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Psychiatric Hospitalization in Twins

M. Koskenvuo[1], H. Langinvainio[1], J. Kaprio[1], J. Lönnqvist[2], P. Tienari[3]
[1] *Department of Public Health Science, and* [2] *Department of Psychiatry, University of Helsinki;* [3] *Department of Psychiatry, University of Oulu, Finland*

Abstract. Hospitalization rates of monozygotic (MZ) and dizygotic (DZ) twin pairs in Finland were compared for schizophrenia, neuroses, and alcoholism. Record-linkage of hospital records and death certificates for the years 1972-1979 was carried out for persons in the Finnish Twin Cohort (16,649 like-sexed twin pairs). The ratio of the number of observed vs that of expected concordant pairs and the ratio of concordance rates between MZ and DZ pairs were greater among males than females, and greater among young (40 years old or less) than among older pairs. The highest difference was found in schizophrenia and the lowest in neuroses. Pairwise concordance rates for schizophrenia (11.0% for MZ and 1.8% for DZ) seem to indicate great environmental influence (high proportion of discordant pairs) with apparent genetic liability (6.1-fold ratio in concordance between MZ and DZ pairs). In neurotic disorders, the difference of pairwise concordance rates between MZ and DZ pairs (6.8% vs 4.0%) was quite low, not strongly supporting a genetic hypothesis. Of the MZ pairs concordant for psychiatric hospitalization, 47% had lived together for their whole life time; of those discordant, 16% lived together. The corresponding figures for DZ pairs were 18% and 15%. The effect of intrapair relationships in disease-concordant pairs should be taken into account when evaluating the effect of genetic and environmental factors in psychiatric disorders.

Key words: Twin concordance, Psychiatric hospitalization, Schizophrenia, Neurosis, Alcoholism

INTRODUCTION

In twin studies of mental disorders, concordance rates (ie, proportions of cotwins with the same diagnosis) are commonly presented, as an indication of the relative roles of genetic and environmental factors. If the focus is on environmental factors, then dis-

cordance in considered [2]. This is particularly appropriate for studying mental health development, because differences between identical twins must be caused by environmental influences [23,28].

Widely differing concordance rates for mental disorders have been obtained in the various investigations, the reasons [4, 9, 22] being selection from biased samples, and statistical and diagnostic differences. Earlier investigations were based on resident hospital populations (rather than consecutive admissions), on inquiries (rather than birth records), and on inadequate zygosity determination, thus apparently overestimating concordance.

Greater environmental similarity between MZ than DZ twin partners can also bias conclusions. Therefore, results from singleton, twin and family studies should be compared. Heritability estimates usually assume no gene-environment correlation or interaction. The intrapair relationship seems to differ significanlty in MZ and DZ twins (21,33). How much this is due to different intrapair influences or parental treatment, and how much to different genetic similarity, is unknown. The greater similarity of MZ cotwins might be due to their greater intrapair interaction also in psychiatric disorders. The study of interpersonal and familial nongenetic factors is therefore relevant in these studies.

The purpose of this study was to compare the concordance rates of various psychiatric diagnostic categories, to analyse the cohabitation history of concordant and discordant MZ and DZ pairs, and to evaluate the relative roles of environmental and genetic factors by studying hospitalization during a eight-year period in a nationwide twin sample.

MATERIAL AND METHODS

The Finnish Twin Cohort Study comprises all Finnish adult same-sexed twin pairs born before 1958 and with both members alive in 1967. The compilation process and baseline characteristics of the questionnaire study have been documented elsewhere [16,28,20]. Epidemiological baseline data was collected by mailed questionnaire in 1975 [17]. In this study, all pairs with both members alive on 1 January 1972 (N = 16649 pairs aged over 15 years) were utilized.

The sample by birth year is shown in Table 1:75% of persons were aged between 20-60 years at the beginning of follow-up, most subjects being born in 1950-1954 and the oldest groups being the smallest.

Zygosity was determined in 1975 on the basis of questions pertaining to childhood resemblance. This method has been validated by blood marker determinations in subsamples and found to be very accurate, both in this cohort [30,31] and in other studies [3]. Those pairs who did not reply to the 1975 questionnaire or died prior to 1975 or gave conflicting information, were classified as unknown with respect to zygosity (XZ) [30]. If only one member of a pair replied to the zygosity questions in the questionnaire, this was used to yield a tentative zygosity status. XZ pairs were 27.2% for all mental disorders, 21.4 for neuroses, 27.3 for alcoholism, 30.5 for psychoses, 41.8 for alcohol intoxication, and 18.4% in the whole material. Most XZ pairs were cases where one twin died before zygosity determination.

