Emotional responses to psychosocial stress in schizophrenia: the role of individual differences in affective traits and coping

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Abstract

Despite the well-established association between psychosocial stress and symptom exacerbation in schizophrenia, factors that account for variability in stress reactivity among individuals with this disorder are unknown. This study examined the association between affective traits, coping style, and neurocognitive functioning and subjective emotional responses during putatively stressful social interactions among individuals with schizophrenia. Self-reported mood was assessed in male schizophrenia outpatients (n = 36) and matched nonpsychiatric controls (n = 15) during a role-play test (RPT) comprised of simulated social encounters requiring assertive or affiliative skills. During the RPT, schizophrenia patients and controls reported similar elevations in negative mood and decreases in positive mood as compared to baseline mood during assertion scenes. Affiliation scenes resulted only in similar decreases in positive mood across groups as compared to baseline mood. Among schizophrenia patients, trait negative affectivity (NA) and maladaptive coping style accounted for one quarter of the variance in negative mood during the assertion RPTs, and these relationships held after controlling for baseline mood, clinical symptoms, and neurocognitive functioning. Results provide preliminary support for the validity of the social RPT as a paradigm for examining psychosocial stress in schizophrenia and suggest that trait negative affectivity and maladaptive coping are associated with individual differences in emotional responses to psychosocial stressors in schizophrenia.

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1. Psychosocial stress reactivity in schizophrenia: the role of individual differences in affective traits and coping

Vulnerability–stress models of schizophrenia hypothesize that dispositional vulnerability factors are associated with sensitivity to environmental stressors that increase an individual’s liability for the onset or exacerbation of psychotic symptoms (e.g., Nuechterlein and Dawson, 1986; Nuechterlein et al., 1992). Stressors that are psychosocial in nature appear to be particularly important influences on the course of schizophrenia as evidenced by frequently reported findings that exposure to adverse life events (e.g., Norman and Malla, 1993; Ventura et al., 1989, 1992) or environments characterized by high expressed emotion (EE; see Butzlaff and Hooley, 1998 for a review).
are associated with exacerbation of psychotic symptoms. Despite this corpus of evidence, current understanding of the psychosocial stress–symptom exacerbation relationship is limited in two critical respects. First, the mechanisms through which exposure to stressors may result in symptom exacerbations are unknown. Second, it is clear that there is considerable variability across individuals with schizophrenia in terms of susceptibility to stress-induced relapse. For example, most patients who relapse do not experience a major life event or return to a high EE environment, and many do not relapse when exposed to such stressors (e.g., Kavanaugh, 1992; Ventura et al., 1989). Although this variability suggests the existence of key stress modulating factors among individuals with schizophrenia, patient characteristics that account for such differences have received minimal attention.

One promising approach to identifying mechanisms involved in the triggering effects of stressors in schizophrenia is to examine subjectively experienced emotional responses. In a discussion of the potential role of emotional arousal associated with exposure to stressful life events, Leff (1994, p. 134) noted, “Presumably, the psychological impact of a life event is due to the evocation of a mixture of powerful emotions which have to be processed in a short time”. Although schizophrenia is not typically conceptualized as an “emotional” disorder, several lines of evidence indicate that many individuals with schizophrenia are highly emotionally responsive to affectively laden stimuli or events. For example, in laboratory studies, individuals with schizophrenia demonstrate heightened sensitivity to negative affect-inducing stimuli (e.g., emotional film clips; see Kring, 1999). Additionally, the induction of negative mood (i.e., relatively transient, subjectively experienced emotional states) is associated with exacerbation of various clinical features of this disorder, including thought and language disturbances (Docherty, 1996; Rosenfarb et al., 1995), social skill deficits (Bellack et al., 1992; Mueser et al., 1993), and autonomic arousal (Tarrier et al., 1988).

Regarding the course of schizophrenia-related disorders, schizophrenia patients have been found to experience elevations in negative mood (Subotnik and Nuechterlein, 1988; Tarrier et al., 1991) and autonomic arousal (Hazlett et al., 1997) prior to symptom exacerbations. Naturalistic studies using experience sampling methods indicate that as compared to controls, individuals with psychotic disorders demonstrate heightened emotional reactivity to naturally occurring daily stressors characterized by larger increases in negative mood and decreases in positive mood (Myin-Germeys et al., 2000, 2001). Furthermore, family members of individuals with psychotic disorders have been shown to demonstrate a similar, though less pronounced, pattern of negative mood reactivity to naturally occurring daily stressors, which is consistent with the possibility that heightened emotional reactivity to stress may be a vulnerability marker for psychotic illness (Myin-Germeys et al., 2001). It is noteworthy that elevations in negative mood are closely linked to activation of the hypothalamic–pituitary–adrenal (HPA) axis (Buchanan et al., 1999; Smyth et al., 1998; van Eck et al., 1996), a stress-sensitive neurobiological system that has been proposed to play an important mediating role in the stress–symptom exacerbation relationship in schizophrenia (Walker and Diforio, 1997). Thus, subjective emotional responses may play a key role in the process through which exposure to stress results in symptom exacerbations.

