will last approximately 1 and half hours. After this, the researcher will answer any questions you may have about the study.

Expenses and payments

At the end of the final meeting we will pay for your public transport travel expenses to the meetings and we will also pay you £30 for your participation. Your parent and you will decide what form of payment you prefer (e.g. money, book tokens, iTunes vouchers). You will receive the payment even if you do not complete all the questionnaires.

What are the possible disadvantages and risks of taking part?

The research will involve quite a large amount of time. We will also ask you to follow the instructions for ESM diaries and collect samples of saliva.

Harm

We believe that our measures carry very little risk. They have all been employed with adults and children in the past. We have recently completed a study of the children of parents suffering from bipolar disorder without any harm caused to the children. Even so, it is possible that you might be upset by some of the more personal questions. Our first priority will be to minimise any distress to you and your family. Throughout, we

will be interested to learn about your feelings about the project. Professor Bentall will be happy to meet with you if needed to discuss any issues that might occur. If you become upset we will stop the study immediately. Please remember that you will be free to withdraw from the study at any time without giving a reason.

Although we are not expecting that this study will cause any harm to participants, Bangor University has insurance in case anything happens.

What are the possible benefits of taking part in the study?

We cannot promise the study will be of direct benefit to you or to your parent. However, we will be happy to discuss results from the study with you if you wish. If we find that you are experiencing any psychological problems, Professor Bentall will discuss with you and your parent the different kinds of help that are available. We will put you in contact with relevant NHS services if you think this would be helpful. Our overall aim is to learn how to help people to avoid psychological problems, so we hope that our study will benefit NHS patients in the future.

What will happen if I do not want to carry on with the study?

If you withdraw from the study, we will keep the data collected up to your withdrawal. We will make it anonymous so that no one can identify these data as coming from you.

Will my taking part in the study be kept confidential?

Yes, all information about you will be handled in strict confidence. Please note that if you disclose to us any information about harm or potential harm to other children, or about terrorist threats, we will have a legal duty to report this to the relevant authorities.

The data collected during the study will be stored in a secure place and only researchers will have access to it. We will protect the files stored on the computer with a password. The data collected on paper will be stored in a lockable cabinet at the School of Psychology at Bangor University. No names or addresses will be included and participants will be identified only by identification numbers. We will store the data obtained during the study for a period of 10 years (in anonymised form) in accordance with the Medical Research Council (UK) guidelines. After this time, all questionnaires will be shredded.

We will use your data to compare two groups of children: those who have a parent with bipolar disorder and those who have parents with no psychological difficulties.

What will happen to the results of the research study?

Our aim is to publish reports resulting from the analysis of the data in scientific journals. No names or personal information will be made public. We want to make the experience as useful to you as possible. Therefore we will write a personal letter to you and your parent with a summary of the study findings.

Who is organising and funding the research?

This study is funded by the Wales Office of Research and Development for Health and Social Care (WORD).

Who has reviewed the study?

This research has been reviewed and given a favourable opinion by an NHS Research Ethics Committee. This is made up of an independent group of people and its main ob-

jective is to protect the safety, rights, well-being and dignity of people participating in research.

Complaints

If you have a concern about this study, please contact the following researchers who will do their best to answer your questions:

Hana Pavlickova: email: psp859@bangor.ac.uk, Tel: +44 (0) 1248 383 254, or

Prof. Richard Bentall: email: richard.bentall@bangor.ac.uk, Tel: +44 (0) 1248 383 624.

If you remain unhappy and wish to make a formal and confidential complaint, you should contact Professor Oliver Turnbull, Head of School of Psychology, University of Bangor, Brigantia Building, Penrallt Rd, Bangor, Gwynedd, email:

o.turnbull@liverpool.ac.uk, Tel: 01248 794 5367.

Where can I obtain further information if I need it?

Should you have any questions regarding this study, please contact

Hana Pavlickova, Psychology, PhD student, at psp859@bangor.ac.uk, (tel. 01248 383 254), or the supervisor of this project, Richard Bentall, Professor of Clinical Psychology, at richard.bentall@liverpool.ac.uk, (tel. 0151 794 5367).

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Participant Information Sheet (Index parents, version 4, Dec 2010)

Study title: Adolescent children who have a parent with bipolar disorder

Introduction

We would like to invite you to participate in our research study. Before you decide we would like you to understand why we are carrying out the research and what it would involve for you. Our researcher will go through the information sheet with you and answer any questions you have. We expect this should take about 30 minutes.

Feel free to talk about the study to others if you wish. Ask us if anything is not clear.

This study is an educational project, which is being carried out as a part of the requirement for the completion of a postgraduate qualification. However, it has also been designed to provide important scientific information about mental illness. The aim of the study is to investigate psychological factors that might make some children vulnerable to the development of bipolar disorder. We are particularly interested to assess various aspects of personality, mood in everyday life, and also the stress hormone cortisol, which we can measure from saliva samples provided at various points in the day.

Why have you been invited?

You have been invited to participate in the study because you were diagnosed with bipolar disorder in the past and you have children in the age range of 13-19 years. We expect that, in total, about 100 parents and 100 children will take part in the study. Half of the parents will have a history of bipolar disorder.

Do I have to take part?

It is up to you to decide if you want to join the study and whether or not your child can take part. If you agree, your child will also have to agree before the study can go ahead. We will describe the study and go through this information sheet with both of you. The information sheet will be then given to you to keep. If you agree to take part, we will then ask you to sign a consent form. Once you have agreed, you will still be free to withdraw at any time, without giving a reason.

What will happen to me if I take part?

If both you and your child agree to take part in the study, you will be asked to meet with the researcher at a mutually convenient location (for example, NHS premises, the university, or your home) on three separate occasions.

