

# Predictors of Social Functioning in Schizophrenia

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## Abstract

**Objective:** Impaired social functioning is a characteristic feature of schizophrenia. The aim of this study was to determine the factors that predict social functioning in schizophrenia.

**Method:** The study included 100 patients that met DSM-IV diagnostic criteria for schizophrenia. All the patients were evaluated using the Scale for the Assessment of Negative Symptoms, Scale for the Assessment of Positive Symptoms, Calgary Depression Scale for Schizophrenia, Facial Emotion Identification Test, Facial Emotion Discrimination Test, Digit Span Test, Rey's Auditory Verbal Learning Test, Trail Making Test, and Social Functioning Scale. Marital status, living arrangements, and working status of the patients were also recorded. Pearson's correlation analysis and multiple stepwise regression analysis were used to determine the relationships between the research variables and social functioning. Categorical variables were compared with the independent samples t test.

**Results:** Negative symptoms, level of education, and facial emotion identification were significant predictors of social functioning total score. Negative symptoms were the most important predictor of almost all domains of social functioning. Age and duration of illness were not associated with social functioning. There were no gender differences in terms of social functioning. Married patients had higher social functioning scores. Employed patients had lower negative symptom scores and higher social functioning scores.

**Conclusion:** Negative symptoms were the most important predictors of social functioning in our study.

**Key Words:** Schizophrenia, social functioning, prediction

## INTRODUCTION

Social functioning can be broadly described as the ability to hold a job, maintain interpersonal relationships, and to take care of oneself. Impaired social functioning is a defining characteristic of schizophrenia, and it persists throughout the illness' duration. According to modern classification and diagnostic systems such as DSM-IV, impaired social functioning is a diagnostic criterion for schizophrenia (American Psychiatric Association, 2000). Furthermore, impairment in social functioning can often exist prior to illness onset, and constitutes a significant predictor of the prognosis of schizophrenia (Harrison et al., 1996; Stephens et al., 1997).

In schizophrenia social functioning is impacted by negative and positive symptoms, mood, social behavior, and environmental factors (Mueser, 2000). Research indicates that negative symptoms have an especially adverse impact on social functioning (Dickerson et al., 1999; McGurk et al., 2000; Smith et al., 2002; Wittorf et al., 2008). Some follow-up studies have reported an association between positive symptoms and social functioning as well (Wittorf et al., 2008). Depressive symptoms can also affect social functioning in patients with schizophrenia (Reine et al., 2003; Gorna et al., 2007).

Social behavior is determined by social perception and cognitive functions (Spaulding et al., 1986). Social perception involves the evaluation of social cues and

Received: 06.02.2009 - Accepted: 13.04.2009

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the emotional responses of others. Patients with schizophrenia have difficulty detecting social cues and recognizing facial emotion (Ihnen et al., 1998; Hooker and Park, 2002; Kee et al., 2003). Facial emotion recognition deficits are associated with impaired social functioning (Hooker and Park, 2002; Hofer et al., 2008). The ability to formulate plans to accomplish social objectives after collecting data via social perception involves cognitive functions. Working memory, verbal memory, attention, and executive functions are the neurocognitive functions that predict social functioning in schizophrenia (Addington and Addington, 2000; Addington et al., 2001; Smith et al., 2002). Several environmental factors, such as level of education, employment status, and social support, can also affect social functioning (Mueser et al., 1997; McDonald and Badger 2002).

The present study jointly evaluated the factors that have been previously determined to affect social functioning in an attempt to determine the significant predictors of social functioning in schizophrenia, and to compare their relative predictive power. Negative and positive symptoms, depressive symptoms, facial emotion recognition, verbal memory, working memory, attention, executive functions, and environmental factors, and their relationship with social functioning were investigated for this purpose.

## METHOD

### Subjects and Study Design

The study included 100 schizophrenia patients aged between 18 and 59 years that were followed-up at the outpatient unit of Ataturk Education and Research Hospital, Clinic of Psychiatry. Patients with mental retardation, neurological disorders, and drug/alcohol abuse or addiction were excluded from the study. Patients that had been hospitalized in a psychiatry department during the previous 6 months were also excluded. Patients that met the inclusion criteria were consecutively enrolled in the study. All the patients were taking antipsychotic medication. Written informed consent was obtained from all the patients.

