

Predicting employment status and subjective quality of life in patients with schizophrenia



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ABSTRACT

Although impaired social functioning, particularly poor employment status, is a cardinal feature of patients with schizophrenia and leads to decreased quality of life (QOL), few studies have addressed the relationship between these two clinical issues. The aim of this study was to determine whether employment status predicts subjective QOL and to evaluate a model in which functional capacity mediates the relationship between general cognitive performance and employment status. Ninety-three patients with schizophrenia were administered a comprehensive battery of cognitive tests, the UCSD Performance-based Skills Assessment-Brief version (UPSA-B), the Social Functioning Scale (SFS), and the Subjective Quality of Life Scale (SQLS). First, we evaluated a model for predicting the employment/occupation subscale score of the SFS using path analysis, and the model fitted well ($\chi^2(4) = 3.6, p = 0.46; CFI = 1.0; RMSEA < 0.001$, with 90% CIs: 0–0.152). Employment status was predicted by negative symptoms and functional capacity, which was in turn predicted by general cognitive performance. Second, we added subjective QOL to this model. In a final path model, QOL was predicted by negative symptoms and employment status. This model also satisfied good fit criteria ($\chi^2(7) = 10.3, p = 0.17; CFI = 0.987; RMSEA = 0.072$, with 90% CIs: 0–0.159). The UPSA-B and SFS scores were moderately correlated with most measures of cognitive performance. These results support the notion that better employment status enhances subjective QOL in patients with schizophrenia.

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1. Introduction

The impairment of functional outcomes is a core problem in schizophrenia and may worsen subjective and objective quality of life (QOL) for patients. Specifically, subjective QOL is an important patient-reported outcome, reflecting individuals' perceptions of psychological wellness and satisfaction (Karow et al., 2014).

Functional outcome is evaluated by some related, but clinically distinct, manifestations such as cognitive function, functional capacity/skills, and social functioning (Green et al., 2000; Green et al., 2004). Cognitive abilities are measured using standardized neuropsychological tests in a laboratory setting. The assessment of functional capacity/skill is associated with an individual's ability to manage his or her everyday activities. Accordingly, performance based measures, such as the UCSD Performance-based Skills Assessment (UPSA) and its brief version, the UPSA-B (Mausbach et al., 2007), have been developed to evaluate the ability to perform daily activities, including counting money, making calls, and managing medical appointments

(Mausbach et al., 2007; Patterson et al., 2001). Social functioning generally means functioning in the real world, such as independent living, interpersonal relationships, and work (Harvey et al., 2011; Leifker et al., 2011). Employment status has been considered as a particularly important functional outcome of individuals with schizophrenia (Nuechterlein et al., 2011).

Reducing psychiatric symptoms, particularly negative symptoms, is also considered to improve QOL, thus enhancing therapeutic alliance and treatment satisfaction (Karow et al., 2012a). Although negative symptoms have been shown to affect QOL in patients with schizophrenia (Brissos et al., 2011; Woon et al., 2010), only a minority of patients exhibit substantial improvement in QOL, even after achieving symptom remission (Karadayi et al., 2011; Schennach-Wolff et al., 2009). QOL has also been associated with functional outcomes, including employment status, independent living, engagement in daily activities, and maintaining personal relationships (Galuppi et al., 2010; Karadayi et al., 2011). In sum, cognitive function and psychiatric symptoms are considered to play a major role in social functioning in patients with schizophrenia (Bowie et al., 2008).

General cognitive function is assessed by performance on neuropsychological tests of most cognitive domains (Dickinson et al., 2004) and has

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been shown to correlate with everyday functioning (Green et al., 2000). However, a conceptual model of the link between cognitive function and social functioning suggests a discrepancy between cognitive performance in the laboratory setting and community outcomes (Bowie and Harvey, 2006; Green et al., 2004). Therefore, it is reasonable to assume that functional abilities/capacity, as evaluated by co-primary measures (e.g., UPSA-B), mediates cognitive function and social functioning (Bowie et al., 2006; Green et al., 2012). Previous studies have shown a role of functional capacity as a mediator of cognitive dysfunctions on employment status (Bowie et al., 2006; Bowie et al., 2010).

