

## BRIEF COMMUNICATIONS

# The Relationship of Catatonia Symptoms to Symptoms of Schizophrenia

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**Objective:** To evaluate the relationships of symptoms of catatonic schizophrenia to 77 symptoms relevant for diagnosing schizophrenia and to socioanamnestic variables.

**Method:** Data from a sample of 112 Canadian patients diagnosed with schizophrenia according to the *Diagnostic and Statistical Manual of Mental Disorders (DSM-III)* were evaluated via  $\phi$  correlation coefficients.

**Results:** Forty-five (40.2%) of our 112 patients had catatonic symptoms, either at the time of this study or in the past. However, only weak correlations ( $\phi < 0.31$ ) to other symptoms relevant for diagnosing schizophrenia were found, and no significant correlations to socioanamnestic variables were found.

**Conclusion:** Symptoms of catatonia appear to be independent of the key symptoms of schizophrenia.

(Can J Psychiatry 1998;43:1031–1035)

**Key Words:** schizophrenia, catatonia symptoms, diagnostic classification

Catatonia was originally described by Kahlbaum in 1873 as a separate disease entity (1) and was only later included as a form of schizophrenia in the Kraepelinian and Bleulerian diagnostic systems. Typically, catatonia has been described as motor anomalies in nonorganic disorders. At one extreme, these anomalies are characterized by excited motor activity, such as psychomotor agitation, that may be combined with excessive but incoherent verbal productivity, potentially violent or destructive behaviour, and a medical risk of collapse from complete physical exhaustion. At the other extreme there is a marked decrease of motor activity (for example, stupor or rigidity with protracted inappropriate posturing) that is sometimes combined with muteness or near muteness, stereotypies, echopraxia, or automatic obedience (2).

A high frequency of catatonic syndromes has been clearly demonstrated in various mental disorders other than schizophrenia. Using a standard instrument, Ungvari and others found the catatonic syndrome in 18 of 212 (8.5%) consecutive psychiatric admissions, but only 8 of these 18 patients met the *Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R)* criteria for a diagnosis of schizophrenia (3). Conversely, Taylor and Abrams found that 28% of their 123 patients acutely ill with bipolar affective disease showed clinical signs of catatonia (4). There were no significant differences between the patients with and without catatonia with respect to other psychopathology, demographic characteristics, or the prevalence and pattern of psychiatric illness in first degree relatives. Fein and McGrath argued that bipolar patients who presented with catatonic symptoms may be misdiagnosed with schizophrenia (5). Their study described 12 patients with negativism, stupor, and mutism on admission to an inpatient ward. Eight of these patients were initially diagnosed with schizophrenia. Within 2 years, however, only 4 were still diagnosed with schizophrenia, while 8 of the 12 were determined to have bipolar affective disorder. Fein and McGrath concluded that catatonia is more closely related to bipolar affective disorder than schizophrenia. Catatonic symptoms have also been found in other psychiatric conditions (3) and in conjunction with somatic illnesses (for example, diabetic acidosis or diffuse encephalomalacia [6]). They also occur with brain-stem lesions or with abnormalities due to various neurological conditions, including some types of encephalitis, bulbocapnine poisoning, and carbon monoxide

poisoning (7,8). Fink and Taylor argued that catatonia should be considered as a separate diagnostic category, distinct from schizophrenia (9).

Early attempts to determine which schizophrenia symptoms, if any, are statistically significantly correlated with those of catatonia were limited to comparisons of symptom frequencies of the catatonic subtype and other subtypes of schizophrenia. Thus, Helmchen used an extensive checklist of symptoms and found that, in addition to exhibiting various motor symptoms, patients with catatonic schizophrenia more frequently demonstrated comprehension disorder, thought blocking, delusions of guilt, and rigidity of affect (10). Data from the International Pilot Study of Schizophrenia indicated that patients with catatonic schizophrenia were frequently represented among patients within the following symptom clusters: flat affect, unkempt appearance, lack of insight, retarded movement, retarded speech, withdrawal, observed restlessness, auditory hallucinations, and incongruous affect (11).

