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A Danish Twin Study of Schizophrenia

By MARGIT FISCHER, B. HARVALD and M. HAUGE

Previous studies on schizophrenia in twins have quite recently been reviewed in detail by Gottesman and Shields (1966*a*) and Shields (1968). The indications of concordance in different series are highly diverging, in monozygotic pairs ranging from near unity to zero. The high concordance rates found by Luxenburger (1928), Kallmann (1946) and Slater (1953) stress the importance of genetic factors in the aetiology of schizophrenia, whereas the low concordance rate in two recent Scandinavian twin series (Tienari, 1963; Kringlen, 1966) has given rise to the question whether special genetic or environmental factors prevail in some populations. It has, therefore, been found of interest to study schizophrenia in a Danish twin population.

Material and Method

The existence in Denmark of two nationwide registers, the Danish Twin Register and a Danish Psychiatric Register, has opened the possibility of ascertaining twin index cases from among the members of a fairly complete twin population.

The Danish Twin Register, comprising all twins born in Denmark within the period 1870–1910 and all same-sexed twins born 1911–20, was started in 1954 by two of the present authors (B.H. and M.H.) as a follow-up study of all twins born in Denmark in the periods mentioned. Pairs broken prior to their sixth birthday were, however, excluded from the more intensive studies as has been described in detail in a recent account of the Twin Register (Hauge *et al.*, 1968); this report also gives complete information about the methods of collecting the material and of establishing the zygosity diagnosis as well as a survey of the present composition of the material and the representativeness of the sample.

The study material, which excludes the early broken pairs, can be divided into two main parts: (*i*) *Part T* which comprises pairs known to have attained the age of 6 years as unbroken pairs and about whom the medical history is available; (*ii*) *Part U* which includes those pairs so far untraced. It is expected that a considerable proportion of these pairs will ultimately be found to have been broken before their sixth birthday, which would imply that they should be excluded from the study material. As only same-sexed pairs have been taken into consideration in the present study the size of the basic material is further reduced. The actual composition of this material is as follows:

Pairs born 1870–1910:
Part T: 5,112 *Part U:* 3,233
Pairs born 1911–20:
Part T: 1,611 *Part U:* 1,332
making a total of 11,288 same-sexed pairs.

The Psychiatric Register was established in the Institute of Human Genetics, Copenhagen, around 1940 as a central registration of all admissions to psychiatric departments and mental hospitals. Out-patients have not been registered.

The ascertainment of probands took place by two approaches: the medical data collected in the twin register were scrutinized, and all twins found to have signs or symptoms of psychic disorder or deviation were selected; next the twin register and the psychiatric register were cross-matched, which led to the selection of all individuals appearing in both. By these procedures a file of probands was constructed, which may be termed the Psychiatric Twin Register. The actual composition of this register appears from Table I.

The index cases for the present study were ascertained in the Psychiatric Twin Register. All available case material of twins with

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TABLE I
Present composition of the psychiatric twin register

Diagnosis	Number of pairs
1. Schizophrenia	70
2. Manic-depressive psychosis	68
3. Paranoid psychosis	16
4. Psychotic or neurotic depression	67
5. Neuroses other than depressive	21
6. Personality disorder	50
7. Suicide without psychiatric classification (Suicide in pairs included under diagnoses 1–6: 22; total suicides therefore 77)	55
8. Other diagnoses	48
Total	395

schizophrenia, schizophreniform psychosis, paranoid psychosis and atypical psychosis was carefully reviewed, and supplemented by personal interviews (by Margit Fischer) in doubtful cases. All twins complying with the following criteria were accepted as probands: presence of a psychiatric disorder with disintegration of personality and affect, associated with impaired relation to reality, disturbance of thought, hallucinations or delusions; the disorder considered to be chronic, often progressive, sometimes with remissions, but never with complete cure. This type of schizophrenia is often called process schizophrenia.

A total of seventy-eight probands was ascertained, belonging to seventy twin pairs. All probands had at some time been hospitalized under the diagnosis of schizophrenia. Table II shows the distribution as to sex, period of birth and zygosity type. Furthermore, the size of the basic study material from which the probands have been drawn is shown in this table.

RESULTS

All relevant details of the findings in the probands and their co-twins are given in the Appendix. This survey gives the basis of the zygosity diagnosis, the age of onset if known, the age at the first admission to a psychiatric ward of the schizophrenic cases, an evaluation of the outcome of the disease as well as the age at which the twins disappeared from observation. Eight pairs with uncertain zygosity have been discarded from the following analyses.

