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Pre-morbid Adjustment and Personality in Psychosis
Effects of Sex and Diagnosis

ALICE FOERSTER, SHÔN LEWIS, MICHAEL OWEN and ROBIN MURRAY

Pre-morbid schizoid and schizotypal traits and social adjustment were assessed blind to diagnosis by interviewing the mothers of 73 consecutively admitted patients with DSM-III schizophrenia or affective psychosis. Analysis of factors associated with pre-morbid deficits showed a highly significant interaction of diagnosis with sex, such that schizophrenic men showed much greater pre-morbid impairment than either schizophrenic women or men with affective disorder. Poor pre-morbid adjustment predicted an early age at first admission. The results can be explained by a neurodevelopmental disorder in some schizophrenic males.

Some adults with schizophrenia were odd as children. The traits most commonly noted involve those deficits of cognition and affect which together comprise Kretschmer's (1921) description of schizoid personality: solitariness, cold affect and eccentricity. Other traits which are often cited are suspiciousness, rigidity and unusual speech. These observations date back to Kraepelin and Bleuler, yet the nature of the relationship between the pre-morbid abnormalities and adult schizophrenia remains obscure. Are they precursors of schizophrenia specifically or of severe mental illness in general? What proportion of schizophrenic patients had such traits as children?

In his review of several early German studies which examined the apparent prevalence of abnormal pre-morbid traits in schizophrenia, Cutting (1985) concluded that overall about a quarter of patients were considered schizoid pre-morbidly, and that a further one-sixth were abnormal in other personality traits. The nature of the link between these abnormal personality traits and the emergent psychosis has been explained in several different ways. The psychotic symptoms have been seen as a reaction to stress in a peculiarly vulnerable personality (Kretschmer, 1921), as a fundamental part of the extended phenotype of schizophrenia (Meehl, 1962), or simply as the early stage of a longitudinal disease process (Kraepelin, 1913). 'High risk', twin and adoption studies (Kendler *et al*, 1981; Mednick *et al*, 1987) have clarified the genetic relationship between abnormal personality and schizophrenia and have enabled better definition of the traits involved with the operationalised concept of schizotypal personality (American Psychiatric Association, 1980). Studies looking back at pre-morbid personality in cohorts of schizophrenic patients are prone to the difficulties involved in retrospective interpretation. Nonetheless, they remain important in view of the impact that abnormal pre-morbid personality appears to have on the nature of the subsequent illness. It seems to predict early onset and poor prognosis (Strauss *et al*, 1977), cognitive deficits and negative symptoms, as well as correlating with cerebral ventricular size in some reports (Weinberger *et al*, 1980; Williams *et al*, 1985).

These observations have given rise to neuro-developmental formulations of schizophrenia. Broadly, these propose the existence of a non-progressive brain lesion of genetic or early environmental origin. The cognitive and behavioural effects of such a lesion are postulated to change over time as the nervous system around it continues to develop. In the immature brain, the functional effects are subtle, with relatively minor deficits in trait characteristics such as affective responsiveness and sociality. Only as the brain reaches functional maturity in adolescence do the psychotic symptoms of delusions, hallucinations and thought disorder become manifest (Weinberger, 1987; Murray & Lewis, 1987; Lewis, 1989).

The current study investigates pre-morbid personality and adjustment in an operationally defined sample of young psychotic patients. In order to standardise collection of information and maximise its validity, the mother was the selected informant in each case. Accordingly, the sample comprised a consecutive series of hospital admissions for whom the mother was available for interview. In all cases, mothers were interviewed by a rater blind to the diagnostic status of the patient. The main hypothesis was that the frequency and severity of pre-morbid deficits would be increased in patients with schizophrenia compared with those with affective psychosis. In the light of recent interest in the effects of gender on age at onset, course and prognosis of schizophrenia (Goldstein, 1988; Angermeyer *et al*, 1989), this was planned as the second independent variable of interest.

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Our predictions were that pre-morbid personality and adjustment deficits:

(a) characterise schizophrenia rather than affective psychosis
(b) are found in men more than in women
(c) predict early onset of psychotic symptoms in schizophrenia.

