

# Childhood antecedents of schizophrenia and affective illness: social adjustment at ages 7 and 11

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## Abstract

**Objective :** To investigate the social adjustment in childhood of people who as adults have psychiatric disorders.

**Design -** Subjects in a prospectively followed up cohort (the national child development study) who had been admitted as adults to psychiatric hospitals were compared with the rest of the cohort on ratings of social behaviour made by teachers at the ages of 7 and 11 years.

**Subjects :** 40 adult patients with schizophrenic illnesses, 35 with affective psychoses, and 79 with neurotic illness who had been admitted for psychiatric reasons by the age of 28. 1914 randomly selected members of the cohort who had never been admitted for psychiatric treatment.

**Main outcome measures :** Overall scores and scores for overreaction (externalising behaviour) and underreaction (internalising behaviour) with the Bristol social adjustment guide at ages 7 and 11.

**Results :** At the age of 7 children who developed schizophrenia were rated by their teachers as manifesting more social maladjustment than controls (overall score 4.3 (SD 2.4) v 3.1 (2.0);  $P < 0.01$ ). This was more apparent in the boys (5 (2.6)) than the girls underreactive behaviour. At both ages prepsychotic (affective) children differed little from normal controls. By the age of 11 preneurotic children, particularly the girls, had an increased rating of maladjustment (including overreactions and underreactions).

**Conclusion :** Abnormalities of social adjustment are detectable in childhood in some people who develop psychotic illness. Sex and the rate of development of different components of the capacity for social interaction are important determinants of the risk of psychosis and other psychiatric disorders in adulthood.

### Clinical implications

- Clinical implications
- Maladjusted social behaviour in some children could be an early sign of psychotic illness in adulthood
- Overreactivity that can be detected by teachers - that is, anxiety for acceptance, hostility, and inconsequential behaviour - is uncommon in 7 and 11 year old boys in general but was common at these ages in those who developed schizophrenia in adult life
- Girls who developed schizophrenia did not behave abnormally at the age of 7 but had become noticeably withdrawn (rather than overreactive) by the age of 11
- The rate of development of the capacity for social interaction may be important in determining the risk of psychosis and other psychiatric disorder in adulthood.

## Introduction

Schizophrenic and affective psychoses - the major psychiatric illnesses in adulthood - have a lifetime prevalence (probably similar in different societies) of 2-3%. Onsets are rare before puberty but then rise steeply (earlier in males than females), with a predominant impact in early and middle adult life. Twin, family, and adoption studies establish a genetic role in aetiology, and there is no strong evidence for an environmental factor.

Abnormalities have been reported in patients with schizophrenia and affective disorders long before the onset of psychotic symptoms. People who were admitted to hospital with schizophrenia had lower intelligence quotients (IQ) than their siblings and classmates<sup>1,2</sup> and were also reported by their teachers as exhibiting deviant behaviour.<sup>3,4</sup> These abnormalities (apparently confined to the boys) have been attributed to neurodevelopmental impairment, susceptibility to psychosocial stressors, or an interaction of these two possible factors.<sup>5</sup>

We previously identified the subjects in the 1958 cohort of the national child development study who as adults were admitted to psychiatric hospitals, and by examining their case notes we identified those that had schizophrenia, affective psychoses, and non-psychotic disorders.<sup>6</sup> We investigated the social behaviour in childhood of these patients in relation to diagnosis and sex by analysing the results of psychometric assessments performed at the age of 7 and 11 years.

### Subjects and methods Subjects

The British perinatal mortality survey of 1958 included some 98% of all births in England, Scotland, and Wales registered during the week of the 3-9 March 1958. Four subsequent attempts (in 1965, 1969, 1974, and 1981) to trace members of the cohort to monitor physical, educational, and social development became known as the national child development study. The numbers of subjects followed up at each stage were 15 398, 15 303, 14 761, and 12 537.

