Are Negative Symptoms Associated With Functioning Deficits in Both Schizophrenia and Nonschizophrenia Patients? A 10-Year Longitudinal Analysis

by Ellen S. Herbener and Martin Harrow

Abstract

The current analyses assess the functional correlates of negative symptoms across diagnoses and across time to assess the appropriateness of a dimensional approach to the study of negative symptoms—specifically, whether negative symptoms should be studied as a single construct across diagnostic groups. Seventy-two schizophrenia/schizoaffective, 36 other psychotic, and 42 nonpsychotic depressed patients were recruited at index hospitalization and were followed up 4.5, 7.5, and 10 years later. At each followup assessment, data were collected on symptoms and adaptive and cognitive functioning. Analyses indicated that negative symptoms showed some similar functional associates in all three diagnostic groups, although results were strongest for the schizophrenia spectrum patients. Negative symptoms at the 10-year followup were associated with different patterns of social deficits prior to index hospitalization in the three diagnostic groups. The data provide some support for a dimensional approach to the study of mental illness, with negative symptoms associated with deficits across diagnosis, but also provide evidence of some diagnostic differences.

Keywords: Negative symptoms, schizophrenia, diagnosis, functioning, longitudinal.


Negative symptoms have gained increasing significance in schizophrenia research over the past 20 years. Research indicates that negative symptoms appear strongly related to various functioning deficits and are strong predictors of long-term poor outcome (McGlashan and Fenton 1992). Specific definitions of negative symptoms differ; DSM–IV focuses on affective flattening, alogia, or avolition in its criteria for schizophrenia, whereas two other widely used scales for assessment of negative symptoms include various other characteristics, including anhedonia and attention deficits (the Scale for the Assessment of Negative Symptoms [SANS], Andreasen and Olsen 1982), and concreteness and stereotyped thinking (Positive and Negative Syndrome Scale [PANSS], Kay et al. 1987), as important negative symptoms. Notably, in a comparison of negative symptoms scales, Fenton and McGlashan (1992) found that although negative symptom scales (including the SANS, the PANSS, and the Pogue-Geile and Harrow scale [Pogue-Geile and Harrow 1984]) differed somewhat in how narrowly or broadly negative symptoms were defined, they showed quite similar and significant correlations with measures of outcome.

Although negative symptoms have received increasing research attention in schizophrenia patients, there has been less systematic study of their presence in patients with other diagnoses. Thus, although there is growing evidence that negative symptoms are present in individuals with various psychiatric diagnoses, it is less clear whether they are associated with similar cognitive and adaptive deficits across diagnostic groups. This question is important because it would help us to determine whether it is appropriate to take a symptom approach to building models for the relationship between pathophysiology and symptomatology across diagnoses (Andreasen et al. 1995) in the case of negative symptoms.

It has been suggested that research in schizophrenia is likely to benefit from a more symptom-focused approach, given the significant heterogeneity of presentation and pathophysiology (Benton et al. 1988; Andreasen and Carpenter 1993; Costello 1993; Buchanan and Carpenter 1997). Research using a symptom-focused approach across diagnoses has already proceeded in some other symptom areas, such as the study of psychosis (Harrow et al. 1995) and thought disorder (Andreasen and Powers 1974; Harrow and Quinlan 1977).

There is some support, to date, for the proposal that negative symptoms may represent a dimension of psy-
chopathology that is shared across diagnostic groups. Factor analytic studies comparing symptom structure across diagnoses have now found similar factors, including negative symptoms, emerging in schizophrenia and other diagnostic groups (Peralta et al. 1997; Toomey et al. 1998). Furthermore, recent analyses on the phenomenology of negative symptoms across diagnostic groups (Herbener and Harrow 2001) found that, although the frequency and persistence of negative symptoms were highest in schizophrenia and schizoaffective patients, patients with other psychotic (OP) disorders were not significantly different on either measure. In contrast, patients with histories of nonpsychotic depression did show both lower frequencies of negative symptoms and less persistent negative symptoms than did the schizophrenia/schizoaffective (SZ/SZAF) group.