Method

A total of 1039 consecutive admissions over 12 months to acute general psychiatric wards of the Royal Bethlem and Maudsley Hospital were screened for symptoms of functional psychosis. Operational criteria for functional psychosis were defined as the presence of delusions, hallucinations or thought disorder during the current episode in the absence of clinically manifest cognitive impairment. Patients aged 16–50 years were included if, at interview, they: (a) had a DSM-III diagnosis of schizophrenia (295.1, −2, −3, −9) or affective disorder with psychotic features (296.24, −34, −44, −54, −64) (American Psychiatric Association, 1980); (b) had a mother available for interview (i.e. living in UK or Eire); and (c) had psychotic symptoms not secondary to effects of drugs or alcohol.

Although 94 patients met these criteria, in 10 cases the patient refused access to the mother and in 11 cases the mother herself refused an interview. Thus, a final sample of 73 patients who fulfilled these criteria had prospective diagnostic interviews and separate, blind maternal interviews for pre-morbid data.

The instruments used were developed for this study and included an assessment of pre-morbid and schizotypal traits (PSST) and an assessment of pre-morbid social adjustment (PSA). The former interview was developed to cover areas of long-standing pre-morbid dysfunction relevant to current concepts of schizoid and schizotypal disorders. Seven items were scored for the period between the ages of 5 and 16 years, each with a standardised entry question and rates on a four-point (0–3) scale with explicit anchor points (3 = most impaired). The items addressed sociability ('active social interaction' to 'withdrawn and isolated with no friends'); demonstrative affect ('warm with spontaneous shows of affection' to 'cold and aloof with all'); suspiciousness/sensitivity ('never unduly suspicious or socially anxious' to 'marked social anxiety, suspiciousness, distrustfulness plus paranoid ideation'); ideas of reference/perceptual distortions ('none' to 'daily expression of odd ideas/unusual perceptions/ideas of reference'); speech ('normal' to 'consistent pattern of clearly deviant speech, with examples'); socialised and unsocialised antisocial behaviour ('never' to 'severe and repeated').

Mothers were instructed to give full answers and to consider enduring personality traits before the first episode of psychosis. Seven of the eight schizotypal, and three of the four schizoid, features listed in DSM-III were included. Copies are available from the authors.

The PSA was derived from the Cannon-Spoor scale for pre-morbid adjustment (Cannon-Spoor *et al*, 1982), adapted for a UK sample. Thus, five items were included, each with an eight-point rating scale with explicit anchor points. The items covered socialisation, peer relationships, scholastic performance, school adaptation, and hobbies and interests. Each item was rated for two periods roughly equivalent to time at primary school and time at secondary school: 5–11 years (PSA1) and 12–16 years (PSA2). Two cases had been admitted as in-patients for psychosis by age 15 years: in each case, PSA1 was rated, but not PSA2 nor PSST.

Inter-rater reliability for these scales was assessed by a second rater (SL) independently rating a random sample of eight consecutive audiotaped interviews (AF). Intraclass correlation coefficients were calculated which showed reliability to be satisfactory for PSA1 ($r = 0.64$; $P < 0.05$) and PSA2 ($r = 0.64$; $P < 0.05$), and good for PSST ($r = 0.98$; $P < 0.001$).

Procedure

Mothers were interviewed by a rater blind to diagnostic information on the proband. A total of 30% of the maternal interviews were conducted by telephone.

Patients were interviewed by a separate rater blind to maternal information. Symptom assessment was by PSE-9 (Wing *et al*, 1974), which was used in addition to clinical and case-note information and adapted to yield DSM-III axis-1 diagnoses. The interview was conducted within 14 days of in-patient admission. Age at first hospital admission for psychotic symptoms was recorded: this index was chosen rather than age of onset in view of its high reliability and compatability with other studies (Hafner *et al*, 1989).

