

Which metacognitive components of insight in schizophrenia? The relationship between subjective and objective measures of metacognition and insight

C. Marucci¹, V. Santarelli²,
A. Collazzoni¹, D. Talevi¹, R. Rossi³,
A. Rossi¹, P. Stratta²

¹ Applied and Biotechnological Clinical Sciences Department (DISCAB) Section of Psychiatry and Clinical Psychology, University of L'Aquila, Italy; ² Department of Mental Health, ASL 1, L'Aquila, Italy; ³ PhD Programme University of Tor Vergata, Roma, Italy

Summary

Objectives

It has been well documented that metacognition is compromised in people with a diagnosis of schizophrenia. Recent theories, concerning the roots of poor insight in schizophrenia, have proposed that it may result, in part, from impairments in metacognition, the capacity to think about thinking. Metacognition is a complex construct including both objective and subjective elements not necessarily overlapping. Aim of this study is to investigate the relationship of these elements with insight.

Methods

Metacognitive abilities were assessed using both objective [*i.e.* Wisconsin Card Sorting Test (WCST), metacognitive adaptation] and subjective measures [Subjective Scale to Investigate Cognition in Schizophrenia (SSTICS)] in 44 individuals with schizophrenia. The G12 item of the Positive and Negative Symptoms Scale (PANSS) was used for Insight evaluation. Functional performance was evaluated using Global Assessment of Functioning.

Results

Table I shows the means of symptoms, insight, metacognition and functional ability in the studied sample. Table II shows Pearson *r* correlations between metacognitive evaluations and symptomatology, insight, cognitive and functional variables. No relationship was found between objective and subjective measures of metacognition. Subjective metacognition, but not the objective one was related to PANNS depressive score. Lack of Insight did not correlate with objective metacognition, but was significantly related to subjective metacognitive complaints and positive, negative, disorganized and excited PANNS symptoms. Global functioning was related only to the PANSS Positive Factor.

Conclusions

Subjective and objective metacognitive measures in schizophrenia could be considered as distinct domains, supporting the hypothesis of the independence of cognitive functioning in schizophrenia from its subjective measures. Our results support the hypothesis of the lack of insight as a complex psychopathological construct related to phenomenology, cognition and psychotic symptoms.

Key words

Metacognition • Insight • Psychotic symptoms • Functional assessment • Schizophrenia

© Copyright by Pacini Editore Srl



OPEN ACCESS

Received: July 25, 2018

Accepted: September 7, 2018

Introduction

Metacognitive function concerns the ability to self-monitor and self-regulate knowledge about one's own cognitive abilities and real cognitive performance, which are fundamental determinants of a competent function-

Correspondence

Paolo Stratta
Department of Mental Health, ASL 1,
via Capo Croce 1, 67100 L'Aquila, Italy
• Tel. +39 0862 368896 • Fax +39 0862 368814
• E-mail: psystr@tin.it

ing in the real world: “knowing about knowing”. Studies have consistently shown that metacognition is compromised in persons with schizophrenia¹, related to functionality, symptomatology^{2,3} and insight of illness⁴.

Lack of insight (LoI) is commonly observed in the persons with schizophrenia. It has been well documented that they have a specific LoI into their condition in comparison to other mental health disorders, both at early⁵ and chronic⁶ phases of the illness.

Several etiological models of LoI have been proposed that have led however to equivocal results. Since the predictive powers of symptoms^{6,7} and neurocognition⁸ on insight appear to be limited, some authors have hypothesized LoI as impaired metacognition^{4,9}. From the metacognitive perspective, the development of insight requires an individual that not only notices and reflects upon historical events related to one’s own illness, but also make sense of such experiences and develop a personally meaningful and consensually valid narrative of the illness. An individual, to develop insight, would need to construct a coherent and integrated account of his psychiatric state. Therefore, impaired metacognition is a promising potential contributor to LoI^{4,10}.

However, research on the relationship between metacognition and insight has yielded mixed results with some studies showing an association^{9,11} while others no¹². These contradictory results could be explained by many factors, such as the complexity of the insight construct, likely multidimensional, the use of different measures of insight and metacognition as well as differences in the diagnostic groups investigated in different studies⁹.

