

## Validity of the Premorbid Adjustment Scale

N. Brill<sup>2,3</sup>, A. Reichenberg<sup>4</sup>, M. Weiser<sup>5</sup>, and  
J. Rabinowitz<sup>1,3</sup>

<sup>2</sup>Ashkelon Academic College, Ashkelon, Israel; <sup>3</sup>Bar Ilan University, Ramat Gan, Israel; <sup>4</sup>Institute of Psychiatry, King's College, London, UK; <sup>5</sup>Tel Aviv University, Tel Aviv, Israel

**Background:** The aim of the current study was to test the predictive and concurrent validity of the Premorbid Adjustment Scale (PAS) by comparing it with another similar but more elaborate retrospective measure and with data collected during late adolescence. **Methods:** We compared PAS late adolescence scores (age 16–18 years) of 91 males with schizophrenia or schizoaffective disorder with data on behavior collected in adolescence, before the first psychotic episode as part of standardized Draft Board screening, and with the same measure readministered during adulthood and modified to collect the same data again retrospectively. **Results:** The correlation of the PAS social withdrawal and social relations items with the social behavior scale of the Draft Board were .76 and .80, respectively, for the concurrent ratings and .52 and .53, respectively, for the data collected at age 17 years. The correlation of the PAS school achievements and school adjustment items with the functioning in structured environments scale of the Draft Board were .71 and .72, respectively, for the concurrent ratings and .43 and .47, respectively, for the data collected at age 17 years. **Conclusions:** Our results support the predictive and concurrent validity of the PAS and the validity of self-reported data on premorbid functioning in persons with schizophrenia.

**Key words:** schizophrenia/premorbid functioning/  
Premorbid Adjustment Scale/recall bias

### Introduction

Assessing premorbid functioning is important due to its association with outcomes in schizophrenia. Poor premorbid functioning has been associated with more severe negative symptoms especially at the onset of the illness,<sup>1</sup> more severe neuropsychological impairments,<sup>2,3</sup> poorer treatment response, more extrapyramidal symptoms,

and the need for higher doses of neuroleptics.<sup>4</sup> Also poorer premorbid social functioning has been associated with more days per year in the hospital.<sup>5</sup> Several scales have been developed to measure premorbid social functioning. Most of these scales, however, were developed a number of years ago (1941–1974) and fail to evaluate premorbid functioning systematically at several life periods.<sup>6</sup> In addition, an extended range of correlations was found between total scores of premorbid measures (variance range 20%–80%), suggesting that each instrument appears to measure unique aspects of premorbid adjustment.<sup>7</sup> The Premorbid Adjustment Scale (PAS), developed by Cannon-Spoor et al.,<sup>6</sup> is a compilation of items from past scales and was developed as a research instrument.<sup>8</sup>

The PAS is frequently used for assessment of premorbid social and school functioning in persons with schizophrenia.<sup>6</sup> The PAS is a 26-item rating scale that includes measures of social isolation, peer relationships, functioning outside of the family, and school functioning at 4 age periods (up to age 11, 12–15, 16–18, and 19 years and above) as well as social-sexual aspects of life starting at age 12 years. Performance is scored on a 7-point scale ranging from 0 (healthiest adjustment) to 6 (lowest adjustment). Despite its widespread use in research, relatively little is known about the reliability and validity of the instrument.<sup>8,9</sup> The aim of the current study was to test the validity of this instrument.

For the purpose of the current study, we administered the PAS to individuals who as adults were diagnosed with schizophrenia. We compared PAS late adolescence (age 16–18 years) derived data with data on behavior collected in adolescence, before the first psychotic episode as part of standardized Draft Board screening, and with the same measure readministered during adulthood and modified to collect the same data again retrospectively. To the best of our knowledge, this is the first study to use information, originally obtained prior to first psychotic episode, to validate PAS ratings based on retrospective reports and data obtained contemporaneously on another validated measure.

### Methods

#### *Participants and Procedure*

Ninety-one males with schizophrenia or schizoaffective disorder were examined. The mean age of participants

<sup>1</sup>To whom correspondence should be addressed; tel: +972-9-748-3679, fax: +972-9-740-1318, e-mail: jr827@columbia.edu.