Computer files of the hospital discharge records of all Finnish citizens during the years 1972-1979 in Finland were used. The inpatient inventory files of mental hospitals were also used. Identification was possible on hospital records only from 1972 onwards. The hospital discharge registry in Finland covers all hospitals including tuberculosis and mental hospitals. Hospital records do not include those patients who have been less than 15 hours at a first aid department. The death certificates for the twin cohort had been collected and coded separately and were then combined in a format compatible with the hospital discharge record for the purpose of linkage. In addition to the underlying cause of death, the immediate cause of death and two supplementary causes of death were also used. Record-linkage was carried out using the unique personal identification number (date of birth and a four-number code) included in the death certificates and hospital records. Lists of consecutive individual records were produced and the records were rechecked manually to avoid

the possibility that a person's records be erroneously recorded more than once.

A subject was considered to have a diagnosis for the disease in question if this was observed as any discharge diagnosis, as a diagnosis in inpatient inventory records, or as a cause of death. In many cases, persons had more than one discharge record, and the same diagnosis was observed on several records. As the records and diagnoses of all patients present in a mental hospital at the end of each calendar year were also available, all long-term patients could be enumerated. The following diagnoses (ICD rubrics, International Classification of Diseases, 8th version) and diagnostic groups were used in classifying the mental disorder cases observed in the study:

Psychiatric disorders (290-309, 980, 571, 577)
All psychoses (290-299)
Schizophrenia (295)
Other functional psychoses (296-299)
Affective psychosis (296)*
Paranoia (297)*
Psychoses with a somatic disease etiology (290-294)*
Neurosis (300)
Alcoholism (303)
Personality disorders and other non-psychotic mental derangments (301-302, 304-309)*
Alcohol intoxication (980)*
Alcohol-abuse associated diseases (291,303,980,571,577)

(*) The number of cases in these diagnoses was small and results are not presented.

Pairwise and probandwise concordance were calculated for males and females in two age groups. Observed and expected numbers were calculated for concordant male and female pairs using individual MZ and DZ data grouped in seven age groups. Individual rates for males and females were tested with Mantel's summary chi-square test.

RESULTS

The hospitalization rate of psychiatric disorders during 8 years in individuals by zygosity and birth year can be seen in Table 2. The youngest age group followed from the age of 15-22 to the age of 22-29 showed lower rates. The age-adjusted rate was somewhat higher ($P < 0.05$) in DZ than MZ twins among females, but no such difference was observed among males. Age-adjusted rate of individuals shown in Table 3 for all psychiatric disorders was higher ($P < 0.001$) among men (5.4%) than women (4.0%). In psychotic disorders and schizophrenia there were small differences between males and females. In neurotic disorders, females showed higher rates than males ($P < 0.01$), but males showed much higher rates for alcoholism and alcohol-associated disorders ($P < 0.001$).

The observed and expected numbers of concordant pairs are shown in Table 4 and 5, and the pairwise and probandwise concordance rates in Table 9.

The ratio of observed and expected rates and the ratio of pairwise concordance rate of MZ and DZ pairs among males and females are shown in Table 6.

When all psychiatric disorders were analysed, the ratio of observed and expected rates was 5.2-fold for MZ males and 4.1-fold for MZ females. Corresponding ratios for DZ pairs were 2.0 and 1.7. The ratio of pairwise and probandwise concordance rates showed similar difference between MZ and DZ pairs. This ratio was higher among younger (born 1935-1957) than among older (born before 1935) pairs.

For schizophrenia, the difference of rates between MZ and DZ pairs was higher than for other disorders. In the younger age group, the O/E-ratio was 24.2-fold among MZ

TABLE 1 - Number of Pairs in the Finnish Cohort with Both Cotwins Alive on 1 January 1972

Birth year	Men		Women	
	MZ	DZ	MZ	DZ
1880-1899	19	28	29	45
1900-1909	76	135	126	222
1910-1919	138	267	176	406
1920-1929	237	626	261	593
1930-1939	354	938	334	770
1940-1949	568	1353	581	1202
1950-1957	604	1391	730	1398
Total	1996	4738	2237	4636

TABLE 2 - Hospitalization Rate for Psychiatric Disorders in 1972-1979 in Individual Twins by Zygosity and Birth Year (per mil)

