Self-Reported Stress and the Deficit Syndrome of Schizophrenia

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GENERALLY speaking, schizophrenia is not associated with diminished positive and negative emotions. Even patients with negative symptoms such as blunted affect have generally not differed in their levels of self-reported emotionality compared to patients without negative symptoms. However, there is evidence to suggest that a subgroup of patients with negative symptoms, those with the deficit syndrome, have a diminished capacity to experience positive and negative emotions. The present study examined whether ratings of the deficit and negative syndrome were associated with lower levels of self-reported stress during a laboratory-based, emotion-induction manipulation. Thirty-six participants with schizophrenia were asked to produce separate affectively positive and affectively negative narratives. Immediately following each narrative, participants were asked to report the level of stress they had experienced while recounting their memories. The deficit syndrome ratings, analyzed in a continuous and a categorical manner, were associated with lower levels of self-reported stress in the affectively negative condition. Moreover, the deficit and negative syndrome ratings significantly differed in their associations to levels of self-reported stress during both tasks, supporting the notion that there are appreciable differences between the two syndromes. Given that stress has been an essential component in conceptualizations of schizophrenia onset and relapse, the possibility of stress-resistant properties associated with the deficit syndrome should be tested in future research.

INTRODUCTION

Investigations of the subjective emotional experiences of patients with schizophrenia have generally found that patients, as a group, report diminished levels of positive emotionality and increased levels of negative emotionality (Berenbaum and Fujita 1994; Blanchard, Mueser, and Bellack 1998). This increased level of negative emotionality is in some ways surprising, since negative symptoms such as blunted affect, alogia, and paucity of expressive gestures are quite common in patients. When patients with flat affect have been compared to patients without flat affect, there have been few differences in the intensity of their self-reported positive and negative emotions (Berenbaum and Olmanns 1992; Kring and Neale 1996), even when these patients are unmedicated (Kring, Kerr, Smith, and Neale, 1993; Dworkin, Oster, Clark, and White 1998). Moreover, patients have reported that certain negative
symptoms were in and of themselves distressing (Selten, Bosch, and Sijben, 1998). Thus, while many patients appear flat, they often report experiencing strong emotions. This “dysjunction” between patients’ subjective report of emotion and their outward expression of emotion has led to the postulation that negative symptoms are a poor reflection of patients’ actual emotional state (Kring and Neale, 1996). However, it is important to note that negative symptoms are etiologically heterogeneous. Thus, while patients with negative symptoms as a group do not exhibit diminished emotionality, it is possible that a subgroup of these patients do. The present study examined whether the subjective experience of stress is reduced in a certain subgroup of schizophrenia patients with prominent, enduring negative symptoms.

Historically speaking, the negative cluster of schizophrenic symptoms has been central in attempts to delineate distinct processes within schizophrenia. The negative syndrome has been incorporated into the operational definitions of Kraepelin’s “loss of volition” (1919), Andreasen and Olsen’s negative schizophrenia (1982), and Crow’s type II schizophrenia (1985). More recently, a “deficit syndrome” construct was proposed (Carpenter, Heinrichs, and Wagman 1988). The deficit syndrome is a significant revision of previous conceptualizations of the negative syndrome in that it distinguishes between primary (idiopathic) and secondary (result of medication, depression, or environmental factors) negative symptoms. The deficit syndrome is theorized to be a pathophysiologically distinct form of schizophrenia, and categorical diagnosis is made based on the presence or absence of enduring, primary negative symptoms. These symptoms include: blunted affect, diminished capacity to experience both positive and negative emotions, poverty of speech, diminished sense of purpose, diminished interest in activities, and a diminished interest in social relationships (Kirkpatrick, Buchanan, McKenney, Alphs, and Carpenter 1989).

