

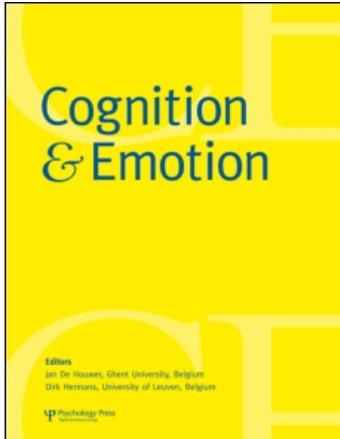
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### A discrete emotions approach to positive emotion disturbance in depression

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# A discrete emotions approach to positive emotion disturbance in depression

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Converging findings suggest that depressed individuals exhibit disturbances in positive emotion. No study, however, has ascertained which specific positive emotions are implicated in depression. We report two studies that compare how depressive symptoms relate to distinct positive emotions at both trait and state levels of assessment. In Study 1 ( $N = 185$ ), we examined associations between depressive symptoms and three trait positive emotions (pride, happy, amusement). Study 2 compared experiential and autonomic reactivity to pride, happy, and amusement film stimuli between depressive ( $n = 24$ ; DS) and non-depressive ( $n = 31$ ; NDS) symptom groups. Results indicate that symptoms of depression were most strongly associated with decreased trait pride and decreased positive emotion experience to pride-eliciting films. Discussion focuses on the implications these findings have for understanding emotion deficits in depression as well as for the general study of positive emotion.

**Keywords:** Depression; Positive emotion; Pride.

A core symptom of depression, anhedonia, involves deficits in the ability to experience positive emotion (American Psychiatric Association, 2000). Positive emotional disturbances play a central role in current theories of depression, such as positioning depression and positive emotion at opposing ends of a

single continuum (e.g., Joseph, 2006). Deficits in positive emotion also assist in uniquely locating depression in affective space by differentiating depression from other forms of psychopathology, including anxiety (e.g., Kring & Bachorowski, 1999; Watson, Clark, & Carey, 1998a).

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Several lines of evidence converge to suggest diminished positive emotion at both trait and state levels of measurement in depression. With respect to positive emotional traits, previous studies indicate that depression is characterised by low levels of trait positive affect (PA). Research using the PA subscale of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988b) demonstrated that participants with clinical diagnoses of intermittent depression reported lower PA across a 28-day period compared to both bipolar spectrum and control participants (Lovejoy & Steuerwald, 1995). Peeters, Nicolson, Berkhof, Delespaul, and de Vries (2003) found that participants with major depression reported lower PA across a 6-day period relative to a control group. Research using the Multidimensional Personality Questionnaire (MPQ; Tellegen & Waller, 1992) demonstrates similar associations between low PA and symptoms and diagnoses of depression (Watson et al., 1988a).

For positive emotional states, a recent meta-analysis including 19 laboratory studies comparing emotion reactivity of individuals with major depression to healthy controls indicates that depression is associated with reduced reactivity to positive stimuli (Bylsma, Morris, & Rottenberg, 2008). For example, in response to amusing films (e.g., *Mr Bean*; Rottenberg, Kasch, Gross, & Gotlib, 2002; *Bill Cosby* and *Ali Baba Bunny*; Berenbaum & Oltmanns, 1992), depressed participants exhibited fewer positive facial expressions and reported lower positive emotion ratings compared to controls. In response to positive stimuli, such as photos of people smiling, exciting sports, nature scenes, and nude males and females, depressed participants reported feeling less pleasant, less emotionally aroused, and displayed less intense facial expressions (Allen, Trinder, & Brennan, 1999; Dunn, Dalgleish, Lawrence, Cusack, & Ogilvie, 2004; Sloan, Strauss, & Wisner, 2001; Sloan, Strauss, Quirk, & Sajatovic, 1997). Furthermore, depression is associated with decreased left as compared to right frontal lobe activation, biological correlates suggesting diminished positive emotion (e.g., Davidson, Abercrombie, Nitschke, & Putnam, 1999; Davidson, Pizzagalli, Nitschke, & Putnam, 2002).

