ORIGINAL ARTICLE

Lifetime Prevalence of Psychotic and Bipolar I Disorders in a General Population

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Context: Recent general population surveys of psychotic disorders have found low lifetime prevalences. However, this may be owing to methodological problems. Few studies have reported the prevalences of all specific psychotic disorders.

Objective: To provide reliable estimates of the lifetime prevalences of specific psychotic disorders.

Design: General population survey.

Setting and Participants: A nationally representative sample of 8028 persons 30 years or older was screened for psychotic and bipolar I disorders using the Composite International Diagnostic Interview, self-reported diagnoses, medical examination, and national registers. Those selected by the screens were then reinterviewed with the Structured Clinical Interview for *DSM-IV*. Best-estimate *DSM-IV* diagnoses were formed by combining the interview and case note data. Register diagnoses were used to estimate the effect of the nonresponders.

Main Outcome Measures: Diagnosis of any psychotic or bipolar I disorder according to the *DSM-IV* criteria.

Results: The lifetime prevalence of all psychotic disorders was 3.06% and rose to 3.48% when register diagnoses of the nonresponder group were included. Lifetime prevalences were as follows: 0.87% for schizophrenia, 0.32% for schizoaffective disorder, 0.07% for schizophreniform disorder, 0.18% for delusional disorder, 0.24% for bipolar I disorder, 0.35% for major depressive disorder with psychotic features, 0.42% for substance-induced psychotic disorders, and 0.21% for psychotic disorders due to a general medical condition. The National Hospital Discharge Register was the most reliable of the screens ($\kappa = 0.80$). Case notes supplementing the interviews were essential for specific diagnoses of psychotic disorders.

Conclusions: Multiple sources of information are essential for accurate estimation of lifetime prevalences of psychotic disorders. The use of comprehensive methods reveals that their lifetime prevalence exceeds 3%.

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THE LIFETIME PREVALENCE (LTP) of both schizophrenia and bipolar I (BPI) disorder is often assumed to be about 1%. However, in a recent systematic review, the median LTP of schizophrenia was only 0.4%.[1] Recent population-based surveys in particular have found considerably lower LTPs of schizophrenia[2-4] and higher rates of BPI disorder[5-10] than in many older studies.[11-14] Potential reasons for this include narrowing of the diagnostic criteria for schizophrenia and parallel broadening of those for affective disorders after the introduction of the *DSM-III*,[15-17] different diagnostic instruments,[18,19] and increasing problems at the levels of case finding and ascertainment.[20] Survey response rates have fallen in recent decades,[21] and people with psychotic disorders are less likely than others to participate in mental health surveys.[2,22,23] Personal interviews may also generate false-negative findings owing to inadequate probing or denial of previous psychotic symptoms.[2,4,24,25] Consistent with this, prevalences of schizophrenia have been higher in studies in which registers or case notes have been available[12,26] compared with studies relying only on interviews. Little population-based research has been conducted on other psychotic disorders.

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Diagnoses of psychotic and bipolar disorders from structured interviews conducted by lay interviewers have not been congruent with classification by psychiatrists.[2,4,19,27] To provide more reliable and valid estimates of psychotic disorder rates, 2-stage procedures for case identification

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have been used. The problem with the 2-stage procedure is that no established method is available for screening individuals with psychotic disorders in the general population. Those methods that have been developed are usually sensitive and specific, but their positive predictive value is poor because of the low prevalence of psychosis in the general population.[28]

The Psychoses in Finland (PIF) Study is based on the Health 2000 Study, a Finnish general population survey.[29] The aims of the PIF Study were to obtain the most accurate possible estimates of LTP of all psychotic and BPI disorders in the general population by gathering extensive information from semistructured interviews, registers, and case notes and to compare different screening methods for detecting psychotic disorders in the general population.

