SCHIZOPHRENIC THINKING AND NEUROLEPTIC DOSAGE

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Three groups (N = 60) of schizophrenics (with varying levels of chronicity and drug dosages) were administered the Whitaker Index of Schizophrenic Thinking, the Mini-Mental State, and the Self-Conscious Scale. The results indicated that no differences existed between the chronic and acute groups on the dependent measures. Furthermore, no significant differences emerged between 21 of the acute patients who were discharged and 9 patients of the acute group who were not discharged (follow-up). No significant differences on any of the dependent measures were observed when subjects were grouped according to level of schizophrenic thinking and of neuroleptic dose. Also, no relationship between neuroleptic drug dosage and thinking for any of the three groups was observed.

The most common treatment of schizophrenic thinking involves the administration of neuroleptic drugs. The antipsychotic medications appear to have a normalizing effect in that they improve typical schizophrenic symptoms, such as hallucinations, delusions, and thinking disorders (Davis, Schafer, Killian, Kinard, & Chan, 1981). Wahba, Conlon, and Meadow (1981) investigated the extent of improvement with neuroleptic treatment in cognitive disturbances and gross clinical pathological manifestations in 44 acute hospitalized patients in three treatment groups. Cognitive changes were measured by the Brief Psychiatric Rating Scale (BPRS) and the Clinical Global Impression scale (CGI). The results indicated that the neuroleptics produced improvement in both the thinking disorders and clinical manifestations of acute schizophrenia.

However, several studies have not supported these positive findings. Neborsky, Janowsky, Munson, and Depry (1981) reported a study in which 20 acutely schizophrenic inpatients were assigned to either a high- or low-dose neuroleptic group. Symptom alleviation was measured by the BPRS and global daily ratings. At baseline, both groups showed similar BPRS scores and did not improve differentially; the global daily rating scale also confirmed relatively equal improvement in both dosage groups over time. Due to these findings, the authors suggested that dosage level was not related to efficacy. Tune et al. (1980) also examined the relationship between neuroleptic dosage and clinical state in 30 schizophrenic patients; they employed an abbreviated version of the Present State Examination (mini-PSE). Although these patients were receiving a wide variety of neuroleptic drugs, the levels were expressed as chlorpromazine equivalents, as suggested by Davis (1976). The major finding was that there was no correlation between neuroleptic dosage and mini-PSE scores.

The problem with the aforementioned studies has been that these studies used nonstandardized dependent measures (*e.g.*, mini-PSE), which could introduce unnecessary error variance. The effects of psychotropic medication on standardized tests measures were assessed more recently by Killian, Holzman, Davis, and Gibbons (1984) with two groups of hospitalized schizophrenics: A control group, who remained on medication, and an experimental group, who were given a 3-week drug holiday. Both groups were tested with a variety of neuropsychological and perceptual tests. The experimental group

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was tested first after the 3-week drug holiday and again 4 weeks later. (The control group was tested on corresponding dates.) Despite the question of the validity of a 3-week wash-out period as indicative of a neuroleptic-free state, the study demonstrated that the medication did not affect test performance and that the presence or absence of clinical improvement did not account for performance on these measures.

In view of the fact that the primary deficits associated with schizophrenia are cognitive, the validity of the Killian et al. (1984) study is limited because no cognitive measures were used. Thus, a cognitively oriented, yet standardized measure would assist in assessing more accurately the relationship between schizophrenia and neuroleptic dosage. The Whitaker Index of Schizophrenic Thinking (WIST; Whitaker, 1973) has been used in studies that focused on the assessment of schizophrenia conceptualization, as well as indirectly in several studies that dealt with neuroleptic dosage. Pishkin, Lovallo, Lenk, and Bourne (1977) reported that drug dosage and cognitive performance were not related when schizophrenics were grouped according to the WIST Index or the total score on the WIST. Simpson, Bourne, Justesen, and Rhodes (1979) reported similar findings in a study that focused on conceptual performance. The results of the study indicated that WIST total score or Index correlated $-.06$ with drug dosage. However, Dobson and Neufeld (1980) more recently reported that "WIST scores," presumably the WIST Index, were correlated significantly with chlorpromazine equivalents.

