RELATION BETWEEN MATERNAL AGE AT PARTURITION AND INCIDENCE OF MENTAL DISORDER IN THE OFFSPRING

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It has been shown that the incidence of mongolism increases with advancing maternal age at the birth of the affected child (Penrose, 1939, 1954; Smith and Record, 1955), and it has been suggested that there may be a similar association for other mental disorders (Penrose, 1953). This view is based mainly on data published by the General Register Office relating to persons admitted to N.H.S. mental hospitals in England and Wales in the years 1949 and 1950 (Registrar General, 1953, 1955).

The maternal age distribution at the birth of these patients was compared with that for all births (derived from birth registrations for persons born since 1936 and from estimates published by the General Register Office for older persons). Conclusions based upon these data may be open to doubt, however, because maternal age was not known for a large proportion of mental hospital admissions (55 per cent.) and because the figures relate to admissions and not to patients: frequency of admission to hospital depends to some extent on home conditions and may, therefore, be influenced by the mother's age and ability to manage.

There have been several inquiries in related fields. Heron (1907) studied the association of birth order and incidence of mental disease, but his method was criticized independently by Greenwood and Yule (1914) and by Weinberg (1913). Malzberg (1940) included birth order in his study of first admissions to Manhattan State Hospital during 1930-1935. Norton (1952) compared 500 patients attending the psychiatric outpatient department of a general hospital (*excluding* those with frank psychoses) with 500 general in-patients matched for age, sex, and social class; although his main object was to study the association between birth order and incidence of mental disorder, he included a record of the maternal age at the birth of patients in both series. He found the proportion of mothers over age 35 to be higher and the proportion of mothers under age 25 to be lower in the neurotic group than in the controls, but the differences were not statistically significant.

The purpose of the present investigation was to discover whether the age-distribution of mothers at

the time of the birth of children who later became mentally disturbed differs from that of all mothers, and if so to explore the possible influence of some of the social and family circumstances of the psychotic patients.

METHOD

Records of patients admitted to the Bethlem Royal Hospital and the Maudsley Hospital during 1949-1954 were first examined. As this is a joint teaching hospital with only voluntary admissions, the patients were not representative of all mental patients. Moreover, for more than a quarter of the patients under 55 years of age, the mother's age at birth of the patient had not been recorded, nor was it possible retrospectively to obtain this information or to discover why it was lacking. In spite of these drawbacks, however, analysis of the data suggested that further inquiry might be useful.

The next step was to study patients admitted to an observation ward of eighty beds in South-East London, where the following information was collected by psychiatric social workers:

- Present age of parents, or age and year of death.
- Number of children born to the mother.
- Position in family of patient.
- Marital status of patient.
- Occupation of patient and patient's father.
- Diagnosis and disposal from observation ward.

The next group investigated consisted of patients at a mental hospital in South London. It has over 2,000 beds and two out-patient clinics attached to general hospitals and serves a diverse area north of the Thames extending from Notting Hill and North Kensington in the east to Twickenham in the west. The main sources of data were the psychiatric social worker's records obtained from the patient and the relatives, and a routine form filled in by the relatives.

For comparison the Registrar General's figures for all births were used (Civil Text, 1946-50, pubd. 1954); for births before 1938, when this information was first recorded, these figures are given as estimates in 5-year periods. The maternal age distribution for

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TABLE I
PERCENTAGE DISTRIBUTION OF FEMALE LIVE BIRTHS IN ENGLAND AND WALES ACCORDING TO AGE OF MOTHER

Age of Mother at Birth of Child (yrs)	Quinquennium							
	1901-05	1906-10	1911-15	1916-20	1921-25	1926-30	1931-35	1936-40
15-	2.3	2.2	2.4	3.0	2.8	3.0	3.5	4.1
20-	20.7	20.1	20.6	22.6	23.4	23.5	23.7	23.6
25-	30.6	30.8	30.7	30.6	31.3	32.2	32.5	32.5
30-	24.3	25.0	25.1	24.1	23.6	23.9	23.5	23.1
35-	15.8	15.9	15.5	14.6	14.1	13.0	12.7	12.5
40 and Over	6.4	6.0	5.7	5.2	4.9	4.3	4.2	4.3

(Adapted from Registrar General's Civil text 1946-50, Appendix 3, Table 3)

births in the whole population is younger in recent years, but since 1900 the proportion of mothers aged 35 years and over at the birth of the patient has ranged only from 22 per cent. at the beginning of the century to 17 per cent. at the end of the period* (Table I).

