Brief Report

EMOTION RECOGNITION PATTERNS IN PATIENTS WITH PANIC DISORDER

Henrik Kessler, M.D.,* Julia Roth, Joern von Wietersheim, Ph.D., Russell M. Deighton, Ph.D., and Harald C. Traue, Ph.D.

Recognition of facially expressed emotions is essential in social interaction. For patients with social phobia, general anxiety disorders, and comorbid anxiety, deficits in their emotion recognition and specific biases have already been reported. This is the first study to investigate facial emotion recognition patterns in patients with panic disorder [PD]. We assumed a general performance deficit in patients with PD. Exploratory analyses should have revealed recognition patterns and specific types of errors. Additionally, we checked the influence of depression and anxiety symptoms, per se, on recognition. A carefully selected group of 37 patients with PD without agoraphobia [DSM-IV 300.01] and no psychiatric comorbidity was compared to 43 controls matched for age and sex. We assessed emotion recognition with the FEEL Test [Facially Expressed Emotion Labeling], using faces displaying fear, anger, sadness, happiness, disgust, and anger. Recognition of emotions in patients with PD was significantly worse than that of controls, specifically, sadness and anger. They also showed a tendency to interpret nonanger emotions as anger. Interestingly, in patients with PD, depressive symptoms were more strongly related to emotion recognition than were anxiety symptoms, and recognition differences between patients and controls disappeared when we controlled for depression. This effect is discussed in the context of previous studies reporting emotion recognition deficits of depressed patients. Depression and Anxiety 24:223–226, 2007. *© 2006 Wiley-Liss, Inc.*

INTRODUCTION

On the one hand, recognition of facially expressed basic emotions is pivotal to social interaction and generally mastered by the majority of healthy subjects [Ekman, 1999; Ekman et al., 2003]. On the other hand, a growing body of evidence indicates that certain patient populations show deficits—sometimes specific—in their ability to recognize facial emotions. In the case of anxiety, for instance, children with social phobia do worse than healthy controls at recognizing facial emotions [Simonian et al., 2001]. Patients with generalized anxiety disorder and social phobia have shown mainly selective biases to threatening faces [Bradley et al., 1999; Mogg et al., 2004]. In studies with depressed patients, comorbid anxiety correlated with low facial emotion recognition performance [Bouhuys et al., 1997; Suslow et al., 2004]. Other studies indicate that depression per se is also associated with emotion recognition deficits [Mikhailova et al., 1996]. Nothing so far has been reported specifically about facial emotion recognition in patients with panic disorder (PD).

This study investigates emotion recognition patterns in a carefully selected group of patients with PD without any psychiatric comorbidity. Derived from studies with social phobia [Simonian et al., 2001] and

University of Ulm, University Clinic of Psychosomatic Medicine and Psychotherapy, Ulm, Germany

*Correspondence to: Henrik Kessler, University of Ulm, University Clinic of Psychosomatic Medicine and Psychotherapy, Am Hochstraess 8, D-89081 Ulm, Germany.
E-mail: henrik.kessler@uniklinik-ulm.de

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comorbid anxiety [Bouhuys et al., 1997; Suslow et al., 2004], the main assumption is that patients with PD generally perform worse than controls in decoding facially expressed basic emotions. Interesting results are also expected when looking specifically at recognition patterns of patients with PD: What emotions are they especially bad at recognizing? What type of mistakes do they typically make when confusing emotions? A third focus is whether depressive and/or anxiety symptoms per se in patients with PD influence the recognition of emotions.

METHODS

To tackle these questions we assessed emotion recognition skills in a group of 37 patients with PD and compared them with 43 controls. Clinical subjects were a carefully diagnosed group of 37 patients with PD without agoraphobia according to DSM-IV (300.01). Mean disease duration at study commencement was 4.3 years ($SD = 6.6$).

Patients had an average of 3.9 panic attacks per month ($SD = 1.6$). Subjects were outpatients in a psychiatric medical practice and clinically assessed by a psychiatrist to confirm diagnosis and rule out other psychiatric disorders (including other anxiety disorders, major depression and schizophrenia). The treatment consisted of standard drug therapy (in most cases, clomipramine) and an average of 1.5 psychiatric consultations per month ($SD = 0.6$). Patients were on average 37.8 years old ($SD = 12.8$ years), and 78% were female. The control group consisted of 43 subjects matched according to age ($M = 36.4$, $SD = 11.5$) and sex (70% female). We acquired these subjects because they consulted the same medical practice as patients with anxiety due to peripheral neurological disorders [mostly nerve lesions due to lumbar disc hernia], and were examined to exclude a recent or past psychiatric diagnosis. We intentionally acquired control group that comprised patients to avoid comparing patients with anxiety to a healthy student group. This was to ensure that any deficits found in patients with anxiety patients were not due to unspecific effects of being patients in treatment.

Patients and controls filled out the German version of the State–Trait Anxiety Inventory [STAI; Laux et al., 1981] and the Beck Depression Inventory [BDI; Hautzinger et al., 1994] to assess anxiety and depressive symptoms, respectively. Both groups gave informed consent after the study was explained. The study protocol met the criteria for University of Ulm's ethical standards for research.