METHODS

STUDY DESIGN

The Health 2000 Study is based on a nationally representative sample of 8028 persons 30 years and older (http://www.ktl.fi/terveys2000/index.uk.html[29]). A 2-stage stratified cluster sampling procedure was used to select 80 areas (including 160 municipalities) from Finland. All 15 of the biggest towns were included, and the remaining 65 health care districts were sampled as clusters by using the probability proportional to population size sampling. From these areas, a random sample of 8028 individuals 30 years and older was finally drawn from the National Population Register. Those 80 years or older were oversampled (2:1). Institutionalized and homeless persons were also included. The field work took place from 2000 through 2001 and consisted of a home interview and health examination at the local health care center or, for those unable to attend, a condensed interview and health examination at home or in an institution. The response rate was 93.00%.[29] The health examination included a detailed medical examination, a part of which a physician assessed whether the subject had a possible or a definite psychotic disorder. Mental disorders were also assessed by the Composite International Diagnostic Interview (CIDI).[30,31]

The Health 2000 Study sample was screened for psychotic disorders, and those with positive findings were reassessed using the research version of the Structured Clinical Interview for *DSM-IV* Axis I Disorders (SCID-I).[32] Case notes were also obtained, and the final diagnostic assessment combined the interview and case note data. This reassessment of psychotic disorders formed the basis of the PIF Study. The ethics committees of the National Public Health Institute and the Hospital District of Helsinki and Uusimaa, Helsinki, approved the Health 2000 Survey and the PIF reassessment. Participants provided written informed consent.

PIF SCREEN

The PIF psychosis screen consisted of several elements. If any screen findings were positive, the person was invited for a reinterview. The positive screen findings included the following:

1. The Health 2000 Study examination found self-reported psychotic disorders (n=77) or possible or definite psychotic disorders as assessed by a physician (n=45).

2. The CIDI section F screen for bipolar I disorder detected a lifetime episode of elevated mood lasting at least 4 days plus at least 3, not necessarily concurrent, CIDI manic symptoms (n=124); the section G screen for positive psychotic symptoms detected any clinically relevant positive psychotic symptom (ie, the symptom interfered with normal life or the person had discussed it with a health care professional), or at least 3 symptoms regardless of clinical relevance that may have occurred during the subject's lifetime (n=238); the section P screen for other psychotic symptoms detected symptoms of positive formal thought disorder, negative symptoms, behavior that suggests the person is having hallucinations, or catatonic symptoms (n=93). After the interview, the interviewer may have recorded comments on the interview (CIDI comments section). If the subject was not selected by any of the other screens, but the interviewer comments were indicative of psychotic disorder, the individual was selected for reinterview (n=4). All CIDI screens also included subjects whose symptoms were caused by physical illness, medication, or substance abuse.

3. Registers included hospital treatment because of a diagnosis of any psychotic or bipolar disorder (National Hospital Discharge Register; n=238), free medication for severe psychotic and other severe mental disorders (Medication Reimbursement Register of the Finnish Social Insurance Institution; n=211), and disability pension because of any psychotic disorder, bipolar disorder, or major depressive disorder (MDD) (Pension Register of the Finnish Centre for Pensions; n=180).

For screening BPI disorder, we also used the Finnish National Prescription Register of the National Insurance Institution. All subjects not selected by any other screen who had used lithium or mood-stabilizing anticonvulsants from 1996 through 2002, but without a diagnosis of epilepsy or other somatic disorder to account for the medication, were also selected for reinterview (n=36).

Information on psychotic disorders was obtained from the registers from 1969 through 2002. In Finland, psychiatric diagnoses were coded according to the *International Classification of Diseases, Eighth Revision* before 1987; according to the Finnish version of the *International Classification of Diseases, Ninth Revision*, from 1987 until 1995, using the criteria of the *DSM-III-R*[33]; and according to the *International Statistical Classification of Diseases, 10th Revision* (*ICD-10*), since 1996. The National Hospital Discharge Register covers all hospitals in Finland. It lists dates and diagnoses for each inpatient and daypatient stay. The Pension Register includes the start date and primary diagnoses for all disability pensions. The Medication Reimbursement Register lists persons receiving free outpatient medication. The Prescription Register records all reimbursed purchases of drugs in Finland.

MENTAL HEALTH ASSESSMENT

The PIF participants were reinterviewed from 2002 through 2004. Subjects selected only via the National Hospital Discharge Register were contacted through the person responsible for the treatment, usually their general practitioner or the psychiatrist from the local mental health care unit. Those selected only by other registers were contacted through the institutions in question.

The study protocol began with a neuropsychological assessment, followed by the SCID-I.[32] The Global Assessment of Functioning and the Social and Occupational Functioning Assessment Scale were completed using structured questions.

Experienced research nurses or psychologists conducted the protocol. They attended a 1-month training session, with regular follow-up training and reliability sessions. All SCID-I findings were reviewed by a clinical supervisor (J.S., T.P., J.H., or T.K.), and final ratings and diagnoses were based on consensus between the interviewer and clinical supervisor.