Several assessment tools of metacognition have been put forward, usually self-administered instruments^{13,14}. These instruments assess the capacity to self-monitor and self-regulate knowledge about one’s own cognitive abilities and cognitive performance¹⁵. Therefore, the subjective cognitive impairments can provide additional information to tell about the severity of clinical and functional outcomes of the patient. The Subjective Scale to Investigate Cognition in Schizophrenia (SSTICS)¹³ is a simple and ecological scale to assess patients’ subjective experiences of cognitive impairment. Although several instruments have been used to measure self-perceived cognitive functioning, only SSTICS was designed to particularly measure subjective complaints regarding the cognitive deficits constantly reported in schizophrenia¹⁶.

On the other hand, a direct objective measure of metacognition is also needed. An objective measure of metacognition has been elaborated by Koren et al.¹⁷ based on the awareness of performance on the Wisconsin Card Sorting Test (WCST). The WCST is the mostly used task to investigate executive functions, whose impaired performance is significantly associated with functional disability^{18,19}.

This paradigm investigates two important aspects of metacognitive functioning: monitoring (i.e. the mechanism that is used to subjectively assess the correctness of potential responses) and control (the mechanism that determines whether or not to volunteer the best available candidate answer). Through this version of WCST it is possible obtain both efficiency quantitative indices of cognitive function and metacognitive ability².

Aim of the study is to explore the relationship between the subjective and objective metacognitive evaluations (SME and OME) in a sample of patients with schizophrenia spectrum disorders and their relationships with insight into illness, psychotic symptoms and functional ability.

Materials and methods

Participants

Participants in the study were persons hospitalized for an index episode of schizophrenic disorder at the Department of Mental Health of L’Aquila. Inclusion criteria were a diagnosis of schizophrenia according to the DSM-IV-TR, and an age between 18 and 65 years. Exclusion criteria were: neurologic disorders; substance abuse in the past 6 months or lifetime history of substance dependence; mental retardation; medical illnesses associated with neurocognitive impairment and inability to provide an informed consent.

The institutional ethics committee approved all recruitment and assessment procedures. All patients provided written informed consent after receiving detailed explanation of the study. This study adheres to the Declaration of Helsinki.

Measures and procedures

The evaluation was made during the illness episode remission, immediately before discharge. This stabilization level was chosen as a criterion for evaluating the subjects in order to minimize state-dependent effects and maximize testing validity.

Clinical assessment

The Positive and Negative Syndrome Scale (PANSS) is a 30-item scale designed to obtain a measure of positive, negative and general symptoms. We used the five-factor model proposed by Wallwork et al.²⁰ comprising a positive factor (items P1, P3, P5, G9), a negative factor (items N1, N2, N3, N4, N6, G7), a disorganized/concrete (cognitive) factor (items P2, N5, G11), an excited factor (items P4, P7, G8, G14) and a depressed factor (items G2, G3, G6), including a total of 20 items.

Insight assessment

The item “Lack of judgement and insight” (G12) from PANSS has been used for the insight assessment. Lack

of insight (LoI) was defined as impaired awareness or understanding of one's own psychiatric condition and life situation. The measure is a 7-point, clinician-rated item: from "1", no impairment, to a "7", emphatic denial of past and present psychiatric illness. This item did not enter into the Wallwork et al.²⁰ model.

Metacognitive functioning

Objective Metacognitive Evaluation (OME)

Objective Metacognitive abilities were assessed using the paradigm of Koren et al.¹⁷, which is an adaptation of the 64-card WCST. In addition to the standard "forced responses", the procedure yielded a measurement of "free responses". To each participant was asked to rate his level of confidence in the answer on a scale of 0 (just guessing) to 100 (completely confident) and to decide whether he wanted the answer count toward his overall performance score. The metacognitive variables used were: 1) Accuracy score (the proportion of correct volunteered responses); 2) Free-response improvement (the difference between the free-response output-bound accuracy score and the forced-choice input-bound (quantity) score); 3) Global monitoring (the truthfulness of one's overall sense of knowledge, defined as the difference between the total number of correct responses and the total number of responses asked to be included); 4) Monitoring resolution (i.e. the extent to which the confidence judgments distinguished between correct and incorrect sorts); 5) Control sensitivity indexed by the gamma correlation calculated across all sorts between the level of confidence and the decision to venture the sort and 6) Gain (the score gain calculated as the overall difference between correct and incorrect responses)¹⁷. Perseverative errors have been also used as index of executive function performance.

