Confusing acceptance and mere politeness: Depression and sensitivity to Duchenne smiles

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ABSTRACT

Background and objectives: Whereas the association between depression and the perception of emotions has been widely studied, only few studies have examined the association between depression and the ability to discriminate genuine (Duchenne) from fake (non-Duchenne) smiles. The present study examined this by comparing currently depressed, previously depressed, and healthy control individuals. Guided by recent theory, the present study also investigated the effect of depression recurrence on smile identification.

Methods: Participants were 27 healthy controls, 33 with past depression (51% with recurrent depression), and 22 with current depression (77% with recurrent depression). Participants were presented with a series of 20 videos depicting smiling individuals, and were asked to indicate whether each smile was genuine or fake.

Results: Having (or having had) a first episode of depression was associated with more mistakes in categorizing smiles as genuine or fake compared to having recurrent depression or to having no history of depression.

Limitations: Cross sectional design and a (relatively) small sample size.

Conclusions: Our results show that an impaired ability to differentiate between markers of affiliation and politeness is specific to first-episode depression, even after the depression has remitted.

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Depressed individuals have less satisfying and more problematic social relationships than do non-depressed individuals (e.g., Coyne et al., 1987; Nezlek, Hampton, & Shean, 2000; Rehman, Gollan, & Mortimer, 2008). Compared with non-depressed individuals, they have fewer social interactions (Gotlib & Lee, 1989), enjoy these interactions less (Nezlek et al., 2000), and experience more interpersonal difficulties, including marital discord (Rehman et al., 2008). The association is bidirectional - the interpersonal difficulties also play a role in the etiology and maintenance of depression (cf., Joiner, 2002; e.g., Teo, Choi, & Valenstein, 2013).

One process that has been considered a mediator of the association between depression and interpersonal difficulties is interpersonal perception (e.g., Bouhuys, Geerts, & Gordijn, 1999a; Gadassi, Mor, & Rafaelli, 2011; Overall & Hammond, 2013). Depression is characterized by negative biases in processing emotional facial expressions (e.g., assigning more negative than positive emotions to neutral expressions; cf., Bistricky, Ingram, & Atchley, 2011). The strength of this bias is associated with greater depression severity (Hale, 1998), less improvement following treatment (Bouhuys et al., 1999a) and higher likelihood of relapse (Bouhuys, Geerts, & Gordijn, 1999b).

Whereas inaccurate perception of negative interpersonal stimuli is a robust finding in depression, findings regarding the association between depression and the perception of positive stimuli, including positive emotions, are less consistent (e.g., Gadassi et al., 2011; Yoon, Joormann, & Gotlib, 2009). Similarly, whereas the association between depression and sensitivity to behaviors that indicate social rejection (e.g., Gilbert, Irons, Olsen, Gilbert, & McEwan, 2006) has received considerable support, to our knowledge, no studies to date have examined the association of depression and cues of social acceptance.
A main cue for social acceptance is the smile that indicates genuine enjoyment. Duchenne (1862/1990), and more recently, Ekman, Davidson, and Friesen (1990), have reported physiognomic distinction between enjoyment and non-enjoyment smiles. The former, often referred to as Duchenne smiles, involve the automatic contraction of the orbicularis oculi muscles (surrounding the eyes) in response to the experience of pleasure. Duchenne smiles are considered indicative of cooperation and affiliation (Brown & Moore, 2002). In contrast, masking (non-Duchenne) smiles are associated with politeness (Bonanno et al., 2002) and may conceal the experience of negative emotions (Ekman, Friesen, & O’Sullivan, 1988). Duchenne but not non-Duchenne smiles elicit trust and a desire for connection in perceivers (Johnston, Miles, & Macrae, 2010). Although recent research has shown that individual differences in reactivity to others’ emotions (susceptibility to emotional contagion for negative, but not positive, emotions; Manera, Grandi, & Colle, 2013) is related to the ability to differentiate between Duchenne and non-Duchenne smiles, the link between depression and this ability, remains largely unexplored.

