Relationship between Recovery and Cognitive Insight, Neurocognition, Social Functioning, and Symptoms in Patients with Schizophrenia: A Cross-Sectional Study

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Abstract: This cross-sectional study investigated the factors associated with recovery in patients with schizophrenia. One-hundred and three patients with schizophrenia participated in this study. Measures included the Japanese version of the Recovery Assessment Scale (RAS-J), Japanese version of the Beck Cognitive Insight Scale (BCIS-J), Wechsler Adult Intelligence Scale-III (WAIS-III) similarities and symbol search subtests, Life Assessment Scale for the Mentally Ill (LASMI), and Brief Psychiatric Rating Scale (BPRS). Stepwise multiple regression analyses were performed to investigate relationship between recovery and other clinical variables, including cognitive insight, neurocognition, social functioning, and symptoms. Goal/success orientation and hope in the RAS-J was significantly associated with self-reflectiveness ($\beta = 0.42$) in the BCIS-J and self-recognition ($\beta = 0.59$) in the LASMI. Reliance on others in the RAS-J was significantly associated with self-certainty ($\beta = 0.49$) and self-reflectiveness ($\beta = 0.49$) in the BCIS-J. Personal confidence in the RAS-J was significantly associated with self-certainty ($\beta = 0.22$) in the BCIS-J and endurance and stability ($\beta = 0.78$) in the LASMI. No domination by symptoms in the RAS-J was significantly associated with self-certainty ($\beta = 0.69$) and self-reflectiveness ($\beta = 0.28$) in the BCIS-J. Willingness to ask for help in the RAS-J was significantly associated with self-certainty ($\beta = 0.41$) in the BCIS-J and belligerence ($\beta = 0.59$) in the BPRS. RAS-J total score was significantly associated with self-certainty ($\beta = 0.20$) and self-reflectiveness ($\beta = 0.12$) in the BCIS-J and endurance and stability ($\beta = 0.69$) in the LASMI. Our findings provide encouraging evidence for the relationship between recovery and cognitive insight and contribute to developing tailored interventions to improve cognitive insight with the aim of achieving recovery in patients with schizophrenia.

Keywords: recovery, cognitive insight, schizophrenia, self-reflectiveness, self-certainty

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Introduction

Schizophrenia treatment has moved beyond management of psychotic symptoms to the more ambitious, and to the patient more personally meaningful, goal of “recovery”. Recovery is a widely discussed concept that emerged in the 1980s in published accounts detailing

the struggles of people with severe and chronic mental illness. These accounts described patients’ journeys to rebuild their lives, defining recovery as a deeply personal, unique process of changing one’s attitudes, values, feelings, goals, skills, and/or roles [1, 2]. Recovery reflects a way of living a satisfying, hopeful, and contributing life, even with limitations caused by the illness, and involves the development of new meaning and purpose in one’s life as one grows beyond the catastrophic effects of mental illness [3]. Because of the importance of recovery in severe mental illnesses, including schizophrenia, interventions to support recovery have been widely implemented [4, 5]. Furthermore, there have been attempts to develop methods of evaluating recovery

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ery in the treatment and rehabilitation of schizophrenia [6]. In a review of previous studies, Liberman et al. [7] suggested the following definition of recovery from any serious mental illness using objectively measurable indicators: at least two consecutive years of maintenance at or above the threshold levels, including symptom remission, functioning in vocational or educational activities, satisfying social interpersonal relationships, and independent self-care functioning. In addition, previous studies have reported several factors that are associated with recovery, including experience of peer support [8], social support from family and friends [9, 10], and meaningful social participation such as work [7, 11, 12].