The patients were interviewed using the Structured Clinical Interview for DSM-IV (SCID-I). Patients with co-morbid psychiatric disorders other than depression were excluded from the study. Patient living arrangements were recorded using a sociodemographic survey. Negative and positive symptoms were assessed using the Scale for the Assessment of Negative Symptoms (SANS), and the Scale for the Assessment of Positive Symptoms

(SAPS), respectively. Depressive symptoms were assessed using the Calgary Depression Scale for Schizophrenia (CDSS). Recognition of facial emotions was evaluated using the Facial Emotion Identification Test (FEIT) and the Facial Emotion Discrimination Test (FEDT). Working memory and attention were evaluated using the Digit Span Test (DST). Verbal memory was evaluated using Rey's Auditory Verbal Learning Test (RAVLT). Executive functions were assessed using the Trail Making Test (TMT). Social functioning was evaluated using the Social Functioning Scale (SFS).

An attending psychiatrist first interviewed the patients using SCID-I and then administered SANS, SAPS, and CDSS in the same session. Subsequently, another attending psychiatrist administered FEIT, FEDT, and SFS in a separate session. A psychologist administered the DST, RAVLT, and TMT, also in a separate. Thus, each patient was evaluated in 3 sessions on 3 consecutive days. The data-gathering phase of the study was completed within a 7-month period. In all, 156 schizophrenia patients were followed-up at the outpatient unit during this time period.

### Tools

- The Structured Clinical Interview for DSM-IV is a diagnostic scale developed by First et al. (1997). This scale's use in the Turkish population was validated by Özkürkçügil et al. (1999).
- The Scale for the Assessment of Negative Symptoms was developed by Andreasen (1990). The Turkish version was reported to be reliable by Erkoç et al. (1991a).
- The Scale for the Assessment of Positive Symptoms was developed by Andreasen (1990). The Turkish version reported to be reliable by Erkoç et al. (1991b).
- The Calgary Depression Scale for Schizophrenia was developed and validated by Addington et al. (1992; 1994). It was translated into Turkish by Aydemir et al. (2000a; 2000b).
- The Facial Emotion Identification Test and Facial Emotion Discrimination Test were developed by Kerr and Neale (1993). Both scales were reported to be valid and reliable for use in Turkey by Erol et al. (2009).
- The Digit Span Test is a subscale of the Wechsler Memory Scale (Wechsler 1987). It was reported to be valid for use in the Turkish population by Osmanlioğlu and Özgüzel (1985). Our evaluation used the cumulative

score for correctly repeated digits on both sections.

- Rey's Auditory Verbal Learning Test was developed by Rey (1964) and was subsequently determined to be valid for use in the Turkish population by Öktem (1992). Our study utilized the learning score.
- The Trail Making Test was developed by Reitan (1958). Our study utilized the duration and error scores from section B of this test.
- The Social Functioning Scale was developed by Birchwood et al. (1990). The Turkish version was reported to be valid by Erakay (2001). It consists of 7 domains: withdrawal, interpersonal behavior, pro-social activities, recreation, independence-competence, independence-performance, and employment/occupation.

### Statistical Evaluation

The gathered data were analyzed using SPSS (Statistical Package for Social Sciences) v.15.0. The impact of categorical variables, such as gender, marital status, and employment status, on social functioning were compared using the independent samples t test. Pearson's correlation analysis was used to determine the correlations between numeric variables. Multiple stepwise regression analysis was used to determine the predictors of social functioning. For all analyses  $P < 0.05$  was considered statistically significant.