During the *first meeting* we will first check your eligibility for the study using a brief diagnostic interview. If we find that you are not eligible, we will pay you £5 to compensate for your time and your participation in the study will end at that point.

If we find that you are eligible for participation, we will ask you to provide details about your occupation, educational level and any prescribed medication that you might be taking. At this point, if your child has agreed to take part in the study, we will also obtain informed consent from him or her.

During the *second meeting*, which will last for about an hour and a half, the researcher will conduct a semi-structured interview with your child. We will then ask you, and also your child, to fill in several questionnaires. These will ask you to express your views about yourself and other people, your attitudes towards taking risks and to describe how you relate to other people.

We will ask your child to keep a brief diary for six days after the meeting. We will provide a digital watch which we will ask your child to wear, and which will beep at irregular intervals to prompt him or her to make a diary entry. We will also ask your child to provide saliva samples by chewing on a cotton wad and placing it in a plastic container that we will provide. This needs to be done at regular intervals during the first hour after waking in the morning and then also in the afternoon, two days during the week. We will explain exactly how to do this, and we will ring you during the week to provide help and encouragement.

The *third meeting* will take place after your child has collected saliva samples and completed the diaries, i.e. in about one week. During this meeting we will ask you and your child to complete several questionnaires asking about your sensitivity to reward, punishment and about the way you cope with stressful events. We will then present three brief film clips to you and your child and ask you to rate how pleasant or unpleasant you feel about them. As we would like to conduct our study as ethically as possible, we would like to gain insight of how your child perceives taking part in the study. We will therefore ask her or him about how she or he feels about participating in the research and if she or he feels it affected her or him in any way. It is estimated that this third meeting will last approximately 1 and half hours. After this, the researcher will answer any questions you may have about the study.

Expenses and payments

At the end of the meeting we will reimburse your public transport travel expenses to the meeting and we will also pay you for participation £20 and your child £30 in a form that you will decide you prefer (e.g. money, book tokens, iTunes vouchers). The completeness of your questionnaires or other tests will not affect your entitlement to the above-mentioned payments.

What are the possible disadvantages and risks of taking part?

The research will involve a considerable commitment of time, both from yourself and your child.

Harm

We believe that our measures carry very little risk (they have all been employed with adults and children in the past), and we have previously completed a study of the children of parents suffering from bipolar disorder without any adverse consequences. Nevertheless, distress might be possible, especially in the case of more personal questions. We are mindful that vulnerability to illness in the children of parents with psychiatric difficulties is likely to be a sensitive issue, and our first priority will be to minimise any upset or concern to your child. Throughout, we will be interested to learn about your feelings about the project. Professor Bentall will be happy to meet with you if needed and to discuss any issues that might occur. If your child does become distressed we will discontinue immediately. Please remember that you and your child will be free to withdraw at any time without giving a reason.

Although we are not anticipating that this study will cause any harm to participants, Bangor University has indemnity insurance in the event of harm being caused.

What are the possible benefits of taking part in the study?

We cannot promise the study will be of direct benefit to you or your child. However, if you would like to discuss the results obtained from you and your child we will be happy to do this. If we find that your child is experiencing clinically significant psychological symptoms, Professor Bentall will fully discuss with you all options that are possible, and will put you in contact with relevant NHS services if you and your child decide that this is desirable. Our overall aim is to learn how to help vulnerable people avoid psychiatric difficulties, so we hope that our study will benefit NHS patients in the future.

What will happen if I don't want to carry on with the study?

If you withdraw from the study, we will keep the data collected up to your withdrawal but we will make it anonymous so that it will be impossible to identify these data as coming from you.

Will my taking part in the study be kept confidential?

Yes, we will follow ethical and legal practice and all information about you will be handled in strict confidence. Please note however, if you disclose to us any information regarding harm or potential harm to children, or about a terrorist threat, we will have a legal duty to report this to the relevant authorities.

The data collected during the study will be stored in a secure place and only researchers will have access to it. Data files stored on the computer will be password protected and the data collected on paper will be stored in a lockable cabinet at the School of Psychology, Bangor University. No names or addresses will be included and participants will be identified only by numbers in any computerised data files used in the analyses of the results. The data obtained during the study will be stored for a period of 10 years (in anonymised form) in accordance with the Medical Research Council (UK) guidelines. After this time, the primary research data (questionnaires) will be shredded.

We will use your data to compare children of parents with no history of psychiatric problems with children of parents who have a history mental health difficulties. Study results will be retained for possible future research into mental health problems.

What will happen to the results of the research study?

Although our intention is to publish reports resulting from the analysis of the data in scientific journals, no names or personal information about the participants will be available in any such publications. In order to make the experience as useful to you as possible, we will write a personal letter to you giving a summary of the study findings.

Who is organising and funding the research?

This study is funded by the Wales Office of Research and Development for Health and Social Care (WORD).

Who has reviewed the study?

This research has been reviewed and given favourable opinion by an NHS Research Ethics Committee. This is made up of an independent group of people and its main objective is to protect the safety, rights, well-being and dignity of people participating in research.

Complaints

If you have a concern about any aspect of this study, in the first instance, please contact the following researchers who will do their best to answer your questions:

Hana Pavlickova: email: psp859@bangor.ac.uk, Tel: +44 (0) 1248 383 254, or

Prof. Richard Bentall: email: richard.bentall@liverpool.ac.uk, Tel: +44 (0) 0151 794 5367.

If you remain unhappy and wish to make a formal and confidential complaint, you should contact Professor Oliver Turnbull, Head of School of Psychology, University of Bangor, Brigantia Building, Penrallt Rd, Bangor, Gwynedd, email: o.turnbull@bangor.ac.uk, Tel: 01248 383670.

