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Bias in beliefs about the self is associated with depressive but not anxious mood

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Abstract

Background: Biases in beliefs about the self are associated with psychopathology and depressive and anxious mood, but it is not clear if both negative and positive beliefs are associated with depression or anxiety. We examined these relationships in people who present with a wide range of depressive and anxious mood across diagnostic categories.

Methods: We probed positive and negative beliefs about the self with a task in which 74 female participants with either Affective Disorder (depression and/or anxiety), Borderline Personality Disorder or no psychiatric history indicated the degree to which 60 self-related words was “like them” or “not like them”. Depressive and anxious mood were assessed with the Beck Depression Inventory–II and the Beck Anxiety Inventory.

Results: The participants with no psychiatric history (n=25) reported a positive bias in their beliefs about the self, the participants with Affective Disorder (n=23) reported no bias, and the participants with BPD (n=26) reported a negative bias. Two hierarchical multiple regressions demonstrated that the positive and negative beliefs contributed additively to the ratings of depression (corrected for anxiety), but did not contribute to the ratings of anxiety (corrected for depression).

Limitations: Despite the apparent small sample size, the regression analyses indicated adequate sampling. Anxiety is a much more heterogeneous condition than is depression, so it may be difficult to find relevant self-descriptors. Only measures of endorsement were used.

Conclusions: Biases in beliefs about the self are associated with depressed, but not anxious mood, across diagnostic categories.

Keywords: depression, anxiety, borderline personality disorder, beliefs, self

1. Introduction

Cognitive biases are psychological shortcuts that allow rapid processing of information, and are reflected in the proportion of positive to negative cognitions and beliefs. People with no psychiatric history report a positive bias in their beliefs about the self [1, 2]. Negative beliefs about the self have been reported in people who have a diagnosis of depression [3], and a diagnosis of anxiety [4, 5], and can be the target of psychological therapies like cognitive-behavioural therapy. Negative beliefs about the self have also been reported in people who have a diagnosis in which depression and anxiety are important components of the presentation: eating disorder [6-8], psychosis [9] and borderline personality disorder [BPD; 10, 11, 12]. The purpose of this brief report is to investigate whether a negative bias in beliefs about the self is associated with depressive or anxious mood, across diagnostic categories.

Depressive and anxious states share many features [13] and co-exist, to different degrees, in people with no psychiatric diagnosis or psychiatric history, and in people with a psychiatric history [14]. It is the distinct, unshared features of depression and anxiety that may be reflected in different belief systems about the self, the world, and the future [15]. The difficulty in attributing beliefs about the self to anxious or depressive states has been visited previously [16]. When the separate effects of depression and anxiety can be parsed, the evidence indicates that the negative beliefs about the self are related to anhedonia and depression, and not related to anxiety and arousal, at least when the participants in the study are healthy volunteers from the community [17].

Beliefs about the self have been assessed with various instruments. Beliefs associated with depression have been measured with the Irrational Beliefs Test [18], Young's Schema Questionnaire [see 8, 19, 20]. Two important scales have been developed to assess beliefs in people with BPD: the Personality Disorder Beliefs Questionnaire [PDBQ; 21], and the Borderline Personality Disorder subscale of the Personality Beliefs Questionnaire [PBQ-BPD; 22].

There are two features about these clinical ratings of beliefs about the self that deserve attention. First, all the statements in these rating scales relate to negative beliefs. Positive beliefs are not probed, so it is not possible to obtain information about a bias in beliefs. Positive beliefs about the self in people with psychiatric disorders have been neglected in clinical research [23]. The degree to

which people had a positive view of self has sometimes been defined by low scores on negativity bias [3].

Second, all of these measures consist of statements that were developed on the basis of clinical practice (e.g. “I will always be alone” from the PDBQ, and “I can’t cope as other people can”) and for clinical purposes. The statements are biased towards items that are specific to particular diagnostic categories. For example, the PBQ-BPD and the PDBQ consist of items that distinguish people who have BPD from those who do not on the basis of valence and content. Both of these scales are clinically useful and distinguish between people who have BPD from people who have other personality disorders [15, 21]. These scales reflect biases that are specific to particular conditions, but shed less light on aspects of illness that are shared across diagnostic categories.