Therefore, the aim of the present study was to explore the association between depression and accuracy in distinguishing between these two types of smiles. Specifically, based on knowledge on negativity biases in social information processing in individuals with depression (e.g., Gilboa-Schechtman et al., 2008), we examined whether depressed individuals show decreased accuracy in the perception of smiles, compared to non-depressed individuals. This perceptual inaccuracy may play a role in the interpersonal stress generation cycle in depression, whereby these perceptions lead to behaviors that cause interpersonal strife, depriving depressed individuals of trust and connection, and contributing to further depression (Hammen, 1991; Liu & Alloy, 2010).

Only one study, to our knowledge, examined differences between individuals with depression and healthy controls in the perception of Duchenne smiles (Douglas, Porter, & Johnston, 2012), and failed to find differences between these two groups. This failure may be accounted for by the fact that participants were asked to indicate whether the person portraying the facial expression truly felt happy. This task may have been ambiguous, thus creating noise and perhaps masking group differences. More importantly, Douglas et al. (2012) did not take into account two aspects of depression: first, the study did not include individuals with remitted depression (i.e., those who experienced a depressive episode but are currently a-symptomatic; for a full definition of remission, see the Method Section), and second, it did not consider differences between those with first-episode and recurrent depression.

The present study will examine the link between these two aspects of depression and accuracy in the perception of smile authenticity. If deficient interpersonal perception (and specifically, inaccurate perception of Duchenne smiles) plays a role in the recurrence of depression, such deficits cannot be merely a concomitant of current depressive symptoms, but rather must be a stable characteristic of depression-prone individuals (Liu & Alloy, 2010). Thus, it would be instructive to assess this perception in individuals with both current and remitted depressive episodes, as well as in individuals who have never been depressed.

Depression-related deficits in accuracy of interpersonal perception have been extensively documented (cf. Bistricky et al., 2011), but only few studies have examined previously depressed individuals (Anderson et al., 2011; Harkness, Jacobson, Dong, & Sabbagh, 2010), and only one study, to our knowledge, compared previously depressed people with currently depressed individuals and healthy controls (Anderson et al., 2011). This study applied signal detection theory (Wickens, 2002) to the assessment of interpersonal perception. Signal detection theory allows researchers to distinguish between sensitivity, which is the ability to correctly distinguish between stimuli (e.g., between neutral and emotional expressions, in the case of Anderson et al., 2011), and bias, which is a measure of the direction of the errors (i.e., when making a mistake, are individuals more likely to mistakenly identify neutral expressions as emotional rather than emotional expressions as neutral, or vice-versa).

Anderson et al. (2011) showed that those with past depression correctly identified more emotional expressions compared to controls, but this increased accuracy was due to a response bias (i.e., to a lower threshold for detecting emotion, even when it is not truly there). In contrast, those with current depression made more mistakes in identifying emotional expressions compared to controls because they had decreased sensitivity. Based on these results we can hypothesize that previously depressed individuals would be more biased compared to healthy controls, whereas currently depressed individuals would be less sensitive compared to healthy controls.

A second aspect of depression that may be related to accurate perception of smile authenticity is depression recurrence. Although depression is highly recurrent, approximately 40% of those who experience a single depressive episode never meet diagnostic criteria for depression again. Thus, two subtypes of depression have been proposed: recurrent and acute (single-episode). These two subtypes are associated with different developmental factors. Specifically, research suggests that compared to single-episode depression, recurrent depression is more genetically-based as it is associated with an earlier age of onset (Eaton et al., 2008), a lifetime history of minor depression, and parental history of recurrent depression (Pettit, Hartley, Lewinsohn, Seeley, & Klein, 2013).

To date, differences between single-episode and recurrent depression in interpersonal perception have not been examined. However, there is some evidence concerning the differences between these subtypes by comparing individuals’ event-related potentials evoked by viewing negative versus positive emotional words (Nandrino, Dodin, Martin, & Henniaux, 2004). This study found that participants who were currently experiencing their first episode of depression had decreased P300 reactions (indicating decreased processing) in response to positive, but not negative words. In contrast, those with recurrent depression showed increased processing of negative but not positive words. Following successful treatment, those with a first-episode of depression still showed decreased reactivity to positive words, whereas those with recurrent depression no longer showed increased reactivity to negative words. These results could suggest that decreased sensitivity to Duchenne smiles would be evident among those with a single-episode depression but not among those with recurrent depression, and that this decreased sensitivity will remain even after the remission of the first episode.

