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Cognitive Biases in Hypomanic Personality: Preliminary Findings Indicating the Relevance of Self-Versus-Other Encoding and High-Versus-Low Levels of Activation

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Background: While research indicates cognitive biases in individuals vulnerable to bipolar symptoms, the specificity of these biases to the self and others, and to low or high activation states, is underexplored. **Method:** These biases were investigated using individuals with high ($n = 24$) and low levels ($n = 24$) of hypomanic personality (HPS) during word rating and free recall of a list of trait words after a positive versus neutral mood induction. **Results:** The mood induction was not successful. Also, in contrast to the predicted self-serving bias, there was a self-denigratory bias in self-ratings relative to ratings of another person. In *post hoc* analyses, the study succeeded in producing a rating task of trait words that differentiated between high and low hypomania-prone individuals, as the high HPS group made higher ratings of high activation trait words (e.g. dynamic) to describe positive and neutral attributes regardless of whether it referred to themselves or another person. The high HPS group also showed a negative recall bias, but it was not specific to the self, questioning assumptions made about negative biases in existing research. Furthermore, a strong relationship emerged between greater use of imagery at encoding and greater recall of self-referent, positive, high activation words, suggesting a role for the intensity of images associated with the amplification of emotions in people with bipolar disorder (Holmes et al., 2008). **Conclusions:** It seems important to consider various multiple factors in memory bias research in people vulnerable to bipolar disorder, including self versus other encoding, high versus low activated states and the role of mental imagery. Further research is needed to spell out their interactive contribution.

Keywords: Hypomania, word list, self-concept, other-concept, imagery.

Introduction

Hypomania is described as a state involving symptoms such as inflated self esteem, grandiosity and increased confidence (American Psychiatric Association, 1994). Interestingly, it has been observed that during a hypomanic or manic episode, individuals are also often irritable and critical of those around them (Goodwin and Jamison, 1990). Indeed, across seven factor analytic studies, negative affect in the form of dysphoria and anxiety, and also irritability and aggression, form two of five core features of mania (Mansell and Pedley, 2008). This inconsistency in disposition, is mirrored by the contradictory findings in empirical research (for a reviews, see Mansell and Hodson, 2009; Mansell and Pedley, 2008) and, in particular,

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the findings that both positive self-esteem and negative self-esteem tend to be higher during hypomania than in depression or remission (e.g. Scott and Pope, 2003).

Leahy and Beck (1988) suggested that the cognitions in mania are opposite to those in depression, with individuals perceiving themselves as talented, creative and superior. However, research investigating the underlying cognitions in bipolar disorder has found that even during mania and hypomania, individuals seem to hold a negative self-concept. For example, Lyon, Startup and Bentall (1999) researched this using a word task in which they asked bipolar patients to endorse words to themselves, and then later asked them to recall as many words as possible. Manic patients endorsed more positive words to themselves, like the normal controls, yet they recalled more negative words in the memory task, similar to depressed patients, suggesting an underlying difference in self-concept from normal controls. Winters and Neale (1985) investigated implicit attributional style in remitted manic patients, and found that, like depressed patients, they attributed more negative events than positive events to themselves.

However, previous research raises some interesting and partially unanswered questions. First, are these negative self-concepts a cause or an effect of the disorder? Second, are the negative cognitions specific to the self, or do they relate to their appraisal of other people as well?

With regard to the first question, studies have attempted to establish causality through looking at non-clinical samples. Gotlib, Traill, Montoya, Joormann and Chang (2005) looked at attention and memory in children of bipolar parents (a high-risk sample), in comparison to control children of healthy parents. It was found that children of bipolar parents showed greater interference from negative word lists on the emotional Stroop than control children. This suggests underlying cognitive differences in those vulnerable to bipolar disorder, long before the onset of any symptoms. They also found that although the two groups of children endorsed the same number of positive and negative adjectives to themselves on a ratings task, when asked to recall words from the task, the high risk children recalled significantly more negative adjectives than the low risk children. However, a significant limitation of this study is that it is not possible to distinguish between the underlying cognitive differences evident in someone with heightened risk of developing bipolar disorder and the underlying cognitive differences due to the psychosocial impact upon a child growing up with a mentally ill parent.

