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Original article

Dissociating self-reported cognitive complaint from clinical insight in schizophrenia

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Abstract

Whereas new pharmacological treatments are developed for cognitive impairments in schizophrenia, self-assessment of cognitive dysfunctioning besides their objective validity could be of interest in evaluating patients' motivation to engage in rehabilitation program. Nevertheless insight into symptoms is severely impaired in schizophrenia and is negatively linked with poor compliance. But it is yet unknown if patients with poor insight into their symptoms could have some insight into their cognitive impairments. The aim of this study was to explore the relationships existing between the cognitive complaint and the level of awareness of the disease in patients with schizophrenia. A total of 101 patients with DSM-IV schizophrenia or schizoaffective disorder and 60 control participants were recruited. Insight was assessed using the Scale to assess Unawareness of Mental Disorder (SUMD) and cognitive complaint intensity was assessed with the Scale to Investigate Cognition in Schizophrenia (SSTICS). Participants with schizophrenia displayed the same level of cognitive complaint when compared to healthy controls. Strong correlations were observed between SSTICS total score and duration of illness, levels of depression and state anxiety. Patients with a good insight into the therapeutic effects achieved with medication expressed a more important cognitive complaint. No correlations were found between the four others SUMD insight dimensions and total SSTICS score. The partial overlap of insight into illness and cognitive complaint suggests that insight is modular in schizophrenia. Assessment of cognitive complaint and awareness of illness need to be assessed before engagement in rehabilitation program.

Keywords: Schizophrenia; Insight; Cognitive complaint; Scale to Investigate Cognition in Schizophrenia; Scale to assess Unawareness of Mental Disorder

1. Introduction

The MATRICS neurocognition committee has recently proposed a consensus cognitive battery for assessing cognitive change in clinical trials of cognition-enhancing drugs for schizophrenia [21,35]. Despite cognitive impairments are a core feature of the disease (for review [42]) no drugs have been approved or have given evidence to be effective cognition-enhancing agents [24,35,47]. Furthermore it seems reasonable to claim that it is also important that patients perceived the pharmacological treatment as effective [47]. It has been showed in several studies that perception of cognitive impairments is a common subjective experience in schizophrenia even if cognitive self-reports appears to be inconsistent with objective cognitive results [30,31,40]. If objective cognitive testing is an important predictor of the course of schizophrenia, assessment of subjective illness perceptions may be useful in predicting treatment compliance and therapeutic alliance [20] especially in mental disorder with a high risk of relapses [26,43].

Surprisingly, very few tools have been designed to systematically collect the subjective experiences of patients with schizophrenia [37,48]. More specifically, little attention has been paid to the exploration of patients' abilities to report

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cognitive complaint in this mental disorder. If there is growing interest in the self-perceived cognitive dysfunction in schizophrenia, studies and clinical interest traditionally focused only on self-perceived symptoms. Nevertheless it has been found that cognitive complaint is informative of the patient's point of view about their quality of life and informative of the patient's well being [40]. If a considerable amount of evidence exists demonstrating that patients with schizophrenia have significant cognitive deficits especially in the areas of memory, attention and executive functions [42], self-perception of cognitive dysfunction has been found to be a good predictor of long-term symptomatic deterioration [33], and, therefore, may provide a more complete picture of individual rehabilitation targets in patients with schizophrenia [40].

To our knowledge, only one validated rating scale allows specifically a quantitative approach of the cognitive complaint of patients with schizophrenia spectrum disorders. This is the SSTICS developed by Stip and colleagues [46] which was designed to investigate self-perceived cognitive deficits. This scale has been used in three studies about schizophrenia which all confirmed that patients with schizophrenia are able to express cognitive complaint [28,40,46]. This research group also demonstrated that the cognitive complaints, as measured by the SSTICS, have little correlations with objective test results [40]. Nevertheless Stip and colleagues [46] observed a strong association between cognitive complaint and depressive symptoms among the schizophrenic population, and found that the intensity of cognitive complaints of patients with schizophrenia was correlated with awareness of illness as measured by the item G12 of the PANSS [25].