## RESULTS

Mean age of the patients was  $35.9 \pm 9.3$  years. Gender distribution was 42% ( $n = 42$ ) female and 58% ( $n = 58$ ) male. In all, 59% ( $n = 59$ ) of the patients were single, 30% ( $n = 30$ ) were married, and 11% ( $n = 11$ ) were divorced. In all, 4% ( $n = 4$ ) of the patients lived alone and 96% ( $n = 96$ ) lived with their families; 53% ( $n = 53$ ) were unemployed, 13% ( $n = 13$ ) were homemakers, 8% ( $n = 8$ ) were students, 10% ( $n = 10$ ) were self-employed, 8% ( $n = 8$ ) were retired, 4% ( $n = 4$ ) were white-collar workers, and 4% ( $n = 4$ ) were blue-collar workers. In terms of level of education, 7% ( $n = 7$ ) were literate, 34% ( $n = 34$ ) were elementary school graduates, 24% ( $n = 24$ ) were middle-school graduates, 30% ( $n = 30$ ) were high school graduates, and 5% ( $n = 5$ ) were college graduates, with a mean  $8.0 \pm 3.6$  years in school. Average illness duration was  $13.1 \pm 8.7$  years. Table 1 summarizes the patients' sociodemographic characteristics.

Patients were compared with respect to gender, marital status, and employment status using the independent samples t test. No significant differences between

TABLE 1. Sociodemographic characteristics.

	n (%)
Gender	
male	58 (58)
female	42 (42)
Marital Status	
single	59 (59)
married	30 (30)
divorced	11 (11)
Living Arrangements	
with family	96 (96)
alone	4 (4)
Employment	
unemployed	53 (53)
homemaker	13 (13)
self-employed	10 (10)
student	8 (8)
retired	8 (8)
blue collar	4 (4)
white collar	4 (4)
Education	
literate	7 (7)
elementary school	34 (34)
middle school	24 (24)
high school	30 (30)
college	5 (5)

genders were identified with respect to age, level of education, duration of illness, negative and positive symptoms, depressive symptoms, test performance, or social functioning. Significant differences were not observed between married and unmarried patients with respect to duration of illness, negative and positive symptoms, depressive symptoms, or test performances; however, compared to unmarried patients, married patients had significantly higher social functioning total score, and withdrawal, interpersonal behavior, and independence-competence scores ( $t = -2.36$ ,  $P = 0.021$ ;  $t = -2.45$ ,  $P = 0.016$ ;  $t = -3.36$ ,  $P = 0.010$ ;  $t = -2.19$ ,  $P = 0.031$ , respectively). In comparing employed and unemployed patients, homemakers actively taking care of a household by themselves, students, and those that retired during the previous 6 months were considered as employed. No significant differences between employed and unemployed patients were observed with respect to age, level of education, duration of illness, positive symptoms, depressive symptoms, or test performance; however, in comparison to unemployed patients employed patients had significantly lower negative symptom score ( $t = 2.33$ ,  $p = 0.022$ ) and significantly higher social functioning scale total score, and withdrawal, recreation, independence-performance, employment/occupation scores ( $t = -2.21$ ,

TABLE 2. Comparison of Social Functioning Scale scores with respect to gender, marital status, and employment status.

	Gender			Marital status			Employment		
	male (n = 58) mean ± SD	female (n = 42) mean ± SD	t	married (n = 30) mean ± SD	not married (n = 70) mean ± SD	t	employed (n = 47) mean ± SD	unemployed (n = 53) mean ± SD	t
Social Functioning Total Score	83.3 ± 28.6	82.9 ± 34.4	-0.1	92.7 ± 23.3	79.0 ± 33.1	-2.4*	90.2 ± 28.9	76.8 ± 31.8	-2.2*
Withdrawal	9.3 ± 2.6	9.3 ± 3.1	-0.0	10.3 ± 2.4	8.8 ± 2.9	-2.5*	9.9 ± 2.9	8.7 ± 2.7	-2.1*
Interpersonal Behavior	4.4 ± 2.6	4.3 ± 2.9	-0.2	5.9 ± 2.3	3.8 ± 2.7	-3.4*	4.7 ± 2.8	4.2 ± 2.7	-1.0
Pro-Social Activities	7.1 ± 5.9	6.9 ± 4.6	-1.0	6.4 ± 3.7	6.8 ± 4.0	0.3	7.0 ± 4.3	6.3 ± 4.4	-0.7
Recreation	9.4 ± 5.5	10.1 ± 5.2	1.4	10.4 ± 4.6	9.8 ± 5.7	-0.5	11.3 ± 4.6	8.8 ± 5.8	-2.4*
Independence-Competence	32.8 ± 7.6	31.3 ± 9.9	-0.9	35.0 ± 4.9	31.1 ± 9.6	-2.2*	33.3 ± 8.3	31.3 ± 8.9	-1.2
Independence-Performance	18.2 ± 8.7	18.6 ± 8.1	1.1	19.9 ± 9.6	16.9 ± 9.3	-1.5	20.8 ± 8.6	15.1 ± 9.5	-3.1*
Employment/ Occupation	3.9 ± 1.9	2.8 ± 1.5	-1.6	4.5 ± 2.1	3.0 ± 1.6	-2.0	4.7 ± 2.1	2.3 ± 1.6	-3.7**

