Cognitive insight and functional outcome in schizophrenia; a multi-center collaborative study with the specific level of functioning scale–Japanese version

Tomiki Sumiyoshi a,⁎, Keiichiro Nishida b, Hidehito Niimura c, Atsuhito Toyomaki d, Tsubasa Morimoto e, Masayuki Tani f, Ken Inada g, Taiga Ninomiya h, Hikaru Hori i, Jun Manabe c, Asuka Katsuki i, Takamitsu Kubo i, Yosuke Koshikawa b, Masanao Shirahama h, Kentaro Kohno h, Toshihiko Kinoshita b, Ichiro Kusumi d, Akira Iwanami f, Takefumi Ueno j, Toshi Kishimoto e, Takeshi Terao h, Kazuyuki Nakagome k

a Department of Clinical Epidemiology, Translational Medical Center, National Center of Neurology and Psychiatry, Tokyo, Japan
b Department of Neuropsychiatry, Kansai Medical University, Osaka, Japan
c Department of Neuropsychiatry, Keio University School of Medicine, Tokyo, Japan
d Department of Neuropsychiatry, Keio University School of Medicine, Tokyo, Japan
e Department of Neuropsychiatry, Keio University School of Medicine, Tokyo, Japan
f Department of Psychiatry, Nara Prefectural Medical University, Nara, Japan
g Department of Psychiatry, Showa University School of Medicine, Tokyo, Japan
h Department of Psychiatry, Tokyo Women's Medical University, School of Medicine, Tokyo, Japan
i Department of Psychiatry, Tokyo Women's Medical University, School of Medicine, Tokyo, Japan
j Department of Psychiatry, Showa University School of Medicine, Tokyo, Japan
k Department of Psychiatry, Showa University School of Medicine, Tokyo, Japan

Article history:
Received 12 June 2016
Received in revised form 31 July 2016
Accepted 4 August 2016
Available online 28 September 2016

Keywords:
Real-world functional outcomes
Metacognition
Neurocognition
Functional capacity
Schizophrenia

Abstract
The Specific Levels of Functioning Scale (SLOF) has been reported to provide a measure of social function in patients with schizophrenia. The aim of this multi-center study was to determine convergent validity of the Japanese version of SLOF, and if cognitive insight would be associated with social function. Fifty-eight patients with schizophrenia participated in the study. Social function, neurocognition, and daily activity skills were evaluated by the Social Functioning Scale (SFS), Brief Assessment of Cognition in Schizophrenia (BACS) and UCSD Performance-based Skills Assessment-Brief (UPSA-B), respectively. We also assessed cognitive insight with the Beck Cognitive Insight Scale (BCIS). Significant relationships were noted between scores on the SLOF vs. those of the SFS, BACS, UPSA-B, and BCIS. Specifically, the correlation between performance on the UPSA-B and SLOF scores was significantly more robust compared to the correlation between performance on the UPSA-B and scores on the SFS. Similarly, the correlation between scores on the BACS and SLOF tended to be more robust than that between the BACS and SFS. Importantly, while the correlation between scores on the BCIS and SLOF reached significance, it was not so between scores on the BCIS and SFS. The SLOF Japanese version was found to provide a measure of social consequences in patients with schizophrenia. Importantly, this study is the first to indicate the relationship between cognitive insight and social function evaluated by the SLOF. This finding is consistent with the observation that SLOF scores were considerably associated with performances on objective functional measures.

© 2016 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

1. Introduction

Ameliorating psychotic symptoms has been a traditional target in the treatment of schizophrenia. However, this approach has been reported to only partially improve functional outcomes of patients in real-world settings (Green, 1996; Green et al., 2000). Consequently,
efforts have been made to develop therapeutics for disturbances of cognitive function, e.g. several types of memory, executive function, attention, and verbal fluency, which has been shown to predict social outcomes more closely than do psychotic symptoms (Harvey, 2009; Wykes et al., 2011). The Measurement and Treatment Research to Improve Cognition in Schizophrenia (MATRICS) Consensus Cognitive Battery (MCCB) (Nuechterlein and Green, 2006) and the Brief Assessment of Cognitive Function in Schizophrenia (BACS) (Keefe et al., 2004) represent assessment tools to evaluate such neurocognitive functioning.