Twenty-five schizophrenic probands belong to a total of twenty-one MZ (monozygotic) pairs. Among the co-twins of these probands nine were found to have schizophrenia with a clinical picture fulfilling the requirements used in the selection of probands. Calculated on the basis of these strict criteria the probandwise concordance rate in MZ twins is:

$9/25 = 0{\cdot}36 =$ MZ grade 1 concordance rate.

Among the probands of forty-five probands from a total of forty-one DZ (dizygotic) same-

TABLE II
Distribution of probands with schizophrenia

Year of birth	Same-sexed male pairs: No. of pairs in basic material*	Same-sexed male pairs: No. of probands MZ	DZ	UZ	Total	Same sexed female pairs: No. of pairs in basic material*	Same-sexed female pairs: No. of probands MZ	DZ	UZ	Total
1870	73	0	0	0	0	92	0	0	0	0
1871–80	834	1	1	1	3	914	1	0	0	1
1881–90	911	2	1	0	3	1,017	3	5	0	8
1891–1900	964	3	4	1	8	1,063	2	6	2	10
1901–10	1,204	2	7	2	11	1,273	6	7	0	13
1911–20	1,359	3	8	2	13	1,584	2	6	0	8
Total	5,345	11	21	6	38	5,943	14	24	2	40

MZ = monozygotic; DZ = dizygotic; UZ = zygosity type uncertain.
* Parts T+U of the Danish Twin Register (see text).

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sexed pairs eight were found who fulfilled the same diagnostic criteria. Thus,

$8/45 = 0{\cdot}18 = DZ_{same\ sex}$ grade 1 concordance rate.

In the evaluation of the concordance in the present material it would be reasonable to include co-twins who suffered from schizophreniform, paranoid or atypical psychoses. The resulting rates will be as follows:

MZ grade 2 concordance rate $= 14/25 = 0{\cdot}56$

$DZ_{same\ sex}$ grade 2 concordance rate $= 12/45 = 0{\cdot}26$

The difference between these two rates is significant at the 5 per cent level.

If finally concordance is extended to include also cases where the co-twin has manifested psychic deviations of different types without having been psychotic, the grade 3 concordance rates will be 0·64 and 0·41 for MZ and DZ twins, respectively.

The rather special age composition of the present material has opened an unusual opportunity for prolonged observation. This is of the utmost importance in the discordant pairs where the unaffected partners in this series have been under observation for an average period of twenty-five years after the first admission of the proband to a psychiatric ward (24·6 years in MZ pairs, 24·5 in DZ pairs). Thus, age correction should not be expected to cause significant changes in the concordance figures. The exclusion of two MZ and two DZ pairs all discordant, in which the co-twins died before a diagnosis of schizophrenia was established in the proband, leads to only insignificant changes of the concordance rates: Grade 1: MZ 0·39, DZ 0·19; Grade 2: MZ 0·61, DZ 0·28.

Comments

It is quite clear that the original goal of collecting all twins with schizophrenia, born in the period mentioned, has not been fully accomplished in the present study. As may be seen from Table II, the proportion of probands is not the same in all five decades included, being much lower in the oldest part of the twin population. It seems improbable that this variation should be due to changes in population incidence. It is much more likely that some probands from the earlier part of the period have been lost, primarily on account of insufficient diagnostic intensity in a period with undeveloped medical care. On the other hand, the loss of probands from the later periods seems to be rather limited.

The intensive study of Fremming (1947) provides good schizophrenia risk figures for the Danish population, based on a sample of about 5,000 persons born in the years 1883–7 in a geographically delimited area and followed-up to an average age of about 60. Fremming found thirty-four schizophrenics in this population out of which five cases, however, are considered as not surely to be in the group of process-schizophrenia (Fremming's cases 11, 13, 15, 17 and 23). The twin material includes a total of about 5,300 pairs born in the period 1901–20, and in this part of the material forty-five probands have been ascertained. Irrespective of differences of mortality, which is furthermore known to be much higher in twins than in the general population, especially during the first years of life, it seems justifiable to assume that ascertainment has been fairly complete in the present study, at least as far as the later part of the material is concerned.

The loss of material from the earlier period may be suspected to comprise mainly milder non-institutionalized cases, but also some severely affected concordant pairs where both partners have died early. Thus it is impossible to evaluate the influence of this bias on the over-all concordance rates.

