Stability of Emotional Responding in Schizophrenia

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Empirical research has shown that schizophrenic patients exhibit fewer facial expressions yet report experiencing similar levels of emotions compared to nonpatients. However, it remains unclear whether medication dampens expressivity or other components of emotional responding and whether emotional responding is stable across time. In this study, schizophrenic patients viewed emotionally evocative stimuli and participated in a clinical interview on two occasions: when they were off- and on-medication. Medication did not significantly affect any component of emotional responding among patients. Moreover, both schizophrenic patients' and nonpatient controls' expressivity and reports of emotional experience were significantly correlated at the two tests, suggesting that emotional responding is stable across time. Implications for understanding emotional responding in schizophrenia are also discussed.

In the last 10 years there has been a renewed empirical interest in the emotional features of schizophrenia (Berenbaum & Oltmanns, 1992; Dworkin, Clark, Amador, & Gorman, 1996; Earnst et al., 1996; Gaebel & Wolwer, 1992; Krause, Steimer, Sanger-Alt, & Wagner, 1989; Kring, Kerr, & Earnst, 1999; Kring, Kerr, Smith, & Neale, 1993; Kring & Neale, 1996; Mattes, Schneider, Heimann, & Birbaumer, 1995; Schneider et al., 1992). The most consistent and robust finding to emerge from these studies is that schizophrenic patients are less emotionally expressive than nonpatients are. Clinically, this diminished expressivity resembles the symptom of flat affect that is defined primarily by a diminished outward expression of emotion (e.g., Andreasen, 1982).

Unfortunately, an impediment to further investigation of the emotional features of schizophrenia in general, and affective flattening in particular, has been distinguishing diminished expressivity from akinesia, one of the most common and troubling side effects of neuroleptic medication (Blanchard & Neale, 1992; Carpenter, Heinrichs, & Alphs, 1985; Marder, Wirshing, & Van Putten, 1991; Sommers, 1985; Van Putten & Marder, 1987; Van Putten, May, & Wilkins, 1980). Although clinical descriptions of akinesia vary, it is typically defined by characteristics that are virtually identical to descriptions of affective flattening; including diminished facial expression, non-spontaneous speech, and few gestures. It is often difficult to determine whether the diminished expressiveness, seen in some schizophrenic patients, is a symptom of the disorder or a side effect of the medication. In addition, the items on clinical rating scales used to rate akinesia are often also used to assess flat affect. Thus, finding positive correlations between ratings of negative symptoms (e.g., flat affect) and akinesia is not uncommon, because the instruments used to assess them contain many of the same items (Prosser et al., 1987). This suggests the need for a more comprehensive, behavioral assessment of expressive behavior and emotional responding.

A More Comprehensive Look at Emotion in Schizophrenia

Affect or emotion can be best understood conceptually in terms of a three component model that includes overt expression, subjective experience, and physiological response (e.g., Ekman, 1992; Lang, 1995; Levenson, 1994). Thus, investigators and clinicians who seek to understand emotional responding in schizophrenia must move beyond clinical rating scales that only assess one component of emotion. In fact, recent empirical studies of emotion in schizophrenia have found a disjunction among these components. For example, a number of studies have found that, compared to nonpatient controls, schizophrenic patients are less facially expressive of both positive and negative emotions, yet they report experiencing as much positive and negative emotion while viewing emotion-eliciting films or pictures (Berenbaum & Oltmanns, 1992; Dworkin et al., 1996; Kring et al., 1993; Kring & Neale, 1996). Other studies have found that schizophrenic patients are less expressive in social interactions compared to nonpatient controls (e.g., Krause et al., 1989; Mattes et al., 1995) and other patient groups (e.g., Parkinson's disease, depression, alcohol abuse) that have features similar to negative symptoms (Davison, Firth, Harrison-Read, & Johnstone, 1996; Gaebel & Wolwer, 1992; Pitman, Kolb, Orr, & Singh, 1987), and that despite their diminished expressivity they report experiencing more negative emotion in these social interactions (Krause, Steimer-Krause, & Hufnagel, 1992).

Unfortunately, a number of these studies of emotional responding were conducted when patients were on neuroleptic medication. The fact that schizophrenic patients' reports of experienced emotion and psychophysiological reactivity are comparable to nonpatients' lead some to suggest that diminished expressivity is a problem more likely attributable to medication side effects,

such as akinesia or other neuromotor dysfunction (e.g., Dworkin et al., 1996). However, it remains unclear what effects, if any, medication has on emotional expressivity and other emotion components among schizophrenic patients.