**Table 1.** Pearson Correlation Between PAS Scores for Age 16–18 Years and the Draft Board Measures at Age 17 Years and Current Reassessment of Cases ( $n = 91$ )

Premorbid Adjustment Scale	Draft Board Measures			
	Social Behavior at Age 17 y		Functioning in Structured Environments at Age 17 y	
	Age 17 y	Current	Age 17 y	Current
Social withdrawal	.52***	.76***	.10	.19
Social relations	.53***	.80***	.18	.19
School achievements	.09	.29**	.43***	.71***
School adjustment	.16	.27**	.47***	.72***
Total PAS age 16–18 y	.48***	.76***	.27**	.40***

\*\* $P \leq .01$ , \*\*\* $P \leq .001$ .

was 26.12 (SD = 3.73) years, and the mean number of years of education was 11.86 (SD = 1.62). All but 7 were born in Israel. Mean age at first hospitalization was 22.21 (SD = 3.73) years. The mean total score on the Positive and Negative Syndrome Scale<sup>10</sup> was 62.58 (SD = 20.41). Persons with a first hospitalization for schizophrenia under the age of 18 years were excluded from the study. The study was approved by the local institutional review board, and all participants gave informed written consent.

Participants were recruited from the outpatient and inpatient units in the Department of Psychiatry, Sheba Medical Center, near Tel Aviv. Although the diagnosis of schizophrenia and spectrum disorders in psychiatric hospitals in Israel has been shown to be congruent with research diagnosis,<sup>11</sup> we also administered the Structured Clinical Interview for DSM IV Axis I Disorders, Research Version, Non patient Edition<sup>12</sup> to a randomly selected one-third of the sample. The clinical diagnoses were upheld for all cases.

After signing informed written consent, participants were administered the PAS and readministered the Draft Board's assessment (see below). The measures were administered by a well-trained rater.

### Instrument

**Israeli Draft Board's Assessment.** This assessment is conducted by an interviewer who has undergone a 4-month training course.<sup>13,14</sup> The assessment of males includes a structured interview assessing behavioral functioning, including *social functioning*—the ability to make and keep friends, social adeptness, and ability to achieve social closeness and *functioning in structured environments*, such as school or work. Performance is scored on a 5-point scale ranging from 1 (lowest) to 5 (highest). The reliability and validity of these measures have been extensively tested by the Draft Board, and population-based norms are available for each of the tests.<sup>13,14</sup> For the purposes of the current study, the Draft Board assessment was administered again alongside the PAS. For the reassessments, interview items were rephrased

so that participants were asked retrospectively about their behavior at age 16–17 years. The correlation between the 2 administrations of the Draft Board social behavior scale was  $r = .60$  ( $P = .000$ ,  $N = 84$ ), while the correlation of the 2 administrations of the Draft Board measure of functioning in structured environments was  $r = .53$  ( $P = .000$ ,  $N = 84$ ).

### Statistical Analysis

Pearson correlations were used to examine the associations between similar PAS late adolescence items (age 16–18 years) and Draft Board measures of behavior at age 16–17 years. To examine *predictive validity*, correlations were calculated for PAS and Draft Board data as collected at age 16–17 years. To examine *concurrent validity*, correlations were calculated between PAS and the current readministration of the Draft Board assessment in which participants were asked about themselves at age 16–17 years.

In preparation for the above analysis, we examined the scale reliability of the PAS using Cronbach  $\alpha$ . Results demonstrated  $\alpha$  of .79 for the late adolescence subscale (age 16–18 years, 5 items), which was the focus of the current investigation. For earlier ages,  $\alpha$  values were .79 (age 12–15 years, 5 items) and .72 (up to age 11 years, 4 items).

### Results

Table 1 presents the Pearson correlations between PAS late adolescence (age 16–18 years) scores and Draft Board assessments at age 17 years and the current readministration of Draft Board assessment. The observed pattern of associations supports the validity of PAS late adolescence (age 16–18 years) scores in estimating premorbid functioning in persons with schizophrenia, as well as the validity of the separate social and school functioning scales of the PAS.

The correlations of the PAS social withdrawal and social relations items and the social behavior scale of the Draft Board were .76 and .80, respectively, for the concurrent ratings and .52 and .53, respectively, for the data collected at

age 17 years. The correlation of the PAS school achievements and school adjustment items with the functioning in structured environments scale of the Draft Board were .71 and .72, respectively, for the concurrent ratings and .43 and .47, respectively, for the data collected at age 17 years.

## Discussion

Poor premorbid functioning has been associated with worse clinical symptoms<sup>1–3</sup> and worse hospitalization outcomes in schizophrenia.<sup>4,5</sup> Often only retrospective information regarding premorbid functioning is available. The current study results strongly support the predictive and concurrent validity of the PAS social and school functioning items for late adolescence.