A general lack of insight is common among patients with schizophrenia [38]. Schizophrenia is the psychiatric disorder in which the awareness of pathology (i.e., ''insight'') is most frequently altered and past studies published over the last two decades have emphasized the specificity of this phenomenon in schizophrenic disorders versus other mental disorders, psychotic or not [1]. In addition, insight deficits are believed to be associated with a patient's noncompliance to treatment as well as a poor course of illness (for example, Refs [2,15,29]). Despite a lack of consensus, some evidence does suggest that poor insight about illness among patients with schizophrenia may be associated with cognitive deficits most predominantly in the executive area [44]. Little is known about the link between the multiple dimensions of insight and the cognitive complaints in schizophrenia. The only available data that we have to date is the negative correlation found by Prouteau and colleagues [40] between SSTICS total score and the PANSS judgment item which showed than the more a patient with schizophrenia is aware of having a mental disorder the more he expresses cognitive complaints. Nevertheless this finding is a quite limited as insight was assessed through the item G12 of the PANSS which has not been initially developed to capture the multidimensional nature of this phenomenon [2,3]. Indeed insight can be modality specific; patients may have insight into some, but not all signs of illness.

In this study, we were interested in exploring the relationship existing between two subjective experiences related to this illness (the cognitive complaints and the level of awareness of psychiatric symptoms) controlling for several variables directly linked to the schizophrenic pathology, especially demographic factors, and psychopathological dimensions such as the levels of depression, anxiety and the severity of negative and positive symptoms. We chose the SUMD [3], which measures multidimensional aspects of insight and has been used in studies of patients with schizophrenia. The SUMD assesses several dimensions of insight into illness: having a mental disorder (*Mental Disorder*), effects of medication (*Medication*), consequences of mental illness (*Consequences*), awareness of the symptoms (*Awareness*) and attribution of the specific signs and symptoms to the mental disorder (*Attribution*). Degree of severity of the cognitive complaint was appreciated with the SSTICS.

We first hypothesized that patients of our sample would report higher levels of cognitive complaints compared to matched–control participants by age and education. Secondly, we expected that patients with impaired insight would report a level of cognitive complaints of lower intensity than patients with a good insight level.

2. Methods and materials

2.1. Participants

Demographic and clinical data are summarized in Table 1. One hundred and one outpatients with schizophrenia ($n = 92$) or schizoaffective disorder ($n = 9$) completed this study. The diagnosis was established with the Structured Clinical Interview for DSM-IV [4,19] and by a consensus between the current treating psychiatrist and one senior psychiatrist belonging to the research team of this study (DC). Severity of symptoms was rated with the Positive and the Negative Syndrome Scale [25]. All patients were clinically stable at the time of assessment. Exclusion criteria were: (a) known neurological disease, (b) Axis II diagnosis of developmental disorders or (c) substance abuse in the past month. Sixty healthy participants were matched to patients for age, education duration and gender. They were recruited through local advertisements. No participants had a history of traumatic brain injury, epilepsy, alcoholism or substance abuse, other diagnosable neurological conditions or organic mental disorder, nor were being treated with antidepressants, benzodiazepines or lithium.

Each participant provided written informed consent form prior the experiment and no compensation was allowed for participation.

2.2. Outcome measures

Demographic and clinical variables were assessed in a semi-structured interview and by reference to medical records and staff. All the participants completed the 21-item BDI-II [6], trait and state anxiety were evaluated by the

Table 1
Demographic characteristic of the participants.

