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Flat Affect in Schizophrenia Does Not Reflect Diminished Subjective Experience of Emotion

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Although accorded historical significance, affective features of schizophrenia have only begun to receive systematic empirical attention. Interestingly, both early psychopathology writers and more recent investigators have reported frequent discrepancies between schizophrenics' feelings and outward expressions of emotion. Using a more comprehensive assessment of emotion, the present study examines the relationship between emotional experience and expression in a sample of medication-free schizophrenics. Compared with their normal counterparts, schizophrenics were indeed much less facially expressive of both positive and negative emotions during emotion-eliciting films, yet they reported experiencing as much positive and negative emotion. Therefore, the blunted affect typical of some schizophrenics misrepresents their underlying emotional experience. Future research into an inhibition hypothesis is recommended.

Although many psychopathology researchers consider schizophrenia to be characterized primarily by cognitive or thought disorder (e.g., Harrow & Quinlan, 1985; Holzman, Shenton, & Solovay, 1986; Matthysse, 1987), there has recently been a renewed interest in affective components of schizophrenia (e.g., Berenbaum & Oltmanns, 1992; Knight & Roff, 1985; Knight, Roff, Barnett, & Moss, 1979; Levin, Hall, Knight, & Alpert, 1985; Sison, Alpert, Fudge, & Stern, 1991). Of course, interest in affective features can be traced historically to the works of Kraepelin (1856–1926) and Bleuler (1857–1939), both of whom considered affective disturbance to be significant. In describing a young patient, Kraepelin (1904) gave a vivid account of the lack of emotional responding often seen in schizophrenia:

> All his movements are languid and expressionless, but are made without hindrance or trouble. There is no sign of emotional dejection, such as one would expect from the nature of his talk, and the patient remains quite dull throughout, experiencing neither fear nor hope nor desires. (Kraepelin, 1904, p. 23)

Bleuler (1911/1950) considered affective disturbance to be a fundamental symptom of schizophrenia, whereas hallucinations and delusions were regarded as accessory symptoms. Interestingly, he noticed that while patients often reported experiencing strong emotions, these reports were not always confirmed by observers. That is, observers noticed either a lack of visible emotion or an emotion different from that reported by the patient. Thus, both Kraepelin and Bleuler regarded a lack of outward display of emotion and significant emotional blunting to be central features of schizophrenia.

Formulating a somewhat different theory on affectivity in schizophrenia, Rado (1953) postulated that anhedonia, or the inability to experience pleasure, was primary. Terming it the "integrative pleasure deficiency," he argued that this impairment was an all-encompassing and chronic feature of the disorder. Whereas Bleuler's view suggests that schizophrenics may experience strong emotions behind their affectively flat expressions, Rado's theory suggests that schizophrenics' lack of outward expression is due to an inability to experience emotions, at least pleasurable ones. Thus, in Rado's conceptualization, low expressivity is construed as an accurate reflection of the patient's internal state. Importantly, Rado's integrative pleasure deficiency concerns only the experience of pleasure and other "welfare emotions" such as joy, affection, pride, self-respect, and desire (Rado, 1969). He believed that the negative or "emergency" emotions were, in fact, experienced more strongly by the patient, perhaps to compensate for, or as a displacement because of, the lack of experienced positive affect. Therefore, the experiential deficit described by Rado appears to be confined to positive emotions, thus implying that expressive deficits may also be specific to positive affect.

Investigating Emotion in Schizophrenia

Despite their historical importance, affective features of schizophrenia are poorly represented in the research literature.

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Most typical are studies focused on the ability of schizophrenics to perceive emotion (e.g., Feinberg, Rifkin, Schaffer, & Walker, 1986; Walker, Marwit, & Emory, 1980; Walker, McGuire, & Bettes, 1984), with no provision for examining either their experience or expression of emotion.

Perhaps accounting for the neglect of emotional expression and experience data, research on affective features of schizophrenia often falters on measurement issues (e.g., Astrup & Noreik, 1966; Schwartz, Grinker, Harrow, & Holzman, 1978). Attempts to address these problems have been made by researchers such as Abrams and Taylor (1978), who developed the Scale for Emotional Blunting (SEB), and by Andreasen (1979), who developed the Scale for the Assessment of Negative Symptoms (SANS). While the availability of these scales has greatly increased the reliability of ratings, their application in research on affective features in schizophrenia is, for the most part, stalled at a descriptive level.

In fact, problems with the use of these scales may even have contributed to this slowed progress. For example, the behavioral sample upon which they are based may not be representative because the ratings are typically made at a single time period, usually during an interview while the patient is in the hospital. The format of these interviews also relies on a certain degree of clinical skill that may systematically fail to elicit emotional material, and thus may not provide an opportunity for patients to express a wide range of emotions. Additionally, the items on the rating scales do not differentiate between reduced expression of positive versus negative emotions but rather assess overall reduced expressiveness, therefore resulting in data that are uninformative with respect to Radó's hypothesis concerning "welfare" versus "emergency" emotions.

Beyond the development of these rating scales, there have been few studies examining schizophrenics' expression and experience of emotion. Brown, Sweeney, and Schwartz (1979) studied self-reports of pleasurable experiences and observer-rated positive affect in six schizophrenic and five depressed patients. Patients filled out the Pleasurable Activities Scale indicating the frequency with which they participated in 92 activities (e.g., cooking, watching people, playing a game) and the degree of pleasure they derived from doing so. Observer ratings were made using the same scale, but instead of rating the degree of pleasure, observers rated overt changes in facial expression associated with each activity. Schizophrenics showed significantly more positive affect than depressives as measured by observer ratings; however, in agreement with Radó's theory, they reported experiencing significantly less pleasure than depressed patients. The relationship between self and other ratings of pleasure was nonsignificant and somewhat low for both patient groups (ranging from .32 to .35).

Oltmanns and his colleagues (Oltmanns, Strauss, Heinrichs, & Driesen, 1988) systematically examined the emotional expressiveness of schizophrenic patients and normal individuals while they viewed emotion-eliciting film clips either alone or in the presence of the experimenter. Although the schizophrenics were less expressive than the normal group, both groups showed a social facilitation effect of enhanced expressiveness when the experimenter was in the room. Additionally, those patients who were rated clinically as being affectively flat were also the least expressive when watching the films.

Berenbaum and Oltmanns (1992) examined the relationship between facial expression and subjective experience of emotion in blunted schizophrenics, nonblunted schizophrenics, depressives, and a normal group. Subjects were videotaped while viewing emotion-eliciting (both positive and negative) film clips and reported the extent to which they felt happy and disgusted following each film clip. Facial expressions were coded using Ekman and Friesen's Emotion Facial Action Coding System (EMFACS; Ekman & Friesen, 1978). The blunted schizophrenics were less expressive than the normal group during both the positive and negative film clips. However, they were less expressive than the nonblunted schizophrenics only during the positive film clips. Interestingly, the blunted schizophrenics did not differ from the other groups in their reported experience of emotion.