Using the mental health enquiry we identified all subjects in the national study who had been treated as adults in hospital for psychiatric reasons between 1974 and 1986. Such a sampling procedure is unlikely to miss cases of schizophrenia as only a small proportion of schizophrenic patients do not have contact with hospitals,<sup>7</sup> but it will select an atypical group of patients with neuroses that are presumably severe. We derived diagnoses of schizophrenia, affective psychosis, and neurosis from the casenote histories as previously described<sup>6</sup> using the present state examination by application of the CATEGO program.<sup>8</sup> From hereon we refer to these groups as preschizophrenia, preaffective psychotic disorder, and preneurosis respectively. The control group was a randomly selected 10% sample of subjects in the national cohort who had never been admitted to hospital for psychiatric treatment and had been followed up at least once. Table I shows the numbers of subjects in each group at each age.

TABLE I - Numbers of subjects from national child development study who had psychometric test results at ages 7 and 11 according to group and psychiatric diagnosis in adulthood<sup>6</sup>

No (%) of		No with BSAG data at age 7		No with BSAG data at age 11	
		sample at age		7 included	
Group (adult diagnosis)		Total	Boys	Girls	Total
Boys	Girls	at age 11			
Normal control (n=1914)		1385	673	712	1378
674	704	1191 (86)			
Preschizophrenia (narrow schizophrenia) (n=40)		33	20	13	30
16	14	25 (75)			
Preaffective psychotic disorders (mania, depressive psychosis, retarded depression) (n=35)		31	17	14	31
17	14	29 (94)			
Preneurosis (neurosis) (n=79)		67	28	39	70
29	41	61 (91)			

BSAG=Bristol social adjustment guide.

#### Measures of social and emotional adjustment

In 1965 and 1969 teachers were asked to complete the Bristol social adjustment guide,<sup>9</sup> a standardised psychometric test of social maladjustment, by underlining which of some 150 descriptions of behaviour at school were relevant to each child in the national child development study. The scoring system allows assessment of either global or more specific aspects of maladjustment. An overall score has been found to be useful in broad epidemiological surveys, although subsequent revisions have acknowledged two separate types of maladjustment referred to as underreaction and overreaction (see appendix).<sup>9</sup> This dichotomy is relevant to studies of psychosis. Social isolation (one aspect of underreaction) and difficulty in forming social and sexual relationships have often been reported in the premorbid personality of schizophrenic patients.<sup>10,11</sup> However, cruel, bullying behaviour (aspects of overreaction) leading to weak peer affiliations has been reported in studies of the childhood behaviours of adult schizophrenic patients.<sup>12,13</sup> Thus we compared groups in terms of both overreaction and underreaction.

The Bristol social adjustment guide (standardised in the United Kingdom, the 1987 manual providing normative data by social class and sex) also recognises more focused dysfunctions, which are referred to as core syndromes (appendix). High scores indicate social maladaptation. Subjects in social classes 4 and 5 (General Register Office's classification<sup>14</sup>) obtain higher scores than those in social classes 1 and 2.<sup>9</sup> We found, however, that the social class of those with preschizophrenia was significantly higher than that of the controls ( $P=0.02$ ). This would tend to lower scores, but it should be noted that the father's occupation was more often unavailable in the preschizophrenic group.

Our main concern was to establish whether the four groups of children - that is, normal controls, those with preschizophrenia, those with pre-affective psychotic disorders, and those with preneurosis - differed in terms of their social adjustment scores. We therefore used analysis of variance. Scores with the Bristol social adjustment guide have a skewed distribution, so we used a square root transformation of the scores to reduce the skewness and make the variances comparable between groups. A four factor analysis of variance with repeated measures on one factor was calculated using spssx, release 2.1.<sup>15</sup> Missing data were replaced for each case by the mean value for the same sex, age, and group except for cases with data missing at both ages.

