

# Associations of Psychiatric Symptoms and Neurocognition with Clinical Insight in Schizophrenia

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## ABSTRACT

Associations of psychiatric symptoms and neurocognition with clinical insight in schizophrenia

**Objective:** It is important to understand the etiology of impaired insight in schizophrenia in order to develop effective interventions to improve disorder awareness, treatment adherence, and recovery outcomes. The current study aims to explore the relationship of clinical domains and neurocognitive functions with different dimensions of clinical insight among patients with schizophrenia.

**Methods:** A total of 59 patients who met the diagnostic criteria for schizophrenia according to DSM-5 were recruited in the study. All patients were receiving outpatient treatment and were in fairly stable clinical conditions as defined by the absence of hospitalizations or changes in medication within the last three months. Patients were evaluated by Positive and Negative Symptoms Scale (PANSS), Scale to Assess Unawareness of Mental Disorder (SUMD), The Wisconsin Card Sorting Test (WCST), Stroop-Test, Auditory Consonant Trigram Test (ACT) and Trail Making Test (TMT).

**Results:** Mean age was  $41.1 \pm 10.3$  years. Of the total 59 patients, 71.2% (n=42) were male and 28.8% (n=17) were female. Mean age of onset for illness was  $24.6 \pm 7.6$  years, mean duration of illness was  $16.5 \pm 9.4$  years and mean number of hospitalizations was  $2.6 \pm 2.8$ . According to our findings, PANSS positive and general scores were predictors for SUMD-total score, PANSS general score and duration of illness were predictors for SUMD-awareness of mental illness score, PANSS positive and general scores were predictors for SUMD-awareness of the need for treatment score, PANSS general score and age of onset of schizophrenia were predictors for SUMD-awareness of the social consequences of disorder score.

**Conclusion:** This study examined clinical insight, psychopathology and various domains of neurocognitive functioning. Our results suggest that clinical insight is associated with positive and general symptoms but not with negative symptoms and neurocognitive impairment in patients with schizophrenia.

**Keywords:** Insight, neurocognitive functions, positive symptoms, schizophrenia

## ÖZET

Şizofrenide klinik içgörünün psikiyatrik semptomlar ve bilişsel işlevler ile ilişkisi

**Amaç:** Şizofrenide bozulmuş içgörünün etiyolojisini anlamak; içgörü kazandırmak, tedavi uyumu ve tedavi yanıtı için etkili müdahale yöntemleri geliştirmek açısından önemlidir. Çalışmamızda, şizofreni hastalarında, klinik özellikler ve bilişsel işlevler ile klinik içgörünün farklı boyutları arasındaki ilişkinin araştırılması amaçlanmıştır.

**Yöntem:** Çalışmaya DSM-5'e göre şizofreni tanı kriterlerini karşılayan 59 hasta alınmıştır. Tüm olguların ilaç tedavisi sürmektedir ve son 3 ay içinde hastane yatışı ve ilaç tedavisinde değişiklik olmamıştır. Hastalar pozitif ve negatif sendrom ölçeği (PANSS), Akıl Hastalığına İçgörüsüzlük Ölçeği (AHİÖ), Wisconsin Kart Eşleme Testi (WKET), Stroop Testi, İşitsel Üçlü Sessiz Harf Sıralaması Testi (ÜSHST) ve İz Sürme Testi ile değerlendirilmiştir.

**Bulgular:** Ortalama yaş  $41.1 \pm 10.3$  yıl olarak saptanmıştır. Çalışmaya alınan hastaların %71.2'si erkek (s=42) ve %28.8'i (s=17) kadındır. Hastalığın ortalama başlangıç yaşı  $24.6 \pm 7.6$  yıl, hastalığın ortalama süresi  $16.5 \pm 9.4$  yıl ve ortalama hastanede yatış sayısı  $2.6 \pm 2.8$  olarak saptanmıştır. PANSS pozitif ve genel puanlarının AHİÖ toplam puanı için, PANSS genel puanı ve hastalık süresinin AHİÖ-hastalığın farkında olma puanı için, PANSS pozitif ve genel puanlarının AHİÖ-tedavi etkisinin farkında olma puanı için ve PANSS genel puanı ve hastalık başlangıç yaşının AHİÖ-sosyal sonuçların farkında olma puanı için öngördürücü olduğu saptanmıştır.