Emotion recognition ability was assessed with the FEEL test [Facially Expressed Emotion Labeling; Kessler et al., 2002]. This computer program displays portrait pictures of actors with the typical facial expression of one of the six basic emotions (anger, sadness, disgust, fear, happiness, and surprise) for exactly 300 ms each. Subjects then have to decide quickly and accurately which of the six emotions they have just seen (forced-choice). The FEEL score takes the correctness and reaction time of the answer into consideration and ranges from 0 to 84 points. The score per emotion ranges from 0 to 14 points.

Additionally, we calculated error scores for each of the six emotions. An error score for anger, for example, gives a total number of items (pictures) a subject wrongly labeled as "anger." This is a specific indicator that assesses subjects' answer behavior independently of general performance. The FEEL Test has already been used with 400 healthy subjects and shows the highest reliability coefficient (with a Cronbach's α of $r = .77$) of all tests of this kind published so far [Kessler et al., 2002].

Prior to data analysis, the normal distribution was checked for all data using Kolmogorov–Smirnov tests. Except for the total FEEL score, all the other data obtained were not normally distributed and hence needed nonparametric statistics for further analysis. For comparison of mean differences we used the Mann–Whitney U test and Spearman's coefficients for correlations. We calculated all significance thresholds using two-tailed tests, and the significance level was set to .01 due to the number of comparisons. We performed post hoc analyses comparing FEEL scores, controlling for anxiety and depression, parametrically using analysis of covariance (ANCOVA). Table 1 shows recognition, error scores, BDI, and STAI results comparing patients with PD and controls.

RESULTS AND DISCUSSION

Confirming our assumption, patients with PD showed a general deficit in emotion recognition [FEEL score] compared to controls. Considering individual emotions, specific recognition of sadness and anger was impaired. Although both groups committed similar types of errors interpreting emotions, patients with PD showed a tendency to interpret nonanger emotions as anger [higher anger error score; $P = .03$]. As expected, patients had significantly higher levels of anxiety and depression. In patients with PD, depression had a stronger influence on emotion recognition ($r = -.52$; $P < .001$) than State Anxiety ($r = -.35$; $P < .05$) or Trait Anxiety ($r = -.37$; $P < .05$). In controls, recognition scores, STAI scores, and BDI scores were not significantly correlated.

When controlling for depression in a post hoc ANCOVA, the effect of group is no longer significant for emotion recognition ($F = 0.456$; $P = .5$). The same is true when controlling for State Anxiety ($F = 1.281$; $P = .3$) or Trait Anxiety ($F = 1.172$; $P = .3$).

The general emotion recognition deficit of patients with PD is in line with results from studies of children with social phobia [Simonian et al., 2001] and depressed patients with comorbid anxiety [Bouhuys et al., 1997; Suslow et al., 2004]. Although it is possible

TABLE 1. Comparison of FEEL score, scores per emotion, error scores, BDI, and STAI between patients with PD = ($N = 37$) and controls ($N = 43$)

	Group	M	SD	Mann–Whitney U text significance (two-tailed)
FEEL	PD	37.5	10.3	484.0
Score	Controls	45.4	10.8	$P = .003^{**}$
Fear	PD	4.4	2.3	667.0
	Controls	5.2	2.7	$P = .211$
Happiness	PD	8.9	2.7	640.0
	Controls	9.8	2.5	$P = .130$
Surprise	PD	7.0	2.4	598.0
	Controls	8.2	3.0	$P = .054$
Disgust	PD	5.9	2.4	551.0
	Controls	7.6	3.3	$P = .017^{*}$
Sadness	PD	4.8	3.2	513.5
	Controls	6.5	2.6	$P = .006^{**}$
Anger	PD	6.5	2.5	415.5
	Controls	8.0	1.8	$P < .001^{***}$
Fear error	PD	2.2	2.5	683.0
	Controls	1.5	1.6	$P = .265$
Happiness error	PD	0.3	1.0	723.5
	Controls	0	0	$P = .156$
Surprise error	PD	2.4	3.3	739.5
	Controls	1.3	1.2	$P = .577$
Disgust error	PD	2.6	1.8	702.0
	Controls	2.1	1.5	$P = .358$
Sadness error	PD	0.4	0.6	653.5
	Controls	0.1	0.4	$P = .038^{*}$
Anger error	PD	3.1	2.1	572.5
	Controls	2.1	1.8	$P = .029^{*}$
BDI score	PD	22.5	11.6	41.0
	Controls	4.0	4.4	$P < .001^{***}$
State Anxiety	PD	63.2	10.7	33.0
	Controls	35.8	7.0	$P < .001^{***}$
Trait Anxiety	PD	58.5	9.5	59.5
	Controls	33.5	7.2	$P < .001^{***}$

$^{*}P < .05$ (tendency due to number of comparisons); $^{**}P < .01$; $^{***}P < .001$.

that patients with PD showed general cognitive deficits (e.g., reduced information-processing speed) compared to controls, which could have confounded our findings, this is not very likely, because both groups did not differ significantly in their reaction times over all emotions. Still, there was no cognitive task implemented to test thoroughly this possible confound.