In parallel research, investigators are beginning to uncover a variety of functionally distinct positive emotions (e.g., Keltner & Lerner, in press; Shiota, Keltner, & John, 2006). Three positive emotions that have received conceptual and empirical attention include pride, happiness, and amusement. *Pride* is considered a self-conscious emotion that signals the accomplishment of a valued task to other members of a group, enabling the individual to negotiate and signal status within a social hierarchy (e.g., Gilbert, 2000, 2001; Tiedens, Ellsworth, & Mesquita, 2000; Tracy & Robins, 2004, 2007). Recent research suggests that the experience of pride is often accompanied by a distinct behavioural signal, including expansive posture (Tracy & Robins, 2004; Tracy & Matsumoto, 2008). The evolutionary origin of this pride display is rooted in displays of social dominance. Furthermore, trained actors can reliably express pride (and happiness) to judges using vocalisations (Banse & Scherer, 1996), and judges can reliably detect pride (as well as happiness and amusement) in vocal bursts (Sauter & Scott, 2007). *Happiness* (also referred to as *joy*) is a reward-oriented emotion experienced when the environment signals an imminent improvement in resource, motivating the individual to acquire material resources and rewards (e.g., Fredrickson, 1998; Ruch, 1993). The Duchenne smile is robustly associated with self-reported happiness (Keltner, Ekman, Gonzaga, & Beer, 2003). In a meta-analysis of 39 studies, Juslin and Laukka (2003) found that humans could reliably vocalise happiness. Finally, *amusement* is an emotion purported to facilitate the acquisition and storage of information. Amusement is experienced during a cognitive shift from one knowledge structure to another and facilitates creative thinking (Isen, Daubman, & Nowicki, 1987; Latta, 1999). It is experienced and displayed during both humour and rough-and-tumble play, both thought to involve cognitive flexibility and creativity (e.g., Ruch, 1993; Shamini & Stuss, 1999). Given these three distinct varieties of positive emotion, where might we expect to see more fine-grained deficits in depression?

Unfortunately, few studies have applied these advances in affective science to study which specific positive emotions are associated with depression. Rather, most studies in depression have relied on global measures of trait positive emotions. Furthermore, most experimental elicitations of positive emotion include only one class of positive stimuli, such as amusing films (e.g., Berenbaum & Oltmanns, 1992; Rottenberg et al., 2002), or collapse across a variety of positive photos to examine general positive responses (Allen et al., 1999; Sloan et al., 2001). As a result, researchers have yet to assess whether depression-related deficits in positive emotion are specific to amusement, for example, or generalise across a variety of positive emotional states.

Emerging insights from the literature on self-esteem and social rank suggest that there may be selective deficits in depression for positive emotions relating to the self, such as pride. First, clinical diagnostic criteria for depression include diminished self-esteem (APA, 2000), and low self-esteem prospectively predicts the recurrence of depressive symptoms (e.g., Orth, Robins, & Roberts, 2008). Gilbert (1992, 2000) postulated that depression is associated with low power or social rank. Pride is a higher power emotion, whereas shame is a lower power emotion. From this conceptualisation, it would follow that depression should be negatively associated with pride. Indeed, emerging work suggests that depression may be associated with decreased pride (e.g., Tracy & Robins, 2004). However, no study has simultaneously examined associations between several distinct classes of positive emotions and symptoms of depression.

## Overview of the present study

The present research sought to examine whether positive emotions in general are dampened in connection with depression, or whether there are selective disturbances among specific emotion classes. This provided a unique opportunity to examine a more fine-grained emotion profile associated with depression. We explored this question at the level of self-reported affective traits (Study 1) and emotional states in response to

pride, amusement, and happiness stimuli (Study 2). Our aim in Study 1 was to examine how depressive symptoms were associated with self-reports of three (happiness, pride, amusement) trait positive emotions. Our aim in Study 2 was to extend these findings using a multi-method standardised laboratory procedure to examine experiential and physiological emotional responses to previously validated pride-, happiness-, and amusement-eliciting films. A neutral film was also included to enable calculations of the degree of emotion reactivity to each positive emotion film from a neutral baseline. Across both studies, we drew on the literature cited above to make the following emotion-specific predictions:

*Hypothesis 1.* Depressive symptoms will be associated with decreased trait pride, and the depressive symptom (DS) group will report decreased positive emotion to pride stimuli compared to the non-depressive symptom (NDS) group.

*Hypothesis 2.* Depressive symptoms will not be associated with decreased trait happiness, and DS participants will not report differences in emotional responding to happy stimuli compared to NDS participants.

*Hypothesis 3.* Depressive symptoms will not be associated with decreased trait amusement, and DS participants will not report differences in emotional responding to amusement stimuli compared to NDS participants.