Whereas it is very well possible that incomplete ascertainment will influence the final result only to a limited extent it is quite clear that all diagnostic misclassifications will be of the greatest importance in a small material. This holds true both with regard to the clinical diagnosis in the co-twins and to the zygosity diagnosis.

The rather high age of the present sample means a certain advantage with respect to clinical diagnosis because of the long period of observation, which also implies that most or all cases of schizophrenia in the co-twins have appeared at the time of examination. On the other hand many of the pairs were broken before the initiation of the present study, which

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TABLE III

Twin studies of schizophrenia, concordance according to "pair-method"

Author	MZ				DZ same sex			
	"Strict" schizophrenia		Including "borderline" cases		"Strict" schizophrenia		Including "borderline" cases	
Luxenburger, 1928* (Germany) ..	7/14	50%	10/14	71%	0/13	0%	0/13	0%
Rosanoff *et al.*, 1934 (U.S.A.) ..	18/41	44%	25/41	61%	5/53	9%	7/53	13%
Essen-Möller, 1941* (Sweden) ..	1/7	14%	5/7	71%	2/24	8%	4/24	17%
Kallmann, 1946* (U.S.A.)			120/174	69% 86%†			34/296	11%
Slater, 1953* (U.K.)			24/37	65% 76%†			8/58	14%
Inouye, 1963‡ § (Japan)			33/55	60%			2/11	18%
Tienari 1963 ‡§ ‖ (Finland)	0/16	0%	0/16	0%				
Kringlen 1966 *§ (Norway)	14/50	28%	19/50	38%	6/94	6%	13/94	14%
Gottesman and Shields, 1966* (U.K.)	10/24	42%	13/24	54%	3/33	9%	6/33	18%
Fischer *et al.*, 1968* (Denmark) ..	5/21	24%	10/21	48%	4/41	10%	8/41	19%

* Excluding "early broken" pairs.
† Age-corrected.
‡ Only including pairs where both partners were alive at the time of examination.
§ Including probands with "borderline" schizophrenia.
‖ Male probands.

implies that the proband and the co-twin could only in part of the cases be examined in the same way and undergo the same psychological test-procedures. The broken pairs constitute a problem with respect to zygosity diagnosis, which explains the rather large group with an uncertain zygosity diagnosis in this series. As far as the classified pairs are concerned, the proportion of MZ probands is 25/78 = 32·2 per cent, a value which comes close to population expectancy. This gives support to the assumption that only a few pairs have been misclassified.

In the present material, where it has been intended to ascertain as probands all persons born within a given period and in a well defined area who fulfil the diagnostic criteria described above, it seems clear that the proband method of calculating the concordance rate is preferable (cf. Allen, Harvald and Shields, 1967). The proband concordance rate expresses the chance that the co-twin of a proband is likewise affected. In some pairs there will be two independently ascertained probands which will increase the numerical value of the concordance rate calculated in this way as compared with the value obtained when the pairwise concordance rate is used in which all concordant pairs are counted only once.

In Table III all major schizophrenia twin series are presented. The table gives the raw concordance figures, based simply on the number of concordant pairs in each material. It should be stressed that these figures are in no way directly comparable, primarily because the necessity of clearly indicating whether one or both partners of concordant pairs have been ascertained independently has been disregarded in most previous studies. Age differences between the materials will also influence the comparability unless special corrections have been introduced. It is not always made clear if such corrections have been made, e.g. by excluding pairs in which the co-twin died at an early age.

The factors just mentioned may give part of the explanation of the rather impressive differences among the series included in Table III. The diagnostic delimitation of schizophrenia, however, is not the same in all series; thus, there can be no doubt that the concept of schizophrenia is comparatively broad in Kallmann's study.

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Irrespective of the differences between the various twin studies in schizophrenia they all indicate that genetic factors influence the population variability with respect to this disease. When, on the other hand, it is attempted to estimate the relative importance of genetic and environmental factors on the basis of these series, widely different values are obtained. The concordance rates of the present study seem to leave more than 50 per cent of population variability to environmental factors; our figures come rather close to the results of previous Scandinavian investigations.

Thus it is conspicuous that the Scandinavian studies all seem to indicate a relatively low rate of concordance. This may be a consequence of stricter diagnostic criteria, but another characteristic of the three recent Scandinavian studies should also be taken into consideration: they can claim to represent all diagnosed cases from the whole population within a given period and as such their relatively low concordance rate may be a more correct estimate of a population parameter.