## Results

Table II presents the scores for overreaction and underreaction for each group at each age. There was an overall difference between the groups ( $F=14.0$ ,  $P<0.001$ ) and a significant main effect of sex ( $F=19.05$ ,  $P<0.001$ ), boys scoring higher than girls in three of the four groups (fig 1). Interpretation of these main effects is, however, difficult until the significant two way interaction between group and age ( $F=2.9$ ,  $P=0.03$ ) and the significant three way interaction between group, sex, and type of subscale ( $F=4.36$ ,  $P=0.005$ ) have been clarified.

TABLE II - Mean (SD) square root transformed scores with Bristol social adjustment guide in different groups at ages of 7 and 11

		Age 7		
		Age 11		
		No of		
No of	Sex	subjects	Overreaction	Underreaction
Group	Total	subjects	Overreaction	Underreaction
Underreaction	Total	subjects	Overreaction	Underreaction
Total				
	Male	673	1.7 (1.3)	1.7 (1.25)

3.4 (2.0)	674	1.7 (1.4)	1.8 (1.2)	3.5 (2.2)
Normal control		Female	712	1.4 (1.2)
2.8 (1.9)	704	1.2 (1.2)	1.4 (1.2)	2.7 (1.9)
		Both	1385	1.55 (1.2)
3.1 (2.0)	1378	1.45 (1.3)	1.6 (1.2)	3.1 (2.1)
		Male	20	2.9 (1.7)
5 (2.6)	16	3.3 (1.4)	2.4 (1.0)	5.6 (1.7)
Preschizophrenia		Female	13	1.7 (1.2)
3.4 (1.8)	14	1.7 (1.2)	2.3 (1.8)	4.0 (2.4)
		Both	33	2.4 (1.5)
4.3 (2.4)	30	2.6 (1.4)	2.35 (1.2)	4.9 (2.2)
		Male	17	2.2 (1.4)
4.55 (2.0)	17	1.9 (1.2)	2.2 (0.9)	4.1 (1.7)
Preaffective psychotic disorders		Female	14	1.7 (1.8)
3.0 (2.7)	14	1.3 (1.95)	1.4 (1.3)	2.7 (2.9)
		Both	31	2.0 (1.6)
3.8 (2.5)	31	1.6 (1.5)	1.8 (1.1)	3.5 (2.4)
		Male	28	2.0 (1.3)
3.8 (2.2)	29	1.9 (1.3)	2.1 (1.0)	4.1 (1.9)
Preneurosis		Female	39	1.7 (1.4)
3.4 (2.2)	41	2.3 (1.4)	2.0 (1.2)	4.3 (2.1)
		Both	67	1.9 (1.6)
3.5 (2.2)	70	2.2 (1.3)	2.05 (1.1)	4.2 (2.0)

Figure 1 shows the three way interaction between group, sex, and overreaction and underreaction. In boys differences between groups were more obvious for overreaction ( $F=12.1$ ,  $P<0.001$ ) than for underreaction ( $F=3.2$ ,  $P=0.02$ ). This difference was attributable to significantly higher scores in the preschizophrenic boys than in each of the other groups (minimum  $t=2.96$ ,  $k=3$  (adjustment for multiple comparisons),  $P=0.01$ ). Significant group differences ( $F=8.6$ ,  $P<0.001$ ) were not so obviously confined to overreaction in girls (the simple interaction effect of group by subscale of the Bristol social adjustment guide just failed to reach the critical F ratio:  $F=1.93$ ,  $P=0.12$ ). Group differences resulted from higher scores in preneurotic as well as preschizophrenic girls compared with normal controls (minimum  $t=2.5$ ,  $k=3$ ,  $P=0.03$ ) or girls with preaffective psychotic disorders. Figure 1 also shows that social maladjustment in preschizophrenia was more apparent in the boys than in the girls, particularly in relation to overreaction. By contrast social maladjustment (including both overreaction and underreaction) was obvious in the preneurotic girls when they were compared with their same sex peers and was unremarkable in the boys (fig 1).