As noted above, important modulating variables are likely to contribute to the heterogeneity in stress reactivity observed among individuals with schizophrenia. To date, success in identifying patient characteristics that account for this heterogeneity has been limited. Basic demographic characteristics such as gender, age, and number of previous hospitalizations do not appear to be important moderators (Norman and Malla, 1994; Pallanti et al., 1997), and clinical symptom state contributes only modestly to variability in stress reactivity (e.g., Norman and Malla, 1994; Pallanti et al., 1997). An alternative approach to identifying such factors in schizophrenia is to examine enduring psychological characteristics that may increase or decrease vulnerability to stress. For example, certain personality traits and coping styles have proven to be robust moderators of stress reactivity in a variety of clinical and nonclinical populations (for reviews see Clark and Watson, 1999; Skodol, 1998; Taylor and Aspinwall, 1996). While such factors have been theorized to be relevant for understanding stress reactivity in schizophrenia (e.g., negative affectivity; Fowles, 1992), they have received limited research attention.
Research indicates that many individuals with schizophrenia are characterized by a pattern of personality traits and coping style that may amplify the effects of psychosocial stressors. Regarding personality traits, schizophrenia has repeatedly been associated with elevated trait negative affectivity (NA) and low trait positive affectivity (PA) as compared to normal controls (Berenbaum and Fujita, 1994; Blanchard et al., 1998), a pattern that appears to be stable across different clinical states (Blanchard et al., 2001). Trait NA refers to an enduring disposition to experience intense aversive emotional states, increased likelihood to experience distress or dissatisfaction at all times, and heightened sensitivity to environmental stressors (Watson and Clark, 1984, 1996). In contrast, trait PA refers to an orthogonal dimension of trait affectivity reflecting the tendency to experience positive or rewarding emotional states and low reactivity to negative stimuli (e.g., Berenbaum and Williams, 1995) and certain types of stressors (Clark and Watson, 1999). Affective disturbances consistent with this pattern of traits are evident premorbidly among individuals who later develop schizophrenia (see Blanchard and Panzarella, 1998 for a review) and during the early course of the disorder (Subotnik et al., 1999). Additionally, traits that are conceptually and empirically linked to trait NA and trait PA such as neuroticism, introversion, and social anhedonia have been shown to predict the later development of schizophrenia-related psychopathology (e.g., Angst and Clayton, 1986; Kwapil, 1998; Malmberg et al., 1998; Van Os and Jones, 2001). Thus, the pattern of high trait NA and low PA may be characteristic of many individuals with schizophrenia throughout their lives rather than solely reflecting the consequences of living with a serious mental illness.

Schizophrenia is also associated with various manifestations of maladaptive coping style, including deficiencies in the use of active problem-focused coping (van den Bosch et al., 1992), limited range and flexibility of coping strategies, which are commonly avoidant or passive (Dohrenwend et al., 1998; Jansen et al., 1998), and ineffective interpersonal problem-solving strategies (e.g., submissiveness, lying, denial) when confronted with negative emotions (Bellack et al., 1992). While the pattern of high trait NA and maladaptive coping style may serve to heighten sensitivity to stressors (e.g., Bolger, 1990; Bolger and Zuckerman, 1995), low trait PA and low adaptive coping style may reflect a lack of protective or stress-buffering characteristics among individuals with schizophrenia.

The current study examined the relationship between affective traits and coping style and subjective emotional responses to stressful social interactions among individuals with schizophrenia. Self-reported negative and positive mood was examined in schizophrenia outpatients and normal controls during a social role-play test (RPT), which was intended to model a psychosocial stressor relevant to the daily lives of individuals with schizophrenia. Participants completed affective trait and coping style measures and clinical symptom assessments. A brief neurocognitive test battery was also administered as neurocognitive deficits have previously been shown to moderate vulnerability to stress in schizophrenia (Pallanti et al., 1997; Rosenfarb et al., 2000), and we sought to evaluate the role of affective traits and coping style above and beyond such deficits. It was predicted that (1) the schizophrenia group would demonstrate greater increases in negative mood and decreases in positive mood than nonpsychiatric controls during the social RPT; (2) within the schizophrenia group, trait NA and maladaptive coping style would be associated with elevations of negative mood above and beyond clinical symptoms and neurocognitive functioning; (3) within the schizophrenia group, higher levels of trait PA and adaptive coping style would be associated with lower negative mood during the RPT above and beyond clinical symptoms and neurocognitive functioning.