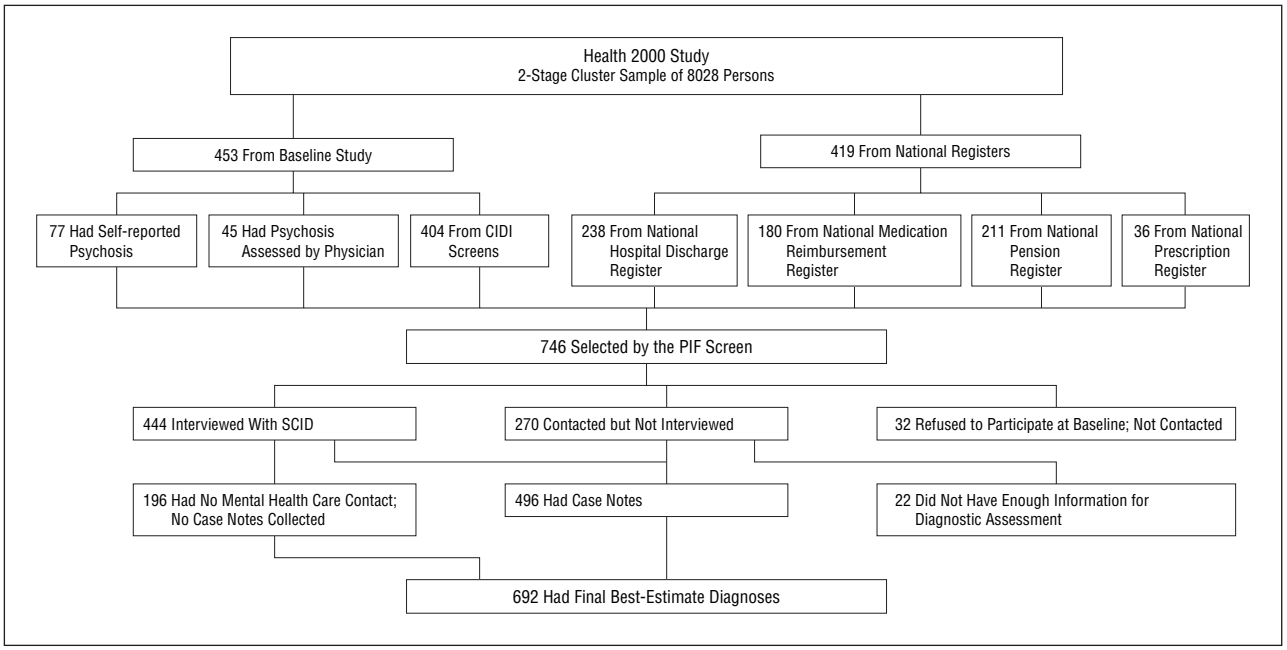

Figure. Design of the Psychoses in Finland (PIF) Study. A subject could have been selected by several screens. From all those selected by the PIF screen, 692 had final best-estimate diagnoses, and 54 (32 who refused to participate at baseline plus 22 who did not have enough information for diagnostic assessment) were in the nonresponse group. CIDI indicates Composite International Diagnostic Interview; SCID, Structured Clinical Interview for *DSM-IV*.

CASE NOTES

For the final diagnostic assessment, all case notes from the hospital and outpatient treatments were collected with the approval of the Finnish Ministry of Social Affairs and Health, excluding the subjects who had refused participation in the Health 2000 Study. Case notes were compiled first using information from the National Hospital Discharge Register and self-reported mental health care contacts, and then from public general medical centers. The aim was to obtain information on all lifetime treatments for all mental health problems.

BEST-ESTIMATE DIAGNOSES

The final best-estimate diagnoses were made by 3 experienced clinicians (J.P., J.S., and S.I.S.) using *DSM-IV-TR* criteria.[34] Diagnostic evaluation was based on all available, systematically evaluated information from the interview and/or the case records. The first 20 cases were assessed together to ensure consistency between the rating clinicians. Thereafter, the reliability of diagnoses was tested on 136 cases, selected by weighting toward those with a diagnosis of any psychotic disorder or of bipolar disorder in the registers or in the SCID-I, which were rated by all 3 clinicians. The κ values for the 3 rates were 0.89 to 0.92 for schizophrenia, 0.91 to 0.96 for schizophrenia spectrum disorders, 0.74 to 0.91 for all nonaffective psychotic disorders, 0.76 to 0.97 for affective psychotic disorders, and 0.85 to 0.93 for psychotic disorders induced by substances or a general medical condition (GMC). All substance-induced psychotic disorders were reviewed by a senior psychiatrist (K.K.), an expert in this area.

