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Thought Disorder and Psychosocial Functioning in Schizophrenia: The Concurrent and Predictive Relationships

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Abstract

Recent findings have linked impairments in social performance among individuals with schizophrenia to deficits in cognition. However, one component of cognition, thought disorder (TD), has received little attention in its association with social functioning. The current investigation examined the cross-sectional and predictive relationships between bizarre-idiosyncratic thought and psychosocial functioning throughout the early course of schizophrenia and compared these relationships to those observed among individuals with affective disorders (*i.e.,* bipolar disorder, manic type, and major depression without psychotic features). Participants were assessed on TD, work, and social functioning using standardized procedures across three follow-ups over an 8-year period. The cross-sectional relationships between TD and impairment in work performance were generally significant. TD also significantly predicted subsequent work functioning years later. Less support was found for the relationship between TD and social functioning. Finally, the relationship between TD and work performance appeared to be more consistent over time for the subjects with schizophrenia compared to those with affective disorders. The results suggest that techniques which minimize TD may have implications for occupational functioning among persons with chronic psychiatric disorders.

The present research was designed to study on a longitudinal basis whether positive thought disorder is related to social functioning in schizophrenia and in affective disorders. Deficits in social functioning have long been considered among the core characteristics of schizophrenia (*e.g.,* Bleuler, 1911/1950; Liberman, 1982; Wallace, 1984). These difficulties in interpersonal functioning often emerge during childhood, well before the florid symptoms of psychosis appear (Asarnow, 1988; Baum and Walker, 1995; Dworkin et al., 1993), and can persist throughout the course of the disorder (*e.g.,* Harding and Keller, 1998; Strauss et al., 1974). In an effort to better understand interpersonal impairments in schizophrenia, cognitive models have been formulated which hypothesize that social dysfunction may be the result of, and/or mediated by, cognitive deficits (*e.g.,* Brenner et al., 1992; Frith, 1994; Liberman et al., 1986). Support for these models has been garnered by studies demonstrating a link between cognitive impairments and social functioning among persons with schizophrenia (reviewed by Green, 1996; Penn et al., 1998). Thus, cognitive deficits appear to have both a correlational and predictive association with social functioning.

Much of the attention on cognitive factors in social adjustment has been limited to neurocognitive processes such as executive performance, memory skills, and vigilance. Less attention has been placed, however, on the role of cognitive processes assessed outside a neuropsychological context but which may exert a role on interpersonal behavior. One such cognitive process that can become aberrant in some patients is their thinking, with this often leading to the symptom of positive formal thought disorder (TD). In this context, TD is viewed as a major symptom involving strange and/or idiosyncratic thinking. It is not used as a measure of executive dysfunction, though TD may be one of several influences on executive functioning. There is both conceptual and empirical support for expecting a relationship between TD and social functioning among persons with schizophrenia. Because TD can be linked to one's ability to perceive (Harrow and Miller, 1980), reason 5 and communicate (Andreasen, 1979a; 1979b), it likely impacts individuals' interpersonal skills during interactions. Empirically, a number of recent studies have shown that TD is associated with social competence (e.g., Perry et al., 1995), subsequent social skill in a work setting (Harrow and Marengo, 1986; Lysaker et al., 1995b), clinical response to work rehabilitation (Lysaker et al., 1995a), and overall outcome (Marengo and Harrow, 1997). Thus, there is some evidence for a significant association between TD and psychosocial functioning (PSF) among persons with schizophrenia.

A number of extensions can be made on previous research in this area. First, most research has studied the association between TD and PSF at one period in time, or over a short follow-up period (*e.g.,* 5 months; Lysaker et al., 1995a). Thus, the longitudinal relationship between TD and PSF has been relatively unexplored. An exception was an earlier report from the Chicago Follow-up Study, which found that thought disorder 2 years post-hospitalization predicted work functioning and overall outcome 2 to 3 years later in a group with schizophrenia as well as psychiatric control groups (Harrow and Marengo, 1986). Second, previous research has investigated the association between TD and PSF either within a sample of persons with schizophrenia alone (Lysaker et al., 1995a, 1995b; Perry et al., 1995) or, when control groups were used, they were based primarily on the presence of psychotic features (*e.g.,* Harrow and Marengo, 1986).5 Thus, this created groups that were heterogeneous with respect to psychiatric diagnosis. Therefore, the nature of the relationship between TD and PSF across different diagnostic groups has not been evaluated. Furthermore, bipolar patients were included since previous research from multiple settings has found that many manic patients and select nonpsychotic patients also have forms of disorganized thinking (*e.g.,* Andreasen and Powers, 1975; Harrow and Quinlan, 1977; Harvey, 1985; Holzman et al., 1986).