2. Method

2.1. Participants

Participants included male schizophrenia outpatients (n = 36) recruited through a university-based psychiatric hospital (n = 26) and a Veterans Administration Medical Center (n = 10), and nonpsychiatric male controls (n = 15) recruited through newspaper advertisements and flyers posted in the local community. DSM-IV (American Psychiatric Association, 1994) diagnoses of schizophrenia were based on the Structured Clinical Interview for DSM-IV (SCID-I;
First et al., 1996). Patients with a history of tardive dyskinesia (based on chart review) were excluded in an effort to rule out organic factors, which may contribute to cognitive or social dysfunctions that are not necessarily attributable to schizophrenia per se. Controls were screened for psychotic, mood, and substance use disorders using the SCID and were excluded for lifetime history of any psychotic or mood disorder. Additional exclusion criteria for all participants included (1) history of neurological disorder or head trauma with significant loss of consciousness, (2) mental retardation as indicated by prorated IQ score from the two-subtest short form of the WAIS-R, (3) current substance abuse or dependence disorder, and (4) history of substance dependence disorder within the past 4 years. All participants provided informed consent to participate in this project. Diagnostic interviews were videotaped and as previously described in a companion study (Blanchard et al., 2001), adequate inter-rater agreement was achieved with kappas ranging from 0.85 to 1.0.

Demographic information for patients and controls is presented in Table 1. There were no differences between groups on age, \( t(40.01) = -1.00, p > 0.05 \), or education level, \( t(49) = 1.50, p > 0.05 \). Chi-square analyses indicated that there were no group differences in ethnicity, \( \chi^2(3,N=51) = 5.07, p < 0.05 \). Consistent with previous research, a smaller proportion of schizophrenia patients than controls had been married, \( \chi^2(3,N=51) = 33.50, p < 0.001 \).

Clinical history information for patients is presented in Table 2. Patients were generally chronically ill with a first psychiatric hospitalization occurring 10 to 20 years prior to participation in this project. All patients were receiving antipsychotic medications that were clinically determined. Antipsychotic medication dosages were converted to chlorpromazine equivalents (Davis et al., 1983). A total of 13 patients were taking traditional antipsychotics (chlorpromazine equivalents, \( M = 570.28, SD = 477.49 \)) and 15 were taking atypical neuroleptics (e.g., risperidone, clozapine) for which there are no chlorpromazine unit equivalents. Eight patients were involved in a double-blind neuroleptic trial (traditional versus novel antipsychotic comparison) for which medication assignment and dosage information is not available.

Symptomatology during the preceding week was evaluated with an anchored version of the Brief Psychiatric Rating Scale (BPRS; Overall and Gorham, 1962). Based on findings concerning the factor structure of the BPRS (Mueser et al., 1997), we utilized four scales including Thought Disturbance, Anergia, Affect, and Disorganization. Each subscale is based on the sum of the items comprising the subscales. In a companion project (Blanchard et al., 2001), adequate inter-rater agreement was established between the interviewers and a criterion rater (JJB) using 16 videotaped interviews (ICC = 0.78 for total 18-item BPRS score). As may be seen in Table 2, the schizophrenia group demonstrated low to moderate levels of symptomatology.

<table>
<thead>
<tr>
<th>Measure</th>
<th>( M (SD) )</th>
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</thead>
<tbody>
<tr>
<td>Age, first symptoms*</td>
<td>21.33 (7.77)</td>
</tr>
<tr>
<td>Age, first hospitalization*</td>
<td>21.34 (8.02)</td>
</tr>
<tr>
<td>Years since first hospitalization*</td>
<td>17.5 (12.02)</td>
</tr>
<tr>
<td>Brief Psychiatric Rating Scale</td>
<td></td>
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<tr>
<td>Anergia</td>
<td>5.89 (2.14)</td>
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<tr>
<td>Affect</td>
<td>11.36 (5.00)</td>
</tr>
<tr>
<td>Thought disturbance</td>
<td>6.94 (3.22)</td>
</tr>
<tr>
<td>Disorganization</td>
<td>4.33 (1.87)</td>
</tr>
<tr>
<td>Total score</td>
<td>30.75 (8.66)</td>
</tr>
</tbody>
</table>

* Data missing for three participants due to inability to recall information.
2.2. Procedures and measures

Participation in this project involved two sessions occurring on different days. During the first session, participants were evaluated with the SCID to confirm inclusion and exclusion criteria. The second session was scheduled during the early afternoon and began by obtaining a self-report measure of baseline mood. Next, a member of the research team who did not administer the diagnostic interview administered the RPT. After each RPT scene, participants completed a self-report mood questionnaire (total time to complete the RPT was between 35 and 50 min). Participants were then assessed with the BPRS (lasting approximately 25 min) and a brief cognitive test battery (lasting approximately 60 min). Finally, participants completed self-report trait and coping questionnaires. This order of administration was selected to ensure that a sufficient time interval existed between the mood manipulation (RPT) and the completion of trait and coping measures to prevent transient mood changes from contaminating these self-report measures.