One important consideration in studies of negative symptoms, particularly in mood-disordered patients, is the need to distinguish between depressive and negative symptoms. Although there is some overlap in symptoms, such as psychomotor retardation and loss of interest in activities, a number of researchers have reported that distinctions among the different types of symptoms can be reliably accomplished (Bermanzohn and Siris 1992; Perenyi et al. 1998). Analyses of relationships between depression and positive and negative symptoms in schizophrenia patients have repeatedly indicated that depression is associated with psychosis but not with negative symptoms (Norman and Malla 1994; Kohler et al. 1998). Prior analyses of our sample found nonsignificant correlations between negative symptoms and major depression in both schizophrenia and nonpsychotic depression patient groups (Herbener and Harrow 2001). In addition, work with our sample suggests that individuals with different diagnoses are not more likely to have different types of negative symptoms; rather, schizophrenia and schizoaffective subjects tended to show the highest frequency of all types of negative symptoms measured, OP patients showed an intermediate frequency, and nonpsychotic depressed (NPD) patients showed the lowest frequency, and the diagnostic groups did not statistically differ on severity of any negative symptom (Herbener and Harrow 2001).

Research on the relationship between negative symptoms and deficits in cognitive functioning in individuals with schizophrenia has generally found impairments on measures of executive functioning (Capleton 1996; Berman et al. 1997; Norman et al. 1997; Voruganti et al. 1997; Baxter and Liddle 1998; Mahurin et al. 1998; Poole et al. 1999), although a few studies have not found this relationship (Nuechterlein et al. 1986; Zakzanis 1998).

Negative symptoms have also been associated both concurrently and predictively with adaptive functioning deficits in schizophrenia patients, with most studies noting a particular relationship between negative symptoms and impairments in social functioning up to 2 years following symptom ratings (Breier et al. 1991; Ho et al. 1998). Research on premorbid factors predicting later negative symptoms in schizophrenia patients has indicated a particular relationship between premorbid social and work functioning and later negative symptoms (McGlashan and Fenton 1992). Only a few studies to date have assessed relationships between negative symptoms and functioning in nonschizophrenia samples. However, these studies have found that negative symptoms in bipolar or other nonschizophrenia psychotic patients are associated with cognitive deficits (Johnstone et al. 1992; Dolan et al. 1993) or adaptive functioning deficits (Pearlson et al. 1984; Schulberg et al. 1999) similar to those found in schizophrenia patients.

At this point there is some evidence for the phenomenological similarity of negative symptoms, particularly across groups with psychotic disorders, as well as similarity between negative symptoms and concurrent functioning deficits across diagnostic groups. The data are generally consistent with the hypothesis that negative symptoms reflect a similar underlying process across at least some diagnostic groups, although clearly much additional research is needed before such causal relationships can be determined. An important step, however, is to determine whether negative symptoms in nonschizophrenia groups show the same predictive and longitudinal qualities as negative symptoms in schizophrenia patients. For example, negative symptoms may be state-related in nonschizophrenia patients but a trait characteristic in schizophrenia patients. Or negative symptoms may be associated with different patterns of impairment in different diagnostic groups. Consistency of relationship between negative symptoms and adaptive and cognitive impairment across diagnostic groups will help us to determine whether a domain of psychopathology approach (cf. Buchanan and Carpenter 1994) is appropriate for the investigation of negative symptoms.

The current research focused on this issue by using longitudinal data to assess the relationship between premorbid, concurrent, and predictive correlates of negative symptoms in SZ/SZAF, OP, and NPD individuals with major mental illness. Analyses focused on data collected at the index hospitalization and at 4.5-year, 7.5-year, and 10-year followup assessments. The following questions are addressed:

1. Are negative symptoms associated with similar concurrent adaptive and cognitive functioning deficits in all diagnostic groups?
2. Are persistent negative symptoms related to the same types of deficits across diagnostic groups?
3. Do negative symptoms predict future adaptive and cognitive functioning deficits? Is this relationship the same across diagnostic groups?

4. Are premorbid characteristics predictive of later negative symptoms or persistent symptoms over a 10-year period? Is this relationship the same across diagnostic groups?

Method

The current study is part of the Chicago Follow-up Study, a longitudinal research program designed to investigate the course of schizophrenia and affective disorders studying prognostic factors, functional and cognitive outcome, and major symptom dimensions, including thought disorder, psychosis, and negative symptoms (cf. Pogue-Geile and Harrow 1984, 1985; Grossman et al. 1991; Goldberg et al. 1995; Harrow et al. 1997).