This investigation represents an extension and amplification of this research from the Chicago Follow-up Study. The concurrent and longitudinal relationships between TD and PSF were investigated over a 7- to 8-year period and includes three successive follow-ups over this period. We extended upon previous research by examining the following issues: a) whether the concurrent relationship between TD and PSF changes over time; b) whether early TD predicts subsequent PSF at the 7.5 year follow-up; and c) whether the relationship between TD and PSF (both concurrent and predictive) is unique to schizophrenia or is present in other diagnostic groups (*i.e.,* bipolar disorder, manic type, and major depression without psychotic features).

Methods

Participants and Recruitment Strategy

This research is part of the Chicago Follow-up Study that is a larger ongoing prospective investigation of the longitudinal course and clinical correlates of schizophrenia and other major psychiatric disorders (Grinker and Harrow, 1987; Harrow et al., 1978). The study is currently being conducted at two large Midwestern hospitals.

Demographic Characteristics

The current sample consists of 169 individuals (82 male, 87 female) who were recruited during their inpatient admissions. Using research diagnostic criteria (Spitzer et al., 1978), there were 67 schizophrenia patients (SZ; 34% female), 25 manic bipolar disorder (BPM; 56% female), and 77 nonpsychotic depressives (DEP; 65% female). Diagnoses were based on one of two extensive standardized interviews at index hospitalization (e.g., the Schedule for Affective Disorders and Schizophrenia [SADS; Endicott and Spitzer, 1978]; or the Schizophrenic State Inventory [Grinker and Harrow, 1987]). Satisfactory interrater reliability for the diagnosis of schizophrenia was obtained (Carone et al., 1991). Psychotic symptoms (delusions and hallucinations) were assessed using a modified version of the SADS, which covers the occurrence of these symptoms within the past month. These scales derived from this interview have successfully been used in previous research (Harrow et al., 1995).

The subjects recruited were relatively young at index hospitalization, 97% were between the ages 17 and 30 years (mean = 23.24, SD = 3.89), and were recruited early in the course of their disorder. The mean number of previous hospitalizations was 1.67 (SD = 2.17). Sixty-six percent of the sample had one or fewer previous hospitalizations. Twenty-six percent were ever married at the index hospitalization. The mean number of years of education was 13.065 (SD = 2.1). Eighty percent of the participants were Caucasian, and 20% were African-American.

There were no significant differences between diagnostic groups with respect to age, marital status, or social class (mean = 3.36 on the Hollingshead Scale; Hollingshead and Redlich, 1958). However, more of the schizophrenia patients were male relative to the nonpsychotic depressives, and significantly more of the nonpsychotic depressive patients were female (65%; $[chi]^2 = 13.67$, $p < .001$). The larger percent of female depressive patients is in accord with the population statistics for this disorder (*i.e.,* DSM-IV; American Psychiatric Association, 1994). Significant differences in education were found between diagnostic groups ($F[2,166] = 7.138$, $p < .01$); those with nonpsychotic depression had significantly more years of education (mean = 13.63, SD = 2.03) than those with schizophrenia (mean = 12.36, SD = 1.87).

Medication

During the month prior to each follow-up period, the presence and dose of all pharmacological treatments were assessed. Diagnostic differences in neuroleptic treatment were significant at 2 years ([chi]^2 = 47.27, *df* = 5, *p* < .00001), 4.5 years ([chi]^2 = 48.32, *df* = 5, *p* < .00001), and 7.5 years ([chi]^2 = 41.31, *df* = 5, *p* < .00001). A repeated measures MANOVA revealed that CPZ equivalent neuroleptic dose across time significantly differed among diagnostic groups (*F* = 16.21, *p* < .0001). Follow-up analyses of CPZ equivalents demonstrated significant differences across groups at 2 years (*F* = 10.09, *df* = 2,108, *p* < .0001, SZ > BPM > DEP), 4.5 years (*F* = 25.13, *df* = 2,146, *p* < .00001, SZ > BPM > DEP), and 7.5 years (*F* = 25.55, *df* = 2,150, *p* < .00001, SZ > BPM > DEP).

To study whether neuroleptic treatment was a significant influence on the relationship that emerged between TD and PSF, we separately analyzed the relationships for schizophrenia patients on neuroleptics and for those schizophrenia patients not on neuroleptics. The relationships that emerged between TD and social functioning were similar for the schizophrenia groups irrespective of medication status. The relationships between TD and work functioning were similar in most cases, regardless of whether they were on neuroleptics, and none of these relationships significantly differed.

Procedures

All follow-up assessments of this sample were conducted individually by trained interviewers blind to patients' original acute phase diagnoses and previous follow-up assessment results. The patient sample was assessed on an average of 2, 4.5, and 7.5 years after their index hospitalization. Written informed consent was obtained at each follow-up.