	Patients ($n = 101$)	Controls ($n = 60$)	T^a/χ^{2b}	P
Age (years), mean ± S.D.	30.51 ± 9.43	33.18 ± 11.28	1.625[c]	0.10
Sex (Male/Female), *N*	72/29	36/24	0.068[d]	0.70
Education (years), mean ± S.D.	11.42 ± 2.89	11.91 ± 2.82	1.067[c]	0.28
Duration of illness (years), mean ± S.D.	6.9 ± 8.98	–	–	
Number of hospitalizations, mean ± S.D.	2.85 ± 2.95	–	–	
Chronic/Acute form of the disease, *N*	48/53			
Age at onset (years), mean ± S.D.	23.5 ± 6.73	–	–	
PANSS Positive, mean ± S.D.	16.35 ± 5.82	–	–	
PANSS Negative, mean ± S.D.	19.34 ± 6.36	–	–	
PANSS Psychopathology, mean ± S.D.	33.92 ± 79	–	–	
PANSS Cognition, mean ± S.D.	14.44 ± 4.7	–	–	
PANSS Total, mean ± S.D.	69.68 ± 14.33	–	–	
Antipsychotics (Typical/Atypical/Both), *N*	52/36/13	–	–	
CPzeq (mg/day), mean ± S.D.	791.49 ± 684.46	–	–	
DZeq (mg/day), mean ± S.D.	21.64 ± 30.86	–	–	
BDI-II total, mean ± S.D.	12.52 ± 8.91	7.80 ± 5.21	−3.371[c]	<0.001
STAI state anxiety, mean ± S.D.	40.83 ± 12.35	39.04 ± 9.39	−0.986[c]	0.32
STAI trait anxiety, mean ± S.D.	35.58 ± 11.65	35.46 ± 11.58	−0.843[c]	0.40
SSTICS total, mean ± S.D.	22.35 ± 12.71	20.90 ± 10.60	−0.702[e]	0.65

BDI-II: Beck depression inventory-II; CPzeq: chlorpromazine equivalents; DZeq: diazepam equivalents; PANSS: Positive and Negative Syndrome Scale; S.D.: standard deviation; SSTICS: subjective scale to investigate cognition in schizophrenia; and STAI: state trait anxiety inventory.
[a] df 158.
[b] df 1.
[c] Independent-samples *t*-test.
[d] Chi-square.
[e] ANCOVA.

Spielberger's STAI [45]. The SSTICS was also administered. This 21-item self-report questionnaire [46] aimed at exploring the cognitive complaints in several cognitive areas which have been reported to be impaired in schizophrenia (i.e., memory, attention, executive functions, language and praxia). Participants were asked to rate the frequency of their cognitive difficulties according to a four-point scale (from 0 ''never'' to 4 ''very often''). The total score of the scale was considered (range: 0–84).

Additionally, the PANSS [25] was administered to the patients. Five components were analyzed (Positive, Negative, Psychopathology, Cognitive and Total). The cognitive dimension [7] comprise five items (Cognitive disorganization, Poor attention, Difficulty in abstract thinking, Stereotypic thinking, and Poor insight) and can be consider as a reasonable choice for representing the broader construct of a ''Cognitively impaired'' component of the PANSS [14].

The average daily doses of antipsychotics and benzodiazepines were, respectively, converted into CPZeq (mg/day) and DZeq (mg/day) using published guidelines [4].

Insight into illness was assessed using the SUMD [3], which is a semi-structured interview designed to assess several dimensions of insight including the following: (1) having a mental disorder, (2) need to take medication, (3) consequences, (4) awareness of mental illness and (5) attribution for the specific signs and symptoms of disorder. Each of these domains is rated on a 6-point rating: 0 (not applicable), 1 (aware), 3 (somewhat aware/unaware), and 5 (severely unaware). An average score is then calculated for each one of them. Following Amador et al [2] criteria, a score ≥ 3 was significant of a poor individual level of insight. Insight was rated by a clinician blind to an individual's SSTICS performance.