Delusion is a characteristic psychotic symptom of schizophrenia, and was once considered to be psychologically beyond comprehension [13]. In recent years, the cognitive behavioral approach to psychotic symptoms has empirically clarified cognitive psychological mechanisms related to the psychotic symptoms of schizophrenia [14]. Within this approach, a lack of clinical insight has been accepted as a hallmark feature of schizophrenia, where insight is defined as awareness of having a mental illness, of specific symptoms and their attribution to the disorder, of social consequences, and of need for treatment [15–18]. An important extension of the concept of clinical insight was proposed by Beck et al. [19]. They suggested that although clinical insight focuses on awareness of illness factors, the concept of “cognitive insight” focuses on the cognitive processes involved in correcting erroneous judgments and certainty about mistaken judgments. Beck et al. [19] distinguishes the traditional approach to clinical insight from cognitive insight, suggesting that the latter is a form of cognitive flexibility that encompasses the evaluation and correction of distorted beliefs and misinterpretations. It has been proposed that patients with schizophrenia, particularly those with delusions, have a limited capacity to evaluate erroneous inferences, to distance themselves from and reflect on their psychotic experiences, and to respond to corrective feedback [20, 21]. In addition, it has been found that cognitive insight is associated not only with delusions, but also with cognitive functioning [22, 23] and has an impact on real world functioning, such as daily functioning, interpersonal relations, and work [24, 25]. For these reasons, psychological interventions aimed to improve cognitive insight in schizophrenia have been developed [26, 27].

Promoting the recovery of patients with schizophrenia is a very important theme within mental health care provided within occupational therapy [28–32]. However, whether the cognitive insight is associated with recovery in patients with schizophrenia has not yet been demonstrated. In this study, we investigated the relation-

ship between recovery and several variables, including cognitive insight, neurocognition, social functioning, and symptoms in Japanese patients with schizophrenia at a psychiatric hospital. We hypothesized that cognitive insight would be associated with recovery in these patients. Moreover, hypotheses included that neurocognition and social functioning would be associated with recovery. Clarifying these relationships may have important clinical implications for the development of interventions that promote recovery in patients with schizophrenia.

Methods

We conducted a cross-sectional study investigating the factors associated with recovery in patients with schizophrenia at a Japanese psychiatric hospital between October 2016 and January 2017. Ethical approval for the study protocol was granted by the ethics board of the Mental Support Soyokaze Hospital, Nagano, Japan. Study participants provided written informed consent for all study procedures.

Participants

Inclusion criteria for this study were aged 20–65 years, and a diagnosis of schizophrenia or schizoaffective disorder based on the criteria of the Structured Clinical Interview for DSM-5 [33]. Exclusion criteria were a diagnosis of mental retardation, alcohol or drug disorders (abuse or dependence), or any current or past history of neurological disorders, including head injury, cerebral vascular disorders, epilepsy or dementia.

Measures

Recovery was assessed with the Japanese version of the Recovery Assessment Scale (RAS) [34–36]. The RAS was developed by Corrigan et al. [34, 35], and a Japanese version (RAS-J) was subsequently developed by Chiba et al. [36]. Outcomes on the RAS-J were analyzed using the five domains previously described, which includes goal/success orientation and hope, reliance on others, personal confidence, no domination by symptoms, and willingness to ask for help [36]. Each item was scored on a 5-point Likert scale (1, strongly disagree; 5, strongly agree), with higher scores indicating a better attitude to recovery.

Cognitive insight was assessed with the Japanese version of the Beck Cognitive Insight Scale (BCIS-J). This comprises 15 items and two subscales: nine self-reflectiveness items assessing objectivity, reflection, and openness to feedback, and six self-certainty items assessing certainty about being right and resistance to correction [19, 37]. Each item was scored using a 4-point

scale (0, do not agree at all; to 3, agree completely), with a higher score of self-reflectiveness indicating greater objectivity, and recognition of self and situation and with a higher score of self-certainty indicating greater certitude and confidence in one's belief. A composite index was calculated by subtracting the self-certainty score from the self-reflectiveness score. Low composite index scores indicate lower cognitive insight, reflecting low self-reflectiveness and high self-certainty.

