Self-esteem moderates affective reactions to briefly presented emotional faces

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Abstract

According to the sociometer hypothesis individuals with low self-esteem experience increased negative affect in response to negative social stimuli, even when these stimuli are not perceived consciously. Using an affective priming paradigm, the present study examined whether trait self-esteem would moderate mood following briefly presented facial expressions. Results from 43 undergraduates revealed that, after controlling for baseline mood, anxiety and depression, the degree of negative affect experienced by the participants following exposure to expressions of anger and disgust varied as a function of their self-esteem. Implications for individuals with low-self esteem and our understanding of the link between self-esteem and negative affect are discussed.

Key Words: self-esteem; emotional facial expressions; negative affect; mood; implicit processing; affective priming; sociometer

1. Introduction

Self-esteem is defined as one's attitude or global affective orientation towards oneself (Rosenberg, 1965). While high levels of self-esteem are associated with happiness, low self-esteem has been linked to increased experiences of negative affect and is considered a vulnerability factor for a number of mental health problems (Leary & Baumeister, 2000). These findings highlight the importance of revealing the mechanisms through which low self-esteem may lead to increased experiences of negative emotion.

Previous research points to a number of ways in which low self-esteem might lead to negative feelings. For example, individuals with low self-esteem tend to overgeneralise the negative consequences of failure (Brown & Dutton, 1995), show a lower motivation to self-enhance after set-backs (Wood, Giordano-Beech, Taylor, Michela & Gaus, 1994), a diminished motivation to 'repair' negative moods (Heimpel, Wood, Marshall & Brown, 2002) and an increased tendency to dampen positive affect (Wood, Heimpel & Michela, 2003).

A more intimate link between negative affect and low self-esteem is proposed by the 'sociometer hypothesis' (Leary, 2004; Leary & Baumeister, 2000). This theory considers self-esteem as a motivational-affective system that functions to continuously monitor a person's social environment for signs of rejection and acceptance. An individual's current feelings of self-esteem act as an internal, subjective marker ('sociometer') of the extent to which the individual feels included versus excluded by other people. The sociometer hypothesis assumes that low self-esteem is rooted in part in repeated experiences of social rejection and criticism, which leave the individual particularly sensitive to negative social evaluations and preoccupied with potential social exclusion (Leary, 2004; Leary & Baumeister, 2000).

According to the sociometer hypothesis, the self-esteem system is characterised by the following central properties. Negative affect will be generated whenever interpersonal deficiencies are perceived and positive affect will be produced when a person feels accepted

by others. In individuals with low self-esteem, the sociometer is thought to be set at a more critical value. As a result, these individuals may exhibit a greater tendency to be oversensitive to cues connoting potential relational devaluation, to detect inadequate amounts of acceptance in their environment, to misinterpret ambiguous interpersonal events as threats to acceptance and to overreact with negative affect and withdrawal to social situations (Leary, 2004). Conceivably, the setting of their sociometers may also predispose individuals with low self-esteem to react less positively to social acceptance. Hence, for these individuals, indices of social rejection might produce particularly intense experiences of negative affect, while social acceptance cues may have a weakened effect on positive moods. In contrast, individuals with high self-esteem may respond less intensely to minor signs of social disapproval. Leary (2004) and Leary and Baumeister (2000) also proposed that the self-esteem system operates automatically, at a level that does not require conscious awareness.

Evidence in support of these characteristics of the self-esteem system includes studies showing that individuals with low self-esteem react with more intense emotional distress to negative feedback (e.g. Pruessner, Hellhammer & Kirschbaum, 1996) and the finding that individuals with low, but not high, self-esteem automatically react with self-depreciation and withdrawal after being primed subliminally (90 ms) with interpersonal rejection words (Sommer & Baumeister, 2002).

To our knowledge, no previous studies have examined directly the moderating influence of self-esteem on automatic emotional reactions to subliminally presented valenced social information. Therefore, in order to address this question, we employed a masked affective priming task modelled closely on a paradigm utilised by Chartrand, van Baaren and Bargh (2006, Study 1). These authors reported that subliminal (60 ms), masked affective words led to valence-congruent shifts in participants' reported moods. However, their study did not address the extent to which self-esteem contributed to the reported changes in mood,

which is the primary aim of the present study. Given that faces are arguably the most important source of social information, we replaced the words with photographs of emotional faces in order to test our hypothesis. Drawing on the sociometer hypothesis, it was predicted that, in comparison to those with high self-esteem, individuals with low self-esteem would experience greater negative affect in response to subliminal cues of social rejection (facial expressions of anger & disgust). It was also expected that they would exhibit less positive affect after encountering subliminal stimuli representing social acceptance (happy expressions).