Assessing Medication Effects

A number of strategies have been employed to assess medication effects on various performance measures. Perhaps the most common method has been to examine the correlation between equated medication dosage levels (e.g., chlorpromazine equivalents) and the dependent variables of interest. Although this approach provides useful descriptive information about medication dosage, it does not take into account the differential impact of different types of medications (Blanchard & Neale, 1992). A second common approach is to first assess medication side effects with clinical rating scales and then to include these scores as a covariant in statistical analyses, to partial out the results of side effects on performance. Rating scales for akinesia contain items that are virtually identical to items on scales designed to assess affective flattening. Thus, relying solely on clinical rating scales provides for an incomplete assessment. Moreover, because akinesia can occur without the other extrapyramidal symptoms, such as rigidity or tremors, rating-scale assessments are not sufficient to distinguish akinesia from flat affect.

In order to assess the effects of medication on expressive behavior and emotional responding, one of the most powerful designs is a within subjects design (Blanchard & Neale, 1992; Rifkin, Quitkin, & Klein, 1975) referred to by Spohn and Strauss (1989) as a counterbalanced crossover design. In this design, the same patients are tested both on and off medication, with roughly half of the sample being off medication at the first testing and then re-tested while on medication, and the other half of the sample being on medication at the first testing and then re-tested while off medication. The within subjects aspect of the design allows patients to serve as their own controls, and the counterbalancing aspect of the design controls for order effects. Using this design, if diminished expressivity is seen when the same patients are taking medication and when they are withdrawn from medication, the diminished expressivity is a likely a part of the disorder (that may be treatment resistant). On the other hand, if diminished expressivity remits when patients are withdrawn from medication, the diminished expressivity is likely a side effect of medication. Finally, if diminished expressivity exacerbates when patients are withdrawn from medication, one might conclude that medication is effectively treating a symptom of the disorder.

This study sought to answer two major questions using a more comprehensive assessment of expressive behavior and emotional responding: how does medication affect components of emotional responding? And are the components of emotional responding stable across time? Assessments of emotional responding included ratings of observable facial expressivity and self-reports of emotional experience in response to emotionally evocative stimuli, in addition to the more standard clinical interview that does not necessarily elicit emotion.

Method

Overview

Using the counterbalanced crossover design, all participants were tested on two occasions, approximately 5 months apart (mean number of days between tests = 160.90, SD = 48.82). The duration between tests was equivalent for patients and controls. One occurred when they were taking neuroleptic medication; the other test occurred when they were off medication (median number of days medication-free = 17; minimum = 6; maximum = 98). To ensure that testing time was not confounded with medication status at time of testing, approximately 50% of the patients were off medication on the first test, and the other 50% were on medication at the first test. Patients were identified for the study in one of two ways: patients who were currently off medication were referred for testing and then re-tested after medication was re-instated (n = 7); and patients who were identified by their treating psychiatrist and referred for testing either while on or off medication, and were then re-tested later following either a medication washout period or the reinstatement of their medication (n = 8). The procedure on both tests was identical for all participants, except that they viewed a different set of film clips at each session.

Participants

Fifteen male patients with diagnoses of either schizophrenia (n = 13) or schizoaffective disorder (n = 2), from either the inpatient unit or outpatient schizophrenia clinic of the Nashville Veterans Administration Medical Center, and 15 nonpatient controls recruited from the community (from advertisement or hospital staff) participated. Diagnoses (*DSM-IV*; American Psychiatric Association, 1994) were determined using the Structured Clinical Interview for Axis I *DSM-IV* Disorders (SCID-I/P; First, Spitzer, Gibbon, & Williams, 1994) and extensive chart review. Nonpatient controls were interviewed to determine that they had no personal or family history of psychopathology. None of the participants had a history of neurological trauma/disease or seizure disorder. Demographic information for all participants and additional clinical information for the patients are presented in Table 1. The patient and nonpatient groups did not significantly differ in age, years of education, or racial composition. Control participants were more likely to be married, and patient participants were more likely to be divorced or separated [χ^2 (2, n = 30) = 12.00, p < .01]. Nearly all patients were taking traditional neuroleptics, including thorazine (n = 1), stellazine (n = 2), haloperidol (n = 3), prolixin (n = 4), navane (n = 1), and trilafon (n = 3). One patient was taking clozapine.