Results

Seventy-three mothers of psychotic patients were interviewed. Details of the 73 patients are given in Table 1. Three pre-morbid ratings were obtained from the maternal informant: pre-morbid schizoid and schizotypal traits (PSST), pre-morbid social adjustment at 5–11 years (PSA1) and pre-morbid social adjustment at 12–16 years (PSA2). PSST was rated in 61 cases, PSA1 in 67 cases and PSA2 in 63 cases: the numerical discrepancies arose because a rating of PSST required the patient to have been in contact with the mother up until 16 years, while PSA1 and PSA2 required contact at 5–11 and 12–16 years respectively. Separations due to emigration, partial rearing by third

Table 1
Details of patients ($n = 73$)

	DSM-III diagnosis	
	Schizophrenia ($n = 45$)	Unipolar/bipolar disorder with psychotic features ($n = 28$)
Mean age at assessment (s.d.): years	26.8 (5.6)	30.1 (8.2)
Ratio male:female	35:10	12:16
Mean age at first in-patient admission (s.d.): years	22.5 (5.3)	24.9 (7.5)

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parties and first admission before age 16 years precluded full ratings in some eligible patients.

Not surprisingly, correlations between the three rating scores were significant. Between PSA1 and PSA2, Spearman's correlation was 0.90; between PSST and PSA1 it was 0.45; between PSST and PSA2 it was 0.49 ($P<0.001$ in each case).

Of the 61 patients rated for PSST, 37 had a diagnosis of schizophrenia compared with 24 with a diagnosis of bipolar or unipolar affective disorder (with psychotic features).

Effect of diagnosis and sex

PSST was scored on a range 0–21. Of the 61 rated, 47 (61%) scored less than 2; the score distribution had a marked positive skew. Similar distributions were noted for PSA1 and PSA2. The rating scores were therefore log-transformed and entered into an analysis of variance with DSM-III diagnosis and sex. For PSST, a significant main effect was seen for diagnosis ($F=6.7$, $P=0.01$); a trend only was seen for sex ($F=3.6$, $P=0.07$). Thus, schizophrenic patients' mothers reported significantly more schizoid and schizotypal traits than did the mothers of affective patients; there was a trend towards more such traits in men.

The analysis of variance showed a significant two-way interaction between diagnosis and sex on PSST score ($F=10.6$, $P=0.002$). Thus, male schizophrenics were rated much more highly for PSST than other groups.

Similar findings emerged for PSA2 with a significant main effect for diagnosis ($F=4.7$, $P=0.03$) but not sex; again, the two variables showed a significant two-way interaction ($F=4.5$, $P=0.03$). PSA1 showed no significant main or interaction effects for diagnosis and sex.

Mean PSST scores were similar in men and women with affective disorder and in schizophrenic women (7.40; 7.86; 7.17); whereas the mean PSST score for schizophrenic men was 9.61. Schizophrenic men had more pre-morbid schizoid and schizotypal features than both schizophrenic women (Mann-Whitney U, $Z=3.0$, $P<0.001$ one-tailed) and men with affective disorder ($Z=3.3$, $P<0.0005$) (Table 2). Mean PSA2 scores showed a similar pattern, with men and women with affective disorder and schizophrenic women scoring 9.27, 10.69 and 10.14 respectively, compared with a mean of 14.00 for schizophrenic men. Schizophrenic men had a significantly higher PSA2 score than schizophrenic women ($Z=1.7$, $P<0.05$) or men with affective disorder ($Z=2.5$, $P=0.005$). Thus, the pre-morbid impairments were neither a function of sex alone, nor diagnosis alone: only being male and pre-schizophrenic predicted impairments.

Table 2

Mean scores of pre-morbid schizoid-schizotypal traits (PSST) and early and late childhood social adjustment (PSA1, PSA2) in men and women with schizophrenia or affective psychosis

	Schizophrenics	Those with affective psychosis
Men		
mean PSST	**9.61***[1]	7.40
mean PSA1	12.83*	9.50
mean PSA2	*14.00*	9.27
Women		
mean PSST	7.17	7.86
mean PSA1	11.00	9.87
mean PSA2	10.14	10.69

*$P<0.05$; **$P<0.005$; ***$P<0.0005$.

1. Planned univariate, non-parametric comparisons (Mann-Whitney, one-tailed): left-hand asterisks relate to comparisons between men and women with schizophrenia; right-hand asterisks relate to comparisons between men with schizophrenia and men with affective psychosis.