In sum, as the literature review suggests, there is little research on interpersonal perception in past depression, and none on interpersonal perception and depression recurrence. The little available research does not consolidate into a coherent picture, but it does suggest that when studying depression and interpersonal perception one needs to take into account differences between (a) current and past depression (Anderson et al., 2011), (b) first-episode and recurrent depression, and (Nandrino et al., 2004), and (c) negative and positive emotional stimuli (Gadassi et al., 2011; Nandrino et al., 2004). The present study will be the first to take into account all three factors when studying the association between depression and interpersonal perception.

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1 We use the term “first-episode depression” for clarity sake — because we do not have longitudinal data on our subjects we cannot know if they indeed have single-episode depression and not the recurrent subtype.
1. The present study

The aim of the current research was to examine the association between depression and sensitivity and bias in the perception of Duchenne smiles. The present study is among the first to compare individuals with current depression to both previously depressed and controls, and to distinguish between those with first-episode and those with recurrent depression. In particular, we consider the association between these factors and the two parameters of perception accuracy, namely bias and sensitivity.

Our predictions regarding bias follow findings that currently and previously depressed individuals have a negative bias in interpersonal perception (e.g., Anderson et al., 2011; Gilboa-Schechtman, Foa, Vaknin, Marom, & Hermesh, 2008). Thus, we expect that currently and previously depressed individuals would show a stronger negative bias than would healthy controls (i.e., they will mistakenly identify genuine smiles as fake rather than mistakenly identify fake smiles as genuine).

Our predictions regarding sensitivity are less clear. Based on Anderson et al. (2011), it can be predicted that currently depressed individuals would show decreased sensitivity to Duchenne smiles compared to both previously depressed individuals and controls. In contrast, based on Nandrino et al.’s (2004) findings of decreased reactivity to positive stimuli in first-episode depression (both during the episode and following successful treatment) it can be hypothesized that those with first-episode depression (either current or past) would be less sensitive to Duchenne smiles, whereas no such decreased sensitivity would be found for those with recurrent depression.

2. Method

2.1. Participants and procedure

Participants were recruited via advertisements posted in two universities in Israel inviting individuals to take part in a study on social perception in exchange for course credit or for a monetary compensation (approximately $9 for each hour of participation). Potential participants completed online questionnaires screening for current and past depression (BDI-II; Beck, Steer, & Brown, 1996, and the IDD-L; Zimmerman & Coryell, 1987, respectively).

Individuals were invited to the lab for a diagnostic interview (SCID-I; First, Spitzer, Gibbon, & Williams, 1996) if they scored (1) lower than 9 on the BDI-II and lower than 15 on the IDD-L (Healthy control [HC] group), (2) lower than 9 on the BDI-II and higher than 25 on the IDD-L (past depression group), or (3) higher than 18 on the BDI-II (current depression group). Eligible participants then completed the Spot the fake smile task and a second administration of the BDI-II. During their second visit to the lab, participants completed another cognitive task and several self-report questionnaires that are beyond the scope of the present study. Participants in the current depression group met DSM-IV diagnostic criteria (APA, 2000) for current MDE or dysthymia. Those in the past depression group met diagnostic criteria for MDE in the past, but were currently remitted (i.e., at least 4 weeks without depressive symptoms). Those in the HC group never met diagnostic criteria for any DSM disorder. Exclusion criteria were (1) current substance use, (2) current or past diagnosis of a psychotic disorder, or (3) current or past diagnosis of a bipolar disorder.

2.2. Measures

2.2.1. Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First et al., 1996)

Modules A/D (mood disorders), B (psychotic symptoms), E (substance use disorders), and F (anxiety disorders) of the SCID-I were administered. As recommended by Lavori et al. (1994), depression was considered recurrent if the participant reported one major depressive episode and at least one other episode of minor or major depression.