A second way to explore whether these biases may precede the development of bipolar disorder is to identify an "at risk" population using self-report measures. Hypomanic episodes are necessary for a diagnosis of bipolar II disorder. However, it was observed by Stone (1980), amongst others (Arieti, 1974; Zerssen, 1982), that there are subtle hypomanic personality traits (Eckblad and Chapman, 1986) in the sub-clinical population, such as boastfulness and over-familiarity, evident before the onset of the disorder. A 13-year longitudinal study established a link between high levels of these personality traits and the onset of bipolar disorder (Kwapil et al., 2000), suggesting that identifying those with hypomanic personality traits may raise the opportunity to reveal more about the underlying cognitive processes in those vulnerable to bipolar disorder, without the limitations of past experience or concurrent medication.

Delduca, Jones and Barnard (2010) used this population to explore autobiographical memory biases in people vulnerable to bipolar disorder. They found that people high in hypomanic personality (high HPS) recalled more specific memories when cued by an unpleasant word in an autobiographical memory task, and were quicker to do so than those low in hypomanic personality (low HPS). Taken together with the above findings, this evidence

would suggest the existence of a negative cognitive bias, not only in those with bipolar disorder, but also in a non-clinical sample vulnerable to hypomania.

However, there is still little research in this area, and the second question remains unanswered; are the negative cognitions specific to the self, or towards others as well?

A recent model of mood swings and bipolar disorder (Mansell, Morrison, Reid, Lowens and Tai, 2007) predicts that the extreme way in which individuals vulnerable to hypomania appraise themselves and others around them, whilst in an activated state, may be important in contributing to the ascent into mania. A state of activation has been regarded as a core feature of hypomania (Bauer et al., 1991; Depue, Krauss and Spoont, 1987). Within the model it is defined within four domains: cognition (e.g. thoughts racing); mood (e.g. high mood); physiology (e.g. high arousal) and behaviour (e.g. doing everything faster). It is suggested that in these activated states, people around a person prone to bipolar disorder may be viewed negatively by them (e.g. incompetent, jealous, manipulative). In support of this view, a subscale of the Hypomanic Attitudes and Positive Predictions Inventory (HAPPI; Mansell, 2006) assessing negative views of *other people* and how they relate to the self (e.g. "When people criticise my enthusiastic behaviour they are being deliberately malicious and nasty") has been found to be elevated in bipolar disorder relative to healthy controls (Mansell, 2006), in bipolar disorder compared to unipolar depression (Alatiq, Crane, Williams and Goodwin, in press), and related to hypomanic vulnerability in a student sample (Dodd, Mansell, Morrison and Tai, 2009). Therefore, a negative cognitive bias may not be exclusive to the self, and may be held in tandem with positive appraisals of the self in high activation states.

The aim of the current study was to explore not only the ratings of self-concept of those with high hypomanic traits, but also their cognitions relating to others, by formulating a new list of trait words suitable for this line of research. The experiment was carried out using a similar methodology to Lyon et al. (1999), using a word-rating task, followed by an unexpected word-recall task to tap more implicit biases. Unlike Lyon et al. (1999), as well as having to endorse words to themselves, participants were also asked to endorse the trait words to someone close to them.

A further variant on previous research was that not only was the valence (positive, negative or neutral) and referent of the words tested, but also whether the words are high or low in activation. The reason for testing this is that previous studies (e.g. Lyon et al., 1999; Gotlib et al., 2005) have not controlled for the fact that both positive and negative trait words can vary in their level of activation. For example, Taylor and Mansell (2008) found that high HPS individuals used more high activation, positive (e.g. "dynamic") and negative words (e.g. "selfish") to appraise their performance in a challenging co-operative task. They did not differ on low activation positive (e.g. "relaxed") and negative (e.g. "lifeless") words. This suggests that a positive and negative distinction may be too simplistic; hence the reason for also including neutral words, differing only in activation level.

Recent research has also suggested that imagery may act as an emotional amplifier in the people with bipolar disorder (Holmes, Geddes, Colom and Goodwin, 2008). This has been supported by the finding that people in hypomanic states tend to experience enjoyable, future-orientated images, the appraisal of which has been suggested to contribute to the ascent into mania (Gregory, Brewin, Mansell and Donaldson, in press). Therefore, this suggests that positive imagery may act as an amplifier in individuals high in hypomanic traits, leading them to make more extreme appraisals when imagining themselves and others, perhaps resulting in heightened recall of highly emotional memories.