\*P < 0.05; \*\*P < 0.01.

P = 0.030; t = -2.05, P = 0.043; t = -2.39, P = 0.019; t = -3.13, P = 0.022; t = 3.68, P = 0.002, respectively).

Table 2 shows the comparison of Social Functioning Scale scores with respect to gender, marital status, and employment status.

Table 3 shows the significant correlation coefficients between numeric variables evaluated using Pearson's correlation analysis.

Multiple stepwise regression analysis was used in order to determine the variables that predict social func-

TABLE 3. Pearson's correlation coefficients of the study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1) Education	-																
2) SANS	-.25*	-															
3) PANS	-.08	.28**	-														
4) CDSS	-.05	.09	.37**	-													
5) FEIT	.43**	-.29**	-.32**	-.14	-												
6) FEDT	.36**	-.24**	-.25*	-.02	.44**	-											
7) RAVLT	.43**	-.40**	-.18	.05	.33**	.25*	-										
8) DST	.55**	-.17	-.10	.04	.45**	.28**	.36**	-									
9) TMT B Dura.	-.44**	.35**	.06	-.05	-.35**	-.32**	-.36**	-.31**	-								
10) TMT B Err.	-.57**	.41**	.14	-.05	-.44**	-.28**	-.51**	-.42**	.60**	-							
11) SFS Total	.40**	-.57**	-.23*	-.14	.45**	.38**	.46**	.32**	-.36**	-.44**	-						
12) Withdrawal	.17	-.39**	-.16	-.22*	.18	.14	.21*	.23*	-.21*	-.12	.72**	-					
13) Interpersonal Behavior	.19	-.43**	-.19	-.06	.31**	.27**	.25*	.23*	-.09	-.21*	.68**	.53**	-				
14) Pro-Social Activities	.30**	-.43**	-.09	-.07	.33**	.13	.28**	.29**	-.21*	-.26*	.67**	.42**	.53**	-			
15) Recreation	.46**	-.47**	-.20*	-.23*	.45**	.34**	.43**	.30**	-.39**	-.44**	.82**	.57**	.53**	.65**	-		
16) Independence-Competence	.31**	-.40**	-.16	-.03	.22*	.35**	.44**	.20*	-.28**	-.33**	.79**	.57**	.57**	.33**	.57**	-	
17) Independence-Performance	.42**	-.53**	-.21	-.19	.49**	.35**	.50**	.25*	-.39**	-.48**	.88**	.59**	.52**	.50**	.80**	.67**	-
18) Employment/ Occupation	.19	-.29**	.02	.03	.25*	.08	.19	.24*	-.21*	-.28**	.56**	.48**	.39**	.36**	.33**	.35**	.45**

\*P < 0.05; \*\*P < 0.01.

TABLE 4. Final models of the multiple stepwise regression analysis.