Where can I obtain further information if I need it?

Should you have any questions regarding this study, please contact

Hana Pavlickova, Psychology, PhD student, at psp859@bangor.ac.uk, (tel. 01248 383 254), or the supervisor of this project, Richard Bentall, Professor of Clinical Psychology, at richard.bentall@liverpool.ac.uk, (tel. 0151 794 5367).

Appendix D Clinical Measures

Hamilton Rating Scale for Depression

1. Depressed Mood (sadness, hopeless, helpless, worthless):

Over the last week have you felt depressed? How would you describe it? Moody? Down hearted? Dejected? Sad? Blue?

How often does it come and go? How long does it last?

Does crying relieve it? Do you feel beyond tears?

How bad is it? So bad that it is excruciating or painful?

0 - Absent.

1 - Indicated only on questioning (*occasional, mild depression*)

2 - Spontaneously reported verbally (*persistent, mild to moderate depression*)

3 - Communicated non-verbally, i.e., facial expression, posture, voice, tendency to weep (*persistent, moderate to severe depression*)

4 - VIRTUALLY ONLY those feeling states reported in spontaneous verbal and non-verbal communication (*persistent, very severe depression, with extreme hopelessness or tearfulness*)

2. Feelings Of Guilt:

In the past week have you blamed yourself for things you have done in the past or recently?

Have you felt guilty about things?

Have you felt that you have let your friends and family down?

In what way? A lot? A little?

0 - Absent.

1 - Self-reproach, feels he/she has let people down (*or guilt over decreased productivity only*)

2 - Ideas of guilt or rumination over past errors or sinful deeds (*feelings of guilt, remorse, or shame*)

3 - Present illness is a punishment. Delusions of guilt. (*severe, pervasive feelings of guilt*)

4 - Hears accusatory or denunciatory voices and/or experiences threatening visual hallucinations

3. Suicide:

Over the last week, have you felt like life was not worth living? Have you wished you were dead? Have you had any thoughts of taking your own life? Have you gone so far as to make any plans to do so? Have you actually made an attempt on taking your own life?

0 - Absent.

1 - Feels life is not worth living

2 - Wishes he/she were dead or any thoughts of possible death to self

3 - Suicidal ideas or gesture

4 - Attempts at suicide

4. Insomnia Early (Initial Insomnia):

Have you had any difficulty getting off to sleep over the last week?
Have you been taking sleeping tablets in the past week? Every night?

- 0 - No difficulty falling asleep
- 1 - Complains of occasional difficulty falling asleep (*i.e., 1/2 hour or more, 2-3 nights*)
- 2 - Complains of nightly difficulty falling asleep (*i.e., 1/2 hour or more, 4 or more nights*)

5. Insomnia Middle:

When you do get to sleep, do you sleep well? Are you restless? Do you keep waking?

- 0 - No difficulty
- 1 - Complains of being restless and disturbed during the night (*or occasional, i.e., 2-3 nights difficulty, 1/2 hour or more*)
- 2 - Waking during the night - any getting out of bed (*except to void*); (*often, i.e., 4 or more nights of difficulty, 1/2 hour or more*)

6. Insomnia Late (Terminal Insomnia):

Do you wake up early in the morning?
If so, do you keep awake or fall asleep again?

- 0 - No difficulty
- 1 - Waking in early hours of morning but goes back to sleep (*occasional, i.e., 2-3 nights, 1/2 hour or more*)
- 2 - Unable to fall asleep again if gets out of bed (*often, i.e., 4 or more nights difficulty, 1/2 hour or more*)

7. Work and Activities:

Over the past week, how have you been able to do your work or other activities such as housework, outside interests or socialising?

- 0 - No difficulty
- 1 - Thoughts and feelings of incapacity, fatigue or weakness related to activities, work or hobbies (*mild reduction in interest or pleasure; no clear impairment in functioning*)
- 2 - Loss of interest in activity, hobbies or work – by direct report of the patient or indirect in listlessness, indecision and vacillation (*feels he/she has to push self to work or activities; clear reduction in interest, pleasure, or functioning*)
- 3 - Decrease in actual time spent in activities or decrease in productivity (*Profound reduction in interest, pleasure, or functioning*)
- 4 - Stopped working because of present illness (*unable to work or fulfill primary role because of illness, and total loss of interest*)

8. Retardation (slowness of thought and speech; impaired ability to concentrate; decreased motor activity) (Observer rated)

- 0 - Normal speech and thought
- 1 - Slight retardation at interview (*or mild psychomotor retardation*)
- 2 - Obvious retardation at interview (*i.e., moderate, some difficulty with interview; noticeable pauses and slowness of thought*)
- 3 - Interview difficult (*severe psychomotor retardation, interview very difficult, very long pauses*)
- 4 - Complete stupor (*extreme retardation; stupor; interview barely possible*)

9. Agitation (Observer rated)

- 0 - None (*movements within normal range*)
- 1 - Fidgetiness
- 2 - Playing with hands, hair, etc.
- 3 - Moving about, can't sit still
- 4 - Hand-wringing, nail biting, hair-pulling, biting of lips (*interview impossible*)

10. Anxiety Psychic:

Demonstrated by tension, difficulty in relaxing, irritability, worry over trivial matters, apprehensive and feelings of panic, fears, difficulty in concentration and forgetfulness, feeling "jumpy"

Over the past week have you been feeling nervous, anxious, frightened, scared or panicky?

Have you found it hard to relax?

Have you had a feeling of dread as though something terrible were about to happen?