2. Method

2.1 Participants

57 undergraduates participated for research credits. Two participants were excluded due to missing questionnaire data. Given that the focus of this study concerned implicit processes, 12 further participants were dropped from the main analyses because they recalled the correct valence of the face stimuli during debriefing. From the remaining 43 participants (38 females; mean age = 19.50; SD = 1.57), 20 were randomly allocated to the positive exposure condition and 23 to the negative.

2.2. Materials and procedure

After providing informed consent, all participants completed the Rosenberg Self-Esteem Scale (Rosenberg, 1965), the Beck Depression Inventory (2nd ed.; Beck, Steer & Brown, 1996), the trait scale of the State-Trait-Anxiety Inventory (Spielberger, 1983) and a set of six 100mm visual analogue scales (VAS) assessing mood. A VAS-format was used to enable the accurate measurement of comparably small-scale mood changes and to reduce response sets. Participants were instructed to rate their momentary mood by marking the appropriate

position on 100 mm lines (endpoints anchored from ‘not at all’ to ‘extremely’) presented together with the following adjectives: cheerful/ happy; depressed/ unhappy; tense/ nervous; sociable; safe/ secure; irritable. In line with the view that positive and negative affect are qualitatively distinct phenomena (Taylor, 1991), the responses to the three positive and the three negative adjectives were averaged to derive indices of positive and negative affect, respectively. There was a strong negative correlation between baseline ratings of positive and negative mood; $r(43) = -.64$, $p < .001$.

Participants were randomly assigned to either the positive or the negative condition and informed that they would be taking part in an experiment on social and non-social decision making. Consistent with the instructions used by Chartrand et al. (2006), participants were told that during the task they had to respond quickly and accurately to brief, flashing visual stimuli appearing at unpredictable places and times by indicating via button press whether they appeared on the right or left side of the screen.

Participants were exposed 96 times to four (2 male, 2 female) emotional facial displays from the Facial Expressions of Emotion: Stimuli and Tests (FEEST; Young, Perrett, Calder, Sprengelmeyer & Ekman, 2002) that were either positive (happy) or negative (angry, disgusted). Anger and disgust expressions were chosen as social threat stimuli because they signal a readiness for physical or symbolic attack in the case of anger and rejection, revulsion and likely withdrawal from the observer in the case of disgust (i.e. social devaluation). The pictures (12.5 x 9.5 cm) were placed 7.5 cm (at angles of 45°, 135°, 225° and 315°) from the central fixation point, which participants had to fixate continuously. To preclude conscious awareness of the emotional expressions, the stimuli were presented very briefly (60 ms) and parafoveally (observer-monitor-distance < 99 cm), and were immediately followed by a 60 ms mask (i.e. neutral face of the same individual). The inter-trial interval varied randomly between 2 to 7 seconds. The presentation of stimuli was randomised for each participant.

After the experiment, participants received a verbal debriefing. They were asked if any aspect of the study seemed strange or suspicious to them and whether they could recall the emotions displayed ("What emotions did the faces exhibit?"). None of the participants indicated that they had had any doubts regarding the cover story (i.e. taking part in a decision making task). 12 participants reported the correct valence of the emotional expressions and were excluded from the main analyses.

3. Results

3.1. Preliminary analyses

The participants in the two exposure conditions did not differ significantly in sex ratio, age, self-esteem, depression, trait anxiety or baseline positive and negative mood, all *p*s > .05. Self-esteem (M = 19.30, SD = 3.96, Cronbach's α = .85) correlated significantly with baseline positive mood (M= 69.46; SD = 15.14; α = .81; r = -.44, p = .003), depression (M = 8.60; SD = 6.58; α = .88; r = -.60, p < .001) and anxiety (M = 40.26; SD = 8.09; α =.85; r = -.69, p < .001). There was a statistical trend for a negative correlation between self-esteem and baseline negative mood (M = 20.64; SD = 16.77; α = .64; r = -.27, p = .08). On average, positive mood decreased by 3.93 (SD = 8.91) and negative mood increased by 2.37 (SD = 11.84) following exposure to positive faces. In the negative condition, positive mood decreased by 8.01 (SD = 12.19) and negative mood increased by 14.14 (SD = 18.97) on average. The Cronbach's alphas for post-exposure positive and negative mood were .76 and .73, respectively.