Although the deficit syndrome is defined, in part, by an enduring diminished capacity to experience emotions, the empirical literature supporting this notion is somewhat mixed. On one hand, patients with the deficit syndrome have evidenced lower levels of anxiety, hostility, depression, guilt (Kirkpatrick, Buchanan, Breier, and Carpenter 1993; Kirkpatrick, Buchanan, Breier, and Carpenter 1994; Tek, Kirkpatrick, and Buchanan 2001), suicidality (Fenton and McGlashan 1994), suspiciousness (Kirkpatrick, Amador, Yale, Bustillo, Buchanan, Tohen 1996) and higher levels of physical anhedonia (Kirkpatrick and Buchanan 1990) as compared to non-deficit patients. However, Earnst and Kring (1999) found that subjects with the deficit syndrome did not self-report diminished emotionality in response to affectively loaded movie clips as compared to a group composed of subjects with non-deficit schizophrenia. This is particularly interesting since 79% of the participants with the deficit syndrome in their study (15 of 19 participants) had been rated as having at least moderate levels of enduring diminished emotionality. In sum, studies that have examined emotion in deficit schizophrenia through self-report questionnaires or clinician ratings generally support the notion that deficit patients tend to experience diminished emotionality, whereas a study that employed a laboratory analogue paradigm did not. It is difficult to resolve these contrasting results without further research. Nonetheless, given the importance of negative emotions such as stress in the onset and relapse of schizophrenia symptomatology (per the diathesis/stress model of schizophrenia, see Fowles [1992] for a review), it would be of particular importance to understand whether the experience of stress is attenuated in deficit patients.

The present study explored the relationship between the deficit and negative syndromes and the experience of situational stress using a laboratory-based, emotion-induction paradigm. Specifically, we hypothesized that deficit, but not negative syndrome ratings would correspond significantly and inversely with scores on a self-report measure of stress during a laboratory stress manipulation. In contrast to Earnst and Kring’s (1999)
findings, we expected that the deficit syndrome group would report significantly less emotion following the laboratory stress manipulation as compared to the non-deficit group.

**METHOD**

**Participants**

Participants consisted of 36 stable outpatients with Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition (DSM-IV; American Psychiatric Association, 1994) schizophrenia who were enrolled in a multi-faceted family research project (Docherty, Gordinier, Hall, and Cutting 1999). Diagnoses were made by N.M. Docherty, a clinical psychologist with diagnostic expertise, based on information obtained using the Schedule for Affective Disorders and Schizophrenia - Lifetime Version (SADS-L; Endicott and Spitzer 1978). Participants who had Global Assessment of Functioning (GAF, DSM-IV; American Psychiatric Association, 1994) ratings below 35 were excluded from this study, as were those who met the DSM-IV criteria for substance abuse or dependence. In addition, participants who were not fluent in English and/or who presented histories suggestive of organic impairment were excluded. The sample consisted of 25 males and 11 females. Twenty-eight of the participants were Caucasian, and eight African American. Participants ranged in age from 19 to 51 years (M = 33 ± 8 years), and had an average education of 13 ± 2 years. Additionally, GAF (M = 50 ± 12) and Shipley IQ scores (M = 93 ± 13) (Zachary, Paulson, and Gorsuch 1985) were used to describe participants' current psychosocial and intellectual functioning.

**Symptom Rating Scales**

The Brief Psychiatric Rating Scale (BPRS; Lukoff, Nuechterlein, and Ventura 1986) was used to assess participants' symptomatology. Ratings were made by graduate-level researchers who had attained acceptable levels of inter-rater reliability (all intraclass correlations > .69, most > .90).

**Deficit syndrome ratings.** Deficit syndrome ratings were computed using the Proxy for Deficit Schedule (PDS; Kirkpatrick, Buchanan, Breier, and Carpenter 1993), a measure that derives deficit ratings directly from BPRS ratings. PDS ratings, although derived from cross-sectional symptom ratings, have been found to correspond highly with ratings on the Schedule for Deficit Syndrome (SDS; Kirkpatrick et al. 1989), the "gold standard" longitudinal measure of the deficit syndrome. In essence, PDS ratings are based on two deficit symptoms: blunted affect (measured by the BPRS blunted affect scale ratings) and diminished emotionality (measured by the AFFSCALE rating, which is a summation of BPRS depression, anxiety, guilt, and hostility scale ratings). The PDS rating is computed by subtracting the AFFSCALE rating from the blunted affect rating.

While the PDS was originally intended to be used categorically to distinguish deficit from non-deficit forms of schizophrenia, the present study primarily employed it as a continuous measure in order to avoid the possibility of miscategorization. However, secondarily, we also used it in the more traditional manner, deriving categorically defined deficit and non-deficit groups. For the categorical analyses, the deficit syndrome group consisted of those with the highest 19% of PDS ratings (PDS rating > 0, n = 7) and the non-deficit group cases with the lowest 42% of PDS ratings (PDS rating < -1, n = 15). The remaining 39% of cases were left out of the categorical analyses (PDS rating = 0, -1, n = 14). This method was established by one of the deficit syndrome authors (see Kirkpatrick et al. 1996a for elaboration on this method) and used the available cut-points that fell closest to those recommended as ideal.