Our first hypothesis, regarding the word rating task, was that both the high and low HPS group would show a self-serving bias (as found by Lyon et al., 1999), and would therefore make higher ratings of positive words of themselves than negative or neutral words. In this study, the provision of an other-referent condition allowed this hypothesis to be tested more rigorously. The hypotheses for the word recall task were, first, that when the mood induction is neutral, the high HPS group would recall significantly more negative words than the low HPS group (as found by Lyon et al., 1999, and consistent with the background context of negatively biased processing proposed by the model of Mansell et al., 2007). Second, it was predicted that following "activation" by the positive mood induction, both groups would recall more positive words, as frequently found in studies of mood-congruent memory (e.g. Eich, Macauley and Ryan, 1994). Third, it was predicted that the high HPS group would recall significantly more self-referent, high activation, positive and negative words than the low HPS group, and more negative, other referent words, due to the way they are proposed to appraise themselves and others when in an activated state (Mansell et al., 2007).

Method

Participants

Undergraduate students from the University of Manchester were selected for the study based on their score on the Hypomanic Personality Scale (HPS; Eckblad and Chapman, 1986). Inclusion into the study required a score of 24 or over (high HYP) or 8 and below (low HYP). These scores were derived from a previous study of a different sample using the HPS with students drawn from the same university (Knowles, Tai, Christensen and Bentall, 2005). These cut-offs were one standard deviation above the mean, and one below the mean, and comparable to other studies of the HPS. In total, 203 students completed copies of the HPS that were distributed at the end of lectures and from their student common room. From this, 48 participants whose scores were in the required range were selected, half of which were classified as high-HPS (19 female; mean age = 19.08 years, $SD = 1.35$; Mean HPS = 29.46, $SD = 4.27$) and half low-HPS (22 female; mean age = 20.58 years, $SD = 6.23$; Mean HPS = 4.96, $SD = 2.48$). An independent-samples t-tests found no significant differences between the groups in age, $t\,(46) = 1.15$. None of the participants were screened for previous episodes or past treatment as the aim of the study was to include individuals with symptoms at the extreme of a hypomanic continuum. Information on sources of support and information was available to all participants within the information sheet, and they were fully debriefed as to the aims of the study.

Materials

Self-report measures. The Hypomanic Personality Scale (HPS; Eckblad and Chapman, 1986) contains 48 true-false items, designed to measure the presence of hypomanic traits, including increased self-confidence, heightened mood, and elevated energy levels. Examples of these include; ''There have often been times when I had such an excess of energy that I felt little need to sleep at night'' (true signals hypomanic personality trait), and ''I can't imagine that anyone would ever write a book about my life'' (false signals hypomanic personality

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trait). Higher scores on this scale indicate a more hypomanic personality. The authors of this scale report good coefficient-alpha and test-retest reliability.

Computer task

The computer program, based on a similar one used by Mansell and Clark (1999), showed 68 personality trait words, for 5 seconds each, before a question appeared on the screen, which was either "How well does this word describe you?" (self-referent), or "How well does this word describe someone close to you?" (other-referent). The instructions required the participant to think of one individual in mind. This rating condition replicated Mansell and Clark (1999) as well as reflecting the importance of appraisals of significant others in the cognitive model. Participants were then given an unlimited time to respond using the number keys (1-extremely unlike, 2-moderately unlike, 3-slightly unlike, 4-slightly like, 5-moderately like and 6-extremely like).

There were two versions of the program (Task 1 and 2), each with the same words in a random order; however, the words matched with the self-referent question in Task 1 were then matched with the other-referent question in Task 2. The words were divided between referent conditions equally, so that there were equal numbers of each category of word for each referent condition in the two tasks. The words appeared in a random order, except for the first four and last four, which were the same in both versions of the program, and were exempt from analysis, as they acted as primacy and recency effect buffers.