## STUDY 1

### Method

#### *Participants and procedure*

Participants were 185 undergraduate students (65.3% female; 21.7% Caucasian, 65.1% Asian American, 13.2% other) between the ages of 18 and 56 ( $M = 20.70$ ,  $SD = 4.63$ ) who received course credit or \$15 compensation. After obtaining consent, participants filled out questionnaire measures in 20-minute individual sessions.

## Measures

**Depressive symptoms.** Current depressive symptoms were measured using the 21-item Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). Symptoms are rated on a 0 (*absence of symptoms*) to 3 scale. The mean BDI score was 7.39 ( $SD = 6.64$ ), comparable to previous college samples (e.g., Robbins & Tanck, 1984). Internal consistency in the present study was good ( $\alpha = .86$ ).

**Trait positive emotions.** Trait positive emotions were assessed using the Dispositional Positive Emotion Scales (DPES; Shiota et al., 2006), a 38-item self-report instrument with seven 5- or 6-item scales for distinct positive emotions. In the present study we focused on three of the more extensively studied subscales: *happiness/joy* ( $\alpha = .71$ ; e.g., "I am an intensely cheerful person"), *pride* ( $\alpha = .71$ ; e.g., "I am proud of myself and my accomplishments"), and *amusement* ( $\alpha = .59$ ; e.g., "I find humour in almost everything"). Individual items were rated on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale.<sup>1</sup> In the present study, the average inter-correlation between the happy, pride, and amusement scales was  $r = .31$ .

## Results

We first computed bivariate correlations between scores on the BDI with the three trait positive emotion subscales. Analyses revealed significant negative correlations between BDI and trait pride ( $r = -.43$ ,  $p < .01$ ), happiness ( $r = -.27$ ,  $p < .01$ ) and amusement ( $r = -.24$ ,  $p < .01$ ). Analyses including gender, age and ethnicity as covariates did not significantly change results.

In order to examine our prediction that depression is uniquely associated with pride, we conducted three sets of partial correlations. Results indicated that BDI remained significantly

associated with pride after controlling for trait happiness and amusement ( $r = -.34$ ,  $p < .001$ ), while BDI was no longer associated with trait happiness after controlling for trait pride and amusement ( $r = -.01$ ,  $p > .80$ ) or trait amusement after controlling for trait pride and happiness ( $r = -.08$ ,  $p > .30$ ).

We also used  $z$  transformations (Meng, Rosenthal, & Rubin, 1992) to further confirm that depressive symptoms were more strongly associated with decreases with trait pride relative to happiness and amusement. A total of three comparisons were conducted comparing the strength of correlations between BDI and trait emotions. BDI was more strongly associated with trait pride as compared to associations of BDI with trait happiness ( $z = 1.75$ ,  $p < .05$ ) and BDI with trait amusement ( $z = 2.01$ ,  $p < .05$ ). There were no significant differences between associations of BDI with trait amusement and BDI with trait happiness ( $z = 0.26$ ,  $p < .40$ ). In sum, although symptoms of depression were associated with decreases in trait pride, happiness, and amusement, symptoms of depression were more strongly associated with trait pride relative to the other two positive emotions.

## STUDY 2

Study 2 was designed to examine whether participants with high and low symptoms of depression differed in their emotional responses to standardised film stimuli designed to elicit emotional states of pride, happiness, and amusement. Study 2 built upon Study 1 by examining these three positive emotions at the state level, whereas Study 1 examined them at the trait level. Furthermore, Study 2 focused on depressive (DS) and non-depressive (NDS) symptom groups selected by standardised high and low BDI

<sup>1</sup> The DPES scale contains several other scales to measure distinct positive emotions, including compassion, awe, contentment, and love. We did not include them in the present study for two reasons. First, there was not a sufficient literature base upon which to generate a priori hypotheses beyond the three target emotions. We focused on only those scales for which we had a priori hypotheses so as to decrease the likelihood of a Type I error. Second, we wanted the DPES trait emotions to parallel the three state positive emotions elicited by our films in Study 2.

cut-offs. By using a multi-method approach to measure experiential and physiological channels of emotional responding, we were also positioned to examine whether disturbances in positive emotionality in depression operate equally across distinct channels of emotional responding.

## Method

### *Participants*

Fifty-five (65.5% female; 34.5% Caucasian, 47.3% Asian American, 7.3% Latino/a, 3.6% Middle Eastern, and 7.3% other) college students between the ages of 18 and 31 ( $M = 20.38$ ,  $SD = 2.19$ ) who completed the BDI in a general pre-screening survey were invited to participate for course credit.