Apparatus

Film stimuli. In the initial test, participants were randomly assigned to watch one of two orders from one of two stimulus tapes, each of which contained one neutral, two positive, and two negative emotional film clips. The

TABLE 1
DEMOGRAPHIC AND CLINICAL CHARACTERISTICS

	Schizophrenic Patients		Nonpatient Controls	
	M	SD	M	SD
Age	40.53	8.42	41.60	8.59
Education (yrs)	11.67	2.55	13.13	1.30
Race (n)				
Caucasian		9		7
African American		6		8
Marital Status (n)				
Married		3		9
Divorced/separated		8		4
Single		4		2
Neuroleptic dose (CPZ equiv.)	617.75	874.51		
No. of prior hospitalizations	7.53	9.56		
AIMS				
Off medication	1.17	1.12		
On medication	1.62	1.37		
RSES				
Off medication	1.67	1.87		
On medication	1.31	1.32		

Note. CPZ equiv.: chlorpromazine equivalence; AIMS: Abnormal Involuntary Movement Scale; RSES: Rating Scale for Extrapyramidal Symptoms.

neutral clips comprised scenes of trains. Happy clips reflected slapstick comedy; disgust clips showed various bugs and bloody animals, and sad clips showed young children watching their parent die. The clips were taken from contemporary films and have been successfully used in other studies with psychiatric patients (e.g., Earnst et al., 1996; Kring et al., 1993; Kring & Neale, 1996). Each film clip was between 3 and 6 minutes in length. In the second test, participants watched film clips in the same order, but from the other stimulus tape.

Self-report of emotional experience. A number of researchers have argued that self-reported emotion can be represented in a circular structure (circumplex) comprising two bipolar dimensions (e.g., Russell, 1980; Watson & Tellegen, 1985). One such representation focuses on two dimensions that reflect the overall valence of emotion (pleasant, unpleasant) and the arousal or activation of emotion (high, low), respectively (Larsen & Diener, 1992; Russell). Although previous studies of emotional responding in schizophrenia have assessed reports of experienced emotion, they have not used measures that distinguish the valence and activation dimensions of emotion. These studies (Kring et al., 1993; Kring & Neale, 1996) assessed experienced emotion

using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), which contains adjectives reflecting a combination of activation and valence (activated pleasant and activated unpleasant items). Thus, determining whether patients differ in their independent reports of valence and activation is not possible with the PANAS. For the present study, participants completed a 44-item emotion adjective checklist derived from Larsen and Diener's Self-Report Affect Circumplex after viewing each film. The measure contained adjectives representing the valence and activation dimensions of emotion, and four scales were created: unpleasant, pleasant, high activation, and low activation.

Clinical rating scales. Two trained raters who were unaware of the participants' status, diagnosis, and time of testing made all clinical ratings for each participant. Flat affect ratings were made using a modified version of the affective flattening subscale of the Scale for the Assessment of Negative Symptoms (SANS; Andreasen, 1983).[1] Ratings of general symptomatology were made using the Brief Psychiatric Rating Scale (BPRS; Overall & Gorham, 1988) using a 0 to 6 scale (Thompson, Buckley, & Meltzer, 1994). Ratings of involuntary facial, extremity, and trunk movements were made using the Abnormal Involuntary Movement Scale (AIMS; Guy, 1976), and ratings of extrapyramidal symptoms (EPS) were made using the Rating Scale for Extrapyramidal Symptoms (RSES), which includes facial expression (masking), tremor, akinesia, rigidity, akathisia, and dystonia items (DiMascio, Bernardo, Greenblatt, & Marder, 1976). We chose the RSES not only because the scale contained items to assess facial masking and akinesia, but also because these items were worded differently than items on the SANS affective flattening subscale.

Procedure

After completing the informed consent procedures, the experimenter conducted a brief, semi-structured interview in which the schizophrenic patients were asked about demographic information and the history of their illness, and the controls were asked about demographic information, their general health, and employment history. A second interview was then conducted during which questions about specific symptomatology were asked. Both interviews were videotaped and later rated for flat affect using the SANS, and for general levels of symptomatology using BPRS.