Words

For the word lists, a small pilot study of 20 participants was conducted, in which they were asked to rate a list of adjectives, originally taken from word lists by Anderson (1968), as either positive, negative, or neutral, and whether they considered them to be of high or low in activation levels. Following this, two chi-squared tests were conducted on each word in order to test whether they fitted significantly into one valence and activation category. From these results, the words that were assigned to each category were measured for word frequency in the English language, from word lists by Francis and Kucera (1982), word likeability from the Anderson (1968) paper, and word length (Carroll, Davies and Richman, 1971). Ten words in each of the six categories were then matched for these criteria. Two one-way ANOVAs were conducted for the word lengths, $F\,(5, 54) = 0.56$, $p = .73$, and word frequencies, $F\,(5, 54) = 1.04$, $p = .41$, to make sure there was no difference between categories. Paired samples *t*-tests were then conducted upon the two activation level conditions within each valence category, which revealed no difference between likeability of the words. Sixty-eight words were used in total, including the primacy and recency buffer words. For the final word list, see Table 1.

Rating scales

In order to measure mood at five intervals throughout the experiment, a scale was used that consisted of a 100 mm line going from extremely low/depressed (–50), passing through normal at the centre (0), to extremely happy/high (+50) at the other end. The labels on this scale were similar to those used by Wright, Lam and Newsom-Davis (2005) and adapted from

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Table 1. Word categories for computer ratings task

Positive		Negative		Neutral	
High activation	Low activation	High activation	Low activation	High activation	Low activation
Energetic	likeable	over-critical	pessimistic	cunning	inexperienced
courageous	grateful	jealous	helpless	bold	impressionable
high-spirited	respectful	noisy	depressed	eccentric	cautious
vivacious	composed	dominating	uninteresting	rebellious	shrewd
outstanding	relaxed	over-confident	humourless	authoritative	conforming
adventurous	attentive	malicious	incompetent	forceful	hesitant
optimistic	trusting	selfish	aimless	outspoken	passive
talented	cooperative	offensive	lifeless	excitable	bashful
ambitious	appreciative	hostile	boring	strict	reserved
enthusiastic	tolerant	quarrelsome	cowardly	opinionated	moderate

a measure of mood on the Internal State Scale (ISS). Participants were asked at various points in the experiment to mark on the line how they currently felt.

Mood induction

Participants were asked to view one of two 5-minute video clips. One from "The Catherine Tate" was shown for the positive induction. This is a popular comedy show on British television and the clip involved a sarcastic teenager. For the neutral induction, a documentary called "Uncovering Atlantis" was used. The clip chosen involved the discussion of archaeological artefacts. Video clips are a frequently used form of mood induction (e.g. Joormann and Siemer, 2004) and are recommended in a review by Martin (1990). A small pilot study was carried out on a group of 10 participants who were asked to rate their mood, using a current mood scale identical to the ones used during the experiment before and after watching the clips. It was found that "The Catherine Tate Show" did increase mood ratings ($M = 33.5$, $SD = 9.73$), significantly more than "Discovering Atlantis" ($M = -1.3$, $SD = 4.85$), $t\,(9) = 10.53$, $p < .001$), confirming the suitability of both clips for the study.

Expectancy of recall

The following question was asked to tap the degree to which the participants may have expected to have their memory tested: "Did you think that your memory for the words would be tested? If so, how much from 0 to 100% likelihood?"

Use of imagery

The following question was used to assess how much the participants had used mental imagery to encode their memories: "Did you conjure up images of yourself and another person in order to make the ratings? If so, how vivid were these images? 0 = not at all, 10 = extremely vivid, like reality".

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Procedure

Participants were required to rate their current mood on the rating scale, before completing one of the two computer tasks, allocated at random through the toss of a coin (prior to the arrival of the participant). The participants were again asked to rate their current mood prior to induction.

Each task group was divided equally, and at random (through the toss of a coin), to the two induction conditions, before their current mood was measured on the rating scale. Following the induction, participants were given 3 minutes to note down as many trait words from the computer program as they could remember. Current mood was then measured again. Finally, the participants were asked to complete the questionnaires used in their recruitment to verify the reliability of the initial scores, before rating their current mood for the final time. The expectancy and imagery questions were asked, and the participant was debriefed.

