



Differences in developmental changes in academic and social premorbid adjustment between males and females with schizophrenia

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ABSTRACT

The assessment of premorbid adjustment in schizophrenia has received considerable attention because of models suggesting that schizophrenia is a neurodevelopmental disorder characterized by abnormalities in functioning prior to onset of the disorder. Some studies suggest that premorbid adjustment is best viewed as a multidimensional construct where different areas of functioning might be differentially impacted by the illness and sex. The current study examined these matters using of Premorbid Adjustment Scale (PAS) in a sample of 421 individuals with schizophrenia. Confirmatory factor analyses conducted for three developmental periods (childhood, early adolescence, late adolescence) and for males and females separately, indicated that the PAS consists of academic and social factors that are invariant across developmental period and sex. However, differences in severity of academic and social premorbid impairment were present between males and females across developmental periods. Findings suggest important differences between males and females in the course of premorbid deterioration prior to onset of schizophrenia.

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1. Introduction

Deficits in premorbid adjustment support neurodevelopmental models of schizophrenia (Murray et al., 1992; Weinberger, 1995). There is now strong evidence in schizophrenia of premorbid abnormalities in motor and intellectual abilities (Marcus et al., 1993; Walker, 1994; Walker et al., 1996; Rosso et al., 2000; Caspi et al., 2003; Schiffman et al., 2004, 2009), affective responsiveness (Walker et al., 1996), and social and academic adjustment (Allen et al., 2001; Reichenberg et al., 2002; Schiffman et al., 2004; Allen et al., 2005; Monte et al., 2008; Strauss et al., 2012). Poor premorbid adjustment has been linked to a number of negative outcomes such as increased negative symptoms, worse global and cognitive functioning, poor psychomotor abilities, and decreased quality of life (Malla and Payne, 2005; MacBeth and Gumley, 2008). However, a relevant question is whether premorbid abnormalities are best characterized as a generalized deficit that equally affects many different premorbid abilities, or if there are multiple premorbid dimensions that show differences in severity and course of deterioration prior to schizophrenia onset and that demonstrate different patterns of association with relevant outcomes. Studies of the Premorbid Adjustment Scale (PAS; Cannon-Spoor et al., 1982) provide some support

for this latter point of view by providing factor analytic evidence for separate social and academic functioning domains (van Kammen et al., 1994; Cannon et al., 1997; Allen et al., 2001) and by demonstrating that these domains are differentially associated with a number of important outcomes after diagnosis of schizophrenia. For example, higher levels of academic adjustment in childhood are associated with more education, more work and better working memory, while a stable course of social adjustment was related to shorter duration of untreated psychosis, more friends, and fewer negative symptoms in adulthood (Larsen et al., 2004). There is also evidence that a differential decline in academic relative to social functioning occurs as the onset of psychosis approaches (Allen et al., 2005; Monte et al., 2008), and that this decline may be more pronounced in males than females (Monte et al., 2008). Individuals who meet criteria for “deficit schizophrenia” (i.e., primary and enduring negative symptoms; Carpenter et al., 1998; Kirkpatrick et al., 2001) show poorer overall premorbid adjustment (Buchanan et al., 1990), as well as more severe deterioration in social functioning compared to those with “nondeficit schizophrenia” (Strauss et al., 2012). Thus, prior research supports the validity of distinct but related academic and social dimensions of premorbid functioning in schizophrenia. However, there are a lack of studies examining academic and social premorbid adjustment as separate constructs, with a need to increase this type of investigation (MacBeth and Gumley, 2008), particularly with regard to differences between males and females.

In the current study, we aimed to extend the literature on premorbid adjustment by addressing a number of unresolved questions regarding

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the stability of the latent structure of the PAS across developmental periods and sex, and by examining differences between males and females on the PAS domains. Regarding latent structure, prior studies have examined the factor structure of the PAS by collapsing across items from the childhood, early adolescence, and late adolescence developmental periods, even though stability of the PAS factor structure across developmental periods cannot be assumed, given evidence for differences in rate of premorbid decline across developmental periods. Also, although there are well-documented sex differences in premorbid decline, which generally indicate better functioning in females with schizophrenia, there is some evidence that these differences are not uniformly reflected across all of the premorbid domain subscales (Gittelman-Klein and Klein, 1969; Childers and Harding, 1990; Larsen et al., 1996a,b; Hoff et al., 1998; however, see Schmael et al., 2007). Therefore, the current study evaluated stability of the PAS factor structure across three developmental periods (childhood, early adolescence, late adolescence) in males and females, and further compared developmentally related changes in academic and social functioning for males and females. Based upon previous factor analytic studies of the PAS (van Kammen et al., 1994; Cannon et al., 1997; Allen et al., 2001), we hypothesized that a model consisting of academic and social factors would provide the best fit of the data at each developmental period for both males and females, and that there would be sex related differences in social and academic developmental trajectories that generally favored females.

