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More Evidence for Generalized Poor Performance in Facial Emotion Perception in Schizophrenia

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Previous studies showing that schizophrenic patients have a deficit in the ability to perceive facial expressions of emotion in others often have not used a differential deficit design and standardized measures of emotion perception. Using standardized and cross-validated measures in a differential deficit design, S. L. Kerr and J. M. Neale (1993) found no evidence for a deficit specific to emotion perception among unmedicated schizophrenic patients. The present study replicated and extended the findings of Kerr and Neale in a sample of medicated schizophrenic patients. Results showed that medicated patients performed more poorly than controls overall; however, they performed no worse on facial emotion perception tasks than on a matched control task. These findings support Kerr and Neale's conclusion that schizophrenic patients do not have a differential deficit in facial emotion perception ability. Future research should examine the nature of schizophrenic patients generalized poor performance on tests of facial emotion perception.

Previous research suggests that schizophrenic patients may have a deficit in the ability to perceive emotional expression in others. Specifically, several studies have shown that they perform more poorly than controls on tests of facial emotion identification (Dougherty, Bartlett, & Izard, 1974; Mandal & Palchoudhury, 1985; Mandal & Rai, 1987; McCown, Johnson, Silverman, & Austin, 1988; Morrison, Bellack, & Bashore, 1988; Muzekari & Bates, 1977; Walker, Marwit, & Emory, 1980). However, researchers did not use a differential deficit design, which makes it difficult to rule out the possibility that schizophrenic patients' deficit in emotion perception reflects generalized poor performance rather than a specific impairment in the recognition of facial expressions of emotion. Specifically, a differential deficit design requires that performance on a facial emotion perception task be compared to performance on a psychometrically matched control task. (Although an extended discussion of differential deficit design is beyond the scope of this article, the interested reader is encouraged to consult Chapman & Chapman, 1978.)

The importance of using a differential deficit design in emotion perception research is underscored by the fact that with one exception (Walker, McGuire, & Bettes, 1984), the studies that have done so have not yielded evidence that schizophrenic patients have a deficit specific to facial emotion perception (Feinberg, Rifkin, Schaffer, & Walker, 1986; Gessler, Cutting, Frith, & Weinman, 1989; Heimberg, Gur, Erwin, Shtasel, & Gur, 1992; Mueser et al., 1996; Novic, Luchins, & Perline, 1984; Walker et al., 1984). That is, while schizophrenic patients performed more poorly than controls on the facial emotion tasks, they performed equally poorly on the nonemotional facial control tasks. However, methodological weaknesses in these studies such as the failure to use standardized or systematically matched tasks may have obscured evidence for a differential deficit.

To address these methodological problems, Kerr and Neale (1993) used a differential deficit design with standardized and cross-validated measures of emotion perception, which were psychometrically matched to a control task of nonemotional facial perception.[1] Kerr and Neale found that unmedicated schizophrenic patients performed more poorly than controls on both the experimental emotion tasks and the nonemotional control task. Furthermore, the patients did not perform significantly worse on the emotion tasks than they did on the control task. This finding is consistent with the notion that schizophrenic patients do not have a deficit specific to emotion perception, but rather, a more generalized performance deficit.

The primary objective of the present study was to replicate and extend the findings of Kerr and Neale (1993) using the same standardized, cross-validated, and psychometrically matched tasks with a sample of medicated schizophrenic patients. Specifically, we examined whether medicated schizophrenic patients would demonstrate a differential deficit in facial emotion perception. Because medication affects certain aspects of cognitive functioning, it was unclear whether

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[1] Kerr and Neale (1993) also included tests of vocal emotion perception and a nonemotional vocal control task. These are not discussed because they are not relevant to the present study.

medicated schizophrenic patients would demonstrate the same pattern of deficits as Kerr and Neale's unmedicated patients. Although the present study does not permit us to draw firm conclusions about the effect, if any, of medication on schizophrenic patients' performance on facial emotion perception tasks (cf. Spohn & Strauss, 1989), obtaining results similar to those of Kerr and Neale in a different sample would provide further support that schizophrenic patients do not have a differential deficit in the ability to perceive facial expressions of emotion, thus further supporting the notion that schizophrenic patients' poor performance on emotion perception tasks reflects a more generalized deficit.

Method

Participants

Participants were 23 medicated male chronic schizophrenic inpatients who met diagnostic criteria of the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev.; *DSM–III–R*; American Psychiatric Association, 1987) for schizophrenia and 22 male controls. Of the schizophrenic patients, two were participants in a larger study on emotion and schizophrenia conducted at the Nashville Veterans Administration Hospital and were paid for their participation in the larger study.[2] The other 21 schizophrenic participants were inpatients at the Alvin C. York Medical Center in Murfreesboro, Tennessee. Controls with no personal or family history of psychopathology were recruited both from the community, through flyers and newspaper advertisements, and from the nonprofessional staff at Vanderbilt University, the Nashville Veterans Administration Hospital, and the Alvin C. York Medical Center and were paid $10 for their participation.

