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Self-assessed cognitive dysfunction and objective performance in outpatients with schizophrenia participating in a rehabilitation program

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Abstract

Objective: To explore the pattern of associations between self-assessed and objective neuropsychological performance in a sample of outpatients with schizophrenia participating in a rehabilitation program. *Method*: The Subjective Scale to Investigate Cognition in Schizophrenia (SSTICS) [Compr. Psychiatry 44 (2003) 331] was used to assess cognitive complaints in 73 subjects with schizophrenia. Visuo-spatial tests of the Cambridge Neuropsychological Test Automated Battery (CANTAB) [Cogn. Neuropsychiatry 3 (1998) 45] were administered as objective measures. *Results*: Cognitive complaints in several cognitive domains were mainly correlated with a true difficulty in memory. Higher SSTICS attention scores, i.e. increased complaints, were associated with poorer CANTAB explicit visual memory and planning performances. Higher SSTICS executive functioning scores were associated with poorer CANTAB explicit visual memory scores. *Conclusion*: These findings suggest that outpatients with schizophrenia express some cognitive difficulties. However, the cognitive nature of these subjective complaints does not strictly correspond with objective performances. These results also suggest that theoretical constructs of cognitive functions do not always have ecological validity. Thus, subjective cognitive complaints should be taken into account in assessment of patient well-being, but cannot be used as a substitute to objective cognitive measures. The simultaneous use of subjective and objective measures of cognitive dysfunction may provide a more complete picture of individual rehabilitation targets in patients with schizophrenia.

Keywords: Cognitive complaint; Neuropsychological performance; Rehabilitation; Schizophrenia

1. Introduction

Perception of cognitive dysfunction is a common subjective experience of schizophrenia (Peralta and

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Cuesta, 1994). From a clinical perspective, there is growing interest in the study of self-perceived cognitive deficits. Indeed, self-perception of cognitive dysfunction (SPCD) as measured by cognitive complaints are increasingly acknowledged for the assessment of quality of life (Barr, 1998) and, in a recent study, they have been reported to be a strong predictor of long-term symptomatic deterioration (Moritz et al., 2000).

However, disturbances in the SPCD have been hypothesized to be a core feature in schizophrenia and an important target for rehabilitation (Danion et al., 1999; Frith, 1992). From a physiopathological perspective, the accuracy of SPCD could be informative of the underlying brain mechanisms of schizophrenia, such as potential frontal dysfunction (Young et al., 1993).

Thus, due to the disturbance of SPCD, subjective complaints may not always provide reliable information concerning true or objective cognitive deficits. Nevertheless, only few studies have explored the validity of SPCD in comparison with objective measures of cognitive deficits. In a sample of schizophrenia patients hospitalized for acute episode, Cuesta et al. (1996) found correlations between the global score of Frankfurt Complaint Questionnaire and a large number of neuropsychological tests. In contrast, Zanello and Huguelet (2001) failed to show a correlation between subjective experience and true frontal cognitive deficits in outpatients with schizophrenia or schizoaffective disorder. The correlation between self-perception of memory abilities and objective performance was largely unexplored in these studies.

The discrepancies in past studies were linked to methodological differences and heterogeneity in patients samples (Zanello and Huguelet, 2001). Accordingly, the correlation between objective and subjective measures may differ between patients with acute psychotic episodes and patients in remission, and requires further exploration in stabilized outpatients. Additionally, the sensitivity of the instruments used may also influence the findings (Zanello and Huguelet, 2001).

The most widely used self-report questionnaire to measure SPCD is the Frankfurt Complaint Questionnaire (Sullwold, 1986). Nevertheless, this questionnaire explores several domains of subjective symptomatology between SPCD and true cognitive abilities (Stip et al., 2003). This latter finding requires a broader exploration to include not only verbal abilities but also visuo-spatial abilities, such as those assessed by the Cambridge Neuropsychological Test Automated Battery (CANTAB; Elliott et al., 1998) which provides validated visuo-spatial tests of main cognitive functions.

The aim of the present study is to explore the relationship between SPCD and objective visuo-spatial performance in an independent sample of outpatients with schizophrenia spectrum disorders.

2. Methods

2.1. Subjects

Subjects included in the present study were drawn from a group of outpatients participating in a rehabilitation program (Integrated Psychological Treatment—IPT) (Brenner et al., 1992), implemented in nine community hospitals in Montreal area, Quebec. In each center, subjects with a clinical diagnosis of schizophrenia were selected by the clinical team according to the following criteria: (1) informed consent to participate in the study; (2) clinical status allowing participation in a rehabilitation program; (3) stabilization on medication. These naturalistic selection procedures were chosen to correspond as closely as possible to real conditions of care and rehabilitation.