In sum, early theorists writing about emotional disturbances in schizophrenia emphasized both the expressive and experiential components of emotion, yet with the exception of Radó's theory, specificity regarding positive versus negative emotions was not incorporated. Certainly there are a number of possible patterns of emotional responding that could be evidenced, reflecting either high or low levels of emotional expression and/or experience. More recent empirical work has begun to address such patterns, providing somewhat equivocal results (e.g., Berenbaum & Oltmanns, 1992; Brown et al., 1979).

The Present Study

Two competing hypotheses about the relationship between emotional expression and experience can be discerned from the schizophrenia literature. Bleuler's (1950) view is consistent with an inhibition hypothesis suggesting that some schizophrenics do experience emotion, but the outward expression of these feelings is hidden. Although Bleuler did not make explicit distinctions between positive and negative emotions, his theorizing implied inhibited expression of all emotions. In contrast, Radó's (1953) theorizing implied an emotional deficit hypothesis whereby schizophrenics' lack of outward expression accurately reflects their lack of emotional experience, at least for positive emotions.

The present investigation sought to examine these competing hypotheses regarding the relationship between emotional expression and emotional experience, encompassing both positive and negative emotions, in a sample of medication-free schizophrenics and normal individuals. Using patients who are not currently taking any neuroleptic medication is an important improvement over previous studies (e.g., Berenbaum & Oltmanns, 1992; Brown et al., 1979). Although there is some debate in the literature concerning the effects these medications have on various cognitive, affective, and motor tasks (Blanchard & Neale, 1992; Cassens, Inglis, Appelbaum, & Gutheil, 1990; Killian, Holzman, Davis, & Gibbons, 1984; Oltmanns, Ohayon, & Neale, 1978; Sommers, 1985; Spohn & Strauss, 1989), using medication-free patients helps to reduce the possibility that their responses may somehow be altered or attenuated because of the medication. In addition, affective features of schizophrenia including flattened affect can be confused with akinesia, a common side effect of neuroleptic medications.

Method

Subjects

Twenty male schizophrenic patients selected from the research units at Mt. Sinai Medical Center and the Bronx Veterans Administration Hospital and 20 normal men recruited from the nonprofessional staff at the State University of New York at Stony Brook participated in the study. For most patients (n = 18), diagnoses were derived from the standard research protocol (Keefe et al., 1987), which included the Schedule for Affective Disorders and Schizophrenia (SADS; Endicott & Spitzer, 1978) conducted by trained interviewers. Hospital diagnoses were obtained via hospital chart review for those patients who had not yet completed the standard diagnostic workup (n = 2). All diagnostic information was carefully reviewed by one member of our research group (J.M.N.) to ensure patients met diagnostic criteria from the revised third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 1987). A semistructured interview was conducted with the normal participants to ascertain any personal or family history of psychiatric illness. Only those participants without such a history were included. Any participant with a history of head trauma, severe alcohol or drug abuse, or known neurological disease was excluded from the study. Additionally, schizophrenics with evidence of tardive dyskinesia were excluded so as not to confuse uncontrollable facial movements with facial expressions of emotion. The schizophrenic and normal subjects did not differ in age, $t(38)$ = 0.55, *ns* (schizophrenics' mean age = 39.4, SD = 11.45); normals' mean age = 37.25, SD = 13.36, or in number of years of education, $t(37)$ = 0.37, *ns* (schizophrenics' mean years = 12.95, SD = 1.84; normals' mean years = 12.75, SD = 1.45). Additionally, the racial composition of the samples was virtually identical: 75% (n = 15) of both the normal and the schizophrenic samples were Caucasian, 15% (n = 3) of the schizophrenics and 10% (n = 2) of the normals were African American, and 10% of the schizophrenics and 15% of the normals were Hispanic. The schizophrenic patients had been hospitalized an average of 7.94 times (SD = 5.33).

All patients were medication free for at least 2 weeks (mean number of days drug free = 20.08, SD = 4.44) prior to testing. Serum neuroleptic levels were analyzed to confirm drug-free status. Because depot neuroleptics often lead to the maintenance of plasma drug levels for several months following their discontinuation (Wistedt, Wiles, & Kolakowska, 1981), patients who had received depot neuroleptics were excluded.

Apparatus and Stimuli

Although all laboratory inductions of emotion are somewhat artificial in nature, viewing film clips was chosen because this is a relatively common activity for most people. This method is also not reliant on subjects' ability to recall past experiences, unlike the autobiographical narrative induction (Gottheil, Paredes, Exline, & Winkelmayer, 1970). Slides or still photographs (e.g., Buck, Miller, & Caul, 1974) present momentary emotional scenes, whereas film clips present a more realistic context in which emotional experiences typically develop over time. Additionally, this procedure has been used successfully with psychiatric patients (Berenbaum & Oltmanns, 1992; Oltmanns et al. 1988). Finally, film clips ensure that the nature of emotional stimuli is consistent across all subjects.

Subjects were randomly assigned to view one of two stimulus tapes (A or B) that consisted of three different film clips representing three emotion domains: happy, sad, and fear/disgust. Two different tapes were used to ensure that responses were not specific to the films but rather to the emotion domain represented by the films. The emotional film clips were excerpts taken from contemporary movies commercially available on videotape (e.g., *The Money Pit* and *Terms of Endearment*), and they lasted from 264 s to 350 s. A different clip (150 s long) from the television show *Wildlife Chronicles* was shown at the end of the three emotional segments as a neutral control clip. The film clips were shown to all subjects in the same order (sad, fear, happy, neutral) using a videocassette player and a 13-inch-screen color television.[1] Subjects sat approximately 5 ft (1.5 m) from the television.

Procedure

Testing was conducted as part of a larger study examining multiple contributors to affective flattening. For the present study, participants were run individually in a session lasting approximately 1.5 to 2 hr. The emotional nature of the films (i.e., the true purpose of the study) was not mentioned in the instructions to subjects. Instead, subjects were told that we were assessing those characteristics of movies that allow people to "get into" the story. This line of instruction was intended to get subjects to attend to the films without revealing the true nature of the study in order to reduce demand characteristics. While viewing each film clip, subjects were videotaped. The physical set-up of the testing room prevented the camera from being completely hidden; however, the camera was present throughout the entire testing session, not solely during the film presentation, and participants were not told when it was turned on. In addition, the videotaping procedure was made as unobtrusive as possible by covering external lights on the camera and by covertly beginning the recording with a remote control switch. The experimenter was present during the viewing of the film clips and attended to miscellaneous paperwork.[2]

Following each film clip, subjects completed the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS is a 20-item self-report measure of mood designed to measure Positive Affect (PA) and Negative Affect (NA) factors. These two factors have been reliably produced in several studies of affect (e.g., Diener & Emmons, 1984; Watson & Tellegen, 1985; Zevon & Tellegen, 1982). The PANAS has high internal consistency, with Cronbach's alphas (Cronbach, 1951) ranging from .86 to .90 for the PA subscale and .84 to .87 for the NA subscale. In completing the PANAS, subjects were instructed to indicate using a 5-point Likert scale (1 = *very slightly or not at all*, 5 = *extremely*) "to what extent you feel this way right now, that is, at the present moment" for each adjective. In addition to the 20 adjectives on the PANAS, two additional adjectives were added (*happy*

[1] Effects due to order of presentation cannot be entirely ruled out. However, because we were dealing with a relatively small sample size, we felt it more prudent to account for any effects due to a particular set of films than to effects of different orders of films, and thus had two different stimulus sets (tapes A and B). To help reduce the possibility that order of presentation influenced subjects' responses, there was an interval of 15–20 min between films clips during which subjects participated in an unrelated task. Additionally, previous studies using differently valenced film clips have reported limited or no carry-over effects (e.g., Kring, Smith, & Neale, 1992; Tomarken, Davidson, & Henriques, 1990).