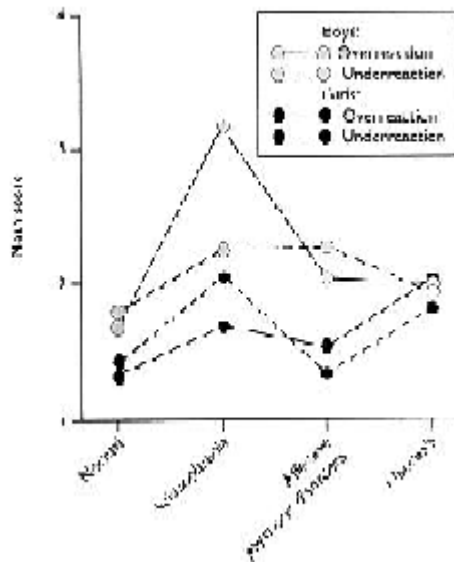


FIG 1 - Mean (square root transformed) scores with Bristol social adjustment guide for overreaction and underreaction in boys and girls according to mental health in adulthood. Ratings at ages of 7 and 11 are aggregated

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All of these differences between groups should, however, be considered in the light of the significant two way interaction of group and age, indicating that the size of the differences between groups changed with time. The overall scores in table II show that the normal controls and the group with pre-affective psychotic disorders obtained similar scores at the ages of 7 and 11, whereas those with preschizophrenia and preneurosis had increased scores by the age of 11 ( $F=2.61$ ,  $P=0.11$  and  $F=4.88$ ,  $P=0.03$ , respectively). In addition, whereas those with preschizophrenia scored significantly higher than the normal controls at both ages (at 7  $t=3.6$ ,  $k=3$ ,  $P<0.003$  and at 11  $t=5.3$ ,  $k=3$ ,  $P<0.003$ ), those with preneurosis differed little from the normal controls at the age of 7 ( $t=1.8$ ,  $k=3$ ,  $P=0.21$ ) but had significantly raised scores by the age of 11 ( $t=4.5$ ,  $k=3$ ,  $P<0.003$ ). Since no other interaction with age was found this progression between 7 and 11 seems to take place in both boys and girls.

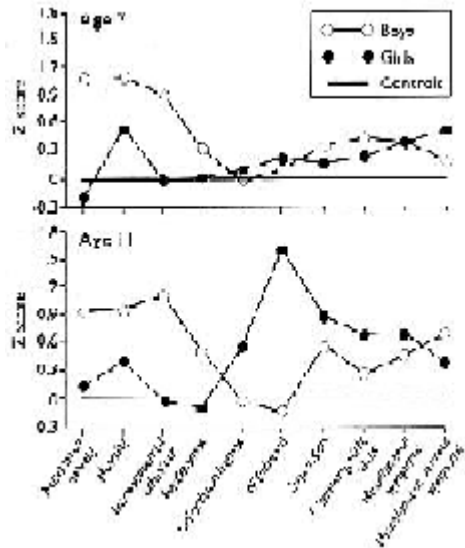
#### Profile analysis of core syndromes by group

Although those with preschizophrenia had higher social adjustment scores at the ages of 7 and 11 and those with preneurosis had higher scores at 11, the degree and type of social maladjustment varied between boys and girls. When the scores for overreaction and underreaction were aggregated in the preschizophrenic group the boys had high overreaction scores whereas the girls differed from controls across the Bristol social adjustment guide as a whole; there was, however, a trend between sex and overreaction or underreaction for preschizophrenia ( $F=1.93$ ,  $P=0.12$ ).

To investigate whether the profile across the core syndromes for boys and girls differed, multivariate profile analysis<sup>16</sup> was carried out using standardised scores by sex for each core syndrome after the scores for the two anxiety and the two hostility syndromes were combined to reduce the number of dependent variables. The core syndromes were grouped together as overreaction - that is, acceptance anxiety to restlessness - and underreaction - that is, unforthcomingness to dismissing adult values.