Patients of foreign nationality, except for those from Eire, were excluded. The upper age limit of patients was 55 years for the observation ward and 50 for the mental hospital.

RESULTS

Data relating to 241 patients in the observation ward and 441 in the mental hospital were obtained. Diagnoses are shown in Table II. In the first part of the analysis here reported, all diagnoses have been considered together, but the more detailed examination which follows is based on the schizophrenic patients which form a large part of the total series.

TABLE II
CLASSIFICATION OF PATIENTS

Diagnosis	Observation Ward				Mental Hospital			
	Males		Females		Males		Females	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Schizophrenia } Mixed Psychoses }	47	46	48	35	111 } 11	63	138 } 7	55
Depression } Involuntary } Depression } Neurotic Depression }	20	19	59	43	19 } - } 10 }	17	25 } 8 } 40 }	27
Psychopathy and } Neurosis } Alcoholism }	23	22	14	10	19 } 6 }	14	34 } -	13
Organic Disorders ..	13	13	17	12	9	5	14	5
Total ..	103		138		175		266	

*The Registrar General's figures are primarily for use in population studies and so are for live female births. A comparison between male and female births for the second 6 months of 1938 shows little difference between mother's age for live female and live male births; in none of the maternal age groups was the difference more than 0.1 per cent.

MOTHER'S AGE AT PARTURITION

(a) *All Diagnoses.*—Since maternal age in the whole population has changed slightly over the century, the expected distribution for comparison with the observed ages of mothers at the birth of patients, was obtained by combining the births in separate 5-year periods given by the Registrar General in the same proportion as the group of patients.

All four groups of patients had a smaller than expected proportion of mothers who were under the age of 25 when the patient was born, and all had a larger than expected proportion of mothers aged 35 and over (Table III and Fig. 1, opposite).

TABLE III
DISTRIBUTION ACCORDING TO MATERNAL AGE AT BIRTH OF PATIENT (ALL DIAGNOSES)

Sex	Maternal Age at Birth of Child (yrs)	Observation Ward		Mental Hospital	
		Observed Number	Expected* Number	Observed Number	Expected* Number
Male	Under 20	3	2.7	4	4.2
	20-24	16	21.3	22	32.5
	25-29	19	30.0	40	45.4
	30-34	33	32.2	48	35.0
	35-39	17	13.8	23	20.6
	40 and Over	8	5.0	8	7.3
	Total	96	96.0	145	145.0
Female	Not Known	7		30	
	Under 20	3	3.4	0	0.0
	20-24	21	27.8	28	44.3
	25-29	41	39.3	50	62.7
	30-34	30	30.5	60	48.9
	35-39	21	18.4	41	29.1
	40 and Over	10	6.7	22	10.4
	Total	126	126.1	201	201.0
	Not Known	12		65	

*The expected number is based on the maternal age distributions of all persons born in the same years as the patients

SIGNIFICANCE

Observation Ward	Males Females	$\chi^2 = 11.75; 4 \text{ d.f.}; 0.025 > P > 0.001$ $\chi^2 = 3.5; 4 \text{ d.f.}; 0.5 > P > 0.3$
Mental Hospital	Males Females	$\chi^2 = 8.7; 4 \text{ d.f.}; 0.1 > P > 0.05$ $\chi^2 = 32.2; 4 \text{ d.f.}; P < 0.001$

(Two youngest age groups taken together)

FIG. 1.—Percentage distribution according to maternal age at birth of patient (all diagnoses)

The “peak” age of mothers for all births was in the 25–29 age group, but for the patients, except for the women in the observation ward, the “peak” was in the 30–34 age group. The observation ward figures are based on small numbers and so are of

limited reliability, the distribution for women not being significantly different from expectation. Both the mental hospital groups are based on larger numbers and the difference between the observed and expected distribution for the women is highly

significant ($\chi^2 = 32.2$; 4 d.f.; $P < 0.001$), but for the men it is not significant ($\chi^2 = 8.7$; 4 d.f.; $0.1 > P > 0.05$). The main contribution to these results comes from the difference between the actual and expected numbers in the 30–34 maternal age group, which is significant for the women ($P = 0.01$) and suggestive for the men ($P = 0.05$).