Based on previously validated cut-offs (Kendall, Hollon, Beck, Hammen, & Ingram, 1987), we recruited a depressive symptom group (DS;  $BDI \geq 17$ ) and a non-depressive symptom group (NDS;  $BDI \leq 9$ ). BDI scores were assessed again at the time of the experiment to ensure stability of group assignments. Participants who no longer met BDI criteria for DS or NDS criteria due to changes in BDI scores from the time of pre-screening were excluded from analyses ( $n = 16$ ). The final sample size for each group was 24 DS participants and 31 NDS participants. The mean BDI score was 24.58 ( $SD = 5.25$ ) for the DS and 3.03 ( $SD = 2.83$ ) for the NDS group. DS and NDS participants did not differ significantly in age,  $t(51) = -0.72$ , *ns*, years of education,  $t(51) = -0.90$ , *ns*, ethnicity,  $\chi^2(1, N = 55) = 0.20$ , *ns*, or gender  $\chi^2(1, N = 55) = 1.72$ , *ns*.

### *Emotion-eliciting stimuli*

Film clips are a standardised method for reliably eliciting emotion states (e.g., Rottenberg, Ray, & Gross, 2007). We included three previously validated (Gruber, Johnson, Oveis, & Keltner, 2008; Rottenberg et al., 2002; Werner et al., 2007) emotion-inducing film clips: pride, amusement, and happiness, as well as a neutral film to

serve as a baseline. The pride film (140 s) depicted scenes of the participants' campus and prestigious professors praising the merit of the students. The happy film (153 s) depicted figure skater Sarah Hughes winning the Olympic gold medal. The amusement film (161 s) contained humorous images from the cartoon characters of South Park. The neutral film (87 s) showed a mundane scene of a man and woman sitting in a kitchen.

### *Measurement of emotional response*

A multi-method approach was employed to measure emotion at experiential and autonomic levels of analysis.<sup>2</sup> These data were assessed across a baseline period (neutral film) and separately for each of the three emotion films. Change scores were used as a reliable way of measuring emotional reactivity to the happiness, pride, and amusement films (Rogosa & Willett, 1983) and were calculated by subtracting the baseline (neutral film) period from the film period.

*Emotional experience.* After each film clip, participants rated their emotional experience on scales of 0 (*not at all*) to 5 (*very much*) in response to the prompt, "To what extent did you experience each of the following emotions while you were watching the film clip?" We assessed the three target positive emotions (pride, amusement, and happiness) and three common negative emotions (sadness, fear, and anger/irritability).

*Autonomic response.* Three measures were selected to allow for continuous measurement, minimise obtrusiveness, and broadly sample peripheral autonomic activity implicated in emotional responding. Specifically, we chose one measure of parasympathetic activity (respiratory sinus arrhythmia; RSA) shown to co-occur with positive emotion (Porges, 1991) as well as emotion regulation (e.g., Beauchaine, 2001), one measure of sympathetic arousal (skin conductance level; SCL) which, among other things, has been associated with negative emotional states (e.g.,

<sup>2</sup> Although we coded facial expressions of sadness, fear, anger, happiness, and amusement using previously published standards (Gruber et al., 2008), the base rate of facial expressions was too low to meaningfully analyse group differences in the present study.

Levenson, 1992), and one measure of general cardiovascular activity (heart rate; HR). Physiological data were sampled at 1 KHz using an ambulatory monitoring system (VU-AMS; de Geus, Willemsen, Klaver, & van Doornen, 1995). Artifacts and recording errors were corrected manually offline. A 90 s epoch of physiological data was extracted from the continuous recordings for each film clip, starting 10 s into each film. The neutral film served as the physiological baseline epoch. A response button on the recording device enabled the synchronisation of physiological data with each film. For each 90 s epoch, averages for the following physiological variables were computed.

*Heart rate (HR).* Electrocardiogram recordings were obtained from three pre-jelled 1<sup>3</sup>/<sub>4</sub>" diameter disposable electrodes placed on the torso in a modified Lead II configuration upon skin abraded with alcohol preparation pads (Stern, Ray, & Quigley, 2001). VU-AMS AMSCOM software was used to calculate HR from the EKG signal, and the R-wave to R-wave interbeat interval series was retained.