To learn more about the biases in the belief systems associated with depressive and anxious mood, we must probe the degree to which people endorse both positive and negative beliefs about themselves. One task that has been useful to examine both positive and negative beliefs is the Self-Referent Encoding Task, or SRET [24-26], which involves the presentation of negative and positive words, followed by a prompt to indicate whether or not these words describe the participant [27]. The use of the SRET allows the investigator to probe both positive and negative biases, with words that are not specific to any particular diagnosis. The use of single words also allows for different measures to be obtained from the participants, for example the number of positive and negative words endorsed as self-descriptors, the response time to each word, recall, recognition, and electrocortical responses to each word. The use of the SRET with these various measures has demonstrated two types of negative bias associated with depression: an automatic negative bias detected by early electrocortical responses, that is present in currently depressed and previously depressed but remitted individuals, and a controlled, effortful bias, detected by late electrocortical responses and by behavioural measures which is only present in currently depressed individuals [28]. The automatic bias may reflect a vulnerability to develop depression, whereas the conscious, controlled bias may reflect a mood-dependent bias [28]. These results obtained in healthy and depressed adults have been replicated in depressed and healthy adolescents [27, 29] as well as low- vs. high-risk healthy adolescents [30] and adolescents with Borderline Personality Disorder [31].

The aim of the current study is to examine the relationship between the mood-congruent, conscious and controlled bias in beliefs about the self and mood, by administering a version of the SRET to people who report a wide range of bias in beliefs about the self, and also a wide range of depressive and anxious mood, across diagnostic boundaries. We investigated 3 groups of people (people with no psychiatric history, people with a diagnosis of an affective disorder, either depression and/or anxiety, and people with BPD) to reflect a wide range of bias, from positive bias to lack of bias to negative bias, and to reflect a wide variation on scores of depression and anxiety. The purpose of the current study was not to identify the content of beliefs that is diagnostic specific, but to identify content that is present across diagnostic categories. On the basis of the previous results obtained by Dunn and colleagues [17] in healthy people from the community, we predicted that a negative bias in beliefs about the self is associated with depression but not anxiety.

2. Method

Participants

Seventy-four females participated in this study. The inclusion criteria were that the participants were female, 18 years of age or older, able to provide consent, and had either a diagnosis of BPD (BPD group, $n=26$), Anxiety disorder or Major Depressive Disorder (AD group, $n=23$), or have no psychiatric history (NPH, $n=25$). Participants for the BPD and the AD groups were recruited from various local community mental health teams and from local support groups. Individuals with NPH were recruited from the community through a local community website. In the AD group, 16 participants met criteria for Major Depressive Disorder, 5 participants for Anxiety Disorder, and 2 participants for both Major Depressive and Anxiety Disorder. No participant in this group met more than two criteria for BPD, and none met criteria for Identity Disturbance. Only female participants were recruited to avoid possible sex differences in the view of self, and because there are more females than males diagnosed with BPD and AD. The exclusion criteria for the study were a diagnosis of substance abuse/dependence, bipolar disorder and psychosis. Participants in the NPH must not have had or currently have a psychiatric diagnosis. The characteristics of the sample are shown in Table 1. The study was approved by the University of Strathclyde Ethics Committee and the local NHS Research Ethics Committee.