Results

Word ratings

To test the hypothesis relating to the word ratings, a 4-way valence (positive vs negative vs neutral) × activation (high vs low) × referent (self vs other) × HPS (high vs low) repeated measures ANOVA, was conducted. The data are presented in Table 2. All tests conducted were two-tailed. Significant interactions were found between valence and referent, $F\,(1, 46) = 4.85$, $p < .033$, referent and HYP, $F\,(1, 46) = 5.13$, $p < .028$, and between valence, activation and HYP, $F\,(1, 46) = 5.86$, $p < .019$.

The first interaction was investigated as it tested the first hypothesis predicting a self-serving bias across participants. Separate paired-samples *t*-tests for each valence of word revealed that, contrary to the prediction, participants gave stronger endorsements to themselves than the person close to them on negative, $t\,(47) = 2.59$, $p < .05$, neutral, $t\,(47) = 2.34$, $p < .05$, but not positive words, $t\,(47) = 1.09$, *ns*.

The interaction between referent and group was explored. After splitting the file by group, it was revealed that referent was a significant main effect in the high HPS group, $F\,(1, 23) = 8.83$, $p < .01$, but not in the low HPS group, $F\,(1, 23) = 0.04$, *ns*. Investigating the means showed that the high HPS group rated themselves more highly, $M = 3.61$, $SD = 0.78$, than they rated others, $M = 3.35$, $SD = 1.04$, regardless of the valence or activation level of the word.

Finally, to investigate the third interaction, a HPS × Activation ANOVA was conducted for each of the three valences of words, revealing a significant interaction between HPS and activation for positive words, $F\,(1, 46) = 21.47$, $p < .001$, and neutral words, $F\,(1, 46) = 35.16$, $p < .001$. Independent samples *t*-tests indicated that, compared to the low HPS group, the high HPS group made lower ratings of neutral,, $t\,(46) = 3.63$, $p < .001$, and positive, $t\,(46) = 2.17$, $p < .05$, low activation words and higher ratings of neutral, $t\,(46) = 4.27$, $p < .001$, and positive, $t\,(46) = 2.50$, $p < .05$, high activation words. No significant differences were found between the groups in their ratings of negative words at low or high intensities.

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Table 2. Mean descriptiveness ratings of trait words for both HPS groups

	High HPS		Low HPS	
Word ratings	*M*	*SD*	*M*	*SD*
Self				
Positive				
High	4.32	0.84	3.83	0.60
Low	4.46	0.66	4.75	0.49
Neutral				
High	4.01	0.64	3.20	0.58
Low	3.15	0.76	3.74	0.66
Negative				
High	3.25	0.78	2.84	0.79
Low	2.46	0.80	2.30	1.00
Other				
Positive				
High	4.52	0.80	4.19	0.67
Low	4.38	0.77	4.68	0.64
Neutral				
High	3.78	0.91	3.34	0.66
Low	2.77	0.85	3.44	0.87
Negative				
High	2.82	0.97	2.82	0.76
Low	1.88	0.76	2.11	0.85

Mood manipulation check

In order to assess whether the inductions had the desired effect upon mood, and whether there were any differences in mood induction between the groups, a HPS (high vs low) × induction (positive vs neutral) × time (pre vs post) ANOVA was conducted. A main effect of induction was identified, F (1, 44) = 10.29, $p < .01$, as well as a significant three-way interaction between group, mood and induction, F (1, 44) = 5.03, $p < .05$, indicating that the mood induction affected the two HPS groups differentially. Four paired samples t-tests were used to show which of the inductions were significant. It was found that in the low HPS group, the positive induction had a significant effect on mood, t (11) = −6.37, $p < .001$, and the neutral induction showed a near significant trend, t (11) = 2.01, $p = .069$. However, in the high HPS group, the positive induction failed to reach significance, t (11) = 1.58, $p = .143$, and as expected, the neutral induction did not change mood significantly, t (11) = 0.89, *ns*. We concluded that the mood manipulation did not fully achieve its desired effects on self-reported mood, which qualified later findings.[1]

Recall

Recall data are presented in Table 3. They were subjected to a HPS × induction × activation × referent × valence ANOVA, revealing no significant effects or interactions. As the first

[1]Data on the mood manipulation are available from the authors.