**Negative syndrome ratings.** Negative syndrome severity, calculated by summing the blunted affect, motor retardation, and emotional withdrawal symptom ratings from the BPRS was also used.
Psychosis ratings. Psychosis severity was measured using the psychosis rating described by Kirkpatrick, Buchanan, Breier, and Carpenter (1993). This rating is a summation of four BPRS items: conceptual disorganization, suspiciousness, hallucinatory behavior, and unusual thought content.

Stress-Induction, and Measurement of Stress

Participants were asked to produce three separate, 10-minute-long narratives. During the first narrative, the participants talked about affectively neutral topics (i.e., hobbies, daily routines, etc.). This neutral condition was administered in order to familiarize the participants with the procedures, in an effort to reduce the situational stress associated with speaking and being tape-recorded. The second and third narratives consisted of the participants talking about affectively loaded memories. In one of the two conditions, participants were asked to recount “non-stressful, pleasant” memories from their lives (the affectively positive condition), and in the other, some “stressful, unpleasant” memories (the affectively negative condition). The format for the narratives was conversational, but with the patients doing most of the talking. Interviewers kept them on task and elicited elaboration of condition-appropriate memories. Order of the positive and negative narratives was counterbalanced, and they were collected on separate days to avoid affective carryover effects.

Immediately following each narrative, participants were asked to report the level of stress they had experienced while recounting their memories, using an analog scale that ranged from zero (“not at all stressful”) to 100 (“extremely stressful”). Both interviewers and participants were blind to the hypotheses of the present study. This procedure is more fully described in an earlier publication (Docherty, Evans, Sledge, Seibyl, and Krystal 1994). For a discussion of the merits of subjective vs. objective measurements of stress, see Cohen, Kessler, Underwood, and Gordon (1995).

Analysis

The analysis was conducted in three steps. (1) Bivariate correlations were calculated between deficit and negative syndrome ratings and the stress ratings from the affectively positive and negative narrative conditions. These correlations were then compared using the Fisher r-to-z test. (2) Stress ratings from the affectively positive and negative narrative conditions were entered into a hierarchical regression in order to examine the relative contribution of each to the variance in the deficit syndrome ratings. The stress ratings from the positive condition were entered in step 1, and the stress ratings from the negative condition were entered in step 2. Conceptually speaking, the stress ratings in the first step approximated a baseline measure of situational stress associated with providing a narrative. The second step assessed the additional contribution of stress experienced due to the affectively negative content of the “bad memory” narrative. (3) Participants were divided into deficit and non-deficit groups, and independent samples t-tests were conducted to compare the deficit and non-deficit syndrome groups on stress ratings from the affectively positive and negative narrative conditions. Levels of significance are two-tailed for all comparisons.

RESULTS

Means and standard deviations were calculated for the deficit (M ± SD = -1.58 (2.70), negative (3.19 ± 2.94) and psychosis (5.67 ± 4.00) syndrome ratings. Average patient ratings of stress experienced during the affectively positive and negative narratives were computed, M ± SD = 33.82 ± 22.60 and M ± SD = 42.06 ± 26.47, respectively. Participants’ gender, ethnicity, education, age, IQ scores, GAF and psychosis severity ratings were not significantly related to their self-report ratings of stress in either condition. Furthermore, deficit syndrome ratings were not significantly related to gender, ethnicity, education, or age, nor were they significantly related to negative syndrome ratings (r[36] =
TABLE 1.
Bivariate Correlations between Deficit and Negative Syndrome Ratings, and Self-Reported Stress in the Affectively Positive and Negative Conditions, and $p$ value of Fisher r-to-z Comparison of These Correlations ($N = 36$)

<table>
<thead>
<tr>
<th>Affective Condition</th>
<th>Deficit</th>
<th>Negative</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>-.27</td>
<td>.32+</td>
<td>.005</td>
</tr>
<tr>
<td>Negative</td>
<td>-.57***</td>
<td>-.16</td>
<td>.03</td>
</tr>
</tbody>
</table>

Note. + = $p < .10$; *** = $p < .001$. Increasing stress and syndrome ratings reflect increasing levels of stress and severity respectively.