This paper provides statistical data from a sample of patients with DSM-III schizophrenia on the size and pattern of correlational relationships of catatonic symptoms to items from an extensive checklist of symptoms relevant for diagnosing schizophrenia.

## Method

The sample comprised 112 patients who fulfilled the DSM-III criteria for schizophrenia and were attending the depot injection clinic at the London Psychiatric Hospital in London, Ontario. There were 70 women and 42 men (age range 20–65 years, mean 38.1, SD 9.8). At the time of the study, all were stabilized on fluphenazine decanoate or enanthate. Patients with organic brain syndromes, sensorimotor handicaps, mental deficiency, or psychoses other than schizophrenia were excluded. These individuals are a subgroup from a larger sample of patients with psychosis ( $N = 120$ ) who were investigated in a series of studies (12–16). The data were collected as a part of the routine clinical work.

All were assessed for 87 symptoms relevant for the diagnosis of schizophrenia. The list of symptoms was taken from a draft version of Landmark's manual (14). The complete list used in the present study was published by Cernovsky and Landmark (17). The ratings of symptoms were based on information from 3 sources: individual interviews with patients, interviews with relatives, and information from medical records.

Symptoms of schizophrenia were coded as "present" if they were noted in the past, at the time of the assessments, or both and as "absent" when the symptom had never been noted. The data on interrater agreement in assessment of some of these symptoms were published previously (13,16).

Catatonia symptoms were scored as present if any of the following symptoms was observed: catatonic stupor, catatonic excitement, automatism, flexible or rigid catalepsy, stereotypies, echopraxia, and negativism. As reported elsewhere, the interrater reliability for the ratings of these catatonia symptoms on our patients was satisfactory ( $K > 0.55$ ) (16).

The relationships of catatonia symptoms to other symptoms relevant for diagnosing schizophrenia were evaluated by means of Pearson  $\phi$  correlation coefficients. Given the large size of the correlation matrix (86 coefficients), the criterion of significance was set to  $P = 0.01$  (1-tailed). We subsequently performed multivariate analyses in the form of stepwise multiple regression to evaluate the proportion of the variance explained jointly by various correlates of catatonic symptoms.

## Results

Forty-five (40.2%) of our 112 patients had catatonic symptoms, either at the time of this study or in the past. We evaluated the relationship of these symptoms to 86 other symptoms relevant for diagnosing schizophrenia. However, 7 of these 86 symptoms were present in less than 10 people (symptoms 32, 42, 47, 57, 80, 82, and 88 [17]), and 2 were absent only in less than 10 persons (17 and 39), indicating that the coefficients involving these might have little value, if any. This reduced the number of the symptoms in our list to 77. As already explained, we measured the strength of association between catatonic symptoms and 77 other symptoms relevant for diagnosing schizophrenia by means of Pearson  $\phi$  correlation coefficients. Significant relationships ( $P = 0.01$ , 1-tailed) are listed in Table 1. Only weak correlations were found, and most of the correlates could also be interpreted as aspects of catatonia (for example, bizarre mannerism, peculiar or altered behaviour). The correlation to passivity feelings is in the opposite direction from what was expected, that is, passivity feelings were more frequently noted in patients without catatonia symptoms. It is noteworthy that correlations of catatonia symptoms to "thought blocking" and to "delusions of guilt" were not significant, even though these symptoms were more frequently noted in catatonic schizophrenia than in other schizophrenia subgroups in Helmchen's study (10).