Interviews were conducted by graduate students in clinical psychology trained to administer the SCID-I, and supervised by a senior psychologist (the second author). Additionally, interviews were audio-taped. Nine interviews (10% of all interviews) were randomly selected and coded by the first author. Inter-rater reliability for the diagnostic group classification was good ($k = 0.84$, $p < .001$).

2.2.2. Beck depression inventory (BDI-II; Beck et al., 1996)

The BDI-II is a 21-item self-report questionnaire that assesses depressive symptoms, rated on a scale from 0 to 3, with higher scores indicating more severe depression. The BDI-II has demonstrated excellent internal consistency reliability ($\alpha = .91$; Dozois, Dobson, & Ahnberg, 1998), and test-retest reliability ($\alpha = .95$; Beck et al., 1996). In the present sample, the internal consistency reliability of the BDI-II was excellent ($\alpha = .94$).

2.2.3. Inventory to Diagnose Depression-Lifetime (IDD-L; Zimmerman & Coryell, 1987)

The IDD-L is a self-report measure that assesses lifetime history of depressive symptoms. Items on the IDD-L are designed to tap the symptoms required for DSM-IV diagnosis of major depression. Following endorsement of a symptom, participants are asked to indicate whether the symptom lasted for at least two weeks. The symptoms are then summed to provide an index of severity. We used the 22-item version of the questionnaire, which has demonstrated high internal consistency in previous studies ($\alpha = .92$). In the present sample, the internal consistency reliability of the IDD-L was excellent ($\alpha = .93$).

2.2.4. Spot the fake smile

We used the BBC Science & Nature Website smiles stimuli set (BBC, n.d.; http://www.bbc.co.uk/science/humanbody/mind/surveys/Smiles). This stimuli set includes 20 color videos presented one at a time for approximately 4 s each. Each video depicts a person (13 women) displaying a neutral facial expression that turns into a smile and then returns to the neutral expression. Half of the videos displayed a real (Duchenne) smile whereas the other half displayed a fake smile. Because we wanted the order of the videos to be randomized across participants, we did not send participants directly to the BBC website as others have previously done (Bernstein, Young, Brown, Sacco, & Claypool, 2008). Instead, we downloaded the videos and displayed them in a random order using MediaLab software (1997-Eternity + Empirisoft Corporation). The task lasted approximately 5 min.

2.3. Sensitivity score calculation

We calculated a signal detection measure for sensitivity ($d'$; Stanislaw & Todorov, 1999). This measure simultaneously considers hits (correctly identifying a Duchenne smile as genuine) and false alarms (incorrectly identifying a non-Duchenne smile as genuine), and is calculated by subtracting the $z$-score that corresponds to the false-alarm rate from the $z$-score that corresponds to the hit rate. Larger sensitivity ($d'$) values indicate higher sensitivity. Negative

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2 We included three individuals with dysthymia in the current depression group as was done in other studies (e.g., Gilboa-Schechtman et al., 2008). We repeated all analyses excluding these participants and found no significant change in the pattern of the results.
values of $d'$ indicate response confusion (i.e., an inability to distinguish between signal and noise).

### 2.4. Bias score calculation

We calculated the signal detection measure for bias ($c$; Stanislaw & Todorov, 1999), which also simultaneously considers hits and false alarms. Bias is calculated by averaging the $z$-score that corresponds to the hit rate and the $z$-score that corresponds to the false alarm rate and then multiplying the result by negative one. Negative values of $c$ indicate a tendency to identify a signal when it is not present (i.e., to identify non-Duchenne smiles as genuine), whereas positive values indicate a tendency not to identify a signal when it is present (i.e., to identify a Duchenne smile as fake).

### 3. Results

#### 3.1. Data reduction

The original sample included 90 participants. However, eight participants (4 HCs, 1 past depression, and 3 current depression; 9% of the original sample) were excluded from analyses because they had a negative sensitivity ($d'$) score, which denotes an inability to distinguish between signal and noise (Stanislaw & Todorov, 1999).