Measures

Thought Disorder (TD). TD was evaluated using the comprehensive Index of Positive Thought Disorder, a concept that encompasses most of the qualities associated with formal thought disorder such as loose associations, illogical or autistic thinking, incoherent speech, and bizarre or strange expressions (IPTD; Harrow and Quinlan, 1985; Marengo et al., 1986). The battery consists of the Gorham Proverbs Test (Gorham, 1956), the Goldstein-Scheerer Object Sorting Test (OST; Goldstein and Scheerer, 1941), and the Comprehension Subtest of the WAIS (Wechsler, 1955). The Comprehension Test, which uses the same scoring procedures outlined in the Index of Positive Thought Disorder, has been found to be discriminating of TD in both medicated and unmedicated patients (Marengo and Harrow, 1997; Harrow et al., 1982). Interrater reliability for the overall scores of positive TD as well as separate scores for the Object Sorting Test and Comprehension Subtest were found to be high; a high degree of internal consistencies were found for the Proverbs Test and the Object Sorting Test (Harrow et al., 1999; Marengo et al., 1986).

Individual summary scores from each of the three tests were used in the analyses. Bizarre-idiosyncratic speech and thinking were assessed by assigning a score of 0, .5, 1.0, or 3.0 to each response, on each of the three respective measures, according to the procedures developed by Marengo et al. (1986). An example of a severely bizarre response to the proverb "When the cat's away the mice will play" was:

"Hickory dickory dock, the mouse ran up the clock. (?) Big Ben in London. Like the old man in the shoe. When the cat's away the mice can run up to the top of the clock-go cookoo, poo on you."

Another example of a severely bizarre response to the proverb "Gold goes in any gate except heaven's" was:

"(Sighs) The sun will never find its gravity. (?) No-without our help it won't. We gotta help. Let the gravity out and give it to the sun. That's our purpose here-to make as many friends as possible."

An example of a severely bizarre response on the Object Sorting Test involved a response to sorting the items that would go with a sink stopper:

"Because the sink stopper stops me from losing control over myself, and to me I think control is necessary, things that are imaginary only, when I feel like believing them."

Psychosocial Functioning (PSF). The Strauss-Carpenter Outcome Scale (SCS) has been frequently used in previous longitudinal research with adequate interrater reliability to assess social and work adjustment (Strauss and Carpenter, 1972). Two indices were used from the scale; specifically, the first index examines the frequency of social contact (e.g., weekly contact with friends, biweekly with friends, monthly, only meets with acquaintances "over the fence," or no contact at all). The second index characterizes the amount of "useful employment" (which includes work as a primary caretaker or student) during the last year before each follow-up (*i.e.,* continuous, more than half of the year, part-time or full-time less than half of the year, and no useful work). Ratings for the social contact and employment scales were confirmed by a structured interview (Harrow Functioning Questionnaire; HFQ) administered by trained research assistants blind to participants' diagnosis, which has been used successfully in several longitudinal studies (*e.g.,* Carone et al., 1991; Grinker and Harrow, 1987; Harrow et al., 1997; Marengo and Harrow, 1997).

Results

To control for type I error, an experiment-wide alpha level of $p < .01$ was set. Information on the course and stability of TD and PSF is reported before examining the concurrent relationships between TD and PSF for each of the three follow-up periods (see Tables 1-3). These relationships were evaluated separately for each diagnostic group. Immediately following each set of concurrent analyses, the difference among the bivariate correlations across the three diagnostic groups were tested using R to Z transformations for independent correlations (Edwards, 1950). We also examined the predictive relationships between TD and PSF among the schizophrenia patients, as well as the differences among these predictive relationships across the three diagnostic groups (Tables 4-6).

	Diagnostic group		
Bivariate correlation	Schizophrenia (*N*)	Bipolar (*N*)	Depressive (*N*)
Comprehension			
Work[b]	.15(62)	.55(21)**[c]	−.02(77)[d]
Social[e]	−.13(62)	.40(21)	.09(77)
Proverbs			
Work	.18(60)	.04(20)	.00(73)
Social	−.01(60)	.19(20)	−.03(73)
Object sorting			
Work	.21(60)	.30(19)	−.10(75)
Social	.26(60)*	.37(19)	−.06(75)

[a]Scales were adjusted so that positive correlations indicate that more severely thought-disordered patients demonstrate more impairment.

[b]Work=Strauss-Carpenter Work Index; [e]Social=Strauss-Carpenter Social Index.

[c,d]Bivariate correlates differ significantly at the $p < .01$ level using the R to Z transformation.

*$p < .05$; **$p < .01$.