2.2.1. Role-play test

The role-play test (RPT) is a segment of the Social Problem Solving Assessment Battery (Sayers et al., 1995), a series of tasks specifically designed for use with chronic psychiatric populations, which assess participants’ ability to solve interpersonal problems through conversation. This battery has high content and social validity, good test–retest reliability across different phases of illness, and has been shown to be capable of identifying problem solving deficits among individuals with schizophrenia (Bellack et al., 1994).

Our decision to utilize the role-play test as a paradigm for examining emotional responses was based on several considerations. First, role-play tests have been used extensively in schizophrenia research and provide a standardized method for examining reactivity to putatively stressful interpersonal encounters. Second, schizophrenia patients frequently demonstrate severe social skill deficits on role-play tests (Bellack et al., 1992), which might be expected to elicit distress. Third, role-play tests share many characteristics with standardized psychosocial stress induction procedures (e.g., public speaking tasks), including a novel social context, unpredictability, challenge, and changes in emotional valence (e.g., Bellack et al., 1992). Fourth, the validity of role-play tests has been established in studies demonstrating associations between RPT performance and community adjustment and functioning during interactions with significant others (Bellack et al., 1990; Mueser et al., 1990).

Participants were informed that the RPT procedure would be videotaped using an unconcealed camera. The procedure began by instructing participants to read and then listen to an audiotaped description of each role-play scene. Participants completed two 90-s practice role-play scenes to ensure comprehension. Each participant then completed four 3-min role-play scenes. Two role-play scenes involved compromise and negotiation ("assertion" scenes) and required participants to confront (a) a landlord about neglecting to fix a leaky ceiling for several weeks and (b) a supervisor about being dismissed from a job training program. Two role-play scenes involved conversation initiation and maintenance skills ("affiliation" scenes) and required participants to interact with (a) a new neighbor in the process of moving into an apartment and (b) a coworker at a new job. It was expected that affiliation scenes would be experienced as both unpleasant and aversive within the schizophrenia group in light of the social anhedonia that is characteristic of schizophrenia (Blanchard et al., 1998, 2001), the novel and evaluative context of the task, and the skill deficits in initiating and sustaining conversations that are often characteristic of schizophrenia. Assertion and affiliation RPT scenes were administered in a fixed, alternating sequence, beginning with an assertion scene. Confederate responses were standardized and primarily entailed open-ended or minimal responses that required participants to control the flow of conversation. Confederates were carefully trained to use a consistent set of prompts and express a neutral emotional tone.

2.2.2. Mood

A scale based upon the circumplex model of emotion as explicited by Larson and Diener (1992) was used to measure mood at baseline and following each scene in the RPT. The scale is a 36-item self-report questionnaire designed to provide a quick, reliable, and valid measurement of pleasantness or positive mood and unpleasantness or negative mood.
The 18-item positive mood scale consists of items tapping activated pleasant affect, pleasant affect, and unactivated pleasant affect. The 18-item negative mood scale consists of items reflecting activated unpleasant affect, unpleasant affect, and unactivated unpleasant affect. At baseline, participants rated the extent to which they were “currently experiencing” each of the 36 mood adjectives on a 5-point scale (very slightly or not at all, a little, moderately, quite a bit, or extremely). Participants then completed the scale after each of the four RPT scenes and were instructed to rate the extent to which they experienced each of the 36 mood adjectives “during the role-play scene you just completed.” A full discussion of the psychometric properties of the model upon which this scale is based is presented in Larson and Diener (1992). Internal consistency reliabilities (Chronbach’s alpha) for the positive and negative mood scales were very good in both the schizophrenia (median $\alpha = 0.95$, range = 0.93–0.97) and control (median $\alpha = 0.89$, range = 0.76–0.98) groups.

2.2.4. Coping

Coping style was assessed with the 60-item dispositional version of the COPE (Carver et al., 1989). The COPE assesses active and avoidant coping efforts, as well as distinct aspects of active coping and coping responses that might impede or interfere with active coping that are not measured in other instruments (e.g., denial, acceptance, behavioral disengagement). The COPE consists of statements describing what people might do and feel when they are under stress, which participants rate on a 4-point likert scale, and yields 11 factors representing different types of coping strategies. The COPE scales demonstrate adequate reliabilities and good convergent and discriminant validity (Carver et al., 1989, 1993).