As a level of functional outcome mediating cognitive function (primary measure) and social function, scales to assess functional capacity (for daily living activities), or co-primary measures, have been implemented (Green et al., 2008). The UCSD Performance-based Skills Assessment-Brief (UPSA-B) (Mausbach et al., 2007) is one of such measures broadly used to evaluate everyday functioning. This scale represents a performance-based scale of everyday functioning, whose Japanese version has been developed and validated (Sumiyoshi et al., 2014, 2011).

For the assessment of social function, attempts have been made to determine which tools can adequately measure “real-world functional outcomes” linked to neurocognition and daily activity skills (Harvey et al., 2011; Leifker et al., 2011). Accordingly, the Validation of Everyday Real-World Outcomes (VALERO) initiative supported by the Rand expert panel selected the Quality of Life Scale (QLS), Social Functioning Scale (SFS), Specific Levels of Functioning Scale (SLOF), Social Behavior Schedule, Independent Living Skills Schedule, and Life Skills Profile as appropriate measures of social, residual, and vocational outcomes (Leifker et al., 2011). Specifically, Harvey et al. (2011) found the SLOF, among other social function scales discussed by the RAND panelists, best predicts performances on the MCCB, UPSA-B, and the advanced finances subscale of the Everyday Functioning Battery.

The SLOF has been developed as an interview-based multidimensional assessment measure of social outcomes, including interpersonal, vocational, and independent-living domains (Schneider and Struening, 1983). To accommodate cross-cultural adaptability of functional outcome measures, its original (English language) version has been translated into other languages for international use, e.g. (Mucci et al., 2014). Although we have developed and validated Japanese versions of the SFS Individuals’ version modified for the MATRICS-PASS (SFS-PASS) (Sumiyoshi et al., 2015), the development and validation of the SLOF Japanese version has been awaited, in line with the growing interest in global clinical trials.

Impairment of metacognition, or the ability to think about thinking, has been suggested to be associated with some functional outcomes, e.g. cognitive function (neuropsychological performance) (Lysaker et al., 2010), functional capacity (everyday functioning) as measured by the UPSA (Lysaker et al., 2011), and quality of life as measured by the QLS (Lysaker et al., 2010) in patients with schizophrenia. Among the domains of metacognition, cognitive insight has been conceptualized as the mental processes involved in self reflection and self-certainty in individuals with psychiatric conditions. The Japanese version of the BCIS was developed based on the original version, and its validity has been confirmed in patients with schizophrenia (Uchida et al., 2009).

Although the lack of clinical insight (awareness of the illness), a core feature of schizophrenia, has been suggested to influence outcome (Durand et al., 2015), limited information is available about whether cognitive insight is related to real-world outcomes in schizophrenia. It was hypothesized that cognitive insight would be associated with social function, particularly when assessed with objective (interview-based) measures, such as the SLOF, but not subjective (self-reported) measures, such as the SFS. Therefore, the present study was conducted to determine convergent validity of the Japanese version of the SLOF, and if cognitive insight would be related to social function, as measured by the SLOF.

2. Methods

2.1. Subjects

This was a multi-center collaborative study, whose design, characteristics of participants and other information have been registered (UMIN ID: 000,012,671). Fifty-eight Japanese patients with schizophrenia were recruited at 10 participating institutions throughout Japan, i.e. Hokkaido University, Keio University, Tokyo Women’s Medical University, Showa University, Nara Medical University, Kansai University, Oita University, University of Occupational and Environmental Health, Hizen Psychiatric Center, and National Center of Neurology and Psychiatry. Diagnosis was made based on DSM-IV-TR criteria by experienced psychiatrists using all available information. Patients known to be abusing alcohol or illicit drugs, or those with epilepsy, brain damage, or neurologic disorders were excluded.