TABLE 1 Correlations between Indices of Thought Disorder (TD) and Psychosocial Functioning (Strauss-Carpenter Subscales) among each of the Diagnostic Groups at the First Follow-up (2 years)[a]

	Diagnostic group		
Bivariate correlation	Schizophrenia (*N*)	Bipolar (*N*)	Depressive (*N*)
Comprehension			
Work	.31(63)**	.04(24)	−.15(70)
Social	−.19(63)	.38(24)	.21(70)
Proverbs			
Work	.39(61)**	.31(23)	.18(66)
Social	.26(61)*	.28(23)	.16(66)
Object sorting			
Work	.38(60)**	.14(21)	.31(69)**
Social	.31(60)**	.22(21)	.07(69)

[a]Scales were adjusted so that positive correlations indicate that more severely thought-disordered patients demonstrate more impairment.

*$p < .05$; **$p < .01$.

TABLE 2 Correlation between Indices of Thought Disorder (TD) and Psychosocial Functioning (Strauss-Carpenter Subscales) among each of the Diagnostic Groups at the Second Follow-up (4.5 years)[a]

	Diagnostic group		
Bivariate correlation	Schizophrenia (*N*)	Bipolar (*N*)	Depressive (*N*)
Comprehension			
Work	.22(59)	−.02(24)	.25(61)
Social	−.10(59)	.14(24)	.31(61)*
Proverbs			
Work	.34(56)**	.05(24)	−.01(60)
Social	.19(56)	.29(24)	.19(60)
Object sorting			
Work	.33(57)**	.13(24)	.03(62)
Social	.17(57)	.05(24)	.11(62)

[a]Scales were adjusted so that positive correlations indicate that more severely thought-disordered patients demonstrate more impairment.

*$p < .05$; **$p < .01$.

TABLE 3 Correlations between Indices of Thought Disorder (TD) and Psychosocial Functioning (Strauss-Carpenter Subscales) among each of the Diagnostic Groups at the Third Follow-up (7.5 years)[a]

	Diagnostic group		
Bivariate correlation	Schizophrenia (*N*)	Bipolar (*N*)	Depressive (*N*)
Comprehension			
Work	.14(62)[b]	.67(22)**[c,d]	−.02(77)[e]
Social	−.05(60)	.20(22)	.11(77)
Proverbs			
Work	.25(60)*	.00(21)	.24(75)*
Social	.12(58)	.14(21)	.13(74)
Object sorting			
Work	.22(60)	.33(20)	.10(77)
Social	.33(58)**[f]	.04(20)	−.03(76)[g]

[a]Scales were adjusted so that positive correlations indicate that more severely thought-disordered patients demonstrate more impairment.

[b,c]Diagnostic groups significantly differ at $p < .01$ level using the R to Z transformation.

[d,e]Diagnostic groups significantly differ at $p < .001$ level using the R to Z transformation.

[f,g]Diagnostic groups significantly differ at $p < .05$ level using the R to Z transformation.

*$p < .05$; **$p < .01$.

TABLE 4 Correlations between (TD) at Follow-up 1 (2 years) with Psychosocial Functioning at Follow-up 2 (4.5 years)[a]

	Diagnostic group		
Bivariate correlation	Schizophrenia (*N*)	Bipolar (*N*)	Depressive (*N*)
Comprehension			
Work	.19(62)	.38(22)	−.05(77)
Social	.03(62)	−.02(22)	.07(77)
Proverbs			
Work	.17(60)	.58(21)**[b]	.04(75)[c]
Social	.10(60)	.00(21)	.06(73)
Object sorting			
Work	.24(60)	.53(20)*[d]	.05(77)[e]
Social	.05(60)	.26(20)	.08(75)

[a]Scales were adjusted so that positive correlations indicate that more severely thought-disordered patients demonstrate more impairment.

[b,c]Diagnostic groups significantly differ at the $p < .01$ level using the R to Z transformation.

[d,e]Diagnostic groups significantly differ at the $p < .05$ level using the R to Z transformation.

*$p < .05$; **$p < .01$.

TABLE 5 Correlations between (TD) at Follow-up 1 (2 years) and Psychosocial Functioning at Follow-up 3 (7.5 years)[a]

Bivariate correlation	Diagnostic group		
	Schizophrenia (*N*)	Bipolar (*N*)	Depressive (*N*)
Comprehension			
Work	.25(63)*	.08(24)	−.05(70)
Social	.08(63)	.03(24)	.28(68)*
Proverbs			
Work	.27(61)*	.50(23)*	.06(66)
Social	−.02(61)	−.05(23)	.08(64)
Object sorting			
Work	.33(60)**	.37(21)	.14(69)
Social	.12(60)	.00(21)	.11(67)

[a]Scales were adjusted so that positive correlations indicate that more severely thought-disordered patients demonstrate more impairment.

*$p < .05$; **$p < .01$.