Materials

All participants were administered the Beck Depression Inventory, second edition (BDI-II) [32] to assess the degree of depression, and the Beck Anxiety Inventory (BAI) [33] to assess the degree of anxiety. The BDI-II [Cronbach's alpha = .91; 34] and the BAI [Cronbach's alpha = .92; 33] are 21-item, self-report multiple-choice scales to assess the severity of depression and anxiety, respectively. The reading level of the participants was assessed with the Wechsler Test of Adult Reading (WTAR) [35], for which the participants are required to pronounce each word on a list of 50 irregularly spelled words. The obtained score was converted to an estimate of the verbal intelligence quotient (VIQ) of the Wechsler Adult Intelligence Scale [3rd edition, 36], using the tables provided in the WTAR manual [35]. This measure was used to ensure there was no difference in reading level between the study groups which may have affected their ability to answer the questionnaires. All the participants who were referred to the study with a diagnosis were administered the Mood Episodes and the Anxiety Disorders sections of the Structured Clinical Interview for DSM-IV Axis I disorders [37], and the Borderline Personality Disorder section of the Structured Clinical Interview for DSM-IV Axis II Personality Disorders [38], to assess whether these participants met criteria for BPD, Major Depressive Disorder or Anxiety Disorder. These interviews are diagnostic examinations and were administered by the research assistant under the guidance of a clinical psychologist. Only participants who met diagnostic criteria were included in the study. In addition, the first 46 of the 74 participants were also administered the Self Image Profile for Adults (SIP-AD) [39]. The SIP-AD is a self-report inventory for assessing self-esteem and self-image [Cronbach's alpha = .898;39], and consists of 32 positive words which are endorsed on a 7 point Likert scale to describe "How I am".

Development of the Who Are You? Questionnaire

A self-referential questionnaire, Who Are You? (WRU), was developed to assess the participants' beliefs about their identity, their self, their goals and their feelings. The questionnaire consists of 220 words with 20 words relating to each of 13 dimensions grouped in 4 sections: i) Identity, ii) Self, iii) Goals, and iv) Feelings. The Identity section assesses seven dimensions (nationality/ethnicity, occupation, possible occupations, social roles, values, religion and political views. The Goals section assessed dominance and nurturing goals. The Feelings section assessed two dimensions: dissociation/integration and distress/comfort. The Self section

assessed three dimensions: appearance, personal attributes, and interpersonal interactions. This current report only includes the data for dimensions that had a clear positive and negative valence: appearance, personal attributes and interpersonal interactions.

For each of these 3 dimensions of self, there were 10 positive words and 10 negative words. The words were selected from frequency lists generated by using the British National Corpus, a compendium of 100 million British words [40]. Words for each of the dimensions of the WRU Questionnaire were selected on the basis of i) their relevance to the dimension, ii) their frequency in the British National Corpus, and iii) their valence. Words initially selected on the basis of relevance were then subjected to further selection on the basis of frequency, to ensure that there was no difference in the mean frequency of words in each dimension. One consequence of this frequency selection criterion is that the most commonly used words to describe aspects of self may not have been selected where other words of similar frequencies were not found for the other dimensions. Words were then selected on the basis of valence. The words were categorised as either positive or negative on the basis of the results from a pilot study. Ten female participants, recruited independently from the main study, and aged between 18 and 32 (mean=23.1, SEM = 1.5), categorised the words as either positive or negative. Only the words that were categorised by all 10 participants as being either positive or negative were selected for the study. A one-way analysis of variance (ANOVA) demonstrated that there were no differences in the mean word frequency between the different dimensions ($F(5,54)=0.46$, $p=0.999$).

To test the discriminant validity of the 3 categories (self, interpersonal interactions, personal attributes) and the two valences, the total scores for the 10 positive and 10 negative items of each category were entered into a Principal Components Analysis (PCA) with Varimax Rotation. Two factors were generated. Factor 1 consisted of the 3 negative scores, and Factor 2 consisted of the 3 positive scores. Bartlett's test of sphericity yielded a p value $< .001$. Both the KMO value (.739) and the range of KMO values (.709 -.765) were above 0.5 and confirm that our sample size was adequate for this PCA. The range of communalities was .603 -.837. The total variance explained by these two principal components was 71.896. The determinant was .074. The PCA indices of quality indicate that the factor structure is stable, that the sampling is adequate for the variables, and that the PCA

for these variables is appropriate. The results demonstrated that valence, but not the 3 categories, was the important discriminator. On the basis of the PCA, we collapsed the 3 categories, and tested the participants on the degree that they rated the 30 positive words and the 30 negative words as self or non-self. The Cronbach alpha for the positive scale was .940, and the alpha for the negative scale was .948.