Demographic data of these subjects are presented in Table 1. Approximately half of them were female. All patients were taking antipsychotic drugs. Written informed consent was obtained from all participants. The study protocol was approved by the ethics committees of participating institutions.

2.2. Assessment procedures

Before the study was started, all raters received extensive training in performing the assessments, according to the procedure previously reported (Strassnig et al., 2015).

2.2.1. Social function measures

2.2.1.1. SLOF. In this study, the abbreviated version of the SLOF, consisting of the following domains, was used, according to the recent literature (Durand et al., 2015; Sabbag et al., 2011, 2012; Strassnig et al., 2015); Interpersonal Functioning (e.g., initiating, accepting and maintaining social contacts; effectively communicating), independent participation in Everyday Activities (shopping, using telephone, paying bills, use of leisure time, use of public transportation), and Vocational Functioning (e.g., employable skills, level of supervision required to complete tasks, ability to stay on task, completes tasks, punctuality). For the purpose of this study, we examined only summary scores based on these three domains, as previously reported (Sabbag et al., 2011). Some of the subscales of the SLOF, e.g. the social acceptability and personal care subscales, were not included in calculation of the total score, based on the suggestions by the Rand Panel, as described in previous studies (Durand et al., 2015; Sabbag et al., 2011; Strassnig et al., 2015).

Table 1

Demographic data.

| Metric              | Mean (SD)    | Range   |
|---------------------|--------------|---------|
| M/F                 | 31/27        |         |
| Age, yr             | 35.9 (9.6)   | 20–58   |
| Duration, month     | 148.3 (111.4)| 4–396   |
| PANSS               | 61.1 (20.1)  | 33–115  |
| Estimated IQ        | 100.2 (11.8) | 69.3–119.8 |
| Medication (CPZ equiv. mg/day) | 546.8 (407.7) | 5–1730 |
| BACS (z-score in SD unit) | -2.0 (2.2) | -8.6 to 2.6 |
| UPSA-B              | 72.4 (18.8)  | 0–94    |
| SFS                 | 109.4 (26.4) | 17–186  |
| SLOF                | 90.7 (15.7)  | 42–117  |
| BCIS                | 8.5 (5.4)    | -2 to 24 |
The raters conducted the interviews with ratings generated by the patient and informant; interviewer-rated scores of the SLOF was used as an objective measure of social function (Sabbag et al., 2011; Strassnig et al., 2015).

The SLOF Japanese version (Sumiyoshi and Sumiyoshi, 2012) was developed based on the original version. The translated version has been approved by developers after conducting independent forward and back translations, reconciliation, and pilot testing on patients.

2.2.1.2. SFS. The SFS-PASS was used to evaluate overall social functioning. This scale was designed by the MATRICS-Psychometric and Standardization Study (MATRICS-PASS) (Kern et al., 2008; Nuechterlein et al., 2008) for the validation study of the MCCB. It comprises the Social Functioning Scale Individuals’ version (Birchwood et al., 1990; Nemoto et al., 2008). The SFS-PASS, consisting of 7 domains, assesses social competence by asking subjects’ status or activities. Data were collected from the participants’ self-rating/reports. To enhance the accuracy of self-rating, most items were accompanied by anchor points (frequencies). For example, the degree of activities of ‘Visiting friends’ is well defined as ‘Never’ = 0 times [0 point]; ‘Rarely’ = more than once in recent 3 months [1]; ‘Sometimes’ = more than once in a month [2]; ‘Often’ = more than once in a week [3]. The associations between ratings with this Japanese version of the SFS (self-reported) and the MCCB composite score have been reported (Sumiyoshi et al., 2015; Sumiyoshi and Sumiyoshi, 2015).