Age at first admission

For the group as a whole, age at first in-patient admission correlated negatively with all pre-morbid measures: PSST $r=-0.18$, $P=0.08$; PSA1 $r=-0.31$, $P=0.005$; PSA2 $r=-0.23$, $P=0.03$ (Spearman's r). It is notable that PSA1 showed the highest correlation with early age at admission. This suggests that the marked pre-morbid deficits shown above in schizophrenic men are unlikely to be due to an early, gradual onset of adult psychosis being confused with pre-morbid deficits, since measures before age 11 were actually the best predictors of early onset. Admission age rather than estimated age at 'onset' was used also to circumvent this problem, as was the exclusion of those in whom first admission was before 16 years of age.

An unexpected finding was that the measures of social adjustment, PSA1 and PSA2 scores, were stronger predictors of early admission in affective disorder ($r=0.52$, $P=0.004$; $r=-0.44$, $P=0.001$) than they were in schizophrenia ($r=-0.22$, NS; $r=0.10$, NS). This might be a type-II statistical error resulting from the under 16 exclusion rule making for a narrow range of first admission ages in the schizophrenic group. Nonetheless, it is an interesting result which appears to demonstrate the importance of pre-morbid factors in determining age at presentation of adult affective psychosis. PSST score was more strongly correlated with early onset in schizophrenia ($r=-0.20$) than in affective disorder ($r=-0.09$), although in neither group was this correlation significant.

Could the correlation between pre-morbid deficits and early age at admission in the whole group explain the observed pre-morbid differences between the schizophrenic and affective disorder groups, since age of onset for schizophrenia is younger in general than for affective disorder? Age at first admission was entered as a covariate in the foregoing ANOVA calculations to test this. For PSST, entering age at first admission did not affect the ANOVA results greatly: although a significant covariate ($F=4.7$, $P=0.004$), it altered the main effect of diagnosis only slightly ($F=6.3$, $P=0.02$) and actually strengthened the two-way interaction between sex and diagnosis ($F=12.3$, $P=0.001$). Neither did entering age as covariate materially alter the results reported above for PSA1 and PSA2. As with PSST, the sex-diagnosis interaction for PSA2 actually

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increased when age at admission was taken into account ($F = 5.6$, $P = 0.002$). Thus, differences in age at first admission (or age at 'onset') did not account for the two diagnostic groups' differences in pre-morbid factors. Indeed, age at first admission was similar (Table 1) in the two groups.

Discussion

Over 12 months, we assessed 73 consecutive in-patient admissions aged 16–50 years who met DSM-III criteria for schizophrenia or affective disorder with psychotic features. In each case, standardised interviews with the patient's mother were conducted by a separate interviewer blind to patient diagnosis, to assess pre-morbid personality and adjustment. We found that abnormal pre-morbid personality with schizoid and schizotypal traits (PSST) was reported significantly more frequently in the schizophrenic patients than in those with affective psychosis. Moreover, schizophrenic men specifically were highly significantly more abnormal in pre-morbid personality than other groups, as shown by a two-way interaction effect between sex and diagnosis. Women with schizophrenia differed little from men and women with affective disorder on these pre-morbid measures. Similar effects were apparent with reported adjustment at secondary-school ages.

In the series as a whole, all poor pre-morbid personality adjustment measures predicted significantly earlier age at first psychiatric in-patient admission. Social adjustment at primary-school age was the strongest predictor. Unexpectedly, these correlations were stronger for affective disorder than for schizophrenia.

What do these results mean? First, it is important to note the main methodological limitation of the study: the retrospective assessment of pre-morbid characteristics. We endeavoured to eliminate likely biases in three ways. Information was collected from the biological mother in all cases and in each case only for those periods in which the mother was in close contact with the patient. A control group was chosen in which illness severity (and, fortuitously, age at first admission) in the acute phase was similar to that of the schizophrenic group: affective disorders with psychotic features. This minimises any possible artefactual effect of the illness severity influencing the mother's recall or report of abnormalities in childhood. Any possible interviewer bias was reduced by the use of an interviewer blind to clinical and diagnostic data regarding the patient. The face validity of the interview to collect pre-morbid data was thus increased, and inter-rater reliability was shown to be acceptable. The accuracy of the data ultimately remains unknown, but systematic bias between diagnostic groups was rendered unlikely.