3.2. Main analyses

To test the relationship between self-esteem and post-exposure mood for the positive vs. negative condition while controlling for baseline mood, two hierarchical regression analyses were carried out entering baseline positive and negative mood, condition (dummy-coded 0 for

negative condition), self-esteem (i.e. mean centred) and the condition x self-esteem interaction term as predictors for post-exposure positive and negative mood, respectively.[1]

3.2.1. Positive mood

As can been seen in *Table 1*, the only significant predictor of post-exposure positive mood was baseline positive mood, which explained around 55% of the variance. Neither condition or self-esteem (entered at Step 2) nor the interaction of these variables (entered at Step 3) explained any additional variance; F change (2,38) = 0.45, p = .64 and F change (1,38) = 0.02, p = .64 respectively.

3.2.2. Negative mood

As can be seen in *Table 1*, baseline negative mood (entered at Step 1) explained around 36% of the variance in post-exposure negative mood. However, condition and self-esteem (both entered at Step 2) explained an additional 11% of the variance, F change (2,39) = 4.11, p = .02. Furthermore, the interaction between condition and self-esteem (entered at Step 3) also accounted for a significant change (9%) in variance explained; F change (1,38) = 7.89, p = .01. [2,3,4]

Semi-partial correlations between self-esteem and post-exposure negative mood (controlling for baseline negative mood) revealed that while there was no significant relationship in the positive condition (r(20) = .20, p = .39), there was a significant negative relationship between self-esteem and post-exposure negative mood in the negative condition; r(23) = -.51, p = .01. These findings are illustrated in Figure 1, in which self-esteem scores are plotted against the standardized residualized post-exposure negative mood scores (i.e. controlled for baseline negative mood) with separate regression lines fitted for the two conditions.

4. Discussion

The aim of the current study was to examine the moderating influence of self-esteem on automatic emotional reactions to subliminally presented facial expressions. In line with predictions, negative affect following the exposure to brief negative social cues (expressions of anger and disgust) depended on the level of participants' self-esteem. Importantly, these results were obtained after controlling for baseline mood. Moreover, these findings cannot be accounted for by individual differences in self-reported depression or trait anxiety, as these were controlled statistically during data analysis. Contrary to our expectations, the degree of positive affect experienced after exposure to positive or negative facial displays was not influenced by levels of self-esteem.

The finding that self-esteem moderates the degree of negative affect experienced in response to subliminally processed, rejecting facial expressions is consistent with previous research indicating that individuals with low self-esteem react with more distress to negative feedback (Pruessner et al., 1996). This result also corresponds with previous findings that unconscious processing of rejection stimuli, rather than truly experienced interpersonal rejection, is sufficient to cause differences in the experience and behaviour of individuals with low self-esteem (Sommer & Baumeister, 2002). Taken together, results suggest that merely activating the representation of social rejection, even outside of people's awareness, can have profound effects on individuals with lower self-esteem.

The findings of the present study are consistent with the view that individuals with low self-esteem have highly attuned and sometimes miscalibrated sociometers that automatically and non-consciously monitor the environment for potential negative social information, which if found would result in the raising of an alarm, in the form of negative affect (Leary, 2004; Leary & Baumeister, 2000). More generally, this study lends support to the proposition that

the sociometer can directly produce negative affect when signs of threat to one's relational value are detected and, additionally, that it may be more sensitive to possible signs of social rejection when it is already set at a lower point.

Contrary to our prediction that individuals with low self-esteem would experience less positive affect in response to subliminally presented positive faces than would participants with high self-esteem, we found no evidence for an association between positive affect and self-esteem or for an effect of condition type on positive mood. This may be due to the comparably small changes observed for positive mood, which in turn are consistent with previous research suggesting that people in general react more strongly and rapidly with negative than with positive affect (see Taylor, 1990). In light of the view that negative moods have an important danger-signalling function (Schwartz, 1990), rapid changes in negative affect as assessed by the present study may also be more accessible to individuals' conscious awareness as reflected in their self-reports.

The findings of the present study might have important implications for individuals with low self-esteem. For example, they may be prone to find themselves in a negative mood state after encountering minor, brief or ambiguous social cues such as negative facial micro-expressions, transient changes in tone of voice or a negative look on the face of a passing stranger not consciously registered. Furthermore, once evoked, negative moods may lead to more analytic, effortful and cautious styles of information processing (Chartrand et al., 2006), enhanced causal reasoning about possible affect-eliciting events (Schwarz, 1990) and increases in self-focused attention (Wood, Saltzberg & Goldsamt, 1990). Importantly, in individuals with low self-esteem, negative mood has been shown to further amplify negative self-evaluations (Brown & Mankowski, 1993). With this in mind, it is plausible that the priming-induced negative self-evaluations observed in individuals with low self-esteem (Sommer & Baumeister, 2002) were mediated in part by increases in negative affect.