Correlations. Bivariate correlations were calculated between the deficit and negative syndrome ratings and the stress ratings from the affectively positive and negative conditions. These results are presented in Table 1. Deficit syndrome ratings were not significantly related to stress ratings in the positive condition, but were significantly, inversely related to the stress ratings in the negative condition. This indicates that, in the affectively negative condition, patients with higher deficit syndrome ratings reported lower levels of stress. Conversely, negative syndrome ratings were positively associated with stress ratings in the affectively positive condition at the trend level, but not to stress ratings in the negative condition. This indicates that, in the affectively positive condition, patients with higher negative syndrome ratings reported higher levels of stress. When the deficit and negative syndrome ratings were compared in their respective associations to stress ratings in the affectively positive and negative conditions, they were significantly different from each other in both conditions.

In order to determine whether differences in severity of psychosis ratings or in IQ scores were influencing the correlations between the deficit syndrome and stress ratings, partial correlations were computed. When controlled for psychosis ratings, the correlations between the deficit syndrome and stress ratings on the affectively positive and negative conditions changed only slightly, ($r[33] = -.21, p = .22$), and ($r[33] = -.56, p < .001$) respectively. When controlled for IQ scores, the correlations between the deficit syndrome ratings and stress ratings on the affectively positive and negative conditions again did not change significantly, ($r[28] = -.28, p = .14$), and ($r[28] = -.53, p = .003$), respectively. These analyses suggest that the relationship between the deficit syndrome ratings and stress ratings was not driven by differences in severity of psychosis or IQ.

Regression. Variables were entered into a hierarchical regression, with the deficit syndrome ratings as the dependent variable. The stress ratings from the positive condition were entered in the first step, and the stress ratings from the negative condition in the second step. As in the bivariate correlations, stress ratings from the positive condition made an insignificant contribution to the variance of the deficit syndrome ratings. In the second step, stress ratings from the negative condition contributed a significant amount of the variance to the deficit syndrome ratings (adjusted $R^2 = .301$, $R^2$ change $= .271$, $p = .001$, $df = 1,33$; total adjusted $R^2 = .341$). This indicates that the stress ratings from the negative condition contributed a significant portion of the variance associated with the deficit syndrome ratings beyond any contribution of stress ratings from the positive condition. Taken together, differences among patients in self-reported stress experienced in the two narrative conditions accounted for 34% of the variance in their deficit syndrome severity ratings.

Deficit vs. Non-Deficit Groups. When patients were divided into deficit and non-def-
Deficit groups, the two groups did not differ significantly on stress ratings from the affectively positive condition \( (M \pm SD = 36.57 \pm 18.26 \) and \( 39.27 \pm 21.45 \) respectively, \( t[20] = -.29, p = .77 \)), but did differ in the affectively negative condition \( (M \pm SD = 23.43 \pm 21.40 \) and \( 54.87 \) \pm 29.06 respectively, \( t[20] = 2.55, p = .02 \)).

The non-deficit patients had significantly higher levels of self-reported stress in the affectively negative condition vs. the positive condition, \( t[15] = 3.12, p = .007 \). Conversely, deficit patients did not significantly differ between the affectively positive and negative condition, \( t[6] = 1.385, p = .11 \), although the low sample size of the deficit syndrome group may have limited the power of this analysis. These results are presented in Figure 1. Consonant with the correlational analysis, this suggests that patients with the deficit syndrome self-reported lower levels of stress in the affectively negative condition than did patients with non-deficit schizophrenia. It is worth noting that the deficit group did have significantly higher negative syndrome scores as compared to the nondeficit group \( t[20] = 2.56, p < .05 \).

**DISCUSSION**

The present study examined self-reported stress in people with the deficit syndrome of schizophrenia. We hypothesized that the deficit, but not the negative syndrome ratings would be associated with lower levels of self-reported stress during a laboratory stress-induction task. Results supported this hypothesis. Consonant with previous research, negative syndrome ratings were not significantly associated with a diminished level of self-reported stress. In the affectively positive condition, negative syndrome ratings were actually associated with increased levels of self-reported stress. Conversely, deficit syn-
drome ratings, analyzed as a continuous or a categorical variable, were associated with a diminished level of self-reported stress in the affectively negative condition. The deficit and negative syndromes significantly differed in their respective associations to self-reported stress in both the affectively negative and positive conditions, supporting the notion that there are appreciable differences between the deficit and negative syndromes. The present findings have some implications for the diathesis/stress model as it is applied to patients with the deficit syndrome.