To test the construct validity of the questionnaire, we correlated the scores for Positive and Negative beliefs about the self for 46 participants with the relevant measures of the SIP-AD. Positive beliefs about the self from the WRU questionnaire correlated significantly with the self-image measure ($r(44)=.695, p<.001$), and with the self-esteem measure of the SIP-AD ($r(44)=-.630, p<.001$). Negative beliefs about the self from the WRU questionnaire correlated significantly with the self-image measure ($r(44)=-.380, p=.008$), and with the self-esteem measure ($r(44)=.522, p<.001$). A low score on the self-esteem measure of the SIP-AD indicates high self-esteem.

Each page of the WRU questionnaire contains the 20 words for one dimension with a question at the top leading into the type of words to follow. The questions for the three dimensions of self were: i) "Which of the following words describe you?" (personal attributes), ii) "Which of the following words describe your appearance?" (appearance), and iii) "Which of the following words describe your experiences with other people?" (interpersonal interactions). The participants were asked to rate each word on a five point Likert scale to show the extent to which the word is like them (1 – Not Like Me, 5 –Like Me). Each participant's ratings for all the positive and all the negative words were summed to provide the Positive Self and Negative Self scores. Each participant's Bias score was obtained by subtracting their Negative Self rating from their Positive Self rating. The words for each dimension, and their frequency in the British National Corpus, are supplied as an online supplementary material.

Procedure

Participants were seen at their place of residence, at the university, at the local psychiatric hospital or at their local mental health resource centre. After they provided written consent, the participants were administered the SCID-I and the SCID-II, and asked to complete the BDI-II, the BAI, the WRU questionnaire, and the WTAR. Forty-six participants also completed the SIP-AD.

3. Results

Differences between groups

The number of people in each group, and the mean age, WTAR-derived VIQ, and mean scores on the BDI-II and BAI are shown in Table 1.

Univariate analyses of variance demonstrated no differences in age or VIQ between the three groups, but substantial differences in scores on the BDI-II, the BAI, on negative and positive self ratings and on bias in beliefs. Tukey post hoc comparisons demonstrated that the NPH group had lower scores on the BDI-II than did the AD group ($p < .001$) and lower scores than did the BPD group ($p < .001$). In addition, the BPD group had higher scores on the BDI-II than did the AD group ($p = .002$). The NPH group had lower scores on the BAI than did the AD group ($p = .001$) and lower scores than did the BPD group ($p < .001$). In addition, the BPD group had higher scores on the BAI than did the AD group ($p = .034$). An independent-samples t-test demonstrated that the BPD group had greater severity for BPD symptoms than did the AD group, as assessed by the sum of ratings on the Borderline Personality Disorder Section of the SCIDII ($t(27)=-8.22, p < .001$).

Univariate analyses of variance demonstrated group differences on the ratings for the positive and negative self. Tukey post hoc comparisons demonstrated that both the AD group ($p = .027$) and the BPD group ($p < .001$) reported more negative ratings for the self than did the NPH group, and the BPD group reported more negative self ratings than did the AD group ($p < .001$). Both the AD group ($p = .036$) and the BPD group ($p < .001$) reported fewer positive ratings than did the NPH group, but there were no significant differences between the AD group and the BPD group in positive ratings for the self.