(b) *Schizophrenia*.—All four groups of patients had a smaller than expected proportion of mothers who were under 25 when the patient was born, and all except the men in the mental hospital had a larger than expected proportion of mothers of age 35 and over (Table IV and Fig. 2, opposite).

TABLE IV
DISTRIBUTION ACCORDING TO MATERNAL AGE AT BIRTH OF SCHIZOPHRENIC PATIENTS

Sex	Maternal Age at Birth of Child (yrs)	Observation Ward		Mental Hospital	
		Observed Number	Expected Number	Observed Number	Expected Number
Male	Under 20	1	1.2	1	3.0
	20–24	4	9.6	18	22.5
	25–29	9	13.5	27	31.2
	30–34	15	10.4	38	23.7
	35–39	10	6.1	12	13.8
	40 and Over	4	2.2	3	4.8
Female	Total	43	43.0	99	99.0
	Not Known	4		13	
	Under 20	0	1.2	0	3.1
	20–24	10	9.7	13	25.0
	25–29	13	13.4	29	34.9
	30–34	9	10.4	41	27.1
	35–39	10	6.1	18	16.2
	40 and Over	1	2.2	11	5.7
	Total	43	43.0	112	112.0
	Not Known	5		33	

SIGNIFICANCE

Observation Ward	Males	$\chi^2 = 10.8$; 3 d.f.; $0.02 > P > 0.01$
	Females	$\chi^2 = 1.3$; 3 d.f.; $0.3 > P > 0.2$
Mental Hospital	Males	$\chi^2 = 11.5$; 4 d.f.; $0.025 > P > 0.02$
	Females	$\chi^2 = 21.3$; 4 d.f.; $P < 0.001$

(Two youngest age groups and, for the Observation Ward only, the two oldest age groups combined)

The “peak” age of mothers of patients was again in the 30–34 age group, except for the women in the observation ward. The maternal age distribution for the men in the observation ward differs from expectation ($\chi^2 = 10.8$; 3 d.f.; $0.02 > P > 0.01$); that for the women in the observation ward does not ($\chi^2 = 1.3$; 3 d.f.; $0.3 > P > 0.2$). For the mental hospital groups, the difference between the observed and expected distribution is significant for the men ($\chi^2 = 11.5$; 4 d.f.; $0.025 > P > 0.02$) and for the women ($\chi^2 = 21.3$; 4 d.f.; $P < 0.001$). Again, the main contribution to these results comes from the difference between the actual and expected numbers

in the 30–34 maternal age group, which is significant for both men and women ($P = 0.005$).

The thirteen men and the 33 women in the mental hospital for whom information on maternal age was not available were examined further to see if their exclusion was likely to bias the distributions of maternal age. Reasons for failure to obtain the information were examined. There were six illegitimate women who may have been first children or may have had young mothers; there is no other obvious reason for thinking that an undue proportion of either old or young mothers were among those whose ages were unknown.

The Registrar General's data for all births are based on information actually recorded at the time of birth; the hospital data were obtained from what the patient or relative could remember about the mother's age except in those cases where the informant was the mother herself. The information, therefore, might not always have been accurate. The Registrar General's figures and the hospital data differ also in that the hospital patients came mainly from South-East or West London, where the maternal-age distribution might be different from that of the country as a whole, even though there were only trivial differences between Greater London and the rest of the country. (In London there was 1 per cent. less in each of the two youngest age groups of mothers and in the two oldest groups combined, and 3 per cent. more in the middle groups.)