Patients selected by clinicians were then included in the present study if they fulfilled following criteria: (1) DSM-IV (American Psychiatric Association, 1994) diagnosis of non-affective psychotic disorder established by a structured diagnostic interview (Structured Clinical Interview for DSM-III-R) (Spitzer et al., 1992); (2) fluency in French; (3) no color blindness nor major visual problems. Subjects were not offered any monetary incentive for their participation.

The present study was carried out on subjects who completed at least 3 months of the IPT program. Of the 87 subjects included at baseline, 14 subjects were excluded for discontinuing the program (one subject returned to work and the clinical state of the 13 remaining subjects was judged incompatible with the IPT program). Only one of these subjects was readmitted.

The sample included 73 subjects (52 men (71.23%), 21 women (28.77%)) with a mean age of 33.1

(S.D. = 11.1, range 19–65 years). Mean educational level was 11.7 years (S.D. = 2.2, range 8–18). Mean duration of illness, defined as the duration between the first diagnosis of psychotic disorder and the inclusion in the current study, was 88.2 months (S.D. = 101.2, range 2–375).

All participants were outpatients fulfilling DSM-IV criteria for schizophrenia ($n = 45$), schizoaffective disorder ($n = 22$), schizophreniform disorder ($n = 5$) and unspecified psychotic disorder ($n = 1$). All patients were stabilized on medication. Most ($n = 72$) were receiving a neuroleptic treatment [classical antipsychotic ($n = 25$), or an atypical antipsychotic ($n = 47$)]. Nineteen subjects were receiving an antidepressant drug, 19 subjects a mood stabilizer, 28 an antiparkinsonian drug, and 2 an anxiolytic drug.

2.2. Assessments

The data used in the present study were collected three months after patients were included in the rehabilitation program. During this first phase, the IPT program was mainly based upon basic cognitive exercises. Assessments were conducted by the same investigator (TP) in all clinical structures. The duration of assessment was approximately 40 min.

2.2.1. Self-assessment of cognitive dysfunction

The Subjective Scale to Investigate Cognition in Schizophrenia (SSTICS) (Stip et al., 2003) is a 21-item self-report questionnaire aimed at exploring the cognitive complaints of patients on several cognitive dimensions which have been reported to be impaired in schizophrenia. Questions address difficulties that could be experienced in the patients every day life and are formulated in a manner easily understood to them. The 21 items of the questionnaire are combined into seven domains of cognitive complaints: (1) total score (TOTAL) is the sum of all items; (2) explicit memory score (EM) is the sum of items ($n = 9$) exploring explicit memory items; (3) working memory score (WM) is the sum of items ($n = 2$) exploring working memory; (4) attention score (ATTN) is the sum of items ($n = 5$) exploring attention; (5) executive functioning score (EXF) is the sum of items ($n = 3$) exploring general executive functioning; (6) language score (LG) is composed of one question about language; and (7) praxia score (PRAX) is composed of one question about voluntary gesture ability. Subjects are asked to rate the frequency of their cognitive difficulties according to a four-point scale (from 0 ‘never’ to 4 ‘very often’).

In a previous study (Stip et al., 2003), the psychometric properties of the SSTICS were evaluated in a population of 114 French-speaking patients with schizophrenia in Montreal.

Preliminary analyses demonstrated good internal consistency for the global score (alpha = 0.88), and alphas ranging from 0.57 to 0.72 for the subscales. It has been shown that SSTICS TOTAL scores of healthy subjects significantly differ from those of subjects with schizophrenia (Mancini et al., 2002).

2.2.2. Neuropsychological assessment

Subjects were administered four subtests of the Cambridge Neuropsychological Test Automated Battery (CANTAB) (Elliott et al., 1998) chosen because they allow a short and valid assessment of the principal domains of cognitive abilities: (1) Motor Screening (MOT) assesses the visuo-motor coordination measured by mean latency time (milliseconds); (2) Paired Associates Learning (PAL) explores explicit visual memory, measured by the number of patterns correctly located after the first presentation (maximum 26); (3) Reaction Time (RTI) measures the reaction time (milliseconds) in a multiple choice condition; (4) Stockings of Cambridge (SOC) assesses the executive abilities of planning by measuring the number of test problems solved in minimum moves (maximum 12).

2.3. Statistical analyses

Statistical analyses were carried out using STATA 7.0 (Corporation, 2001). Distributions of variables were examined and log transformations were used in order to remove skews when appropriate. Multiple linear regression analyses were used to explore the associations between CANTAB and SSTICS scores, and to adjust for a priori defined potential confounding factors (age, gender, educational level and duration of illness). Partial correlation coefficients (Rp) were then calculated to quantify the effect size of significant associations.

3. Results

The global cognitive complaint score (mean SSTICS total score = 26.2, S.D. = 11.9) is in accordance with scores found in previous studies using the SSTICS in similar samples (Mancini et al., 2002; Stip et al., 2003).