Table 1. Correlates of catatonia symptoms

(N = 112,  $\phi$  coefficient,  $P < 0.01$ , 1-tailed)

Present (N = 45) Absent (N = 67)

	Present (N = 45)		Absent (N = 67)		$\phi$	P-level (1-tailed)
	%	N	%	N		
Passivity feelings	33.3	15	64.2	43	-0.30	0.001
Bizarre mannerism	62.2	28	34.3	23	0.28	0.002
Change of motor activity (increase or decrease)	66.7	30	40.3	27	0.26	0.003
Elated or unstable mood	68.9	31	44.8	30	0.24	0.006
Peculiar or altered behaviour	95.6	43	79.1	53	0.23	0.008

Thus, our statistical findings indicate that catatonia symptoms occur largely independently of the specific patterns of schizophrenia symptoms. The next important research task is to similarly evaluate relationships of catatonic symptoms to symptoms of psychoses other than schizophrenia. The failure in the past to find any differences between bipolar patients with and without catatonia (4) suggests that catatonia might also be unrelated to the expression or specific symptom patterns of bipolar disorders. Our list of 87 symptoms also included a small group of those that are frequently seen as some of the clinically relevant indices of mood disorders. The 7 items used for differential diagnosis are as follows: elated and unstable mood, abnormal quantity of speech, change of motor activity (increase or decrease), depressed mood (unresponsive to environmental changes), phasic course of illness, early waking, unrealistic changes in self-esteem, and other manic-depressive symptoms. In our present study, only 2 of these items were correlated to catatonia symptoms, and the correlations were low: 0.26 for changes in motor activity and 0.24 for elated and unstable mood. When examined in a multivariate analysis using the stepwise multiple regression procedure, these 2 variables accounted jointly only for a small fraction of the variance in catatonic symptoms ( $R = 0.30$ , adjusted  $R^2 = 0.07$ ). At least 1 of these 2 correlates (the changes in motor activity) may be primarily due to the definitional overlap between catatonia and mood disorders. In summary, although there appears to be some conceptual overlap between mood disorders and catatonia, our weak correlations suggest that the extent of the overlap is minimal.

Additional analyses evaluated the magnitude of statistical relationships of catatonia symptoms to the following socioanamnestic variables: number of past hospitalizations, number of times diagnosed with schizophrenia in hospital settings, length of total stay in psychiatric hospital, education, gender, and age. No significant relationships were found (Pearson point biserial correlation coefficients,  $P > 0.01$ , 1-tailed). This suggests that catatonic symptoms are associated neither with chronicity (as conceptualized by frequency of previous hospitalizations and overall length of hospital stay) nor with psychologically influential factors such as education, gender-specific role acquisition, and age. In our sample, these factors appeared to exert no etiological influence on catatonia symptoms.

Only 5 correlates of catatonia were found in the present study. Their combined relationship to catatonia symptoms was measured in a multivariate analysis. The stepwise multiple regression analysis was performed to examine the proportion of variance in catatonic symptoms accounted for by these 5 variables. We obtained a multiple  $R$  of 0.44 with adjusted  $R^2$  at 0.16. If replicable, these data suggest that the 5 correlates might jointly account only for about 10% to 20% of variance. As already reported, the 2 mood disorder symptoms (changes in motor activity and elated and unstable mood) alone accounted for 7% of variance in catatonic symptoms. The 3 schizophrenia symptoms (passivity feelings, bizarre mannerism, and peculiar or altered behaviour) accounted jointly for 15% of variance ( $R = 0.42$ , adjusted multiple  $R^2 = 0.15$ ) in catatonic symptoms. While the links of catatonic symptoms to mood disorders or to symptoms of schizophrenia might clinically be noticeable in some samples or some settings, these clinical links are likely to be weak.

It also should be noted that both of the 2 symptoms of mood disorder were significantly correlated with the 3 symptoms of schizophrenia. For example, the multiple correlation of elated and unstable mood to the 3 symptoms of schizophrenia was 0.39 (adjusted multiple  $R^2 = 0.15$ ), and the multiple correlation of the "changes of motor activity" to these 3 schizophrenic symptoms was 0.37 (adjusted multiple  $R^2 = 0.11$ ). These weak but statistically significant correlations are consistent with the phenomenological overlap of mood disorder and schizophrenia that is noted clinically, with respect to some selected symptoms. Statistically, this relationship is similar to that between catatonia symptoms and symptoms of mood disorders or between catatonia symptoms and symptoms of schizophrenia in our data.