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Table 3. Mean word recall for both HPS groups

	High HPS		Low HPS	
Recall	*M*	*SD*	*M*	*SD*
Self				
Positive				
High	1.08	0.78	1.13	0.90
Low	0.50	0.83	0.58	0.72
Neutral				
High	1.00	1.14	1.04	0.91
Low	0.67	0.70	0.63	0.71
Negative				
High	1.29	1.04	0.96	0.91
Low	0.96	0.95	0.67	0.82
Other				
Positive				
High	1.04	0.69	1.13	1.12
Low	0.67	0.82	0.54	0.66
Neutral				
High	1.17	0.96	0.63	0.71
Low	0.50	0.59	0.50	0.66
Negative				
High	0.92	0.97	0.58	0.65
Low	1.00	0.93	0.79	0.88

hypotheses relating to the analysis of the recall data had predicted greater recall of negative words in the high HPS group when in the neutral mood condition, an independent samples *t*-test comparing words recalled between the two groups by valence alone was conducted. It indicated that the high HPS group recalled significantly more negative words than the low HPS group, $t\ (46) = 2.06$, $p < .05$. To test directly whether this bias was specific to self-referent words, a paired samples *t*-test on the negative recall data found no significant difference between the negative ratings of the self and the other person, $t\ (23) = 0.95$, $p = .35$, indicating no evidence that the negative bias was specific to the self. These findings were not specific to the neutral mood condition, as predicted.

Expectancy of recall task

Although the average expectancy of recall was very low overall (9%), when the mean was split by high and low HPS group, it was found that the expectancy of the high HPS was significantly higher than for the low HPS group $t\ (46) = 2.37$, $p < .05$. However, when the three participants who rated their expectancy over 50% (all in the high HPS group) were factored out of the analyses, there were no differences in the recall findings.

Imagery

An independent samples *t*-test revealed a non-significant trend for the high HPS group, $M = 7.33$, $SD = 1.71$, to report using more mental imagery than the low HPS group, $M = 6.31$,

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$SD = 2.31$, $t\,(46) = 1.74$, $p = .088$. A follow-up Pearson correlation was conducted, between level of processing and recall, for each of the different categories of words to test whether, as predicted by Holmes et al. (2008), there was a relationship with positive emotional recall, and if it was specific to the self and to highly activated internal states as would be suggested by Mansell et al. (2007). Significant correlations were found between greater use of imagery and higher recall of self-referent, positive, *high* activation words, $r = 0.41$, $p < .01$, and between lower use of imagery and higher recall of self-referent, positive, *low* activation words, $r = –0.34$, $p < .05$. No equivalent correlations were statistically significant for negative words.

Discussion

The ineffectiveness of the mood induction entailed that the hypothesis concerning biases in recall in relation to mood could not be tested. The results also contradicted the predicted well-documented phenomenon of a self-serving bias as, across groups, participants attributed more negative and neutral words to themselves than another person, but did not differ on positive words. In a post hoc analysis, the rating task of trait words did however differentiate between high and low hypomania-prone individuals. Specifically, the high HPS group endorsed more high activation neutral and positive words (e.g. "bold" and "energetic") and less low activation neutral and positive words (e.g. "grateful" and "cautious") regardless of whether they referred to themselves or others. However, as a whole, the hypomanic group gave themselves higher ratings on all trait words regardless of valence and activation, compared to when they were rating another person. The results of the recall task were more modest and were compromised by the unsuccessful effect of the positive mood induction on the high HPS group. Nevertheless, a hypothesis-driven test showed a general negative recall bias in the high HPS group across conditions that were not specific to the self. There also emerged a strong relationship between greater self-reported use of imagery at encoding and greater recall of self-referent, positive, high activation words (e.g. "dynamic").

The tendency for hypomanic personality to be associated with ratings of the self and others with more high activation and less low activation words was not predicted, nor was this effect expected to be specific to positive and neutral words. It is unclear the reason for this effect, although it is somewhat consistent with the view that high activation states are often regarded as a preferable alternative to negative states of low activation, i.e. depression. Consistent with this view, Mansell and Hodson (2009) found the autobiographical memories of individuals with bipolar disorder related to "striving to achieve a highly activated, socially oriented, positive self-concept" (p. 260).