The hypotheses of the present study were derived from the sociometer theory and the results were interpreted accordingly. However, our findings are also consistent with other well-supported models of self-esteem, including self-verification and terror management theory (Pyszczynski, Greenberg, Solomon, Arndt & Schimel, 2004).

The use of the brief VAS instead of standardised self-report measures of mood (e.g. profile of mood-states) was a limitation of the current study, as the standardized measures would have had obvious advantages for the validity and generalisability of the study's findings. Another limitation of the current study concerns the simultaneous use of two different negative expressions, which made it impossible to examine the degree to which the observed effects were related to anger or disgust or a combination of both emotions. In addition, the awareness check was suboptimal and a more objective check (e.g. forced-choice recall task) would have clearly been desirable. Nevertheless, the high rates of correct recall in the current study may be due, in part, to mood-state dependent or trait-related (e.g. anxiety) interpretation biases. It should also be noted that recalling the correct facial valence did not affect the obtained results. Future research may address these shortcomings and may also attempt to replicate the present results using more objective indices of affective responses (e.g. galvanic skin response).

In conclusion, the present study showed that the degree of negative affect experienced by participants following subliminally presented cues of social rejection (facial expressions of anger and disgust) varied as a function of self-esteem. The possible influence of this tendency on the information processing style and self-evaluations of participants with low self-esteem may represent an additional pathway linking low self-esteem to increased experiences of negative affect. It also complements previous explanations centred on later stage processes such as affect regulation (Heimpel et al., 2002; Wood et al., 1994, 2003) and conscious appraisal processes (Brown & Dutton, 1995).

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Footnotes

1) The use of baseline mood as simple control variable was justified, as preliminary regressions revealed no significant interactions involving the predictors and baseline mood.

2) The regression predicting post-exposure negative mood was repeated adding anxiety and depression respectively as additional simple predictors and substituting self-esteem with anxiety and depression in separate analyses. Results showed that neither anxiety, nor depression, had any influence on post-exposure negative mood; all ps > .05.

3) Excluding the 5 males from the analysis did not affect the main results,

4) A re-analysis of the main regression with all 55 participants (including the 12 participants excluded due to their apparent awareness of face valence) showed essentially identical results as the initial analysis. Interestingly, participants who correctly recalled negative faces were significantly lower in self-esteem and baseline positive mood. They were also significantly higher in depression, trait anxiety and baseline negative mood; all $t(27)s \geq 2.07$, all ps < .05. However, participants who correctly recalled positive faces were significantly lower in baseline negative mood; $t(23.69) = 2.06$, $p = .05$). These characteristics might at least in part be responsible for the high correct recall rate.

Table 1. Hierarchical regression results for the prediction of post-exposure mood

Post-exposure positive mood		**B**	**B SE**	**beta**	**t**	**R^2**	**ANOVA**
Model 1	Baseline positive mood	0.73	0.10	0.74	7.01***	.55	F(1,41)=49.09***
Model 2	Baseline positive mood	0.73	0.12	0.75	6.24***	.56	F(3,39)=16.22***
	Condition	2.98	3.18	0.10	0.94		
	Self-esteem	0.05	0.45	0.01	0.12		
Model 3	Baseline positive mood	0.73	0.12	0.74	6.08***	.56	F(4,38)=11.86***
	Condition	2.97	3.22	0.10	0.92		
	Self-esteem	0.11	0.64	0.03	0.18		
	Condition x self-esteem	-0.11	0.82	-0.02	-0.13		

Post-exposure negative mood		**B**	**B SE**	**beta**	**t**	**R^2**	**ANOVA**
Model 1	Pre-exposure negative mood	0.73	0.15	0.60	4.81***	.36	F(1,41)=23.13***
Model 2	Pre-exposure negative mood	0.69	0.15	0.56	4.64***	.47	F(3,39)=11.63***
	Exposure condition	-11.81	4.72	-0.29	-2.50*		
	Self-esteem	-0.96	0.63	-0.19	-1.53		
Model 3	Pre-exposure negative mood	0.63	0.14	0.51	4.54***	.56	F(4,38)=12.23***
	Exposure condition	-11.73	4.35	-0.29	-2.70*		
	Self-esteem	-2.65	0.84	-0.51	-3.18**		
	Exposure condition x self-esteem	3.16	1.12	0.44	2.81**		

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

Figure 1. Relationship between self-esteem and residualized post-exposure negative mood, as a function of exposure condition