Subjective Metacognitive Evaluation (SME)

The Subjective Scale to Investigate Cognition in Schizophrenia (SSTICS) was developed as a measure of self-appraisal cognitive deficit. The questionnaire contains 21 items focusing on memory, attention, executive functions and praxia. Sustained executive function, Memory of information, Consciousness of effort, Daily life, Distractibility and Alertness subscales were calculated¹³. Lecardeur and colleagues¹⁶ demonstrated that the SSTICS is a good instrument for evaluating the subjective cognitive complaints of patients with schizophrenia and also revealed good concordance between cognitive impairments experienced by patients and cognitive disorders assessed by a clinical rater.

Community functioning ability

Functional performance was evaluated using Global Assessment of Functioning (GAF), a rating scale used to assess the social and occupational functioning of adults.

Statistical analyses

Descriptive statistics were computed for all variables of interest. Cronbach's alpha for subjective and objective metacognitive (SME and OME) evaluations was calculated. A factor analysis was done on the metacognitive measures using a principal components analysis with oblimin rotation using Kaiser's criterion for factor retention (i.e. eigenvalue > 1).

We examined potential bivariate relationships between insight, cognitive and metacognitive variables, clinical and functional assessment using Pearson's product-moment correlations.

All analysis yielding a p value of less than 0.05 were considered significant. Statistical analysis was performed using SPSS software (V 20.0).

Results

Forty-four persons (28 men and 16 women) were recruited: mean age of 40.16 years (SD 12.74), educational level 10.28 years (SD 3.20), 24.9% were married and 81.8% unemployed at the time when they were interviewed. The mean age at onset of illness was 26.65 (SD 10.82) and the mean duration of illness 13.68 (SD 10.73). All participants were on antipsychotic medication at the time of the evaluation and the mean chlorpromazine equivalent dose was 500 (SD 195.09)²¹. Mean and SD of the studied variables are reported in Table I.

Cumulative scores for subjective and objective metacognitive evaluations (SME and OME respectively) were obtained through factor analysis. Firstly, Cronbach's alpha was calculated. Cronbach's alpha on the six SS-TICS subscales was .85 with no items whose exclusion increased the overall reliability value. Cronbach's alpha on the six WCST metacognitive indexes showed 4 items (Accuracy score, Improvement due to free choice, Monitoring resolution, Control sensitivity) whose exclusion increased the overall reliability value. These items were then excluded from calculations and Cronbach's alpha on the 2 remaining items was .87.

Exploratory Factor Analysis performed on the 6 SME and the 2 OME items showed a Kaiser-Meyer-Olkin value of .748 and a Bartlett's test of Sphericity of 179.547, d.f. 28, $p < .0005$. Two factors had eigenvalues greater than 1 explaining the 70.39% of the total variance (46.98 and 23.41 respectively). All the items of the SS-TICS highly loaded on the first cluster (all coefficients > .74), while the WCST metacognitive items very highly loaded of the second one (all coefficients > .95). The factorial scores obtained (regression method) were then considered in subsequent correlations.

No correlation was found between SME and OME. SME correlated with PANSS depressive factor ($r = .32$, $p < .05$, i.e. higher cognitive complaint – higher depression) and lack of insight ($r = -.37$, $p < .01$, i.e. higher

TABLE I. Means (standard deviation) of symptoms, insight, metacognition and functional ability in the studied sample ($n = 44$).

Five-factor model PANSS	Positive factor	13.74 (4.24)
	Negative factor	17.94 (8.38)
	Disorganized/concrete factor	9.59 (3.35)
	Excited factor	12.33 (4.67)
	Depressed factor	7.02 (2.18)
	Total	90.78 (20.19)
	Lol	4.51 (1.33)
WCST cognitive index	Perseverative errors	12.39 (8.39)
WCST metacognitive indexes	Accuracy score	.58 (.19)
	Improvement due to free choice	.02 (.04)
	Global monitoring	-23.40 (15.89)
	Monitoring resolution	.30 (.40)
	Control sensitivity	.36 (.55)
	Gain	9.02 (23.50)
SSTICS	Sustained executive function	4.79 (3.53)
	Memory of information	4.51 (3.36)
	Consciousness of effort	5.62 (3.35)
	Daily life	3.63 (3.26)
	Distractibility	3.49 (2.22)
	Alertness	.86 (1.17)
	Total score	23.67 (13.70)
GAF		44.08 (10.37)

Note. PANSS: Positive and Negative Syndrome Scale; Five-factor model PANSS (Wallwork et al., 2012); Lol: Lack of judgement and insight (Item 12 PANSS General Psychopathology); WCST: Wisconsin Card Sorting Test; SSTICS: Subjective Scale to Investigate Cognition in Schizophrenia; GAF: Global Assessment of Functioning

cognitive complaint – better insight). On the other hand, OME highly correlated with WCST perseverative errors ($r = -.62$, $p < .0005$, i.e. higher metacognitive performance – less perseverative errors) (Tab. II).

