



## Original article

## Negative emotions towards others are diminished in remitted major depression

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## ABSTRACT

**Background:** One influential view is that vulnerability to major depressive disorder (MDD) is associated with a proneness to experience negative emotions in general. In contrast, blame attribution theories emphasise the importance of blaming oneself rather than others for negative events. Our previous exploratory study provided support for the attributional hypothesis that patients with remitted MDD show no overall bias towards negative emotions, but a selective bias towards emotions entailing self-blame relative to emotions that entail blaming others. More specifically, we found a decreased proneness for contempt/disgust towards others relative to oneself (i.e. self-contempt bias). Here, we report a definitive test of the competing general negative versus specific attributional bias theories of MDD.

**Methods:** We compared a medication-free remitted MDD ( $n = 101$ ) and a control group ( $n = 70$ ) with no family or personal history of MDD on a previously validated experimental test of moral emotions. The task measures proneness to specific emotions associated with different types of self-blame (guilt, shame, self-contempt/disgust, self-indignation/anger) and blame of others (other-indignation/anger, other-contempt/disgust) whilst controlling for the intensity of unpleasantness.

**Results:** We confirmed the hypothesis that patients with MDD exhibit an increased self-contempt bias with a reduction in contempt/disgust towards others. Furthermore, they also showed a decreased proneness for indignation/anger towards others.

**Conclusions:** This corroborates the prediction that vulnerability to MDD is associated with an imbalance of specific self- and other-blaming emotions rather than a general increase in negative emotions. This has important implications for neurocognitive models and calls for novel focussed interventions to rebalance blame in MDD.

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## 1. Introduction

Excessive self-blame and feeling worthless compared to others are symptoms of major depressive episodes across cultures [37]. One influential view is that vulnerability to MDD is due to a proneness to experience higher levels of negative emotions and lower levels of positive emotions in general [43]. Negative emotionality models of MDD, however, do not distinguish self-blaming emotions (e.g. guilt, shame, self-contempt/disgust,

self-indignation/anger) from emotions related to blaming others (i.e. other-blaming emotions, such as indignation/anger and contempt/disgust towards others). In contrast, blame attribution models posit that MDD vulnerability arises from the tendency to make overgeneralised internal rather than external attributions of causal agency for negative events [2,24]. Self-blaming attributions are closely linked with increasing self-blaming emotions and decreasing other-blaming emotions [45]. Attributional models therefore predict a relative increase in self-blaming emotions in MDD with relatively decreased other-blaming emotions. Previous research investigating the attributional model in MDD, however, has not probed emotions [6,5], which is needed to demonstrate the link between attributions and depressive symptoms [4]. Whether MDD vulnerability is associated with an overall increase in

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negative emotions or with decreases on some negative emotions has widespread implications for the understanding of the pathophysiology of MDD vulnerability.

In order to determine the role of different self-blaming feelings in the psychopathology of MDD, their distinctive qualities and social functions need to be considered. Shame was demonstrated to entail losing other people's esteem [20], which explains its importance for social comparison and competition [16]. Its attribution to one's character traits is thought to make it particularly maladaptive [23]. Indeed, shame-proneness is reliably associated with mild depressive symptoms in people with no mental health diagnoses [23]. In contrast, guilt was associated with a failure to act according to internalised moral standards and duties [20]. Interestingly, increased dutifulness and a sense of responsibility are important personality traits in people with melancholic depression [42], as is inappropriate guilt (DSM-IV-TR, American Psychiatric Association, [3]). Scores on the Interpersonal Guilt Questionnaire (IGQ-67, [31]), which captures overgeneralised forms of empathy-based guilt, were elevated in symptomatic [33] and remitted [18] MDD. However, by focussing on shame and guilt, other types of self-blaming feelings have gone largely unexplored.

We hypothesized that self-contempt/disgust is of particular relevance to MDD [18], because it entails the devaluation of one's character [14] like shame, but is related to violations of internalised moral duties [20] like guilt. Self-hate, a construct closely related to self-contempt/disgust, was increased in current [33] and remitted [18] MDD. Studies into self-disgust have used observer-rated measures [46] and questionnaire-assessed self-disgust in healthy populations that were associated with higher levels of depressive symptoms [34,38]. One study using a questionnaire measure collapsing disgust towards one's physical appearance and personality showed high scores in a small sample of current MDD and other mental health conditions including borderline personality disorder (BPD) [21]. A further recent study separated experimentally induced personal and physical self-disgust and found physical self-disgust to be more relevant in BPD compared with MDD [1]. So far, there has been only our previous pilot study in remitted MDD to probe self-contempt/disgust, a moral form of self-disgust [18].