These two possibilities were investigated by asking patients in two general hospitals in South-East London for details of their mother's age. The maternal ages agreed with the distribution for the

TABLE V
DISTRIBUTION ACCORDING TO MATERNAL AGE AT BIRTH OF PATIENTS IN TWO GENERAL HOSPITALS IN S.E. LONDON

Maternal Age at Birth of Child (yrs)	Males		Females	
	Observed Number	Expected Number	Observed Number	Expected Number
Under 20	7	2.3	10	5.4
20–24	18	19.6	48	41.9
25–29	22	25.2	51	59.0
30–34	20	19.6	40	44.9
35–39	7	11.9	27	26.4
40 and Over	9	4.4	11	9.4
Total	83	83.0	187	187.0
Not Known	4		8	

SIGNIFICANCE

Males	$\chi^2 = 8.0$; 4 d.f.; $0.1 > P > 0.05$ (two youngest age groups combined)
Females	$\chi^2 = 6.7$; 5 d.f.; $0.3 > P > 0.2$

SCHIZOPHRENIA

Observed

Expected

OBSERVATION WARD

MENTAL HOSPITAL

MALE PATIENTS

FEMALE PATIENTS

FIG. 2.—Percentage distribution according to maternal age at birth of patient (schizophrenia)

general population for persons born in the same periods (Table V), so that it does not appear that these factors contributed much to the difference found between maternal ages for patients and for the general population.

Thus, in comparison with the mothers of all

children born, the four groups of schizophrenic patients showed a deficit of young mothers, a shift of the "peak" towards the older ages, and, with one exception, an excess of older mothers. This exception, that of schizophrenic men in the mental hospital, is considered in the next section.

SIZE OF FAMILY OF SCHIZOPHRENIC PATIENTS

The maternal age of patients would be expected to be older in a group with an undue proportion of large families or of later-born children. This is illustrated in Fig. 3, which shows the distribution of maternal age for Bethlem and Maudsley schizophrenic patients under 45 years of age who were discharged during 1949–1954.

When the observation ward and mental hospital patients are examined, it is found that the mental hospital men come, on the whole, from smaller sized families than the other groups (Table VI oppo-

site). If it is assumed that the maternal age distributions within each family size of these four groups were similar to those of the Bethlem and Maudsley patients, these family sizes can be combined, by weighting according to the number of patients from each size, to give an expected distribution of maternal ages for each group. These are not significantly different from those actually observed, which suggests that the lack of mothers over 35 years of age in the group of men from the mental hospital in comparison with the other groups is due partly to the presence in this group of a disproportionate number of patients from small families.

FIG. 3.—Maternal age at birth of schizophrenic patients according to family size (Bethlem and Maudsley Hospitals)

TABLE VI
DISTRIBUTION OF SCHIZOPHRENIC PATIENTS ACCORD-
ING TO SIZE OF FAMILY

Size of Family	Observation Ward				Mental Hospital			
	Males		Females		Males		Females	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
1	4	9	4	9	13	12	12	9
2	7	16	8	17	29	27	29	22
3	8	18	4	9	27	25	23	17
4	4	9	11	24	14	13	18	14
5	3	7	8	17	6	6	16	12
6	6	14	0	0	5	5	8	6
7	2	5	4	9	4	4	10	8
8	1	2	2	4	0	0	8	6
9	3	7	1	2	2	2	3	2
10	2	5	0	0	1	1	4	3
11	1	2	0	0	3	3	1	1
12	3	7	3	7	1	1	1	1
13	0	0	1	2	1	1	0	0
14	0	0	0	0	1	1	0	0
Total	44		46		107		133	
Not Known	3		2		5		12	

This raises the question whether the differences between the groups of schizophrenics and the general population—the shift towards higher maternal age at time of birth—might not in fact be due to over-representation of large families in the schizophrenic groups.

There is little information on size of family for the total population, but the 1946 Family Census for the Royal Commission on Population gives the number of live births for women first married in certain periods. The schizophrenic patients, as shown in Table VI, cannot be compared directly with these figures, since, if all members of a family are equally liable to become patients, a family of, say, eight children has eight times as many chances of being represented as a family of one child. This was pointed out by Greenwood and Yule (1914), who estimated the frequency of the size of families from which groups such as the schizophrenic patients come by dividing the number of sibships of size x by x . The effect of this procedure is illustrated for mental hospital patients in Table VII, col. C. These distributions have been converted into percentage distribution in Table VIII (overleaf) which also includes schizophrenic patients in the observation ward and, for comparison, the family size of fertile marriages contracted in the two periods 1900–9 and 1925–9. The date of marriage of the patients' parents is not known, but only 34 (30 per cent.) of the men and 21 (15 per cent.) of the women among the patients were born after 1929, so that the majority of marriages must have taken place between