After adjustment for potential confounding factors, multiple regression analyses showed negative associations between SSTICS scores and CANTAB scores (Table 1): the greater the cognitive complaint, the poorer objective performance. Nevertheless, specific areas of self-reported deficits did not seem to correspond with the appropriate domains of objective testing. Higher SSTICS attention score (ATTN), i.e. increased complaints, was associated with poorer CANTAB explicit visual memory performance ($B = -2.61$, Rp = − 0.31, $p = 0.01$) and planning ($B = -2.31$, Rp = − 0.27, $p = 0.02$). Higher SSTICS executive functioning (EXF) score was associated with poorer CANTAB explicit visual memory score ($B = -3.23$, Rp = − 0.37, $p = 0.002$). As shown by partial correlations coefficients, the associations were moderate, ranging from − 0.27 to − 0.37.

4. Discussion

Subjective cognitive complaints do not correspond with the appropriate domain of cognitive dysfunction. We found no association between memory complaints and objective memory scores. Rather, complaints related to attention were correlated with objective memory and executive scores. In addition, complaints related to executive functioning were correlated with objective memory scores.

4.1. Methodological limitations

The patients included in the sample were those participating in a rehabilitation program. As these patients are not representative of the whole population of patients with schizophrenia, generalizing the findings of the present study to unselected subjects with schizophrenia may be questioned. However, this naturalistic selection provides relevant information regarding patients likely to be included in a rehabilitation program.

As no control group was included in the present study, we cannot assess the specificity of cognitive

Table 1
Associations between cognitive performance and self-perception

CANTAB[a]	MOT	PAL	RTI[b]	SOC
SSTICS[c]	Adjusted[d] *B* (95% CI)	Adjusted[d] *B* (95% CI)	Adjusted[d] *B* (95% CI)	Adjusted[d] *B* (95% CI)
TOTAL	0.87 (− 4.3, 11.1), $p = 0.39$	− 1.60 (− 0.17, 0.02), $p = 0.11$	− 0.22 (0, 0), $p = 0.83$	− 1.65 (− 0.07, 0), $p = 0.10$
WM	0.43 (− 77.3, 119.3), $p = 0.67$	1.41 (− 0.35, 2.03), $p = 0.16$	− 1.48 (− 0.09, 0.01), $p = 0.14$	− 0.37 (− 0.62, 0.42), $p = 0.71$
EM	1.77 (− 2.2, 35.4), $p = 0.082$	− 0.61 (− 0.31, 0.16), $p = 0.54$	− 0.53 (− 0.01, 0.01), $p = 0.60$	− 1.07 (− 0.16, 0.05), $p = 0.30$
ATTN	0.27 (− 19.9, 26.1), $p = 0.79$	− 2.61 (− 0.63, − 0.08), $p = 0.01$	0.79 (− 0.01, 0.02), $p = 0.44$	− 2.31 (− 0.25, − 0.02), $p = 0.02$
EXF	− 0.31 (− 35.1, 25.7), $p = 0.76$	− 3.23 (− 0.91, − 0.21), $p = 0.002$	0.50 (− 0.01, 0.02), $p = 0.62$	− 1.38 (− 0.27, 0.05), $p = 0.17$
LG	0.96 (− 41.2, 117.2), $p = 0.34$	0.72 (− 0.62, 1.31), $p = 0.48$	− 1.47 (− 0.07, 0.01), $p = 0.15$	− 0.07 (− 0.44, 0.41), $p = 0.95$
PRAX	− 0.19 (− 143.8, 118.3), $p = 0.85$	− 0.92 (− 2.32, 0.86), $p = 0.36$	− 0.36 (− 0.08, 0.06), $p = 0.72$	− 1.63 (− 1.24, 0.12), $p = 0.11$

[a] Cambridge Neuropsychological Test Automated Battery (CANTAB) assesses cognitive performance such as visuo-motor coordination (MOT), explicit visual memory (PAL), reaction time (RTI) and executive abilities of planning (SOC).

[b] The variable RTI was log-transformed.

[c] Subjective Scale to Investigate Cognition in Schizophrenia (SSTICS) assesses the self-perception of cognitive performance in explicit memory (EM), working memory (WM), attention (ATTN), executive functioning (EXF), language (LG) and praxia (PRAX) The scale provides a global self-perception score (TOTAL).

[d] Adjusted for age, gender, educational level and duration of illness.

system representation in schizophrenia. Thus, we cannot rule out that similar associations may be found in patients with other psychiatric diagnoses, or in healthy controls. However, the possible lack of specificity does not limit the interest of the findings obtained in subjects with schizophrenia spectrum disorder, due to their implications for cognitive rehabilitation.