To reduce the number of dependent variables, two composite scales were selected on the basis of the factor analytic and correlational work of Carver et al. (1989) and previous research employing this instrument (Blanchard et al., 1999). An “adaptive coping” index was calculated by summing two scales utilized in our earlier study that were highly correlated among schizophrenia outpatients ($r = 0.70$; Blanchard et al., 1999): 12 items from the “active coping” scale (based on the following 4-item COPE subscales: active coping, planning, suppression of competing activities) and 12 items from the “acceptance coping” scale (based on the following 4-item COPE subscales: restraint coping, positive reinterpretation and growth, acceptance coping). Sample items from these subscales include, “I concentrate my efforts on doing something about it” and “I try to see it in a different light, to make it seem more positive”. In the current sample, the two previously developed active coping and acceptance coping scales were highly intercorrelated ($r = 0.74$), as were the six COPE subscales comprising the overall adaptive coping index (mean $r = 0.62$, range = 0.52–0.79). The adaptive coping scale (possible range: 24–96) demonstrated good reliability in the schizophrenia ($\alpha = 0.91$) and control ($\alpha = 0.79$) groups. As in our earlier study (Blanchard et al., 1999), a “maladaptive coping” index was calculated by summing the following 4-item COPE subscales: denial, mental disengagement, and behav-
ioral disengagement (possible range 12–48). Sample items from these scales include, “I turn to work or other substitute activities to take my mind off of it” and “I pretend that it really has not happened”. In the current sample, the three COPE subscales comprising the maladaptive coping index were moderately to highly intercorrelated (mean $r = 0.48$, range $= 0.32–0.63$). This scale demonstrated good internal consistency in the schizophrenia group ($\alpha = 0.81$) but low internal consistency in the control group ($\alpha = 0.40$), which may be associated with the relatively limited range of scores on this scale among controls.

2.3. Cognitive functioning

2.3.1. General intellectual ability

General intellectual ability was assessed with an abbreviated version of the Wechsler Adult Intelligence Scale—Revised (WAIS-R, Wechsler, 1981). Vocabulary and Block Design were used as a two-subtest short form of the WAIS-R. These subtests have high reliabilities and have a higher correlation with the Full Scale IQ scores than any other dyad ($r=0.90$; Silverstein, 1982).

2.3.2. Memory

Selected subtests of the Wechsler Memory Scale—Revised (WMS-R; Wechsler, 1987) were used to assess verbal and visual memories. Immediate and delayed (30 min) verbal memories were evaluated with the Logical Memory I and II subtests, which assess paragraph recall ability. Immediate and delayed (30 min) visual memories were evaluated with the Visual Reproduction I and II subtests, which assess recall for basic geometric designs. All tests were administered as described in the WMS-R Manual (Wechsler, 1987).

2.4. Data analysis

Statistical analyses were conducted in three stages. First, group differences in self-reported mood during the RPT were examined to assess the validity of the intended mood manipulation using $2 \times 3$ (baseline, assertion RPT scenes, affiliation RPT scenes) repeated measures ANOVAs separately for negative and positive mood. Second, we sought to replicate previous findings of high trait NA and low trait PA and high maladaptive coping and low adaptive coping in schizophrenia by examining group differences on the trait and coping measures. Third, correlational and regression analyses were conducted within the schizophrenia group to examine associations between traits, coping, neurocognitive functioning and symptomatology, and changes in mood during the RPT.

3. Results

3.1. Mood during the RPT

Results for negative and positive mood during the RPT are presented graphically in Fig. 1. For negative mood, there was a significant main effect for condition, $F(2,48) = 26.60, p < 0.001$; however, the main effect of group, $F(1,49) = 3.82$, and the group $\times$ condition interaction, $F(2,48) = 0.13$, were not significant ($p$’s >0.05). Follow-up paired sample t-tests across groups revealed higher negative mood during assertion scenes than baseline, $t(50) = 60.91$, $p < 0.001$, and higher negative mood during assertion versus affiliation scenes, $t(50) = 8.10$, $p < 0.001$. Negative mood during affiliation scenes did not differ from baseline ($p>0.05$).

For positive mood (see Fig. 2), there was a significant main effect for condition, $F(2,48) = 33.74$, $p < 0.001$. The main effect of group, $F(1,49) = 2.06$, and the group $\times$ condition interaction, $F(2,48) = 2.84$, were not significant ($p$’s >0.05). Follow-up paired samples t-tests across groups revealed that relative...
to baseline, participants reported lower positive mood during the assertion scenes, \( t(50) = 7.78, p < 0.001 \), and affiliation scenes, \( t(50) = 3.07, p < 0.01 \). Additionally, participants reported lower positive mood during assertion scenes than during affiliation scenes, \( t(50) = 7.40, p < 0.05 \).

Overall, assertion scenes elicited both increases in negative mood and decreases in positive mood, whereas affiliative scenes elicited decreases in positive mood but did not affect negative mood. The schizophrenia and control groups did not differ in their responses to the RPT scenes.

### 3.2. Affective traits, coping style, symptoms, and neurocognitive functioning

Descriptive data for affective trait, coping style, and neurocognitive measures in the schizophrenia and control groups are presented in Table 3. Consistent with previous research, the schizophrenia group demonstrated a pattern of high trait NA and low trait PA and a coping style characterized by more common use of maladaptive coping strategies. Although the group means differed in the predicted direction for adaptive coping (schizophrenia lower than controls), this difference was not statistically significant. Neurocognitive test results indicated that the schizophrenia group performed worse than controls across the measures of general intellectual and memory functioning included in this study (\( p \text{'s} < 0.05 \)) with the exception of WMS-R Visual Reproduction I (\( p = 0.10 \)).