*Respiratory sinus arrhythmia (RSA).* This is commonly assessed by examining patterns of covariation between the respiratory cycle and heart rate. CMET cardiac metric software (available from <http://apsychoserver.psych.arizona.edu>) was used to calculate RSA from the interbeat interval series in the frequency range (0.12–0.40 Hz) of spontaneous breathing (Allen, Chambers, & Towers, 2007).

*Skin conductance level (SCL).* Absolute SCL was obtained from two Ag/AgCl electrodes positioned on the volar surface of the middle phalanx of the first and third fingers of the non-dominant hand. Five-millimetre electrode collars were used to

control for recording area, and 0.5% NaCl electrolyte paste was used as a conductant.

### *Procedure*

After obtaining informed consent, participants were seated approximately 2 feet from a 17" computer monitor, and remained seated throughout the entire experiment. Participants first completed the BDI to confirm group status. Participants were then hooked up to the physiological recording equipment and a 10-minute acclimatisation period was obtained while participants filled out other questionnaires not part of the present study containing demographic information and current mood-state information. Next, the neutral film (baseline) was presented. At the end of the film, participants reported their emotion experience.

Next, the three emotion (pride, happiness, amusement) films were presented in counter-balanced order. Before each film, participants read a message on the computer screen requesting them to watch the film clip carefully. After each film clip, there was a 2-minute pause while participants self-reported emotions felt during the film. At the end of the experiment participants were disconnected and debriefed.

### *Results*

We first conducted a manipulation check to assure the films elicited the target emotions of pride, happiness, and amusement. As evident in Table 1, the pride film elicited greater pride than all other films; the happiness/joy film elicited greater happiness than all other films; and the amusement film elicited greater amusement than all other films ( $p < .001$ ). For our main analyses, change scores were formed by subtracting the neutral film values from target (positive) film values.<sup>3</sup> A Greenhouse–Geisser correction was used when

<sup>3</sup> Baseline differences in emotional responses during the neutral film between DS and NDS participants were examined using a series of univariate ANOVAs. The DS group reported greater anxiety ( $M = 2.37$ ,  $SD = 0.99$ ) relative to the NDS group ( $M = 1.74$ ,  $SD = 0.84$ ),  $p < .01$ . Furthermore, consistent with prior research (see Rottenberg et al., 2007, for a review), the DS group ( $M = 5.96$ ,  $SD = 0.97$ ) exhibited lower baseline RSA levels compared to the NDS group ( $M = 6.42$ ,  $SD = 0.92$ ). There were no differences for the other emotion variables ( $p > .05$ ).

**Table 1.** *Self-reported emotions to films across all participants*

	<i>Film clip</i>			
	<i>Neutral</i>	<i>Pride</i>	<i>Happy</i>	<i>Amusement</i>
<i>Positive emotion</i>				
Pride	1.25 (0.43)	3.28 (1.13) <sup>a</sup>	2.47 (1.19)	1.28 (0.54)
Happiness	1.24 (0.61)	2.18 (0.86)	2.67 (1.41) <sup>b</sup>	1.86 (0.79)
Amusement	1.55 (0.76)	2.57 (0.97)	2.26 (0.91)	4.17 (1.00) <sup>c</sup>
<i>Negative emotion</i>				
Sadness	2.07 (1.10)	1.35 (0.78)	1.19 (0.62)	1.17 (0.50)
Anxiety	1.95 (0.89)	1.27 (0.62)	1.29 (0.58)	1.25 (0.51)
Irritability	2.30 (1.25) <sup>c</sup>	1.20 (0.67)	1.44 (0.97)	1.60 (0.97)

*Notes:* Scores represent raw scores reported to each film (rated on a scale from 1 (*not at all*) to 5 (*very much*). Mean values are displayed with standard deviations in parentheses where applicable. <sup>a</sup>Score greatest for pride film compared to all other films ( $p < .001$ ). <sup>b</sup>Score greatest for happy film compared to all other films ( $p < .01$ ). <sup>c</sup>Score greatest for amusement film compared to all other films ( $p < .001$ ).

assumptions for sphericity were not met, and adjusted  $F$  and  $p$  values are reported.<sup>4</sup>