Although, a number of studies have demonstrated increased proneness to self-blaming emotions in MDD [16,33,15,7,41], their results are nevertheless compatible with an overall increase in negative emotions. This is because negative emotions that entail blaming others were not assessed. In order to probe the alternative predictions made by the blame attribution vs. the negative emotionality model of MDD, a direct comparison of self-blaming and other-blaming emotions is needed. Overgeneralised self-blaming attributions, as claimed by the blame attribution model, are predicted to lead to a reduction in other-blaming as well as an increase in self-blaming emotions. So far, only our previous pilot study has taken this approach to show a relative reduction in emotions related to blaming others compared with self-blaming emotions in remitted MDD [18].

Furthermore, investigations of proneness to self-blaming emotions have usually relied on questionnaire measures of the underlying emotions as hidden constructs by asking for the hypothesized behavioural consequence of the emotion (e.g. hiding/withdrawal for shame and reparative action for guilt). This was to avoid relying on participants' subjective intuitions about emotions. This approach was based on the assumption that people are imprecise in distinguishing emotions such as shame and guilt [40]. Recent work on the neural basis of moral emotions [26], however, has revealed that participants show distinctive neural signatures associated with stimuli subjectively reported as evocative of a particular moral emotion [49,17] and that

subjectively reported shame and guilt exhibit partly distinct neural changes in remitted MDD [36]. Further support for a subjective approach to emotions comes from anthropological evidence of the transcultural ubiquity of distinct moral emotions [12] that must rely on transculturally stable conceptual underpinnings [27].

Here, we used a previously validated task of high reliability [18,51], the Value-Related Moral Sentiment Task (VMST), to measure proneness to experience experimentally induced self- and other-blaming moral emotions. We compared control individuals with no personal or family psychiatric history to individuals with remitted MDD, thereby revealing vulnerability traits rather than correlates of depressive states [8]. Patients with remitted MDD reliably show increases on measures of overall negative emotionality [30] and have a highly increased risk of developing future major depressive episodes compared with people with no personal history of MDD [10]. The stimuli for the VMST are based on previous normative studies [49,48] and allowed us to directly compare self- (guilt, shame, self-contempt/disgust, self-indignation/anger) and other-blaming emotions (indignation/anger towards others, contempt/disgust towards others). Furthermore, this test allowed us to control for the intensity of negative emotions by obtaining additional ratings of stimuli during the task.

Based on the results of our previous pilot study [18], we tested the hypotheses that:

- individuals with remitted MDD show a bias towards self-blaming relative to other-blaming emotions (self-blaming emotional bias) rather than an overall increase in negative emotions;
- this self-blaming emotional bias is detectable when comparing contempt/disgust towards self and others;
- and contempt/disgust towards others is reduced in remitted MDD.

## 2. Methods

### 2.1. Participants

This paper reports two analyses. For our first analysis, we used an independent sample of participants recruited for this study to determine reproducibility of our earlier findings of increased self-contempt bias in a previous sample [18]. The second analysis draws on pooled data from both samples in order to increase the power for a model to directly compare the importance of different moral emotions.

This study was approved by the South Manchester NHS Research Ethics Committee. All participants gave written informed consent after the procedures had been fully explained, and were compensated for time and travel costs. Participants were recruited using online and print advertisements as part of the UK Medical Research Council-funded "Development of Cognitive and Imaging Biomarkers Predicting Risk of Self-Blaming Bias and Recurrence in Major Depression" project. Initial suitability was assessed with a phone pre-screening interview of 707 volunteers (for exclusion reasons see Table 1) to select participants to be seen by a senior psychiatrist (RZ) and assessed using the Structured Clinical Interview-I for DSM-IV [13]. Current co-morbid axis-I and relevant past axis-I disorders were excluded (see [Supplemental Material for full inclusion and exclusion criteria and assessment details](#)).

Eighty-four medication-free participants with MDD remitted for at least six months and 42 control participants with no history of or first-degree relatives with MDD were independently enrolled for the current study and included in the data analysis. The groups

**Table 1**  
Exclusion reasons for volunteers following phone pre-screening interview.

Reason for exclusion	n
Current antihypertensive medications or statins	20
Current antidepressant or other centrally active medications	52
Diabetes	4
Epilepsy	5
Multiple sclerosis	3
Past cancer	7
Past stroke	1
Thyroid function problems	19
Vitamin D deficiency	1
Other psychiatric disorders than MDD	54
Substance or alcohol abuse	23
Other general medical condition	5
Family history of MDD/bipolar/schizophrenia (control group)	26
Excluded because of age-matching (control group)	3
Left-handed	20
MRI contraindications	77
Non-native English speaker	19
Out of age range	4
No reason recorded	5
Withdrawal after phone pre-screening	33
Not meeting full screening criteria for MDD	30
Not remitted for long enough	7
Fulfilling criteria for current MDD	13
Total excluded after phone pre-screening	431