Additionally, while the Pishkin et al. (1977), Simpson et al. (1979), and Dobson and Neufeld (1980) studies did use more appropriate dependent measures, none of the studies focused exclusively on the role of neuroleptics on schizophrenic thinking, and such variables as chronicity and improvement were not taken into account. Thus, regardless of the efficacy of the dependent measure used in these studies, design complications may have given rise to the disparity in findings. The intent of the present research was to attempt to clarify the relationship, or lack of relationship, between neuroleptic dosage and schizophrenic thinking in a study that used both acute and chronic subjects as well as several "cognitive," standardized measures.

Method

Subjects

Sixty adult, non-brain-damaged schizophrenic inpatients from a 1,000 bed state hospital volunteered to participate in the study. Diagnosis of schizophrenia was determined by a board-eligible psychiatrist and verified independently by a licensed doctorate-level psychologist, who used DSM-III criteria (American Psychiatric Association, 1980). Subjects were divided initially into three groups: (1) 30 acute schizophrenics, hospitalized less than 1 month; (2) a follow-up group, which consisted of 8 of the 30 acute subjects still hospitalized 2 months later; and (3) 30 chronic schizophrenics, who had been hospitalized continuously for more than 1 year. Demographics, which are shown in Table 1, indicate that participants were generally similar on the biographical information except for length of hospitalization (difference between the acute and chronic groups was approximately 6 years). For statistical purposes, subjects also were divided into groups according to levels of schizophrenic thinking on the basis of WIST Index scores and later according to neuroleptic dose.

Procedure

The following tests were administered individually: The Mini-Mental Status, Form A of the Whitaker Index of Schizophrenic Thinking, and the Self-consciousness Scale. The Mini-Mental Status (MMS; Folstein, Folstein, & McHigh, 1980) is a short, 11-item "standardized" instrument devised to test the extent of cognitive impairment. Specifically, the test addresses the subjects' orientation, registration, attention and calculation, recall and language. A total of 30 points can be obtained on this test, with 1 point given for

Table 1
Means and Standard Deviations for Demographic Characteristics of Participants According to Grouping

	Groups											
	Chronicity				WIST Index				CPZE levels			
	Acute		Chronic		Low		High		Low		High	
Demographic variables	*M* = 26	*F* = 4	*M* = 24	*F* = 6	*M* = 17	*F* = 13	*M* = 25	*F* = 5	*M* = 19	*F* = 11	*M* = 23	*F* = 7
Gender												
Age	33.5	(11.8)	35.7	(9.1)	33.0	(11.5)	37.1	(10.4)	34.3	(10.4)	36.0	(10.7)
Education	10.2	(2.8)	9.3	(2.3)	10.4	(2.7)	8.7	(2.6)	9.3	(2.7)	10.4	(2.3)
Days in hospital	28.2	(45.4)	2146.2	(1777.51)	560.7	(771.5)	1396.0	(2049.3)	947.6	(1454.6)	989.6	(1743.6)
Previous hospitalization	6.52	(6.1)	4.93	(5.1)	5.6	(6.1)	6.3	(6.1)	5.9	(6.5)	6.2	(5.7)
Age of onset	21.5	(9.1)	22.5	(7.0)	22.0	(7.4)	21.5	(8.3)	21.3	(7.9)	22.1	(7.7)