- 0 - No difficulty
- 1 - Subjective tension and irritability (*mild, occasional*)
- 2 - Worrying about minor matters (*moderate, causes some distress; or excessive worrying about real problems*)
- 3 - Apprehensive attitude apparent in face or speech (*severe; impairment of functioning due to anxiety*)
- 4 - Fears expressed without questioning (*symptoms incapacitating*)

11. Anxiety, Somatic

Have you suffered from any of the following in the past week: trembling, shakiness, excessive sweating, feelings of suffocation or choking, attacks of shortness of breath, dizziness, fatigue, headaches, pain in the back of the neck, butterflies, or tightness in the stomach.

How often and/or badly?

- 0 - Absent
- 1 - Mild (*symptom(s) present only infrequently, no impairment, minimal distress*)
- 2 - Moderate (*symptom(s) more persistent, or some interference with usual activities, moderate distress*)
- 3 - Severe (*significant impairment in functioning*)
- 4 - Incapacitating

The Bech-Rafaelsen Mania Scale (MAS)

1. Elevated mood

Over the past week have you sometimes felt intensely happy or elated, without reason?

So elated that it seemed unnatural?

0 - Not present

1 - Slightly elevated mood, optimistic, but still adapted to the situation

2 - Moderately elevated mood, joking, laughing, however somewhat irrelevant to the situation

3 - Markedly elevated mood, exuberant both in manner and in speech, clearly irrelevant to the situation

4 - Extremely elevated in mood, quite irrelevant to the situation

2. Increased verbal activity

Have people said to you in the past week that you talked too fast and too much so that they don't understand you?

Do you feel pressure to keep talking?

0 - Not present

1 - Somewhat talkative

2 - Clearly talkative, few spontaneous in the conversation but still not difficult to interrupt

3 - Almost no spontaneous intervals in the conversation, difficult to interrupt

4 - Impossible to interrupt, dominates completely the conversation

3. Increased social contact (intrusiveness)

Have you got involved in things more than usual over the past week?

What have you got involved in?

What normally stops you getting involved in these activities?

How did others react to your involvement?

0 - Not present

1 - Slightly meddling (putting his/her oar in), slightly intrusive

2 - Moderately meddling and arguing or intrusive

3 - Dominating, arranging, directing but still in context with the situation

4 - Extremely dominating and manipulating, not in context with the setting

4. Increased motor activity

Over the past week, have you been more active than normal?

So active that you or other people thought something was wrong?

0 - Not present

1 - Slightly increased motor activity, e.g. some tendency to lively facial expression

- 2 – Clearly increased motor activity, e.g. lively facial expression, not able to sit quietly in chair
- 3 – excessive motor activity, on the move most of the time, but the subject can sit still if urged to (rises only once during the interview)
- 4 – Constantly active, restlessly energetic. Even if urged to, the subject cannot sit still

5. Sleep disturbances

Rate actual sleep duration, regardless of whether participant feels tired or not

- 0 – Not present (habitual duration of sleep)
- 1 – Duration of sleep reduced by 25%
- 2 – Duration of sleep reduced by 50%
- 3 – Duration of sleep reduced by 75%
- 4 – No sleep

6. Social activities (distractibility)

Have you been able to get things done during past week?

Is your ability to get things done affected because your attention is drawn to something else? When you try to do one thing so you find that you start to do something else so you do not get things done?

Tell me about a time when this has happened in the past week

- 0 – No difficulties
- 1 – Slightly increased drive but work quality is slightly reduced as motivation is changing, the subject is somewhat distractible (attention drawn to irrelevant stimuli)
- 2 – Work activity clearly affected by distractibility, but still to a moderate degree
- 3 – The participant occasionally loses control of routine tasks because of marked distractibility
- 4 – Unable to perform any task without help

7. Hostility, irritable mood

In the past week, have you been getting irritated with people more easily?

How has that started in itself?

Do you keep it to yourself or raise your voice or flare up without reason?

Have you lost your temper or your control?

Yelled? Slammed doors? Hit people? Got in trouble with the police?

How often in the past week?

- 0 – Not present
- 1 – Somewhat impatient or irritable but control is maintained
- 2 – Moderately impatient or irritable. Does not tolerate provocations.
- 3 – Provocative, makes threats, but can be calmed down
- 4 – Overt physical violence, physically destructive

8. Increased interest in the opposite sex

Have you found your interest in the opposite sex has changed in the past week? In what way?

- 0 – Not present
- 1 – Slight increase in interest in the opposite sex, e.g. slightly flirtatious
- 2 – Moderate increase in interest in the opposite sex e.g. clearly flirtatious
- 3 – Marked increase in interest in the opposite sex e.g. excessively flirtatious
- 4 – Completely preoccupied by interest in the opposite sex

9. Increased self-esteem

**In the last week, have you felt that you have special abilities, powers or talents?
How so you explain this?**

If NO

In the last week, have you thought that you were better than other people at your work and other activities?

What makes you think this?

- 0 – Not present
- 1 – Slightly increased self-esteem e.g. overestimates slightly own habitual capabilities
- 2 – Moderately increased self-esteem e.g. overestimates more clearly own habitual capabilities or hints at unusual abilities
- 3 – Markedly unrealistic ideas, e.g. believes he/she possesses extraordinary abilities, powers of knowledge (scientific, religious etc) but can quickly be corrected
- 4 – Grandiose ideas which cannot be corrected

10. Flight of thoughts

In the last week have you found thoughts crowding into and racing through your mind?

A though they were speeded up and you had too many thoughts compared to usual?

Could you describe this?