Tasks

Two emotion perception tasks were used in this study, a facial emotion identification task and a facial emotion discrimination task, both of which were developed by Kerr and Neale (1993) from photographs of facial emotion originally developed by Ekman and Friesen (1976) and Izard (1971). Both emotion tasks consist of black and white photographs that have been transferred to videotape and depict six different emotions: happy, sad, angry, afraid, surprised, and ashamed.

The control task used was the Test of Facial Recognition, Short Form (Benton, Hamsher, Varney, & Spreen, 1983; Benton, VanAllen, Hamsher, & Levin, 1978; Levin, Hamsher, & Benton, 1975). This test is made up of black and white photographs of nonemotional faces.

Procedure

Participants were videotaped while being interviewed using the Brief Psychiatric Rating Scale (BPRS; Overall & Gorham, 1962), which was later rated for overall psychiatric symptomatology. They were alternately assigned to one of two orders of task administration such that half of them performed the control task first and the other half performed the experimental tasks first. The experimental emotion perception tasks were presented in invariant order such that all participants performed the facial emotion identification task before the facial emotion discrimination task.

In the emotion identification task, 19 pairs of faces appeared for about 15 s each on a 13-in. (33.02-cm) television monitor situated about 6 feet in front of the participant. Participants were instructed to look at each face, decide which of the six listed emotions was being expressed on each individual's face, and then indicate their responses by circling either *happy*, *sad*, *angry*, *afraid*, *surprised*, or *ashamed* on their answer sheets.

The emotion discrimination task was presented in the same mode as the emotion identification task; however, two faces at a time appeared on the TV monitor, and there were 30 rather than 19 trials. Participants were instructed to look at each pair of faces and determine whether the two individuals shown were displaying the same or different emotions on their faces. Participants recorded their answers by circling either *same* or *different* on their answer sheets.

The control task, the Test of Facial Recognition, required that participants look at a target face and then select from an array of six choices the face or faces that depicted the same individual as the target. The test had 13 trials; the first 6 trials had only one matching face in the array of six, and participants were instructed to choose only one picture from the choices. For the last 7 trials, there were three matching faces in the array for each target face, and participants were instructed to select three pictures from the choices. Participants indicated their choices by either pointing or saying aloud the numbers appearing below the faces.

Table 1
Demographic Characteristics of Schizophrenia and Control Groups

Characteristic	Schizophrenia (n = 23)		Control (n = 22)	
	N		*N*	
Race				
White	13		10	
Black	10		11	
Hispanic	0		1	
Marital status				
Single	10		6	
Divorced–separated	6		2	
Married	5		12	
	M	*SD*	*M*	*SD*
Age	42.43	7.29	40.55	7.81
Education	12.86	1.52	13.36	2.17
Dose neuroleptic (CPZ equivalent)	1,148.67	639.17		
Total BPRS score	22.04	9.53		
Number of prior hospitalizations	8.57	7.84		
Total duration of prior hospitalizations (weeks)	26.40	19.68		

Note. CPZ = chlorpromazine; BPRS = Brief Psychiatric Rating Scale.

Results

Demographic information for both the schizophrenic and control groups is presented in Table 1. The two groups did not differ significantly in either age, $t(43) = .84$, $p = .41$, or years of education, $t(42) = -.88$, $p = .38$. In addition, chi-square tests indicated that the two groups did not differ in racial makeup, $\chi^2(2, N = 45) = 1.42$, $p = .49$; however, there was a marginally significant trend for the control group to have a higher frequency of married individuals than the schizophrenic group,

[2] Results did not differ when analyses were conducted excluding these two patients.

Table 2
Descriptive Statistics and Reliability of Emotion Perception and Control Tasks

Task	Schizophrenia			Control		
	M	*SD*	α	*M*	*SD*	α
Facial emotion identification	10.70	3.62	.75	12.32	2.25	.28
Facial emotion discrimination	23.22	3.78	.41	25.23	3.10	.70
Test of Facial Recognition	21.52	2.83	.51	22.09	2.43	.46

Note. The maximum scores are 19 for the facial emotion identification test, 30 for the facial emotion discrimination test, and 27 for the Test of Facial Recognition.

$\chi^2(3, N = 41) = 6.15, p = .10$. BPRS scores, neuroleptic dose, and duration of hospitalization were not significantly correlated with performance on any of the face perception tasks. However, there was a significant positive correlation between number of previous hospitalizations and performance on the facial emotion identification task, $r = .45, p < .02$.