Lack of Insight item (G12) was correlated with PANSS positive symptoms ($r = .30$, $p < .05$), negative symptoms ($r = .35$, $p < .01$), Disorganized/Concrete Factor ($r = .49$, $p < .001$), Excited Factor ($r = .41$, $p < .01$) and total score ($r = .58$, $p < .0005$).

The GAF was related only to the PANSS Positive Factor ($r = -.50$, $p < .0005$).

Discussion

Our data revealed that the SSTICS subscales did not correlate with any of the WCST indexes, nor perseverative errors or metacognitive. Previous studies on subjective and objective measures of metacognition reported mixed results²². Correlations were found between SME and OME by some authors^{14 23 24}, while other ones reported only a small or no relationship²⁵. These last findings are similar to our results, suggesting that the subjective evaluation of cognition in schizophrenia could be a specific dimension of cognition, which is independent from its objective measurements^{4 18 26}.

It would be hypothesized that the absence of correlation is due to cognitive impairment without awareness

and, subsequently, complaints about it. This absence of awareness would be encompassed within a more general concept of lack of insight²⁶.

As a matter of fact we found a negative correlation between awareness of illness, measured by the item G12 of the PANSS and SME. Previous studies confirm this result^{13 27 28}, although not confirmed by others ones^{16 28 29}. It is conceivable that more a patient lacks insight, less he perceives cognitive difficulties. As suggested by Medalia and Thysen¹⁴, who compared insight into clinical symptoms vs insight into neurocognitive symptoms, patients have significantly less cognitive insight than clinical insight. We found no correlation between insight and OME as far as concerned metacognitive and cognitive indexes of WCST. As emerged from the meta-analysis by Aleman et al.⁸, some studies found associations between the WCST (cognitive or metacognitive indexes) and poor insight^{17 30 31}, while a number of studies failed to replicate such relationship^{9 10}.

On the other hand, OME highly correlated with WCST perseverative errors. The more there is higher metacognitive performance, the less perseverative errors are present confirming our previous findings^{2 3}.

A relevant aspect that emerged in our study is the relationship between SSTICS and depressive symptoms. Our findings are consistent with previous reports showing significant correlations^{4 21 27-29}; however, contrasting

TABLE II. Pearson *r* correlations between metacognitive evaluations and symptomatology, insight, cognitive and functional variables (*n* = 44).

	Subjective metacognitive evaluation	Objective metacognitive evaluation
PANNS		
Positive factor	-.17	-.06
Negative factor	.01	-.21
Disorganized/concrete factor	-.24	-.10
Excited factor	-.06	-.05
Depressed factor	.32*	.07
Total	-.09	-.16
Lol	-.37**	-.10
WCST perseverative errors	.04	-.62***
GAF	.06	.10

p* < .05; *p* < .01; ****p* < .0005

reports do exist³². It could be possible to hypothesize a role of Lol as third variable that could mediate the relationship between SSTICS and depressive symptoms, i.e. an enhanced risk of depression could be present in patients more aware of their disability. Such a condition is well known as the “Insight paradox”, with those persons with schizophrenia with higher levels of Insight showing increased levels of depression^{33,34}.

As far as the relationship between Lack of Insight with clinical symptomatology, we found significant correlation with PANSS positive, negative, disorganized, excited symptoms as well as with total score. These results confirm previous studies supporting the hypothesis of the lack of insight as a complex psychopathological construct related to phenomenology, cognition and psychotic symptoms^{6,7,35}.

Our study has significant strengths. We used objective and subjective metacognitive performance, which are thought to be dissociated in some psychiatric disorders, particularly in psychosis. Regarding the SME we used SSTICS¹³ the only one designed to specifically measure subjective complaints regarding the cognitive deficits in schizophrenia¹⁶. About the OME, the adaptation of the 64-card Wisconsin Card Sorting Test (WCST), proposed by Koren et al.¹⁷ is a good instrument that investigate both cognitive and metacognitive functioning.