Although only a tendency, the fact that patients with PD tend to misinterpret nonanger emotions as anger requires further investigation. This effect could be associated with anxiety patients' reported biases toward social stimuli as being threatening [Beck et al., 1985; Margraf et al., 1993; Mogg and Bradley, 2002]. Why did patients with PD specifically do worse in recognizing anger and sadness (on a much lower level)? Studies with other patient groups showed a heterogeneous picture considering specific deficits in emotion recognition. Interestingly, there is some evidence that patients with depression seem especially impaired in recognizing anger [Mendlewicz et al., 2005], but other authors reported general recognition deficits for depression [Persad and Polivy, 1993], leaving the question of specifics open. Another result is the strong effect of depressive symptoms on emotion recognition, although none of the patients with PD met the criteria for a depressive disorder. In line with the reported emotion recognition deficits in primarily depressed patients, the depression component of PD may be primarily influencing emotion recognition. Nevertheless, anxiety symptoms do influence recognition significantly. This is especially interesting since Bouhuys et al. [1997] found the anxiety component in patients with depression to be influential in terms of emotion recognition. The high comorbidity of the two conditions makes it difficult for clinicians actually to decide which of the two causes patients' impaired emotion recognition. Interestingly, anxiety, depression, and emotion recognition were completely independent of each other in controls. This stands in contrast to the results of Surcinelli et al. [2006], who found that high

trait anxiety in healthy adults is associated with *improved* fear recognition. We argue that our results are due to a "bottom" effect, where only anxiety and depression scores in a pathological range seriously affect a basic task such as emotion recognition.

REFERENCES

Beck AT, Emery G, Greenberg RL. 1985. Cognitive structures and anxiogenic rules. In: Beck AT, Emery G, Greenberg RL, editors. Anxiety disorders and phobias. New York: Basic Books. p 54–66.

Bouhuys AL, Geerts E, Mersch PP. 1997. Relationship between perception of facial emotions and anxiety in clinical depression: Does anxiety-related perception predict persistence of depression? J Affect Disord 43:213–223.

Bradley BP, Mogg K, White J, Groom C, de Bono J. 1999. Attentional bias for emotional faces in generalized anxiety disorder. Br J Clin Psychol 38:267–278.

Ekman P. 1999. Basic emotions. In: Dalgleish T, Power M, editors. Handbook of cognition and emotion. Sussex, UK: Wiley. p 134–157.

Ekman P, Campos J, Davidson RJ, de Waals F. 2003. Emotions inside out. New York: Ann NY Acad Sci.

Hautzinger M, Bailer M, Worall H, Keller F. 1994. Beck-Depressions-Inventar (BDI) [Beck Depression Inventory (BDI)]. Bern, Switzerland: Huber.

Kessler H, Bayerl P, Deighton RM, Traue HC. 2002. [Facially expressed emotion labeling [FEEL]: A computer test for emotion recognition]. Verhaltenstherapie und Verhaltensmedizin 23: 297–306.

Laux L, Glanzmann P, Schaffner P, Spielberger CD. 1981. Das Stait-Trait-Angstinventar [The State–Trait Anxiety Inventory]. Weinheim, Germany: Beltz.

Margraf J, Barlow DH, Clark DM, Telch MJ. 1993. Psychological treatment of panic: Work in progress on outcome, active ingredients, and follow-up. Behav Res Ther 31:1–8.

Mendlewicz L, Linkowski P, Bazelmans C, Philippot P. 2005. Decoding emotional facial expressions in depressed and anorexic patients. J Affect Disord 89:195–199.

Mikhailova ES, Vladimirova TV, Iznak AF, Tsusulkovskaya EJ, Sushko NV. 1996. Abnormal recognition of facial expression of emotions in depressed patients with major depression disorder and schizotypal personality disorder. Biol Psychiatry 40:697–705.

Mogg K, Bradley B. 2002. Selective processing of non-verbal information in anxiety: Attentional biases for threat. In: Philippot P, Coats EJ, Feldman RS, editors. Nonverbal behavior in clinical settings. New York: Oxford University Press. p 54–73.

Mogg K, Philippot P, Bradley BP. 2004. Selective attention to angry faces in clinical social phobia. J Abnorm Psychol 113:160–165.

Persad SM, Polivy J. 1993. Differences between depressed and nondepressed individuals in the recognition of and response to facial emotional cues. J Abnorm Psychol 102:358–368.

Simonian SJ, Beidel DC, Turner SM, Berkes JL, Long JH. 2001. Recognition of facial affect by children and adolescents diagnosed with social phobia. Child Psychiatry Hum Dev 32:137–145.

Surcinelli P, Codispoti M, Montebarocci O, Rossi N, Baldaro B. 2006. Facial emotion recognition in trait anxiety. J Anxiety Disord 20:110–117.

Suslow T, Dannlowski U, Lalee-Mentzel J, Donges US, Arolt V, Kersting A. 2004. Spatial processing of facial emotion in patients with unipolar depression: A longitudinal study. J Affect Disord 83: 59–63.