In preschizophrenia the profiles for boys and girls were similar - that is, parallel - at the age of 7 ( $F=1.5$ ,  $P=0.15$ ). At the age of 11, however, the profiles were significantly different ( $F=4.2$ ,  $P<0.01$ ), this difference arising at the

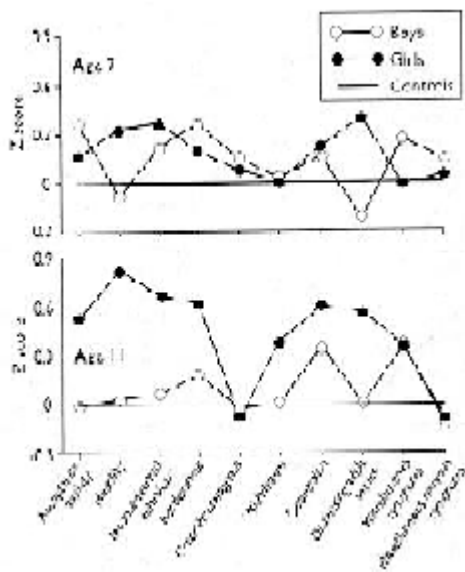
transition from overreaction to underreaction - that is, the girls showed fewer features of overreaction and more of underreaction than the boys (fig 2).



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FIG2 - Mean standardized scores for core syndromes of Bristol social adjustment guide in preschoolers

As the significant differences between the preneurotic group and normal controls largely occurred at the age of 11, profile analysis was restricted to this age. The profile scores as a whole for the preneurotic group were higher than those of the controls except for the syndromes of unforthcomingness and miscellaneous nervous symptoms (fig 3). The increase was more obvious in the girls but the profile was not different from that of the boys.



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FIG3 - Mean standardized scores for core syndromes of Bristol social adjustment guide in preneurosis

## Discussion Main findings

Even at the age of 7 subjects who will later develop schizophrenic illness differ from schoolmates in the eyes of their teachers. Preschizophrenic boys were more likely to be rated as overreactive than boys who later developed an affective psychosis or neurosis or who were psychologically normal as adults. They tended to be distinguished by being "anxious for acceptance," being hostile to other children and adults, and engaging in inconsequential behaviours. Half of these boys were considered to be as deviant as the most deviant 10% of the school population, and we found little evidence of the social withdrawal that has sometimes been regarded as characteristic of preschizophrenic children. Both preschizophrenic and preneurotic girls were more maladjusted socially than normal controls, especially by the age of 11.

In the preschizophrenic group the aggregated scores for overreaction and underreaction showed some increase between the ages of 7 and 11, but the profiles of the core syndromes, which were similar for both sexes at the age of 7, differed significantly by the age of 11. Preschizophrenic boys showed a similar profile of overreaction at both ages, whereas the girls were significantly more likely to be rated as underreactive, particularly as withdrawn but also as unforthcoming and depressed at the age of 11. This could correspond to the asociality which is often a precursor as well as a sequel to a first episode of schizophrenic psychosis.

Subjects with affective psychotic disorders were less clearly abnormal than those with schizophrenia at either age. Subjects who later became neurotic also showed few abnormalities at the age of 7 but became steadily more maladjusted between the ages of 7 and 11. Social maladjustment (including both overreaction and underreaction) was significant in girls but not in boys.

Important differences therefore exist between children who later develop schizophrenia and those who later develop an affective psychosis or neurosis. The increase in abnormality in the preneurotic group between the ages of 7 and 11 may reflect an early stage of a depressive or anxiety disorder, a finding consistent with the suggestion that the jump in the rate of depression between child and adulthood occurs in early adolescence and is substantially higher in girls.<sup>17</sup> Interpretation of this observation is hazardous because the nature of the disorder in these patients is uncertain. They were all admitted for non-psychotic disorder by the age of 28, but they all had reports of depression in their case notes and many also had experienced anxiety.