**Sonuç:** Klinik içgörü ile ilişkili olabilecek etkenlerin değerlendirildiği bu çalışmada, şizofreni hastalarında klinik içgörünün pozitif ve genel semptomlarla ilişkili olduğu ancak, negatif semptomlar ve nörokognitif bozulma ile ilişkili olmadığı saptanmıştır.

**Anahtar kelimeler:** İçgörü, nörobilişsel işlevler, pozitif semptomlar, şizofreni



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## INTRODUCTION

It has been shown that 50% to 80% of schizophrenia patients have partial or no insight about their disorders (1). In recent years, researchers have identified two types of insight: clinical and cognitive insight (2). Clinical insight is conceptualized and measured on the basis of being aware of the clinical manifestations of the disorder, such as having a mental disorder, being aware of the symptoms of the disease or treatment need (3). Cognitive insight, on the other hand, expresses the ability to distinguish oneself from others and to evaluate their own thoughts and interpretations (4). The nature and extent of the insights into the diseases of psychiatric patients may be meaningful; that is, poor insight may lead to delayed recognition of the disorder, inadequate compliance with treatment, and inadequate treatment response (5). In addition, poor insight has been associated with decreases in social (6) and occupational functioning (7) and deterioration in the quality of life (8). For all these reasons, understanding etiology of impaired insight in schizophrenia is important to improve insight in this population, and to develop effective intervention methods for treatment responses and compliance.

Although the mechanisms causing impaired insight are not fully known, possible etiological models have been asserted. First of these models considers poor insight among the primary findings of schizophrenia (9). However, controversial results have been found in past studies investigating this model (5). In the literature, there are studies that reported relationship between poor insight and positive findings (10) and negative findings (11). However, some studies did not find such relationship (12,13).

Another etiologic model has indicated poor insight as part of impaired neurocognitive function. Past research regarding this model revealed inconsistent findings. In some studies, there was a relationship between poor insight, executive functions (14,15) and memory impairment (16), whereas no relation was found in other studies (17,18). In a recent meta-analysis, neurocognitive impairment has been shown to have a significant but small effect on clinical insight (19).

The aim of this study is to investigate the relationship of psychotic findings and cognitive functions with clinical insight and its three dimensions in stable patients with chronic schizophrenia. Our first hypothesis is; there is a negative relationship between clinical insight and positive and negative symptoms. Our second hypothesis is; there is no correlation between clinical insight and cognitive functions due to our small sample size.

## METHOD

A total of 59 stable patients, followed up at outpatient clinics of Bozyaka Training and Research Hospital Community Mental Health Center, who met the criteria of schizophrenia diagnosis according to DSM-5, who were on medication treatment and who had no change in drug treatment, no hospitalization history within the last 3 months, were recruited in the study. The participants who were younger than 18 years old or older than 65 years old, who had a history of head trauma causing unconsciousness, who had a neurological disease, who have had alcohol or substance use disorders in the last year and who had mental retardation were not included in the study. Local ethics committee approval was obtained for the study. Informed written consents were obtained from all participants.

Patients were evaluated by using a Sociodemographic and clinical data form—structured by the authors—, Positive and Negative Symptoms Scale (PANSS), Scale to Assess Unawareness of Mental Disorder (SUMD), The Wisconsin Card Sorting Test (WCST), Stroop-Test, Auditory Consonant Trigram Test (ACT) and Trail Making Test (TMT).

## Measures

**Positive and Negative Syndrome Scale (PANSS):** It is a semi-structured interview scale with 30 items and seven points, was developed by Kay et al. (20). Seventeen psychiatric parameters take place in positive symptoms subscale, seven on the negative symptoms subscale and the remaining sixteen on the general psychopathology subscale. The Turkish reliability and

validity study of the scale was conducted by Kostakoglu et al. (21).