Birth year	Men		Women	
	MZ	DZ	MZ	DZ
1880-1899	26	18	17	33
1900-1909	26	41	52	74
1910-1919	70	49	43	67
1920-1929	65	75	56	51
1930-1939	81	76	40	40
1940-1949	58	46	33	41
1950-1957	32	43	20	32
Total age adjusted	54.3	53.8	34.6	42.5
Mantel's summary chi square test	ns		$P < 0.05$	

TABLE 3 - Age-Adjusted Hospitalization Rate in 1972-1979 Among Males and Females in Psychiatric Disorders (per mil)

Diagnoses (ICD rubrics)	Males	Females	Mantel's summary χ^2 (P)
Psychiatric disorders (290-309,980,571,577)	54	40	<0.001
Psychoses (290-299)	21	18	ns
Schizophrenia (295)	12	11	ns
Other functional psychoses (296-299)	4	6	<0.05
Neurosis (300)	11	15	<0.01
Alcoholism (303)	19	2	<0.001
Alcohol-associated diseases (291,303,980, 571,577)	26	6	<0.001

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TABLE 4 - Observed (O) and Expected (E) Concordant MZ and DZ Pairs in Psychiatric Disorders - MEN

Diagnoses (ICD rubrics)	MZ			DZ		
	O	E	O/E	O	E	O/E
Psychiatric disorders (290-309,980,571,577)	31	6.01	5.2	31	15.43	2.0
Born 1935-1957	26	4.01	6.5	20	7.68	2.6
Born before 1935	5	2.01	2.5	11	7.75	1.4
Schizophrenia (295)	5	0.32	15.6	2	0.86	2.3
Born 1935-1957	5	0.24	20.8	2	0.52	3.9
Born before 1935	0	0.08	–	0	0.34	–
Other functional psychoses (296-299)	2	0.32	6.3	1	0.62	1.6
Born 1935-1957	2	0.19	10.5	1	0.30	3.3
Born before 1935	0	0.13	–	0	0.32	–
Neurosis (300)	4	0.28	14.3	5	0.72	6.9
Born 1935-1957	3	0.18	16.7	4	0.38	10.5
Born before 1935	1	0.10	10.0	1	0.34	2.9
Alcoholism (303)	9	0.98	9.2	10	2.22	4.5
Born 1935-1957	8	0.65	12.3	6	1.14	5.3
Born before 1935	1	0.33	3.0	4	1.08	3.7

TABLE 5 - Observed (O) and Expected (E) Concordant MZ and DZ Pairs in Psychiatric Disorders - WOMEN

Diagnoses (ICD rubrics)	MZ			DZ		
	O	E	O/E	O	E	O/E
Psychiatric disorders (290-309,980,571,577)	12	2.93	4.1	16	9.25	1.7
Born 1935-1957	5	1.15	4.4	8	4.05	2.0
Born before 1935	7	1.78	3.9	8	5.20	1.5
Schizophrenia (295)	3	0.15	20.0	2	0.65	3.1
Born 1935-1957	3	0.09	33.3	0	0.41	–
Born before 1935	0	0.06	–	2	0.24	8.3
Other functional psychoses (296-299)	1	0.31	3.2	2	1.24	1.6
Born 1935-1957	0	0.09	–	1	0.32	3.1
Born before 1935	1	0.22	4.5	1	0.92	1.1
Neurosis (300)	2	0.42	4.8	5	1.20	4.2
Born 1935-1957	0	0.12	–	3	0.74	4.1
Born before 1935	2	0.30	6.7	2	0.46	4.3
Alcoholism (303)	0	0.01	–	0	0.03	–
Born 1935-1957	0	0.01	–	0	0.01	–
Born before 1935	0	0.00	–	0	0.02	–

TABLE 6 - Observed/Expected (O/E) Concordance Rate and Ratio of Pairwise Concordance Rate of MZ and DZ Pairs in Psychiatric Disorders

Diagnoses) (ICD rubrics)	(O/E in MZ)/ (O/E in DZ)		(Pairwise concordance in MZ) / (Pairwise concordance in DZ)	
	Males	Females	Males	Females
Psychiatric disorders (290-309,980,571,577)	2.6	2.4	2.8	2.0
Schizophrenia (295)	6.8	6.5	7.1	4.9
Other functional psychoses (296-299)	3.9	2.0	3.8	1.6
Neurosis (300)	2.1	1.1	2.2	1.2
Alcoholism (303)	2.0		2.3	

TABLE 7 - Twin Pairs Concordant for Psychiatric Hospitalization and for the First Three Digits of ICD 8, Diagnosed in the Same or in Different Hospitals (% values)