Neurocognition was assessed with the similarities and symbol search subtests from the Wechsler Adult Intelligence Scale-Third Edition (WAIS-III) [38]. Sumiyoshi *et al.* [39, 40] suggested that the combination of these WAIS-III subtests is the optimal and most concise assessment of neurocognition in terms of administration time, providing an assessment that is sensitive to overall cognitive functioning and functional outcomes for schizophrenia.

Social functioning was assessed with the Life Assessment Scale for the Mentally Ill (LASMI) [41]. The LASMI was developed to assess an individual's disabilities in daily life. It contains 40 items in five categories, including daily living, interpersonal relations, work, endurance and stability, and self-recognition, with higher scores indicating more severe disability. In this study, we used four categories: daily living, interpersonal relations, endurance and stability, and self-recognition.

Symptoms were assessed with the 18-item Brief Psychiatric Rating Scale (BPRS) [42]. Outcomes on the BPRS were analyzed using the 5-factor solution described by Harvey *et al.* [43], which includes the following subscales: positive, negative, disorganization, belligerence, and affect. Each item was rated from 1 (not present) to 7 (extremely severe), with higher scores indicating more severe symptoms.

Statistical analyses

Descriptive statistics were used to summarize the demographic and clinical variables. Pearson correlation coefficients were calculated to examine the association between RAS-J and each variable (BCIS-J, WAIS-III similarities and symbol search, LASMI, and BPRS). To investigate the extent of the impact of clinical variables on recovery, stepwise multiple regression analysis was performed to determine the factors associated with recovery. Scores on each of the RAS-J subscales and the RAS-J total score were dependent variables, and clinical variables that were significantly correlated with RAS-J (with $p < .05$ and with $r > 0.3$) were independent variables. A test result was considered significant where $p < .05$ for a two-sided test. Statistical analyses were performed with JMP13.0.0 for Microsoft Windows (SAS

Institute, Cary, NC, USA).

Results

One-hundred and three patients with schizophrenia participated in this study. Demographic and clinical variables are summarized in Table 1 and 2. The mean age of participants was 50.93 years ($SD = 10.93$), and the mean antipsychotic dose (chlorpromazine equivalents) was 750.89 mg ($SD = 253.28$). Of the 103 participants, 59 (57.28%) were male and 44 (42.72%) were inpatients. Mean scores for RAS-J subtests were as follows: goal/success orientation and hope, 32.34 ($SD = 5.83$); reliance on others, 14.24 ($SD = 2.47$); personal confidence and hope, 15.97 ($SD = 3.71$); no domination by symptoms, 6.87 ($SD = 1.88$); willingness to ask for help, 14.07 ($SD = 2.32$); and the mean RAS-J total score was 83.50 ($SD = 12.04$). Mean scores for the BCIS-J were as follows: self-reflectiveness, 11.09 ($SD = 4.92$); self-certainty, 7.36 ($SD = 2.88$); and composite index score, 3.69 ($SD = 3.96$). Results of the Pearson correlation of the scores for RAS-J with other variables are shown in Table 3. There were several significant correlations ($r > 0.3$). Goal/success orientation and hope was correlated with self-reflectiveness ($r = 0.35$) in the BCIS-J and self-recognition ($r = 0.37$) in the LASMI. Reliance on others was correlated with self-reflectiveness ($r = 0.65$), self-certainty ($r = 0.45$), and the composite index ($r = 0.46$) in the BCIS-J. Personal confidence was correlated with self-certainty ($r = 0.38$) in the BCIS-J, endurance and stability ($r = 0.53$), and self-recognition ($r = 0.31$) in the LASMI, and disorganization ($r = 0.40$) and belligerence ($r = 0.45$) in the BPRS. Not dominated by symptoms was correlated with self-reflectiveness ($r = 0.47$)