*Emotional experience.* The multivariate analysis of variance (MANOVA) conducted on emotion experience yielded a significant main effect for Emotion,  $F(2.44, 117.30) = 43.91$ ,  $p < .001$ ,  $\eta_p^2 = .48$ , as well as a significant Film  $\times$  Emotion interaction,  $F(5.67, 270.67) = 29.37$ ,  $p < .001$ ,  $\eta_p^2 = .38$ . The main effect for Film approached significance,  $F(1.78, 82.19) = 2.91$ ,  $p = .07$ ,  $\eta_p^2 = .06$ . These effects were qualified, however, by a significant higher order interaction of Film  $\times$  Emotion  $\times$  Group,  $F(10, 480) = 2.51$ ,  $p < .01$ ,  $\eta_p^2 = .05$ . To identify the source of this higher order interaction, we conducted a series of two-way (Film  $\times$  Group) repeated-measures analyses of variance (ANOVAs) separately for each self-reported emotion. For positive emotions, the two-way interactions were significant for pride,  $F(2, 104) = 5.28$ ,  $p < .01$ ,  $\eta_p^2 = .09$ , and happiness,  $F(1.63, 84.61) = 3.37$ ,  $p < .05$ ,  $\eta_p^2 = .08$ , but not for amusement,  $F(2, 104) = 0.16$ ,  $p > .80$ ,  $\eta_p^2 = .00$ , sadness,  $F(1.77, 91.95) = 2.56$ ,  $p > .05$ ,  $\eta_p^2 = .05$ , anxiety,  $F(2, 104) = 0.87$ ,  $p > .40$ ,

$\eta_p^2 = .01$ , or irritability,  $F(2, 96) = 0.73$ ,  $p > .40$ ,  $\eta_p^2 = .02$ .

For pride, follow-up one-way ANOVAs revealed a marginally significant trend for DS participants reporting less pride during the pride film  $F(1, 53) = 3.85$ ,  $p = .055$ , but not during the happy or amusement films ( $ps > .30$ ). For happy, follow-up one-way ANOVAs indicated that DS participants reported less happiness than NDS participants to the pride film  $F(1, 53) = 8.86$ ,  $p < .01$ , but not during the happy or amusement films ( $ps > .40$ ). Mean self-reports for happiness and pride are indicated in Table 2.

*Physiology.* The repeated-measures MANOVA conducted on RSA, HR, and SCL yielded a main effect for Physiology Channel,  $F(2, 51) = 10.44$ ,  $p < .001$ ,  $\eta_p^2 = .29$ . This effect was qualified by a Film  $\times$  Physiology Channel interaction,  $F(4, 49) = 2.85$ ,  $p < .05$ ,  $\eta_p^2 = .19$ . To decompose the Film  $\times$  Physiology Channel interaction, three one-way repeated-measures ANOVAs were conducted separately for RSA, HR, and SCL. Follow-up examination suggested that participants exhibited more reactivity across all three physiological channels to the amusement film

<sup>4</sup> We took special care to examine the skewness and kurtosis indices of our variables across Studies 1 and 2. Log transformations were performed to normalise the distribution for variables as needed. Substituting these variables in analyses did not substantially change the pattern of results.

**Table 2.** Mean change (and standard deviation) of emotion experience and physiological responding across films by group condition in Study 2

	<i>Happy film</i>		<i>Pride film</i>		<i>Amusement film</i>	
	<i>DS</i>	<i>NDS</i>	<i>DS</i>	<i>NDS</i>	<i>DS</i>	<i>NDS</i>
<i>Self-reported emotion</i>						
Happiness	2.91 (1.78)	2.48 (1.04)	1.87 (0.86)*	2.40 (0.81)*	0.54 (0.98)	0.68 (0.85)
Pride	2.67 (1.35)	2.32 (1.05)	2.93 (1.34) <sup>†</sup>	3.53 (0.88) <sup>†</sup>	0.07 (0.61)	0.00 (0.650)
Amusement	0.59 (1.09)	0.81 (0.85)	0.83 (1.27)	1.18 (1.05)	2.39 (1.10)	2.79 (1.10)
Sadness	-1.04 (1.52)	-0.77 (0.99)	-0.57 (1.59)	-0.84 (0.93)	-0.96 (1.43)	-0.87 (0.96)
Anxiety	-0.89 (1.04)	-0.49 (0.80)	-0.76 (1.23)	-0.62 (0.77)	-0.80 (1.17)	-0.62 (0.75)
Irritability	-0.79 (1.62)	-0.90 (1.16)	-1.16 (1.74)	-1.06 (1.00)	-0.84 (1.86)	-0.58 (1.23)
<i>Autonomic physiology</i>						
HR	-2.10 (6.07)	-2.33 (4.48)	-2.40 (4.26)	-2.25 (4.17)	-1.81 (5.78)	-1.74 (5.14)
SCL	0.25 (1.22)	0.60 (1.68)	-0.07 (0.88)	0.20 (0.88)	0.54 (1.12)	1.09 (1.54)
RSA	0.10 (0.47)	-0.35 (0.85)	0.15 (0.74)	-0.15 (0.76)	0.43 (0.77)	0.09 (0.71)