- 0 – Not present
- 1 – Somewhat lively descriptions, explanations and elaborations without losing the connection with the topic of conversation. The thoughts are thus still coherent.
- 2 – The participants' thoughts are occasionally distracted by random associations (often rhymes, slangs, puns, pieces of verse or music)
- 3 – The line of thought is more regularly disrupted by diversionary associations
- 4 – It is very difficult or impossible to follow the participant because of the flight of thoughts, participant jumps from one topic to another.

11. Noise level

Made entirely from observations of the mental state at the interview

- 0 – Not present
- 1 – Speaks somewhat loudly without being noisy
- 2 – Voice discernable at a distance, somewhat noisy
- 3 – Vociferous, voice discernable at a long distance, is markedly noisy or singing
- 4 – Shouting, screaming, or using other sources of noise to hoarseness

Appendix E Psychological Measures

SELF ESTEEM RATING SCALE-Short Form

Name _____

ID # _____

This questionnaire is designed to measure how you feel about yourself. It is not a test, so there are no right or wrong answers. Please answer each item carefully and accurately as you can by using the following scale:

- 1 = Never**
- 2 = Rarely**
- 3 = A little of the time**
- 4 = Some of the time**
- 5 = A good part of the time**
- 6 = Most of the time**
- 7 = Always**

1. ___ I feel that others do things much better than I do.
2. ___ I feel confident in my ability to deal with people.
3. ___ I feel that I am likely to fail at things I do.
4. ___ I feel that people really like to talk with me.
5. ___ I feel that I am a very competent person.
6. ___ When I am with other people, I feel that they are glad I am with them.
7. ___ I feel that I make a good impression on others.
8. ___ I feel confident that I can begin new relationships if I want to.
9. ___ I feel ashamed about myself.
10. ___ I feel inferior to other people.
11. ___ I feel that my friends find me interesting.
12. ___ I feel that I have a good sense of humor.
13. ___ I get angry at myself over the way I am.
14. ___ My friends value me a lot.
15. ___ I am afraid I will appear stupid to others.
16. ___ I wish I could just disappear when I am around other people.
17. ___ I feel that if I could be more like other people then I would feel better about myself.
18. ___ I feel that I get pushed around more than others.
19. ___ I feel that people have a good time when they are with me.
20. ___ I wish that I were someone else.

Responses to Depression Questionnaire

People think and do many different things when they feel depressed. Please read each of the following and indicate whether you almost never, sometimes, often or almost always think or do each one when you feel down, sad or depressed.

Please answer indicating what you generally *do*, not what you think you *should* do.

		Almost Never	Sometimes	Often	Almost Always
<u>1</u>	listen to sad music.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>2</u>	think about all your shortcomings, failings, faults, mistakes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>3</u>	write down what you are thinking about and analyse it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>4</u>	help someone else with something in order to distract yourself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>5</u>	do something that has made you feel better in the past	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>6</u>	think about recent situations, wishing it had gone better.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>7</u>	think 'I'm going to go out and have some fun'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>8</u>	think about how angry you are with yourself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>9</u>	analyse your personality to try to understand why you are depressed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>10</u>	think 'I'm going to do something to make myself feel better'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>11</u>	think 'I won't be able to do my job/work because I feel so badly'	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>12</u>	think 'I'll concentrate on something other than how I feel'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>13</u>	take your feelings out on someone else	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>14</u>	think 'why do I always react this way?'	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>15</u>	analyse recent events to try to understand why you are depressed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>16</u>	think about how passive and unmotivated you feel.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>17</u>	try to understand yourself by focusing on your depressed feelings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>18</u>	ask someone to help you overcome a problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>19</u>	go to a favourite place to get your mind off your feelings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>20</u>	make a plan to overcome a problem	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>21</u>	go to a potentially dangerous place, where you wouldn't normally go e.g. a rough nightclub.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>22</u>	do something you enjoy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>23</u>	go away by yourself and think about why you feel this way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>24</u>	remind yourself that these feelings wont last.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>25</u>	smash something up	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>26</u>	think about how you don't seem to feel anything any more.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>27</u>	Think about how hard it is to concentrate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>28</u>	do something fun with a friend.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>29</u>	think 'why can't I get going?'	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>30</u>	drink alcohol excessively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>31</u>	take recreational drugs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>32</u>	do something reckless or dangerous.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>33</u>	try to initiate new relationships with strangers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>34</u>	isolate yourself and think about the reasons why you feel sad.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>35</u>	concentrate on your work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>36</u>	think about how you don't feel up to doing anything.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>37</u>	talk it out with someone whose opinions you respect (i.e. friend/family/clergy).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>38</u>	go someplace alone to think about your feelings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>39</u>	drive your motor vehicle faster and/or more aggressively than usual.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>40</u>	think 'why do I have problems other people don't have?'	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>41</u>	think about how alone you feel.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>42</u>	go shopping with no regard for the debts you may run up	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>43</u>	think about how sad you feel.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>44</u>	seek out and engage in casual sexual relations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>45</u>	Hurt yourself, for example by cutting yourself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>46</u>	stay around people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>47</u>	think about your feelings of fatigue and achiness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>48</u>	try to find something positive in the situation or something you learned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

HPS-20

This questionnaire consists of statements to which you can respond true or false. In each case, please record your answer by circling the appropriate response. Please answer honestly. There are no right or wrong answers and we expect there to be variation in the way different people respond to the items.

Thank you for your participation.