	MZ pairs		DZ pairs	
	Same hospital	Different hospitals	Same hospital	Different hospitals
The same diagnosis	83	58	75	44
Different diagnoses	17	42	25	56
Total	100	100	100	100

TABLE 8 - Twin Pairs with Psychiatric Hospitalization by Cohabitation and Concordance

Psychiatric hospitalization	Cohabitating pairs	
	MZ	DZ
Concordant pairs		
%	46.7	17.6
N	14	6
Discordant pairs		
%	16.2	15.1
N	33	94
Total		
%	23.8	18.2

Table 9 - Numbers of Affected (N) and of Concordant (C) Pairs and Pairwise (Pair %) and Probandwise (Pro %) Concordance Rate by Zygosity and Psychiatric Diagnosis

Diagnoses (ICD rubrics)	MZ pairs				DZ pairs			
	N	C	Pair %	Pro %	N	C	Pair %	Pro %
MEN								
Psychiatric disorders (290-309,980,571,577)	174	31	17.8	30.2	489	31	6.3	11.9
Born 1935-1957	113	26	23.0	37.4	293	20	6.8	12.8
Born before 1935	61	5	8.2	15.2	196	11	5.6	10.6
Schizophrenia (295)	41	5	12.2	21.7	120	2	1.7	3.3
Born 1935-1957	30	5	16.7	28.6	79	2	2.5	4.9
Born before 1935	11	0	0	0	41	0	0	0
Other functional psychoses (296-299)	18	2	11.1	20.0	35	1	2.9	5.6
Born 1935-1957	10	2	20.0	33.3	19	1	5.3	10.0
Born before 1935	8	0	0	0	16	0	0	0
Neurosis (300)	39	4	10.3	18.6	107	5	4.7	8.9
Born 1935-1957	27	3	11.1	20.0	66	4	6.1	11.4
Born before 1935	12	1	8.3	15.4	41	1	2.4	4.8
Alcoholism (303)	69	9	13.0	23.1	175	10	5.7	10.8
Born 1935-1957	44	8	18.2	30.8	108	6	5.6	10.5
Born before 1935	25	1	4.0	7.7	67	4	6.0	11.3
WOMEN								
Psychiatric disorders (290-309,980,571,577)	140	12	8.6	15.8	383	16	4.2	8.0
Born 1935-1957	75	5	6.7	12.5	211	8	3.8	7.3
Born before 1935	65	7	10.8	19.4	172	8	4.7	8.9
Schizophrenia (295)	32	3	9.4	17.1	105	2	1.9	3.7
Born 1935-1957	19	3	15.8	27.3	69	0	0	0
Born before 1935	13	0	0	0	36	2	5.6	10.5
Other functional psychoses (296-299)	21	1	4.8	9.1	66	2	3.0	5.9
Born 1935-1957	9	0	0	0	22	1	4.5	8.7
Born before 1935	12	1	8.3	15.4	44	1	2.3	4.4
Neurosis (300)	49	2	4.1	7.8	143	5	3.5	6.8
Born 1935-1957	26	0	0	0	91	3	3.3	6.4
Born before 1935	23	2	8.7	16.0	52	2	3.8	7.4
Alcoholism (303)	7	0	0	0	20	0	0	0
Born 1935-1957	5	0	0	0	11	0	0	0
Born before 1935	2	0	0	0	9	0	0	0

pairs and 2.2-fold among DZ pairs. The lowest difference between MZ and DZ pairs was seen in neurosis. The highest O/E-ratio among DZ pairs was seen in alcoholism and neurosis. The analysis of alcohol-associated diseases showed similar pairwise results as alcoholism.

When the concordance rates for a diagnosis were studied by dividing the pairs into those diagnosed in the same hospital and into those diagnosed in different hospitals, it appeared that pairs treated in the same hospital had more similar diagnoses (80%) than pairs treated in different hospitals (52%) (Table 7).

Among the 1186 pairs with at least one member with a history of psychiatric hospitalization, there was data on 891 pairs about cohabitation in the 1975 questionnaire study. The members of MZ pairs concordant for psychiatric hospitalization had lived together for their whole life more often (47%) than members of discordant MZ pairs (18%) ($P < 0.05$). The proportion of pairs with cohabiting members was 16% for concordant DZ and 15% for discordant DZ pairs and 24% for all MZ and 18% for all DZ pairs (Table 8). When the proportion of cohabiting pairs was tested between concordant MZ pairs and all other pairs the difference was highly significant ($P < 0.001$). When address data of the concordant pairs for psychiatric hospitalization during 1972-1979, which lived outside hospitals in 1975, was analysed, it was found that 38% of MZ and 15% of DZ pairs lived together.