Correlational analyses within the schizophrenia group involving self-reported mood during the RPT, traits, coping, neurocognitive tests, and symptom measures focused on assertion RPT scenes, as affiliation scenes did not result in significant increases in negative mood. As shown in Table 4, negative mood during assertion RPT scenes correlated positively with baseline negative mood, trait NA, maladaptive coping, BPRS total scores, and WMS-R Visual Reproduction II scores. Contrary to expectations, negative mood also positively correlated with adaptive coping. Positive mood during assertion RPT scenes correlated positively with baseline positive mood and negatively with WMS-R Visual Reproduction I scores, but was not significantly correlated with trait, coping, or symptom measures.\(^2\)

To determine whether trait NA and maladaptive coping demonstrate an association with negative mood during the RPT above and beyond baseline

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\(^2\) A parallel set of correlational analyses was conducted among the normal controls. Results indicated that maladaptive coping style positively correlated with baseline negative mood (\( r = 0.78, p < 0.001 \)). However, all other relationships among traits and coping and negative mood during the RPT and neurocognitive test scores were nonsignificant. These null findings should be interpreted cautiously due to the small sample size in this group.
negative mood in the schizophrenia group, variables were entered into a hierarchical multiple regression equation in the following order: (1) baseline negative mood, (2) trait NA, and (3) maladaptive coping. Our decision to enter trait NA prior to maladaptive coping was motivated by theoretical and empirical considerations regarding the proposal that personality traits may influence stress reactivity through their affects on differential choice or effectiveness of coping strategies (Bolger and Zuckerman, 1995). As can be seen in Table 5, baseline mood accounted for 27% of the variance in assertion negative mood, which was statistically significant. Trait NA and maladaptive coping accounted for 17% and 8% of the variance, respectively, which were both statistically significant. Thus, trait NA and maladaptive coping accounted for a significant portion of variance in subjectively experienced social stress during the RPT above and beyond that accounted for by baseline mood.

Additional analyses were conducted within the schizophrenia group to determine whether trait NA and maladaptive coping account for variance in negative mood during the RPT above and beyond symptoms and cognitive factors found to be correlated with negative mood. Variables were entered into a regression equation in the following order: (1) baseline negative mood, (2) BPRS total score, (3) WMS-R Visual Reproduction II score, (4) trait NA, and (5) maladaptive coping. Again, baseline mood accounted for a significant amount of variance in assertion negative mood ($\Delta R^2 = 0.27$, $F = 12.69$, $p < 0.001$).

Table 4
Correlations between self-reported mood during assertion role-play tests and other variables among schizophrenia patients ($n = 36$)

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<tr>
<td>(1) Assertion NM</td>
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<td>(2) Assertion PM</td>
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<td>(3) Baseline NM</td>
<td>0.52**</td>
<td>0.09</td>
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<tr>
<td>(4) Baseline PM</td>
<td>0.16</td>
<td>0.63**</td>
<td>–0.10</td>
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<tr>
<td>(5) Trait NA</td>
<td>0.57**</td>
<td>0.00</td>
<td>0.36*</td>
<td>–0.03</td>
<td>–</td>
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<tr>
<td>(6) Trait PA</td>
<td>0.05</td>
<td>0.05</td>
<td>0.01</td>
<td>0.29</td>
<td>–0.16</td>
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<tr>
<td>(7) Maladaptive coping</td>
<td>0.56**</td>
<td>0.28</td>
<td>0.35*</td>
<td>0.26</td>
<td>0.40*</td>
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<tr>
<td>(8) Adaptive coping</td>
<td>0.38*</td>
<td>0.07</td>
<td>0.16</td>
<td>0.38*</td>
<td>0.16</td>
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<td>0.11</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(9) BPRS total</td>
<td>0.40*</td>
<td>0.10</td>
<td>0.17</td>
<td>0.08</td>
<td>0.57**</td>
<td>–0.04</td>
<td>0.11</td>
<td>0.32</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(10) Estimated IQ</td>
<td>–0.21</td>
<td>–0.29</td>
<td>–0.14</td>
<td>–0.18</td>
<td>–0.01</td>
<td>–0.29</td>
<td>–0.24</td>
<td>0.07</td>
<td>–0.03</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(11) WMS-R Verbal I</td>
<td>–0.17</td>
<td>–0.17</td>
<td>–0.30</td>
<td>–0.09</td>
<td>–0.16</td>
<td>–0.09</td>
<td>0.09</td>
<td>–0.22</td>
<td>–0.40*</td>
<td>0.41*</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(12) WMS-R Verbal II</td>
<td>–0.22</td>
<td>–0.13</td>
<td>–0.36*</td>
<td>–0.05</td>
<td>–0.17</td>
<td>–0.04</td>
<td>0.03</td>
<td>–0.21</td>
<td>–0.39*</td>
<td>0.40*</td>
<td>0.95**</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(13) WMS-R Visual I</td>
<td>–0.18</td>
<td>–0.42*</td>
<td>–0.38*</td>
<td>–0.20</td>
<td>–0.24</td>
<td>0.04</td>
<td>–0.32</td>
<td>–0.21</td>
<td>–0.39*</td>
<td>0.40*</td>
<td>0.31</td>
<td>0.19</td>
<td>0.32</td>
</tr>
<tr>
<td>(14) WMS-R Visual II</td>
<td>–0.39*</td>
<td>–0.18</td>
<td>–0.37*</td>
<td>–0.20</td>
<td>–0.27</td>
<td>–0.13</td>
<td>–0.26</td>
<td>–0.32</td>
<td>–0.20</td>
<td>0.50**</td>
<td>0.40*</td>
<td>0.47**</td>
<td>0.74**</td>
</tr>
</tbody>
</table>