#### 3.2. Participant characteristic

Table 1 presents means and SDs of age, BDI-II scores sex ratio, rates of comorbid disorders in the diagnostic groups, and antidepressant use for each of the depression status groups (i.e., current vs. past depression), as well as Chi-square tests and ANOVAs for group differences. As can be seen in the Table, the only significant group difference was in BDI-II scores: currently depressed individuals had significantly higher BDI-II scores compared to those with past depression and to healthy controls.

Table 2 presents means and SDs of age, BDI-II scores, sex ratio, rates of comorbid disorders in the diagnostic groups, and antidepressant use for each of the depression subtypes (i.e., first episode vs. recurrent depression) as well as Chi-square tests and t-tests for group differences. As can be seen in Table 2, participants with recurrent depression and those with a first-episode depression only differed in BDI-II scores, with the latter reporting higher levels of depressive symptoms than the former.

#### 3.3. Data analysis

Our analyses were composed of the following four steps. First, to test the hypothesis that both depressive status (past depression vs. current depression) and depression subtype (recurrent vs. first-episode) predicted sensitivity scores, we conducted a two-way ANOVA with depressive status and depressive subtype as the between-subject factors, and sensitivity as the independent variable. The HC group could not be included in this two-way ANOVA because it does not vary along the variable of depressive subtype. Therefore, the comparison to the HC group was conducted in the second step using two one-way ANOVAs comparing the HC group simultaneously, in the first ANOVA, to the two depressive status groups, and, in the second ANOVA, to the two depression subtype groups. Third, to rule out depression severity as an alternative explanation, we computed the correlation between depressive symptoms (BDI-II scores) and sensitivity scores. Finally, we repeated the analyses with BDI-II scores as a covariate. These four steps were also conducted with bias scores as the dependent variable.

#### 3.3.1. Group differences in sensitivity

Sensitivity scores were submitted to a two-way ANOVA with diagnostic group and depression subtype as the between-subject factors. Table 3 presents sensitivity means and SDs for each group. Contrary to our hypothesis, the main effect of depression status was not significant ($F[1,51] = 1.09, ns$). Individuals who are currently depressed ($d' = 0.50, SD = 0.58$) did not differ in sensitivity from those with past depression ($d' = 0.93, SD = 0.66$). However, as predicted, the main effect of depression subtype was significant ($F[1,51] = 6.12, p < .05, \eta^2 = .11$). Those with recurrent depression ($d' = 1.06, SD = 0.65$) were significantly more accurate in identifying genuine smiles than those with first-episode depression ($d' = 0.69, SD = 0.53$). The effect of depression recurrence was similar for those with past and current depression, as evidenced by the non-significant interaction between depression subtype and status ($F[1,51] = 0.82, ns$).

To examine differences between HCs and the two depression status groups (i.e., comparing HC, past depression, and current depression) in sensitivity, we conducted a one-way ANOVA with diagnostic group as the between-subject factor. Similar to the results of the two-way ANOVA, no significant effect emerged ($F[2,79] = 0.22, ns$). To examine differences between HCs and the two depression subtype groups (i.e., comparing HC, first-episode depression, and recurrent depression) in sensitivity, we conducted a one-way ANOVA with depression subtype as the between-subject factor. Similar to the results of the two-way ANOVA, a

### Table 1

Demographic information and comorbid diagnoses for each of the diagnostic groups.