Table 2 presents descriptive statistics and reliability coefficients for each of the tasks for both groups. Similar to Kerr and Neale's (1993) control sample, internal consistency was moderately high for the facial emotion discrimination test and moderate for the control Test of Facial Recognition among our controls. In contrast, the reliability of the facial emotion identification test was poor in this sample, compared to the moderately high reliability of this task in Kerr and Neale's sample. Among patients in this sample, the facial emotion identification task had moderately high reliability, which was comparable to that obtained by Kerr and Neale. Reliabilities for both the facial emotion discrimination task and the Test of Facial Recognition were somewhat lower.

Differences Between Groups

Scores on all three tasks were standardized to facilitate comparisons across tasks because each is scored on a different scale. The two groups were then compared on the basis of their standardized scores on each of the three tasks. A 2 (Group: schizophrenic, control) × 3 (Task: facial emotion identification, facial emotion discrimination, facial recognition) repeated measures multivariate analysis of variance (MANOVA) was performed, where group was the between-subjects factor and task was the within-subjects factor. The group main effect was significant, $F(1, 43) = 3.93, p = .05$, indicating that schizophrenic patients performed more poorly across the three tasks relative to the controls. However, the Group × Task interaction was not significant, $F(2, 86) = 0.62, p = .54$, indicating that the pattern of performance on the tasks did not differ for patients and controls. That is, schizophrenic patients tended to do equally more poorly than controls on each of the three tasks.

Correlations Among Tasks

Among controls, the correlation between the two emotion perception tasks approached significance, $r = .31, p = .08$. In contrast, neither the facial emotion identification task nor the facial emotion discrimination task were correlated with the control task ($r = .15$, *ns*; $r = .19$, *ns* respectively). Among schizophrenic patients, there was a significant positive correlation between the two emotion perception tasks, $r = .43, p < .02$. In addition, there was a significant positive correlation between the facial emotion identification task and the control Test of Facial Recognition, $r = .46, p < .02$, and the correlation between facial emotion discrimination and the Test of Facial Recognition approached significance, $r = .32, p = .07$. Although correlations between the emotion tasks and the control task were higher among schizophrenic patients than controls, transforming correlation coefficients to Fisher *Z*'s revealed that these differences were not statistically significant.

Discussion

The present study found that although medicated schizophrenic patients performed significantly worse than controls on three facial perception tasks, they did not demonstrate a differential deficit in the ability to accurately identify and discriminate facial expressions of emotion. That is, schizophrenic patients performed as poorly relative to controls on a control task of nonemotional facial perception as they did on the two emotion perception tasks. Thus, using a separate sample of medicated patients, the present study replicates the findings of Kerr and Neale (1993).

Although correlations among the face perception tasks did not significantly differ between schizophrenic patients and controls, the pattern of intercorrelations among tasks was consistent with Kerr and Neale's (1993) findings, providing further support that schizophrenic patients' poor performance is better interpreted as a generalized rather than a specific deficit. Specifically, among controls, but not schizophrenic patients, the emotion tasks were uncorrelated with the control task, suggesting that these two types of tasks are tapping distinct constructs among controls but not schizophrenic patients.

In contrast to Mueser et al. (1996), we did not find evidence that performance on any of the face perception tests was related to symptomatology or illness chronicity. In fact, greater number of hospitalizations was associated with better performance on the test of facial emotion identification, and other indices of illness chronicity and symptom severity were not significantly correlated with performance on any of the face perception tasks. It is interesting to note that Kerr and Neale (1993), whose schizophrenic sample was similar to ours in terms of chronicity, did not find evidence for a correlation between number of previous hospitalizations and task performance. Thus, the relationship between chronicity and performance on tests of facial perception remains unclear and should continue to be examined in future research.

Because the controls were paid for their participation, we cannot rule out the possibility that payment induced better performance among the controls compared to schizophrenic patients. However, given that $10 is a fairly modest incentive, and because it was our experience that schizophrenic patients were generally enthusiastic about participating in the study without payment, this possibility seems unlikely.

It is important to note that the term *generalized poor performance* as it is used here indicates a performance deficit at any

level more generalized than facial emotion perception ability. That is, poor performance on both an emotion perception and a nonemotional facial recognition task indicates only that the deficit is not at the level of emotion perception. Although there is of course the possibility that the deficit can be explained by poor performance on tasks of any kind, alternatively, the deficit may be at a more specific level, such as visual selective attention or even facial processing. One promising avenue for future research in this area is to explore the nature of the underlying deficit that causes schizophrenic patients to do poorly on both types of tasks. For example, to test the hypothesis that the deficit is specific to facial processing, researchers might compare schizophrenic patients' performance on a facial matching task such as the Test of Facial Recognition and a matching task consisting of complex geometric stimuli.

Moreover, because the present study did not include a direct comparison of medicated and unmedicated schizophrenic patients, we cannot draw conclusions about the effects of medication on schizophrenic patients' performance on facial perception tests. Ideally, future research should test patients at two different time points—one while on medication and the other while medication free. Knowledge of how, if at all, medication affects performance on facial perception tests would help to inform researchers about the nature of schizophrenic patients' deficit in this area.

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