No.	Item	Please circle a response	
1.	I seem to have an uncommon ability to persuade and inspire others.	TRUE	FALSE
2.	I often get into moods where I feel like many of the rules of life don't apply to me.	TRUE	FALSE
3.	Sometimes ideas and insights come to me so fast that I cannot express them all.	TRUE	FALSE
4.	I seem to be a person whose mood goes up and down easily.	TRUE	FALSE
5.	There are often times when I am so restless that it is impossible for me to sit still.	TRUE	FALSE
6.	I often feel excited and happy for no apparent reason.	TRUE	FALSE
7.	I often have moods where I feel so energetic and optimistic that I feel I could outperform almost anyone at anything.	TRUE	FALSE
8.	In unfamiliar surroundings I am often so assertive and sociable that I surprise myself.	TRUE	FALSE
9.	I am frequently in such high spirits that I can't concentrate on any one thing for too long.	TRUE	FALSE
10.	I very frequently get into moods where I wish I could be everywhere and do everything at once.	TRUE	FALSE

11.	A hundred years after I'm dead, my achievements will probably have been forgotten.	TRUE	FALSE
12.	I am so good at controlling others that sometimes it scares me.	TRUE	FALSE
13.	I am usually in an average sort of mood, not too high and not too low.	TRUE	FALSE
14.	I do most of my best work during brief periods of intense inspiration.	TRUE	FALSE
15.	I am considered to be a kind of 'hyper' person.	TRUE	FALSE
116.	Many people would consider me to be amusing but kind of eccentric.	TRUE	FALSE
17.	I have often felt happy and irritable at the same time.	TRUE	FALSE
18.	I frequently find that my thoughts are racing.	TRUE	FALSE
19.	When I feel an emotion, I usually feel it with extreme intensity.	TRUE	FALSE
20.	I like to have others think of me as a normal kind of person.	TRUE	FALSE

9	I must act on a good feeling as soon as I experience it	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
10	Unless I am active all the time, I will end up a failure	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
11	When I feel good about myself, I realise that all my previous anxieties and fears are unfounded	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
12	The better I feel, the more I get ashamed of whatever I do	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
13	If I am very special to everyone around me then all my problems will disappear	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
14	When I feel good, I know that whatever I do, I could do no wrong	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
15	When my moods drive upwards there is nothing I can do about it	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
16	I sometimes do something risky just for the sake of stirring things up	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
17	If I notice something new when I am feeling good, I must make every effort to think about how it connects with everything else	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
18	Whenever I feel energetic I get overbearing and arrogant	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
19	My high moods are outside my own control	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
20	When I feel I am right, I must keep on generating lots more ideas and solutions	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
21	When I get new ideas I must tell people a once and at length so that they admire me	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
22	When I feel restless, what happens to me is more important than what happens to other people	0	50	100	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

SPSRQ

For the following set of questions please indicate whether the statement best suit your personality by circling either YES or NO.

1. Do you often refrain from doing something because you are afraid of it being illegal?	Yes/No			
2. Does the good prospect of obtaining money motivate you strongly to do some things?	Yes/No			
3. Do you prefer not to ask for something when you are not sure you will obtain it?	Yes/No			
4. Are you frequently encouraged to act by the possibility of being valued in your work, in your studies, with your friends or with your family?	Yes/No			
5. Are you often afraid of new or unexpected situations?	Yes/No			
6. Do you often meet people that you find physically attractive?	Yes/No			
7. Is it difficult for you to telephone someone you do not know?	Yes/No			
8. Do you like to take some drugs because of the pleasure you get from them?	Yes/No			
9. Do you often renounce your rights when you know you can avoid a quarrel with a person or an organisation?	Yes/No			
10. Do you often do things to be praised?	Yes/No			
11. As a child, were you troubled by punishments at home or in school?	Yes/No			
12. Do you like being the centre of attention at a party or a social meeting?	Yes/No			
13. In tasks that you are not prepared for, do you attach great importance to the possibility of failure?	Yes/No			
14. Do you spend a lot of your time on obtaining a good image?	Yes/No			
15. Are you easily discouraged in difficult situations?	Yes/No			
16. Do you need people to show their affection for you all the time?	Yes/No			
17. Are you a shy person?	Yes/No			
18. When you are in a group, do you try to make your opinions the most intelligent or the funniest?	Yes/No			
19. Whenever possible, do you avoid demonstrating your skills for fear of being embarrassed?	Yes/No			
20. Do you often take the opportunity to pick up people you find attractive?	Yes/No			
21. When you are with a group, do you have difficulties selecting a good topic to talk about?	Yes/No			
22. As a child, did you do a lot of things to get people's approval?	Yes/No			
23. Is it often difficult for you to fall asleep when you think about things you have done or must do?	Yes/No			
24. Does the possibility of social advancement, move you to action,	Yes/No			

even if this involves not playing fair?				
25. Do you think a lot before complaining in a restaurant if your meal is not well prepared?	Yes/No			
26. Do you generally give preference to those activities that imply an immediate gain?	Yes/No			
27. Would you be bothered if you had to return to a store when you noticed you were given the wrong change?	Yes/No			
28. Do you often have trouble resisting the temptation of doing forbidden things?	Yes/No			
29. Whenever you can, do you avoid going to unknown places?	Yes/No			
30. Do you like to compete and do everything you can to win?	Yes/No			
31. Are you often worried by things that you said or did?	Yes/No			
32. Is it easy for you to associate tastes and smells to very pleasant events?	Yes/No			
33. Would it be difficult for you to ask your boss for a raise (salary increase)?	Yes/No			
34. Are there a large number of objects or sensations that remind you of pleasant events?	Yes/No			
35. Do you generally try to avoid speaking in public?	Yes/No			
36. When you start to play with a slot machine, is it often difficult for you to stop?	Yes/No			
37. Do you, on a regular basis, think that you could do more things if it was not for your insecurity or fear?	Yes/No			
38. Do you sometimes do things for quick gains?	Yes/No			
39. Comparing yourself to people you know, are you afraid of many things?	Yes/No			
40. Does your attention easily stray from your work in the presence of an attractive stranger?	Yes/No			
41. Do you often find yourself worrying about things to the extent that performance in intellectual abilities is impaired?	Yes/No			
42. Are you interested in money to the point of being able to do risky jobs?	Yes/No			
43. Do you often refrain from doing something you like in order not to be rejected or disapproved of by others?	Yes/No			
44. Do you like to put competitive ingredients in all of your activities?	Yes/No			
45. Generally, do you pay more attention to threats than to pleasant events?	Yes/No			
46. Would you like to be a socially powerful person?	Yes/No			
47. Do you often refrain from doing something because of your fear of being embarrassed?	Yes/No			
48. Do you like displaying your physical abilities even though this may involve danger?	Yes/No			