In total, 707 people participated in the phone pre-screening interview, 276 passed this screening with 184 in the remitted MDD and 92 in the control group and were invited for the first study day. Of these, 138 individuals pre-screened as remitted MDD and 64 pre-screened as control participants were reachable, able and willing to be seen on the first study day after reading the participant information sheet sent to them. After the first day of the study, 32 individuals from the remitted MDD group were excluded (6 fulfilled criteria for a bipolar disorder, 1 fulfilled criteria for current generalized anxiety disorder, 6 fulfilled criteria for current social anxiety disorder, 1 participant was excluded due to MRI contraindications, 5 did not meet full criteria for MDD, 3 had not been remitted from an episode for long enough, 4 fulfilled criteria for past substance abuse, 2 were excluded due to probable personality disorders, 3 showed residual symptoms of post-traumatic stress disorder, 1 withdrew after the first assessment) with a further 10 participants who were eligible to take part but unable to schedule the second session for completing the VMST. The remaining 96 participants confirmed as remitted MDD completed the second session. Twelve participants from the remitted MDD group were excluded from the present analysis because of selecting more than one moral emotion on the VMST in more than 5% of trials resulting in 84 participants in the final remitted MDD group. After the first day of the study, 10 participants who had fulfilled phone pre-screening criteria for the healthy control group were excluded (1 fulfilled criteria for current adjustment disorder, 1 fulfilled criteria for current MDD, 1 fulfilled criteria for current social anxiety disorder, 1 participant was a non-native English speaker, 1 fulfilled criteria for a past MDE that lasted for less than two months, 1 had a past depressive episode that did not fulfil criteria for past MDE, 4 had a probable or definite positive first degree family history of MDD) with a further 6 eligible to take part but unable to attend the second session. The remaining 48 participants confirmed as healthy controls completed the second session. Data from 6 control participants were excluded because of selection of more than one feeling on the VMST on more than 5% of trials resulting in the final 42 participants in the healthy control group.

were matched on age (control group mean =  $34.8 \pm 13.9$  [ $\pm$  refers to standard deviations throughout the text], remitted MDD mean =  $34.8 \pm 12.2$ ,  $t = .02$ ,  $P = 1.0$ ), years of education (control group mean =  $17.3 \pm 2.4$ , remitted MDD mean =  $16.9 \pm 2.4$ ,  $t = -1.0$ ,  $P = .32$ ), and gender (control group: 25 female/17 male, remitted MDD: 60 female/24 male, Contingency Coefficient =  $.12$ ,  $P = .18$ ).

For the pooled data analyses including the medication-free MDD ( $n = 17$ ) patients and control participants ( $n = 28$ ) from our previous study, the MDD group showed a trend towards being older (control group:  $n = 70$ , mean =  $30.0 \pm 12.4$ , remitted MDD:  $n = 101$ , mean =  $33.3 \pm 12.2$ ,  $t = 1.7$ ,  $P = .09$ ). Therefore, we used age as a covariate in all pooled analyses. The pooled groups were matched on education (control group mean =  $16.7 \pm 2.3$ , remitted MDD mean =  $16.7 \pm 2.3$ ,  $t = -.05$ ,  $P = .96$ ), and gender (control group: 46 female/24 male, remitted MDD: 75 female/26 male, Contingency Coefficient =  $.09$ ,  $P = .23$ ).

Both groups had Global Assessment of Functioning (GAF, [13]) Scale scores in the range corresponding to minimal or absent symptoms/good functioning (81–90), although control participants exhibited higher scores, indicating higher levels of functioning/predominant absence of symptoms (control mean =  $88.9 \pm 2.7$ , MDD mean =  $85.1 \pm 6.1$ ,  $t = 3.8$ ,  $P < .0001$ ). Both groups had Montgomery Asberg Depression Rating Scale (MADRS) [29] scores that were well below the cut-off for depression (10 points), but the MDD group showed trend-wise higher scores (control mean =  $.6 \pm 1.2$ , remitted MDD mean =  $1.1 \pm 1.5$ ,  $t = -1.661$ ,  $P = .10$ ). The MADRS [29] is a standard observer-rated depression severity scale of high reliability consisting of 10 items with a range of 0–6. The clinical details of the MDD group are summarized in Table 2.

