Psychiatry Research 267 (2018) 249–255

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Premorbid adjustment predictors of cognitive dysfunction in schizophrenia

Pentagiotissa Stefanatou[a], Chrysovalado-Sofia Karatosidi[a], Evgenia Tsompanaki[b], Emmanouil Kattoulas[a], Nicholas C. Stefanis[a,c,1], Nikolaos Smyrnis[a,c,1,*]

[a] Psychiatry Department, National and Kapodistrian University of Athens, Medical School, Eginition Hospital, Athens, Greece
[b] Department of Statistics, School of Information Sciences and Technology, Athens University of Economics and Business, Athens, Greece
[c] University Mental Health Research Institute, Athens, Greece

ARTICLE INFO

Keywords:
Psychosis
Premorbid adjustment scale
Neuropsychological measures
Cognitive impairment
IQ decline
Executive function
Canonical correlation analysis

ABSTRACT

Premorbid adjustment (PA) in academic and social domain is a key-predictor of cognitive performance in schizophrenia. Prior studies provided inconsistent findings regarding the differential relationships of PA domains with post-illness cognition. Multivariate associations of academic and social PA in each developmental stage (childhood, early and late adolescence) with post-onset cognitive variables were explored. Furthermore, possible differential relationships of PA domain deterioration courses with post-onset cognitive dysfunction were investigated. Seventy-five schizophrenia patients were evaluated with Premorbid Adjustment Scale (PAS). General cognitive ability, verbal IQ, verbal memory and learning, processing speed, working memory, executive function and premorbid IQ were assessed. Canonical Correlation Analyses revealed that poorer academic PA across childhood and early adolescence was related to worse post-onset verbal IQ, working memory, verbal learning and executive function, while academic PA deterioration between early and late adolescence was associated with poorer verbal learning and executive function and, as further analysis indicated, predicts IQ decline. Academic PA was exclusively associated with post-onset cognitive impairment. New evidence emerged for the specificity of each developmental period in constructing academic PA in its relation to post-illness cognition. Early premorbid academic maladjustment possibly constitutes the onset of a cognitive dysmaturational process which results to post-diagnosis impaired cognition.

1. Introduction

Impairment or deterioration of academic and social premorbid adjustment (PA) from childhood to adolescence is a broadly recognized antecedent of schizophrenia (Allen et al., 2001, 2005; Cannon et al., 2002; Monte et al., 2008; Reichenberg et al., 2002, 2010). It is related to the more malignant course of the illness (Galderisi et al., 2002; Rund et al., 2007; Strauss et al., 2012), thus it is considered to be a key predictor of its clinical and psychosocial outcome (Addington and Addington, 2005; Barajas et al., 2013; MacBeth and Gumley, 2008; Rund et al., 2007). Specifically, poor PA has been linked to more severe post-onset cognitive dysfunction (Chang et al., 2013; Cuesta et al., 2015; Norman et al., 2005; Silverstein et al., 2002) and the latter represents a primary feature of the disorder. Meta-analytic studies approximate the impairment prevalence to 70–75% of the schizophrenia patient population (Heinrichs et al., 2013), indicating a mean impairment across cognitive areas of one standard deviation compared to healthy controls (Dickinson et al., 2007; Schaefer et al., 2013). Additionally, cognitive deficits in schizophrenia are more prominent in processing speed, episodic, verbal and working memory, learning, attention and executive function (Heinrichs and Zakzanis, 1998; Reichenberg, 2010; Reichenberg and Harvey, 2007; Schaefer et al., 2013). Cognitive deficits are also considered as a key predictor for the outcome of the disorder and a key target of treatment efforts, given their strong associations to poor psychosocial functional status (Green, 2016)- stronger than positive or negative symptoms (Green, 1996; Harvey et al., 1998; Keefe and Fenton, 2007; Kurtz et al., 2008; Nuechterlein et al., 2011). Thus, the link between cognitive deficits and impaired PA in patients with schizophrenia has been the focus of investigation in an effort to shed light on both the aetiopathology of the disorder and its clinical course.