2.2.2. Functional capacity measure

2.2.2.1. UPSA-B. The Japanese version of the UPSA-B (Mausbach et al., 2007) was used to assess everyday functioning. This battery consists of Finances and Communication subdomains. The former includes financial skills such as counting change or extracting information from a bill payment. The latter evaluates communicative ability such as speaking on the phone or rescheduling an appointment. All the tasks are role-played. Each task score is summed by subscales and then transformed to standard scores (0–100). The total score is the sum of the subscale standard scores (0–100). The Japanese version was developed based on the international version of the UPSA-B, with some modifications to adjust for differences in everyday living skills in Japan (Sumiyoshi et al., 2011). The equivalency to its original version and validity have been confirmed (Sumiyoshi et al., 2014).

2.2.3. Neurocognition

2.2.3.1. Brief Assessment of Cognition in Schizophrenia (BACS). Cognitive assessment was conducted by the Japanese version of the Brief Assessment of Cognition in Schizophrenia (BACS) (Kaneda et al., 2013), based on the original version (Keeffe et al., 2004). The cognitive domains included in the BACS are verbal memory, working memory, motor speed, verbal fluency, attention, and executive function. The primary measure from each test of the BACS was standardized by creating z-scores whereby the mean score of Japanese healthy controls was set to zero and the standard deviation set to one (Kaneda et al., 2013). A composite score was calculated by averaging all z-scores of the six primary measures.

2.2.4. Cognitive insight

Cognitive insight (metacognition) was measured by the BCIS Japanese version (Uchida et al., 2009). It is a self-report instrument consisting of 15 items rated on a 4-point scale (0, do not agree at all; to 3, agree completely).

2.2.5. Psychopathology

The severity of symptoms was measured by the Positive and Negative Syndrome Scale (PANSS) Japanese version (Kay et al., 1987).

2.2.6. Statistical analyses

SPSS ver. 22.0 was used for statistical analyses. Test–retest reliability of the SLOF scores was examined by Kendall’s rank correlation coefficient. The internal consistency of the SLOF were measured by Cronbach alpha coefficients. Pearson’s correlation coefficients with scores of the SFS, BACS, and UPSA-B were obtained to test the validity of the SLOF. Also, the relationships between summary scores of the SLOF and those of the BCIS or PANSS were evaluated by the Pearson’s method. Significance was considered when p-value was less than 0.05.

3. Results
3.1. Demographic data

Table 1 shows demographic backgrounds of patients. All were medicated. Generally, they were relatively chronic, with mean duration of illness >12 yr. Psychometric variables were generally distributed. Mean (SD) of SLOF subscale scores were: Interpersonal Functioning, 21.8 (6.0); Everyday Activities, 48.1 (7.1); and Vocational Functioning, 20.8 (5.5).

3.2. Reliability

Cronbach alpha for the SLOF Japanese version was 0.80.

3.3. Validity

As shown in Table 2, significant positive correlations were observed between scores on the SLOF and those of the SFS, BACS, UPSA-B, and BCIS. Also, SLOF scores were negatively correlated with PANSS scores. A significant associations were also noted between the SLOF scores vs. PANSS Positive (R = −0.345, p < 0.01) and Negative (R = −0.690, p < 0.001) subscale scores.

Further analysis, with z-transformation of correlation coefficients, indicated that the correlation between performance on the UPSA-B and SLOF scores was significantly more robust compared to the correlation between performance on the UPSA-B and SFS scores (R = 0.230, p = 0.05). Similarly, the correlation between scores on the BACS and SLOF tended to be more robust than that between the BACS and SFS (R = 1.89, p = 0.059).

Importantly, while the correlation between scores on the BCIS and SLOF reached significance, it was not so between scores on the BCIS and SFS (Table 2, Fig. 1).