## 2.2. Assessment of self-blaming and other-blaming feelings

In order to assess proneness to experience different experimentally induced self- and other-blaming feelings, we used the previously described and validated Value-Related Moral Sentiment Task (VMST, [49,36,51]) shown to have very high split-half reliability coefficients ([18]:  $> .85$  for each moral emotion measure, available at <http://www.translational-cognitive-neuroscience.org/start/test-materials>). Participants were shown written descriptions of negative interactions between themselves and their best friends in which either they (self-agency condition,  $n = 90$ ) or their best friend (other-agency condition,  $n = 90$ ) acted counter to social and moral values. Statements read as “[participant’s best friend’s name] does act tactlessly towards you” (other-agency condition, 90 items), “You do act tactlessly towards [participant’s best friend’s name]” (self-agency condition, 90 items). The same social concepts (e.g. ‘tactless’, ‘generous’) were used in the self- and other-agency conditions, and 50% of the stimuli used negative concepts (e.g. ‘tactless’) while 50% used

**Table 2**  
Clinical characteristics of remitted MDD group recruited for this study.

<i>Past MDD subtype</i>	
With melancholic features	50/96
With atypical features	10/96
No specific subtype	36/96
<i>Number of previous MDEs</i>	
1	24/96
2	29/96
3	18/96
4	10/96
5	7/96
6 or more	8/96
Average number of previous MDEs	$3.5 \pm 5.8$ (range: 1–53)
<i>Last MDE details</i>	
Average length of MDE (months)	$13.3 \pm 16.2$ (range: 1–96)
Average time in remission (months)	$29.5 \pm 35.1$ (range: 6–282)
Severe depressive episode <sup>a</sup>	77/96
Moderate depressive episode <sup>a</sup>	19/96
<i>Life-time axis-I co-morbidity<sup>b</sup></i>	
Anorexia nervosa	1/96
Bulimia nervosa	1/96
Post-traumatic stress disorder	3/96
Trichotillomania	1/96
No life-time co-morbidity	90/96
<i>Family history</i>	
First degree relative with MDD	53/96
No family member with history of MDD	34/96
First degree relative with schizophrenia or bipolar disorder	8/96
Unknown	1/96

MDE: major depressive episode; MDD subtype classification was based on adapting the SCID-I for DSM-IV-TR to allow lifetime assessment of subtypes. All participants had stopped medication well before the required washout phase.

<sup>a</sup> According to ICD-10 criteria.

<sup>b</sup> All co-morbid disorders were fully remitted at time of study and none of the co-morbid disorders was a likely primary cause of the depressive episodes.

negated positive concepts (e.g. 'not generously'). Participants were required to select the feeling that they felt was the best label for the emotion that they would experience most strongly in response to the social violation. The choice of feelings included shame, guilt, indignation/anger towards oneself, indignation/anger towards best friend, contempt/disgust towards oneself, contempt/disgust towards best friend, no feeling, or other feeling. Participants rated how strongly they would experience unpleasant feelings as a result of the behaviour using a 1–7 visual analogue Likert scale (1 = not unpleasant, 7 = extremely unpleasant). This task is based on an earlier version and details about the stimulus selection and design have also been described in [18,49,48].