<table>
<thead>
<tr>
<th></th>
<th>HC (N = 27)</th>
<th>Past depression (N = 33)</th>
<th>Current depression (N = 22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>18 (66.7%)</td>
<td>23 (69.7%)</td>
<td>17 (77.3%)</td>
</tr>
<tr>
<td>SAD</td>
<td>0</td>
<td>5 (15.2%)</td>
<td>7 (31.8%)</td>
</tr>
<tr>
<td>GAD</td>
<td>0</td>
<td>2 (6.1%)</td>
<td>1 (4.5%)</td>
</tr>
<tr>
<td>Panic</td>
<td>0</td>
<td>0</td>
<td>1 (4.5%)</td>
</tr>
<tr>
<td>OCD</td>
<td>0</td>
<td>0</td>
<td>1 (4.5%)</td>
</tr>
<tr>
<td>PTSD</td>
<td>0</td>
<td>0</td>
<td>2 (9.1%)</td>
</tr>
<tr>
<td>Specific phobia</td>
<td>0</td>
<td>0</td>
<td>2 (9.1%)</td>
</tr>
<tr>
<td>Any anxiety</td>
<td>0</td>
<td>7 (21.2%)</td>
<td>10 (45.5%)</td>
</tr>
<tr>
<td>Antidepressant use</td>
<td>0</td>
<td>6 (18.2%)</td>
<td>5 (22.7%)</td>
</tr>
<tr>
<td>Recurrent depression</td>
<td>0</td>
<td>17 (51.5%)</td>
<td>17 (77.3%)</td>
</tr>
<tr>
<td>Age</td>
<td>23.59 (3.33)</td>
<td>23.55 (2.83)</td>
<td>23.25 (2.47)</td>
</tr>
<tr>
<td>BDI-II</td>
<td>3.48 (4.55)</td>
<td>7.18 (6.72)</td>
<td>19.14 (8.64)</td>
</tr>
</tbody>
</table>

*Chi-square values for the comparison of comorbid disorders are calculated comparing current vs. past depression; *p < .05, **p < .01, ***p < .001.

Abbreviation used: SAD — Social Anxiety Disorder; GAD — Generalized Anxiety Disorder; OCD — Obsessive Compulsive Disorder; PTSD — Post-Traumatic Stress Disorder; BDI-II — Beck Depression Inventory-II.
main effect for depression subtype emerged, albeit marginal in significance \(F(2, 79) = 2.59, p = .08, \eta^2 = 0.06\). To further explore differences between the three groups we conducted LSD post-hoc contrasts, that revealed a significant difference between the first-episode depression and the recurrent depression groups \(p < .05\), and a marginally significant difference between the first-episode depression and HC groups \(p = .06\). No significant difference emerged between the recurrent depression and HC groups.

Next we examined the correlation between sensitivity scores and the BDI-II, which was not significant \(r(82) = -0.05, ns\). To control for the effects of depressive symptom severity, we repeated the two-way ANOVA with BDI-II scores as a covariate. The effect of depression subtype remained significant and in the same direction \(F(1, 50) = 5.81, p < .05, \eta^2 = 0.10\). Because LSD post-hoc tests cannot be calculated when a covariate is included in the analyses, we conducted three one-way ANCOVAs to investigate the depression subtype main effect: once comparing those with recurrent depression to HCs, once comparing those with recurrent depression to those with first-episode depression, and once comparing those with first episode depression to HCs.

The ANCOVA comparing those with recurrent depression to HCs showed that when controlling for BDI-II, the difference between participants with recurrent depression and HCs remains non-significant \(F(1,58) = 0.14, ns\). In addition, the effect of the BDI-II was also non significant \(F(1,58) = 0.07, ns\). The ANCOVA comparing those with recurrent depression to those with first-episode depression showed that the difference between these groups remained significant when controlling for the BDI-II \(F(1,52) = 4.96, p < .05, \eta^2 = 0.09\). The effect of the BDI-II was not significant \(F(1,52) = 0.28, ns\), The ANCOVA comparing those with first-episode depression to HCs showed that the difference between these groups was not significant when controlling for the BDI-II \(F(1,45) = 0.89, ns\). The effect of the BDI-II in this ANCOVA was significant \(F(1,45) = 5.60, p < .05, \eta^2 = 0.11\), indicating that higher BDI-II scores were associated with lower sensitivity \(r(48) = -0.40, p = .005\).