**Scale to Assess Unawareness of Mental Disorder (SUMD):** It is a likert type scale applied by the clinician, and was developed by Amador et al. (22). In the statistical analyzes, the first three items—evaluating awareness of the disease, awareness of the treatment effect and awareness of the social outcomes—and the sum of the scores of these three items were used. Each item is scored from 1 to 5. High scores indicate weak insight. The Turkish reliability and validity study of the scale was performed by Bora et al. (23).

**Wisconsin Card Sorting Test (WCST):** WCST was developed by Heaton (24). WCST is considered to be sensitive to dorsolateral prefrontal cortex functions (25). The computer version was used in the study. Success in the WCST depends on understanding the mapping principle. For this test, 128 geometric pattern cards, each consisting of 3 groups according to color, shape, and quantity were used. There is no time limit. Turkish adaptation studies was carried out by Karakas et al. (26). The number of perseverative errors and the number of completed categories were used in the evaluation.

**Stroop Test:** It is a test that uses color naming in contrast to reading the word in order to study the ability to ignore agitator stimuli. In order to perform the test, just one visual feature must be selectively processed and the others must be blocked (27). The Stroop Test consists of four parts: saying the black printed words (color name), name the ink color of colorful squares or dots, saying the written word of color names printed in different colors, and naming the ink color of the words without saying the written word (color name). Turkish adaptation studies was carried out by Karakas et al. (26).

**Auditory Consonant Trigram Test (ACT):** It is a test that evaluates the working memory. The sum of the number of correctly remembered letters was used in the evaluation of the test. Turkish validity and reliability studies was performed (28).

**Trail Making Test (TMT):** It was developed by Reitan (29). The duration of section B was taken into consideration in our study (30).

### Statistical Analysis

All statistical analysis were performed using SPSS v 20.0 for Windows Statistical Package. The relevance of normal distributions of continuous variable was evaluated by Kolmogorov-Smirnov test. Since SUMD scores were not normally distributed, Spearman correlation coefficients were used to evaluate the relations between insight scores and age of disease onset, duration of disorders, number of hospitalization, PANSS scores, and neuropsychologic test scores. To determine predictors of clinical insight, linear regression analysis was performed. Insight scores, and the variables that correlated with PANSS score were included in these analyses. The  $p < 0.05$  values were considered statistically significant.

## RESULTS

The mean age of the patients was  $41.1 \pm 10.3$  years. 71.2% ( $n=42$ ) of the patients were male and 28.8% ( $n=17$ ) were females. The average duration of education was  $7.7 \pm 3.4$  years. The mean age of onset was  $24.6 \pm 7.6$  years, the mean duration of illness was  $16.5 \pm 9.4$  years and the mean number of hospitalizations was  $2.6 \pm 2.8$ .

**Table 1: Scale scores of patients**

Scale	Mean	SD
<b>SUMD-awareness of mental disorder</b>	2.6	1.2
<b>SUMD-awareness of effect of medication</b>	2.0	1.3
<b>SUMD-awareness of social consequences</b>	2.8	1.7
<b>SUMD-total</b>	7.5	3.6
<b>PANSS- positive</b>	12.0	4.7
<b>PANSS- negative</b>	19.3	7.7
<b>PANSS- general</b>	28.3	6.5
<b>WCST- number of perseveration</b>	37.9	18.7
<b>WKET- categories achieved</b>	3.0	1.9
<b>Stroop time</b>	32.1	12.6
<b>ACT</b>	32.8	10.7
<b>Trail Making Test B- time</b>	208.1	112.3

PANSS: Positive and Negative Symptoms Scale, SUMD: Scale to Assess Unawareness of Mental Disorder, WCST: The Wisconsin Cart Sorting Test, ACT: Auditory Consonant Trigram Test, SD: Standard deviation

It was determined that 64.4% of the patients were single (n=38), 23.7% were married (n=14) and 11.9% (n=7) were divorced. When the treatments received in the last three months were examined it was found that; 44.1% (n=26) of the patients were using only atypical antipsychotics, 30.5% (n=18) were on a combination of atypical antipsychotics and antidepressants, 16.9% (n=10) were on atypical antipsychotics and typical antipsychotics, and 8.5% (n=5) were on atypical antipsychotics, typical antipsychotics, and antidepressants.