Should heterogeneity with respect to schizophrenia-provoking environmental factors exist in a population, one would expect to find lower concordance rates in material representing the total population than in series sampled from among the patients of a single hospital or city with a more homogenous environmental background. Furthermore the degree of heterogeneity with respect to relevant environmental factors may well vary from one population to another. This problem, however, cannot be discussed successfully until significant exogenous factors have been singled out.

In their discussion of the mode of inheritance of schizophrenia Gottesman and Shields (1966*a*, *b*) found considerable support for a polygenic theory. One of their arguments in favour of this hypothesis was a rather close correlation between severity and concordance. In the present material the average age at first admission was found to be 33·2 years in probands of concordant pairs and 33·3 years in probands of discordant pairs. The average outcome (cf. the Appendix) was slightly milder in probands of concordant pairs. These results seem to be at variance with the findings of Gottesman and Shields. This can of course be due to the limited size of the material but may on the other hand suggest that ascertainment in our material has been slightly influenced by concordance. The disagreement on this point could, however, also reflect the difference of sampling procedure between the British and the Danish material, the Danish representing the total population in which heterogeneity with respect to environmental influences may obscure genetic relationships, which appear more clearly in a material with a more uniform environmental background.

All genetic studies on schizophrenia clearly suffer from the lack of a clearcut biochemical or symptomatic delimination of a well defined disease entity. In the present study it was therefore decided to apply rather sharp diagnostic criteria in the selection of probands, knowing that this would limit the validity of all conclusions based on this series to this degree of morbidity. When, later on, all groups of twins included in the Psychiatric Twin Register have been examined it will be possible to define other groups of probands with less clearcut schizophrenic traits, and eventually by the study of their co-twins to elucidate the interplay between different psychic abnormalities.

Summary

From among a population of same-sexed Danish twins born 1870–1920 a total of seventy-eight probands with process-schizophrenia were selected. Among the co-twins of twenty-five MZ probands nine were found to have schizophrenia, and a further five co-twins had presented schizophrenic traits; the corresponding figures for the co-twins of forty-five DZ probands were eight and five respectively. In eight probands zygosity could not be determined with sufficient certainty. If partners with schizophreniform, paranoid or atypical psychoses are accepted as concordant, the probandwise MZ and DZ concordance rates will be 0·56 and 0·26. This difference is significant, which in agreement with earlier twin studies indicates that genetic factors influence population variability with regard to schizophrenia. The actual value of the MZ concordance rate in the present study is, however, in the lower range of all previously

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obtained figures, in this respect corresponding with two recent Scandinavian studies. It is characteristic of these three studies as opposed to all others that the probands have been selected from a total population.

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APPENDIX I. KEY

Sex: f = female, m = male.

Method of zygosity determination:

ant = diagnosis based on degree of similarity/dissimilarity of general appearance and selected anthropological traits; information about whether partners have repeatedly or never been mistaken for one another.

ser = diagnosis based on extensive serological examinations (for details, cf. Hauge *et al.*, 1968).

A, B = the partners of a pair; probands are marked by *.

Age at first admission refers only to admission to psychiatric wards.

Age at disappearance from observation: +indicates disappearance due to death.

Type of outcome:

0 = complete cure.
1 = good remission, socially adjusted.
2 = incomplete remission, not institutionalized but a social burden.
3 = incomplete remission, institutionalized.
4 = still psychotic, not institutionalized.
5 = no remission, institutionalized.
6 = deterioration, institutionalized.

Concordance rating:

C1 = grade 1 concordance: co-twin schizophrenia.
C2 = grade 2 concordance: co-twin psychotic, but not schizophrenic as judged by the proband criteria.
C3 = grade 3 concordance: co-twin not psychotic but "nervous", "odd" and/or neurotic.
C4 = grade 4 = discordant, co-twin normal.
* = proband.

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APPENDIX II. SURVEY OF THE MATERIAL