4. Discussion

The results of this study suggest the validity of the SLOF Japanese version in terms of the relationship with SFS scores, another social...
function measure, as well as scores on the BACS (neuro-cognition) and UPSA-B (functional capacity), in patients with schizophrenia. Its internal consistency was found to be acceptable. Importantly, we have provided the first data indicating a positive correlation between cognitive insight and real-world outcomes, as measured by the SLOF.

The SLOF (English version) is recommended as one of the "real-world functional outcomes" measures (Durand et al., 2015; Sabbag et al., 2011, 2012; Schneider and Struening, 1983; Strassnig et al., 2015), which has been shown to be closely linked to cognitive function and capacity of daily activity (Harvey et al., 2011). The significant correlations with scores on the SFS [another of the recommended real-world outcome measures (Leifker et al., 2011)], UPSA-B, and BACS in the current study indicate convergent validity of the SLOF Japanese version. Specifically, the association with SFS scores suggest that the SLOF is useful as a measure of social function, or real-world functional outcomes. Further, the ability of the SLOF to predict scores on the UPSA-B and BACS, reported here, is consistent with results in the VALERO Study (Harvey et al., 2011) with a similar set of performance-based measures, e.g. UPSA-B and MCCB. In fact, cognitive function evaluated by the BACS used here has been shown to correlate with performance on the MCCB Japanese version (Kaneda et al., 2013).

There was a difference in the degree of association with the performance-based measures (UPSA-B, BACS) between the SLOF and SFS (Fig. 1). The more robust associations for the SLOF can be explained by the fact that it was objectively rated (interview-based) while patients self-reported for the SFS. These results are similar to previous observations (Durand et al., 2015) that observer-, but not self-rated functional status was correlated with performance on the MCCB and UPSA-B in patients with schizophrenia, although our data indicate weak, but significant correlations between SFS scores vs. performances on the UPSA-B and BACS.

To our knowledge, the present study is the first to report a significant relationship between social function, measured by the SLOF, and cognitive insight, assessed by the BCIS. So far, several studies have sought to relate meta-cognition and cognitive function (neuropsychological performance) or functional capacity in subjects with schizophrenia. Thus, Lysaker et al. (2010) observed positive correlations between "mastery", an ability to work through one’s representativeness/mental states, as evaluated by the Metacognition Assessment Scale, and cognitive function, e.g. attention/information processing, learning memory, and executive function. The same group of investigators (Lysaker et al., 2011) also found this aspect of meta-cognition predicted performance on the

![Fig. 1. Correlations between cognitive insight, measured by the Beck Cognitive Insight Scale (BCIS) vs. social function, measured by the Specific Levels of Functioning Scale (SLOF) or Social Function Scale for the MATRICS-PASS (SFS).](image-url)
UPS A (Comprehensive Planning domain). The positive correlation between SLOF and BCIS scores, observed in the present study, indicates the association between some types of meta-cognition and functional outcomes in patients with schizophrenia.

The positive relationship between cognitive insight and social function evaluated by the SLOF (interviewer-rated), but not SFS (self-reported) is consistent with the observation that ratings with the former scale were more strongly associated with performances on objective functional measures (i.e., BACS and UPSA-B). This finding also point to the usefulness of objective ratings of social function measures, as has been suggested (Durand et al., 2015).

The negative correlations between SLOF scores vs. scores on the PANSS (Total and Positive and Negative subscales) indicate the severity of psychotic symptoms affect social function. So far, the associations between positive (Galderisi et al., 2014) and negative (Robertson et al., 2014; Strassnig et al., 2015) symptoms vs. SLOF scores have been reported. Our findings are consistent with these previous observations, and provide additional evidence that overall psychiatric status, including positive symptoms, may be related to real-world functional outcomes in patients with schizophrenia.

The limitations of this study include the relatively small number of subjects and the cross-sectional nature. For example, it may be worthwhile to see if meta-cognition would be a determinant of long-term functional outcomes in individuals with schizophrenia-spectrum disorders.

