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Correlation between neuropsychological and social cognition measures and symptom dimensions in schizophrenic patients

A. Carlo Altamura^a, Elisabetta Caletti^a, Riccardo Augusto Paoli^a, Michela Cigliobianco^{a,*}, Elisa Zugno^a, Paolo Grillo^b, Cecilia Prunas^a, Alice Caldiroli^a, Stefano Zago^c

^a Psychiatric Clinic, Department of Neuroscience and Mental Health, University of Milan, Fondazione IRCCS Ca' Granda, Ospedale Maggiore Policlinico, Milan, Italy

^b Epidemiology Unit, Department of Preventive Medicine, University of Milan, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan, Italy

^c Neurologic Clinic, Department of Neuroscience and Mental Health, University of Milan, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan, Italy

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ABSTRACT

Neurocognitive and social cognition deficits have been largely reported in Schizophrenia (SKZ) but their association with psychopathology remains uncertain. Our purpose was to explore the relationship between symptom dimensions and neuropsychological performances.

We enrolled 35 stabilized schizophrenic outpatients of the Department of Psychiatry of Policlinico Hospital, University of Milan, who completed psychiatric Rating Scales, the Brief Assessment of Cognition in Schizophrenia (BACS) and the Executive and Social Cognition Battery (ESCB).

Disorganized dimension seems to have the most significant impact on cognition, being associated with performance in several BACS subtests (verbal memory, working memory, motor speed, symbol coding, Tower of London) and ESCB tasks (MET and Hotel task number of tasks attempted, number of broken MET rules, sum of deviations in Hotel Task). Positive dimension correlated with performance in verbal fluency, negative dimension with IOWA Test results, cognitive dimension with MET number of inefficiencies and Eyes test score. Impulsive-aggressive and depressive dimensions weakly correlated only with Faux Pas test. Our study supports the existence of a specific disorganized dimension in SKZ, separated from cognitive dimension evaluated through clinical instruments (e.g. PANSS), but capable of influencing cognitive abilities. Furthermore, it strengthens the validity of ecological tasks in evaluating cognition in SKZ.

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1. Introduction

Schizophrenia (SKZ) is no longer considered a single disease entity, but a heterogeneous clinical syndrome, with multiple and different clinical manifestations (Tandon, 2012; Tandon et al., 2013). The SKZ definition substantially changed with the DSM-5 (APA, 2013) giving space to a dimensional approach that should overcome poor explanation of high heterogeneity provided by DSM-IV (APA, 2000) subtypes (Barch et al., 2013; Heckers et al., 2013).

Neurocognitive deficits and negative symptoms received the strongest support as related to major processes (Green et al., 2000; Kirkpatrick et al., 2006). In particular the degree of cognitive impairment is predictive of social skills (Barch and Keefe, 2010) and

seems to remain unchanged despite the remission of acute symptoms (San et al., 2007).

Social Cognition (SC), which involves a complex set of processes allowing adaptive social interaction (Green et al., 2005) and in particular one of its aspects, the Theory of Mind (ToM), has repeatedly shown to be compromised in most SKZ patients (Lee et al., 2004). "Mentalizing" is conceptualized as the ability to reflect upon one's own and other people's mental states including desires, beliefs, knowledge, intentions and feelings (Frith and Frith, 2003). Brune (2005) demonstrated that ToM is crucially linked to social behavioral competence and is the most significant predictor of severe social behavioral abnormalities regardless of the duration of illness.

However, explicit knowledge could not be enough for a good performance in real life, because an individual may demonstrate a good functional capacity but may not be able to use it in his own social context (Bromley and Brekke, 2010). For this reason to assess neurocognitive performance several studies used some "ecological" tasks, in order to obtain more context-sensitive measures

* Correspondence to: Psychiatric Clinic, Department of Neuroscience and Mental Health, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, via Francesco Sforza no. 35, Milan, Italy. Fax: +39 02 55033190.

E-mail address: m.cigliobianco@gmail.com (M. Cigliobianco).

similar to real-life situations (Baez et al., 2013; Caletti et al., 2013).

One of the most commonly used rating scales in assessing psychopathological symptoms in SKZ is the Positive and Negative Syndrome Scale for Schizophrenia (PANSS) (Kay et al., 1987). Several studies attempted to rearrange PANSS items through factor analysis, trying to obtain new models capable of measuring illness dimensions more accurately (Peralta and Cuesta, 1994; Emsley et al., 2003). Most of them obtained five factor models with a high similarity in items distribution (Lykouras et al., 2000). In particular, Wallwork et al. (2012) attempted to build a consensus model by assigning only the consistent PANSS items to each of the five factors based on previously published models. The relationship between these five components and the socio-demographic and clinical characteristics has allowed to identify two variants of SKZ: one characterized by a prevalent florid symptomatology, with fewer negative symptoms and cognitive disturbances, the other with a predominant cognitive impairment and small number of positive and negative symptoms. The former variant seemed to be associated with reduced hospitalization (Lindenmayer et al., 1995; Lykouras et al., 2000).