TABLE 6 Correlations between (TD) at Follow-up 2 (4.5 years) with Psychosocial Functioning at Follow-up 3 (7.5 years)[a]

Course of TD and PSF in Schizophrenia

To examine the stability of TD throughout the course of schizophrenia, the IPTD was submitted to individual one-way repeated measures ANOVAs. Results of the analyses revealed no significant differences across the three follow-up periods; all *F*s < 1.34, all *ps* > .05. To investigate the stability of social and work functioning across the three follow-ups, the work and social subscales of the SCS were submitted to one-way repeated measures ANOVAs. Similarly, results revealed no significant effects for follow-up period. To further characterize the course of work functioning across the three follow-up periods, 48% demonstrated consistently poor work functioning, and 27% demonstrated sporadic and 25% moderately consistent employment.

Concurrent Relationships

The First Follow-up (2 years). Among schizophrenia patients, the relationship between greater TD (measured by the Object Sorting Test) and more impairment in social activity level approached significance ($p < .05$) (Table 1). With respect to group differences between bivariate correlations, the only significant difference was the association between greater TD (measured by the WAIS Comprehension Subtest) and more impaired work performance among the bipolar group (BPM) compared with those with depression (DEP; $z = 2.45$, $p < .01$).

The Second Follow-up (4.5 years). Correlational analyses revealed that for the schizophrenia group, greater TD (as assessed in all three tasks) was significantly associated with more impairment in work functioning (Table 2). To determine which TD variable contributed the most variance in work functioning, a stepwise multiple regression was performed, which indicated that the Proverbs Test contributed the most variance to the equation (R^2 = .15, p < .01). Greater impairment in social activity level was only significantly associated with TD indexed from the Object Sorting Task. These correlations did not significantly differ from those of the other clinical groups.

The Third Follow-up (7.5 years). Similar to the results at the 4.5 year follow-up, among the schizophrenia patients, greater TD (on the OST and Proverbs Test) was significantly associated with more impaired work functioning at the 7.5 year follow-up (Table 3). To determine which TD variable contributed the most variance in work functioning, a stepwise multiple regression was performed, which suggested that the Proverbs Test contributed the most variance to the equation (R^2 = .13, p < .01). These correlations did not significantly differ from those in the other diagnostic groups.

Prediction of Psychosocial Functioning from Thought Disorder

TD at the 2-Year Follow-up Predicting PSF at the 4.5-Year Follow-up. Among schizophrenia patients, greater TD (measured by the OST) at the 2-year follow-up was associated with more impaired social activity level at the 4.5 year follow-up (r = .33, p < .01) (Table 4). The statistical difference with the corresponding bivariate correlation in the depressed group approached significance (z = 2.12, p < .05); similarly, there was a trend revealing that greater TD (measured by the Proverbs task) predicted later work functioning (p < .05 level). Finally, the relationship between TD (as measured by the WAIS Comprehension Subtest) and later work functioning was significantly stronger among those with bipolar disorder in comparison with those with major depression (z = 3.24, p < .001) and schizophrenia (z = 2.54, p < .01).

TD at the 2-year Follow-up Predicting PSF at the 7.5-year Follow-up. None of the correlations between TD and PSF were significant for the group with schizophrenia (Table 5). For the bipolar patients, there were consistently strong relationships between thought disorder at the 2-year follow-up and subsequent work functioning 5 years later, with two of the three relationships being significant.

TD at the 4.5-Year Follow-up Predicting PSF at the 7.5-Year Follow-up. For the group with schizophrenia, greater TD (as measured separately on all 3 tasks) at 4.5-year follow-up was associated with more impaired work functioning 3 years later (Table 6), with the relationship for the OST task (r = .33) significant at the .01 level. The associations between greater TD (as measured by the Proverbs and Comprehension Test) and more impaired subsequent work functioning approached significance (p < .05). Although the relationships for the bipolar patients did not achieve significance at the .01 level, two of the three relationships showed correlations higher than r = .35. None of these correlations significantly differed across the three diagnostic groups.

Additional Analyses

Given that TD significantly relates to psychosocial functioning among schizophrenia patients, additional concurrent correlations were conducted to determine how TD compares with other aspects of symptomatology, such as psychosis, in its relation to functioning. At 2 years, severity of hallucinations was associated with poorer work functioning ($r = .39$, $p < .01$). The association between delusions and work impairment approached significance ($r = .30$, $p = .01$). At 4.5 to 5 years, severity of delusions ($r = .37$, $p < .01$) and hallucinations ($r = .32$, $p < .01$) was associated with poorer work functioning. The severity of delusions and hallucinations were significantly related to work impairment at 7.5 years (respectively, $r = .36$, $r = .40$, ps $< .01$). None of these correlations significantly differed from those of TD and work functioning.