Although statistical modeling has been employed to examine the relationships among cognitive function, functional abilities, and social functioning (interpersonal skills, community activities, and work skills) (Bowie et al., 2006), there is little information on specifying a model to include pathways to QOL (Hwang et al., 2009; Savilla et al., 2008). We seek to extend understandings on pathways to QOL by developing a comprehensive model of the relationships among cognitive function, functional capacity, employment status, psychiatric symptoms, and QOL.

The purpose of this study was to determine clinical predictors of social functioning and QOL in Japanese patients with schizophrenia. We focused on employment status as one of the most important aspects of social functioning. We hypothesized that the effect of cognitive performance on employment status would be mediated by functional abilities, while employment status and negative symptoms would predict QOL.

2. Methods

2.1. Participants

A total of 93 patients with schizophrenia (53 male, 40 female) participated in this study. Patients were outpatients treated at the Department of Psychiatry of Osaka University Hospital. A consensus diagnosis, according to Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) criteria, was made by experienced senior psychiatrists using the Structured Clinical Interview for DSM-IV (SCID) for schizophrenia (American Psychiatric Association, 1994). Psychotic symptoms (positive symptoms, negative symptoms, and general psychopathology) were evaluated using the Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987).

All participants provided written informed consent after the study procedures were fully explained. All procedures were conducted according to the Declaration of Helsinki and approved by the ethics committee of Osaka University.

2.2. Assessment of cognitive performance

Cognitive performance was assessed using a comprehensive neuropsychological battery, which has been employed in previous studies (Dickinson et al., 2014; Ohi et al., 2015). This included the following cognitive domains: verbal memory, n-back/controlled attention, visual memory, processing speed, card sorting/reasoning, and span/working memory. The following neuropsychological tests were used: the Japanese Adult Reading Test (JART) (Hashimoto et al., 2013; Matsuoka et al., 2006); the Wechsler Adult Intelligence Scale, Third Edition (WAIS-III) Similarities, Digit Span, Arithmetic, Picture Completion, and Digit Symbol Coding subtests (Japanese WAIS-III Publication Committee, 2006; Wechsler, 1997); the Wechsler Memory Scale-Revised (WMS-R) Logical Memory 1, Logical Memory 2, Verbal Paired Association, Visual Paired Association 1, and Visual Paired Association 2 tests (Sugishita, 2001; Wechsler, 1987); the Continuous Performance Test (CPT, 2–4 digits); the Wisconsin Card Sorting Test (WCST) categories achieved and number of total errors;

the Rey Auditory Verbal Learning Tests (AVLT) total recalls (I–V trials); Category Fluency; and Letter Fluency. A general cognitive composite (*g*), was calculated in the same manner, as described in previous studies (Dickinson et al., 2011; Dickinson et al., 2014; Ohi et al., 2015). Scores on different measures were converted to z-scores using control means and standard deviations (data not shown). Then, *g* composites were derived from the mean of the z-scores of the cognitive measures.

2.3. Assessment of functional capacity and social functioning

We assessed functional capacity with the UCSD Performance-based Skills Assessment-brief (UPSA-B) (Mausbach et al., 2007). The UPSA-B was developed as an abbreviated version of the UPSA that assesses daily living skills based on role-play performance among patients with mental illnesses (Patterson et al., 2001). The UPSA-B requires a shorter administration time and contains two of the five subdomains of the full version. It measures everyday functional skills of patients using role-play tasks for finance (e.g., counting money and reading a bill) and communication (e.g., dialing a number from memory and calling to reschedule a doctor's appointment) (Mausbach et al., 2007; Sumiyoshi et al., 2014). Higher scores indicate greater ability in every-day activities (scores range from 0–100).

Social functioning was assessed using the SFS part included in the modified Social Functioning Scale/Social Adaptation Scale (modified SFS/SAS). The modified SFS/SAS was created in the MATRICS Psychometric and Standardization Studies (MATRICS-PASS; Green et al., 2008; Kern et al., 2008; Nuechterlein et al., 2008) for the MATRICS Consensus Cognitive Battery. The Japanese version of the modified SFS/SAS was produced by Sumiyoshi and Sumiyoshi (2011), and its utility was recently reported (Sumiyoshi et al., 2015). The SFS part was administered as a self-report questionnaire. Individuals were asked to rate their actual level of activity and ability in areas of social function. Investigators (clinical psychologists or trained research assistants) also reviewed these ratings to confirm the validity of the report. The SFS consists of seven subscales: social engagement, interpersonal communication, independence-performance, independence-competence, recreation, pro-social, and employment/occupation. The SFS total scores were derived from the sum of these subscale scores. Higher scores indicate better real-world functioning in the community. The SFS and the Japanese version were originally developed by Birchwood et al. (1990), and Nemoto et al. (2008), respectively.