An equally interesting and unexpected finding from the ratings task was that the high HPS group rated all words as more descriptive of themselves, regardless of valence and activation. This preliminary finding suggests an overall bias towards the self, and may be associated with the suggestion that people with bipolar disorder have a tendency to appraise changes in internal state with extreme personal meanings (Mansell et al., 2007). Perhaps, whether positive or negative, people with a vulnerability to hypomania may be hypervigilant to their own internal state, increasing their likelihood to endorse traits to themselves.

The finding of a negative recall bias supports our prediction of an implicit negative self-concept, with the results indicating similarities in the pattern of memory recall between those who score highly on the HPS and those with bipolar disorder (Bentall and Thompson, 1990), supporting the suggestion that there are underlying differences in the cognitive processes in

those vulnerable to hypomania that exist without the onset of symptoms (Gotlib et al., 2005). It is interesting here to note that the participants vulnerable to hypomania in this study, despite displaying a negative cognitive style, did not seem to perform in the same way as those with unipolar depression in other studies; a study by Bradley and Mathews (1983) that looked at self and other-referent memory recall in those with unipolar depression found a negative bias in recall only for self-referent words, whilst the normal tendency for positive recall in the other-referent condition was preserved. The results of the current study differ from this, as although the high HPS group showed a negative bias in recall, there was no effect of referent, suggesting that the underlying negative cognitive style found in those vulnerable to hypomania may not just be evidence of a negative self-concept, but may extend to others around them. However, these findings are only preliminary, and require consideration in future research.

The trend for the high HPS to use more imagery is consistent with the suggestion that the hypomanic state may be amplified by positive images (Holmes et al., 2008), particularly given the significant findings of heightened recall of self, positive, high activation words (e.g. "energetic") associated with greater self-reported imagery at encoding, and lower levels of recall of positive, low activation words (e.g. "relaxed").

These preliminary findings illustrate the complex and contradictory features of the self-concept and memory in people vulnerable to hypomania (Mansell and Hodson, 2009). This study revealed evidence for tendency for hypomania-prone individuals to be more focused on positive and neutral states of high activation in their explicit appraisals of themselves and others, coupled with some indication of a more implicit negative bias in recall that also applied to themselves and other people. These preliminary findings indicate that the recall of positive, high activation words was restricted to those individuals who used more imagery, which may provide a process of positive emotion amplification for some people with a proneness to hypomania. Whether this process is adaptive or problematic remains the topic for further research.

There are several limitations of the study that could be explored in future research. First, it would be necessary to identify a successful mood induction. Furthermore, in the current study a single, visual analogue scale was used to assess mood, yet if positive and negative moods are at least partially independent, as indicated by the dual positive and negative affect involved in hypomanic experiences (Mansell and Pedley, 2008), then at least two scales would seem more appropriate. The study would have greater clinical relevance if the trait words are used within a clinical versus non-clinical sample. A further advance would be gained from adopting an approach that recognizes the discrepancy self-representations (Higgins, 1987). In a study of bipolar disorder across different phases, participants' ratings of their current self view (actual self) were significantly discrepant from their desired self view (ought and ideal selves) during depression, but not during mania and remission (Bentall, Kinderman and Manson, 2005). The trait words developed here could be adapted to assess self-discrepancies. Within the Mansell et al. (2007) model, self-discrepancies are critical as they drive people's attempts to attain internal states that they appraise as extremely successful, and away from states that are appraised as catastrophic (a full integration is provided by Mansell and Hodson, 2009).

In conclusion, this study failed to test one of its main hypotheses, owing to an ineffective mood induction, and found evidence against the predicted self-serving bias in self-ratings. Instead, its findings suggest that in future work on memory and bipolar vulnerability it would be fruitful to distinguish between the self and other in encoding, and in differentiating states

of high and low activation as well as valence within memory studies. The study also provides a promising indication that greater use of imagery is associated with stronger encoding of positive memories of the self that represent states of high activation (e.g. "energetic"), as opposed to low activation (e.g. "relaxed"). This may be important to our understanding of hypomania vulnerability (Holmes et al., 2008). The results deserve further evaluation in future research.

Ethical statement

This research was approved by the University of Manchester, School of Psychological Sciences Research Ethics Committee.

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