Social Functioning	Significant Predictors	R2	r2 Change	f Change	p
Total Score	Education	.442	.158	18.422	< 0.001
	SANS		.237	37.907	< 0.001
	FEIT		.047	8.116	0.005
Withdrawal	SANS	.186	.151	17.447	< 0.001
	CDSS		.035	4.202	0.043
Interpersonal Behavior	SANS	.219	.183	21.974	< 0.001
	FEIT		.036	4.513	0.036
Pro-Social Activities	Education	.226	.089	9.572	0.003
	SANS		.137	17.110	< 0.001
Recreation	Education	.415	.212	26.411	< 0.001
	SANS		.136	20.318	< 0.001
	FEIT		.042	6.571	0.012
	CDSS		.025	4.041	0.047
Independence-Competence	Education	.297	.094	10.224	0.002
	RAVLT		.113	13.855	< 0.001
	SANS		.055	7.179	0.009
	FEDT		.034	4.584	0.035
Independence-Performance	Education	.471	.172	20.411	< 0.001
	SANS		.196	30.117	< 0.001
	FEIT		.067	11.322	0.001
	RAVLT		.036	6.441	0.013
Employment/Occupation	SANS	.122	.082	8.810	0.004
	DST		.039	4.314	0.040

tioning. Level of education was entered as a forced variable in the first block, whereas SANS, SAPS, CDSS, FEIT, FEDT, RAVLT, DST, and TMT B duration and error scores were entered in the second block. Age and duration of illness were excluded from the regression analysis, as Pearson's correlation analysis did not identify any significant correlations between these 2 variables and the others. Level of education, negative symptoms, and facial emotion identification were significant predictors of social functioning total score. In all, 44.2% of the variance in the social functioning scale total scores was explained by negative symptoms (23.7%), level of education (15.8%), and facial emotion identification (4.7%). Excluding the forced entry variable (level of education), negative symptoms and facial emotion identification together explained 28.4% of the variance.

The following variables were identified as significant predictors for each of the social functioning domains:

- For the withdrawal domain: negative symptoms and depressive symptoms;
- For the interpersonal behavior domain: negative symptoms and facial emotion identification;
- For the pro-social activities domain: education level and negative symptoms;

- For the recreation domain: level of education, negative symptoms, facial emotion identification, and depressive symptoms;
- For the independence-competence domain: level of education, verbal memory, negative symptoms, and facial emotion discrimination;
- For the independence-performance domain: level of education, negative symptoms, facial emotion identification, and verbal memory;
- For the employment/occupation domain: negative symptoms, attention, and working memory.

Table 4 shows the final regression models and the significant predictors of social functioning and their domains.

## DISCUSSION

### Clinical Symptoms and Social Functioning

This study corroborates and expands the findings of previous studies concerning the relationship between negative symptoms and impairment in social functioning (Dickerson et al., 1999, McGurk et al., 2000, Smith et al., 2002, Wittorf et al., 2008). Our study shows that negative symptoms were the primary predictor of impairment in social functioning in general, as well as in the sub-domains.

Several studies reported that there wasn't an association between residual positive symptoms and social functioning (DeJong et al., 1986; Prudo and Monroe Blum, 1987; Halford and Hayes, 1995; Dickerson et al., 1999). In the present study positive symptoms were not among the significant predictors of social functioning, although there were weak correlations between positive symptoms, and social functioning total score and the recreation domain. In a recent 1-year follow-up study Wittorf et al. (2008) reported that positive symptoms could be a predictor of social functioning and leisure activities; however, their study focused on impairment in social functioning in relation to increases in positive symptoms over time. It is important to note that all studies on positive symptoms—including ours—involve stable patients and only consider residual positive symptoms.

In the present study depressive symptoms were significant predictors of withdrawal and recreation only, and accounted for a small portion of the variance (3.5%, and 2.5%, respectively). Depressive mood and depressive disorders are known to have negative affects on social functioning in general (Hirschfeld, 2000; Dorz et al., 2002), and in schizophrenia (Reine et al., 2003). In contrast, Rieckmann et al. (2005) reported that non-depressive schizophrenia patients have higher levels of social functioning than depressive schizophrenia patients. Studies on this subject have investigated different aspects of social functioning with different scales. The present study's results indicate that depressive symptoms can predict some domains of social functioning. Future studies should more comprehensively analyze the relationship between depression and different domains of social functioning in schizophrenia in an effort to explain these disparities.