## Comparison with other studies

In several respects our findings are in agreement with those of Watt et al, who studied school records of preschizophrenic patients and normal controls.<sup>3</sup> They found considerable sex differences, the boys showing a pattern of irritability, disagreeableness, and defiance of authority while the girls were insecure, shy, and participated less in groups. As in our study, the changes were more striking in the boys; our study supports the conclusion of Watt et al that overinhibition is characteristic of preschizophrenia in girls rather than boys. But the two studies differ with respect to the sequence of changes in the two sexes. Watt et al concluded that there was greater evidence of progression of deviance in boys than in girls between kindergarten and the age of 18. Our findings, resting on measures at two specific ages, suggest that social maladjustment is certainly present (mainly as overreaction) in boys as a group as early as 7 and the profile changes little by the age of 11, whereas the



abnormalities (which include withdrawal, unforthcomingness, and depression) seen in girls at the age of 11 are not significant at the age of 7. "Progressive deviance," as defined by Watt et al, could describe the changes in girls, but in boys the deviance is more obvious, probably occurring before the age of 7 and progressing in a limited way during much of childhood.

## Conclusion

The onset of psychotic illness in adult life, throughout the period of maximum fertility, is one of its most characteristic but unexplained features. However, abnormalities in social behaviour can be detected 15 or more years before the onset of the more characteristic symptoms of psychosis; this suggests that such illnesses should be seen in the context of a lifetime course of development. Moreover, our data suggest that the major forms of psychotic illness differ in the pattern and timing of their precursors in childhood and that sex differences are prominent. Changes over time that differ between the two sexes may be relevant in further understanding the origins of psychosis. This work was supported by the Medical Research Council and in part by a grant from the Theodore and Vada Stanley Foundation. We thank John Bynner, Peter Shepherd, Kevin Dodwell, and colleagues at the Social Statistics Research Unit, City University, London, for their help with the data from the national child development study; the National Birthday Trust and the National Children's Bureau for sponsoring the study; Andre Charlett, Diana Kornbrot, Josie Pearson, Heinz Hafner, Peter Jones, and an anonymous statistical referee from the BMJ for their valuable statistical advice; and Malcolm Weller for useful discussions.

## Appendix

The following is a fuller description of the aggregated scales of the Bristol social adjustment guide with behaviours that define each core syndrome.

### Overreaction

Overreaction is an aggregate of six core syndromes.

Anxiety for acceptance by children comprises behaviours including buffoonery, being overly brave, showing off, and bragging.

Anxiety for acceptance by adults is separated into two parts: (a) being overly friendly - that is, bringing gifts or other objects to the teacher - and talking excessively to the teacher and (b) seeking to engage excessively or monopolise the teacher and requiring sympathy.

Hostility towards other children includes various criteria for being unpleasant to other children.

Hostility towards adults has three components (a) showing lability of mood when asked to do something or when actually doing it and having variable standards of performance; (b) damaging personal property, lying and using bad language, or being obscene; and (c) stealing and being aggressive.

Inconsequential behaviour comprises (a) poor concentration or lack of perseverance and (b) carelessness and untidiness, lolling about, and being mischievous.

Restlessness includes being too restless in individual games or when working alone and lacking persistence.

Underreaction

Underreaction is an aggregate of four core syndromes.

Unforthcomingness - Timidity - for example, not initiating conversation and being reluctant to approach the teacher - and shyness.

Withdrawal - being distant and cut off from people and avoiding communication.

Depression has two parts: (a) variation in mood, the child sometimes being alert and sometimes lethargic and lacking in interest and (b) apathy and lifelessness, or miserableness, and depression.

Dismissing adult values has two parts: (a) unwillingness to work except when compelled to and (b) suspiciousness, selfishness, and untrustworthiness.

Miscellaneous

Miscellaneous symptoms has two parts (a) immaturity, playing only with

younger children, or being bullied and (b) truancy.

Miscellaneous nervous symptoms include stuttering, twitching, and biting nails badly.

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