Discussion

The data suggest a modest but significant relationship between thought disorder and psychosocial functioning among individuals with schizophrenia. Three major questions were posed: a) Does the relationship between TD and PSF change over time? b) Does early TD predict subsequent PSF? and c) Are the concurrent and longitudinal relationships between TD and PSF unique to schizophrenia or present in psychopathology, in general?

The Relationship between TD and PSF in Schizophrenia

Early in the course of the disorder (approximately 2 years after the index hospitalization), the relationship between positive thought disorder and psychosocial functioning is not strong. Although the acute phase of the disorder has subsided by 2 to 3 years post-index hospitalization, evidence demonstrates that residual symptomatology continues to persist for several years among many individuals with schizophrenia (*e.g.,* Harrow et al., 1997; Harrow and Marengo, 1986). Several theorists have hypothesized that during the early phase of the schizophrenia deterioration continues in many aspects of psychosocial functioning. (*e.g.,* Bleuler, 1978; Carpenter and Strauss, 1991). Therefore, several areas of symptomatology, such as negative symptoms (*e.g.,* Bellack et al., 1990; Jackson et al., 1989), other psychotic symptoms (Harrow et al., 1995), and depression (Sands and Harrow, 1994), may more profoundly impact instrumental functioning than TD alone.

By 4.5 years post-hospitalization, up to 15% of the variance in work performance and about 10% of the variance in social functioning could be attributed to TD severity among those with schizophrenia. The relationship between TD and work performance remained comparable between 4.5 and 7.5 years post-hospitalization. TD continued to account for about 12% of the variance in work functioning up to 7.5 years post-index hospitalization, therefore reducing the likelihood that the relationships observed in the second follow-up were due to chance. These findings are comparable to those of Perry et al. (1995), who also examined the concurrent relationship between TD severity and impairment in instrumental functioning among a slightly more chronic group of individuals with schizophrenia. Thus, the findings support a consistent relationship between TD severity and work impairment as the schizophrenia disorder progresses.

There was less support for the concurrent relationship between TD and social functioning. Work functioning generally had a more consistent association with TD compared to social functioning. It is possible that TD severity may be less likely to impair social activity level because social contacts are frequently developed within one's "psychiatric community" among individuals more accepting of such pathology. Conversely, there is likely to be less tolerance for psychopathology of this nature within a "mainstream" work setting. If this hypothesis is correct, one would expect work performance to be more sensitive to diagnostic group differences than social functioning.

Indirect support for the above hypothesis was reported by Harrow et al. (1997), who found that individuals with schizophrenia typically demonstrated more significant impairment in work functioning relative to the other psychotic and nonpsychotic patients, whereas smaller differences in social activity level were noted among these diagnostic groups. Harrow et al. (1997) suggest that stigmatization is more probable in mainstream employment settings, contributing to the difficulty returning to the work force. Research on stigmatization towards persons with severe mental illness lends support to this hypothesis (reviewed by Farina, 1998; Penn and Martin, 1998).

TD and Its Association with Current Social Functioning

The only modest associations between TD and social activity level may result from a number of factors. First, factor-analytic studies suggest that social functioning and symptoms may represent semi-independent domains (*e.g.,* Lenzenweger and Dworkin, 1996). Therefore, severity of TD may be a process independent of social activity level. Second and alternatively, a number of studies have found that negative symptoms, rather than positive symptoms, have a stronger relationship with social functioning (*e.g.,* Bellack et al., 1990; Jackson et al., 1989). Third, social activity level may be more related to factors not assessed in the current study but known to have an association with social behavior, namely neurocognitive deficits (Green, 1996; Penn et al., 1998). Finally, the only modest association between TD and social activity level may not reflect the relationship between TD and other indices of social behavior, such as social skills or social networks.

Does the Presence of TD in Schizophrenia Predict Subsequent PSF?

The data provide some support for a predictive relationship between TD and PSF throughout the course of schizophrenia (first 7 to 8 years), although the relationship is only a modest one. Bivariate associations among successive follow-ups, especially those at 4.5 and 7.5 years, showed significant associations between TD and PSF. These predictive relationships were most commonly observed between TD and work functioning, a finding consistent with other research in this area (Harrow and Marengo, 1986; Lysaker et al., 1995b). However, TD generally did not predict subsequent social functioning, suggesting that the prognostic utility of TD may be limited to predicting occupational skills or functioning. Although there were significant predictive relationships 2 to 3 years later at both the 2-year and the 4.5-year follow-ups, when the prediction was extended for over 5 years (*i.e.,* the first *vs.* the third follow-up), the predictions were no longer significant. A factor that may account for the somewhat stronger predictive relationship between thought disorder and subsequent work functioning is that the presence of thought disorder implies an underlying condition of vulnerability to psychopathology and functioning impairment among the schizophrenia patients. Even years later, this vulnerability (with the vulnerability persisting over time) reduces future work functioning and diminishes the chances of later success in this area.