Given the present results, it is conceivable that patients with the deficit syndrome would be less likely to perceive potentially stressful life events or interpersonal interactions as stressful, and therefore might be less likely to decompensate in reaction to events. In connection with this idea, it is important to note that relapse is most often conceptualized in terms of positive and disorganization symptoms. There is some evidence to suggest that the deficit syndrome is associated with lower levels of disorganization and positive symptoms (Kirkpatrick et al. 1993; Buchanan et al. 1994; Kirkpatrick, Amador, et al., 1996, Cohen and Docherty, in press, but see Buchanan, Strauss, Breier, Kirkpatrick, and Carpenter 1997), a finding which the present study supported. Thus, the deficit syndrome appears to be associated with lower levels of reactive symptomatology, as well as lower levels of self-reported situational stress. Further research could test how patient differences in baseline symptomatology and stress responsivity might affect clinical course and relapse.

The deficit syndrome is generally considered a marker of more severe illness (see Kirkpatrick, Buchanan, Ross, and Carpenter 2001 for a review). However, the present findings suggest that there may be beneficial or protective factors associated with the deficit syndrome. A diminished capacity to experience stress could represent a physiological and psychological defensive phenomenon, a self-protective response that occurs in some severe and chronically ill patients. Thus, the diminished emotionality associated with the deficit syndrome could be akin to the psychological numbing observed in some Post-Traumatic Stress Disorder cases. The etiology of the stress resistance that may occur in some patients with schizophrenia is also an area deserving of more empirical attention.

In contrast to the results reported by Earnst and Kring (1999), whose study also employed a laboratory-based emotion-induction paradigm, the present study found that the deficit syndrome was associated with a diminished level of emotionality. Earnst and Kring (1999) suggested that there might be a dysjunction between state and trait levels of emotionality in the deficit syndrome, since, by definition, deficit patients tend to exhibit diminished trait emotionality. The present study did not support this because deficit patients evidenced lower levels of self-reported state stress levels. However, it is possible that differences in findings in the two studies are attributable to differences in the emotion-eliciting stimuli. Earnst and Kring employed objective standardized emotional stimuli, while the present study employed subjective respondent-defined stressors. Our use of individualized stressors (i.e., self-selected memories) may have provided a more sensitive measure of stress reactivity in patients.

One alternate interpretation of the present findings warrants mention. It is possible that the observed difference in self-reported stress between deficit and non-deficit patients was due to deficit patients having more difficulty identifying and articulating their distress, rather than to a diminished experience of stress per se. In effect, deficit patients’ self-report may not have matched their actual emotional experience. Indeed, deficit patients have evidenced higher levels of alexithymia than non-deficit patients (Nkam, Langlois-Thery, Dollfus, and Petit 1997). This is a difficult issue to resolve since investigating the degree to which individuals actually experience emotion beyond their self-report is problematic. The present study was unable to address this issue. With respect to future research, a measurement of emotion across physiological, behavioral, and phenomenological domains, following the methods.
of Kring and Neale (1996), may be of some use. However, multi-modal measurements of emotion are often only moderately correlated with each other (e.g., Alpert and Rosen 1990) and it is not clear which, if any, of these domains most accurately reflects a person’s true emotional experience. Future research in this area might concentrate on more covert measures of emotional experience—for example, through content analysis of Rorschach Inkblot test responses—to minimize the potential inaccuracies of self-report.

With respect to limitations of the present study, the small sample size may have precluded our finding significant associations between deficit ratings and stress in the affectively positive condition. In addition, the PDS is probably not the best measure of the deficit syndrome. It is not optimal to measure enduring negative symptoms using cross-sectional data. Nonetheless, the PDS has been found to correspond well with a longitudinal and more complex measure of the deficit syndrome (Kirkpatrick, Buchanan, Breier, and Carpenter 1993), and proved to be an effective discriminator in the present study.

CONCLUSION

In conclusion, the present study found that deficit syndrome ratings were inversely associated with self-reported stress following administration of a laboratory stressor. The finding that the deficit syndrome may be characterized by diminished stress reactivity has important implications. Simply put, if individuals with the deficit syndrome display a diminished capacity to experience stress, then stress may not contribute much to relapse in deficit schizophrenia. Future research should examine further whether there are stress-resistant properties associated with the deficit syndrome.

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