NM = negative mood, PM = positive mood, NA = negative affect, PA = positive affect, BPRS = Brief Psychiatric Rating Scale, and WMS-R = Wechsler Memory Scale—Revised.

* $p < 0.05$, two-tailed.
** $p < 0.01$, two-tailed.

negative mood in the schizophrenia group, variables were entered into a hierarchical multiple regression equation in the following order: (1) baseline negative mood, (2) trait NA, and (3) maladaptive coping. Our decision to enter trait NA prior to maladaptive coping was motivated by theoretical and empirical considerations regarding the proposal that personality traits may influence stress reactivity through their affects on differential choice or effectiveness of coping strategies (Bolger and Zuckerman, 1995). As can be seen in Table 5, baseline mood accounted for 27% of the variance in assertion negative mood, which was statistically significant. Trait NA and maladaptive coping accounted for 17% and 8% of the variance, respectively, which were both statistically significant. Thus, trait NA and maladaptive coping accounted for a significant portion of variance in subjectively experienced social stress during the RPT above and beyond that accounted for by baseline mood.

Additional analyses were conducted within the schizophrenia group to determine whether trait NA and maladaptive coping account for variance in negative mood during the RPT above and beyond symptoms and cognitive factors found to be correlated with negative mood. Variables were entered into a regression equation in the following order: (1) baseline negative mood, (2) BPRS total score, (3) WMS-R Visual Reproduction II score, (4) trait NA, and (5) maladaptive coping. Again, baseline mood accounted for a significant amount of variance in assertion negative mood ($\Delta R^2 = 0.27$, $F = 12.69$, $p < 0.001$).

Table 5
Hierarchical linear multiple regression analysis for negative mood during assertion role-play test scenes in the schizophrenia group ($n = 36$)

<table>
<thead>
<tr>
<th>Variables by block</th>
<th>$R^2$</th>
<th>$\Delta R^2$</th>
<th>$\Delta F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Baseline negative mood</td>
<td>0.27</td>
<td>0.27</td>
<td>12.69***</td>
</tr>
<tr>
<td>(2) Trait NA</td>
<td>0.44</td>
<td>0.17</td>
<td>9.83**</td>
</tr>
<tr>
<td>(3) Maladaptive coping</td>
<td>0.52</td>
<td>0.08</td>
<td>5.55*</td>
</tr>
</tbody>
</table>

NA = negative affectivity.

* $p < 0.05$.
** $p < 0.005$.
*** $p < 0.001$.

An additional regression analysis was conducted entering adaptive coping into the regression equation after baseline mood and prior to trait NA and maladaptive coping. Results were essentially unchanged. Adaptive coping accounted for a significant proportion of variance ($\Delta R^2 = 0.09$, $F = 4.76$, $p < 0.05$), and trait NA accounted for slightly less variance (14%) while maladaptive coping accounted for the same proportion of variance (8%), which were both statistically significant.
The addition of total BPRS scores accounted for a significant increment of variance in the equation ($\Delta R^2 = 0.17, \Delta F = 5.37, p < 0.05$) but Visual Reproduction II did not ($p > 0.05$). Subsequently, trait NA ($\Delta R^2 = 0.07, \Delta F = 4.11, p = 0.05$) and maladaptive coping ($\Delta R^2 = 0.09, \Delta F = 5.83, p < 0.05$) each accounted for significant increments of variance in self-reported negative mood.

4. Discussion

This study examined subjective emotional responses to putatively stressful social interactions among individuals with schizophrenia and their relationship to individual differences in affective traits and coping. During the RPT, assertion scenes elicited increased negative mood and decreased positive mood that was similar in magnitude across patients and controls, whereas affiliation scenes led to similar decreases in positive mood across groups but did not significantly affect negative mood. These patterns indicate that assertion scenes elicited greater subjectively experienced stress during the RPT than the affiliation scenes. The similar mood changes across groups are consistent with studies demonstrating that individuals with schizophrenia report emotional changes similar to non-psychiatric controls when confronted with nonsocial, emotionally valenced stimuli (see Kring, 1999), although there was no evidence for the prediction that the schizophrenia group would report higher levels of negative mood than controls during the RPT. Overall, results support the notion that individuals with schizophrenia are sensitive and responsive to emotionally evocative stimuli and extend this line of research to the domain of social interactions.