Table 1. Patient demographics

Age (years), mean (SD)	50.93 (10.93)
Gender, n (%)	
Male	59 (57.28)
Female	44 (42.72)
Age of onset (years), mean (SD)	23.76 (3.47)
Number of hospital stays, mean (SD)	2.80 (1.22)
Total length of hospital stays (months) ^a , mean (SD)	21.92 (16.46)
Education (years), mean (SD)	11.30 (2.38)
Experience of employment, n (%)	
Yes	31 (30.10)
No	72 (69.90)
Treatment setting, n (%)	
Inpatient	81 (78.64)
Outpatient	22 (21.36)
Antipsychotic dose (mg/day) ^b , mean (SD)	750.89 (253.28)

^a The total length of hospital stay represented the total length of all previous hospital stays.

^b Chlorpromazine equivalent dose.

Table 2. Descriptive statistics of clinical variables

	Mean (SD)	Range
RAS-J		
Goal/success orientation and hope	32.34 (5.83)	21–43
Reliance on others	14.24 (2.47)	10–20
Personal confidence	15.97 (3.71)	9–25
No domination by symptoms	6.87 (1.88)	4–15
Willingness to ask for help	14.07 (2.32)	10–20
RAS-J total	83.50 (12.04)	65–114
BCIS-J		
Self-reflectiveness	11.09 (4.92)	3–27
Self-certainty	7.36 (2.88)	3–16
Composite index	3.69 (3.96)	–4–16
WAIS-III		
Similarities raw score	15.39 (5.98)	0–27
Symbol search raw score	21.97 (9.05)	8–39
LASMI		
Daily living	22.37 (6.87)	8–32
Interpersonal relations	22.50 (7.75)	8–34
Endurance and stability	7.55 (1.34)	4–9
Self-recognition	7.85 (2.89)	1–12
BPRS		
Positive	24.16 (4.63)	11–32
Negative	12.30 (2.68)	6–19
Disorganization	13.89 (3.24)	6–19
Belligerence	12.19 (3.17)	6–18
Affect	17.84 (3.82)	9–24
BPRS total	80.49 (14.01)	38–107

RAS-J, Japanese version of the Recovery Assessment Scale; BCIS-J, Japanese version of the Beck Cognitive Insight Scale; WAIS-III, Wechsler Adult Intelligence Scale-Third Edition; LASMI, Life Assessment Scale for the Mentally Ill; BPRS, Brief Psychiatric Rating Scale.

and self-certainty ($r = 0.61$) in the BCIS-J. Willingness to ask for help was correlated with self-reflectiveness ($r = 0.32$) and self-certainty ($r = 0.61$) in the BCIS-J, and belligerence ($r = 0.31$) in the BPRS. RAS total was correlated with self-reflectiveness ($r = 0.48$) and self-certainty ($r = 0.54$) in the BCIS-J, endurance and stability ($r = 0.30$) in the LASMI, and belligerence ($r = 0.38$) in the BPRS.

The stepwise multiple regression analysis was performed to investigate factors associated with recovery measured by the RAS-J. However, there was evidence of multicollinearity because the variance inflation factor for dependent variables in a stepwise multiple regression analysis including BCIS-J self-reflectiveness, self-certainty, and composite index scores, with RAS-J reliance on others as the dependent variable were 356.72, 126.36, and 223.47, respectively. Therefore, we conducted the analysis of factors associated with RAS-J reliance on others excluding the BCIS-J composite index. The final models from the stepwise multiple regression analyses are shown in Table 4. The models fit were good (goal/success orientation and hope, $F = 765.30$, $p = .000$; reliance on others, $F = 597.26$, $p = .000$; personal confidence, $F = 1529.56$, $p = .000$; no domination by symptoms, $F = 621.95$, $p = .000$; willingness to ask for help, $F = 1150.42$, $p = .000$; RAS-J total, $F = 1499.79$, $p = .000$).