Note: DS = Depressive symptom group; NDS = Non-depressive symptom group; HR = heart rate; RSA = Respiratory sinus arrhythmia; SCL = Skin conductance level. Self-reported emotion rated on a 1 (*very slightly or not at all*) to 5 (*very much*) scale. Emotional displays coded on a 0 (*none*) to 5 (*marked*) scale. Mean values are displayed with standard deviations in parentheses where applicable. Numerical values reflect changes scores (film period - baseline period). \* $p < .05$  comparison of DS and NDS. <sup>†</sup> $p = .055$  comparison of DS and NDS.

compared to the pride and happy films ( $ps < .05$ ). See Table 2 for means and standard deviations.

## GENERAL DISCUSSION

Much of the previous research on depression has focused on global positive emotion. In the present study we assessed three distinct classes of trait and state positive emotions. The present research examined the association between depression and the trait and state experience of three classes of distinct positive emotions: pride, happiness, and amusement. In Study 1, depressive symptoms were associated with decreased trait pride, happiness, and amusement. These results are consistent with prior research suggesting depression is associated with deficits in general positive emotion (e.g., Lovejoy & Steuerwald, 1995; Tellegen & Waller, 1992; Watson et al., 1988a). By comparing the relative strength of association between depression and discrete positive emotions we also found evidence to suggest that depression may be most strongly associated with deficits in the self-oriented emotion of pride. This is consistent with cognitive theories suggesting that

negative self-relevant cognitions are central to depression (e.g., Beck, 1987; Muraven, 2005), discussed further below.

Despite these provocative findings, Study 1 was limited in several respects. First, we relied exclusively on self-report measures. Although widely used as a measure of global positive affect, the PANAS has been demonstrated to primarily sample high activation positive emotions (Russell & Carroll, 1999). Furthermore, the DPES trait positive emotion scale was limited by modest reliability estimates for the three emotion trait scales. These reliability estimates may have attenuated the magnitude of correlations between depressive symptoms and trait positive emotions and we caution readers to bear this in mind when interpreting these results. Second, trait emotion assessments do not tease apart which differences are due to depression versus environmentally influenced differences in emotion patterns. Finally, we are unable to make conclusions with respect to how individuals with diagnosable levels of depression may differ from those in the present study.

In Study 2, we attempted to address many of these limitations by examining emotion

responding using a multi-method approach across experiential and physiological channels, examining state emotional responding to standardised film stimuli, and by assessing participants with high (DS) and low (NDS) symptoms of depression. We found that DS participants were characterised by decreased positive emotion experience—less happiness and pride—in response to the pride film relative to the NDS group. DS and NDS participants did not differ in their self-reported emotion to any other film clip. These findings suggest that diminished positive emotion experience may be specific to certain types of positive stimuli (i.e., pride-eliciting) as opposed to diminished positive emotion across all classes of positive stimuli, a point we develop further below. These findings are consistent with prior research indicating diminished positive emotion experience to positive stimuli (e.g., Allen et al., 1999; Sloan et al., 1997). At the same time, this study is inconsistent with prior work finding decreased reports of amusement experience in response to amusing films in a clinically diagnosed depressed group (e.g., Rottenberg et al., 2002). One possible account for this discrepancy might be emotional responding differences between more severe forms of the disorder diagnosed with major depression as compared to the analogue samples used in the present study. It may be the case that in more severe forms of depression the experience of amusement (along with pride) becomes dampened. Given that the study by Rottenberg and colleagues did not include other classes of positive stimuli, such as pride-eliciting stimuli, it is difficult to ascertain whether this finding would have generalised across all classes of positive stimuli. Future work is necessary to examine whether specific deficits in pride generalise across other classes of emotion in more severe forms of the disorder.