2.4. Assessment of subjective QOL

Subjective QOL was evaluated using the Schizophrenia Quality of Life Scale (SQLS). The SQLS is a self-report questionnaire, which provides scores on three subscales: dysfunction of psycho-social activity, dysfunction of motivation/energy, and level of symptoms/side effects (Wilkinson et al., 2000). Lower scores indicate better QOL. The SQLS has been shown to be reliable, valid, and practical in patients with schizophrenia (Kaneda et al., 2002).

2.5. Statistical analyses

We applied path analysis to evaluate path models. The PANSS positive and negative symptoms subscale scores, *g* composite score (general cognitive performance), the UPSA-B total score, and employment/occupation subscale of the SFS, and SQLS were included in the path models. These models were developed through an iterative procedure applied in a previous study (Bowie et al., 2006). The non-significant paths with the smallest contribution to the

dependent variable were sequentially removed from a saturated model until the best-fitting model was identified.

We employed χ^2 statistics, a comparative fit index (CFI), and root mean-square error of approximation (RMSEA) with 90% confidence intervals (CIs) to evaluate model fit, as recommended in the literature (Jackson et al., 2009). A good-fitting model was determined by non-significant χ^2 tests, CFI greater than 0.95, and RMSEA less than 0.08. Pearson's correlation coefficients were calculated to examine the relationships among subdomains of cognitive function, functional capacity, social functioning, psychiatric symptoms, and QOL. Statistical analyses were performed using SPSS and AMOS 22.0 software (SPSS Japan Inc., Tokyo, Japan).

3. Results

3.1. Analyses of the employment/occupation model

First, we evaluated a model predicting employment status (employment/occupation model), which is a modified version of work skill prediction model of Bowie et al. (2006). In the model, the employment/occupation domain of the SFS was used as the outcome variable. Positive and negative symptoms and the *g* composite were included as independent variables. The UPSA-B total score was included as a mediating variable influencing the effect of the *g* composite on employment/occupation. This model provided a good fit based on a non-significant χ^2 test ($\chi^2 = 3.6$, $df = 4$, $p = 0.46$) and fit indices (CFI = 1.0; RMSEA < 0.001, with 90% CIs: 0–0.152) (Fig. 1). The employment/occupation model adequately satisfied fit criteria, suggesting that functional capacity mediated the relationship between the *g* composite and employment. The employment/occupation domain of the SFS was predicted by negative symptoms ($\beta = 0.38$, $p < 0.001$) and functional capacity ($\beta = 0.33$, $p < 0.001$), explaining 33% of the variance. Positive symptoms did not influence employment status. Positive and negative symptoms were both moderately related to *g* ($p < 0.01$). Additionally, we also tested a model using the SFS total score instead of the employment/occupation score. Generally, fit indices indicated a good fit of the model for patients ($\chi^2 = 6.6$, $df = 4$, $p = 0.16$, CFI = 0.988) with the exception of the RMSEA, which was slightly larger than the threshold criterion for good fit (RMSEA = 0.085, with 90% CIs: 0–0.196). Other models that included the remaining domains of the SFS failed to satisfy good fit criteria or did not show a significant effect of the UPSA-B on the SFS domains ($p > 0.05$).

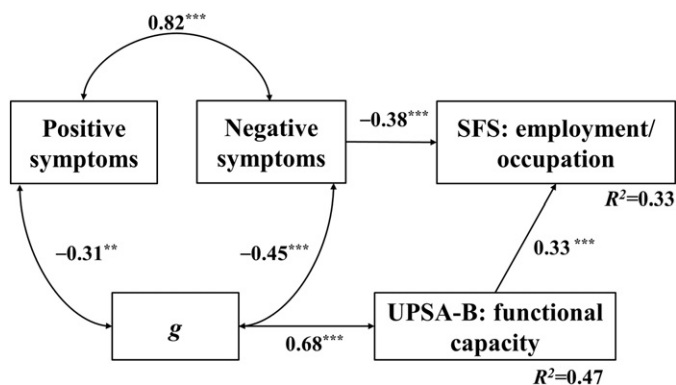


Fig. 1. Employment/occupation model predicting employment status in patients with schizophrenia. The employment/occupation model showed good fit based on fit indices ($\chi^2 = 3.6$, $df = 4$, $p = 0.46$; CFI = 1.0; RMSEA < 0.001, with 90% CIs: 0–0.152).