2.3. Data analysis

Data were analyzed by SPSS® for Windows. Prior to analysis, all data were examined for normality and homogeneity of variance. Independent *t*-tests were conducted to compare the demographic and clinical variables for the two groups. ANCOVA was performed for SSTICS groups' comparison. By employing Amador and Strauss (1990) criteria, participants were divided into two groups (''good'' and ''poor'' insight) for each SUMD dimension [3]. Before comparing the SSTICS results of the two groups, we investigated the potential covariates shared by the five SUMD insight dimensions and the SSTICS score. SSTICS score was correlated with demographic and clinical variables. As SUMD scores were not normally distributed, nonparametric correlation was applied (Spearman's rho). Bravais–Pearson correlation coefficient was used for the other correlation analyses. These correlations were performed to investigate the potential covariates shared by the five SUMD insight dimensions and the SSTICS total score. Finally, analyses of variance or covariance were performed when good and poor insight groups were compared on their SSTICS total score.

3. Results

3.1. Patient and control groups' comparisons

As illustrated in Table 1, in our clinical sample, data on symptoms suggest that both negative and positive symptoms are predominant. The averaged BDI-II score corresponds to a mild level of depression and was significantly higher than in the control group ($P < 0.001$). The average of CPZeq and DZeq were, respectively, equal to 791.4 and 21.6 mg/day (Table 1). Note that our sample received a dose of antipsychotic medications similar to that reported in clinical settings (Hori et al., 2006). The two groups were matched for the STAI state ($P = 0.32$) and trait ($P = 0.40$) anxiety levels. Finally, there was no significant difference in SSTICS scores for patients and controls ($P = 0.65$).

3.2. Insight assessment

Table 2 summarizes the descriptive statistics for the SUMD insight dimensions. These statistics suggest that there is a reasonable level of variance among the participant's level of insight. Based on the test manual (Amador and Strauss, 1990 [3]), a score of three is considered the cut-off to define an individual's level of insight sufficient to inquire about attribution. As illustrated in Table 3, the percentage (%) of participants classified as having no to low-partial insight (i.e., a score ≥ 3) ranges from 56 to 67%. These results indicate that our sample included individuals with variable levels of insight. These percentages are in accordance with those found for clinical population in the literature (Amador et al., 1994 [1]).

3.3. Relationships between SSTICS, SUMD and demographic and clinical variables

In control group, there was a significant positive correlation between SSTICS score and the BDI-II scale, with a high level of depressive symptoms associated with a higher cognitive complaint ($r = 0.37$; $P = 0.009$). The same pattern of association was noted for STAI trait ($r = 0.31$; $P = 0.03$) and state level of anxiety ($r = 0.50$; $P = 0.005$). There was no significant correlation for age ($r = 0.03$; $P = 0.81$) and level of education ($r = -0.22$; $P = 0.06$).

Table 2
Descriptive statistics for the Scale to assess Unawareness of Mental Disorder (SUMD) and percent of patients with a score ≥ 3 ($n = 101$).

	SUMD insight dimensions				
	Mental disorder	Medication	Consequences	Awareness	Attribution
Mean	3.13	2.83	3.27	3.26	3.50
Median	3	3	4	3.15	3.5
S.D.	1.48	1.60	1.59	0.88	1.31
Minimum	1	1	1	1	1
Maximum	5	5	5	5	5
Cut-off score ≥ 3	62%	58%	66%	67%	56%

In patient group, as illustrated in Table 3, none of the SUMD insight dimensions was correlated with averaged CPZeq and DPZeq daily doses. Duration of illness and number of hospitalization were negatively correlated with Mental disorder of the SUMD. BDI-II and STAI (state and trait) anxiety total scores were both negatively correlated with Mental disorder and Awareness dimensions. PANSS Positive symptom score was positively associated with Mental disorder, Medication, Consequences and Attribution dimensions. PANSS Negative score was only positively associated with Mental disorder. A positive association was found between Mental disorder, Medication, Consequences and Attribution dimensions and both the total and the Psychopathology scores of the PANSS. PANSS Cognition was positively correlated with all SUMD insight dimensions. Finally, there was no relationship between Awareness SUMD insight dimension and any PANSS indices.