After the interview, participants were given instructions for the film-viewing task. Specifically, participants were told that the experimenter was interested in how movies affected their uncontrollable, physiological responses.[2] Participants viewed the film clips approximately 6 feet from a color televi-

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[1] SANS ratings includes the following items: unchanging facial expression, paucity of expressive gestures, poor eye contact, affective nonresponsivity, and lack of vocal inflections.

[2] Psychophysiological measures, including skin conductance and electromyography were also obtained, but were not the focus of this investigation.

sion with VCR, and were videotaped throughout this task. The experimenter and the camera were positioned behind a partition so that the testing procedure was as unobtrusive as possible. After each film, participants answered three brief questions about the film clip to assess attention and understanding. Following these questions, participants completed the emotion self-report measure.

Participants' videotaped facial expressions were coded using the Facial Expression Coding System (FACES; Kring & Sloan, 1991). This coding procedure has been described in detail elsewhere (Kring, Alpert, Neale, & Harvey, 1994; Kring et al., 1993; Kring, Smith, & Neale, 1994). Briefly, coders rate the frequency, intensity, and duration of both positive and negative expressions. Coding was conducted by two trained undergraduate raters who were unaware of the hypotheses of the study and to the names and nature of the film clips. As in prior studies, agreement between raters was high, with an average intraclass correlation (ICC; Case 2 formula from Shrout & Fleiss, 1979) of .93.

Results

Symptom and Medication Side Effects Rating Scales

Agreement between raters on the SANS flat affect ratings as assessed by ICC (Shrout & Fleiss, 1979) was high for both patients (ICC = .80) and controls (ICC = .85). A 2 (group: patient, control) $\times$ 2 (time: off medication for patients or time 1 for controls, on medication or time 2) repeated measures MANOVA was conducted with SANS scores as the dependent variable. The group main effect was significant $[F(1, 28) = 18.09, p < .001, ES = .39]$[3] indicating that patients were more affectively flat than controls. Neither the time nor the group $\times$ time effects were significant. Thus, schizophrenic patients' ratings of flat affect were similar when they were on ($M = 10.07$, $SD = 3.63$) and off ($M = 8.60, SD = 5.48$) medication, $t(14) = 1.44, ns$. Similarly, nonpatients' ratings of flat affect did not significantly differ between testing time 1 ($M = 4.57, SD = 3.10$) and testing time 2 ($M = 3.47$, $SD = 2.52$). The correlation between SANS ratings on the two tests was significant for both patients, $r(13) = .69, p < .01$ and controls, $r(13) = .44, p <$ .05. Thus, although patients were more affectively flat than controls, this symptom remained stable across changes in medication status.

Agreement for the BPRS ratings was also high, ICC = .94. Although ratings of general symptomatology were slightly less when patients were on medication ($M = 16.50, SD = 6.99$) than when they were off medication ($M = 19.11, SD = 9.33$), the difference between these two assessments was not significant, $t(14) = 0.71, ns$. BPRS ratings on the two tests were signifi-

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[3] Effect sizes (ES) are reported for significant omnibus main effects and interactions. For multivariate analyses, values reflecting small, moderate, and large effect sizes are .02, .15, and .35 respectively (see Cohen, 1988, 1992).

cantly correlated, $r(13) = .91, p < .01$. Although this sample was fairly chronic with respect to the number of previous hospitalizations (see Table 1), the overall level of symptomatology was not extremely severe at either assessment.

Ratings of both tardive dyskinesia and EPS were very low in the sample, indicating that these patients did not have many of side effects that often accompany treatment with neuroleptic medication (see Table 1). In addition, these ratings did not significantly differ at the two testing times.

Behavioral Assessment of Emotional Responding

There were no significant effects involving the order of film presentation or stimulus tape, thus these variables were not included in the analyses reported. In order to determine if patients' and controls' emotional responding differed as a function of their medication status (or time of testing for controls) or diagnostic group, we conducted a series of repeated MANOVA with medication status or time (off, on for patients; time 1, time 2 for controls) and film type (positive, negative, neutral) as within subjects factors, and group (patient, control) as a between subjects factor.[4] Pairwise comparisons were evaluated using Scheffé's procedure (Scheffé, 1953).