AISS

For each item, indicate which response best applies to you:

- A) describes me very well
- B) describes me somewhat
- C) does not describe me very well
- D) does not describe me at all

1. I can see how it would be interesting to marry someone from a foreign country.
2. When the water is very cold, I prefer not to swim even if it is a hot day.
3. If I have to wait in a long line, I'm usually patient about it.
4. When I listen to music, I like it to be loud.
5. When taking a trip, I think it is best to make as few plans as possible and just take it as it comes.
6. I stay away from movies that are said to be frightening or highly suspenseful.
7. I think it's fun and exciting to perform or speak before a group.
8. If I were to go to an amusement park, I would prefer to ride the rollercoaster or other fast rides.
9. I would like to travel to places that are strange and far away.
10. I would never like to gamble with money, even if I could afford it.
11. I would have enjoyed being one of the first explorers of an unknown land.
12. I like a movie where there are a lot of explosions and car chases.
13. I don't like extremely hot and spicy foods.
14. In general, I work better when I'm under pressure.
15. I often like to have the radio or TV on while I'm doing something else, such as reading or cleaning up.
16. It would be interesting to see a car accident happen.
17. I think it's best to order something familiar when eating in a restaurant.
18. I like the feeling of standing next to the edge on a high place and looking down.
19. If it were possible to visit another planet or the moon for free, I would be among the first in line to sign up.
21. I can see how it must be exciting to be in a battle during a war.

DOSPERT

For each of the following statements, please indicate your likelihood of engaging in each activity or behavior. Provide a rating from 1 to 5, using the following scale:

- 1 = Extremely unlikely
- 2 = Unlikely
- 3 = Not sure
- 4 = Likely
- 5 = Extremely likely

1. Admitting that your tastes are different from those of your friends. (S) _____
2. Going camping in the wilderness, beyond the civilization of a campground. (R) _____
3. Betting a day's income at the horse races. (G) _____
4. Buying an illegal drug for your own use. (H) _____
5. Cheating on an exam. (E) _____
6. Chasing a tornado or hurricane by car to take dramatic photos. (R) _____
7. Consuming five or more servings of alcohol in a single evening. (H) _____
8. Cheating by a significant amount on your income tax return. (E) _____
9. Disagreeing with your father on a major issue. (S) _____
10. Betting a day's income at a high stake poker game. (G) _____
11. Having an affair with a married man or woman. (E) _____
12. Forging somebody's signature. (E) _____
13. Passing off somebody else's work as your own. (E) _____
14. Going on a vacation in a third-world country without prearranged travel and hotel accommodations. (R) _____
15. Arguing with a friend about an issue on which he or she has a very different opinion. (S) _____
16. Going down a ski run that is beyond your ability or closed. (R) _____
17. Approaching your boss to ask for a raise. (S) _____
18. Illegally copying a piece of software. (E) _____

19. Going whitewater rafting during rapid water flows in the spring. (R) _____
20. Betting a day's income on the outcome of a sporting event (e.g. baseball, soccer, or football). (G) _____
21. Telling a friend if his or her significant other has made a pass at you. (S) _____
22. Shoplifting a small item (e.g. a lipstick or a pen). (E) _____
23. Wearing provocative or unconventional clothes on occasion. (S) _____
24. Engaging in unprotected sex. (H) _____
25. Stealing an additional TV cable connection off the one you pay for. (E) _____
26. Not wearing a seatbelt when being a passenger in the front seat. (H) _____
27. Periodically engaging in a dangerous sport (e.g. mountain climbing or sky diving). (R) _____
28. Not wearing a helmet when riding a motorcycle. (H) _____
29. Gambling a week's income at a casino. (G) _____
30. Taking a job that you enjoy over one that is prestigious but less enjoyable. (S) _____
31. Defending an unpopular issue that you believe in at a social occasion. (S) _____
32. Exposing yourself to the sun without using sunscreen. (H) _____
33. Trying out bungee jumping at least once. (R) _____
34. Piloting your own small plane, if you could. (R) _____
35. Walking home alone at night in a somewhat unsafe area of town. (H) _____
36. Regularly eating high cholesterol foods. (H) _____

Sample ESM diary double-page (utilized in Chapter 3)

I feel ...	Not			Moderate			Very
Cheerful	1	2	3	4	5	6	7
Lonely	1	2	3	4	5	6	7
Excited	1	2	3	4	5	6	7
Relaxed	Not			Moderate			Very
Anxious	1	2	3	4	5	6	7
Satisfied	1	2	3	4	5	6	7
Irritated	Not			Moderate			Very
Sad	1	2	3	4	5	6	7
Guilty	1	2	3	4	5	6	7

At this moment ...	Not			Moderate			Very
I like myself	1	2	3	4	5	6	7
I'm ashamed of myself	1	2	3	4	5	6	7
I'm a failure	1	2	3	4	5	6	7
I'm a good person	1	2	3	4	5	6	7