[2] Constraints imposed by hospital rules with regard to testing patients did not allow for unobtrusive videotaping or for the experimenter to leave the room while the schizophrenics viewed the films. To remain consistent, this same procedure was employed for the normal group. It is not unreasonable to expect that the presence of another person may have influenced expressive behavior. However, we have little reason to believe that schizophrenics and normals were differentially affected by the presence of the experimenter. Using a similar paradigm, Oltmanns et al. (1988) found a social facilitation effect for both schizophrenic patients and normals, even though the schizophrenics were less expressive.

and *sad*) to provide verification that the film clips were eliciting their intended emotions. (The PANAS already includes the adjective *afraid*.)

Between film clips, subjects completed neuropsychological tests (taking approximately 15–20 min), which served as distractors to reduce any carry-over effects from the previous film clip. The next film clip was then shown preceded by a brief review of the instructions.

Coding Facial Expression

Videotapes of the subjects were coded using a newly developed coding system called the Facial Expression Coding System (FACES; Kring & Sloan, 1991; Kring, Smith, & Neale, 1989, 1992). Many currently available coding systems measure very specific aspects of facial behavior, and the creation of a new one demands some justification. Among existing systems, the Facial Action Coding System, or FACS (Ekman & Friesen, 1976, 1978), is an anatomically based system that measures specific movements in the facial musculature. A second system, EMFACS, assesses only those muscle movements believed to be associated with emotional expressions. These two systems are quite comprehensive in their coverage of facial muscle movements and have spawned a great deal of research on facial expressions (e.g., Ekman, Davidson, & Friesen, 1990; Ekman, Friesen, & Ancoli, 1980; Krause, Steimer, Sanger-Alt, & Wagner, 1989). We elected to develop a different measure for both theoretical and empirical reasons. First, the Ekman indexes of specific emotional expressions do not correspond with the two-dimensional model of emotional experience we chose for the self-report portion of the study's design. Indeed, the theoretical framework and empirical support for FACS come from the discrete or basic emotions literature (Ekman, 1992). A failure to find correspondence between Ekman's specific expressions and the dimensions of experience we were able to index could result from a simple conflict between measurement models. Some researchers have collapsed across specific EMFACS emotion codes, particularly for negative expressivity (e.g., Berenbaum & Oltmanns, 1992; Ekman et al., 1980), and thus it could be argued that a dimensional measure of expressivity could be obtained in this manner. However, neither FACS nor EMFACS was empirically designed as a dimensional measure. Additionally, because our interests were in positive and negative expressivity, greater economy is achieved by measuring those dimensions rather than first assessing discrete categories and then collapsing across them. Thus, our interest in dimensional expressivity coupled with our concern over the conceptual mismatch between our measure of experience and expression recommended developing a more economical and, in our view, appropriate approach.

In FACES, an expression is defined as any change from a neutral facial display to a nonneutral display and back to a neutral display. If a subject shifts from a neutral to a nonneutral display but does not return to a neutral display, and instead evidences another clear change in affective expression, this change is coded as an additional expression. When such a change (expression) is noted, coders make three additional ratings of the expression. First, they rate the expression as either positive or negative (its valence). Coders then rate the expression's intensity, using a 4-point Likert scale (1 = *low*, 4 = *very high*), and its duration (in seconds). At the end of each film clip, coders compute the following summary information: (a) the total number (frequency) of positive expressions, their mean intensity, and their mean duration, and (b) the total number of negative expressions, their mean intensity, and their mean duration. Coders also assign a global expression rating to the entire clip (i.e., overall expressivity level) using a 5-point Likert scale (1 = *low*, 5 = *high*). Thus, seven expression variables are obtained for each film clip.

Coding of the schizophrenics' videotapes was conducted by two undergraduates, and coding of the normal group's videotapes was conducted by one of these undergraduates and a graduate student. All segments for each subject were presented consecutively to coders. Adherence checks were made periodically throughout the study to ensure that coders remained consistent. Coders were blind to the hypotheses of the study, the diagnostic status of the participants, and the nature and names of the film clips. In some instances, it is possible that coders could have identified participant group (patient or normal) because some patients wore hospital gowns. However, because coders were blind to the hypotheses of the study, they would have had no reason to believe that schizophrenics would be either more or less expressive than their normal counterparts.

Results

Manipulation Check

The film clips shown in the present study have been used in previous research with normal participants and were found to elicit their intended emotion (Kring et al., 1992). To ensure this same effectiveness for the schizophrenic patients, "target" adjectives (i.e., adjectives matching the emotion domain of the film) from the PANAS were examined. In general, both schizophrenics and normals reported feeling more of the target emotion (e.g., happiness following the happy film) than nontarget emotions (sadness or fear). The distributions of these ratings were significantly skewed and would not become normalized under any transformation. Therefore, nonparametric analyses were conducted. Specifically, chi-square analyses of the highest mood rating for each type of film (e.g., for the sad film, how many participants reported feeling more sadness than either happiness or fear?) were significant for both schizophrenics, $\chi^2(2, N = 20) = 24.99$, $p < .001$, and normals, $\chi^2(2, N = 20) = 62.19$, $p < .001$, indicating that the films elicited their intended emotion.

Interrater Agreement for FACES Ratings

Intraclass correlations were computed for pairs of raters across all variables following the recommendations of Shrout and Fleiss (ICC [2, 1]; 1979). Using this random-effects model, coders (judges) are considered to be selected from a random sample of judges, and each judge rates each subject or target. Because the variance due to coders is not ignored, the correlations can be interpreted as an index of agreement rather than consistency (Shrout & Fleiss, 1979). For the schizophrenics, these correlations ranged from .65 to .99, with an average of .95 (based on r to z' transformation). For the normal subjects, the correlations ranged from .55 to .98, with an average of .84. Although these agreement coefficients varied, 73% of the correlations were greater than .80, and 85% were greater than .75. The low correlations are due primarily to limited variability. For example, the agreement coefficients were lowest for the neutral film, during which only 5 of the normal and 3 of the schizophrenic participants exhibited an expression. In general, the agreement was uniformly high, and thus the individual FACES variables were averaged across raters for the remaining analyses.