Goal/success orientation and hope in the RAS-J

Table 3. Correlations among RAS-J, BCIS-J, WAIS-III, LASMI, and BPRS

RAS-J	GO	RE	PE	NO	WI	Total
BCIS-J						
SR	0.35**	0.65**	0.14	0.47**	0.32**	0.48**
SC	0.24*	0.45**	0.38**	0.61**	0.61**	0.54**
CI	0.27**	0.46**	–0.12	0.10	–0.07	0.19
WAIS-III						
Similarities	–0.11	0.05	–0.11	0.17	0.15	–0.03
Symbol search	0.04	0.03	–0.15	0.10	–0.18	–0.04
LASMI						
DL	0.03	–0.01	0.21*	0.09	0.19	0.13
IR	–0.05	–0.26**	0.20*	–0.10	0.01	–0.03
ES	0.28**	–0.04	0.53**	–0.00	0.08	0.30**
SR	0.37**	–0.01	0.31**	–0.09	0.07	0.27**
BPRS						
Positive	0.27**	–0.06	0.29**	0.10	0.17	0.26**
Negative	–0.18	–0.25*	0.16	–0.20*	0.17	–0.09
Disorganization	0.11	–0.24*	0.40**	–0.08	0.27**	0.17
Belligerence	0.26**	0.13	0.45**	0.19	0.31**	0.38**
Affect	–0.15	–0.25*	–0.24*	–0.21*	–0.15	–0.26**
Total	0.09	–0.16	0.25*	–0.04	0.18	0.12

RAS-J, Japanese version of the Recovery Assessment Scale; GO, goal/success orientation and hope; RE, reliance on others; PE, personal confidence; NO, no domination by symptoms; WI, willingness to ask for help; BCIS-J, Japanese version of the Beck Cognitive Insight Scale; SR, self-reflectiveness; SC, self-certainty; CI, composite index; WAIS-III, Wechsler Adult Intelligence Scale-Third Edition; LASMI, Life Assessment Scale for the Mentally Ill; LASMI-DL, daily living; LASMI-IR, interpersonal relations; LASMI-ES, endurance and stability; LASMI-SR, self-recognition; BPRS, Brief Psychiatric Rating Scale.

* $p < .05$, ** $p < .01$

Table 4. Stepwise multiple regression analyses for relationships between recovery measured by RAS-J and clinical variables

		<i>B</i>	<i>SE</i>	β	<i>t</i>	95% CI	<i>p</i>	Adjusted <i>R</i> ²
GO	SR (BCIS-J)	1.13	0.14	0.42	8.22	0.85–1.40	.000**	0.94
	SR (LASMI)	2.30	0.20	0.59	11.60	1.91–2.69	.000**	
RE	SC (BCIS-J)	0.90	0.15	0.49	5.89	0.60–1.20	.000**	0.92
	SR (BCIS-J)	0.58	0.10	0.49	5.96	0.38–0.77	.000**	
PE	SC (BCIS-J)	0.46	0.10	0.22	4.73	0.27–0.65	.000**	0.97
	ES (LASMI)	1.66	0.10	0.78	16.51	1.46–1.86	.000**	
NO	SC (BCIS-J)	0.62	0.07	0.69	8.58	0.48–0.77	.000**	0.93
	SR (BCIS-J)	0.17	0.05	0.28	3.49	0.07–0.26	.000**	
WI	SC (BCIS-J)	0.74	0.10	0.41	7.19	0.53–0.94	.000**	0.96
	Belligerence (BPRS)	0.67	0.06	0.59	10.38	0.54–0.79	.000**	
RAS-J total	SC (BCIS-J)	2.12	0.54	0.20	3.95	1.05–3.19	.000**	0.98
	SR (BCIS-J)	0.86	0.32	0.12	2.73	0.24–1.49	.007**	
	ES (LASMI)	7.55	0.45	0.69	16.94	6.66–8.43	.000**	