For demographic variables, SSTICS total score was only significantly positively correlated with duration of illness ($r = 0.26$; $P = 0.012$) and with number of hospitalizations ($r = 0.24$; $P = 0.022$). No significant difference was noted between acute and chronic forms of the disease on SSTICS total score (20.27 ± 12.48 *versus* 24.37 ± 1.44; $T = -1.651$; $P = 0.102$). Neither age ($r = 0.08$; $P = 0.46$), education ($r = 0.16$; $P = 0.11$) nor age at onset ($r = -0.15$; $P = 0.15$) produced any significant correlations with SSTICS total score. With regard to clinical characteristics, high level of depression ($r = 0.26$; $P = 0.03$) and anxiety (state: $r = 0.35$; $P < 0.001$; trait: $r = 0.21$; $P < 0.02$) were positively associated with SSTICS total score. No significant correlation was found with DZeq ($r = 0.06$; $P = 0.51$) and CPZeq ($r = 0.09$; $P = 0.38$). Type of antipsychotics (Typical/Atypical/Both) did not contribute to SSTICS total score [$F(2,99) = 0.88$; $P = 0.41$]. No significant correlations were found between SSTICS total score and the five PANSS indices (all Ps > 0.1). Note that Anxiety level (STAI) and Depression level (BDI-II) were significantly correlated with both SSTICS total scores and Mental disorder and Awareness SUMD insight dimensions. By consequence, these variables were entered as a covariate in the analysis when comparing good and poor insight groups on SSTICS total scores.

3.4. SSTIC comparison for patients with good and poor insight

Table 4 indicates that in our clinical sample, patients with a good insight concerning effects of medication expressed a more important cognitive complaint ($P = 0.003$). No significant differences were observed in total score on SSTICS between patients with good and poor insight through the four others SUMD insight dimensions (i.e., Mental disorder; Consequences; Awareness; Attribution).

4. Discussion

This study examined the relationship between self-reported cognitive complaint evaluated with the SSTICS and the

Table 3
Non-parametric Spearman's rho correlations of SUMD insight dimensions with demographic and clinical characteristics ($n = 101$).

	SUMD insight dimensions				
	Mental disorder	Medication	Consequences	Awareness	Attribution
Age	−0.08	−0.02	0.04	−0.01	−0.02
Education (years)	−0.13	−0.08	−0.14	−0.12	−0.08
Duration of illness (years)	−0.23*	−0.20	−0.07	−0.10	−0.08
Number of hospitalizations	−0.24*	−0.17	−0.08	−0.13	−0.18
Age at onset (years)	0.16	0.20	−0.01	0.06	0.06
BDI-II total	−0.27*	−0.08	−0.18	−0.26*	−0.09
STAI state anxiety	−0.34**	−0.13	−0.18	−0.30**	−0.05
STAI trait anxiety	−0.29**	−0.07	−0.19	−0.27*	−0.08
PANSS Positive	0.22*	0.25*	0.26*	0.12	0.28*
PANSS Negative	0.23*	0.17	0.09	0.02	0.02
PANSS Psychopathology	0.26*	0.22*	0.26**	0.04	0.30**
PANSS Cognition	0.22*	0.39**	0.32**	0.32**	0.28*
PANSS Total	0.35**	0.28**	0.29**	0.07	0.26*
CPzeq (mg/day)	0.04	0.02	0.02	0.05	−0.04
DZeq (mg/day)	−0.07	−0.07	−0.03	0.02	−0.05

BDI-II: Beck depression inventory-II; CPzeq: chlorpromazine equivalents; DZeq: diazepam equivalents; PANSS: Positive and Negative Syndrome Scale; and STAI: state trait anxiety inventory.
*$P = 0.05$.
**$P = 0.01$.

multidimensional aspects of insight as determined by the SUMD in schizophrenia.

First, we found that patients with schizophrenia, after controlling for level of depressive symptoms, did not express abnormally high cognitive complaints when compared to data gathered in healthy controls matched for age and education. This result does not corroborate previous data [28]. One possible explanation could be that although Mancini and colleagues controlled for age, they did not control for emotional status and their control group was highly educated (university studies) [28].