Do Other Positive Symptoms Predict PSF in Schizophrenia?

Previous studies have found a strong relationship between the presence of TD and delusions as well as TD and hallucinations (Harrow and Marengo, 1986; Marengo and Harrow, 1997). When the predictive relationship between TD and work functioning was compared with other types of positive symptoms (*i.e.,* delusions and hallucinations), its predictive utility did not significantly differ. Therefore, TD is one factor, among additional psychiatric symptoms, that relates to functional outcome.

The Relationship between TD and PSF in Other Clinical Groups

The concurrent and predictive relationship between disorganized thought and work performance was not unique to schizophrenia. Although the relationship between TD and PSF appeared more consistent among those with schizophrenia (*i.e.,* more correlations were significant at the .01 level in the schizophrenia group relative to the other diagnostic groups), the groups did not statistically differ from one another. The detection of correlational differences among the clinical groups may have been limited by the unequal sample sizes. The bipolar/manic group had less than half the sample size of those with schizophrenia. It is possible that with a large sample more significant correlations might have emerged among the bipolar patients. However, the current data do provide support for the hypothesis that this relationship is not unique to schizophrenia. Instead, the relationship between TD and PSF may be more a function of a related symptomatology process. This relationship is therefore not dependent on diagnosis and is consistent with other study findings (Harrow and Marengo, 1986).

The data from the present study support a relationship between formal thought disorder and work functioning. In general, the relationship between TD and PSF for schizophrenia patients held at successive assessment over a 7.5-year period. The results are stronger for instrumental work performance than for social activity level. Although the relationships were more consistent for schizophrenia patients, they are not unique to schizophrenia.

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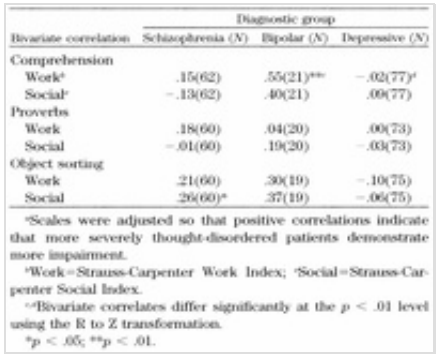
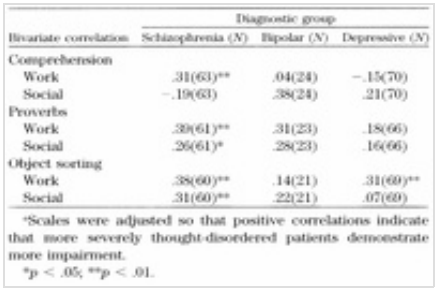


Bivariate correlation	Diagnostic group: Schizophrenia (*N*)	Bipolar (*N*)	Depressive (*N*)
Comprehension			
Work[b]	.15(62)	.55(21)**[c]	−.02(77)[c]
Social[b]	−.13(62)	.40(21)	.09(77)
Proverbs			
Work	.18(60)	.04(20)	.00(73)
Social	−.01(60)	.19(20)	−.03(73)
Object sorting			
Work	.21(60)	.30(19)	−.10(75)
Social	.26(60)*	.37(19)	−.06(75)

[a]Scales were adjusted so that positive correlations indicate that more severely thought-disordered patients demonstrate more impairment.
[b]Work = Strauss-Carpenter Work Index; [b]Social = Strauss-Carpenter Social Index.
[c,d]Bivariate correlates differ significantly at the $p < .01$ level using the R to Z transformation.
*$p < .05$; **$p < .01$.

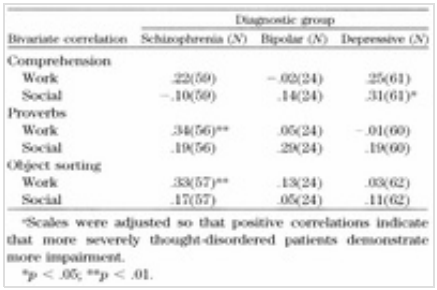
Table 1



Bivariate correlation	Diagnostic group: Schizophrenia (*N*)	Bipolar (*N*)	Depressive (*N*)
Comprehension			
Work	.31(63)**	.04(24)	−.15(70)
Social	−.19(63)	.38(24)	.21(70)
Proverbs			
Work	.39(61)**	.31(23)	.18(66)
Social	.26(61)*	.28(23)	.16(66)
Object sorting			
Work	.38(60)**	.14(21)	.31(69)**
Social	.31(60)**	.22(21)	.07(69)

[a]Scales were adjusted so that positive correlations indicate that more severely thought-disordered patients demonstrate more impairment.
*$p < .05$; **$p < .01$.