Testing for bias

We conducted a mixed-design 3x2 ANOVA with Group (NPH vs AD vs BPD) as the between-subjects variable and valence (positive vs negative) as the within-subject variable. There was no main effect of Valence ($F(1,71) = .529, p = .469$), a main effect of Group ($F(2,71) = 4.724, p = .012$) and a significant Group x Valence interaction ($F(2,71) = 27.977, p < .001$). Post hoc paired t tests demonstrated that the participants in the NPH group showed a positive bias ($t(24)=6.088, p < .001$), the participants in the AD group showed no bias ($t(22)=.746, p = .464$), and the participants in the BPD group showed a negative bias ($t(25)=-5.188, p < .001$) (Figure 1). These significant p values ($p < .001$) are robust with a Bonferroni correction. A subsequent univariate analysis of variance demonstrated that the bias scores

differed between groups (see Table 1). Tukey post hoc tests showed that the bias scores were significantly different between the NPH group and both the AD group ($p=.007$) and the BPD group ($p<.001$). In addition, the bias scores were significantly different between the AD group and the BPD group ($p<.001$).

The scores on the BDI-II correlated highly with the scores on the BAI ($r(74) = .805, p < .001$). The degree of bias in beliefs correlated highly with the scores on the BDI-II ($r(74) = -.780, p < .001$) and scores on the BAI ($r(74) = -.651, p < .001$).

The contribution of positive and negative beliefs about the self on depression and anxiety

For all participants, the scores for Positive Self had a negative correlation with scores on the BDI-II ($r=-.628, p<.001$) and the BAI ($r=-.485, p<.001$). Although the participants in the AD group and the BPD group differ from the participants in the NPH group on the basis of mood, they presumably also differ on other characteristics. To investigate whether the beliefs about self are associated with other features other than mood scores, we also correlated the scores for beliefs about the self with scores for BPD symptoms, as measured by the SCID II. These correlations were only carried out on the AD and BPD groups, because the participants in the NPH group were not administered the SCID II. For the AD and BPD groups only, the Positive Self scores did not correlate with the severity of BPD symptoms ($r=-.156, p=.419$). For all participants, the Negative Self scores had a positive correlation with scores on the BDI-II ($r=.734, p<.001$) and the BAI ($r=.643, p<.001$). For the AD and BPD groups only, the Negative Self scores also correlated positively with the severity of BPD symptoms ($r=.558, p=.002$), and this correlation was reduced when we co-vary with the mood (as measured by the BDI-II and the BAI) scores ($r=.373, p=.055$). According to the results in the AD and BPD groups, the positive and negative beliefs appear to be more related to the mood scores than to the scores on the BPD symptoms.

To examine the independent contribution of positive and negative beliefs on the scores of depression and anxiety, and to isolate these contributions to either depression or anxiety, we conducted two hierarchical multiple linear regressions on the scores from the BDI-II and BAI. For each regression, we entered the score for the BAI or BDI-II in the first step, then the scores for the negative beliefs about self in the second step, and finally the scores for the positive beliefs about the self in the third step.

The results of the first regression on the scores of the BDI-II are shown in Table 2. The BAI score accounted for 64.9% of the BDI-II score. Negative ratings about the self accounted for additional 8.0 % of the variance, and positive ratings about the self accounted for an additional 3.4 % of the BDI-II score, such that the BAI score, the negative ratings and the positive ratings of self together account for 76.2 % of the score on the BDI-II.

The difference between the Adjusted R^2 and the R^2 provides an index of the generalisability of this result, and hence provides an indirect index of the sampling. The difference between R^2 and R in the final model is .010, which means that if the model were derived from the population rather than the sample, the model would account for 75.2% of the variance, or 1% less. The Durbin-Watson value is 1.455 and we can assume independent errors. The significant changes in ΔR^2 at each step indicate that each model is a better predictor than the previous model.

The β value indicates that the BAI scores had the greater influence on the BDI-II scores, and that the negative and positive self ratings had a similar degree of influence. All the values for VIF are well below 10, the average VIF is 1.739, and the tolerance statistics are well above .2, so there is no collinearity within our data.