Pair No./ year of birth	Sex	Method of zygosity determination	Diagnosis	Approx. age at onset	Age at first admiss.	Age at disapp. from obs.	Type of outcome	Concordance rating
	a. MONOZYGOTIC PAIRS							
006/			A*: schizophrenia	25–30	36	53+	5	C4
1878	f	ant	B: normal			53+		
009/			A*: schizophrenia	33	35	65+	5–6	C4
1894	f	ant	B: normal, death following surgical treatment of peptic ulcer.			18+		
015/			A*: schizophrenia	28	28	66	4	C1
1901	f	ser	B*: schizophrenia	29	29	66	2	
018/			A*: schizophrenia	35	41	50+	6	C1
1887	f	ant	B*: schizophrenia	30–35	70	80	4	
025/			A*: schizophrenia	30	31	57+	5–6	C3
1899	m	ant	B: lived alone, regarded as odd, "a crank"			64+	1(?)	
026/			A*: schizophrenia	40–45	54	64+	2	C4
1901	f	ant	B: normal, died from bronchial asthma			37+		
031/			A*: schizophrenia	27	27	71	3	C4
1896	m	ser	B: normal			71		
032/			A*: schizophrenia	40	51	61	5	C1
1906	f	ser	B*: schizophrenia	43	49	61	4	
043/			A*: schizophrenia	23	33	79+	5	C4
1888	m	ant	B: normal			46+		
044/			A*: schizophrenia	26	26	65	6	C1
1902	m	ser	B*: schizophrenia	27	27	65	1–2	
045/			A*: schizophrenia	52	52	59	1	C2
1908	f	ant	B: acute psychosis	23	23	23+	?	
060/			A*: schizophrenia	38	39	43+	5	C3
1883	m	ant	B: "nervous"			82+	?	
062/			A*: schizophrenia	32	32	34+	5	C4
1898	f	ant	B: normal			69		
118/			A*: schizophrenia	35	41	56	5	C2
1911	m	ser	B: periods of atypical psychosis	45		56	2	
119/			A*: schizophrenia	20	24	55	6	C2
1912	f	ser	B: periods of atypical psychosis	17	21	55	2	
142/			A*: schizophrenia	27	29	53	3(5)	C2
1913	m	ser	B: paranoid psychosis	44	47	53	1	
143/			A*: schizophrenia	21	23	53	2	C2
1913	m	ser	B: periods of schizophreniform psychosis	28	48	53	0–1	
403/			A*: schizophrenia	50?	52	80+	5	C4
1882	f	ant	B: normal			77+		
405/			A*: schizophrenia	23	29	74+	5	C4
1879	m	ant	B: normal until senile dementia at age 80			88		

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Pair No./ year of birth	Sex	Method of zygosity determination	Diagnosis	Approx. age at onset	Age at first admiss.	Age at disapp. from obs.	Type of outcome	Concordance rating
	(a. MONOZYGOTIC PAIRS, *cont.*)							
408/			A*: schizophrenia	23	24	68	5	C4
1899	m	ser	B: normal			68		
417/			A*: schizophrenia	20	30	52	5	C1
1915	f	ser	B: schizophrenia	17		52	1–2	
	b. DIZYGOTIC PAIRS							
001/			A*: schizophrenia		20	61+	6	C1
1901	f	ant	B*: schizophrenia		26	36+	5	
011/			A*: schizophrenia		22	27+	5	C2
1909	m	ant	B: schizophreniform psychosis		35	58	1–2	
034/			A*: schizophrenia		23	67	5	C4
1899	f	ant	B: normal, died after childbirth			27+		
036/			A*: schizophrenia		22	61	6	C3
1908	f	ser	B: ulcus duodeni refused co-operation G.P. says: very peculiar			61		
069/			A*: schizophrenia		34	55	3	C3
1911	m	ant	B: "very nervous", died after traffic accident			52+		
083/			A*: schizophrenia		23	54	5	C2
1913	f	ant	B: atypical psychosis with hysterical symptoms		22	27+	2	
085/			A*: schizophrenia		22	46	3	C4
1920	m	ser	B: normal, diabetes insipidus			46		
087/			A*: schizophrenia		32	54	5	C4
1913	f	ser	B: normal			54		
089/			A*: schizophrenia		42	49	2	C4
1917	f	ant	B: normal			49		
094/			A*: schizophrenia		36	50	4	C4
1916	f	ant	B: normal, refused co-operation			50		
097/			A*: schizophrenia		24	46	5	C4
1920	m	ser	B: normal			46		
131/			A*: schizophrenia age 51		33	54	4	C4
1912	m	ser	thyreotoxicosis					
			B: normal			54		
134/			A*: schizophrenia		33	50	1	C4
1914	m	ant	partly remission emigrated 1964					
			B: normal			52		
160/			A*: schizophrenia		23	52	5	C4
1912	m	ser	B: normal			52		
183/			A*: schizophrenia		31	46	2	C4
1920	f	ser	B: normal			46		
199/			A*: schizophrenia		22	48	3	C4
1918	m	ser	B: normal			48		
200/			A*: schizophrenia		40	50	1	C4
1916	m	ser	B: normal			50		