TABLE VII
SIZE OF FAMILY AND BIRTH ORDER OF MENTAL HOSPITAL SCHIZOPHRENIC PATIENTS

Sex	Size of Family	Number of Patients	Estimated Frequency of Families containing Patients	Birth Order	Number of Patients* (O)	Expected Birth Order derived from Column C (E)	$\frac{(O - E)^2}{E}$
	A	B	C	D	E	F	G
Male	1	13	13.00	1	37	41.24	0.44
	2	27	13.50	2	31	28.24	0.27
	3	25	8.33	3	15	14.74	0.05
	4	14	3.50	4	10	6.41	2.01
	5	6	1.20	5	2.5	2.91	
	6	4	0.67	6	0.5	1.74	
	7	4	0.57	7	—	1.04	
	8	—	0.00	8	1	0.47	
	9	1	0.11	9	1	0.47	0.72
	10	1	0.10	10	—	0.36	
	11	2	0.18	11	—	0.26	
	12	1	0.28	12	—	0.08	
	Total	98	41.24		98	97.93	$\chi^2 = 3.49$; 4 d.f.; $P \approx 0.5$
	Not Known	14					
Female	1	12	12.00	1	39	41.12	0.11
	2	25	12.50	2	28	29.15	0.05
	3	20	6.67	3	17	16.62	0.01
	4	15	3.75	4	9.5	9.95	0.02
	5	11	2.20	5	8.5	6.20	0.62
	6	8	1.33	6	5	4.00	
	7	8	1.14	7	2	2.67	
	8	5	0.63	8	1	1.53	
	9	3	0.33	9	1	0.90	
	10	4	0.40	10	1	0.57	0.12
	11	1	0.09	11	—	0.17	
	12	1	0.08	12	1	0.08	
	Total	113	41.12		113	112.99	$\chi^2 = 0.93$; 5 d.f.; $P \approx 0.96$
	Not Known	25					

* A patient who is a twin is counted as one-half in each birth order

TABLE VIII

PERCENTAGE DISTRIBUTION ACCORDING TO SIZE OF FAMILY OF SCHIZOPHRENIC PATIENTS COMPARED WITH THAT OF ALL FERTILE MARRIAGES

Size of Family	Schizophrenic Patients*				General Hospital Patients*		All Fertile Marriages			
	Mental Hospital		Observation Ward				1900-9		1925-9	
	Males	Females	Males	Females	Males	Females	Non-Manual	Manual	Non-Manual	Manual
1	32	29	28	27	9	29	20	13	35	27
2	33	30	25	27	35	18	26	18	36	27
3	21	16	19	27	17	16	20	15	16	17
4	8	9	11		9	16	13	14	7	11
5	3	5		15	3	4	8	11	3	6
6 and 7	3	6	9		15	10	8	15	2	8
8 and 9	0	2	3	2	5	4	4	8	1	3
10 and Over ..	1	1	4	2	6	3	1	6	-	1

*Frequencies estimated by method described in text

1900 and 1929. It does not appear therefore that very large families were unduly represented among the schizophrenic patients, nor that they played a very important part in causing the high maternal age distribution of patients.

BIRTH ORDER AND POSITION WITHIN THE FAMILY OF SCHIZOPHRENIC PATIENTS

Heron (1907) considered that mental disease was more frequent among first born children than among later births, and it was the analysis of data which he produced to support this which was criticized by Greenwood and Yule and by Weinberg. The reconstruction of frequency of different sizes of sibships, suggested by Greenwood and Yule and used in the previous section, can be extended to estimate the number of affected persons in each birth rank which would be expected if all members of a family were equally likely to be admitted to a mental hospital. These estimates do not differ significantly from the numbers which were actually found (Table VII,

cols. D-G). This suggests that there was no excess of schizophrenia among the first or the early born. Malzberg (1940) reached a similar conclusion from a study of admissions to the Manhattan State Hospital.