Patient Sample. The current research included 150 patients studied prospectively at the acute phase of hospitalization and then followed up periodically over the next 10 years. Using Research Diagnostic Criteria, the sample included 52 schizophrenia and 20 schizoaffective patients, 36 patients who presented at index hospitalization with OP disorders (21 bipolar psychotic affective disorders, 6 unipolar psychotic depressive disorders, 9 OP disorders), and 42 patients with nonpsychotic affective disorders. Diagnosis was completed during the index hospitalization. Followup interviews studying negative symptoms were conducted 4.5 years, 7.5 years, and 10 years following initial enrollment in the study. Data about negative symptoms were available on all 150 patients at the 10-year followup, on 85 percent of the sample at the 7.5-year followup, and on 75 percent of the sample at the 4.5-year followup.

Patient recruitment for this study focused on young patients with recent onset of illness. Seventy-five percent of the subjects had one or no prior hospitalizations at index. The mean age of patients at index admission was 22.5 years, and the average ages of patients in the three diagnostic groups did not differ significantly (F[2,147] = 0.83, p > 0.10). Level of education did vary significantly between the groups (F[2,146] = 5.43, p < 0.01), with the SZ/SZAF group showing a lower level of education than the other two groups (Newman-Keuls post hoc tests, p < 0.05). On average, the SZ/SZAF subjects had completed high school, whereas subjects in the other two groups had completed 1 year of college. The SZ/SZAF and NPD groups differed significantly in gender distribution, with a higher percentage of females in the NPD group than in the SZ/SZAF group, a finding consistent with most current studies of these diagnostic groups. Neither the NPD group nor the SZ/SZAF group was significantly different from the OP group in terms of gender distribution.

Acute Phase and Followup Assessments. All 150 patients were assessed prospectively on entering the study during index hospitalization. Diagnoses were based on at least one of two structured interviews conducted with the patients: the Schedule for Affective Disorders and Schizophrenia (Endicott and Spitzer 1978) or the Schizophrenia State Inventory, a structured, tape-recorded interview that has been described in previous reports (Grinker and Harrow 1987).

During each followup assessment, an established research protocol was completed, including structured interviews, performance tests, and observational ratings. Trained raters who were naive to the diagnoses from index hospitalization and blind to the results from previous followups completed the interviews and ratings. The Behavior Rating Scale of the Psychiatric Assessment Interview (Carpenter et al. 1976) was completed at the end of each interview.

Measures of Negative Symptoms. The negative symptom scale is designed to assess flat affect, poverty of speech, and psychomotor retardation/poverty, with specific behavioral items quite similar to those used in studies by other research groups (cf. Liddle 1987). These are aspects of behavior that some but not all researchers have identified as important to the negative symptom definition (Crow 1980; Kibel et al. 1993) and include two of the three negative symptoms used for schizophrenic diagnosis in DSM-IV (APA 1994). Individual items were combined into three subscales reflecting poverty of speech, flat affect, and psychomotor retardation/poverty (see Pogue-Geile and Harrow 1984, 1985, for details). Ratings were made by the interviewers at the end of the 3- to 4-hour in-person interview, and scores were based on the subjects' behavior throughout the full interview period. Intraclass correlations between raters are 0.96 for the poverty of speech scale, 0.86 for the flat affect scale, and 0.85 for the psychomotor retardation/poverty scale. To estimate the general frequency of negative symptoms, a categorical index was created. This index required that a subject show significant pathology on at least one of the three subscales to be considered as having negative symptoms. Because psychomotor retardation could potentially reflect depression or side effects of antipsychotic medication, significance on at least one of the other two subscales was required for the categorical scale. Negative symptoms were not significantly correlated with gender or education levels in any of the diagnostic groups.

Assessments of the presence of negative symptoms were made at each followup. Subjects in all three diagnos-
tic groups showed variation in the persistence of negative symptoms across assessments. We thus also created a measure of negative symptom persistence based on the number of followup assessments at which each subject had negative symptoms. Scores ranged from 0 to 3, and all diagnostic groups had individuals at both extremes. Additional information about the persistence of negative symptoms in each diagnostic group is available in a prior article focusing on this issue (Herbener and Harrow 2001).

**Measures of Adaptive Functioning.** Outcome scales developed by Strauss and Carpenter (1972) were used to assess rehospitalization, work, and social adjustment at each followup assessment. The rehospitalization scale indexed how many months each subject had been hospitalized in the year prior to the followup assessment. The social function scale assessed the frequency and context of social interactions, from none or chance encounters with others to regular planned meetings several times a month. The work function scale assessed the portion of the prior year during which the subject had been employed, including part-time or partial-year employment.