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Pair No./ year of birth	Sex	Method of zygosity determination	Diagnosis	Approx. age at onset	Age at first admiss.	Age at disapp. from obs.	Type of outcome	Concordance rating
	(b. DIZYGOTIC PAIRS, *cont.*)							
201/			A*: schizophrenia		24	24+	?	C4
1920	f	ant	B: normal			46		
251/			A*: schizophrenia		65	67+	3	C4
1896	m	ant	B: normal, died after chance-shot (suicide?)			60+		
259/			A*: schizophrenia		19	58	3	C2
1903	m	ant	B: atypical psychosis (depressive and paranoid symptoms) suicide		20	23+	?	
370/			A*: schizophrenia (?)		47	49+	?	C3
1900	f	ant	B: 1960: seemed paranoid at visit. Refused further co-operation. 1965: admitt. neurosis, depressive		65	65	0–1	
401/			A*: schizophrenia		25	55+	5	?
1898	f	ant	B: normal, died from epid. influenza			20+		
402/			A*: schizophrenia		23	55+	6	C4
1881	f	ant	B: normal			86		
404/			A*: schizophrenia		30	34+	5	C3
1888	f	ant	B: neurosis			78		
406/			A*: schizophrenia		27	80	6	C4
1886	f	ant	B: normal			76+		
407/			A*: schizophrenia		24	47+	5	C1
1885	f	ant	B*: schizophrenia		40(?)	43+	3	
409/			A*: schizophrenia		68	69	4	C4
1891	m	ant	B: normal			67+		
410/			A*: schizophrenia		31	65	4	C1
1902	m	ser	B*: schizophrenia	40	45	65	2	
411/			A*: schizophrenia		33	61	4	C4
1906	m	ser	B: normal			61		
413/			A*: schizophrenia, partly remission about age 40, died from brain tumour		26	50+	1–2	C1
1895	f	ant	B*: schizophrenia, many adm. in G.H. from age 31		41	73	3	
414/			A*: schizophrenia		32	60	4	C3
1907	f	ser	B: neurosis depressiva		53	60	1–2	
415/			A*: schizophrenia		24	56	4	C4
1910	f	ant	B: normal, died after child-birth			33		
420/			A*: schizophrenia		43	61	2	C4
1905	m	ant	B: normal			61		
422/			A*: schizophrenia		36	87+	5–6	C3
1874	m	ser	B: "nervous"		66	88	0–1	
423/			A*: schizophrenia		24	67	5	C4
1900	m	ser	B: mental retardation, lives in institution		26	67		

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Pair No./ year of birth	Sex	Method of zygosity determination		Diagnosis	Approx. age at onset	Age at first admiss.	Age at disapp. from obs.	Type of outcome	Concordance rating
	(b. DIZYGOTIC PAIRS, *cont.*)								
437/			A*:	schizophrenia		43	64	2	C4
1903	f	ant	B:	normal until age 59, later depressive and organic symptoms (?tumour frontalis), suicide age 60		59	60+	?	
438/			A*:	schizophrenia, mental retardation		31	56	3	C4
1910	f	ant	B:	normal, refused co-operation			56		
439/			A*:	schizophrenia		26	68	3	C4
1898	f	ant	B:	normal, refused co-operation			56		
	c. PAIRS OF UNCERTAIN ZYGOSITY								
013/			A*:	schizophrenia		22	64	6	C4
1903	m		B:	normal			55+		
046/			A*:	schizophrenia		27	40+	5	C4
1877	m		B:	normal			44+		
070/			A*:	schizophrenia		25	52	5	C2
1914	m		B:	encephalitides seq., mental retardation, psychotic episodes		15	30+	5	
110/			A*:	schizophrenia, refused co-operation		32	55	1–2	?
1911	m		B:	died in childhood			8+		
356/			A*:	schizophrenia		34	34+	?	C3
1904	m		B:	suicide no further information			18+		
400/			A*:	schizophrenia		27	62	5	?
1900	f		B:	died in childhood			15+		
412/			A*:	schizophrenia, refused co-operation		53	68	2	?
1898	f		B:	died in childhood					
419/			A*:	schizophrenia		29	75+	5	C3
1886	m		B:	lived in social institution, no further information			57+	?	

Margit Fischer

B. Harvald

M. Hauge

Psychiatric Research Department, University of Aarhus, State Hospital, Risskov, and the Danish Twin Register, Institute of Medical Genetics, University of Copenhagen, Denmark

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