The relative position in the family may be considered rather than actual order, *i.e.* the patients may be shown as "only", "eldest", "intermediate", and "youngest" children. This differs from the birth order classification of the previous paragraph in that, for example, a fifth child in a family of five would be shown as the "youngest" while the fifth in a family of nine would be an "intermediate" child. The results of this classification are shown in Table IX. In both groups of men the youngest member of the family was represented more frequently than the eldest. If all members of these families were male and were equally likely to be represented, the number of eldest or youngest men expected would be ten for the observation ward patients and 28 for those from the mental hospital.

TABLE IX

RELATIVE FREQUENCY OF SCHIZOPHRENIC PATIENTS ACCORDING TO POSITION IN FAMILY

Position in Family	Observation Ward				Mental Hospital			
	Males		Females		Males		Females	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Only	4	(9)	4	(9)	13	13	12	10
Eldest	5	(11)	11	(24)	24	25	28	24
Intermediate	20	(45)	19	(41)	27	28	46	39
Youngest	15	(34)	12	(26)	34	35	32	27
Total	44		46		98		118	
Not Known	3		2		14		27	

Neither for the observation ward nor the mental hospital did the observed numbers differ significantly from those expected. The same tendency was shown in Malzberg's figures; of 522 patients he had 126 eldest and 143 youngest of both sexes compared with 129 expected. Wahl (1956) found among a group of 568 schizophrenic naval men that 18 per cent. were first and 26 per cent. last children. The greater number of youngest men may be a true picture of youngest children in the general population.

SOCIAL CLASS OF SCHIZOPHRENIC PATIENTS

Family size and age at marriage differ considerably between different social groups. Some idea of the effect of these differences on the age of mothers at maternity can be obtained from the Registrar General's Occupational Fertility Tables, 1931 and 1939 (Hopkin and Hajnal, 1953), which give maternal ages for all births in England and Wales in 1939 according to the fathers' occupation. The maternal

age distributions vary considerably between these groups (Table X). In only three groups was the "peak" child-bearing age of the mother in the 30-34 age group, and in most cases the proportion of mothers under 25 at their child's birth was higher, and the proportion aged 35 and over lower, than among the schizophrenic patients.

The occupation of the patient and of the patient's father was obtained for the observation ward admissions.* These were divided according to the Registrar General's classification (Table XI, over-leaf).

(The social class of women patients was not given, as in most cases they were housewives. The Registrar General's practice is to class them according to

*The comparison of the father's occupation, and hence social class, as given by the Registrar General (Table X) and by the patients is not strictly valid. The Registrar General's figures are recorded at the time of registration of the birth, that for the patients at the time of admission or when the father died. It is possible that the occupational class of the father would be higher at the time of the patient's admission than at the time of his birth.

TABLE X
MOTHER'S AGE AT BIRTH OF CHILD—CLASSIFIED ACCORDING TO FATHER'S OCCUPATION
(1939 Registrations in England and Wales)