Only definite psychotic disorders were diagnosed. We estimated the LTP of psychotic disorders at the time of the baseline survey. Therefore, subjects with onset of psychotic symptoms after 2001 were considered unaffected.

POPULATION WITH SCREEN-POSITIVE FINDINGS

The PIF screen selected 9.29% of the Health 2000 Study population (**Figure**). Thirty-two subjects in the screened population had refused to participate in the Health 2000 Study at baseline, and only register information was available for them. Forty-six had died before our contact, but we obtained case notes for them. Of the remaining population, 66.3% were successfully reinterviewed. The final diagnostic assessment involved 692 subjects (92.8%) of the screened population.

CONTROL SUBJECTS

To obtain population reference data for the methods used in the assessment and to validate the PIF screen, 174 controls were randomly selected for reinterview from all those who had attended any phase of the baseline study. Some of the controls (n=24) were later selected also by the PIF screen and were included only in the screened population in the analysis. Of the remaining 150 controls with screen-negative findings, 66.0% were reinterviewed, and the final diagnostic assessment involved 140 (93.3%) of the controls.

STATISTICAL ANALYSIS

The data were weighted to adjust for differential probabilities of selection in the sampling design and for correlation within clusters and to correct for the oversampling in the group 80 years or older. We used SAS version 8.02[35] and SUDAAN version 9.0.0[36] statistical software for the analyses.

Prevalences were estimated by calculating proportions for dichotomous variables, and asymmetric 95% confidence intervals (CIs) for percentages were calculated using the logit transformation.[36] Prevalences in different age groups and between sexes were compared using the χ^2 statistic for survey design. To estimate the effect of nonresponse, we calculated the prevalences again using register diagnoses for those nonrespondents who had a register diagnosis of psychotic disorders, but only if the exact diagnostic code was available (77.1% of nonrespondents with register diagnosis). Concordances between the screen findings and the *DSM-IV* final diagnoses were evaluated by calculating the κ, sensitivity, specificity, and positive and negative predictive values. The total number of subjects

Table 1. Overlap of Different Screens in the PIF Study*

Screen	National Registers		Baseline Study		CIDI Section		
	Hospital Discharge	Other†	Self-reported Psychosis	Physician-Assessed Psychosis	G	F	P
National Hospital Discharge Register	238						
Other national registers†	148	293					
Self-reported psychosis	55	50	77				
GP-assessed psychoses	37	36	23	45			
CIDI section G	41	49	28	20	238		
CIDI section F	13	18	8	5	33	124	
CIDI section P	24	33	9	12	18	11	93
Selected only by the respective screen	68	111	11	2	149	81	49

Abbreviations: CIDI, Composite International Diagnostic Interview; GP, general practitioner; PIF, Psychoses in Finland.
*The values in the main diagonal represent the total number of subjects selected by the respective screen. Other values represent the number of subjects selected by both screens in the respective row and column.
†Includes the Medication Reimbursement Register of the Finnish Social Insurance Institution and the Pension Register of the Finnish Centre for Pensions.

Table 2. The Best-Estimate *DSM-IV* Diagnoses of the Population With Screen-Positive Findings

Diagnosis	No. (%) of Subjects
Any psychotic disorder*	248 (35.8)
Nonpsychotic disorders	
Mood disorders†	247 (35.7)
MDDs‡	148 (21.4)
Bipolar disorders§	15 (2.2)
Anxiety disorders	120 (17.3)
Substance-induced disorders||	180 (26.0)
Other diagnoses	59 (8.5)
Diagnosis deferred	18 (2.6)
No diagnosis	143 (20.7)
All subjects¶	692

Abbreviation: MDDs, major depressive disorders.
*Includes nonaffective and affective psychotic disorders, substance-induced psychotic disorders, and psychotic disorders due to general medical condition.
†Includes MDDs, depressive disorder not otherwise specified, dysthymia, bipolar disorders, and mood disorder not otherwise specified.
‡Includes single-episode and recurrent MDDs.
§Includes bipolar II disorder, bipolar disorder not otherwise specified, and cyclothymia.
||Includes alcohol and other substance abuse or dependence.
¶Some subjects had more than 1 diagnosis.

for each screen included all participants in that particular phase of the baseline study. Subjects in the nonresponse group were excluded.