Although PA has been extensively studied for over 30 years, it remains a controversial theoretical issue, whether it should be best viewed as a unitary or as a multi-dimensional construct. Particularly, several studies using the Premorbid Adjustment Scale (PAS) (Cannon-Spoor et al., 1982), the leading instrument to assess PA, employed

* Corresponding author at: Psychiatry Department, National and Kapodistrian University of Athens, Medical School, Eginition Hospital, Athens, Greece.
E-mail address: smyrnis@med.uoa.gr (N. Smyrnis).
[1] These two authors contributed equally to this work.

https://doi.org/10.1016/j.psychres.2018.06.029
Received 22 September 2017; Received in revised form 11 June 2018; Accepted 12 June 2018
Available online 18 June 2018
0165-1781/

either the general score or the subscale scores of at least two PA domains, academic and social. A series of factor analytic studies of PAS have established the validity of these two (Allen et al., 2013) or even more domains (Barajas et al., 2013). Meanwhile, it is argued that academic and social PA domains present distinctive developmental trajectories, which after the onset of psychosis follow different paths of cognitive dysfunction, clinical and psychosocial outcomes. However, studies yield conflicting results regarding the determination of the distinct or even exclusive associations that the academic and social premorbid impairment individually have with the cognitive functioning and the clinical characteristics of schizophrenia patients. Some studies describe an exclusive relationship between academic PA and cognitive dysfunction post-onset (Allen et al., 2001; Barajas et al., 2013; Larsen et al., 2004; Rund et al., 2004, 2007). Other studies report that the academic PA domain is more strongly related to cognitive decline than the social (Chang et al., 2013; Norman et al., 2005), two studies (Silverstein et al., 2002, 2003) indicate stronger associations of the social PA domain with post-onset cognitive impairment compared to academic, whereas Gonzalez-Blanch et al. (2008) report that both domains contribute equally and independently to cognition. Concurrently, certain studies argue that poor PA is mostly related to a generalized cognitive impairment (Allen et al., 2001; Cuesta et al., 2015), while others present findings of specific cognitive deficits (Addington and Addington, 2005; Chang et al., 2013; Silverstein et al., 2002). Thus, there is need for a thorough examination of the relationship between PA and cognitive dysfunction in schizophrenia, including the detailed investigation of academic and social PA courses throughout development (childhood, early adolescence, late adolescence). The establishment of differential deterioration course values for each PA domain in predicting cognitive dysfunction post-onset may contribute to the efforts of delineating the pre-psychotic period of the disease and it could deepen the understanding of its important implications for the diagnosis, detection, prevention, intervention and treatment strategies.

The current study aimed at contributing to the clarification of the theoretical issue regarding the possible distinct relationships of the academic and social PA domain with cognitive function post-onset, in a sample of 75 clinically stable male schizophrenia patients. Our objectives were: 1) to investigate specific relations of each PA domain with cognitive function post-onset; 2) to investigate the differential course across development of the academic and social PA domains and their relations with post-onset cognitive function and 3) to explore whether the course of the academic and social PA domain were predominately associated with a generalized cognitive decline or selective cognitive impairments in these patients.

2. Methods

2.1. Sample

The study sample included 75 male inpatients who met DSM-IV (American Psychiatric Association, 1994) criteria for schizophrenia. Participants gave written informed consent. They were all hospitalized at an inpatient Psychiatry Clinic unit for men at Eginition University Hospital. All patients were receiving antipsychotic medication and were at a stable phase of symptom remission during neuropsychological testing. The testing was carried out between the years 2009 and 2014. The mean age of the patient sample was 30.98 years (SD:8.21 years) and the mean educational level was 12.54 years (SD:2.78 years). The age of illness-onset for all patients was > 19 years. The mean years of illness was 8,33 (SD:7.25). Exclusion criteria included a) mental retardation b) a history of serious neurological disorder c) illness-onset preceding completion of the 19th year of age and d) unavailability of close relatives able to provide valid childhood and adolescence information.