**Measures of Cognitive Functioning.** Four general areas of cognitive functioning were used in the current analyses: Wechsler Adult Intelligence Scale (WAIS) Information, which provides a measure of general intellectual ability (Wechsler 1955); WAIS Comprehension, which measures social comprehension, judgment, and knowledge; WAIS Digit Symbol, which assesses sustained attention skills and psychomotor coordination; and Gorham's Proverbs Test (Gorham 1951), which assesses verbal abstraction abilities. These four tests provided indexes of both relatively specific abilities in areas related to negative symptoms—that is, social understanding, psychomotor and attentional skill, and executive functioning—as well as a more general measure of intellectual ability and educational achievement that would be expected to be more resistant to change over time (Lezak 1995). Coding of abstraction was based on a system previously used by this research group (Marengo et al. 1980) with good reliability ($r > 0.90$). Because of time limitations during followup assessments, some patients were not able to complete all cognitive tests.

**Measures of Premorbid Functioning.** The Zigler-Phillips Social Competence Scale (Zigler and Phillips 1960), which assesses premorbid social functioning, was completed on subjects at index hospitalization. In addition, trained clinicians rated whether each patient showed significant schizotypal or schizoid traits based on all available information at the index hospitalization.

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**Results**

Are negative symptoms associated with similar concurrent adaptive and cognitive functioning deficits in all diagnostic groups? We assessed the contribution of diagnosis and the presence of negative symptoms to performance on the adaptive functioning measures at the 4.5, 7.5-, and 10-year followups with univariate analysis of variance (table 1). At all followup assessments, the presence of negative symptoms was associated with impairment in functioning independent of deficits associated with diagnosis. Negative symptoms were associated with impairments in social functioning at all three followup
Table 1. Relationship between negative symptoms and adaptive functioning at three followups over 10 years for major diagnostic groups

<table>
<thead>
<tr>
<th>Followup Year and Measure</th>
<th>Schizophrenia/Schizoaffective</th>
<th>Other Psychotic</th>
<th>Nonpsychotic/Depressed</th>
<th>Diagnosis by symptom interaction, F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No negative symptom</td>
<td>Have negative symptom</td>
<td>No negative symptom</td>
<td>Have negative symptom</td>
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<tr>
<td>4.5-yr followup</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rehospitalization</td>
<td>3.36</td>
<td>3.05</td>
<td>3.70</td>
<td>3.38</td>
</tr>
<tr>
<td>Social function</td>
<td>3.03</td>
<td>1.95</td>
<td>3.10</td>
<td>3.13</td>
</tr>
<tr>
<td>Work function</td>
<td>2.28</td>
<td>1.30</td>
<td>3.15</td>
<td>2.13</td>
</tr>
<tr>
<td>7.5-yr followup</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rehospitalization</td>
<td>3.50</td>
<td>2.86</td>
<td>3.68</td>
<td>3.71</td>
</tr>
<tr>
<td>Social function</td>
<td>3.29</td>
<td>2.41</td>
<td>3.16</td>
<td>2.57</td>
</tr>
<tr>
<td>Work function</td>
<td>1.56</td>
<td>0.64</td>
<td>2.88</td>
<td>2.86</td>
</tr>
<tr>
<td>10-yr followup</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rehospitalization</td>
<td>3.65</td>
<td>2.62</td>
<td>3.74</td>
<td>3.33</td>
</tr>
<tr>
<td>Social function</td>
<td>2.77</td>
<td>2.34</td>
<td>3.33</td>
<td>3.11</td>
</tr>
<tr>
<td>Work function</td>
<td>1.67</td>
<td>1.41</td>
<td>2.26</td>
<td>2.33</td>
</tr>
</tbody>
</table>

*p < 0.05; ** p < 0.01; *** p < 0.001

1 Higher mean scores reflect more favorable functioning in each area.
assessments over the 10-year period and were associated with deficits in work functioning and higher rehospitalization rates at two of the three followup assessments. The data showed that for the SZ/SZAF and NPD patients, subjects with negative symptoms always performed worse than those without negative symptoms, whereas in the OP group, the effects were less consistent (Table 1).

Table 2 shows data from analyses of cognitive functioning. Negative symptom presence was associated with impairments in cognitive functioning in 8 of the 12 analyses. Effects were significant at the 4.5-, 7.5-, and 10-year followups for assessments of social knowledge and judgment, and of psychomotor functioning. Patients in the SZ/SZAF and NPD groups who had negative symptoms consistently performed more poorly than similarly diagnosed patients without negative symptoms in all domains at all assessments. At the 7.5- and 10-year followups, the OP patients showed the same pattern as the other two groups did, with subjects with negative symptoms showing poorer cognitive functioning than those without negative symptoms at all measures.