DISCUSSION OF METHODOLOGY

The design of the study has caused selection of cases during the retrospective part of the follow-up. The most severe cases of psychiatric patients during the years 1972-1975 were less likely to have participated to the questionnaire study in 1975 and thus their zygosity has remained unknown (XZ). Those pairs with both members living, but nonrespondent in the questionnaire study, were also missed from MZ and DZ pairs. However, the age-adjusted prevalence rates for all psychiatric disorders among XZ pairs were only 1.7 times higher than among respondent pairs, so that psychiatric disorders do not seem to have been a major cause of non-response. Persons with alcoholism and schizophrenia have a higher mortality than the normal population. Mortality may have caused such selection that the comparison between MZ and DZ pairs or between diagnosis groups may be biased.

The representativeness of hospital cases in the entire disease spectrum varies, even though it can be assumed that selective factors will operate more strongly among the least severe cases and among fatal cases. Persons with severe psychiatric symptoms, as well as patients considered to be dangerous to their surroundings or to themselves, are more likely to be hospitalised than patients undergoing voluntary treatment, if they can be treated as outpatients. In Kringlen's study [22], in 20% of all pairs concordant for schizophrenia the other cotwin had not been in hospital care. The rates observed in this study in individuals, however, were on the same levels as in the majority of epidemiological studies [11].

The accuracy of the Finnish National Hospital Discharge Register has been recently studied [26]. Register data was compared with the medical records of 961 patients (95% of the records sampled). The sample represented all discharges in 1974-1975 from general, mental, and institutional hospitals with alcoholism, alcohol psychosis, alcohol poisoning, liver cirrhosis, or pancreatitis as the principal diagnosis. The percentage of agreement

between register and medical record data for the various items studied was as follows: date of birth 98%, hospital code 98%, admission date 96%, discharge date 94%, principal diagnosis 91%. In part, this discrepancy is explained by the fact that the diagnosis recorded on the hospital discharge form is entered at the time of discharge, while the hospital record diagnosis is recorded later, when the case records are completed.

The accuracy of diagnosis in hospital records was probably statisfctory for epidemiological purposes [26]. The external validity of diagnosis has not been studied. The professional teaching of psychiatrists in Finland, however, has been quite uniform because of the small number of universities and the similar therapeutic and diagnostic orientation. The reliability of diagnosis may vary between hospitals, so that geographical selection of twins to treatment in the same hospital may cause some bias. It seems that in those twin pairs in which both cotwins have psychiatric problems, both members tend to attend the same hospital and be diagnosed by the same medical staff. On the other hand, concordant pairs seemed to live more often on the same hospital area than discordant pairs. If the subjects were chosen only from a certain small area, the relative proportion of discordant pairs would be lower than concordant pairs, compared to the total sample. It seems that geographical selection and high migration of population may be a significant source of bias when concordance rates are calculated.

When the concordance of twin pairs is evaluated, attention should be given to the concordance criteria and the follow-up time. Kallmann [15], Slater [34] and Gottesman and Shields [8] found an association between severity of schizophrenia and the concordance rate. In Kringlen's study [22] there was no difference in concordance rates for typical schizophrenia and for schizophreniform psychosis. However, when he used a global mental health rating as a criterium of severity, there seemed to appear an association between severity of schizophrenic illness and concordance. On the other hand, schizophrenia patients with and without family history could not be differentiated according to characteristics of disease [1].

The follow-up time of eight years in this study, though fairly short, is comparable to other twin studies. The mean age of the twin cohort in the beginning of follow-up in 1972 was about 30 years, but more than 50% of all pairs were less than 30 years old. The highest incidence for hospitalized schizophrenia in Finland is in the age of 20-29 years. In Kringlen's sample [22], the difference in age at onset of disorder was less than four years in 65%, and in age at admission in 50%. In the earlier literature, the interval has been less than eight years in 75-90% of twin pairs concordant for schizophrenia [15,24, 34]. As the follow-up time in this study was eight years, the comparison of MZ and DZ pairs is probably not biased by the lenght of follow-up.

When MZ and DZ pairs were compared using O/E-ratios and pairwise (or probandwise) concordance rates, the comparison gave very similar results. This is possibily explained by the unselection of the material.