The current findings provide preliminary support for the utility of the social RPT as a laboratory paradigm to examine psychosocial stress reactivity in schizophrenia. An appealing feature of the RPT is its apparently greater ecological validity for examining psychosocial stress among individuals with schizophrenia than other commonly used procedures (e.g., public speaking tasks), as stressors that occur within the context of interpersonal interactions appear particularly important in schizophrenia (e.g., Butzlaff and Hooley, 1998). However, the lack of group differences in self-reported mood suggests the procedure may not have been sufficiently challenging or distressing to detect heightened emotional responses in the schizophrenia group and could benefit from methodological refinement. For example, the lack of negative mood evoked by the affiliation scenes suggests that such role plays may not be ideal for examining stress reactivity. Furthermore, while the decreases in positive mood during the affiliation scenes could potentially be interpreted as consistent with social anhedonia within the schizophrenia group (Blanchard et al., 2001), the controls apparently experienced these scenes as equally unrewarding. Thus, refinements aimed at increasing the duration and intensity of negative mood elicited by the RPT (e.g., replace affiliation scenes with other types of negative mood-inducing scenes) could render the task more well suited to examine emotional responses to stress as well as associated hormonal (e.g., HPA axis activation) and autonomic nervous system responses.

The most significant findings from this study concern the relationships between affective traits, coping style, and mood changes during confrontational social interactions in schizophrenia. Whereas studies of demographic and clinical characteristics have yielded little in accounting for differences in responses to stressors, our results suggest that enduring psychological characteristics play a meaningful role in understanding differences in subjectively experienced stress among individuals with schizophrenia. Trait NA and maladaptive coping uniquely accounted for approximately one quarter of the variance in negative mood during assertion RPT scenes above and beyond baseline mood and continued to significantly account for variance in negative mood after controlling for clinical symptomatology and neurocognitive functioning. These results extend the stress-modulating effects of trait NA and maladaptive coping found in a variety of clinical and nonclinical populations (e.g., Bolger and Zuckerman, 1995; Clark et al., 1994; Skodol, 1998; Taylor and Aspinwall, 1996) to schizophrenia. These results are the first to demonstrate an association between repeated observations of elevated trait NA in schizophrenia (Berenbaum and Fujita, 1994; Blanchard et al., 1998, 2001) and emotional responses during social interactions and encourage further research into the role of this affective trait in the stress exposure–relapse process.
It is important to note several limitations of the current study. Findings regarding the role of trait NA and maladaptive coping are based on self-report and may partly reflect method variance. We were, however, able to demonstrate that these variables accounted for variance in negative mood during the RPT above and beyond baseline mood, clinical ratings of symptomatology, and performance on neurocognitive tasks. This issue can be more directly addressed by incorporating measures of additional components of the stress process, such as hormonal or autonomic reactivity (e.g., Jansen et al., 1998, 2000). The cross-sectional design of this study did not allow us to examine the stability of the affective traits and coping styles examined or determine whether these traits reflect premorbid personality characteristics in the current sample. It is unclear to what extent the various medications taken in the schizophrenia group may have affected emotional responding (Blanchard and Neale, 1992), although similar patterns of self-reported mood have been found in unmedicated patients exposed to non-social emotionally evocative stimuli (e.g., Kring and Neale, 1996). Finally, it is unclear whether the current findings are generalizable to the emotional responses of women diagnosed with schizophrenia (Salem and Kring, 1998).

In this study, it was demonstrated on a preliminary basis that trait NA and maladaptive coping style are meaningfully associated with variability in emotional responding to psychosocial stress among individuals with schizophrenia. It will be important to determine whether trait NA and/or maladaptive coping are specific vulnerability factors that amplify stress reactivity in schizophrenia or simply reflective of more general tendencies toward distress (Cohen and Wills, 1985). The relationship between traits and coping in the stress process in schizophrenia also requires clarification. Evaluation of more specific facets of affective traits and coping style (e.g., cognitive appraisals) may facilitate identification of individuals at elevated risk for stress-induced relapse as well as stress-buffering factors, as trait PA and adaptive coping style may lack the sensitivity necessary to detect personal protective factors in schizophrenia. Continued investigation of trait NA and maladaptive coping style holds promise for identifying physiological factors that may contribute to abnormal stress reactivity in schizophrenia (e.g., Depue, 1996) and tailoring psychosocial interventions (e.g., affect regulation or coping skill interventions) to individual patient characteristics.

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References