3.2. Analyses of the QOL model

We further evaluated a model in which the subjective QOL was added to the employment/occupation model (QOL model) as a higher-order outcome variable. Because two SQLS subscales, psychosocial and symptoms/side effects, were not predicted by employment status ($\beta = -0.087$, $p = 0.42$; $\beta = -0.088$, $p = 0.42$), they were not included in the QOL model. The motivation/energy subscale fit the QOL model ($\chi^2 = 10.3$, $df = 7$, $p = 0.17$; CFI = 0.987; RMSEA = 0.072, with 90% CIs: 0–0.159) (Fig. 2). The SQLS motivation/energy score was predicted by negative symptoms and employment status ($\beta = 0.42$, $p < 0.001$; $\beta = -0.21$, $p = 0.03$), explaining 31% of the variance in SQLS motivation/energy.

3.3. Correlations among social capacity, social functioning, and other variables

Demographic data, clinical information, and other variables are summarized in Table 1. Correlations between functional capacity, social functioning, cognitive performance, clinical variables, and QOL are presented in Table 2. The UPSA-B scores were correlated with all cognitive measures and psychiatric symptoms. Generally, correlation coefficients between cognitive performance and the UPSA-B ($r = 0.3$ – 0.7) were slightly higher than the corresponding coefficients for the SFS ($r = 0.2$ – 0.4).

4. Discussion

The purpose of this study was to determine the predictors of employment status and subjective QOL and to evaluate the hypothesized model of these relationships for Japanese patients with schizophrenia. To the best of our knowledge, this is the first attempt to construct a comprehensive model including cognitive function, functional capacity, employment status, psychiatric symptoms, and QOL, to investigate complex relationships of the variables using path-modeling approach. Our results support the mediational role of functional capacity in the relationship between cognitive performance and employment status, which leads to better QOL.

The employment/occupation model met the criteria for a good fit, whereas the other model predicting overall social functioning showed slightly larger RMSEA than those required for good fit criteria. The former model successfully explained variables in a manner consistent

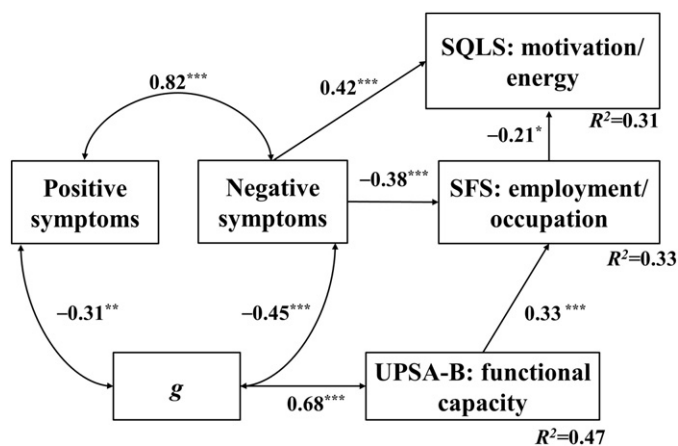


Fig. 2. Quality of life (QOL) model predicting subjective QOL in patients with schizophrenia. The lower scores indicate better QOL in motivation/energy subscale of the Schizophrenia Quality of Life Scale (SQLS). The QOL model showed good fit based on fit indices ($\chi^2 = 10.3$, $df = 7$, $p = 0.17$; CFI = 0.987; RMSEA = 0.072, with 90% CIs: 0–0.159).

Table 1
Demographic and clinical characteristics, cognitive performance, functional skills, and social functioning of patients.