In summary, the results of this study suggest that the SLOF Japanese version provides a measure of social consequences in patients with schizophrenia, indicating universality of this real-world functional outcomes scale. Importantly, we have provided the first evidence for a relationship between cognitive insight and social function evaluated by the SLOF. This finding is consistent with the observation that scores on this social outcome scale were considerably associated with performances on objective functional measures (BACS, UPSA-B).

Role of funding source

Study sponsors played no role in study design; data collection, analysis, or interpretation; manuscript preparation; or the decision to submit the paper for publication.

Contributors

Drs. Sumiyoshi and Nakagome designed the study. Dr. Nakagome organized the collaborative team of institutions. Dr. Sumiyoshi conducted the analyses, and prepared the first draft. Drs. Ueno, Toyomaki, Nishida, and Niimura provided opinions for statistical analyses and/or interpretations of data. Drs. Nishida, Niimura, Toyomaki, Morimoto, Tani, Inada, Ninomiya, Hori, Manabe, Katsuki, Kubo, Koshikawa, Shirahama, Kohno, Ueno, and Sumiyoshi assisted with data collection. Drs. Inada, Kinoshita, Iwanami, Kishimoto, Terao, and Nakagome provided resources to assist with study completion. All authors contributed to and have approved the final manuscript.

Conflict of interest statement

Tomiki Sumiyoshi has received honoraria for advisory board, consultations, and/or speaker’s role from Dainippon Sumitomo Pharmaceutical and Otsuka Pharmaceutical. Keichiro Nishida has received speaker’s role and honoraria for advisory board from Dainippon Sumitomo Pharmaceutical and Otsuka Pharmaceutical. Masayuki Tani has received honoraria for advisory board, consultations, and speaker’s role from Dainippon Sumitomo Pharmaceutical and Otsuka Pharmaceutical. Ken Inada has received honoraria for advisory board, consultations, and/or speaker’s role from Astellas Pharmaceutical, Dainippon Sumitomo Pharmaceutical and Otsuka Pharmaceutical. Hikaru Hori has received honoraria for speaker’s role from Dainippon Sumitomo Pharmaceutical and Otsuka Pharmaceutical. Asuka Katsuki has received honoraria for speaker’s role from Dainippon Sumitomo Pharmaceutical. Yosuke Koshikawa has received honoraria for advisory board from Dainippon Sumitomo Pharmaceutical. Toshihiko Kinoshita has received honoraria for advisory board, consultations, and speaker’s role from Dainippon Sumitomo Pharmaceutical, Astellas Pharmaceutical and Otsuka Pharmaceutical. Ichiro Kusumi has received honoraria for advisory board, consultations, and/or speaker’s role, and research/grant support from Dainippon Sumitomo Pharmaceutical, Otsuka Pharmaceutical and Astellas. Akira Iwanami has received honoraria for advisory board, consultations, and speaker’s role from Dainippon Sumitomo Pharmaceutical and Otsuka Pharmaceutical. Takeshi Terao has received honoraria for speaker’s role from Otsuka Pharmaceutical. Kazuyuki Nakagome has received honoraria for advisory board, consultations, and speaker’s role from Dainippon Sumitomo Pharmaceutical and Otsuka Pharmaceutical.

Acknowledgement

The authors acknowledge supports from; Dr. Jun. Nakamura, Ms. Sayaka Kobayashi, Ms. Kumiko Hagiya, Ms. Naoko Shimmitsu, Ms. Ayaka Ashida, Ms. Mai Azuma, Mr. Masanao Shirahama, and Mr. Kentaro Kono. This study was funded by Japan Foundation for Neuroscience and Mental Health.