each correct response. Form A of the Whitaker Index of Schizophrenic Thinking (WIST) purports to measure schizophrenic thinking and is divided into three sections: Similarities, Word Pairs, and New Inventions. Each section contains 7 to 9 questions, with 5 randomly arranged responses. The incorrect answers are, in order of increasing incorrectness or illogicality: Loose association (1), reference association (2), clang association (3), and nonsense association (4) with score values shown in parentheses. When the individual items for each separate section have been scored, the scores are summed to obtain the total WIST sum. The time required by the subject to complete the WIST also is recorded and rounded to the nearest minute. The sum score and time are added to obtain the WIST Index. According to Whitaker (1973), the most efficient discriminator of schizophrenic thinking is the index, which has a cut-off value of 21 (*i.e.*, a score of 22 or more is indicative of schizophrenic thinking). The third test, the 23-item Self-Conscious Scale (SCS; Fenigstein, Scheier, & Buss, 1975), also is divided into three subscales: Private self-consciousness, public self-consciousness, and social anxiety. A Likert-type scale is the basis of the response format, in which the subject responds on a scale of zero (extremely uncharacteristic) to four (extremely characteristic). The three section scores are determined by adding the responses from all of the items on that particular section. The total score of the SCS is determined by adding the three sections' total scores.

All subjects were taking neuroleptics at the time of testing. Anecdotal information obtained from conversations with attending psychiatrists indicated that medication dose was determined by patient's behavior and not by motor side effects (although these effects were taken into consideration in determining dose level). Presumably, higher doses were given to sicker or more treatment-resistant patients. Dosages, in turn, were converted to chlorpromazine equivalent (CPZ-E) according to currently accepted standards (Davis, 1976); daily intake of the prescribed medication was used without regard to prior pharmaceutical history.

At 8:30 A.M. prospective participants were chosen from a volunteer pool of inpatients, initially screened by the nursing staff and by a licensed psychologist, who was not involved in test administration. Those patients who met the criteria (*i.e.*, each subject must have been diagnosed as schizophrenic according to criteria stated earlier, have a sixth-grade education, show a willingness to be tested, and exhibit an ability to comprehend as well as sign a standard consent form) for the study were asked to speak with a research technician, who was blind to diagnosis and history. The technician explained the purpose and procedure of the study and read the consent form to the patient. Testing then was initiated in either a conference room or an empty ward. In the event that the subject could not read, materials were read to the subject by the technician, with total testing time not in excess of 45 minutes. After completion of the tests, the subjects were debriefed and escorted back to their respective wards.

Results

A series of one-way analyses of variance (ANOVA) were computed on an Apple IIe (Stienmetz, Romano, & Patterson, 1981). Considering the number of analyses performed, a .01 level of significance was adopted in order to minimized type I errors. Three sets of ANOVAs were performed with the subjects grouped according to three separate independent variables, including chronicity, level of schizophrenic thinking, and neuroleptic dosage. Chronicity was defined as the length of current hospitalization, in days; the acute group had a mean length of stay of 28.2 days, and the chronic group had resided continuously in the hospital for a mean of 2146.2 days. The level of schizophrenic thinking was defined by the mean WIST Index score (M = 30). Subjects with a WIST Index score of 30 or below were placed in a low group category, and those who scored above the mean were placed in the high group. Finally, subjects were grouped

Table 2
List of Chlorpromazine Equivalents for the Three Groups

Acute		FU		Chronic	
Subject #	CPZ-E levels	Subject #	CPZ-E levels	Subject #	CPZ-E levels
1	2000	2	1500	34	800
2	4500	3	800	35	2100
3	800	4	1300	36	400
4	800	8	700	37	150
5	2000	15	1500	38	200
6	2000	19	2000	39	4000
7	1300	21	1500	40	1000
8	500	23	1000	41	1500
9	1000	30	0	42	1200
10	300			43	1000
11	1300			44	1000
12	500			45	800
13	800			46	3000
14	4000			47	350
15	200			48	3000
16	800			49	1600
17	1500			50	1200
18	1300			51	1500
19	2000			52	0
20	1000			53	400
21	300			54	1500
22	2000			55	800
23	250			56	200
24	1500			57	1500
25	1000			58	2000
26	1000			49	1000
27	1500			60	500
28	1500			61	300
29	1000			62	1500
30	1500			63	400

according to level of neuroleptic dosage, as measured by chlorpromazine equivalent (CPZE) level (M = 1212.5 milligrams per day). Subjects who were administered 1200 milligrams (or lower) of CPZE per day were placed in a low group, while those who received higher CPZE levels were placed in a high group. It is important to note that these means obtained for the three independent variables were obtained from all subjects tested. However, means and standard deviations for the six groups of subjects are found in Table 3. Missing data were prorated by obtaining the mean score from related items on the particular subscale. Subjects for whom more than 50% of the dependent measures were missing were excluded from the analysis.