To check for extreme cases, we set the criteria list for outliers outside 3 standard deviations. In a sample of 74 participants, we could expect at most 1 (.3%) of the sample to be outwith these limits, and 1 case was listed. This case had a standardised residual of 3.372, which is higher than 3 and should be investigated further. None of the cases had a Cook's distance greater than 1, so none of the cases exerted an undue influence on the model. Only one case had a Mahalanobis distance greater than 10 (13.850). This value is well below 15, and when the regression was run again with this case deleted, a similar, near identical, model resulted.

The plots of the standardised and Studentised residuals over the standardised predicted value of the BDI-II scores (available from the author on request) displayed a mild heteroscedasticity. An examination of the partial plots demonstrates that the heteroscedasticity likely originates from the negative self ratings rather than the positive self ratings or the BAI scores. The variation in BDI-II scores is greater when the self ratings are more negative. As shown from Table 1, the negative self-ratings were higher in the BPD group, so the mild heteroscedasticity may indicate a looser

relationship between negative self scores and scores on the BDI-II in this group of participants.

The results of the regression on the scores of the BAI are shown in Table 3. The BDI-II score accounted for 64.9% of the BAI score. Neither the negative or the positive ratings about the self accounted for any additional significant variance.

The difference between R^2 and R in the final model is .005, which means that if the model were derived from the population rather than the sample, the model would account for 64.4% of the variance, or 0.5% less. The Durbin-Watson value is 1.798 and we can assume independent errors. All the values for VIF are well below 10, the average VIF is 2.166, and the tolerance statistics are well above .2, so there is no collinearity within our data.

To check for extreme cases, we set the criteria list for outliers outside 3 standard deviations. In a sample of 74 participants, we could expect at most 1 (.3%) of the sample to be outwith these limits, and no cases were found. No cases had a standardised residual higher than 3. None of the cases had a Cook's distance greater than 1, so none of the cases is having an undue influence on the model. Only one case had a Mahalanobis distance greater than 10 (14.202). This value is still below 15, and when the regression was run again with this case deleted, a similar, near identical, model resulted. The partial plot of the residuals of the BAI score and the BDI-II score demonstrated a linear relationship between the two variables and homoscedasticity.

Summary of results

The results demonstrate a wide range of bias in the beliefs about the self. This bias correlates highly with scores on the BDI-II and scores on the BAI. When investigated more closely, the negative and positive scores separately contribute to the variance of the BDI-II scores, even after these scores have been corrected for scores on the BAI. However, the negative and positive scores do not contribute to the scores on the BAI after these scores have been corrected for scores on the BDI-II.

4. Discussion

The aim of this study was to test the hypothesis that biases in beliefs about the self were associated with depressive, but not anxious mood, across diagnostic categories. We recruited participants who presented with a wide range of depressive and anxious mood, and a wide range of bias in beliefs about the self.

The results demonstrate that positive and negative beliefs about the self are related to depressive mood, but not anxiety, and that positive and negative beliefs about the self contribute additively to depressive mood. The results provide some evidence that people with a diagnosis of BPD have a greater negative bias in beliefs about the self than do people with an affective disorder without a personality disorder, and that this great negative bias reflects more negative beliefs rather than fewer positive beliefs.

4.1 Greater bias

Regarding bias, the results are consistent with the results of previous studies demonstrating that people with no psychiatric history display a positivity bias in their beliefs [1, 2]. The lack of bias in the AD group appears, at first glance, to be inconsistent with previous results with the SRET [27, 28], but there are reasons to suspect that these results are not different from some previous results. The first reason is that the AD group consists of people with affective disorder and/or anxiety disorder. The bias in people in this group who have a diagnosis of anxiety disorder without an affective disorder, should be positive, and this positive bias would decrease the likelihood that the group as a whole would demonstrate a negative bias. The second reason is that bias in the current paper was defined differently than in many previous studies [e.g. 28]. Although the use of the SRET has standardised the procedure to investigate bias, there remains variability on how investigators analyse the data obtained from the SRET [41]. To help avoid some problems in analysing this data, Prieto and colleagues [42] provided some guidelines to define bias, particularly to avoid errors when calculating bias where some samples were missing. When using the recall and recognition measures, there are individual differences in the total number of words that are recalled or recognised. The guidelines provided by Prieto and colleagues reduce error in these analyses, but the analysis is limited to between-groups analysis. A true measure of bias can only be obtained with a within-subjects analysis, wherein the number of positive and negative endorsements are compared in a within-subjects design. When we performed a between-subjects ANOVA, we obtained the same results as other investigators. The participants with depression and or anxiety endorsed more negative words and fewer positive words than did the participants with no psychiatric history. This result is consistent with a negative bias, according to some investigators. However, we argue that this between-group difference indicates that