		Mean (SD)
Demographics	Sex (male/female) (n)	53/40
	Age	34.1 (12.0)
	Education (years)	13.8 (2.2)
	Age at onset	23.9 (10.1)
	Duration of illness (years)	10.3 (7.7)
Cognitive performance	JART	103.3 (9.6)
	WAIS Similarities	8.9 (3.3)
	WAIS Digit Span	9.4 (3.6)
	WAIS Arithmetic	8.4 (3.5)
	WAIS Picture Completion	8.3 (3.8)
	WAIS Digit Symbol Coding	6.9 (3.4)
	WMS Logical Memory 1	18.4 (10.4)
	WMS Logical Memory 2	14.1 (9.9)
	WMS Verbal Paired Association	17.8 (5.0)
	WMS Visual Paired Association 1	13.7 (4.3)
	WMS Visual Paired Association 2	5.4 (1.3)
	CPT Digit 2	3.5 (0.8)
	CPT Digit 3	2.9 (0.9)
	CPT Digit 4	2.0 (1.0)
	WCST Categories Achieved	3.6 (1.9)
	WCST Total Errors	19.7 (10.0)
	AVLT Total	46.6 (14.3)
	Category Fluency	16.3 (5.5)
	Letter Fluency	22.0 (8.9)
Functional skills	g ^a	-1.20 (0.98)
	UPSA-B Total	67.1 (17.8)
Social functioning	SFS Social engagement/withdrawal	10.2 (2.3)
	SFS Interpersonal behavior	6.6 (2.9)
	SFS Pro-social activities	11.3 (7.8)
	SFS Recreation	18.7 (6.2)
	SFS Independence-competence	28.3 (7.4)
	SFS Independence-performance	24.0 (7.9)
	SFS Employment/occupation	5.5 (3.8)
	SFS Total	104.6 (29.8)
Psychiatric symptoms	PANSS Positive	18.4 (5.5)
	PANSS Negative	19.9 (5.8)
	PANSS General psychopathology	44.0 (11.3)
	PANSS Total	82.3 (21.6)
Medication	CPZeq (mg/day)	613.4 (577.4)
	SQLS Psychosocial	46.1 (23.0)
	SQLS Motivation/energy	52.8 (22.7)
	SQLS Symptoms/side effects	26.5 (18.1)

JART, Japanese Adult Reading Test; WAIS, Wechsler Adult Intelligence Scale-Third Edition; WMS, Wechsler Memory Scale-Revised; CPT, Continuous Performance Test; AVLT, Rey Auditory Verbal Learning Test; WCST, Wisconsin Card Sorting Test; UPSA-B, Brief UCSD Performance-based Skills Assessment; SFS, Social Functioning Scale; PANSS, Positive and Negative Syndrome Scale; CPZeq, chlorpromazine equivalent of total antipsychotics; SQLS, Subjective Quality of Life Scale; and ANCOVA, analysis of covariance (covariates: sex, age, years of education).

^a The “g” composite was derived from the average of the z-scores (using control means and standard deviations) of the cognitive measures.

with a previous study (Bowie et al., 2006). The role of functional capacity, as measured by the UPSA-B, may be important for the employment/occupation domain of social functioning in patients with schizophrenia, as poor cognitive abilities may underlie the deficit patients present in their ability to perform daily activities, which leads to inefficiency in work life (Ho et al., 2013). These findings suggest an important role of functional capacity as a link between cognitive improvement and employment outcomes (Bowie and Harvey, 2006). Consistent with previous studies (Bowie et al., 2006; Fujino et al., 2014; Tas et al., 2013), negative symptoms were found to be moderately associated with cognitive function, social functioning, and QOL. Our model, which included a measure of subjective QOL, indicated that part of QOL may be explained by real-world functioning, which is consistent with previous results (Galuppi et al., 2010). These findings suggest that better social functioning (e.g.,

Table 2
Correlations between functional skills, social functioning, cognitive performance, and clinical variables.

	UPSA-B total	SFS total	Employment/occupation
JART	.418**	.207*	.050
WAIS Similarities	.534**	.305**	.227*
WAIS Digit Span	.518**	.184	.190
WAIS Arithmetic	.649**	.291**	.329**
WAIS Picture Completion	.398**	.393**	.295**
WAIS Digit Symbol Coding	.496**	.403**	.392**
WMS Logical Memory 1	.565**	.326**	.254*
WMS Logical Memory 2	.551**	.325**	.219*
WMS Verbal Paired Association	.506**	.352**	.325**
WMS Visual Paired Association 1	.470**	.234*	.310**
WMS Visual Paired Association 2	.358**	.283**	.187
CPT Digit 2	.478**	.239*	.292**
CPT Digit 3	.376**	.187	.189
CPT Digit 4	.331**	.138	.133
WCST Categories Achieved	.453**	.173	.252*
WCST Total Errors	-.406**	-.185	-.260*
AVLT Total	.514**	.304**	.319**
Category Fluency	.389**	.327**	.275**
Letter Fluency	.456**	.393**	.276**
g ^a	.709**	.423**	.388**
UPSA-B Total	-	.389**	.486**
PANSS Positive	-.319**	-.365**	-.434**
PANSS Negative	-.431**	-.546**	-.517**
PANSS General Psychopathology	-.338**	-.436**	-.459**
PANSS Total	-.374**	-.468**	-.490**
CPZeq (mg/day)	-.269**	-.217*	-.255**
SQLS Psychosocial	-.173	-.387**	-.295**
SQLS Motivation/Energy	-.164	-.685**	-.431**
SQLS Symptoms/Side Effects	-.339**	-.325**	-.281**