SUMD, PANSS and neurocognitive test scores are presented in Table 1.

The correlations between SUMD scores and clinical

variables, PANSS and neuropsychological tests are presented in Table 2. SUMD total score had a negative correlation with age of onset of the disorders, and a positive correlation with PANSS positive and general scores. SUMD awareness of mental disorders score had a negative correlation with the disease duration, and a positive correlation with PANSS positive and general scores. It was determined that SUMD-awareness of effects of medication score had a negative correlation with the age of onset of the disorders, and a positive correlation with PANSS positive and general scores. SUMD-awareness of social consequences scores had a negative correlation with the age of onset of disorder, and a positive correlation with PANSS general scores.

**Table 2: Correlation of insight scores with clinical characteristics, symptoms and cognitive functions**

	SUMD-awareness of mental disorder	SUMD-awareness of effect of medication	SUMD-awareness of social consequences	SUMD total
Age of onset	-0.155	-0.328*	-0.424**	-0.368**
Disorder duration	-0.298*	-0.136	0.022	-0.141
Number of hospitalization	0.024	-0.140	0.021	-0.016
PANSS- positive	0.394**	0.454**	0.214	0.385**
PANSS- negative	0.131	0.092	0.194	0.165
PANSS- general	0.616**	0.534**	0.316*	0.540**
WCST- number of perseveration	0.027	-0.134	0.210	-0.017
WKET- categories achieved	0.008	0.065	-0.078	-0.009
Stroop time	-0.236	-0.229	-0.168	-0.238
ACT	-0.003	-0.005	0.018	0.012
TMT B- time	0.112	-0.076	0.038	0.045

\*p<0.05, \*\*p<0.01, PANSS: Positive and Negative Symptoms Scale, SUMD: Scale to Assess Unawareness of Mental Disorder, WCST: The Wisconsin Cart Sorting Test, ACT: Auditory Consonant Trigram Test, TMT: Trail Making Test, SD: Standard deviation

**Table 3: Regression analysis of predictor of clinical insight**

	B	β	t	p	Adjusted R <sup>2</sup>	F	p
<b>SUMD total</b>					0.295	9.106	<0.001
PANSS- general	0.185	0.334	2.534	0.014			
PANSS- positive	0.203	0.269	2.065	0.044			
Age of disorder onset	-0.086	-0.184	-1.644	0.106			
<b>SUMD-awareness of mental disorder</b>					0.350	11.418	<0.001
PANSS- general	0.071	0.387	3.076	0.003			
PANSS- positive	0.060	0.240	1.928	0.059			
Disorder duration	-0.028	-0.220	-2.053	0.045			
<b>SUMD-awareness of effect of medication</b>					0.298	9.221	<0.001
PANSS- overall	0.065	0.329	2.503	0.015			
PANSS- positive	0.078	0.293	2.253	0.028			
Age of disorder onset	-0.025	-0.153	-1.364	0.178			
<b>SUMD-awareness of social consequences</b>					0.138	5.659	0.006
PANSS- overall	0.069	0.266	2.151	0.036			
Age of disorder onset	-0.060	-0.273	-2.213	0.031			

PANSS: Positive and Negative Symptoms Scale, SUMD: Scale to Assess Unawareness of Mental Disorder

Variables predicting clinical insight are given in Table 3. PANSS positive and overall scores were predictors for SUMD total score, PANSS overall score and disease duration were predictors for SUMD awareness of mental disorders score, PANSS positive and general scores were predictors for SUMD awareness of effects of medication and PANSS overall score and age of onset disorders were predictors for SUMD awareness of social consequences score.