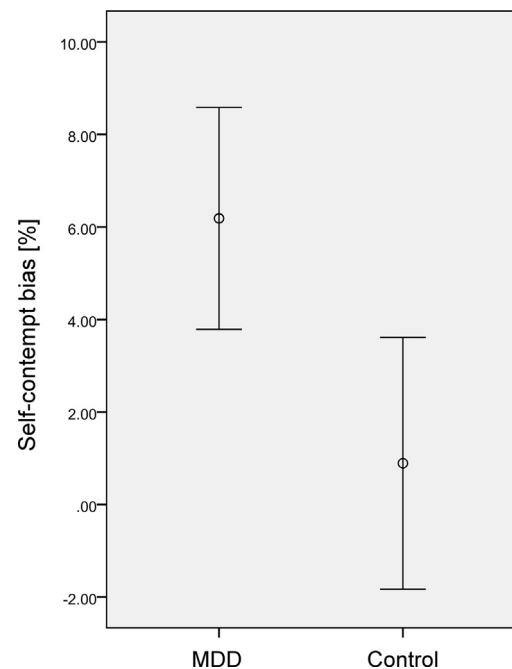
### 2.3. Data analysis

All analyses were carried out using SPSS20 (<http://www.spss.com>). The percentages of valid items in each condition (self-agency, other-agency) for which individuals selected a specific feeling were used for analysis. Only those trials in which individuals selected self-blaming feelings in the self-agency condition and other-blaming feelings in the other-agency condition were used. This was based on our previous work showing that self-blaming feelings are mostly experienced in the self-agency and other-blaming feelings mostly in the other-agency condition [49] and that we had no specific hypotheses about agency-incongruent responses (please see [Supplemental Materials for an exploratory analysis of agency-incongruent emotions](#)). On some occasions, participants selected more than one feeling and so these items were excluded from the analysis. Six of 48 control and 12/96 MDD participants recruited for this study were excluded because they selected more than one feeling on more than 5% of trials on the VMST indicating that they did not keep to the instructions or were not able to distinguish between feelings and therefore were not able to decide which feeling they experienced most strongly.

As described previously [18], the self-contempt bias score was calculated by subtracting the percentage of other-contempt/disgust from the percentage of self-contempt/disgust responses. Data were checked for outliers (outside of mean  $\pm$  2.5 standard deviations across the groups) and all results including outliers were confirmed by an analysis that excluded the outliers. For those t-test results with significantly unequal variances, statistics assuming unequal variances were reported. We used univariate analyses of variance (ANOVA) to control for confounding covariates and repeated measures ANOVAs to probe the effects of different moral emotions. The significance threshold for all analyses was  $P = .05$ , 2-sided.

## 3. Results

Self-contempt biases were increased in the MDD compared with the control group in the participants independently recruited for this study ( $n = 124$ , control mean =  $1.4 \pm 9.7$ , MDD mean =  $5.9 \pm 12.2$ ,  $t = -2.1$ ,  $P = .04$ ). This result was confirmed when excluding one outlying value in each group (control mean =  $.6 \pm 8.2$ , MDD mean =  $5.5 \pm 11.7$ ,  $t = -2.728$ ,  $p = .007$ ). This result was also confirmed when pooling participants with those from our previous study [18], excluding those currently taking antidepressant medication ( $n = 171$ , see Fig. 1 and legend). Elevated self-contempt bias in MDD was further confirmed when excluding outlying values and when using their current MADRS score as a covariate of no interest (see Fig. 1 and legend). Furthermore, self-contempt bias in the MDD group was not associated with the number of previous episodes ( $n = 101$ ,  $t = -1.348$ ,  $p = .18$ ) or with the number of months in remission ( $n = 101$ , Spearman  $\rho = .10$ ,  $p = .34$ ). Self-contempt bias in MDD compared to healthy controls is the most reproducible finding across both samples, although it is more strongly driven by reductions



**Fig. 1.** Displayed are means and 95% confidence intervals for self-contempt bias (i.e. % self-contempt/disgust responses in the self-agency condition – % contempt/disgust towards others responses in the other-agency condition) in the pooled control ( $n = 70$ ), and MDD groups ( $n = 101$ ). Self-contempt bias was significantly elevated in the MDD (MDD mean =  $6.2\% \pm 12.1\%$ ) compared with the control group (control mean =  $.89\% \pm 11.4\%$ ,  $n = 169$ ,  $t = 2.9$ ,  $P = .005$ ). These results were confirmed when using age (age-corrected effect of group:  $F = 7.9$ ,  $P = .006$ ) or current MADRS scores as a covariate (MADRS-corrected effect of group:  $F = 5.5$ ,  $P = .02$ ) and when excluding three participants with outlying values ( $t = 2.8$ ,  $P = .005$ ).

in contempt/disgust towards others in the previously reported study [18] and more strongly driven by increases in self-contempt/disgust in the independently recruited sample (see [Supplemental Materials](#)).

A repeated measures ANOVA for the six agency-congruent moral emotions in our pooled sample ( $n = 171$ ) revealed a moral emotion by group interaction ( $F[5163] = 3.3$ ,  $P = .007$ , controlled for age and age  $\times$  group interactions). This was driven by reduced contempt/disgust towards others ( $B = -10.9$ , standard error = 4.2,  $t = -2.6$ ,  $P = .01$ ) and indignation/anger towards others ( $B = -19.8$ , standard error = 6.2,  $t = -3.2$ ,  $P = .002$ ) in the MDD compared to the control group with no significant effects of group on any other moral emotion ( $t > -1.25$ ,  $P > .20$ , [Supplemental Table 3](#)). These results were confirmed after excluding outlying values (effect of MDD on indignation/anger towards others:  $t = -2.7$ ,  $P = .009$ ; contempt/disgust towards others:  $t = -2.0$ ,  $P = .05$ ) and when using current MADRS scores as a covariate (MADRS-corrected effects of MDD on indignation/anger towards others:  $t = -2.9$ ,  $P = .005$ ; contempt/disgust towards others:  $t = -2.6$ ,  $P = .01$ ).