References

Beck, AT, Baruch, E, Balter, JM, Steer, RA, Warman, DM, 2004. A new instrument for measuring insight: the Beck cognitive insight scale. Schizophr. Res. 68, 319–329.
Birchwood, M, and Smith, J, Cochrane, R, Wetton, S, Copeman, S, 1990. The social functioning scale: the development and validation of a new scale of social adjustment for use in family intervention programmes with schizophrenic patients. Br. J. Psychiatry 157, 853–859.
Durand, D, Strassnig, M, Sahbag, S, Gould, F, Twamley, EW, Patterson, TL, et al., 2015. Factors influencing self-assessment of cognition and functioning in schizophrenia: implications for treatment studies. Eur. Neuropsychopharmacol. 25, 185–191.
Galderisi, S, Rossi, A, Rocca, P, Bertolino, A, Mucci, A, Bucci, P, et al., 2014. The influence of illness-related variables, personal resources and context-related factors on real-life functioning of people with schizophrenia. World Psychiatry 13, 275–287.
Green, MF, 1996. What are the functional consequences of neurocognitive deficits in schizophrenia? [see comments]. Am. J. Psychiatry 153, 321–330.
Green, MF, Kern, RS, Braff, DL, Mintz, J, 2000. Neurocognitive deficits and functional outcome in schizophrenia: are we measuring the “right stuff”? Schizophr. Bull. 26, 119–136.
Green, MF, Nuechterlein, KH, Kern, RS, Baade, LE, Fenton, WS, Gold, JM, et al., 2008. Functional co-primary measures for clinical trials in schizophrenia: results from the MATRICS psychometric and standardization study. Am. J. Psychiatry 165, 221–228.
Harvey, PD, 2009. Pharmacological cognitive enhancement in schizophrenia. Neuropsychol. Rev. 19, 324–335.
Harvey, PD, Raykov, T, Twamley, EW, Vella, L, Heaton, RK, Patterson, TL, 2011. Validating the measurement of real-world functional outcomes: phase 1 results of the VALERO study. Am. J. Psychiatry 168, 1195–1201.
Kaneda, Y, Ohmori, T, Okahisa, Y, Sumiyoshi, T, Pu, S, Ueoka, Y, et al., 2013. Measurement and treatment research: exploring relationships between neurocognitive function and self-assessment. Schizophr. Res. 104, 298–304.
Kay, SR, Fiszbein, A, Opler, LA, 1987. The positive and negative syndrome scale (PANSS) for schizophrenia. Schizophr. Bull. 13, 261–276.
Keefe, RS, Goldberg, TE, Harvey, PD, Gold, JM, Poe, MP, Coughnoun, LR, 2004. The brief assessment of cognition in schizophrenia: reliability, sensitivity, and comparison with a standard neurocognitive battery. Schizophr. Res. 68, 283–297.
Kern, RS, Nuechterlein, KH, Green, MF, Baade, LE, Fenton, WS, Gold, JM, et al., 2008. The MATRICS consensus cognitive battery, part 2: co-norming and standardization. Schizophr. Bull. 34, 119–127.
Leffler, FR, Patterson, TL, Heaton, RK, Harvey, PD, 2011. Validating measures of real-world outcome: the results of the VALERO expert survey and RAND panel. Schizophr. Bull. 37, 334–343.
Lysaker, PH, McCormick, BP, Sneath, G, Buck, KD, Hamrn, J, Grant, M, et al., 2011. Metacognition and social function in schizophrenia: associations of mastery with functional skills competence. Schizophr. Res. 131, 214–218.
Lysaker, PH, Shea, AM, Buck, KD, Dimaggio, G, Nicole, G, Procacci, M, et al., 2010. Metacognition as a mediator of the effects of impairments in neurocognition on social functioning.
function in schizophrenia spectrum disorders. Acta Psychiatr. Scand. 122, 405–413.

Mausbach, BT, Harvey, PD, Goldman, SR, Jeste, DV, Patterson, TL, 2007. Development of a brief scale of everyday functioning in persons with serious mental illness. Schizophr. Bull. 33, 1364–1372.