To assess the role of medication dosage, we also conducted an analysis using medication dosage, in chlorpromazine equivalents, as a covariate. In addition, we used premorbid social, work, and educational functioning as covariates for the social, work, and cognitive functioning measures, respectively, to determine whether premorbid differences could account for our findings. Inclusion of these factors diminished some of the effects: as would be expected, factors such as medication dosage and premorbid abilities also contributed to long-term functioning. However, patients with negative symptoms were still significantly more likely to show impairments on both psychosocial and cognitive functioning variables over the 10-year period.

Are persistent negative symptoms related to the same types of deficits across diagnostic groups? Table 3 shows correlation coefficients indexing the relationship between persistence of negative symptoms across the 10-year followup period and indexes of psychosocial and cognitive functioning at the 10-year followup. Persistent negative symptoms were associated with a higher rate of rehospitalization for the entire sample. Interestingly, relationships between persistent negative symptoms and psychosocial functioning were generally in the low range for all diagnostic groups. In contrast, the relationship between persistent negative symptoms and cognitive functioning was much higher, with all four measures reaching statistical significance for the entire sample. Furthermore, the relationship between performance on the comprehension test and persistent negative symptoms was large and significant for all three diagnostic groups.

Are negative symptoms predictive of future adaptive and cognitive functioning deficits? Is this relationship the same across diagnostic groups? Correlation coefficients indexing the relationship between negative symptoms or persistent symptoms over a 10-year followup period and functioning at the 7.5-year followup are presented in Table 4. For the full sample, negative symptoms at the 4.5-year followup were predictive of deficits at the 7.5-year followup on work functioning and on all cognitive measures. When this relationship was assessed separately by diagnostic group, significant correlations were found for only the SZ/SZAF group. Some effect sizes in the OP and NPD groups were at a medium level (Cohen 1977) but did not reach statistical significance, probably because of a smaller sample size.

Table 5 reports negative symptom data assessed at the 7.5-year followup predicting psychosocial and cognitive functioning deficits at the 10-year followup. Negative symptoms significantly predicted hospitalization and social functioning difficulties 2.5 years later, as well as significantly predicting cognitive functioning deficits on all four measures over the 2.5-year period for the entire sample. Again, the SZ/SZAF group showed the highest number of significant relationships, but effect size comparisons indicated no significant differences among the diagnostic groups. Negative symptoms at the 7.5-year followup significantly predicted rehospitalization for the SZ/SZAF and NPD groups. The relationship between negative symptoms at the 10-year followup and social functioning at the 10-year followup was stronger for the NPD group than the SZ/SZAF group, although neither reached statistical significance.

On cognitive functioning variables, although the SZ/SZAF group showed the only statistically significant relationships, the OP group had a larger effect size on the Digit Symbol test. Interestingly, all three groups showed a moderate effect size (i.e., 0.30 or greater; Cohen 1977) for the relationship between negative symptoms at the 7.5-year followup and social comprehension at the 10-year followup.

These data indicate that predictive relationships between negative symptoms at one assessment and psychosocial functioning at a later assessment are inconsistent over time, even in the SZ/SZAF group, suggesting that this relationship is not as stable as is sometimes hypothesized. Furthermore, although relationships between negative symptoms and functioning variables appear stronger in the SZ/SZAF group than in other diagnostic groups, comparisons of effect sizes indicate that significant differences are the exception rather than the rule. These points will be addressed further in the Discussion.

Are premorbid characteristics predictive of later negative symptoms or persistent symptoms over a 10-year
Table 2. Relationship between negative symptoms and cognitive functioning at three followups over 10 years for major diagnostic groups