Table 3
Means for Dependent Measures for the Nine Groups

Measures	Acute (total) (N = 30)	Acute-discharged (N = 21)	Acute-nondischarged (N = 9)	Follow-up (N = 9)	Chronic (N = 30)	Low WIST Index (N = 35)	High WIST Index (N = 33)	Low CPZE level (N = 38)	High CPZE level (N = 30)
WIST Similarities	7.996	9	5.556	9.334	9.333	3.8	14.0	9.7	7.5
WIST Word Pairs	6.333	7.571	4.333	5.444	5.933	2.3	10.33	6.9	5.2
WIST New Inventions	5.933	5.333	7.222	7.222	7.567	4.5	9.2	7.5	5.9
WIST Index	28.9	29.523	27.444	33.111	35.466	16.61	43.84	34.8	28.5
MMS	21.6	21.190	23.111	20.667	21.267	23.1	19.7	20.6	22.5
SC Private	24.533	23.381	20	23.444	22.833	23.2	24.5	24.7	22.5
SC Public	20.333	19.714	21.777	14.556	17.333	16.3	19.9	18.4	17.6
SC Social	11.933	13	9.444	13.222	13.866	12.4	13.9	13.3	12.8
SC Total	36.833	55.477	57.933	51.222	54.333	52.3	58.1	56.3	53.5

There were no significant group differences when subjects were divided according to any of the three independent measures. The ANOVAs indicated a lack of significant differences between acute and chronic schizophrenic groups with respect to the nine dependent measures (*i.e.*, MMS, each subscale of the WIST and SCS, as well as the WIST Index and SCS total).

A second series of one-way ANOVAs were performed on initial testing scores for the non-discharged group (N = 21). These results showed no significant differences on the nine measures. In order to examine whether the acute subjects who were not discharged differed from the time of the first testing to the time of the second testing (2 months later), a series of repeated measures ANOVAs were calculated. These analyses revealed no significance between group differences. Furthermore, the results of a one-way ANOVA between the 21 discharged acute patients and the 30 chronic patients did not demonstrate a significant difference on these variables.

The one-way ANOVAs that compared subjects grouped according to levels of schizophrenic thinking (high WIST Index group and low WIST Index group) failed to yield significant differences on any of the nine dependent measures.

Additionally, the results of the one-way ANOVAs performed on the nine dependent measures of subjects grouped according CPZ-E levels (high level of CPZ-E and low level of CPZ-E) also did not show significant differences.

Lastly, a number of correlations were performed on the data to ascertain whether any relationships existed between the CPZ-E levels and the nine measures. Pearson's r correlations between the CPZ-E levels and the nine measures for all 68 subjects yielded no significant correlations. Furthermore, a Pearson's r correlation between the CPZ-E levels and the weights (in Kg) of the subjects revealed no significant differences. It is noted, though, that the WIST subscales correlated significantly with each other, as expected. The MMS was shown to be correlated with the WIST Index as well.

Table 4
Pearson's r Correlations for Each of the Measures

	MMS	WIST Similarities	WIST Word Pairs	WIST New Inventions	WIST Index	SC Public	SC Private	SC Social	SC Total
MMS		.49*	.29	.39*	.48*	.20	.09	.12	.17
WIST Similarities			.78*	.49*	.90*	.31*	.19	.40*	.34*
WIST Word Pairs				.57*	.86*	.34*	.30	.42*	.4*
WIST New Inventions					.71*	.20	.19	.02	.18
WIST Index						.31*	.34*	.33*	.39
SC Public							.72*	.31*	.86*
SC Private								.53*	.92*
SC Social									.68*