Other studies tried to investigate the correlation between illness dimensions and cognition and demonstrated that an alteration of processing speed is seen to indirectly affect negative symptoms (Lipkovich et al., 2009). In general, an association between cognition and negative symptoms have been found, but in different degrees (Green and Nuechterlein, 1999; Lewandowski et al., 2011; Bagny et al., 2013) rendering the correlation uncertain. The high presence of disorganized thinking and/or formal alterations of thought should be intuitively linked to greater cognitive impairment, but also in this case the results are uncertain (Pandina et al., 2013; Rodríguez-Jiménez et al., 2013) and in addition, the same symptoms seem to moderate the pathway between cognition and both social cognition and metacognition (Minor and Lysaker, 2014). Moreover, a correlation between positive and depressive dimensions and cognitive deficits seems weak (Dominguez Mde et al., 2009; Yilmaz et al., 2012).

Psychopathological dimensions and SC (e.g. emotional processing, ToM, perception of social relationship) have been investigated but still require a deeper understanding (Ventura et al., 2011; Lam et al., 2014). Couture et al. (2006) showed that SC deficits are an important factor in the progress of various types of symptoms and might be a mediator of the association between neurocognition and outcome. ToM outcome, which seems to be an independent factor from executive functions tout court (Pickup, 2008), was found to be related to disorganized symptoms and disturbances of thinking, paranoid delusions (Harrington et al., 2005) and increased severity of positive and negative symptoms (Harrington et al., 2005; Brüne et al., 2007; Green et al., 2008; Green and Horan, 2010; Abdel-Hamid et al., 2009; Ventura et al., 2010; Urbach et al., 2013).

1.1. Aim of the study

Since a degree of neurocognitive impairment has been shown to be predictive of social skills such as management of daily life in SKZ patients, our study tried to understand the relationship between SKZ symptom dimensions and neuropsychological and SC processes. We hypothesized a correlation between principal psychopathological dimensions and neurocognitive performance, stronger for disorganized dimension and persistent even when neuropsychological and SC performances are evaluated with ecological tasks.

2. Methods

2.1. Subjects

Thirty-five SKZ outpatients (aged 19–63) enrolled at the Department of Psychiatry of the University of Milan. The study was approved by the Ethics Committee of Fondazione IRCCS Ca' Granda Maggiore Policlinico Hospital and informed consent was obtained from all subjects.

Inclusion criteria

- A diagnosis of SKZ according to DSM-IV-TR (APA, 2000).
- No substance abuse for at least two weeks.
- Clinical stability during last 6 weeks and treatment with stabilizing doses of antipsychotics.

Exclusion criteria

- Mental retardation or other neurological conditions involving the Central Nervous System.
- An acute psychotic episode corresponding to a Positive and Negative Syndrome Scale (PANSS) score > 50.
- Pregnancy and breastfeeding.

2.2. Procedures

All patients fulfilled the diagnostic criteria for SKZ (Structured Clinical Interview for DSM-IV Axis I; First et al., 2002).

Psychopathological dimensions were stated as follows:

Positive and Negative dimensions: positive and negative PANSS sub-scales (Kay et al., 1987). Disorganized dimension: sum of following PANSS scores: conceptual disorganization (P2), difficulty in abstract thinking (N5), stereotyped thinking (N7), disorientation (G10), poor attention (G11) (Monteiro et al., 2008). Cognitive dimension: sum of following PANSS scores: conceptual disorganization (P2), difficulty in abstract thinking (N5), stereotyped thinking (N7), tension (G4), mannerisms and posturing (G5), poor attention (G11), lack of judgment and insight (G12) (Bell et al., 1994). Depressive dimension: CDSS total score (Addington et al., 1990); a score of 6 or more has been shown to have a good sensitivity (92%) and specificity (77%) for predicting the presence of a major depressive episode in SKZ (Addington et al., 1993). A more restrictive cut-off equal or above 8 showed a specificity of 91% and a sensitivity of 85% (Addington et al., 1993).

Impulsive–Aggressive dimension: hostility (P7) and poor impulse control (G14) PANSS scores.

Global severity (severity dimension): CGIs baseline scores (Guy, 1976).

Social functioning was stated through the General Assessment of Functioning scale (GAF) (APA, 2000). The GAF foresees 10 anchor points divided in 10 points that consider the subject's psychosocial functioning putting him in an ideal continuum that goes from the mental health (100) to the serious illness with risk of death (0).

Neuropsychological status of all subjects was assessed as follows:

1. The Brief Assessment of Cognition in Schizophrenia (BACS) is a standard neuropsychological battery with normative data for the Italian population (Keefe et al., 2004; Anselmetti et al., 2008) its advantage, in respect to MATRICS battery, is the shortness of administration and scoring, although appreciating entirely the level of the impairment of cognitive areas (Kraus and Keefe, 2007). It consists of subtests assessing episodic and working memory, motor speed, verbal fluency (semantic and letter fluency), executive functioning (planning, processing,

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