FACES Composite Variables

Correlations between the individual FACES variables, computed separately for schizophrenic and normal subjects, are reported in Table 1. In general, within each of the four film clips, positive expression frequency, positive expression intensity, and positive expression duration were highly correlated. Similarly, negative expression frequency, negative expression intensity, and negative expression duration were highly correlated (overall average Pearson correlation for schizophrenics: $r = .82$; overall average Pearson correlation for normals: $r = .75$).[3]

Because of this, and to reduce the number of dependent variables in this initial analysis, composite variables were computed. To do this, standardized scores first had to be calculated because the FACES variables are measured in different units.[4] Standardization was achieved by computing Z scores for positive expression frequency, positive expression intensity, and positive expression duration, and negative expression frequency, negative expression intensity, and negative expression duration for the total sample. The Z scores were then summed to form positive and negative expression composites for each emotion domain (sad, fear/disgust, happy, neutral). For example, the positive expression composite for the happy film was formed by summing the standardized positive expression frequency, positive expression intensity, and positive expression duration ratings from the happy film.

Emotional Expression

Descriptive statistics for the positive and negative FACES composites for each of the four films are presented in Table 2. Before any between-groups differences in expressiveness could be meaningfully examined, effects due to the different stimulus tapes were evaluated. To this end, 2 (schizophrenic vs. normal diagnostic group) × 2 (A vs. B stimulus tape) multivariate analyses of variance (MANOVAs) were conducted separately for the positive and negative FACES composites for the four films. The multivariate omnibus F were ratios for both the Diagnostic Group × Stimulus Tape interaction and the stimulus tape main effect were nonsignificant. In addition, all univariate F ratios were nonsignificant, indicating that participants' expressiveness did not depend on whether they viewed Tape A or B. Stimulus tape was therefore not included in the remaining analyses of expressiveness.

The FACES composite variables were entered into a 2 (schizophrenic vs. normal group) × 4 (sad, fear/disgust, happy, or neutral film type) repeated measures MANOVA, conducted separately for positive and negative expressiveness, with film type as a within-subjects factor and group as a between-subjects factor. For positive expressiveness, the Group × Film Type interaction was significant, $F(3, 34) = 4.95$, $p < .01$, as was the group main effect, $F(1, 36) = 4.49$, $p < .04$. Similarly for negative expressiveness, both the Group × Film Type interaction, $F(3, 34) = 2.69$, $p < .05$, and group main effect, $F(1, 36) = 4.39$, $p < .05$, were significant. The film type main effect could not be evaluated in these analyses because standardized (Z) scores were the dependent variables. That is, the mean scores for both positive and negative expressiveness for each film were zero. Analyses of simple effects, as illustrated in Figure 1, revealed the schizophrenics to be lower than normal subjects on the negative expression composite during the sad film, $F(1, 38) = 7.38$, $p < .01$, and the fear/disgust film, $F(1, 38) = 11.84$, $p < .001$, and they were also lower than normals on the positive expression composite during the happy film, $F(1, 38) = 20.60$, $p < .001$. Thus, schizophrenic patients evidenced less positive expressiveness during the happy film and less negative expressiveness during the sad and fear/disgust films than normal subjects. Remaining differences were nonsignificant.[5,6]

In addition to documenting group differences in expressivity, it is interesting to note the relation between positive and negative expressivity for the schizophrenic and normal groups. One question is whether high levels of negative expressivity are related to high levels of positive expressivity. Second, is expressivity consistent across similar contexts? (That is, is negative expressivity consistent across negative films?) These correlations are reported in Table 3. Positive and negative expressivity is moderately correlated for both schizophrenics and normals. Interestingly, the correlation between negative expressivity during the sad film and negative expressivity during the fear/disgust film was quite strong for schizophrenics, indicating a consistency in negative expressivity. Remaining correlations were small and nonsignificant for both groups with one exception: For the normal subjects, negative expressivity during the sad film was positively related to negative expressivity during the happy film ($r = .48$, $p < .03$).

Emotional Experience

Descriptive statistics for the PANAS ratings after each film clip are shown in Table 4. One patient was missing data on the

[3] FACES intercorrelations are particularly high for the neutral film during which little expressiveness occurred, and thus the magnitude of these correlations is influenced by the few who exhibited expressions. Subjects who exhibited no expressions received scores of 0, 0, and 1 for frequency, duration, and intensity, respectively. For example, only 1 schizophrenic exhibited a negative expression lasting 1 s during the neutral film. Thus, the data comprised that individual's scores of 1 for frequency and duration in combination with all other patients' scores of 0 for frequency and duration, which results in a perfect correlation between those variables.

[4] The intensity rating was made using a Likert scale, the duration was recorded in seconds, and frequency was a simple count of the number of expressions.

[5] Our primary interests were in differences between positive and negative expressiveness; however, an overall, global expressiveness rating was also made by FACES coders. Differences in these global ratings mirrored the findings for positive and negative expressiveness. For the emotional films, results from a 2 (diagnostic group) × 3 (film type: sad, fear/disgust, happy) repeated measures MANOVA yielded a significant group main effect, $F(1, 38) = 13.60$, $p < .001$, and a significant Group × Film Type interaction, $F(2, 37) = 8.27$, $p < .001$.

[6] Because one of the undergraduate coders was unable to continue with the project, an additional student was trained and then completed the coding. Thus, it could be argued that the reported group differences in expressiveness were simply due to differences in coders rather than expressive behavior per se. To examine this possibility, the expression analyses were conducted using only the coder who rated both schizophrenic and normal subjects. Results of these analyses were virtually identical to those done with pairs of raters, with two exceptions. First, for positive expressiveness, the group main effect approached significance, $F(1, 36) = 3.19$, $p < .08$); however, as was the case with the analyses using both coders, the Group × Film Type interaction was significant, $F(3, 34) = 5.03$, $p < .005$. Second, the univariate simple effect analysis for negative expressiveness during the sad film was marginally significant, $F(1, 38) = 3.17$, $p < .08$.

Table 1
Intercorrelations of FACES Variables

	Positive expressions			Negative expressions		
Rated dimension	1	2	3	1	2	3
			Sad film			
1. Frequency	—	.94**	.90**	—	.77**	.46*
2. Mean intensity	.85**	—	.90**	.95**	—	.64**
3. Mean duration	.99**	.81**	—	.81**	.94**	—
			Fear/disgust film			
1. Frequency	—	.56*	.37	—	.62**	.43
2. Mean intensity	.57**	—	.85**	.96**	—	.68*
3. Mean duration	.25	.50*	—	.77**	.80**	—
			Happy film			
1. Frequency	—	.66**	.34	—	.80**	.43
2. Mean intensity	.74**	—	.47*	.94**	—	.68**
3. Mean duration	.69**	.91**	—	.58**	.76**	—
			Neutral film			
1. Frequency	—	.99**	.99**	—	1.00**	.92**
2. Mean intensity	.84**	—	1.00**	1.00**	—	.94**
3. Mean duration	.94**	.97**	—	1.00**	1.00**	—

Note. FACES = Facial Expression Coding System. Correlations for normal subjects are in bold, above the diagonal; correlations for schizophrenic subjects are below the diagonal.
* $p < .05$. ** $p < .01$.