The design of the rehabilitation program did not include symptomatic assessment at the time of cognitive testing. Thus, we cannot fully exclude the possibility that the associations between subjective and objective cognitive measures may be at least in part explained by symptomatic status. All the patients included in this sample were stabilized on medication. Subjects readmitted or presenting with an acute psychotic episode were no longer participating in the program, and were excluded from the study. Thus, patients were relatively homogeneous regarding symptomatic state, and we have little motive to suspect the existence of a confounding effect of symptomatology.

4.2. Interpretation of findings

In a previous study using the SSTICS, objective verbal memory score was already correlated with the largest number of SPCD, whatever the cognitive domain of complaint (Mancini et al., 2002; Stip et al., 2003). In accordance with these findings, we found in the present study that several subjective scores were correlated with objective measures of visuo-spatial abilities. A further finding was that an association was also found between self-perceived executive functioning and objective memory score. More generally, the cognitive complaint of outpatients with schizophrenia seemed mainly to correspond with objective difficulty in visual memory tasks.

To interpret the findings, we need to consider the following questions: is the discrepancy between subjective and objective measures due to a difference between patients and neuropsychologists in conceptualizing and categorizing the deficits, or is it due to the patient's inability to formulate and specify the exact nature of their cognitive dysfunction?

The findings show that objective planning deficits are rather experienced in terms of attentional difficulties. Attentional difficulties are the most frequent complaint reported in patients with schizophrenia (Freedman, 1974). This result raises the question of differences between objective and subjective constructs. The patients with schizophrenia may not conceptualize their cognitive functioning as clinicians do. Assessing this question, Stip et al. (2003) found that factor analysis of subjective complaints led to a model different from the initial grouping of items based on neuropsychology models. Several studies have reported these kinds of discrepancies. In a study exploring the convergence between neurocognitive tests and clinicians ratings of cognitive dysfunction using SANS attention subscale, Vadhan et al. (2001) found only moderate associations. Furthermore, clinicians' ratings of cognitive symptoms using the positive and negative symptom scale (PANSS) were as much correlated with negative symptoms as cognitive test performances (Harvey et al., 2001). Similar results have also been reported in measurement of quality of life (Voruganti et al., 1997). Quality of life weekly self-ratings has been shown to be consistent over a 4-week period as well as correlated with clinician's ratings. It has been proposed that quality of life should be measured by both subjective and objective tools. A same strategy could be proposed for cognition. Indeed, SPCD are informative of patient's point of view that is not explored using only objective assessment.

The discrepancies between objective and subjective measures may also reflect the simultaneous mobilization of different cognitive functions in daily life activities, which are more complex than experimental test conditions. For example, the distinction between attentional and executive competences is a theoretical construct, as good executive functioning is highly dependent on good attentional abilities. Green and Nuechterlein (1999) recently underscored the need to distinguish "constructs" and "indicators" in the study of neurocognition. Indeed, a theoretical construct (i.e. attention, memory, executive functioning) cannot be directly observed. Thus, studies use an indicator that can only be hypothesized to be a good measure of the targeted construct. Moreover, the present study did not provide strict conceptual correspondence between the questionnaire and the objective tests. Indeed, the SSTICS was asking questions about daily life activities and the tests chosen in CANTAB did not include a measure of attention. Nevertheless, all the tests, and especially RTI and MOT, required sustained attention.

The fact that negative and moderate correlations were found indicate that outpatients with schizophrenia

has some awareness of their global cognitive difficulties. It could also suggest that they have a poor understanding of which specific domain is impaired, in accordance with the self-perception disturbance in schizophrenia. In our study, memory complaints are not in accordance with the objective memory deficit, which will be more perceived as difficulties in attentional and executive daily tasks. Cuesta et al. (1996) found that objective and subjective measures were associated in patients presenting with acute symptoms. The present findings confirm that the associations between subjective and objective scores of cognitive functioning persist several months after the psychotic episode.

5. Conclusion

These results suggest that difficulties in memory and planning are not expressed in terms of learning and organizing difficulties in subjects with schizophrenia, but rather in other terms such as attentional problems. Prudent interpretations of such discrepancies should first question the ecological validity of theoretical models in neuropsychology, as well as the convergence between cognitive measures and theory. Nevertheless, the findings indicate that cognitive complaints can be a reliable sign of real cognitive difficulties, which require further validation by objective tests. Representation of cognitive system organization as well as identification of true cognitive difficulties are important targets for rehabilitation programs, as memory and executive dysfunction are among the most disturbing deficits in daily life activities. Moreover, cognitive complaints are informative of the patient's point of view and subjective reality. A major clinical implication of the present findings is that subjective and objective cognitive measures should be used simultaneously in a rehabilitation context, in order to obtain a more complete picture of cognitive functioning in patients with schizophrenia.

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