Kringlen [22] was unable to demonstrate any difference in morbidity between twins and the general population. The higher concordance rates in MZ twins cannot be explained away by postulating that the twinship itself predisposes to schizophrenia or to other psychiatric disorders. Our results did not show any meaningful difference in morbidity figures between MZ and DZ twins.

DISCUSSION OF RESULTS

In schizophrenia, earlier studies have reported higher concordance rates for MZ than for DZ twins [6-8,10,22,27,35-37]. The concordance rates in these studies varies considerably. In our sample, concordance figures for females were lower than for males, while Kringlen [22] did not find a difference in concordance rates in the two sexes. On the other hand, the concordance figures for women were higher in some other samples [8,24,29,34]. Thirty per cent of the subjects in this study were 22-29 years of age at the end of the follow-up. They showed somewhat lower hospitalization rates than older age groups: 77% of the rate observed in the next age group. The low concordance rates found in this study are not explained by including the youngest age group in the analyses.

Althouugh the absolute pairwise concordance rates were low in this study (11.0% for MZ and 1.8% for DZ) the relative difference between MZ and DZ concordance was high. For schizophrenia, the results are in accordance with a hypothesis that postulates great environmental influence (a high proportion of discordant pairs) with apparent genetic liability (high difference in MZ and DZ concordance rates). Another hypothesis of inductive psychosis between members of MZ pairs is also supported by the results, when we see that 48% of concordant MZ pairs have lived together for their whole life. The mechanism of inductive psychosis has been documented, for example, between siblings and between mother and child [12,32].

Only 0.19% of MZ pairs (8 pairs) in this study were concordant for schizophrenia with hospital care. Further evaluation of inductive mechanism of psychosis between members of MZ pairs, or similar influence of parents on members of MZ pairs, will be very fundamental in the question of genetic versus environmental etiology of psychotic disorders. At this moment, however, the biochemical research has not found any well documented genetically determined factor having a clear association to the development of schizophrenia disorder [11].

The variation in concordance rates in neurosis and personality disorders is also marked. Eysenck [5] estimated, on the basis of several twin studies, an overall neurosis concordance rate of about 2-fold for MZ pairs compared to DZ pairs. Torgersen [38] found no difference in concordance of neurotic depression between MZ and DZ twins. In this study, concordance difference between MZ and DZ pairs (1.1-2.2-fold) was quite low, not supporting clearly the genetic hypothesis in neurotic disorders. For females, particularly, the difference in concordance between MZ and DZ pairs was minimal, with a 4.2-fold O/E-ratio for DZ pairs suggesting a family effect in neurotic disorders. However, there may be differences between various types of neurotic disorders.

Kaij [14] studied 174 male pairs of twins in Sweden and found that significanlty more MZ than DZ twins had similar drinking habits. The alcoholism concordance for MZ twins was 2-fold compared to DZ twins, with a significant difference between the two groups. A large sample of Swedish twins studied in the 1960s supported Kaij's finding that MZ twins were significanlty more concordant in alcohol consumption than DZ [13]. In Finland, Partanen et al [25] studied a large group of male twins. No difference was found between MZ and DZ twins with regard to addictive alcohol symptoms or drunkenness arrests. Also, little difference was seen between within-pair variations of DZ twins compared to their nontwin brothers. However, in terms of amount and frequency of alcohol consumption, concordance was significantly higher among MZ than DZ twins. Based on the data from the questionnaire studies of twin cohorts in Finland and Sweden,

heavy alcohol drinking was found to be more concordant in MZ than in DZ pairs among men and women [19].

In comparison to earlier studies, the concordance rates obtained in this study are relatively low. The rates among individuals, however, did not show low levels. In a more extensive follow up time the concordance rates may increase, but this will not necessarily influence MZ/DZ concordance ratios.

In this study, 83% of male and 91% of female MZ pairs were discordant for mental hospital treatment during a 8-year period. This discordance gives a possibility to elucidate different curricula in mental health development in twins.

The development of common mental diseases may have different genetic factors, unfortunately still unspecified. The intrapair relationship between disease-concordant MZ and DZ pairs have not been carefully studied. It should be studied to find possible specific environmental factors in the life history of disease-concordant MZ pairs. The discussion of genetic versus environmental factors in psychiatric disorders may have a more exact base when the relationship between twins and family members will be documented more in depth.

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Correspondence: Dr. M. Koskenvuo, Department of Public Health Science, University of Helsinki, Haartmaninkatu 3, 00290 Helsinki 29, Finland.