2.2. Instruments

Premorbid Adjustment was evaluated using PAS (PAS-GR) (Cannon-Spoon et al., 1982; Rabinowitz et al., 2007)]. The PAS assesses functioning across four developmental stages: childhood (up to 11 years), early adolescence (12–15 years), late adolescence (16–18 years) and adulthood (19 years and beyond); and across five domains: sociability/withdrawal, peer relationships, scholastic performance, adaptation to school and socio-sexual functioning (socio-sexual functioning is not assessed during childhood). PAS was administered by a psychiatrist, on the basis of information obtained via interviews with patients and their family members, mainly parents. The information provided by family members was deemed valid provided that they had a close relationship with the patient during his childhood and adolescence. Through each interview the PAS rater selected the score closest to the descriptive phrase expressed by the respondents. Social adjustment was estimated through the items of peer relationships, sociability/withdrawal and social-sexual ties at each age period. According to PAS design, the item of social-sexual ties is not included in the childhood period. Academic adjustment was estimated through the items of scholastic performance and school adaptation at each developmental stage. The general information section and adulthood subscale were not included in the statistical analysis to avoid including symptoms of the prodromal phase (Allen et al., 2005; Barajas et al., 2013; Norman et al., 2005; Silverstein et al., 2002). All participants completed childhood, early and late adolescence. To ensure avoidance of prodromal symptomatology, we defined the premorbid period as ending 1 year before the onset of psychotic symptoms. This was based on the instructions of Comprehensive Assessment of at Risk Mental States (CAARMS) interview (Yung et al., 2005) according to which the presence of subthreshold psychotic symptoms is assessed during the past 12 months. Concurrently, aiming at the investigation of the three pre-adult PAS periods, individuals with illness-onset preceding completion of the 19th year of age were not included in the analysis.

According to Canoon-Spoor et al. (1982) instructions, an overall premorbid adjustment score and overall scores per PA domain for each of the three developmental stages were also estimated by summing up all the item scores of the relevant subscales and dividing by the maximum possible score. All PAS subscale scores were calculated as decimals ranging from 0.0 to 1.00, where higher scores indicate lower levels of performance. The deterioration of each participant was calculated using his score during a specific developmental stage, minus his score during a next developmental stage (childhood minus early adolescence; early adolescence minus late adolescence; childhood minus late adolescence), separately for academic, social and overall PA.

Patients completed a battery of neuropsychological tests designed to measure different domains of cognitive functions often found to be deficient in schizophrenia: a) General and Verbal intellectual capacity was estimated using the Full Scale Intelligence Quotient (IQ) and Verbal (IQ) from the Wechsler Adult Intelligence Scale-Greek version (WAIS) (Wechsler, 1955; Kokkevi et al., 1979); b) Estimated Premorbid IQ was accessed by the standardized score of the Vocabulary WAIS subtest, according to usual procedures (Ringe et al., 2002; De Oliveira et al., 2014). IQ decline was calculated, by the difference of Estimated Premorbid IQ minus current IQ; c) Verbal Memory and Learning was estimated using the Rey Auditory Verbal Learning Test (RAVLT)-Greek version (Rey, 1964; Schmidt, 1996; Messinis et al., 2007): verbal memory span, total verbal learning and free delayed recall in words were measured (raw scores); d) Processing speed was calculated using the Digit Symbol WAIS (raw scores); e) Working memory was calculated using the Digit Span WAIS (raw scores); f) Executive Functions were estimated through the Wisconsin Card Sorting Test (WCST) (Heaton et al., 1993): categories completed, percent number of perseverations and percent number of perseverative errors were measured (raw scores); g) Auditory Attention was estimated using the Verbal Memory Span RAVLT (Trial I) and the Digit Span WAIS (raw scores).