Social Class	Occupational Group of Father	Mother's Age at Maternity (yrs)							All Ages
		Under 20	20-24	25-29	30-34	35-39	40 and Over	Not Known	
1	Professions	0.6	11.6	37.4	33.3	13.6	3.0	0.5	100
1	Higher Ranks in Banking, Insurance, Transport, etc. ..	0.6	11.8	37.0	32.6	14.0	3.4	0.6	100
2	Civil Servants above Clerks, Local Government Officials ..	0.7	13.0	36.1	30.6	14.9	4.3	0.4	100
2	Teachers	0.4	10.2	35.5	35.9	14.6	3.0	0.4	100
2	Employers and Managers in Building Trade	0.9	13.4	35.2	30.6	14.4	4.7	0.8	100
2	Owners and Managers of other Industrial and Commercial Enterprises	1.2	14.7	35.5	29.8	14.0	4.1	0.7	100
2	Farmers and Farmers' Sons ..	1.6	14.5	28.9	29.1	17.6	7.1	1.2	100
3	Foremen in Mines and Quarries ..	2.7	11.6	26.9	29.7	20.7	7.8	0.6	100
3	Foremen in Textile Industries ..	2.2	15.1	31.7	29.4	16.9	4.5	0.2	100
3	Other Foremen	2.1	17.1	30.4	26.9	16.9	6.1	0.5	100
3	Skilled Mine Workers	4.4	23.9	28.1	22.1	14.9	6.1	0.5	100
3	Skilled Textile Workers	4.1	22.1	33.5	24.2	12.4	3.3	0.4	100
3	Skilled Agricultural Workers ..	3.3	20.2	32.4	25.0	14.1	4.5	0.5	100
3	Skilled Building Workers	4.7	25.2	34.6	22.6	9.7	2.7	0.5	100
3	Other Skilled Workers	3.9	23.6	34.1	22.9	11.5	3.6	0.4	100
3	Clerks, Draughtsmen, Typists ..	1.6	14.5	37.4	29.7	13.1	3.2	0.5	100
3	Shop Assistants and Higher Ranks of Personal Service	3.9	24.1	36.8	22.7	9.4	2.5	0.6	100
3	"Other Ranks" in Police, Navy, Air Force	4.4	24.2	36.0	22.0	10.2	2.7	0.3	100
4	Semi-skilled Mine and Quarry Workers	6.7	27.9	28.1	22.1	14.9	6.1	0.5	100
4	Semi-skilled Textile Workers ..	4.5	22.7	31.4	24.2	13.1	3.7	0.4	100
4	Agricultural Labourers	5.4	25.0	29.9	21.0	13.3	4.8	0.6	100
4	Other Semi-Skilled Workers ..	4.6	24.3	30.9	21.9	13.2	4.7	0.4	100
4	Lower Ranks of Personal Service ..	3.9	22.5	31.6	24.5	12.6	4.3	0.6	100
4	"Other Ranks" in Army	9.3	31.5	33.6	17.2	6.6	1.4	0.4	100
5	Building Labourers other than "Navvies"	4.9	23.8	30.0	21.2	13.9	5.7	0.5	100
5	Other Unskilled Labourers (excluding Agricultural) ..	4.7	22.9	29.2	22.0	14.6	6.1	0.5	100
All Social Classes		3.9	22.2	32.7	23.7	12.7	4.3	0.5	100

Adapted from Hopkin and Hajnal (1953) "Analysis of Births in England & Wales, 1939" in the Registrar General's Decennial Supplement, England & Wales, 1931 (Part IIb, Occupational Fertility, 1931 and 1939).

their husband's occupation, but for these patients this was not always known.) The relatively high proportion of male patients with fathers in Social Classes I and II is interesting, as it is generally believed that the incidence of schizophrenia is highest in the lower classes. However, it is not possible to give rates because the population from which the patients were drawn is not known. Classification based on the occupation of the patients does not show such a large proportion of the higher social classes. This is partly due to the fact that some of the patients, particularly the younger ones, were students or had no occupation.

TABLE XI

SOCIAL CLASS OF SCHIZOPHRENIC PATIENTS ADMITTED TO OBSERVATION WARD AND OF THEIR FATHERS

Social Class	Patients	Fathers of	
	(Males)	Males	Females
I and II	4	11	5
III	15	18	22
IV and V	17	12	12
No Occupation and Not Stated	11	6	9

MOTHER'S AGE RELATED TO AGE AT ADMISSION OF SCHIZOPHRENIC PATIENTS

Among the mental hospital men whose maternal age was known, of the 43 admitted for the first time before the age of 25, eleven (26 per cent.) had mothers aged over 35 at the time of their birth; of the other 56 men, admitted for the first time at ages of 25 or over, four (7 per cent.) had mothers aged 35 or over. A possible explanation of this difference is that a relatively old mother may find it more difficult to understand or to manage her rather odd son than a younger mother. Alternatively, it may be an indication that, in men, earlier- and later-presenting schizophrenia are two distinct diseases, and a relationship between incidence and advancing maternal age exists mainly for the former. Female patients do not show this difference.

CONDITION OF PARENTS AT PATIENT'S FIRST ADMISSION

For *all* patients under 35 years of age when first admitted to a mental hospital, almost half had lost one or both parents (Table XII). It is not known whether this is an unduly high proportion compared with the general population, but if the loss of a parent is a factor in the admission of a person to hospital, admissions may include a high proportion of patients whose parents were older than average for their generation.