Discussion

The most significant finding of the present study is the lack of a relationship between drug dosage and schizophrenic thinking as measured by the WIST, MMS, and SCS. There do not appear to be significant differences between the chronic and acute schizophrenics on the CPZ-E levels. Furthermore, significant differences did not emerge between the 21 discharged acute patients and 9 nondischarged acute patients. The scores of the 9 nondischarged acute patients remained relatively stable over time. According

to the analyses that compared the acute group to the chronic group, there were no significant differences between the two on schizophrenic thinking, as measured in this study, or on dosage levels using CPZ-E levels. Additionally, the group of 30 acute schizophrenics showed similar trends on the WIST and MMS self-report scales, yet only 21 of the 30 were discharged. Upon testing the 9 remaining acute patients, it became evident that the scores of the 9 nondischarged patients had remained constant over time. Also, when subjects were grouped according to level of schizophrenic thinking or dose, no significant differences were observed.

The finding that schizophrenic thinking does not appear to be related to neuroleptic dosage as measured by the WIST, MMS, and SCS supports numerous previous findings (Pishkin et al., 1977; Neborsky et al., 1981; Simpson et al., 1979; Tune et al., 1980). Furthermore, it extends these findings because the present study attempted to alleviate several of the design limitations in the earlier studies reviewed.

Nevertheless, it is important to note that the present study also has several limitations. First, an inherent problem is the issue of uncontrolled dosage. Dosage was not standardized over time, medications had been administered prior to testing, and proper medication histories could not be attained adequately. Thus, all patients may have been given a wide variety of dosages prior to the initial testing and, when applicable, to follow-up testing. While it would have been beneficial to have had a substantial "drug-holiday" before testing and then set standardized or titrated dosage levels, we were interested in increasing the validity and generalizability of these findings to typical inpatient clinical scenarios. Also, individual differences in the administration of drugs and the dosages used were present in the study and, therefore, confound the correlation of dose to outcome. Hence, an alternative to examining the relationship of dose to outcome would be either to randomize or titrate dosage levels accordingly. Thus, an experimental, rather than correlational, analysis of neuroleptic dose and schizophrenic thinking would be attained. However, if drug dosages indeed were determined on the basis of clinical response (and presumably higher dosages were given to more difficult or disordered patients), a relationship between thinking and dosage levels should have been observed. Furthermore, we would have expected differences (*e.g.*, improvements) in thinking by the second administration of the WIST in the follow-up sample because they had been administered neuroleptics for at least 60 days. Finally, the alternative use of wash-out periods or of subjects consenting to drug-free trials poses potentially more complicated confounding variables and did not seem appropriate for this study. (*Cf.* Spohn & Fitzpatrick, 1980.) Regardless of the potential confounds of this study, the findings are sufficiently robust to warrant reporting as well as further study.

In summary, while several limitations exist, schizophrenic thinking may not be critical in the continued hospitalization of schizophrenics. Furthermore, neuroleptic dosage does not appear to correlate with measures of schizophrenic thinking, even though the measures themselves were well correlated with each other. Clearly, further research must be initiated if a more adequate understanding of the ontology of schizophrenic thinking and its amelioration is desired.

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SOCIAL PERCEPTION AND COMMUNICATION SKILLS AMONG SCHIZOPHRENICS AND NONSCHIZOPHRENICS

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This study examined the performance of both schizophrenic (N = 13) and nonschizophrenic patients (N = 7), as well as that of a nonpatient contrast group (N = 18), on standardized measures of both social perception and social skill. Social judgment and self-perception also were examined. Schizophrenics were less skillful and less socially perceptive than members of both other groups. Members of the nonschizophrenic patient group also were significantly impaired on the dependent measures when compared to contrast subjects. Results point to the multi-component nature of skills deficits in schizophrenics. Implications for assessment and treatment programs on communication skills training with schizophrenics are discussed.

Recent clinical research has focused increasingly on communication skills training approaches with schizophrenic patients (Falloon, Boyd, & McGill, 1984; Liberman, Neuchterlein, & Wallace, 1982). While the results of such programs are encouraging,

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