PA subscales. Reliability (coefficient alpha) was equally high on the PANAS subscales for schizophrenics and normals.[7]

Similar to the analyses of expressiveness, effects due to stimulus tape were examined using a 2 (schizophrenic vs. normal group) × 2 (A vs. B stimulus tape) MANOVA conducted separately for PA and NA ratings during the four films. Once again, the multivariate omnibus *F* ratios for both the Diagnostic Group × Stimulus Tape interaction and the stimulus tape main effect were nonsignificant, as were all univariate tests. Thus, stimulus tape was not included in any further analyses.

To assess between group differences in subjective experience, the PANAS ratings served as dependent variables in 2 (schizophrenic vs. normal group) × 4 (sad, fear/disgust, happy, or neutral film type) repeated measures MANOVAs, conducted separately for PA and NA. For PA, the Group × Film Type interaction was significant, $F(3, 35) = 2.91$, $p < .05$, as were the group, $F(1, 37) = 8.97$, $p < .005$, and film type, $F(3, 37) = 3.77$, $p < .02$, main effects. For NA, the Group × Film Type interaction was also significant, $F(3, 36) = 3.39$, = 3.39, $p < .03$, as was the film type main effect, $F(3, 36) = 16.07$, $p < .001$. The group main effect for NA was not significant, $F(1, 37) = 1.10$, *ns.* An examination of the simple effects revealed no differences in reported PA and NA between groups for the sad and fear/disgust films. However, the schizophrenics reported feeling significantly more of both PA and NA than the normal group during the happy and neutral films.

To examine the sensitivity of the PANAS scores to the manipulation (i.e., were NA scores highest during the negative films and PA scores highest during the positive film?), additional within-groups comparisons across films were conducted. Contrasts comparing reported PA in response to the happy film with reported PA to the three other films were significant for normal subjects, $F(1, 19) = 7.34$, $p < .02$, and approached significance for schizophrenics, $F(1, 18) = 3.70$, $p < .07$. Contrasts comparing reported NA in response to the negative films with reported NA to the happy and neutral films were significant for normals, $F(1, 19) = 50.43$, $p < .001$, and schizophrenics, $F(1, 19) = 7.09$, $p < .02$.

Although only significant for the happy and neutral films, the schizophrenics reported experiencing more PA across the four films than the normal subjects. Because most of the PA items reflect either a combination of positive affect and high activation (e.g., *excited, attentive*) or pure activation (*active*), the schizophrenics may have been reporting more on experienced activation than positive emotion per se. Although this possibility cannot be entirely ruled out, examining responses to the *happy* item we added to the PANAS should reflect only positive affect and not activation. If the pattern of results is quite different from the PA analyses, an activation interpretation is supported. In contrast, if the results parallel the PA findings, support for such an interpretation is diminished. Similar to the above analyses, a 2 × 4 MANOVA was conducted using reported happiness for each film as the dependent variables. The

[7] The low alpha value for the normal group's reported NA during the neutral film probably resulted from its low variability ($SD = 0.92$), particularly relative to the variability of the other PANAS variables, which had an average standard deviation of 7.14. Indeed, 93% of the NA items for the neutral film were rated 1 by all normal subjects.

Table 2
Means and Standard Deviations for FACES Composites

Film type	Positive composite				Negative composite			
	Schizophrenic		Normal		Schizophrenic		Normal	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Sad	−0.32	2.90	0.41	3.37	−1.03	1.76	1.09	3.05
Fear	−0.29	2.52	0.03	2.70	−1.23	1.24	1.28	3.10
Happy	−1.67	2.36	1.53	1.98	0.11	3.31	0.02	2.15
Neutral	−0.13	2.86	0.12	3.03	−0.20	2.68	0.18	3.14

Note. FACES = Facial Expression Coding System. Means are *Z*-score composites formed by adding together standardized frequency, intensity, and duration FACES variables, separately for positive and negative expressions.

group main effect was nonsignificant, but similar to the PA analyses; a significant Group × Film Type interaction, $F(3, 36) = 3.93$, $p < .02$, and film type main effect, $F(3, 36) = 11.06$, $p < .001$, were obtained. The pattern of results was similar to the PA analyses with one important exception: Although the schizophrenics reported experiencing similar although slightly higher levels of happiness than the normal group following the sad, fear, and neutral films (significant only for the neutral film), they reported experiencing slightly less happiness (not significant) than the normals following the happy film. That the schizophrenics' reports of experienced happiness for the sad, fear, and neutral films were also similar to or higher than the normals' reports suggests that they were not just reporting on activation.

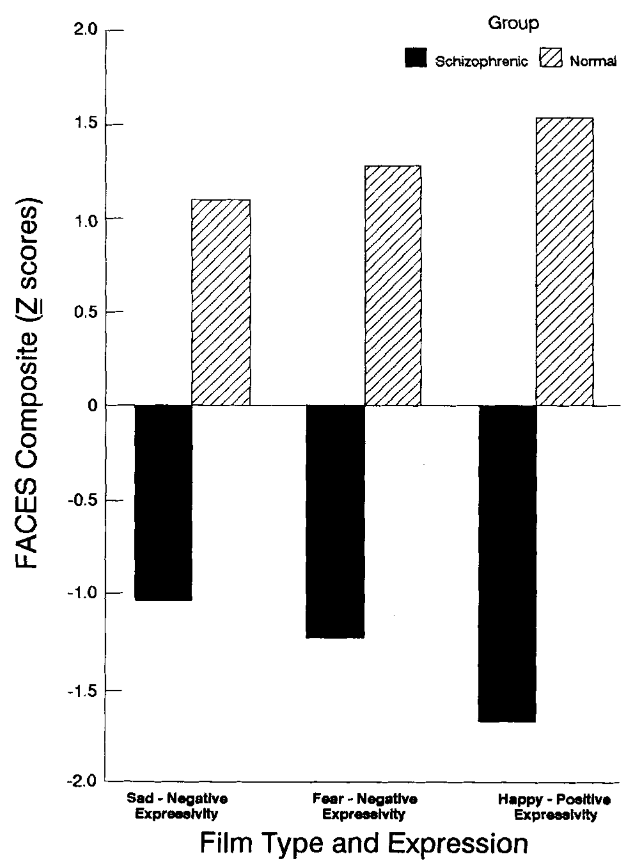

Figure 1. Emotional expression composites for schizophrenic and normal subjects by film type. (FACES = Facial Expression Coding System; Negative Expressivity = negative FACES expression composite; Positive Expressivity = positive FACES expression composite. All group differences are significant, $p < .03$.)