TABLE XII

STATE OF PARENTS AT TIME OF ADMISSION TO MENTAL HOSPITAL (ALL PATIENTS UNDER 35 YEARS)

State of Parents	Males		Females		Total	
	No.	Per cent.	No.	Per cent.	No.	Per cent.
Both Parents Alive ..	71	63	60	44	131	53
Mother Alive, Father Dead ..	23	21	41	30	64	26
Father Alive, Mother Dead ..	9	8	19	14	28	11
Both Parents Dead ..	9	8	16	12	25	10
Total	112	100	136	100	248	100
Not Known	9		23		32	

Another measure of incompleteness of the family from which the patient came was taken to be the disruption of the home before the patient was 16 years of age. This included parental death, separation, desertion, and adoption (Table XIII). At least one-fifth of the patients came from disrupted homes and there may be others who did not give this information. It is possible that broken families or parental disharmonies may differentially affect older and younger children.

TABLE XIII

PROPORTION OF MENTAL HOSPITAL PATIENTS FROM "DISRUPTED" HOMES

Diagnosis	Males			Females		
	Total No.	No. from "Disrupted" Homes		Total No.	No. from "Disrupted" Homes	
		No.	Per cent.		No.	Per cent.
Schizophrenia	112	26	23	145	39	28
Psychotic Depression ..	19	3	(16)	33	4	(12)
Neurotic Depression ..	10	1	(10)	40	12	(30)
Psychopathy and Neurosis	19	5	(26)	34	8	(24)
Total	160	35	22	252	64	25

SUMMARY

(1) The maternal age at birth of patient was recorded for patients in an observation ward and in a mental hospital in London, and compared with the Registrar General's data for all births,

(2) The schizophrenic patients, both men and women from both observation ward and mental hospital, showed a slightly higher maternal age distribution than was expected. All four groups showed a deficit of mothers under 25 years of age, and (except for men in the mental hospital) an excess of mothers of 35 and over. In the case of the mental hospital men, the small proportion of elderly

mothers was thought to be due to the fact that a disproportionate number of these patients came from small families. This group also showed an association between maternal age and age at first admission to hospital. Home circumstances may have some influence on the time when a patient enters hospital, and in mild cases may even determine whether or not he receives in-patient care. It is possible that the numbers of schizophrenics who remain outside hospital may show no excess of relatively old mothers.

(3) The shift towards higher maternal age for mothers of schizophrenics compared with all births did not appear to be accounted for by unreliability of memory or by differences in social class. There seemed to be a tendency for the schizophrenic man to be the youngest member of his family, but it is not known whether in the general population the youngest member of the family is more frequently male.

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REFERENCES

- Glass, D. V., and Grebenik, E. (1954). "The Trend and Pattern of Fertility in Great Britain". Papers of the Royal Commission on Population, vol. VI, pts. I and II. H.M.S.O., London.
- Greenwood, M., and Yule, G. U. (1914). *J. roy. statist. Soc.*, 77, 179.
- Heron, D. (1907). "A First Study of the Statistics of Insanity and the Inheritance of the Insane Diathesis". Eugenics Laboratory Memoirs, No. 2. University of London. Dulau, London.
- Hopkin, W. A. B., and Hajnal, J. (1953). "Analysis of the Births in England and Wales, 1939, by Father's Occupation". In Registrar General's Decennial Supplement, England and Wales, 1931, Part IIb, Occupational Fertility, 1931 and 1939. H.M.S.O., London.
- Malzberg, B. (1940). "Social and Biological Aspects of Mental Disease". State Hospitals Press, Utica, N.Y.
- Norton, A. (1952). *British Journal of Social Medicine*, 6, 253.
- Penrose, L. S. (1939). *J. ment. Sci.*, 85, 1141.
- (1953). Personal communication.
- (1954). *Ann. N.Y. Acad. Sci.*, 57, 494.
- (1955). *Lancet*, 2, 312.
- Registrar General (1953). "Statistical Review of England and Wales, 1949". Supplement on General Morbidity, Cancer, and Mental Health. H.M.S.O., London.
- (1954). *Ibid.*, Civil Text, 1946–1950.
- (1955). *Ibid.*, 1950–51.
- Smith, A., and Record, R. G. (1955). *British Journal of Preventive and Social Medicine*, 9, 51.
- Wahl, C. W. (1956). *Amer. J. Psychiat.*, 113, 201.
- Weinberg, W. (1913). "Die Kinder der Tuberkulösen". Hirzel, Leipzig.