### 3.3.2. Group differences in bias

Bias scores were submitted to a two-way ANOVA with depressive status and depression subtype as the between-subject factor. Table 3 presents means and SDs of bias for each group. No significant effects emerged for depressive status \(F(1, 51) = 0.88, ns\), depression subtype \(F(1, 51) = 1.11, ns\), or their interaction \(F(1, 51) = 2.73, ns\). The one-way ANOVA comparing bias scores of HCs to those with past and current depression revealed no significant effects \(F(2, 79) = 1.93, ns\), as did the one-way ANOVA comparing bias scores of HCs to those with first episode depression and recurrent depression \(F(2, 79) = 0.74, ns\). The correlation between bias scores and the BDI-II was not significant \(r(82) = 0.15, ns\), and entering it to the analyses as a covariate made no significant changes in the pattern of the results.

Because previous studies on depression and interpersonal perception indicated that antidepressant use may influence this ability \(e.g., Anderson et al., 2011\), we repeated all analyses excluding individuals who used antidepressants at time of the study. This exclusion did not significantly change the pattern of the results.

### 4. Discussion

The present study is among the first to investigate the association between depression and the perception of Duchenne smiles, and the first to compare people with current and past depression, and people with first-episode and recurrent depression. Participants with a first-episode depression identified Duchenne smiles less accurately than did participants with recurrent depression and healthy controls, whereas these two latter groups did not differ from each other. This decreased accuracy was not moderated by the current depression status — i.e., by whether the depressive episode was current or in the past. We found no evidence for group differences in bias in the perception of Duchenne smiles.

Interestingly, our results also suggest that the difference in accuracy between people with a first-episode depression and healthy controls can be explained by the severity of depressive symptoms, whereas the difference in accuracy between people with a first-episode depression and people with recurrent depression, cannot. Our results suggest, therefore, that depressed mood affects the accuracy of identification of genuine smiles among those with a first episode of depression, but not among those with recurrent depression.
These findings are in line with previous work on decreased accuracy in the perception of positive emotional expression among individuals with depression (Yoon et al., 2009), but add to these findings in two ways. First, we found that the decreased sensitivity is specific to those with first-episode, but not recurrent depression. This finding is in line with recent theory and findings suggesting that recurrent depression and single-episode depression are distinct (Eaton et al., 2008; Monroe & Harkness, 2011; Pettit et al., 2013). We therefore suggest that this decreased sensitivity in the perception of Duchenne smiles may be specific to those with first-episode depression, and may not characterize those with recurrent depression. Clearly, because our participants reported a first episode of depression and may later develop further episodes, conclusions need to be made with caution and more research is needed to corroborate this assertion.

A possible explanation for the decreased sensitivity in the identification of Duchenne smiles among those with first-episode depression but not those with recurrent depression may involve the trigger of the depressive episode. The first episode of depression is often triggered by a major life event (e.g., bereavement), whereas depression recurrence is often triggered by milder stressors (Robinson & Sahakian, 2008). It may be that the increased stress associated with the first episode leads to an avoidant reaction. One aspect of this avoidance could be mental disengagement from the social world, contributing to decreased accuracy in the perception of Duchenne smiles. As mentioned above, the Duchenne smile is a marker of social acceptance but also of trust in others, a trust which is often harmed in cases of distressing life events. Testing this explanation is beyond the scope of the present study, and thus future work is necessary to test this hypothesis.

A second way in which our work adds to previous research on depression and interpersonal perception is that it suggests that the decreased sensitivity to Duchenne smiles can still be evident when the depression has remitted. These findings are in line with those of Nandrino et al. (2004) who showed that those with first-episode depression show reduced brain reactivity to positive emotional words compared to those with recurrent depression, and that this decreased reactivity remained even after successful treatment and depression remission. Replication of this finding in larger samples is needed.

Niedenthal, Mermalld, Maringer, and Hess (2010) suggest that the correct recognition of smiles relies on the embodied simulation process—a process by which an observer of an emotional expression automatically mimics and then experiences the observed facial expression and consequently attributes the emotional experience to the other person. Indeed mimicry has been found to aid in the identification of genuine smiles (Maringer, Krumhuber, Fischer, & Niedenthal, 2011). Thus, it is possible that those who experience a first-episode depression have an impaired capacity to mimic genuine smiles or a deficiency in experiencing pleasure when mimicking the smile. The fact that depressive symptoms explain the difference between those with first-episode depression and healthy controls may support the second option. This interpretation is in line with recent findings that show that people with depression (compared to healthy controls) show less accurate interpersonal perception as well as less intense affective responses when viewing emotional stimuli (Schneider et al., 2012). Future studies are needed to examine this explanation.