Despite differences in self-reported positive emotion, DS did not differ from NDS participants in physiological emotional reactivity. This is consistent with prior work examining experiential and autonomic responding to standardised film stimuli in participants with clinically diagnosed major depressive disorder (Rottenberg et al.,

2002). However, these findings are inconsistent with physiological indicators of central nervous system responding that suggest depression is associated with unique biological profiles of responding to positive stimuli (i.e., decreased left as compared to right frontal lobe activation; Davidson et al., 1999, 2002). Several possible interpretations might account for this pattern of findings. First, it may be the case that depressive symptoms are tied more intimately with central, and not peripheral, nervous system activity in response to emotional stimuli. Such a possibility may reflect a greater relative degree of higher order cognitive processing of emotional stimuli in depression that is less rooted in mobilising the body for action. A second possibility is that diminished pride in depression may be manifest by a disjunctive pattern in which experiential components do not cohere with physiological response systems. Indeed, future studies designed to adequately assess coherence across emotion response channels using more sophisticated temporal analyses are warranted (e.g., Mauss, Levenson, Loren, Wilhelm, & Gross, 2005).

Although not a major focus of the present study, it is noteworthy that DS and NDS participants did not differ in self-reported negative emotion to any of the film clips. This is consistent with prior work that did not find differences in self-reported sadness in response to sad films (Rottenberg et al., 2002). Differences between our study and previous findings may be accounted for by methodological differences in the specific film chosen (i.e., *South Park* as compared to *Mr Bean*) or differences in negative emotional responding in clinically diagnosed versus analogue samples in the present study.

The findings from Study 2 should also be interpreted within the confines of several limitations. First, although the happiness and pride films elicited distinct positive emotion states (happiness and pride, respectively) they also elicited other co-occurring positive emotions of a lesser intensity. Thus, any conclusions with respect to emotion-specific hypotheses must be interpreted cautiously. Second, this study was limited in relying upon single items to assess

self-reported emotions, like many other studies in the field (e.g., Rottenberg et al., 2002; Rottenberg, Salomon, Gross, & Gotlib, 2005). Third, the mean degree of change across our physiological measures was modest and we acknowledge that this may have precluded our ability to adequately test hypotheses and thus the results should be interpreted within these confines. Fourth, the sample sizes were modest and were insufficient to further explore the role of emotional responding in depression among different ethnic subgroups. It will be important to replicate these findings and examine potential ethnic differences in a larger sample. Fifth, is it possible that decreased positive emotion to the pride film in DS relative to NDS participants may be accounted for by feelings regarding their university affiliation rather than decreased reactivity to pride stimuli more generally? Although decreased trait pride from Study 1 counters this alternative interpretation, this possibility calls for future research on depression and distinct elicitors of pride.

Results from the present two studies suggest that depression may be associated with a greater degree of disturbance in the affective trait of pride compared to other positive emotional traits as well as diminished positive emotional reactivity to pride-relevant stimuli. This diverges from the perspective that depression is associated with a uniform and global deficit in all classes of positive emotions. Methodological differences may explain why the pattern of results observed in the present study diverges from previous research that has suggested deficits across a range of positive stimuli. First, it is important to note that many previous studies did not conduct analyses of distinct positive stimuli (e.g., Allen et al., 1999; Dunn, Dalgleish, Lawrence, & Ogilvie, 2007; Sloan et al., 2001). Moreover, several prior studies included clinically diagnosed participants with major depressive disorder (Rottenberg et al., 2002, 2005; Sloan et al., 2001), whereas our study relied on a self-reported measure of depressive symptoms among a college undergraduate sample. Clinically depressed people may exhibit a more pervasive pattern of diminished positive emotion

across multiple classes of positive emotion and not specific pride-related deficits.

Bearing these considerations in mind, the findings of the present study open up the tantalising possibility of a dysfunctional emotion system in depression whereby self-relevant stimuli trigger negative self-appraisals that may dampen the ability to experience positive, self-relevant emotions such as pride. Indeed, this is consistent with conceptualisations of depression involving low self-esteem (Orth et al., 2008; Watson, Suls, & Haig, 2002). Hence, negative self-focused attention in depression might lead to decreased positive emotional responding in response to self-relevant cues. Indeed, Rottenberg and colleagues (2005) found that relative to control participants, depressed participants exhibited decreased happiness when recalling idiographic memories involving the self. Future research will need to clearly delineate the relationship between negative self-appraisals and self-relevant positive emotions. It is also important to bear in mind that pride is a multifaceted emotion that includes pride associated with personal achievement as well as that based on group membership (e.g., Tiedens et al., 2000). Indeed, Gilbert (1992, 2000) noted that pride often results from a low rank order within one's social group. A diminished capacity to respond to pride stimuli may also reflect a reduced sense of group identification or membership. It will be important for future research to use different types of pride elicitors in order to more carefully tease apart the potential contributors to depression-related deficits in pride.

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