Limitations however have to be considered. The main one is that the study is cross-sectional in a naturalistic clinical setting. A prospective study is needed to confirm the stability over time of the relationships identified herein.

We used one item only from PANSS to evaluate insight while other studies used more detailed measures. However, several studies employed single-item insight

measures embedded in scales to assess symptomatology, such as the PANSS.

The sample size is relatively small reducing the power of the analysis; it however can be sufficient to heuristically investigate the relationship among the studied variables.

Conclusions

On the basis of our data subjective and objective metacognitive measures can be considered distinct domains. On the other hand, Insight is a complex construct interacting with neurocognitive, social-cognitive and metacognitive abilities⁹.

Several studies suggested that metacognitive impairments, particularly self-reported/subjective metacognition may play a role in the development of poor insight⁴. Cognitive complaints are informative about the patient's own psychological status and long term symptom improvement. Indeed, self-perception of cognitive dysfunction has been found to be a good predictor of long-term symptomatic deterioration and it is a critical aspect in schizophrenia for implementing appropriate coping strategies²⁵.

The pattern of correlation between Lol, symptoms and self-perceived cognitive deficit that we found, suggests that Insight in schizophrenia may be better considered as a more global concept of “awareness” encompassing different constructs such as insight into clinical symptoms and insight into cognitive impairment^{9,32}.

Conflict of Interest

The authors do not have conflicts of interest about this article.