2. Methods

2.1. Participants

Participants included in this study were selected from a series of 665 cases. Only individuals whose prodrome and illness onset occurred entirely in the PAS adult period (age 19 or after) were included. Schizophrenia onset was operationally defined as the first time at which full criteria for schizophrenia were met according to the DSM that was in use at the time of the evaluation. The presence of symptoms meeting criteria for schizophrenia was established using the Structured Clinical Interview for DSM diagnoses (SCID). Prodrome was operationally defined as presence of symptoms that met criteria for one of the Criteria A symptoms for schizophrenia as established by the SCID. We did not include data collected for the adulthood period because those PAS items differ from the ones for earlier developmental periods, and because many participants were already in the prodromal phase of the illness by early adulthood. Finally, only individuals with complete data for each developmental period were included.

Based on these criteria, 421 participants were included in this study. Comparisons between the participants that were retained to those who were excluded indicated no significant differences on gender (chi-square = .004, $df = 1$, $p = .95$), race (chi-square = 1.34, $df = 2$, $p = .51$), diagnosis of schizophrenia vs. schizoaffective disorder (chi-square = .04, $df = 1$, $p = .84$), or the PAS childhood score ($F = 3.05$, $df = 1$, 658, $p = .08$), although the excluded group had poorer PAS scores for early adolescence ($F = 23.19$, $df = 1$, 650, $p < .001$), and late adolescence ($F = 63.96$, $df = 1$, 576, $p < .001$), which was expected given their earlier age of onset.

The final sample consisted of 421 adults (male = 284, female = 137) who met DSM criteria for schizophrenia ($n = 382$) or schizoaffective disorder ($n = 39$). There were 257 outpatients and 164 inpatients recruited through the research programs at the Maryland Psychiatric Research Center (MPRC). Demographic and clinical characteristics are presented in Table 1 for the entire sample, and for males and females separately. One-way ANOVAs and chi square analyses comparing males and females indicated that the groups did not significantly differ on race, inpatient/outpatient status, or schizophrenia/schizoaffective diagnosis. Males were significantly younger than females at the time of the evaluation, had an earlier age of onset, fewer years of education,

Table 1

Demographic and clinical characteristics for females, males and the entire sample.

	Female (<i>n</i> = 137)		Male (<i>n</i> = 284)		Total (<i>n</i> = 421)		<i>F</i>	<i>df</i>	<i>p</i>
	Mean	<i>sd</i>	Mean	<i>sd</i>	Mean	<i>SD</i>			
Age	40.8	8.9	35.4	9.1	37.2	9.4	32.39	1, 419	<.001
Age onset	26.3	7.1	23.8	5.3	24.6	6.1	16.46	1, 419	<.001
Education ^a	12.9	2.0	12.6	2.0	12.7	2.0	3.39	1, 411	.07
PAS childhood	1.73	1.03	1.98	1.07	1.90	1.06	5.07	1, 419	.03
PAS early adolescence	1.82	1.00	2.22	1.07	2.09	1.06	13.22	1, 419	<.001
PAS late adolescence	1.92	1.12	2.60	1.22	2.38	1.23	30.02	1, 419	<.001
PAS total	1.84	0.94	2.30	1.00	2.15	1.01	20.10	1, 419	<.001
		%	%		%		χ^2	<i>df</i>	<i>p</i>
Race							0.817	2	.67
White		51.1	54.9		53.7				
African American		42.3	40.1		40.9				
Other		6.6	4.9		5.5				
Treatment program							2.00	1	.16
Inpatient		43.8	36.6		39.0				
Outpatient		56.2	63.4		61.0				
Diagnosis							0.012	1	.91
Schizophrenia		90.5	90.8		90.7				
Schizoaffective		9.5	9.2		9.3				

^a Total *n* = 413, females = 135, males = 278.

and poorer premorbid adjustment overall and for every developmental period.

2.2. Measures

The PAS is widely used to assess premorbid functioning in schizophrenia and other disorders and has excellent psychometric properties (Cannon-Spoor et al., 1982; Alvarez et al., 1987; Krauss et al., 1998; Allen et al., 2001; Brill et al., 2008). The PAS was designed to assess premorbid functioning across developmental periods and across a number of domains. Developmental periods include childhood (up to 11 years), early adolescence (12 to 15 years), late adolescence (16 to 18 years), and adulthood (19 years and above). PAS items include 1) sociability and withdrawal, 2) peer relationships, 3) scholastic performance, 4) adaptation to school, and 5) social-sexual functioning (social-sexual functioning is not assessed during childhood). Each domain is rated on a 0 to 6 point scale, with 0 indicating normal adjustment and 6 indicating severe impairment. The “premorbid” period for PAS purposes is the period ending six months prior to the first episode.

The PAS was completed by raters trained to reliably administer and score the instrument based on standardized procedures. These included a semi-structured interview completed with participants and their family members to gain information pertaining to the premorbid period (Cannon-Spoor et al., 1982). Family members selected for the interview were determined to be reliable informants on the basis of having substantial contact with the participant during childhood, adolescence, and early adulthood. In addition, collateral information was obtained from hospital and academic records when available. This extensive background information collected on these participants was necessary to ensure accurate completion of the PAS because many of the participants had been diagnosed with schizophrenia for many years at the time of the current evaluation.

2.3. Procedure

The PAS was administered as part of a battery of measures that were given to participants on their index admission into the MPRC, from the years 1988 to 2010. In addition to the PAS, this battery included demographic and clinical history interviews, a family history interview,

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