How replicable would our list of 5 correlates of catatonia symptoms (Table 1) be if other samples were used? Armstrong and Soelberg recommended the evaluation of the replicability of similar findings by techniques such as split sample analysis (18). We examined the replicability by dividing the present sample of 112 patients into 2 groups and recalculating the correlation matrix. Since age was not significantly correlated with catatonic symptoms in our data (point biserial  $r = 0.13$ ,  $P = 0.159$ ), and since those free of catatonic symptoms (mean age 37.1 years) were on average only moderately younger than those with these symptoms (mean age 39.7 years), we recalculated the relationships of catatonic symptoms to the other 87 symptoms for all

patients younger than 38 years ( $N = 55$ , age range 20–37, mean age 29.9, SD 4.5) and then also separately for those at least 38 years old ( $N = 57$ , age range 38–65, mean age 46.1, SD 6.3). The correlates are listed in Table 2. To facilitate comparisons with Table 1, we listed all correlation coefficients at or above 0.23 (using the absolute value before rounding), even though many of the associated  $P$  values no longer met our  $P < 0.01$  (1-tailed) criterion because of reduced sample size. All  $P$  values are listed in the table. The majority of the expected trends (that is, those observed on the sample of all 112 patients) failed to meet our criterion of significance by more than a narrow margin.

**Table 2. Correlates of catatonia symptoms ( $N = 55$  and  $N = 57$ ,  $\phi$  correlation coefficient)**

Variable	$\phi$	$P$ -level (1-tailed)
Persons age 37 and under ( $N = 55$ )		
Delusional perception (Schneiderian concept)	-0.30	0.014
“Made” thoughts (Schneiderian concept)	-0.25	0.032
Thought broadcasting (Schneiderian concept)	-0.30	0.014
Hallucinations	0.29	0.017
Persistent motor disturbances	0.26	0.027
Bizarre delusions	-0.27	0.022
Impaired memory	0.25	0.032
Change of motor activity	0.40	0.001
Phasic course of illness	0.23	0.044
Bizarre mannerism	0.25	0.033
Passivity feelings	-0.40	0.001
Persons age 38 and over ( $N = 57$ )		
Affect (flat, blunted, or inappropriate)	0.35	0.038
Peculiar or altered behaviour	0.25	0.032
Negativism	0.34	0.005
Elated and unstable mood	0.26	0.028
Delusions of guilt, unworthiness, and sin	0.30	0.012
Other manic–depressive symptoms	0.30	0.012
Depressed mood (unresponsive to environmental changes)	-0.30	0.013
Bizarre mannerism	0.31	0.023

The comparison of correlational patterns for these 2 age subgroups indicates only a small degree of overlap (Table 2). Most notably, only 1 item, bizarre mannerism, is common to both lists. This discrepancy suggests that the correlates listed in Table 1 are unstable and, at best, only partly replicable on other samples of psychiatric patients, especially if assessment tools other than those from our study are used. All correlations in Table 2 are weak or, at best, of moderate strength. One of the 2 highest correlations (passivity feelings,  $r = 0.40$ ) is opposite to what was theoretically expected. Thus our data suggest that the relationships between catatonia symptoms and schizophrenia as postulated by contemporary clinical lore might be unstable and weak or inconsistent.

We have already reported our failure, with respect to data in Table 1, to replicate Helmchen’s findings (10). However, as shown in Table 2, we replicated Helmchen’s results on our older subgroup of patients (see the trend with  $r = 0.30$  in our subgroup of older patients). This suggest that Helmchen’s finding of a relationship of delusions of guilt to catatonia might be representative of some subsamples of the population with schizophrenia.