RAS-J, Japanese version of the Recovery Assessment Scale; GO, goal/success orientation and hope; RE, reliance on others; PE, personal confidence; NO, no domination by symptoms; WI, willingness to ask for help; BCIS-J, Japanese version of the Beck Cognitive Insight Scale; SR, self-reflectiveness; SC, self-certainty; LASMI, Life Assessment Scale for the Mentally Ill; LASMI-IR, interpersonal relations; LASMI-ES, endurance and stability; LASMI-SR, self-recognition; BPRS, Brief Psychiatric Rating Scale; *B*, Partial regression coefficient; β , standardized partial regression coefficient; 95% CI, 95% confidence interval

***p* < .01

(adjusted $R^2 = 0.94$) was significantly associated with self-reflectiveness ($\beta = 0.42$, $p = .000$) in the BCIS-J and self-recognition ($\beta = 0.59$, $p = .000$) in the LASMI. Reliance on others in the RAS-J (adjusted $R^2 = 0.92$) was significantly associated with self-certainty ($\beta = 0.49$, $p = .000$) and self-reflectiveness ($\beta = 0.49$, $p = .000$) in the BCIS-J. Personal confidence in the RAS-J (adjusted $R^2 = 0.97$) was significantly associated with self-certainty ($\beta = 0.22$, $p = .000$) in the BCIS-J and endurance and stability ($\beta = 0.78$, $p = .000$) in the LASMI. No domination by symptoms in the RAS-J (adjusted $R^2 = 0.92$) was significantly associated with self-certainty ($\beta = 0.69$, $p = .000$) and self-reflectiveness ($\beta = 0.28$, $p = .000$) in the BCIS-J. Willingness to ask for help in the RAS-J (adjusted $R^2 = 0.96$) was significantly associated with self-certainty ($\beta = 0.41$, $p = .000$) in the BCIS-J and belligerence ($\beta = 0.59$, $p = .000$) in the BPRS. RAS-J total score (adjusted $R^2 = 0.98$) was significantly associated with self-certainty ($\beta = 0.20$, $p = .000$) and self-reflectiveness ($\beta = 0.12$, $p = .007$) in the BCIS-J and endurance and stability ($\beta = 0.69$, $p = .000$) in the LASMI.

Discussion

Participant characteristics

Participants in this study included 81 inpatients (78.64%) and 22 outpatients (21.36%), with a mean RAS-J total of 83.50 ($SD = 12.04$). Although standardized scores for the RAS-J have not been elucidated, our results are consistent with the Japanese sample with schizophrenia reported by Chiba *et al.* ($mean = 82.11$,

$SD = 15.76$) [36], which included 115 inpatients (55%) and 94 outpatients (45%). Therefore, the degree of recovery for participants in our study may be generalizable to Japanese patients with schizophrenia. Although the BCIS-J standardized score has also not been identified, the mean self-reflectiveness score in our study (11.09, $SD = 4.92$) was similar to that in a Japanese sample with schizophrenia reported by Uchida *et al.* (11.85, $SD = 3.30$), while mean self-certainty scores in our study (7.36, $SD = 2.88$) were higher than those reported in the previous study (4.27, $SD = 2.13$) [37]. It has been reported that low self-reflectiveness and high self-certainty reflect low cognitive insight, and are associated with the occurrence of delusions [44, 45]. Therefore, it is possible that participants in our study had more severe delusions than those among general Japanese patients with schizophrenia.

Factors associated with recovery in patients with schizophrenia

Results of stepwise multiple regression analysis indicated that goal/success orientation and hope in the RAS-J was significantly associated with self-reflectiveness in the BCIS-J and self-recognition in the LASMI. Reliance on others in the RAS-J was significantly associated with self-certainty and self-reflectiveness in the BCIS-J. Personal confidence in the RAS-J was significantly associated with self-certainty in the BCIS-J and endurance and stability in the LASMI. No domination by symptoms in the RAS-J was significantly associated with self-certainty and self-reflectiveness in the BCIS-J. Willingness to ask for help in the RAS-J was signifi-

cantly associated with self-certainty in the BCIS-J and belligerence in the BPRS. Finally, RAS-J total score was significantly associated with self-certainty and self-reflectiveness in the BCIS-J and endurance and stability in the LASMI.