## DISCUSSION

This study evaluates factors that may be related to clinical insight, and it was determined that both the positive symptoms and the increase in the general symptoms predicted poorer clinical insight. These findings are consistent with previous studies. Amador et al. (1) reported that intrinsic strength strongly correlates with positive symptoms such as delusions and disorganization. In a survey of 96 patients with acute psychotic disorders Nieto et al. (31) also found that insight was associated with positive and general symptoms, but not with negative symptoms. In another study, it was reported that poor insight was associated with positive symptoms and violent behavior (32).

In a comparative study between schizophrenia patients with and without treatment history, a significant correlation was found between positive symptom scores and insight (33). Consistent with our study, Kim et al. (34) found correlations between positive symptoms (especially delusions, hallucinations, and scattered thoughts) and insight. A negative correlation between positive symptoms and insight was also found in a study conducted in Turkey (35). The relationship between the increase in positive symptoms and poorer insight is explained in various ways in the literature. The first explanation is: regarding the delusions, the most important part of the positive symptoms, it is considered that the same mechanism preventing the person to establish a causal relationship in the daily events, inhibits the establishment of cause-and-effect relationships for the events that are related to the disease as well, and therefore it should be expected that

the patients could not have developed insight with regard to the disorder (11). The second possible explanation is that the insight in schizophrenia patients is impaired due to the reduced awareness of one's own mental processes. In a recent functional brain imaging study in schizophrenia patients, a relationship was found between clinical insight and activation in the cortical midline structures and frontopolar cortex. These regions are suggested to be related to the assessment of mental processes in the healthy people (36). In the view of the fact that there was no correlation between insight and negative symptoms in our study, our findings are consistent with the statement that insight in schizophrenia patients may be part of positive symptoms. According to this hypothesis, poor insight in patients with schizophrenia is a special type of delusion, and the patients deny disorder persistently despite the obvious negativities in their life (37).

Contrary to our hypothesis, there was no relationship between negative findings and insight in our study. Conflicting results have been reported in studies investigating the relationship between insight and negative findings. Some studies have found a relationship between insight (10,11) and negative findings, while others have not found any relationship (31,35). The reasons for conflicting results between studies may be the use of different insight scales, small sample sizes, and the recruitment of patients with different clinical characteristics.

This study, which does not find a significant relationship between insight and neurocognitive functions, is consistent with other larger studies that have not established a relationship between insight and executive functions, memory, and attention (10,17,18). However, in a recent meta-analysis, a significant but small relation was found between neurocognitive functions and clinical insight (19). The small sample size in our study may be one of the reasons for not finding a relationship between insight and neurocognitive tests. Another reason could be that the schizophrenia patients in our study may have different clinical characteristics. For example, Quee et al. (38) reported different correlations between insight and neurocognitive tests during

different periods of disorders. Since we recruited stable patients with chronic schizophrenia into our study, the likelihood of finding a relationship between insight and neurocognitive functions in newly emerging disease or in patients with psychotic relapse could not be excluded. In conclusion, our findings suggest that neurocognitive impairment has no or mild effect in impaired clinical insight in stable patients with chronic schizophrenia.

There are many limitations in our study. First, due to cross-sectional nature of our study, the necessity of elucidating the cause-and-effect relationship between variables by a follow-up study. Our second limitation is that it is impossible not to exclude the possible effects of treatment on clinical insight since all of our patients were on antipsychotic treatment. Other limitations are that the sample group predominantly consisted of males who were usually in their 40s, having a long disease duration and it was a group that accepted treatment. For these reasons, it is not known to what extent the findings may be generalized to;

different stages of the disease, female patients, first episode of the disease, patients that do not receive regular treatment. Studies in newly diagnosed, young patients with no medication use will make an important contribution to elucidating the factors associated with insight.

Contributions category	Authors name
Development of study idea	P.K.Z., N.Z., O.B.
Methodological design of the study	P.K.Z., N.Z., T.S.
Data acquisition and process	P.K.Z., O.B., T.S.
Data analysis and interpretation	N.Z., O.B., T.S.
Literature review	N.Z., P.K.Z.
Manuscript writing	P.K.Z.
Manuscript review and revision	N.Z., O.B., T.S.

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