Observable Expressivity. The frequency of congruent facial expressions (i.e., positive expressions to the positive films; negative expressions to the negative films; all expressions to the neutral film) served as the dependent variable in a 2 (group) × 2 (time) × 3 (film type) repeated measures MANOVA. The group main effect was significant $[F(1, 28) = 4.22, p = .05, ES = .15]$, indicating that controls displayed more congruent facial expressions than patients did. Neither the time main effect nor the time × film type interaction were significant, suggesting that medication did not significantly affect observable expressivity for patients, nor did controls' expressivity differ across the two testing sessions. The film type main effect was significant, however, $[F(2, 28) = 18.48, p < .001, ES = .58]$. Both patients and controls displayed more positive expressions to the positive films than negative expressions to the negative films and all expressions to the neutral film (p's < .01; see Table 2).

Self-Report. Descriptive statistics for the self-report scales are shown in Tables 3 and 4. Separate 2 (group) × 2 (time) × 3 (film type) repeated measures MANOVAs were conducted for the pleasant, unpleasant, high activation, and low activation self-report scales. Compared to controls, patients did not differ in their reports of pleasant or low activation emotion. However, patients reported experiencing more unpleasant emotion than controls $[F(1, 28) = 8.15, p = .008, ES = .23]$ and they tended to report experiencing more high activation emotion $[F(1, 28) = 3.65, p = .066, ES = .12]$ across all films. Across all scales, however, medication did not affect patients' emotion self-reports.

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[4] For all dependent variables, similar analyses were conducted for patients with time of testing occasion (first, second) rather than medication status as a within subjects factor. No significant main effects or interactions involving time of testing were found.

TABLE 2
Frequency of Congruent Positive and Negative Expressions in Response to Films

	Group							
	Schizophrenia				Control			
	Off Medication		On Medication		Time 1		Time 2	
Film & Expression	M	SD	M	SD	M	SD	M	SD
Positive	5.14	6.92	4.29	9.08	11.07	9.55	9.13	7.13
Negative	0.57	0.65	0.29	0.61	2.33	2.89	2.00	4.84
Neutral	0.04	0.13	0.14	0.36	0.30	0.53	0.17	0.41

Note. Tabled values represent mean number of congruent expressions (number of positive expressions to the positive film).

That is, neither the time main effect nor the time × film type interactions were significant in any of the self-report analyses, suggesting that self-reports of emotional experience did not differ when patients were on or off medication. The group × time interaction was significant only for the pleasant scale, $[F(1, 28) = 4.31, p = .047, ES = .14]$. Follow-up analyses indicated that patients' reports of pleasant emotion did not differ as a function of medication status. Rather, nonpatient controls reported experiencing slightly more pleasant emotion at the first test compared to the second test.

The film type main effects were significant (all $ps < .01$) in all analyses (effect sizes of .63, .55, .54, and .58 for pleasant, unpleasant, high activation, and low activation, respectively) indicating that both patients and controls

TABLE 3
SCHIZOPHRENIC PATIENTS' SELF-REPORT OF EMOTIONAL EXPERIENCE

| | Scale | | | | | | | | | | | |
| | Pleasant | | | Unpleasant | | | High Activation | | | Low Activation | | |
Film	M	SD	α	M	SD	α	M	SD	α	M	SD	α
Positive												
Off	2.59	0.84	.95	1.78	0.72	.95	2.33	0.90	.96	2.16	0.39	.72
On	2.63	0.76	.94	1.69	0.44	.87	2.21	0.63	.91	2.30	0.45	.82
Negative												
Off	1.85	0.57	.89	2.31	0.60	.90	2.57	0.66	.91	1.88	0.48	.85
On	2.02	0.74	.94	2.30	0.67	.91	2.62	0.81	.94	2.01	0.55	.88
Neutral												
Off	2.18	0.71	.88	2.10	0.71	.88	1.86	0.59	.86	2.69	0.57	.70
On	2.26	0.85	.94	1.93	0.62	.83	2.48	0.50	.74	2.61	0.52	.64

Note. Tabled values represent mean rating for each item on the scale. Off = off medication; On = on medication; α = Cronbach's alpha.