Experience and Expression

To determine whether the discrepancy between expression and experience was greater in the schizophrenic than the normal subjects, discrepancy scores were computed by standardizing (i.e., computing *Z* scores for) the PA and NA subscales from the PANAS and then subtracting the standardized expression composite variables from each. Thus, positive discrepancy scores were computed by subtracting the positive expressiveness composite from PA for each film, and the negative discrepancy scores were computed by subtracting the negative expression composite from NA for each film. To avoid confusing the magnitude of the discrepancy scores with their sign, the *Z* score discrepancy values were converted to *T* scores ($M = 50$, $SD = 10$). Means and standard deviations for these discrepancy scores are shown in Table 5.

These discrepancy scores were entered as dependent variables in 2 × 4 MANOVAs, conducted separately for positive and negative discrepancies. Looking at discrepancies in positive expressiveness and PA, the Group × Film Type interaction was significant, $F(3, 33) = 4.07$, $p < .02$, as was the group main effect, $F(1, 35) = 8.14$, $p < .01$. Analyses of simple effects revealed that compared to normals, schizophrenics had significantly larger discrepancies between expression and experience of positive emotions during the happy film, $F(1, 37) = 23.93$, $p < .001$. For discrepancies in negative expressiveness and NA, the group main effect was significant, $F(1, 37) = 6.32$, $p < .02$, indicating that schizophrenics had larger negative discrepancy scores across all films. It is interesting to note that these discrepancies reflect not only the schizophrenics' lower expressivity but also their greater reports of experienced emotion.

Correlations between expressivity and self-report of emotional experience were computed separately for schizophrenic and normal groups. These correlations were small and nonsig-

Table 3
Expressivity Intercorrelations for Schizophrenic and Normal Subjects

Expression and film type	Positive expressivity during the happy film: Schizophrenic	Positive expressivity during the happy film: Normal	Negative expressivity during the sad film: Schizophrenic	Negative expressivity during the sad film: Normal
Negative expressivity				
Sad film	.37	.41*	—	—
Fear film	.49**	.16	.94***	.23

* $p < .07$. ** $p < .03$. *** $p < .001$.

nificant, and they did not differ between groups. Because so many of the schizophrenics were nonexpressive, the limited range in the data likely influenced the magnitude of the correlations. Thus, these low correlations must be interpreted with caution.

Discussion

Using a sample of medication-free schizophrenic subjects, the present study found that during both positive and negative emotional films, schizophrenics were less facially expressive than normal subjects, yet they reported experiencing as much, and under certain conditions even more, emotion than did the normals. These results provide initial support for the Bleulerian view that schizophrenic patients experience both positive and negative emotions but do not express them outwardly.

One initially puzzling finding was that both subject groups reported experiencing more PA than NA during the negative film clips (sad and fear/disgust). However, other studies using the PANAS have found that, in general, both normal individuals and psychiatric patients report higher levels of PA than NA (e.g., Watson, Clark, & Carey, 1988; Watson, Clark, & Tellegen, 1988). In addition, PANAS ratings also varied with film content in an expected fashion. Thus, although both schizophrenics and normals reported feeling more PA than NA, both groups also reported feeling more NA following the negative films than following either the neutral or the happy film (see Table 4).

As mentioned before, an alternative and not altogether independent explanation for the higher levels of PA is that items on the PA subscale, such as *attentive, interested, alert,* and *excited* reflect not only pleasant affect but also high activation. In fact, adjectives that are typically considered positive, such as *happy* or *amused,* are not on the PA subscale. However, analyses of the individual *happy* item we added to the PANAS yielded results very similar to the PA analyses, suggesting that participants' self-reports were not just a reflection of experienced activation. Using a measure that includes emotion adjectives that can be differentiated by valence (pleasant and unpleasant) and activation (e.g., Larsen & Diener, 1992) would allow for a more detailed look at reports of experienced emotion.

Interestingly, that the schizophrenics were found to experience more PA during the films is not supportive of either Rado's anhedonia theory or more recent empirical findings concerning anhedonia in schizophrenia (e.g., Brown et al., 1979; Chapman, Chapman, & Raulin, 1976). In the present study, schizophrenics did not show a differential deficit in positive versus negative emotional experience. That is, they reported experiencing both positive affect during a positive film and negative affect during negative films.

Of course, schizophrenics' ability to fill out self-report measures reliably can be questioned. However, findings from the present study do not indicate that their responses are artifactual. The reliability (Cronbach's alpha) of the PANAS scales was equally high for the schizophrenic and normal groups. It is interesting to note, however, that the differentiation of experienced emotion was less pronounced for schizophrenics than normals. That is, although the schizophrenics' reports of experienced emotion varied in the expected direction according to film type, the normals' ratings appear to have done so somewhat more strongly. The present data concerning experienced

Table 4
Descriptive Statistics for Emotional Experience (PANAS) Variables

Film type	PA Schizophrenic *M*	PA Schizophrenic *SD*	PA Schizophrenic α	PA Normal *M*	PA Normal *SD*	PA Normal α	NA Schizophrenic *M*	NA Schizophrenic *SD*	NA Schizophrenic α	NA Normal *M*	NA Normal *SD*	NA Normal α
Sad	28.00	8.72	.83	25.15	5.98	.78	17.00	5.69	.77	17.20	5.22	.77
Fear	29.11	9.96	.88	24.00	7.97	.87	17.90	7.81	.85	18.95	6.91	.89
Happy	33.12	9.18	.85	27.15	7.53	.87	15.80	6.52	.87	11.25	2.20	.74
Neutral	32.84	9.01	.82	21.20	8.85	.95	13.65	5.55	.84	10.70	0.92	.16

Note. PANAS = Positive and Negative Affect Schedule. PA = Positive affect; NA = Negative affect (PANAS scale).

Table 5
Means and Standard Deviations for Discrepancy Scores

Film type	Positive discrepancy				Negative discrepancy			
	Schizophrenic		Normal		Schizophrenic		Normal	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Sad	54.91	26.18	44.10	35.45	59.96	18.75	39.30	33.10
Fear	56.16	27.69	46.97	21.36	62.00	16.04	37.94	33.87
Happy	68.90	25.48	31.38	21.99	53.51	32.20	45.57	21.23
Neutral	57.08	30.71	56.46	27.92	56.46	27.92	44.70	31.55

Note. Discrepancy scores were computed by subtracting the standardized expression composite variables from standardized Positive and Negative Affect Schedule subscales. Positive discrepancy = Positive Affect (PA) − positive expression composite; negative discrepancy = Negative Affect (NA) − negative expression composite. The discrepancy scores are presented as *T* scores ($M = 50$, $SD = 10$).

positive and negative affect are consistent, however, with Berenbaum and Oltmanns's (1992) finding that blunted schizophrenics' levels of experienced emotion did not significantly differ from those of nonblunted schizophrenics, depressives, or normals. Additionally, they found that blunted schizophrenics did not differ from nonblunted schizophrenics on measures of physical and social anhedonia. The inclusion of items more specifically related to the experience of pleasure may be warranted in future studies to more specifically investigate anhedonia.

Although the schizophrenic patients reported experiencing more PA, they were very unexpressive during the positive films. Before concluding that this expression "deficit" is more pronounced for positive than negative emotions, an important caution is warranted. The films in the present study were not scaled, and they are likely to be unequal in their emotion-eliciting capacity. It thus may be the case that the apparent larger discrepancy between schizophrenics and normals in positive compared with negative expressiveness reflects the fact that positive expressions are generally easier to elicit in a laboratory setting.