## Discussion

From a conservative perspective, our criterion of statistical significance might be insufficiently stringent when applied to the large matrix of 83 coefficients (the presence of catatonic symptoms was correlated with 77 other symptoms of psychopathology and with 6 demographic variables). With our criterion of significance ( $P \leq 0.01$ , one-tailed) and our data set including 112 patients, even coefficients as weak as 0.23 are still significant. The advantage of this particular  $P$ -level criterion, however, is that it is highly unlikely that clinically important strong relationships were missed. Potentially important relationships could have been excluded had we applied a more stringent  $P$ -level criterion, for example, the Bonferroni correction (19). These considerations suggest that the unexpected paucity of correlates between catatonia symptoms and schizophrenia symptoms in our correlational findings is not the result of an excessively stringent criterion of statistical significance.

The correlational patterns in our study, that is, our 5 correlates of catatonia, might be unstable and difficult to replicate on

other samples of patients with schizophrenia. Even though the same assessment tools were used in our comparison of these correlational patterns of 2 subgroups of our patients, we noted markedly different results in these 2 subgroups (Table 2).

The weakness of the present study lies in its reliance on correlational patterns in a patient group composed entirely of those diagnosed with schizophrenia. Hopefully, replicatory studies of catatonia symptoms in mixed diagnostic samples would show whether or not our results are generalizable.

In summary, catatonia symptoms were correlated with a few symptoms of schizophrenia and mood disorder. The correlations were weak, and some of the correlates appeared to overlap conceptually with catatonia. On the basis of these data, the occurrence of catatonia symptoms could be a nonspecific phenomenon, because they were free of strong correlational ties to key symptoms from the schizophrenia spectrum and also from strong ties to our smaller group of symptoms typical of mood disorders. Our findings are consistent, at least in part, with Kahlbaum's concept of catatonia as a separate disease and the more recent calls to establish catatonia as a diagnostic category independent of schizophrenia (9). Our findings could support the DSM-IV efforts to classify catatonia as independent of catatonic schizophrenia, either as an associated feature of mood disorders or as a catatonic disorder due to general medical conditions such as neoplasm of the brain, encephalitis, hypercalcemia, hepatic encephalopathy, or diabetic ketoacidosis (20). Further statistical studies, especially those with other measures of catatonia (for example, the scale recently used by Rosebush and others [21]) are needed to reexamine our findings and to extend the correlational data to include disease clusters other than schizophrenia and mood disorders.

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## Clinical Implications

- Catatonia symptoms appear to be independent of the key symptoms of schizophrenia.
- Catatonia symptoms appear to be independent of the basic socioanamnestic variables.
- More than one-third of patients in clinical samples may experience catatonia symptoms during their schizophrenic illness.

## Limitations

- This study has a retrospective design.
- The assessment of catatonia symptoms was unidimensional and dichotomous (present/absent).
- All patients in this sample were treated with fluphenazine: symptom profiles might be different in patients receiving other medications.

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### Résumé

**Objectif :** *Évaluer les relations entre les symptômes de la schizophrénie catatonique et d'une part, 77 symptômes servant au diagnostic de la schizophrénie et, d'autre part, les variables socio-anamnestiques.*

**Méthode :** *À l'aide des coefficients de corrélation phi, on a évalué les données d'un échantillonnage de 112 patients canadiens ayant reçu un diagnostic de schizophrénie selon le Manuel diagnostique et statistique des troubles mentaux (DSM-III).*

**Résultats :** *Quarante-cinq (40,2 %) des 112 patients présentaient des symptômes catatoniques, soit au moment de l'étude, soit dans le passé. Toutefois, on n'a constaté que des corrélations faibles (0,31) à d'autres symptômes servant à diagnostiquer la schizophrénie, et aucune corrélation significative aux variables socio-anamnestiques.*

**Conclusion :** *Les symptômes de la catatonie semblent être indépendants des principaux symptômes de la schizophrénie.*

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Manuscript received January 1998, revised, and accepted April 1998.

This paper is based on a presentation at the XXVI International Congress of Psychology; 1986 August 16–21; Montreal, QC.

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**Can J Psychiatry, Vol 43, December 1998**