Another possible interpretation of the decreased accuracy of identifying Duchenne smiles in first-episode depression comes from a study of the effects of social exclusion. The literature shows that social exclusion usually increases individuals’ motivation to reconnect with others (e.g., show greater interest in making new friends following an experience of rejection; Maner, DeWall, Baumeister, & Schaller, 2007). However, there are exceptions to this rule: social rejection sometimes causes the opposite effects—i.e., under certain conditions, exclusion may lead to social avoidance or even antisocial behavior. For example, individuals who were more fearful of others’ evaluating them negatively were less likely to seek to reconnect with others following exclusion, whereas those who were not fearful of negative evaluation did seek to reconnect with others (Maner et al., 2007).

Similar conclusions were drawn from studies comparing reaction to social exclusion of different severity levels (Bernstein & Claypool, 2012a, 2012b). These studies revealed that after exclusion that is less severe, emotional distress (Bernstein & Claypool, 2012a) and sensitivity to physical pain (Bernstein & Claypool, 2012b) increase. However, after a more severe exclusion experience, emotional distress is not experienced (Bernstein & Claypool, 2012a), and sensitivity to pain decreases (Bernstein & Claypool, 2012b). The authors interpret these findings as suggesting that more severe exclusion causes individuals to “shut down” and show emotional numbing.

Interestingly, the desire to reconnect after social exclusion has been demonstrated to enhance sensitivity to Duchenne smiles (Bernstein et al., 2008). Therefore, we may conclude that the decreased accuracy in identifying Duchenne smiles found among those with a first-episode depression may reflect a reduced desire to re-affiliate. Indeed, it is possible that the first episode of depression was preceded or accompanied by a severe experience of social exclusion, and/or an enhancement in sensitivity to negative evaluation—thus leading to emotional numbing and a reduced desire to reconnect (Bernstein & Claypool, 2012a, 2012b; Maner et al., 2007). Future studies on depression and interpersonal perception should assess exclusion experiences and fear of negative evaluation so that these possible mechanisms could be tested.

Our study has several limitations. The main one is its cross-sectional design, which makes it impossible to determine who (if any) of those with a first episode of depression would eventually experience depression recurrence. Consequently, we cannot examine the ramifications of the decreased accuracy in identifying Duchenne smiles found among those with a first-episode depression. Future longitudinal studies are needed to shed more light on these questions. Additionally, we did not assess the length of the depressive episode, which may be associated with interpersonal perception. Another limitation of the study is its relatively small sample size, especially considering that four depression groups were compared. However, the fact that the effect of depression recurrence emerged nonetheless, and that it remained significant even when controlling for depressive symptoms, supports the strength of this effect and points to the importance of examining this aspect of depression in future studies. Another consequence of the small sample size was an unequal sex distribution between the study groups. This made it impossible for us to examine sex differences, which are known to affect the association between depression and interpersonal perception (e.g., Gadassi et al., 2011; van Beek & Dubas, 2008; Wright et al., 2009). Future studies are needed to explore whether men and women differ in the association between depression and interpersonal perception. However, this limitation may also be considered as an advantage, because our control group was highly comparable to the clinical groups, thus ruling out many possible alternative explanations to our findings (e.g., socioeconomic status).

The present study has shown that people with a first-episode of depression (either current or past) are impaired in identifying Duchenne smiles. This impairment was not present in people with recurrent depression, thus showing a different effect of depressive
symptoms on perception depending on depression subtype. Specif-
cically, the decreased accuracy among those with a first-episode depression is driven by the intensity of the depressive symptoms; this raises the possibility that this impaired perception results from a reduced capacity to experience a perceived emotion and to therefore be less able to correctly recognize it. Additionally, it may reflect a decreased willingness to reconnect with others or a reduced ability to trust others following the first episode of depression. Future work should test these possibilities.

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