Additionally, normal and schizophrenic subjects may have differed in the type of positive expressions displayed during the positive film. Indeed, one shortcoming of the coding system used in the present study (rather than EMFACS) is its inability to distinguish between what Ekman calls "Duchenne" (i.e., enjoyment smiles; Frank, Ekman, & Friesen, 1993) and "non-Duchenne" smiles. Duchenne smiles, which involve contraction of both upper (*orbicularis oculi*) and lower (*zygomaticus major*) facial muscles, have been shown to be more strongly associated with the experience of happiness and amusement than other smiles involving contraction of only lower facial muscles (Ekman, 1989; Ekman et al., 1990; Ekman & Friesen, 1982). However, while the normal subjects may have exhibited more of either type of smile than the schizophrenics, the schizophrenics were generally much less expressive during the happy film. Indeed, only 5 of the 20 schizophrenics displayed more than one positive expression during the happy film, whereas 19 of the 20 normals displayed more than one positive expression. Thus, given the overall low occurrence of schizophrenics' expressive behavior, it seems unlikely that different types of smiles would meaningfully differentiate schizophrenics. Still, the normal group may have displayed more non-Duchenne smiles as a means of conforming to the implicitly social nature of the experiment. In other words, because the experimenter was in the room, the normal participants may have faked smiling in response to the happy film. However, in a study that was explicitly social (face-to-face conversation), Krause et al. (1989) found that groups of schizophrenics and normal subjects did not differ in the expression of non-Duchenne smiles. Interestingly, in the Krause et al. study, the overall level of expressivity was the same for schizophrenics and normals; however, the schizophrenics evidenced fewer expressions involving the upper facial muscles, and thus fewer Duchenne smiles.

Another important issue to consider is that of discriminating power. Specifically, is the differential deficit (schizophrenics differ from normals with respect to facial expression but not subjective experience) due to different psychometric properties of the two variables? Chapman and Chapman (1983) have cautioned that tests differing in reliability will likely show differential deficits solely because of the discrepancy in reliability, rather than because of any discrepancies tapped by the tasks. In the present study, both dependent measures (self-reported experience and observer-rated expressiveness) were reliable, and these reliabilities were approximately equal for the schizophrenic and normal subjects. In addition, the true score variance (observed variance times reliability) is greater for the experience (PANAS) variables than the expression variables. This is opposite from what would be expected if the findings were due to psychometric artifact. Determining the difficulty levels for these variables is problematic given that it is unclear what the optimal levels of difficulty are for our measures of expression and experience.

Results of the present study suggest a disjunction between emotional expressiveness and self-reported emotional experience in schizophrenics that is consistent with an inhibition model of affective flattening such as Bleuler's. However, limitations must also be considered. The patient sample was composed of older men who had been hospitalized a number of times. Certainly it will be imperative in future work to establish whether or not these same patterns of emotional responding are seen in female schizophrenics as well as in a younger, less chronic sample. Using medication-free schizophrenics is certainly an important advancement that helps reduce the possibility that any findings are due to medication and its side effects. Finally, using the word inhibition to describe the diminished expressiveness evidenced by the schizophrenics may be somewhat premature. The data presented here do not directly address whether schizophrenics actively inhibit their expressions, whether they are unable to display their feelings, or whether they are unaware of their own expressive displays. Future studies, perhaps employing psychophysiological measures, would provide an interesting augmentation to the study of emotion in schizophrenia.

References

Abrams, R., & Taylor, M. A. (1978). A rating scale for emotional blunting. *American Journal of Psychiatry, 135,* 226–229.

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., rev.). Washington, DC: Author.

Andreasen, N. (1979). Affective flattening and the criteria for schizophrenia. *American Journal of Psychiatry, 34,* 208–212.

Astrup, C., & Noreik, K. (1966). *Functional psychoses: Diagnostic and prognostic models.* Springfield, IL: Charles C Thomas.

Berenbaum, H., & Oltmanns, T. F. (1992). Emotional experience and expression in schizophrenia and depression. *Journal of Abnormal Psychology, 101,* 37–44.

Blanchard, J. J., & Neale, J. M. (1992). Medication effects: Conceptual and methodological issues in schizophrenia research. *Clinical Psychology Review, 12,* 345–361.

Bleuler, E. (1950). *Dementia Praecox or the group of schizophrenias* (J. Zinkin, Trans.). New York: International Universities Press. (Original work published 1911)

Brown, S., Sweeney, D. R., & Schwartz, G. E. (1979). Differences between self-reported and observed pleasure in depression and schizophrenia. *Journal of Nervous and Mental Disease, 167,* 410–415.

Buck, R., Miller, R. E., & Caul, W. F. (1974). Sex, personality, and physiological variables in the communication of affect via facial expression. *Journal of Personality and Social Psychology, 30,* 587–596.

Cassens, G., Inglis, A. K., Appelbaum, P. S., & Gutheil, T. G. (1990). Neuroleptics: Effects on neuropsychological function in chronic schizophrenic patients. *Schizophrenia Bulletin, 16,* 477–499.

Chapman, J. P., & Chapman, L. J. (1983). Reliability and the discrimination of normal and pathological groups. *Journal of Nervous and Mental Disease, 171,* 658–661.

Chapman, L. J., Chapman, J. P., & Raulin, M. L. (1976). Scales for physical and social anhedonia. *Journal of Abnormal Psychology, 85,* 374–382.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16,* 297–334.

Diener, E., & Emmons, R. A. (1984). The independence of positive and negative affect. *Journal of Personality and Social Psychology, 47,* 1105–1117.

Ekman, P. (1989). The argument and evidence about universals in facial expressions of emotion. In H. Wagner & A. Manstead (Eds.), *Handbook of psychophysiology: The biological psychology of emotions and social processes* (pp. 143–164). London: Wiley.

Ekman, P. (1992). Are there basic emotions? *Psychological Review, 99,* 550–553.

Ekman, P., Davidson, R. J., & Friesen, W. V. (1990). The Duchenne smile: Emotional expression and brain physiology II. *Journal of Personality and Social Psychology, 58,* 342–353.

Ekman, P., & Friesen, W. V. (1976). Measuring facial movements. *Journal of Environmental Psychology, 1,* 56–75.

Ekman, P., & Friesen, W. V. (1978). *The Facial Action Coding System (FACS): A technique for the measurement of facial action.* Palo Alto, CA: Consulting Psychologists Press.

Ekman, P., & Friesen, W. V. (1982). Felt, false, and miserable smiles. *Journal of Nonverbal Behavior, 6,* 238–251.

Ekman, P., Friesen, W. V., & Ancoli, S. (1980). Facial signs of emotional experience. *Journal of Personality and Social Psychology, 39,* 1125–1134.