### **Cognitive Functions and Social Functioning**

Green (1996) and Liddle (2000) conclude that among neurocognitive functions, verbal memory, working memory, attention, and executive functions affect social functioning in schizophrenia. In the present study we investigated verbal memory, working memory, attention, and executive functions, and observed significant correlations between these cognitive functions, and social functioning and its domains; however, cognitive functions only predicted independence-competence, independence-performance, and employment/occupation domains significantly, and they explained only a small portion of the variance. Researchers have reported that neurocognitive functions explain as little as 4% to as much as 50% of the variance in social functioning

(Silverstein, 1997; Addington and Addington, 1999; Pinkham et al., 2003; Bowie and Harvey, 2008). One possible explanation as to why our analysis indicated such low predictive power of neurocognitive functions might be that we analyzed numerous variables together, in contrast to other studies that focused on only a few variables. More research with multiple variables is required to answer this question.

### **Facial Emotion Recognition and Social Functioning**

Results of the present study confirm previous reports that indicate facial emotion recognition is a significant predictor of social functioning (Hooker and Park, 2002; Kee et al., 2003). The growing interest in social functioning in schizophrenia research has also increased interest in facial emotion recognition; 2 recent studies suggest that facial emotion recognition might play an intermediary role between cognitive functions and social functions (Brekke et al., 2005; Addington et al., 2006).

### **Sociodemographic Characteristics and Social Functioning**

One noteworthy finding of the present study is the gender neutrality of social functioning, in contrast with previous studies that reported higher social functioning in female schizophrenia patients than in male patients (Usall et al., 2001; 2002; Thorup et al., 2007). While some of these studies reported higher levels of negative symptoms in male patients (Thorup et al., 2007), others indicated no gender differences in the levels of positive and negative symptoms (Usall et al., 2001, Usall et al., 2002). In the present study there weren't any differences between male and female patients in terms of other factors that may affect social functioning, such as symptom level, ability to recognize facial emotions, and cognitive functions; no gender differences were observed in terms of social functioning. Thus, the observed higher social functioning in female patients might be attributed to not only lower levels of negative symptoms, but also to better cognitive functioning (Lewine, 2004), as well as greater ability to recognize facial emotions (Scholten et al., 2005).

Previous studies have indicated a positive impact of employment on social functioning (Srinivasan and Thara, 1997; Mueser et al., 2001; Angell and Test, 2002;). In our sample employed patients had significantly higher levels of social functioning; however, note that in our study employed patients also had significantly lower levels of negative symptoms, which are reported to be

the primary predictor of employment in schizophrenia (Hoffman and Kupper, 1997; Srinivasan and Tirupati, 2005). Therefore, our results should be interpreted carefully. One should consider the impact of negative symptoms on social functioning before concluding that employment positively affects social functioning.

The present study shows that married patients had higher social functioning scores. While Salokangas et al. (2001) reported better quality of life in married schizophrenia patients, Usall et al. (2002) reported that marital status has no impact on social functioning. It is difficult to ascertain the nature of the relationship between social functioning and marital status in terms of cause versus effect.

Our study's results confirm those of earlier studies (Harvey et al., 2006) reporting that level of education affects social functioning. One should keep in mind, however, that level of education has a significant impact on facial emotion recognition ability and cognitive functions, and it was a forced entry variable in this study.

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## CONCLUSION

Negative symptoms, level of education, and facial emotion recognition were significant predictors of social functioning in almost all aspects. Among these, negative symptoms were the most prominent, as they accounted for the largest proportion of variance. Our study was cross-sectional in design and could not detect the long-term effects of the research variables on social functioning. This is a limitation of the study; however, a 2-year follow-up study reported that social functioning varied very little over time in patients with schizophrenia (Dickerson et al., 1999).

While numerous studies have examined the factors that affect social functioning in schizophrenia, to the best of our knowledge this is the first study to evaluate all the relevant factors together, and we think it will facilitate identification of the determinants of social functioning in schizophrenia and help in the development of treatment methods to improve social functioning.

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