Where am I?							
Am I alone? YES NO (please circle one answer)							
If not, who am I with?							
	Not			Moderate			Very
I like this company	1	2	3	4	5	6	7
Right now, I'd prefer to be alone	1	2	3	4	5	6	7
I'm enjoying myself	1	2	3	4	5	6	7

What am I doing?							
	Not			Moderate			Very
I'd rather be doing something else	1	2	3	4	5	6	7
I'm skilled at it	1	2	3	4	5	6	7
This activity is challenging	1	2	3	4	5	6	7
	Not			Moderate			Very
I'm hungry	1	2	3	4	5	6	7
I'm tired	1	2	3	4	5	6	7
I feel unwell	1	2	3	4	5	6	7
	Not			Moderate			Very
I can't get rid of my thoughts	1	2	3	4	5	6	7
I feel unreal	1	2	3	4	5	6	7

I'm scared of losing control	1	2	3	4	5	6	7
------------------------------	---	---	---	---	---	---	---

Since the last beep, the most important thing that happened to me was							
.....							
.....							
This event was	Very unpleasant			Neutral		Very pleasant	
	-3	-2	-1	0	1	2	3
Why did this event happen?.....							
.....							
.....							

Since the last beep I've thought about the bad things that have happened to me.								
Disagree	-3	-2	-1	0	1	2	3	Agree
Since the last beep I have ruminated about my feelings								
Disagree	-3	-2	-1	0	1	2	3	Agree
Since the last beep I've tried to work out solutions to some of my problems								
Disagree	-3	-2	-1	0	1	2	3	Agree
Since the last beep I have made plans for the future								
Disagree	-3	-2	-1	0	1	2	3	Agree
Since the last beep I have tried to cheer myself up								
Disagree	-3	-2	-1	0	1	2	3	Agree
Since the last beep I've done something nice to distract myself from my feelings								
Disagree	-3	-2	-1	0	1	2	3	Agree
Since the last beep I've acted impulsively without regard to the consequences								
Disagree	-3	-2	-1	0	1	2	3	Agree
Since the last beep I have taken a risk about something								
Disagree	-3	-2	-1	0	1	2	3	Agree

Since the last beep I've used (please circle).						
	nothing	alcohol	medication	tobacco	other	
This beep disturbed me						
	Not		Moderate		Very	
	1	2	3	4	5	6
It is now exactly hrs mins						

Sample ESM diary double-page (utilized in Chapter 4)

Bleep number: _____

I feel ...	Not		Moderate			Very	
Cheerful	1	2	3	4	5	6	7
Lonely	1	2	3	4	5	6	7
Excited	1	2	3	4	5	6	7
Optimistic	1	2	3	4	5	6	7
Confident	1	2	3	4	5	6	7
Energetic	1	2	3	4	5	6	7
	Not		Moderate			Very	
Relaxed	1	2	3	4	5	6	7
Anxious	1	2	3	4	5	6	7
Satisfied	1	2	3	4	5	6	7
	Not		Moderate			Very	
Irritated	1	2	3	4	5	6	7
Sad	1	2	3	4	5	6	7
Guilty	1	2	3	4	5	6	7

At this moment ...	Not		Moderate			Very	
I like myself	1	2	3	4	5	6	7
I'm ashamed of myself	1	2	3	4	5	6	7
I'm doubting myself	1	2	3	4	5	6	7

Where am I?							
Am I alone? YES NO (please circle one answer)							
If not, who am I with?							
	Not		Moderate			Very	
I like this company	1	2	3	4	5	6	7
Right now, I'd prefer to be alone	1	2	3	4	5	6	7

What am I doing?							
	Not		Moderate			Very	
I'd rather be doing something else	1	2	3	4	5	6	7
I'm skilled at it	1	2	3	4	5	6	7
This activity is challenging	1	2	3	4	5	6	7
	Not		Moderate			Very	
I'm tired	1	2	3	4	5	6	7
I feel unwell	1	2	3	4	5	6	7
I am able to concentrate	1	2	3	4	5	6	7

Since the last beep, the most important thing that happened to me was							
.....							
.....							
.....							
This event was	Not at all			Neutral		Very	
Pleasant	1	2	3	4	5	6	7
Important	1	2	3	4	5	6	7

Since the last beep I've spent time worrying about my life.								
Disagree	1	2	3	4	5	6	7	Agree
Since the last beep I have tried to cheer myself up								
Disagree	1	2	3	4	5	6	7	Agree
Since the last beep I've acted impulsively without regard to the consequences								
Disagree	1	2	3	4	5	6	7	Agree

This beep disturbed me	Not		Moderate		Very		
	1	2	3	4	5	6	7
It is now exactly hrs mins							

Measures utilized in Chapter 2

RSEQ

<http://www.yorku.ca/rokada/psycetest/rosenbrg.pdf>

DAS24

<http://www.sciencedirect.com/science/article/pii/S0092656684710191>

IPSAQ

http://scholar.google.co.uk/scholar_url?hl=en&q=http://www.researchgate.net/publication/223185201_A_new_measure_of_causal_locus_the_internal_personal_and_situational_attributions_questionnaire/file/79e4150d2347c8266e.pdf&sa=X&scisig=AAGBfm2a_KFvLy0rm_YTDisZ47QuvQYpyg&oi=scholar&ei=_waTUrKzEM6shQf_3IH4BQ&ved=0CDAQgAMoADAA

PQQ (based on Selves Questionnaire)

<http://guilfordjournals.com/doi/abs/10.1521/soco.1985.3.1.51>