Endicott, J., & Spitzer, R. L. (1978). A diagnostic interview: The schedule for affective disorders and schizophrenia. *Archives of General Psychiatry, 35,* 837–844.

Feinberg, T. E., Rifkin, A., Schaffer, C., & Walker, E. (1986). Facial discrimination and emotional recognition in schizophrenia and affective disorders. *Archives of General Psychiatry, 43,* 276–279.

Frank, M. G., Ekman, P., & Friesen, W. V. (1993). Behavioral markers and recognizability of the smile of enjoyment. *Journal of Personality and Social Psychology, 64,* 83–93.

Gottheil, E., Paredes, A., Exline, R. V., & Winkelmayer, R. (1970). Communication of affect in schizophrenia. *Archives of General Psychiatry, 22,* 439–444.

Harrow, M., & Quinlan, D. (1985). *Disordered thinking and schizophrenic psychopathology.* New York: Gardner Press.

Holzman, P. S., Shenton, M. E., & Solovay, M. R. (1986). Quality of thought disorder in differential diagnosis. *Schizophrenia Bulletin, 12,* 360–372.

Keefe, R. S. E., Mohs, R. C., Losonczy, M. F., Davidson, M., Silverman, J. M., Kendler, K. S., Horvath, T. B., Nora, R., & Davis, K. (1987). Characteristics of very poor outcome schizophrenics. *American Journal of Psychiatry, 144,* 889–895.

Killian, G. A., Holzman, P. S., Davis, J. M., & Gibbons, R. (1984). Effects of psychotropic medication on selected cognitive and perceptual measures. *Journal of Abnormal Psychology, 93,* 58–70.

Knight, R. A., & Roff, J. D. (1985). Affectivity in schizophrenia. In M. Alpert (Ed.), *Controversies in schizophrenia: Change and constancies* (pp. 280–316). New York: Guilford Press.

Knight, R. A., Roff, J. D., Barnett, J., & Moss, J. L. (1979). Concurrent and predictive validity of thought disorder and affectivity: A 22-year follow-up of acute schizophrenics. *Journal of Abnormal Psychology, 88,* 1–12.

Kraepelin, E. (1904). *Lectures on clinical psychiatry* (T. Johnstone, Trans.). New York: William Wood.

Krause, R., Steimer, E., Sanger-Alt, C., Wagner, G. (1989). Facial expressions of schizophrenic patients and their interaction partners. *Psychiatry, 52,* 1–12.

Kring, A. M., & Sloan, D. (1991). *The Facial Expression Coding System (FACES): A users guide.* Unpublished manuscript.

Kring, A. M., Smith, D. A., & Neale, J. M. (1989, August). *The development of an economical method for coding facial expression.* Paper presented at the 97th annual meeting of the American Psychological Association, New Orleans, LA.

Kring, A. M., Smith, D. A., & Neale, J. M. (1992). *Individual differences in dispositional expressiveness: The development and validation of the Emotional Expressivity Scale.* Manuscript submitted for publication.

Larsen, R. J., & Diener, E. (1992). Promises and problems with the circumplex model of emotion. *Review of Personality and Social Psychology, 13,* 25–59.

Levin, S., Hall, J. A., Knight, R. A., & Alpert, M. (1985). Verbal and nonverbal expression of affect in speech of schizophrenia and depressed patients. *Journal of Abnormal Psychology, 94,* 487–497.

Matthysse, S. (1987). Schizophrenic thought disorder: A model-theoretic perspective. *Schizophrenia Bulletin, 13,* 173–184.

Oltmanns, T. F., Ohayon, J., & Neale, J. M. (1978). The effect of anti-psychotic medication and diagnostic criteria on distractibility in schizophrenia. *Psychiatry Research, 14,* 81–91.

Oltmanns, T. F., Strauss, M. E., Heinrichs, D. W., & Driesen, N. (1988, November). *Social facilitation of emotional expression in schizophrenia.* Paper presented at the annual meeting of the Society for Research in Psychopathology, Cambridge, MA.

Rado, S. (1953). Dynamics and classification of disordered behavior. *American Journal of Psychiatry, 110,* 406–416.

Rado, S. (1969). *Adaptational psychodynamics: Motivation and control* (J. Jameson & H. Klein, Eds.). New York: Science House.

Schwartz, D. M., Grinker, R. R., Harrow, M., & Holzman, P. S. (1978). Six clinical features of schizophrenia. *Journal of Nervous and Mental Disease, 166,* 831–838.

Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin, 86,* 420–428.

Sison, C. E., Alpert, M., Fudge, R., & Stern, R. (1991). Patterns of psychophysiological and acoustic responses and flat affect in schizophrenia. *Schizophrenia Research, 4,* 267.

Sommers, A. A. (1985). "Negative symptoms": Conceptual and methodological problems. *Schizophrenia Bulletin, 4,* 25–47.

Spohn, H. E., & Strauss, M. E. (1989). Relation of neuroleptic and anticholinergic medication to cognitive functions in schizophrenia. *Journal of Abnormal Psychology, 98,* 367–380.

Tomarken, A. J., Davidson, R. J., & Henriques, J. B. (1990). Resting frontal brain asymmetry predicts affective responses to films. *Journal of Personality and Social Psychology, 59,* 791–801.

Walker, E., Marwit, S. J., & Emory, E. (1980). A cross-sectional study of emotion recognition in schizophrenics. *Journal of Abnormal Psychology, 89,* 428–436.

Walker, E., McGuire, M., & Bettes, B. (1984). Recognition and identification of facial stimuli by schizophrenics and patients with affective disorders. *British Journal of Clinical Psychology, 23,* 37–44.

Watson, D., Clark, L. A., & Carey, G. (1988). Positive and negative affectivity and their relation to anxiety and depressive disorders. *Journal of Abnormal Psychology, 97,* 346–353.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54,* 1063–1070.

Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin, 98,* 219–235.

Wistedt, B., Wiles, D., & Kolakowska, T. (1981). Slow decline of plasma drug and prolactin levels after discontinuation of chronic treatment with depot neuroleptics. *Lancet, 1,* 1163.

Zevon, M. A., & Tellegen, A. (1982). The structure of mood change: An idiographic/nomothetic analysis. *Journal of Personality and Social Psychology, 43,* 111–122.

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Correction to Lewinsohn et al.

In the article "Adolescent Psychopathology: I. Prevalence and Incidence of Depression and Other *DSM–III–R* Disorders in High School Students," by Peter M. Lewinsohn, Hyman Hops, Robert E. Roberts, John R. Seeley, and Judy A. Andrews (*Journal of Abnormal Psychology*, Vol. 102, No. 1, pp. 133–144), in the Total Incidence columns in Table 4 on page 140, the data for the Attention Deficit row should be switched with that for the Conduct row. That is, for attention deficit disorder, the total incidence is 0.00 for the male, female, and total samples; for conduct disorder, the total incidence is 0.12 ($SE = 0.12$) for the male sample, 0.29 ($SE = 0.20$) for the female sample, and 0.20 ($SE = 0.12$) for the total sample. The data given in the First Incidence and Relapse columns are correct.