Bold values indicate a significant correlation ($p < 0.05$).

JART, Japanese Adult Reading Test; WAIS, Wechsler Adult Intelligence Scale-Third Edition; WMS, Wechsler Memory Scale-Revised; CPT, Continuous Performance Test; AVLT, Rey Auditory Verbal Learning Test; WCST, Wisconsin Card Sorting Test; UPSA-B, Brief UCSD Performance-based Skills Assessment; SFS, Social Functioning Scale; PANSS, Positive and Negative Syndrome Scale; CPZeq, chlorpromazine equivalent of total antipsychotics; and SQLS, Subjective Quality of Life Scale.

^a The “g” composite was derived from the average of the z-scores (using control means and standard deviations) of the cognitive measures.

* $p < 0.05$.

** $p < 0.01$ (2-tailed).

having a job), is associated with improved subjective QOL in patients with schizophrenia, via increased motivation and energy.

The link between functional capacity and social functioning may be affected by the degree of social support and other environmental factors. While employment status, measured by the SFS, was predicted by performance on the UPSA-B, other components of social functioning (e.g., interpersonal communication and pro-social activities) were not. Enhancement of additional abilities, such as social cognition and adaptive beliefs, may be required for the latter aspects of social functioning to be improved (Addington et al., 2010; Green et al., 2012). Moreover, social support, familial resources, financial disadvantage, and previous work history have been reported to affect real-world functioning (Gould et al., 2012; Marwaha and Johnson, 2004). Inclusion of these factors may have increased the explanatory power of our model.

Cognitive function was found to be more strongly associated with functional capacity than with social functioning, consistent with previous results (Durand et al., 2014; Green et al., 2004). By contrast, cognitive performance was not correlated with social functioning in a set of 106 demographically equivalent healthy control subjects (data not shown), suggesting that patients' social functioning is more likely to be affected by the level of cognitive function.

Some limitations of the current study should be considered. The cross-sectional nature of this study does not allow us to draw

conclusions concerning causal links among functional outcomes, psychiatric symptoms, and QOL. Longitudinal studies are needed to determine the consistency of the models presented here. Second, we employed a self-report measure of QOL; a combination of self-reports and interviewer ratings may have provided a more accurate evaluation of QOL (Karow et al., 2012b). Third, although our model accounted for significant proportions of variance of employment status, other factors, such as assistance from the clinical team as would occur in assertive community treatment (Chandler et al., 1997; Resnick et al., 2003), supported employment (Burns et al., 2007; Cook et al., 2005), public assistance, and family support (Xiong et al., 1994), might account for additional prediction of the variance. Inclusion of these factors may have increased the explanatory power of our model.

In conclusion, the present study provides support for (1) the concept that employment status and negative symptoms predict subjective QOL, i.e., motivation and energy, and (2) the mediating role of functional capacity in the ability of cognitive function to predict employment status. Further research into the relationship between cognitive function and social function may help to develop strategies to alleviate the difficulties faced by patients with schizophrenia.

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The funders had no role in the study design, data collection and analyses, decision to publish, or preparation of the manuscript.

Contributors

H. Fujino was critically involved in the collection and analysis of the data and the first draft of the manuscript. C. Sumiyoshi and T. Sumiyoshi contributed intellectually to the interpretation of the data and writing of the manuscript. Y. Yasuda, H. Yamamori, K. Ohi, M. Fujimoto, M. Takeda, and O. Imura were heavily involved in the collection of the majority of the data and contributed intellectually to the interpretation of the data. R. Hashimoto supervised the entire project, collected the data and was critically involved in the design, analysis, and interpretation of the data. All authors contributed to and have approved the final manuscript.

Conflict of interest

All authors declare that they have no relevant conflicts of interest.

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