Mucci, A, Rucci, P, Rocca, P, Bucci, P, Gibertoni, D, Merlotti, E, et al., 2014. The specific level of functioning scale: construct validity, internal consistency and factor structure in a large Italian sample of people with schizophrenia living in the community. Schizophr. Res. 159, 144–150.

Nemoto, T, Fuji, C, Miura, Y, Chino, B, Kobayashi, H, Yamazawa, R, et al., 2008. Reliability and validity of the social functioning scale Japanese version (SFS-J). Jpn. Bull. Soc. Psychiatry 17, 188–196.

Nuechterlein, KH, Green, MF, 2006. MATRICS Consensus Cognitive Battery Vol. MATRICS Assessment, Inc., Los Angeles.

Nuechterlein, KH, Green, MF, Kern, RS, Baade, LE, Barch, DM, Cohen, JD, et al., 2008. The MATRICS consensus cognitive battery, part 1: test selection, reliability, and validity. Am. J. Psychiatry 165, 203–213.

Robertson, BR, Prestia, D, Twamley, EW, Patterson, TL, Bowie, CR, Harvey, PD, 2014. Social competence versus negative symptoms as predictors of real world social functioning in schizophrenia. Schizophr. Res. 160, 136–141.

Sabbag, S, Twamley, EM, Vella, I, Heaton, RK, Patterson, TL, Harvey, PD, 2011. Assessing everyday functioning in schizophrenia: not all informants seem equally informative. Schizophr. Res. 131, 250–255.

Sabbag, S, Twamley, EW, Vella, I, Heaton, RK, Patterson, TL, Harvey, PD, 2012. Predictors of the accuracy of self assessment of everyday functioning in people with schizophrenia. Schizophr. Res. 137, 190–195.

Schneider, LC, Struening, EL, 1983. SLOF: a behavioral rating scale for assessing the mentally ill. Soc. Work Res. Abstr. 19, 9–21.

Straussig, MT, Raykov, T, O’Gorman, C, Bowie, CR, Sabbag, S, Durand, D, et al., 2015. Determinants of different aspects of everyday outcome in schizophrenia: the roles of negative symptoms, cognition, and functional capacity. Schizophr. Res. 165, 76–82.

Sumiyoshi, T, Sumiyoshi, S, 2012. Specific Levels of Functioning Scale-Japanese Version, Tokyo.

Sumiyoshi, T, Sumiyoshi, C, 2015. Functional outcome in patients with schizophrenia: the concept and the measurement. Act. Nerv. Super. 57, 1–11.

Sumiyoshi, C, Harvey, PD, Takaki, M, Okahisa, Y, Sato, T, Sora, I, et al., 2015. Factors predicting work outcome in Japanese patients with schizophrenia: role of multiple functioning levels. Schizophr. Res. Cogn. 2, 105–112.

Sumiyoshi, T, Sumiyoshi, C, Hemmi, C, 2011. UCSD Performance-Based Skills Assessment-Brief (UPSA-B): Japanese Version. Administration and Scoring Manual, Tokyo.

Sumiyoshi, C, Takaki, M, Okahisa, Y, Patterson, TL, Harvey, PD, Sumiyoshi, T, 2014. Utility of the UCSD performance-based skills assessment-brief Japanese version: discriminative ability and relation to neurocognition. Schizophr. Res. Cogn. 1, 137–143.

Uchida, T, Matsumoto, K, Kikuchi, A, Miyakoshi, T, Ito, F, Ueno, T, et al., 2009. Psychometric properties of the Japanese version of the Beck cognitive insight scale: relation to clinical insight. Psychiatry Clin. Neurosci. 63, 291–297.

Wykes, T, Huddy, V, Cellard, C, McGurk, SR, Czobor, P, 2011. A meta-analysis of cognitive remediation for schizophrenia: methodology and effect sizes. Am. J. Psychiatry 168, 472–485.