TABLE 4
Nonpatient Controls' Self-Report of Emotional Experience

Film	Pleasant			Unpleasant			High Activation			Low Activation		
	M	SD	α	M	SD	α	M	SD	α	M	SD	α
Positive												
Time 1	2.70	0.58	.90	1.37	0.35	.88	2.00	0.55	.92	1.91	0.43	.86
Time 2	2.46	0.67	.88	1.36	0.42	.92	1.81	0.58	.94	1.95	0.44	.87
Negative												
Time 1	1.84	0.40	.80	1.85	0.57	.90	2.35	0.81	.95	1.65	0.49	.89
Time 2	1.64	0.41	.88	1.95	0.44	.89	2.34	0.86	.96	1.54	0.54	.95
Neutral												
Time 1	2.06	0.58	.90	1.67	0.58	.88	1.48	0.38	.77	2.53	0.59	.82
Time 2	2.07	0.42	.74	1.50	0.47	.87	1.43	0.34	.78	2.44	0.69	.88

Note. Tabled values represent mean rating for each item on the scale. α = Cronbach's alpha.

reported experiencing the "expected" emotions following the different films. As seen in Tables 3 and 4, all participants reported experiencing more pleasant emotion following the positive films than the negative films; more unpleasant emotion following the negative films than the positive films; less high activation emotion following the neutral film than either the positive or negative films, and more low activation emotion following the neutral film than either the positive or negative films (all $ps < .01$). In summation, although patients' self-report of emotional experience did not differ strongly depending on their medication status, they reported experiencing more unpleasant emotion than controls, and tended to experience more activated emotion. Both patients and controls reported experiencing emotions consistent with the valence of the films.

Stability of Emotional Responding

The previous analyses demonstrated that emotional responses did not differ depending on medication status for patients and upon time of testing for controls. An additional method for assessing the stability of emotional responding is to compute correlations between responses at the two tests (test-retest). Correlations for responses to the positive and negative films are presented in Table 5. For patients, emotional responses while off medication were significantly correlated with emotional responses while on medication.[5] The correlation between schizophrenic patients' negative expressivity at the two tests failed to reach significance. It is important to note, however, that the range of negative expressivity was quite restricted. Patients rarely displayed

[5] Correlation between responses at the first test and responses at the second test, regardless of medication status were also computed for patients, and were all significant.

TABLE 5
CORRELATION BETWEEN TWO TESTING SESSIONS

| | Group | |
	Schizophrenia	Control
Positive films		
Positive expressions	.53*	.79**
Pleasant scale	.74**	.61*
High activation scale	.73**	.57*
Negative films		
Negative expressions	.43	.65*
Unpleasant scale	.85**	.93**
High activation scale	.79**	.95**

Note. For patients, correlations are between the on medication and off medication tests. For
   controls, correlations are between time 1 and time 2 tests. Probabilities are one tailed.
   $* p < .05; ** p < .01$.

any negative expressions. The correlations between emotional responding at
the two testing occasions were also significant for controls. Importantly, tests
for differences between patient and control correlation coefficients (r to z
transformation) were all nonsignificant. In summation, for both schizophrenic
patients and controls, emotional responding was stable across tests that were
separated by an average of 5 months.

Discussion

Schizophrenic patients were less facially expressive, yet they reported
experiencing similar or greater amounts of emotion than nonpatient controls.
Moreover, emotional responding among schizophrenic patients was relatively
stable across time. Using a within subjects design, whereby the same patients
were tested both on and off medication, we found that schizophrenic patients'
observable facial expressivity and self-report of emotional experience did not
differ at the two tests (on-, off-medication).

Limitations of the present investigation must be acknowledged. First, the
study is limited by its fairly small sample size. Although post-hoc power esti-
mates ranged from .60 to .90 (Faul & Erdfelder, 1993), our analyses may
have had insufficient power to reject the null hypothesis. However, we did
have sufficient power to detect between group effects, and effects due to the
film manipulation. Patients differed from controls on some measures and
both patients' and controls' responses varied according to film type. Accord-
ingly, it is prudent to interpret our findings in the context of the film manipu-
lation; that is, our data suggest that patients' responses differ from non-
patients', and vary according to differences in emotional stimuli. Any effects
that the medication may have on emotional responding are minimal relative

to the between group differences and effects of the film type manipulation. Second, because our sample included only male participants, it remains unclear whether women with schizophrenia would exhibit the same pattern of emotional responding. Third, although the patients in our sample had been hospitalized a number of times, their level of overall psychopathology at both tests was not severe. Perhaps a sample of more seriously ill patients might have evidenced greater increases in symptomatology following medication withdrawal that may have then affected emotional responding; this remains an empirical question. Finally, the external validity of our film paradigm is limited. Nonetheless, the experimental control offered by a laboratory manipulation of emotion answers important questions that can then be tested in a more ecologically valid, but less well-controlled setting.