<table>
<thead>
<tr>
<th>Followup Year and Measure</th>
<th>Schizophrenia/ Schizoaffective</th>
<th>Other Psychotic</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No negative symptom</td>
<td>Have negative symptom</td>
<td>No negative symptom</td>
<td>Have negative symptom</td>
</tr>
</tbody>
</table>
| 4.5-yr followup Information | 11.56 | 9.89 | 12.29 | 12.50 | 12.13 | 11.60 | 2.14 | 0.71 | 0.64
| Comprehension | 11.25 | 7.76 | 11.41 | 10.63 | 12.87 | 11.40 | 5.28** | 7.16** | 1.75
| Digit Symbol | 10.44 | 9.06 | 11.56 | 9.88 | 13.58 | 12.20 | 6.50** | 4.18* | 0.02
| Abstraction | 10.55 | 4.94 | 9.61 | 10.14 | 14.43 | 13.20 | 4.06* | 1.35 | 1.37
| 7.5-yr followup Information | 10.93 | 9.30 | 11.70 | 10.67 | 12.13 | 11.75 | 2.22 | 1.68 | 0.24
| Comprehension | 10.04 | 8.05 | 11.91 | 9.50 | 13.21 | 10.50 | 4.91** | 8.56** | 0.08
| Digit Symbol | 10.59 | 8.25 | 11.65 | 8.20 | 13.10 | 11.00 | 3.96* | 10.69*** | 0.24
| Abstraction | 10.67 | 5.00 | 12.32 | 9.33 | 14.88 | 13.25 | 6.79** | 5.52* | 0.82
| 10-yr followup Information | 11.67 | 9.44 | 12.33 | 11.50 | 12.29 | 9.00 | 1.31 | 6.20** | 0.57
| Comprehension | 11.82 | 8.58 | 12.67 | 9.17 | 13.74 | 9.33 | 0.81 | 15.15*** | 0.13
| Digit Symbol | 12.41 | 8.87 | 14.00 | 9.50 | 13.42 | 11.00 | 0.87 | 8.82* | 0.20
| Abstraction | 10.50 | 6.95 | 12.47 | 12.20 | 16.38 | 11.33 | 3.96* | 2.68 | 0.53

*p < 0.05; **p < 0.01; ***p < 0.001

1 Higher mean scores reflect better cognitive functioning in each area.
Table 3. Persistence of negative symptoms and functioning at 10-year followup

<table>
<thead>
<tr>
<th>Functioning at 10-yr followup</th>
<th>Full sample, ( r )</th>
<th>Schizophrenia/schizoaffective, ( r )</th>
<th>Other psychotic, ( r )</th>
<th>Nonpsychotic depressed, ( r )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive functioning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rehospitalization</td>
<td>-0.23*</td>
<td>-0.23</td>
<td>0.03</td>
<td>0.05</td>
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<tr>
<td>Social function</td>
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<td>-0.06</td>
<td>0.02</td>
<td>0.22</td>
</tr>
<tr>
<td>Work function</td>
<td>-0.14</td>
<td>-0.13</td>
<td>0.06</td>
<td>0.11</td>
</tr>
<tr>
<td>Cognitive functioning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>-0.41***</td>
<td>-0.42**</td>
<td>-0.31</td>
<td>-0.39*</td>
</tr>
<tr>
<td>Comprehension</td>
<td>-0.54***</td>
<td>-0.53***</td>
<td>-0.55*</td>
<td>-0.49*</td>
</tr>
<tr>
<td>Digit Symbol</td>
<td>-0.31**</td>
<td>-0.36*</td>
<td>-0.21</td>
<td>-0.10</td>
</tr>
<tr>
<td>Abstraction</td>
<td>-0.30**</td>
<td>-0.42**</td>
<td>0.09</td>
<td>-0.07</td>
</tr>
</tbody>
</table>

* \( p < 0.05; ** \( p < 0.01; *** \( p < 0.001

Table 4. Correlations between the presence of negative symptoms at 4.5-year followup and functioning at 7.5-year followup

<table>
<thead>
<tr>
<th>Functioning at 7.5-yr followup</th>
<th>Full sample, ( r )</th>
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<td></td>
</tr>
<tr>
<td>Rehospitalization</td>
<td>-0.11</td>
<td>-0.12</td>
<td>0.24</td>
<td>-0.14</td>
</tr>
<tr>
<td>Social function</td>
<td>-0.14</td>
<td>-0.08</td>
<td>-0.17</td>
<td>-0.20</td>
</tr>
<tr>
<td>Work function</td>
<td>-0.31***</td>
<td>-0.31*</td>
<td>-0.14</td>
<td>-0.30</td>
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<tr>
<td>Cognitive functioning</td>
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<td></td>
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</tr>
<tr>
<td>Information</td>
<td>-0.30**</td>
<td>-0.42**</td>
<td>-0.21</td>
<td>0.12</td>
</tr>
<tr>
<td>Comprehension</td>
<td>-0.38***</td>
<td>-0.45**</td>
<td>-0.20</td>
<td>-0.36</td>
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<tr>
<td>Digit Symbol</td>
<td>-0.27**</td>
<td>-0.25</td>
<td>-0.19</td>
<td>-0.16</td>
</tr>
<tr>
<td>Abstraction</td>
<td>-0.34**</td>
<td>-0.46**</td>
<td>-0.30</td>
<td>0.02</td>
</tr>
</tbody>
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* \( p < 0.05; ** \( p < 0.01; *** \( p < 0.001