There were no differences between groups in rated intensity of unpleasantness of negative emotions in the self-agency condition (control group mean =  $3.6 \pm 1.0$ , MDD group mean =  $3.6 \pm .8$ ,  $t = -.6$ ,  $P = .58$ ) or other-agency condition (control group mean =  $3.4 \pm .9$ , MDD group mean =  $3.4 \pm .7$ ,  $t = -.2$ ,  $P = .81$ ).

## 4. Discussion

This study compared emotional biases in two groups differing in vulnerability to MDD. We investigated the hypothesis that MDD vulnerability is associated with a selective bias towards specific types of self-blaming emotions relative to emotions that entail blaming others rather than an overall increase in negative

emotions. More specifically, we hypothesised a relative bias towards self-contempt/disgust with a reduction in contempt/disgust towards others. Self-contempt entails judgements of one's character [14] and is related to violations of internal moral values [20].

Our results confirmed the hypothesis of a self-contempt bias in the independent sample of patients with remitted MDD recruited for this study, as well as when pooling data with our previous study [18]. Further, we ran an analysis of all moral emotion measures in the pooled study sample to confirm the specificity of this finding. As predicted, we found a reduced proneness to feeling contempt/disgust towards others in MDD compared with the control group. Furthermore, MDD patients exhibited a decreased tendency to feel indignation/anger towards others. There were no differences on any of the other moral emotions or on the intensity of experienced unpleasantness of emotions. These data corroborate the hypothesis that vulnerability to MDD is associated with a relative increase of self-blaming emotions and a relative decrease in emotions associated with blaming others. These results are incompatible with the view that there is an overall increase in negative emotions associated with vulnerability to MDD.

Our results seemingly contradict a large number of studies (reviewed in [30]) reporting increased overall negative emotionality in remitted MDD as measured on the positive and negative affect schedule [44] and on neuroticism measures [9,11]. A closer consideration of these measures, however, suggests that summed scores on these instruments can reflect different types of emotional biases in different populations. This is because items assessing self-blaming emotions are mixed together with other negative emotions. Single items, however, cannot be analysed because they have not been validated. On the Eysenck personality questionnaire, for example, items assessing self-blaming emotions and interpersonal sensitivity/low self-worth are mixed together with questions about past experience of general depressive symptoms, as well as general anxiety and emotional instability. Our data therefore suggest that increased scores on these measures in remitted MDD may well be driven by endorsing past depressive symptoms, as well as self-blame and low self-worth-related items. Furthermore, there are general anxiety items, which can be endorsed for very different reasons. For example, low self-worth and self-blame in MDD is likely to be associated with being more nervous and worry more because of lack of self-confidence and hope. On the other hand, patients with panic disorder and good self-esteem will endorse the same items because of worrying about their next panic attack. The difficulty in interpreting the predictive relationship of traditional negative emotionality measures in remitted MDD for future outcomes has previously been pointed out, calling for the development of refined measures [30].

Whilst we demonstrated a relative increase in self-blaming vs. other-blaming emotions, this appeared to be mainly driven by reductions in other-blaming emotions. These results could therefore be interpreted as suggesting a reduction in other-blaming rather than an increase in self-blaming emotions in remitted MDD. We would caution against this interpretation however, because increases on our self-contempt bias measure can be interpreted as relative increases of self-contempt/disgust compared to contempt/disgust towards others when correcting for individual differences in the overall frequency of reporting contempt/disgust. This may also account for the higher reproducibility of the self-contempt bias measure as compared to the simple measures of self-contempt (increased in the independent sample) and contempt towards others (decreased in the previous sample). Furthermore, in our previous study self-blaming emotions such as those measured on the IGQ-67 were indeed increased in remitted MDD and correlated with self-contempt bias more strongly than with its simple component measures (i.e. self-contempt/disgust

and contempt/disgust towards others, [18]). In addition, we demonstrated increased agency-incongruent (i.e. overgeneralised) self-blaming emotions in the MDD group when their best friend was the agent (see [Supplemental Materials](#)).

Our supporting analyses showed that group differences were not driven by differences in levels of depressive symptoms. Self-contempt bias can therefore be interpreted as a marker of trait vulnerability rather than as a sign of incomplete remission. Future longitudinal studies are needed to probe how self-contempt biases interact with psychological and biological triggers when patients develop depressive episodes. It will also be important to demonstrate how distinctive self-contempt biases are for MDD compared with other mental health conditions.