participants with depression and/or anxiety do not present the same bias as the participants with no psychiatric history. When we analyse the data with a within-subject analysis, we find that the participants with depression and anxiety show no bias. When other investigators use a similar within-subjects comparison, they also find that people with depression show no bias [43].

The results also demonstrate that people with a diagnosis of BPD show a negativity bias in their beliefs about the self. The increase in negative bias in people with BPD is due to more negative self-beliefs, rather than fewer positive beliefs. This result is also consistent with the results of Auerbach and colleagues [31] who described a negative bias on the SRET in female participants with BPD.

4.2 Beliefs associated with depression and not anxiety

Depressive and anxious moods co-occur frequently in various diagnostic categories, and an understanding of the shared and distinctive factors associated with depressed and anxious moods could be helpful in understanding the processes by which these moods develop. The results of the current study demonstrate that biases in beliefs about the self are associated with depressive but not anxious moods across diagnostic categories. The mechanism underlying this relationship between these beliefs about the self and depressed mood remains to be clarified. One possibility is that the relationship between beliefs and mood is mediated by the effects of these beliefs on an individual's predictions about the future, and consequently on motivation [44]. These results provide some evidence that depressive mood shares at least some features across diagnostic categories, even though there is some evidence of differences in the quality of depressive mood between Major Depressive Disorder and Borderline Personality Disorder [45]

Whereas beliefs about the self might underlie feelings of depression, other types of beliefs might underlie feelings of anxiety. For example, negative metacognitive beliefs are more associated with anxious mood than depressive mood in people with auditory verbal hallucinations [46].

4.3 Additive contribution of negative and positive beliefs

The results of the current study also provide evidence that negative and positive beliefs about the self contribute additively to depressed mood. The additive contributions of the positive and negative beliefs are consistent with the recent evidence that these two types of beliefs are updated by different regions of the brain and as such raise the possibility that they are generated by distinct processes [47].

Some caution is necessary in interpreting these results however. The endorsement of particular beliefs about the self may reflect the importance of those characteristics to the individual, and may not be a reflection of the valence. What is more, the importance of these characteristics may be different for participants in the different groups.

4.4 Limitations

We have taken care to minimise the effects of a relatively small sample size by recruiting participants across diagnostic categories. By doing so, we ensured that there was a broad range of scores for both the predictor and dependent variables. All the indices of the principal components analysis and the hierarchical linear regressions indicated an adequate sample size. However, the number of participants in each group was too small to carry out separate statistical analyses for each group.

We only used the number of endorsed words on our version of the SRET. This measure is the most sensitive of the behavioural measures from the SRET [48]. Because all the words are endorsed, this measure eliminates the need to adopt the useful guidelines of Prieto and colleagues [42], and that we can use a within-subject analysis that provides a better test of bias. Our measure of beliefs did not include previously published measures of beliefs [18, 21, 22] about the self.

The relative heterogeneity of anxiety and the comparative homogeneity of depression make it difficult to identify distinctions between the two conditions [49]. Anxiety is likely associated with a wider range of beliefs than is depression, and it is possible that the heterogeneity of anxiety, whether manifested in healthy people, people with an affective disorder, or people with BPD, is masking the existence of beliefs about the self that could not be discriminated in this study.

4.5 Conclusions

The degree and valence of a negative bias in beliefs about the self is associated with depressed mood, but not anxiety, in people across diagnostic categories.

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