Table 5. Correlations between the presence of negative symptoms at 7.5-year followup and functioning at 10-year followup

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<tr>
<th>Functioning at 10-yr followup</th>
<th>Full sample, ( r )</th>
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<tr>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Rehospitalization</td>
<td>-0.41***</td>
<td>-0.41**</td>
<td>-0.12</td>
<td>-0.40**</td>
</tr>
<tr>
<td>Social function</td>
<td>-0.22**</td>
<td>-0.25</td>
<td>0.14</td>
<td>-0.31</td>
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<tr>
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<td>-0.16</td>
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<td>Cognitive functioning</td>
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<td></td>
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<tr>
<td>Information</td>
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<td>-0.23</td>
<td>-0.15</td>
<td>-0.25</td>
</tr>
<tr>
<td>Comprehension</td>
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<td>-0.42**</td>
<td>-0.38</td>
<td>-0.34</td>
</tr>
<tr>
<td>Digit Symbol</td>
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<td>-0.21</td>
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<tr>
<td>Abstraction</td>
<td>-0.26**</td>
<td>-0.30*</td>
<td>0.03</td>
<td>-0.08</td>
</tr>
</tbody>
</table>

* \( p < 0.05; ** \( p < 0.01; *** \( p < 0.001
Are Negative Symptoms Associated With Functioning Deficits

Correlations between measures of premorbid functioning and negative symptom presence at the 10-year followup assessments are shown in table 6. Both premorbid social competence levels and premorbid schizoid traits were significantly predictive of the presence of negative symptoms for the full sample 10 years later \( (p < 0.05) \), and premorbid schizotypal traits showed a trend in the same direction over the 10-year period \( (p < 0.10) \). Premorbid social competence significantly predicted negative symptoms in the SZ/SZAF group. Premorbid schizoid characteristics showed a trend-level relationship with negative symptoms at the 10-year followup in the SZ/SZAF group, with the same effect size in the NPD group. Premorbid schizotypal traits showed trend-level relationships with negative symptoms for the SZ/SZAF and OP groups but not for the NPD group. Overall, the data indicate that some aspects of premorbid social functioning measured at index hospitalization were significant predictors of negative symptoms measured 10 years later for the full sample of patients and for the SZ/SZAF sample. Although none of the relationships between premorbid characteristics and negative symptoms reached statistical significance for the non-schizophrenia groups, effect sizes were quite similar for several predictive relationships. Specifically, effect sizes were identical for the relationship between premorbid schizoid traits and later negative symptoms in the SZ/SZAF and NPD groups, and premorbid schizotypal traits were even more strongly predictive of negative symptoms in the OP group than in the SZ/SZAF group.

Discussion

Our analyses assessed the relationship between negative symptoms and functioning both longitudinally over a 10-year period and across diagnoses. Our results indicate that (1) negative symptoms are associated with concurrent deficits in both adaptive and cognitive functioning in all three diagnostic groups, with this relationship holding across multiple followup assessments; (2) negative symptoms predict some later deficits in adaptive and cognitive functioning in all three diagnostic groups, with the effect consistently being strongest in the SZ/SZAF group and in the cognitive domain; (3) persistent negative symptoms are strongly associated with cognitive impairment, with this effect holding true for all three diagnostic groups; and (4) some premorbid characteristics are predictive of negative symptoms assessed 10 years later in all diagnostic groups. In all analyses, relationships between negative symptoms and functioning were strongest for the SZ/SZAF group. However, statistical comparisons of effect sizes typically found no or few significant differences among diagnostic groups. The present research fits in with previous research of ours and of other investigators indicating that negative symptoms are not exclusive to schizophrenia, or of importance in only schizophrenia.

Since the 1980s there has been a resurgence of interest in the negative syndrome in schizophrenia patients, and substantial research has indicated that negative symptoms reflect an important aspect of schizophrenic pathology. It has been less clear whether negative symptoms should be considered a dimension of pathology that occurs across diagnostic groups (but is most common in schizophrenia patients) or whether negative symptoms reflect different processes in different diagnostic groups. The relationship between cognitive functioning measures and negative symptoms is particularly interesting because it would support a hypothesis that deficits in optimal brain functioning may be contributing to the presentation of both symptoms and cognitive functioning impairment and that this mechanism could be shared across diagnostic groups.