This is the first study to demonstrate that cognitive insight measured with the BCIS-J is significantly associated with recovery measured with the RAS-J in patients with schizophrenia in a Japanese psychiatric hospital setting. In our model, cognitive insight was the most important predictive variable explaining the degree of recovery. These results provide encouraging evidence for a relationship between recovery and cognitive insight, supporting the assertion that interventions aimed to improve cognitive insight are needed for the achievement of recovery in patients with schizophrenia.

Moritz et al. [26, 27] developed metacognitive training (MCT) as a psychological intervention for improving cognitive insight related to delusions in schizophrenia. Ishigaki [46] developed the Japanese version of the MCT (MCT-J), and introduced it into the mental health field in Japan. Further study is needed to examine the impact of MCT-J in improving cognitive insight and the effects this has on recovery of patients with schizophrenia.

Endurance and stability in the LASMI, which assesses social adaptation, and its sustainability and stability, was associated with goal/success orientation and hope, personal confidence, and total RAS-J scores. Goals and hopes are important components of recovery [11, 47]. This suggests that interventions aimed at improving sustainability and stability of social adaptation would help patients achieve these recovery domains. Belligerence in the BPRS was associated with willingness to ask for help in the RAS-J. In fact, our findings show that comprehensive support is important for the achievement of recovery. Therefore, not only should interventions aim to improve cognitive insight but they should also target social adaptation.

We did not find a significant correlation between RAS-J and the WAIS-III similarities and symbol search subtests that reflect neurocognition. This result is not consistent with some previous studies, which have found associations between neurocognition and recovery in schizophrenia [22, 23, 48, 49]. This difference may be due to differences in the measures used to assess neurocognition, as we only used two WAIS-III subtests reflecting overall cognitive functioning in schizophrenia [39, 40]. Therefore, it could not examine the relationship between multiple aspects of cognitive functioning and recovery measured using RAS-J in this study. To verify the relationship between neurocognition and recovery, it may be necessary to include a comprehensive measure

of cognitive functioning, such as the MATRICS Consensus Cognitive Battery (MCCB) or Brief Assessment of Cognition in Schizophrenia (BACS) which could assess multiple aspects of cognitive functioning in schizophrenia.

Limitations

A number of study limitations should be noted. First, study participants might not be representative of all patients with schizophrenia, as this study was conducted at a single site and the sample size was small. Therefore, caution should be exercised in generalizing the findings to patients with schizophrenia as a whole. A multicenter research approach with a large sample is required to avoid this limitation and provide greater clarity regarding the relationship between recovery and cognitive insight. Second, participants included both inpatients and outpatients with schizophrenia. It may be necessary to investigate factors associated with recovery in each of these groups separately, because hospitalization may act to impede recovery [50]. Third, the longitudinal studies are required to explore the cause-and-effect association between recovery and cognitive insight, because cross-sectional studies are limited in the inferences that can be made about cause-and-effect associations between recovery and the factors including cognitive insight examined. Fourth, the RAS-J is a self-reported questionnaire and useful to assess subjective personal recovery, but not for assessing objective recovery. Therefore, future research is needed to investigate the relationship between objective recovery and cognitive insight in schizophrenia.

Conclusions

This study provides encouraging evidence for the relationship between recovery and cognitive insight in schizophrenia and may contribute to developing tailored interventions to improve cognitive insight with the aim of achieving recovery of patients with schizophrenia. Interventions to improve cognitive insight are rarely implemented in Japan. Therefore, future research is needed to evaluate the effects of adding such interventions to rehabilitation programs, including occupational therapy, and the impact on recovery within the context of such programs.

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