References

- 1 Frith CD. *The Cognitive Neuropsychology of Schizophrenia*. Hove, UK: Lawrence Erlbaum Associates Ltd 1992.
- 2 Stratta P, Bustini M, Daneluzzo E, et al. *La valutazione della capacità metacognitiva nel disturbo schizofrenico: dalla funzione cognitiva al mondo reale*. Italian Journal of Psychopathology 2008;14:75-9.
- 3 Stratta P, Daneluzzo E, Riccardi I, et al. *Metacognitive ability and social functioning are related in persons with schizophrenic disorder*. Schizophr Res 2009;108:301-2.
- 4 Chan KK. *Associations of symptoms, neurocognition, and metacognition with insight in schizophrenia spectrum disorders*. Compr Psychiatry 2016;65:63-9.
- 5 Cuesta MJ, Peralta V, Campos MS, et al. *Can insight be predicted in first-episode psychosis patients? A longitudinal and hierarchical analysis of predictors in a drug-naïve sample*. Schizophr Res 2011;130:148-56.
- 6 Osatuke K, Ciesla J, Kasckow, et al. *Insight in schizophrenia: a review of etiological models and supporting research*. Compr Psychiatry 2008;49:70-7.
- 7 Sevy S, Natahanson K, Viswerswaraiah H, et al. *The relationship between insight and symptoms in schizophrenia*. Compr Psychiatry 2004;45:16-9.
- 8 Aleman A, Agrawal N, Morgan KD, et al. *Insight in psychosis and neuropsychological function: meta-analysis*. Br J Psychiatry 2006;189:204-12.
- 9 Lysaker PH, Vohs J, Ballard R, et al. *Metacognition, self-reflection and recovery in schizophrenia: review of the literature*. Future Neurol 2013;8:103-15.
- 10 Vohs JL, Lysaker PH, Liffick E. *Metacognitive capacity as a predictor of insight in first-episode psychosis*. J Nerv Ment Dis 2015; 203:372-8.
- 11 Cooke MA, Peters ER, Fannon D, et al. *Cognitive insight in psychosis: the relationship between self-certainty and self-reflection dimensions and neuropsychological measures*. Psychiatry Res 2010;178:284-9.
- 12 Greenberger C, Serper MR. *Examination of clinical and cognitive insight in acute schizophrenia patients*. J Nerv Ment Dis 2010;198:465-9.
- 13 Stip E, Caron J, Renaud S, et al. *Exploring cognitive complaints in schizophrenia: the subjective scale to investigate cognition in schizophrenia*. Compr Psychiatry 2003;44:331-40.
- 14 Medalia A, Thysen J. *A comparison of insight into clinical symptoms versus insight into neurocognitive symptoms in schizophrenia*. Schizophr Res 2010;118:134-9.
- 15 Cella M, Swan S, Medin E, et al. *Metacognitive awareness of cognitive problems in schizophrenia: exploring the role of symptoms and self-esteem*. Psychol Med 2014;44:469-76.
- 16 Lecardeur L, Briand C, Prouteau A, et al. *Preserved awareness of their cognitive deficits in patients with schizophrenia: convergent validity of the SSTICS*. Schizophr Res 2009;107:303-6.
- 17 Koren D, Seidman LJ, Goldsmith M. *Real-world cognitive and metacognitive dysfunction in schizophrenia: a new approach for measuring (and remediating) more "rightstuff"*. Schizophr Bull 2006;32:310-26.
- 18 Orellana G, Slachevsky A. *Executive functioning in schizophrenia*. Front Psychiatry 2013;4:1-15.
- 19 Stratta P, Arduini L, Daneluzzo E, et al. *Relationship of good and poor Wisconsin Card Sorting Test performance to illness duration in schizophrenia: a cross-sectional analysis*. Psychiatry Res 2004;121:219-27.
- 20 Wallwork RS, Fortgang R, Hashimoto R, et al. *Searching for a consensus five-factor model of the Positive and Negative Syndrome Scale for schizophrenia*. Schizophr Res 2012;137:246-50.
- 21 Woods SW. *Chlorpromazine equivalent doses for the newer atypical antipsychotics*. J Clin Psychiatry 2003;64:663-7.
- 22 Homayoun S, Nadeau-Marcotte F, Luck D, et al. *Subjective and objective cognitive dysfunction in schizophrenia – is there a link?* Front Psychology 2011;2:148.
- 23 Keefe RSE, Poe M, Walker T, et al. *The schizophrenia cognition rating scale: an interview-based assessment and its relationship to cognition, real-world functioning, and functional capacity*. Am J Psychiatry 2006;163:426-32.
- 24 Moritz S, Balzan RP, Bohn F, et al. *Subjective versus objective cognition: evidence for poor metacognitive monitoring in schizophrenia*. Schizophr Res 2016;178:74-9.
- 25 Prouteau A, Verdoux H, Briand C, et al. *Self-assessed cognitive dysfunction and objective performance in outpatients with schizophrenia participating in a rehabilitation program*. Schizophr Res 2004;69:85-91.
- 26 Johnson I, Tabbane K, Dellagi L, et al. *Self-perceived cognitive functioning does not correlate with objective measures of cognition in schizophrenia*. Compr Psychiatry 2011;52:688-92.
- 27 Bayard S, Capdevielle D, Boulenger JP, et al. *Dissociating self-reported cognitive complaint from clinical insight in schizophrenia*. Euro Psychiatry 2009;24:251-8.
- 28 Sellwood W, Morrison AP, Beck R, et al. *Subjective cognitive complaints in schizophrenia: relation to antipsychotic medication dose, actual cognitive performance, insight and symptoms*. PLoS One 2013;8:e83774.
- 29 Zhou Y, Rosenheck R, Mohamed S, et al. *Insight in inpatients with schizophrenia: relationship to symptoms and neuropsychological functioning*. Schizophr Res 2015;161:376-81.
- 30 Smith TE, Hull JW, Israel, LM, et al. *Insight, symptoms and neurocognition in schizophrenia and schizoaffective disorder*. Schizophr Bull 2000;26:193-200.
- 31 Young DA, Campbell Z, Zakzanis KK, et al. *A comparison between an interview and self-report method of insight assessment in chronic schizophrenia*. Schizophr Res 2003;63:103-9.
- 32 Potvin S, Pelletier J, Stip E. *Neurocognitive insight in schizophrenia: a meta-analysis*. Sante Ment Que Fall 2014;39:183-200.
- 33 Arduini L, Artemis Kalyvoka MD, Stratta P, et al. *Insight and neuropsychological function in patients with schizophrenia and bipolar disorder with psychotic features*. Can J Psychiatry 2003;48:338-41.
- 34 Belvederi Murri M, Amore M, Calcagno P, et al. *The "Insight Paradox" in schizophrenia: magnitude, moderators and mediators of the association between insight and depression*. Schizophr Bull 2016;42:1225-33.
- 35 Xavier RM, Pan W, Dungan G, et al. *Unraveling interrelationships among psychopathology symptoms, cognitive domains and insight dimensions in chronic schizophrenia*. Schizophr Res 2018;193:83-90.

How to cite this article: Marucci C, Santarelli V, Collazoni A, et al. *Which metacognitive components of insight in schizophrenia? The relationship between subjective and objective measures of metacognition and insight*. Journal of Psychopathology 2019;25:18-23.