However, the current research also suggests additional questions and differences as well as similarities in the import of negative symptoms across diagnoses. Negative symptoms do appear to be associated with concurrent adaptive and cognitive functioning deficits across diagnostic groups. However, the predictive ability of negative symptoms is not consistent in SZ/SZAF or in other diagnostic groups. A number of issues are raised by the
differences in our concurrent and predictive data: (1) concurrent relationships tend to be stronger than predictive relationships, which suggests that even the transient presence of negative symptoms co-occurs with impairments in adaptive and cognitive functioning; and (2) negative symptoms are inconsistently predictive of particular psychosocial deficits, so although negative symptoms appear to be related to some decrement in functioning, we have not yet identified what incapacity they are most strongly linked with. Because most studies look at concurrent relationships or focus on a single predictive period, there is little opportunity to evaluate the consistency of prediction across time. This makes longitudinal analyses even more imperative as a way to distinguish between relationships that appear by chance and relationships that show consistency over time.

Negative symptoms are sometimes assumed to be persistent over time. Although our data suggest that negative symptoms are persistent over prolonged periods of time for some subjects, this finding appears to be the exception rather than the rule. In previous analyses with this sample (Herbener and Harrow 2001), we found that 19 percent of our SZ/SZAF sample presented with negative symptoms across all three assessment periods, whereas 41 percent showed symptoms at one or two assessments and 40 percent did not show negative symptoms at any of the three assessment periods. The current analyses thus addressed the issue of the relationship between negative symptoms and functioning in two ways: first by looking at relationships with the presence of negative symptoms at individual assessment periods and related functioning, and second, by looking at measures of persistent symptoms and functioning correlates.

Our analyses of persistent symptoms indicate that they are related to some similar cognitive deficits in all three diagnostic groups. The large and significant correlations between persistent symptoms and performance on the Comprehension subtest are particularly notable. Furthermore, negative symptoms were strongly and consistently associated with concurrent impairments in both social comprehension and social functioning at all three followup assessments. The strength and consistency of the relationship between negative symptoms, impairment on measures of social understanding, and low rates of social interaction support other recent research that has noted the importance of social cognition in rehabilitation for schizophrenia patients (Hogarty and Flesher 1999). Our data on premorbid characteristics and later negative symptoms also generally support the idea that negative symptoms are associated with some social impairments early in development. Interestingly, both premorbid schizoid and premorbid schizotypal traits showed trend-level predictive relationships with later negative symptoms, suggesting that both cognitive characteristics, such as the odd beliefs typically associated with schizotypy, and withdrawn behavior (more strongly associated with schizoid behavior), may indicate a vulnerability to later negative symptoms. It is also possible that negative symptoms are related to somewhat different vulnerability factors in different diagnostic groups, with individuals in the SZ/SZAF group showing a higher incidence of both types of vulnerability factors. These findings are consistent with other recent research suggesting some significant overlap in vulnerability factors to SZ/SZAF and OP disorders (Gershon 2000).

Persistent negative symptoms in the SZ/SZAF group were significantly related to all aspects of cognitive functioning measured, whereas persistent symptoms were related to only a few aspects of cognitive functioning in other groups. One interpretation of this finding is that negative symptoms reflect a pathological mechanism that can occur across diagnostic groups but that a second factor may act to increase the severity and degree of impairment associated with negative symptoms in the SZ/SZAF group.

Research on the relationship between negative symptoms and adaptive and cognitive functioning impairments has often been limited to assessments of individuals with schizophrenia. The current research assessed whether impairments that have been associated with negative symptoms in schizophrenia patients also hold true for other diagnostic groups and whether effects are consistent across time. Our results did show a significant relationship between negative symptoms and deficits in psychosocial and cognitive functioning in all three diagnostic groups, although the relationship is stronger in SZ/SZAF subjects than in other diagnostic groups. It is interesting to note that in studies of psychotic symptoms, comparisons across diagnostic groups have also found that schizophrenia patients suffer more intense or persistent symptoms than do other diagnostic groups (Harrow et al. 1995). Overall, our results support a dimensional approach to studying psychopathology and raise additional questions about mechanisms that may or may not be shared across diagnostic groups.

References


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