Consistent with previous research, patients were rated as more affectively flat than controls, and these ratings were stable across time. Although traditional neuroleptics, such as the ones taken by the patients in this study, have a greater likelihood of producing side effects than newer medications, such as clozapine or olanzapine, the side effects as assessed by the AIMS and RSES in this sample were minimal and did not vary with a change in medication status. Recent research on the so-called atypical neuroleptics suggests that these agents may be more effective in treating negative symptoms including flat affect (e.g., Kane, Honigfield, Singer, & Meltzer, 1988; Meltzer, 1991; Miller, Perry, Cadoret, & Andreasen, 1994; Umbricht & Kane, 1995). Only one patient in this sample was taking clozapine, so the potential efficacy of these drugs could not be tested. It will be of interest in future research to examine whether these newer neuroleptics will modify expressive behavior.

In addition to rating expressivity with clinical rating scales, we also measured expressive behavior in a more explicitly emotional context. Patients displayed fewer observable expressions than nonpatients did, and their expressivity in response to emotional films was related at the two tests suggesting that these responses are also stable across time. Moreover, observable expressive behavior was not affected by a change in medication status. That the patients were not more expressive when medication was discontinued again suggests that side effects from medication do not strongly affect expressive behavior. Taken together, findings from the interview and film paradigm confirm results from previous research. However, these findings also suggest that schizophrenic patients' diminished expressivity cannot be accounted for by the side effects of medication.

Although patients were less expressive than controls, they did not report experiencing less emotion. Indeed, they reported similar or even greater amounts of emotion, replicating prior research. However, these findings also highlight the stability of schizophrenic patients' emotional experience: medication did not alter reports of experience, and these reports were consistent across a period of 5 months. Our self-report measure included assessments of the valence (pleasant, unpleasant) and activation (high, low) dimensions of emotion, and findings indicated that patients' self-reports were consistent

with the valence of the films. However, patients reported experiencing more unpleasant emotion than nonpatients did. This same pattern of results has been reported in other studies of emotional responding in schizophrenia (e.g., Kring et al., 1993; Kring & Neale, 1996), and is important for two reasons. First, patients do not report less pleasant emotions, which is seemingly inconsistent with other observations of anhedonia in schizophrenia (e.g., Blanchard, Mueser, & Bellack, 1998). This suggests that when patients are presented with emotionally evocative stimuli, they feel as much pleasure as nonpatients do. However, on a daily basis, patients may not avail themselves of pleasurable activities and thus may report experiencing less pleasure (Delespaul, 1995; deVries, Delespaul, Nicolson, & Bayer, 1993). Second, although patients reported experiencing more unpleasant emotion following the negative films than either the positive or neutral films, patients nonetheless experienced more emotion that is unpleasant across films than nonpatients did. Although it is not clear, why patients may have found the films to be more unpleasant than controls, other studies have also found that patients report experiencing more unpleasant emotion than controls on a daily basis (e.g., Blanchard et al.).

In summation, findings from this study suggest that emotional responding among schizophrenic patients is stable across time and changes in medication status. Of practical importance, these findings suggest that researchers interested in emotional responding in schizophrenia may not need to limit their study to only samples of medication-free schizophrenic patients. However, our findings suggesting minimal effects of medication on emotional responding, should be interpreted in the context of the effective film type manipulation. In addition, these findings should be bolstered by replication with a larger sample, perhaps including patients with more severe symptomatology.

Concluding that schizophrenic patients' emotional lives are dysfunctional in comparison with that of nonpatients is too broad and is not entirely accurate (see also Dworkin, Oster, Clark, & White, 1998). Although the pattern of emotional responses between patients and controls differs, schizophrenic patients' responses are consistent and stable across time, in much the same way that nonpatients' responses are consistent. In other words, both patients and controls demonstrate fairly stable emotion response tendencies, at least in response to emotional films. Future work should examine the stability of emotional response tendencies in other contexts, such as social interaction with family members. Our findings also highlight the nature of the emotion dysfunction in schizophrenia: patients do not readily express their emotions, but they do experience emotions in much the same way that nonpatients do. Thus, the term flat affect is too broad, in that it implies that all emotional life is dulled or flattened. It seems prudent that researchers and clinicians who use clinical rating scales to assess emotion also include an assessment of emotional experience. Assessments of emotion would likely be most informative in the context of an emotionally evocative situation. Similarly,

interventions aimed at increasing the concordance between patients' outward display and feeling states ought to work in the context of spontaneous emotional episodes.

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