Secondly, our findings demonstrate a partial overlap of insight and cognitive complaint. Patients with a good awareness of the achieved effects of medication expressed a more important cognitive complaint. No significant differences were observed in total score on SSTICS between patients with good and poor insight through the four others SUMD insight dimensions. These last results are difficult to compare with those of Stip and colleagues who showed a significant negative correlation between SSTICS total score and the PANSS judgment item (G12) [46]. In fact, in our study insight was assessed through a multidimensional scale (SUMD) and group comparisons were realized by controlling several demographic and clinical variables.

Clinically, very few attempts to assess the validity of self-report measures are considered in schizophrenia patients with poor insight (for example, Ref. [8]). Our findings suggest that self-reported cognitive complaint may exist, even when patients demonstrates lack of awareness as measured by the five SUMD dimensions. Indeed, patients with schizophrenia can report cognitive impairments even if they are not aware of their positive symptoms such as hallucinations or delusions, or negative symptoms such as blunted affects. This partial overlap of insight level and cognitive complaint could be a very interesting observation for rehabilitation programs. Schizophrenia is the mental disease with the higher rates of noncompliance with medication treatments [43,51]. Level of insight predicts noncompliance to treatment and failure to comply with prescribed drug schedules is the most common reason for hospital readmission (for review [15]). Cognitive remediation approaches seek to enhance cognitive processes or to circumvent cognitive impairments in schizophrenia in an effort to improve functional outcome [50]. The establishment of a program for cognitive remediation centered on cognitive complaint at the beginning of a rehabilitation program could be the best way to improve the therapeutic alliance and the long-term follow-up of the patient. This is what Bentall [9] named the "complaint-orientated approach" which encourages the use of psychological treatments designed to specifically address the cognitive processes underlying patients' subjective difficulties. From this point of view further research is needed to examine this hypothesis. More generally, these data give some arguments that patients with a severe mental disease can endorse having one specific problem (cognitive impairment) less stigmatizing but reject a larger label as having a mental disorder. As proposed by Lysaker and Buck [27], becoming more aware of schizophrenia can be a complex and confusing process with a paradox. Indeed awareness of schizophrenia can be both harmful and essential for recovering with some evidence than insight is an individual process [27]. If numerous studies have showed a strong relationship between poor insight and medication non-adherence [2,29], some others reported that patients who gained awareness of their illness also reported increasing levels of depression [18,32]. In accordance with these data, we found in this study that patients with a good awareness of the achieved effects of medication expressed a more important cognitive complaint. Schizophrenia is associated with a wide range of impairments in self-awareness and self-reflection abilities, with extreme consequences such as the loss of the sense of unity and continuity which are essential aspects of identity. Raffard and

Table 4
ANOVA or ANCOVA comparing SSTICS total score for patients with good (SUMD < 3; *I*+) and poor (SUMD ≥ 3; *I*) insight ($n = 101$).

	I+	*I*−	*F*[a]	*P*
Mental disorder, mean ± S.D.	22.6 ± 2.2[b]	22.4 ± 1.6[b]	0.001[d]	0.96
Medication, mean ± S.D.	27.2 ± 10.7	19.4 ± 13	9.24[c]	0.003
Consequences, mean ± S.D.	24.5 ± 10.9	21.4 ± 13.3	1.22[c]	0.27
Awareness, mean ± S.D.	26.2 ± 2.5[b]	21.4 ± 1.5[b]	2.24[d]	0.13
Attribution, mean ± S.D.	22.4 ± 13.9	24.1 ± 12.6	0.52[c]	0.47

I+: good insight level; and I−: poor insight level.
[a] df 199.
[b] Evaluated at covariate.
[c] ANOVA.
[d] ANCOVA controlling for anxiety and depression levels.