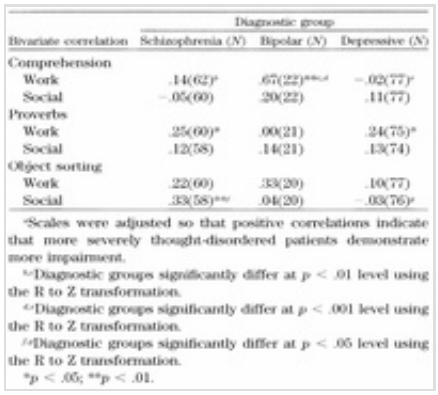
Table 2



Bivariate correlation	Diagnostic group: Schizophrenia (*N*)	Bipolar (*N*)	Depressive (*N*)
Comprehension			
Work	.22(59)	−.02(24)	.25(61)
Social	−.10(59)	.14(24)	.31(61)*
Proverbs			
Work	.34(56)**	.05(24)	−.01(60)
Social	.19(56)	.29(24)	.19(60)
Object sorting			
Work	.33(57)**	.13(24)	.03(62)
Social	.17(57)	.05(24)	.11(62)

[a]Scales were adjusted so that positive correlations indicate that more severely thought-disordered patients demonstrate more impairment.
*$p < .05$; **$p < .01$.

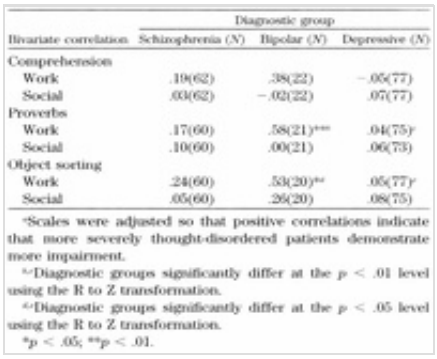
Table 3



Bivariate correlation	Diagnostic group: Schizophrenia (*N*)	Bipolar (*N*)	Depressive (*N*)
Comprehension			
Work	.14(62)[b]	.67(22)**[b,c]	−.02(77)[b]
Social	−.05(60)	.20(22)	.11(77)
Proverbs			
Work	.25(60)*	.00(21)	.24(75)*
Social	.12(58)	.14(21)	.13(74)
Object sorting			
Work	.22(60)	.33(20)	.10(77)
Social	.33(58)**[c]	.04(20)	−.03(76)[d]

[a]Scales were adjusted so that positive correlations indicate that more severely thought-disordered patients demonstrate more impairment.
[b,c]Diagnostic groups significantly differ at $p < .01$ level using the R to Z transformation.
[c,d]Diagnostic groups significantly differ at $p < .001$ level using the R to Z transformation.
[d,e]Diagnostic groups significantly differ at $p < .05$ level using the R to Z transformation.
*$p < .05$; **$p < .01$.

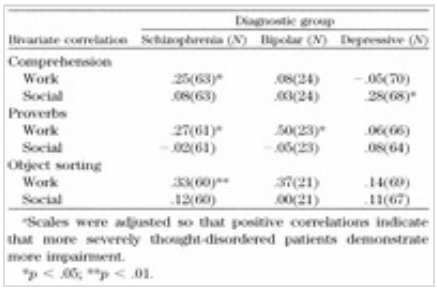
Table 4



Bivariate correlation	Diagnostic group: Schizophrenia (*N*)	Bipolar (*N*)	Depressive (*N*)
Comprehension			
Work	.19(62)	.38(22)	−.05(77)
Social	.03(62)	−.02(22)	.07(77)
Proverbs			
Work	.17(60)	.58(21)***	.04(75)[c]
Social	.10(60)	.00(21)	.06(73)
Object sorting			
Work	.24(60)	.53(20)**[c]	.05(77)[c]
Social	.05(60)	.26(20)	.08(75)

[a]Scales were adjusted so that positive correlations indicate that more severely thought-disordered patients demonstrate more impairment.
[b,c]Diagnostic groups significantly differ at the $p < .01$ level using the R to Z transformation.
[d,e]Diagnostic groups significantly differ at the $p < .05$ level using the R to Z transformation.
*$p < .05$; **$p < .01$.

Table 5



Bivariate correlation	Diagnostic group: Schizophrenia (*N*)	Bipolar (*N*)	Depressive (*N*)
Comprehension			
Work	.25(63)*	.08(24)	−.05(70)
Social	.08(63)	.03(24)	.28(68)*
Proverbs			
Work	.27(61)*	.50(23)*	.06(66)
Social	−.02(61)	−.05(23)	.08(64)
Object sorting			
Work	.33(60)**	.37(21)	.14(69)
Social	.12(60)	.00(21)	.11(67)

[a]Scales were adjusted so that positive correlations indicate that more severely thought-disordered patients demonstrate more impairment.
*$p < .05$; **$p < .01$.

Table 6

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