The results confirmed our first prediction, that a diagnosis of schizophrenia was significantly associated with reported pre-morbid schizoid-schizotypal traits and late-childhood social impairments (PSA2). This supports the notion that such pre-morbid abnormalities are more characteristic of schizophrenia than of the other psychoses. Late childhood impairments in adjustment (PSA2) were more predictive of schizophrenia than were early impairments (PSA1), a finding which accords with evidence that, although schizoid-schizotypal traits can be detected in early childhood (Hanson *et al*, 1976; John *et al*, 1982), their impact on broader social adjustment emerges most strongly in later childhood (Watt, 1972). The high correlation noted between early childhood social adjustment (PSA1) and age at first admission to hospital for psychosis suggests that where deficits are severe enough to impair social adjustment at an early stage, these are powerful predictors of early onset. This finding was not diagnosis-specific and actually was more pronounced for affective psychoses, perhaps as a result of the greater variance in age at admission to hospital in this group.

Deficits were relatively specific to boys who were to develop schizophrenia, compared with girls who were to develop schizophrenia or boys who were to develop affective psychosis. The last two groups differed little from each other in measures of schizoid-schizotypal personality or social adjustment, or from the fourth group: girls who were to develop affective psychosis (Table 2). How can we explain this finding? Two possible artefacts should be first considered. It could conceivably be that the male schizophrenic group had a particularly early or insidious onset of psychosis, the initial features of which were interpreted by mothers as poor personality and adjustment. Inspection of the data analysis enables us to reject this explanation. The age at first admission to hospital was not significantly earlier in male schizophrenics than the other groups. Furthermore, age at first admission was controlled for in an analysis of covariance which strengthened rather than weakened the association. The second possible artefact is less easy to test: the traits of interest might be present in pre-schizophrenic girls but are not recognised as such by mothers because of some sex-related expectations of social behaviour. However, this would not explain the observed differences between the two male diagnostic groups. Nor would it fit with what is known of sex differences in childhood temperament and social behaviour: if anything, girls are more empathic and 'sociable' (Hoffman, 1977) than boys, especially in relation to their mother (Maccoby & Jacklin, 1980) and thus any deviance in their social development

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should be more, not less, easily detectable by mothers.

If the finding is real, then it has implications for research into the causes of schizophrenia. Diagnosis-dependent differences in pre-morbid characteristics have been well researched; the interacting effect with sex has not. Sex differences in certain aspects of the course of schizophrenia have been known for a considerable time. In particular, that median age of onset is earlier in men than in women is well established, although still unexplained (Lewine *et al*, 1981; Hafner *et al*, 1989). Prognosis also seems better in women (Loranger, 1984) while men are more likely to show defect-state symptoms (Goldstein & Link, 1988). Poorer pre-morbid adjustment in male compared with female schizophrenic patients has been noted (Kloreman *et al*, 1977; Zigler & Levine, 1984) but the specific interaction of sex and diagnosis was not examined in these studies although a review of the evidence for pre-morbid intellectual impairments in schizophrenia concluded that, where such deficits exist, they are mostly a male characteristic (Aylward *et al*, 1984). Conventional genetic hypotheses (Gottesman & Shields, 1982) would be hard-put to explain the apparent specificity of pre-morbid deficits to schizophrenic men. A polygenic-multifactorial model might invoke sex-dependent thresholds, but this would require that, if the male form of the disorder were more severe, it should also be considerably less prevalent; this is not the case. A single major locus model could explain the data only if an unusual sex-specific interaction at the cellular level were invoked, as in the recent model of pseudoautosomal X-linkage posited by Crow *et al* (1989). One attempt to explain sex-differences in onset proposed a hormonal protective factor in women (Seeman, 1983). Such a mechanism would not explain our findings of pre-pubertal differences, particularly in the absence of an observed effect concerning age at first admission to hospital.

A possible explanation for the findings is that there exists a subtype of schizophrenia which is characterised by particular deficits of pre-morbid functioning, and that this subtype is more commonly found in men. There exists a ubiquitous excess of males in recognised neurodevelopmental disorders such as epilepsy, stuttering and severe mental retardation. Recent evidence from brain imaging studies suggests that the non-progressive abnormalities seen in schizophrenia are also found predominantly in men (Andreasen *et al*, 1990). Childhood deviance in social adjustment and personality might therefore be an early behavioural manifestation of a neurodevelopmental subtype of schizophrenia which is most often found in males.

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