Whilst self-contempt biases were increased in our remitted MDD group, we confirmed our previous finding that there is no increased guilt- or shame-proneness on the VMST. A previous study showed increased guilt-proneness in remitted MDD [15]. This may have arisen, however, by including statements reminiscent of self-contempt/disgust as part of the guilt-measure [15]. Normal levels of guilt and shame on the VMST in remitted MDD are in keeping with our finding that our guilt and shame measures capture non-depressogenic forms of self-blame [18] rather than those more overgeneralised forms of guilt as captured on the IGQ-67 [32] and maladaptive behavioural consequences of self-blaming emotions, labelled as “shame” on the Test of Self Conscious Emotions [39]. This explains why measures of shame that define it by its hypothesized behavioural (social withdrawal) and attributional properties (attribution to stable character traits) were elevated in previous studies of remitted MDD [15,41], but were correlated with self-reported self-contempt bias rather than with self-reported shame on the VMST in our previous study [18].

The assumption that self-reported emotion labels are less valid than probing their hypothesized behavioural consequences has not been tested to our knowledge. Clinicians have always relied on subjective labels and reports of patients, which were more formally developed into the phenomenological psychopathology method by Jaspers [22]. The high reliability [18,51] of VMST measures of self-reported moral emotions, as well as their reproducible association with distinct neural correlates [49,51,50,28] argues for the validity of assessing self-reported moral emotion labels.

On a more cautionary note, one must distinguish between two different types of vulnerability to MDD [18]. There is the primary vulnerability to develop depression that exists prior to the occurrence of any depressive episode and the increased secondary vulnerability to develop further episodes following the first major depressive episode that may be partly due to scarring effects arising from this first episode [47,35,25]. The main limitation of this study was its inability to separate primary and secondary vulnerability. The lack of association between self-contempt biases and the number of previous depressive episodes as well as length of remission, however, renders scarring effects or incomplete remission as the cause of self-contempt biases unlikely. Studies in patients at high risk of MDD prior to their first episode are needed in order to establish whether self-contempt biases are indeed a primary vulnerability factor.

Taken together, our findings demonstrated a selective self-contempt bias with a reduction in emotions related to blaming others in patients with remitted MDD. This is incompatible with a general increase in negative emotionality as a vulnerability factor for MDD. Future studies are needed to show whether self-contempt bias is distinctive of patients with MDD resembling the sample studied here that was characterized by full remission, high psychosocial functioning, a strong family history, and no relevant co-morbidity. Similar patient groups as the one studied here have been described before as showing a “melancholic personality type”

associated with an increased sense of duty and conscientiousness as well as high psychosocial functioning between episodes [19].

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### Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

### Appendix A. Supplementary material

Supplementary material associated with this article can be found in the online version available at <http://dx.doi.org/10.1016/j.eurpsy.2015.02.005>.

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## **SUPPLEMENTAL MATERIAL**

### **Negative emotions towards others are diminished in remitted major depression**

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## Supplemental methods

### *Participants*

Initial suitability was assessed with a phone pre-screening interview of 707 volunteers (for exclusion reasons see Table 1), which included questions about personal history of major physical illnesses, substance abuse, axis-I disorders, psychological and pharmacological treatment, as well as family history of psychiatric disorders (a copy of the updated version of a previously described [1] screening interview can be obtained at <http://www.translational-cognitive-neuroscience.org/start/test-materials>). *Inclusion criteria for both groups were:* right handedness, English as first language and aged 18-65 years old. Additional inclusion criteria for the history of depression group were at least one past major depressive episode according to the Diagnostic Statistical Manual (DSM-IV-TR, [2]), that was a moderate to severe depressive episode according to the International Classification of Diseases (ICD-10, World Health Organization) with at least a 2 month duration requiring treatment and remission of symptoms for at least 6 months.

*Exclusion criteria for both groups were:* centrally active medications other than hormonal contraceptives, residual symptoms of or manifest axis-I disorders [2], significant psychosocial impairment as an indicator of a clinically relevant personality disorder or incomplete remission, a Montgomery Åsberg Depression Rating Scale (MADRS, [3]) score >10 (=cut-off for depression [4]), current self-harming behaviour, a history of alcohol or substance abuse, schizophrenia, schizo-affective disorder, bipolar disorder, developmental disorders, learning disabilities, neurological illnesses or physical illnesses that significantly impair psychosocial functioning or brain function. *Additional exclusion criteria for the remitted MDD group were:* depressive episodes secondary to another psychiatric disorder. *Additional exclusion criteria for the healthy control group were:* a history of medication with antidepressants or antipsychotics, or a first degree relative with a diagnosed major depression,



bipolar disorder or schizophrenia, or a personal history of any axis-I disorder [2] with a corresponding category in ICD-10.