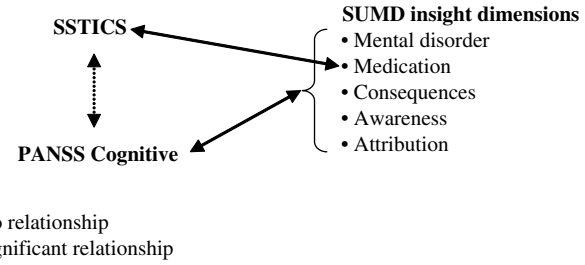

Fig. 1. Summary of the relationships (correlation analyses) between SSTICS total score, PANSS cognition and SUMD insight dimensions.

colleagues showed in a recent study that participants with schizophrenia compared to control participants, reported in their autobiographical memories fewer memories about past achievements and more memories regarding hospitalization and stigmatization of illness despite impairments in extracting meaning from personal memories [41]. These findings and recent literature on metacognition in schizophrenia speak for awareness of discrete problems in the absence of a larger narrative about self and illness. Therefore, discussion about schizophrenia should include talking about what the illness means for the patient [27].

In this work, we were also interested in investigating the relationship between self-reported cognitive difficulties and several demographic and clinical variables. In control and patient groups, SSTICS total score was positively correlated with emotional variable (i.e., level of depression and anxiety symptoms). These observations corroborate data obtained in cross-sectional studies in elderly adults where cognitive complaint (more specifically the memory complaint) was associated with depressive symptoms [10,12,16,36,39,] and individual emotional status [17]. More interestingly, Antikainen and colleagues have shown that improvements in memory complaints of patients suspected of suffering from depression and referred for psychiatric outpatient care were associated with mood improvement [5]. Further, in an original way, we correlated the SSTICS total score with daily doses of antipsychotic converted to chlorpromazine equivalents. We observed that intensity level of cognitive complaint was not correlated with the DZeq and the CPZeq of antipsychotic treatment. Recent studies showed that all antipsychotic treatment groups (atypical and classical) made modest improvements in psychosocial functioning [49]. Furthermore, the relative effectiveness of newly antipsychotic drugs for individuals with schizophrenia may depend on multiple factors, including self-perception of effectiveness and cognitive consequences of a pharmacological treatment [41]. In accordance with this view, our results showed no relationship between antipsychotic type (atypical versus classical) and level of cognitive complaint.

One limitation of this study is that we did not realize an objective neuropsychological evaluation. So we were not able to determine if patients with a high cognitive complaint were those characterized with objective neuropsychological impairments. An indirect way to explore the validity of the cognitive complaint in reflecting objective performances was to correlate SSTIC total score with PANSS scores (specifically PANSS Cognitive component).

In fact, even if PANSS scales are not a viable alternative to neuropsychological testing to obtain information about cognitive functioning in schizophrenia, these scale dimensions were found to be associated (low to moderate) with objective cognitive deficits (for example, Refs [11,14,22,23]). As summarized in Fig. 1, we did not find any significant relationship between SSTIC total score and PANSS Cognitive component. This observation let us to question, in schizophrenia, the validity of the cognitive complaint in reflecting "real" (objective) cognitive alterations. In a study conducted by Prouteau and colleagues the pattern of associations between self-assessed (SSTICS) and objective neuropsychological performance was explored [40]. These authors found a very poor relationship between the cognitive nature of the subjective cognitive complaint and objective performances thus suggesting that theoretical constructs of cognitive functions do not always have ecological validity. Although Prouteau and colleagues controlled for demographic variables, they did not control for emotional ones [40]. However, it was shown that depression levels in patients with schizophrenia have a major influence on their neuropsychological performances (for example, Refs [13,34]).

In conclusion in many areas of contemporary schizophrenia research, self-report measures have potential use, but more needs to be done to demonstrate the validity of this methodology particularly in patients with impaired insight. In the future, it would be challenging to explore the relationships between insight in psychiatric symptoms and insight in cognitive symptoms. This would make it possible to clarify whether or not these two dimensions encompass a more general notion of "awareness" in schizophrenia.

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6. Conflict of interest

None.

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