Although many studies have used the PAS to assess premorbid functioning, few have assessed the reliability or validity of the scale. Krauss et al<sup>9</sup> undertook this task in a sample of German persons with schizophrenia and schizoaffective disorder and found high intercorrelations between each of the subscales and the overall PAS score thus supporting the reliability of the scale. The current study supports the validity of the PAS and supports the use of the PAS based on self-report data of persons with schizophrenia.

This study has several limitations. First, the current study was comprised only of males. This is because the Draft Board behavioral assessment is administered only to males. Another limitation was that the sample was in remission and had a relatively low level of positive symptoms (mean = 11.3, SD = 5.53). This may limit the generalizability of the findings. An additional limitation was that we could not validate the other life stages of the PAS. In summary, the results of the current study support the predictive and concurrent validity of the PAS completed based on self-report data and therefore increase the confidence in utilizing this instrument in clinical and research settings.

## Funding

National Alliance for Research on Schizophrenia and Depression (Young Investigator Award to M.W.); German Federal Ministry of Education and Research (BMBF) within the framework of German Israeli Project Cooperation (to J.R.); Elie Wiesel Chair (to J.R.); Hanacy Scholarship Bar Ilan University (to N.B.).

## Acknowledgments

This work was part of a PhD carried out under the supervision of Prof Rabinowitz, School of Social Work, Bar Ilan University.

## References

1. Haim R, Rabinowitz J, Bromet E. The relationship of premorbid functioning to illness course in schizophrenia and psychotic mood disorders during two years following first hospitalization. *J Nerv Ment Dis.* 2006;194:791–795.
2. Rabinowitz J, De Smedt G, Harvey PD, Davidson M. Relationship between premorbid functioning and symptom severity as assessed at first episode of psychosis. *Am J Psychiatry.* 2002;159:2021–2026.
3. Palmer BW, Heaton RK, Paulsen JS, et al. Is it possible to be schizophrenic yet neuropsychologically normal? *Neuropsychology.* 1997;11:437–446.
4. Rabinowitz J, Harvey PD, Eerdeken M, Davidson M. Premorbid functioning and treatment response in recent-onset schizophrenia. *Br J Psychiatry.* 2006;189:31–35.
5. Rabinowitz J, Haim R, Reichenberg A, et al. Association between functioning in adolescence prior to first admission for schizophrenia and affective disorders and patterns of hospitalizations thereafter. *Schizophr Res.* 2005;73:185–191.
6. Cannon-Spoor HE, Potkin SG, Wyatt RJ. Measurement of premorbid adjustment in chronic schizophrenia. *Schizophr Bull.* 1982;8:470–484.
7. Kokes RF, Strauss JS, Klorman R. Premorbid adjustment in schizophrenia. Part II. Measuring premorbid adjustment: the instruments and their development. *Schizophr Bull.* 1977;3:186–213.
8. van Mastrigt S, Addington J. Assessment of premorbid function in first-episode schizophrenia: modifications to the Premorbid Adjustment Scale. *J Psychiatry Neurosci.* 2002;27:92–101.
9. Krauss H, Marwinski K, Held T, Rietschel M, Freyberger HJ. Reliability and validity of the premorbid adjustment scale (PAS) in a German sample of schizophrenic and schizoaffective patients. *Eur Arch Psychiatry Clin Neurosci.* 1998;248:277–281.
10. Kay SR, Fiszbein A, Opler LA. The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophr Bull.* 1987;13:261–276.
11. Weiser M, Kanyas K, Malaspina D, et al. Sensitivity of ICD-10 diagnosis of psychotic disorders in the Israeli National Hospitalization Registry compared with RDC diagnoses based on SADS-L. *Compr Psychiatry.* 2005;46:38–42.
12. First MB, Spitzer RL, Gibbon M, Williams JBW. *Structured Clinical Interview for DSM IV Axis I Disorders, Research Version, Non patient Edition (SCID—I/NP).* New York, NY: Biometrics Research Department, New York State Psychiatric Institute; 1997.
13. Gal R. The selection, classification and placement process. In: Gal R, ed. *A Portrait of the Israeli Soldier.* Westport, Conn: Greenwood Press; 1986:77–96.
14. Tubiana JH, Ben-Shakhar G. An objective group questionnaire as a substitute for a personal interview in the prediction of success in military training in Israel. *Personnel Psychol.* 1982;35:349–357.