Suitable participants according to the phone pre-screening (see Table 1) were invited for a clinical interview by a senior psychiatrist (RZ) and a structured assessment by either KL or JG after having been extensively trained in joint assessments and achieving high inter-rater reliability (KL, JG, RZ had completed the recommended SCID-I-training and inter-rater reliability was very good:  $\kappa=0.64$  [KL&RZ] and  $\kappa=1$  [KL&JG] for past MDD;  $\kappa=.60$  [KL&RZ] and  $\kappa=1$  [KL&JG] for past MDD including melancholic and atypical specifiers). The following instruments were administered: the Structured Clinical Interview for DSM-IV (SCID-I, [5]), which was modified to allow lifetime diagnoses of MDD subtypes and was used as a standardized measure to verify diagnosis of MDD [2], and a shortened version of the Weissman Family History Screen [6], which was used to assess the psychiatric history of first degree family members.

## Supplemental results

### *Agency-congruent emotions in the independent sample*

Our main analysis of differential effects of moral emotions focussed on the pooled sample in order to achieve satisfactory statistical power. Here, we present an exploratory analysis of the results in our independently recruited sample. A repeated measures ANOVA for the six moral emotion measures (guilt, shame, contempt/disgust towards self, indignation/anger towards self, contempt/disgust towards others, indignation/anger towards others) in our independent sample ( $n=81$  MDD,  $n=42$  control participants) revealed a moral emotion by group interaction ( $F[5,120]=2.8, p=.02$ ). This was driven by trends of increased self-contempt/disgust ( $B=4.1$ , standard error=2.1,  $t=1.9, p=.06$ ) and increased shame ( $B=3.5$ , standard error=1.7,  $t=2.1, p=.04$ ) in the MDD compared to the control group with no effects of group on any other moral emotion ( $t<1.3, P>.22$ ). These results were unchanged for self-contempt/disgust after excluding outlying values (effect of MDD on self-contempt/disgust:  $t=1.9, p=.06$ ), but the effects on shame weakened after excluding outliers ( $t=1.6, p=.11$ ).

### *Agency-incongruent emotions*

Although our primary hypotheses were restricted to agency-congruent emotions, we also explored the role of agency-incongruent emotions (i.e. guilt, shame, self-contempt and self-indignation in the other-agency condition, and contempt towards others or indignation towards others in the self-agency condition). As expected, agency-incongruent emotions were infrequent overall. The MDD group, however, showed higher agency-incongruent guilt, self-contempt/disgust and shame compared with the control group (see Supplemental Table 4).

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**Supplemental Table 3** Between-group comparisons on agency-congruent emotions

Response	Remitted MDD		Control		Statistics	
	mean	sd	mean	sd	<i>t</i> -value	<i>p</i> -value
Self-agency: Guilt (%)	26.9	13.9	27.2	12.9	-.19	.85
Self-agency: Shame (%)	13.6	9.8	12.6	10.4	.60	.55
Self-agency: Indignation/anger towards self (%)	7.1	7.0	9.2	8.3	-1.8	.08
Self-agency: Self-contempt/disgust (%)	15.0	11.8	13.0	10.6	1.2	.25
Other-agency: Indignation/anger towards other (%)	23.9	14.3	28.7	15.4	-2.1	.04*
Other-agency: Contempt/disgust towards other (%)	8.8	8.7	12.1	11.6	-2.0	.05*

\*=significant at  $p=.05$ , 2-sided. Total sample of  $n=70$  Control and  $n=101$  MDD in all comparisons.

**Supplemental Table 4** Between-group comparisons on agency-incongruent emotions

Response	Remitted MDD		Control		Statistics	
	mean	sd	mean	sd	<i>t</i> -value	<i>p</i> -value
Other-agency: Guilt (%)	3.4	3.6	2.1	3.2	2.4	.02*
Other-agency: Shame (%)	4.0	5.8	2.3	3.7	2.3	.02*
Other-agency: Indignation/anger towards self (%)	1.1	1.7	1.1	1.9	-.2	.87
Other-agency: Self-contempt/disgust (%)	4.2	5.6	2.5	4.7	2.3	.03*
Self-agency: Indignation/anger towards other (%)	.9	2.0	.7	1.0	.9	.35
Self-agency: Contempt/disgust towards other (%)	.4	1.0	.4	.8	-.4	.67

\*=significant at  $p=.05$ , 2-sided. Total sample of  $n=70$  Control and  $n=101$  MDD in all comparisons.