RESULTS

SCREEN-POSITIVE FINDINGS AND *DSM-IV* DIAGNOSES

Table 1 presents the number and the overlap of subjects selected by different screens, and **Table 2** presents the *DSM-IV* axis I diagnoses of the screen-positive subjects. Overall, 35.8% had any psychotic disorder. Diagnosis was deferred for 18 subjects, 8 of whom had had psychotic symptoms. Of the 248 subjects with a final diagnosis of any psychotic disorder, 127 (51.2%) attended the SCID-I. A diagnosis could be made in 59.7% of these on the basis of the SCID-I alone, but the remaining 40.3% did not report or remember some important details of their illness. For them, case notes were essential for accurate diagnosis.

LTP OF PSYCHOTIC AND BPI DISORDERS

Lifetime prevalence estimates of psychotic and BPI disorders and their 95% CIs are presented in **Table 3**. **Table 4** presents the LTP estimates for both sexes in different age groups. The LTP was 3.06% for any psychotic disorder, 1.94% for nonaffective psychotic disorders, and 0.59% for affective psychotic disorders. When we used register diagnoses for subjects in the nonresponse group, the prevalences rose to 3.48%, 2.29%, and 0.62%, respectively. If BPI disorder without psychotic features is excluded, the estimates are 2.99% (95% CI, 2.59%-3.43%) for any psychotic disorder and 0.47% (95% CI, 0.34%-0.64%) for affective psychotic disorders, and 3.40% (95% CI, 2.98%-3.89%) and 0.51% (95% CI, 0.37%-0.68%), respectively, when the nonresponse group is included.

COMPARISON OF DIFFERENT SCREENING METHODS

Table 5 presents the numbers of subjects selected by specific screens as having a lifetime diagnosis of psychotic disorder and their percentages of the total group with the same diagnosis in the study. Of the subjects with nonaffective or affective psychotic disorder, 75.5% to 81.0% were captured by the National Hospital Discharge Register, compared with only 59.4% and 47.8% of the those with psychoses induced by substance use or a GMC, respectively. Only one third of the subjects with nonaffective psychotic disorders or substance-induced psychotic disorder (and an even smaller proportion of these with other psychoses) would have been found by the CIDI psychotic symptoms screen. Section F of the CIDI was able to detect only 25.0% of the subjects with BPI disorder. Of the subjects selected only by the Pre-

Table 3. Lifetime Prevalence Estimates of *DSM-IV* Psychotic and BPI Disorders*

Diagnosis	No. of Subjects	All Subjects	Men	Women	All Subjects, Including Nonresponders†
Nonaffective psychotic disorders	153	1.94 (1.63-2.29)	1.64 (1.24-2.17)	2.19 (1.78-2.70)	2.29 (1.95-2.69)
Schizophrenia	67	0.87 (0.68-1.11)	0.82 (0.56-1.19)	0.91 (0.65-1.27)	1.00 (0.79-1.25)
Schizoaffective disorder	24	0.32 (0.21-0.46)	0.14 (0.06-0.34)‡	0.47 (0.30-0.72)	
Schizophreniform disorder	5	0.07 (0.03-0.16)	0.11 (0.04-0.30)	0.02 (0.00-0.17)	
Delusional disorder	15	0.18 (0.11-0.30)	0.16 (0.07-0.34)	0.21 (0.11-0.40)	
Brief psychotic disorder	4	0.05 (0.02-0.14)	0.08 (0.03-0.26)	0.02 (0.00-0.17)	
Psychotic disorder NOS	38	0.45 (0.33-0.62)	0.33 (0.19-0.56)	0.56 (0.39-0.82)	
Affective psychoses	49	0.59 (0.45-0.77)	0.72 (0.50-1.04)	0.49 (0.32-0.72)	0.62 (0.47-0.80)
BPI disorder§	20	0.24 (0.16-0.37)	0.31 (0.18-0.55)	0.18 (0.09-0.36)	
With psychotic features	10	0.12 (0.06-0.23)	0.14 (0.06-0.34)	0.10 (0.04-0.24)	
Without psychotic features	10	0.12 (0.07-0.23)	0.17 (0.08-0.37)	0.09 (0.03-0.23)	
MDD with psychotic features	29	0.35 (0.24-0.51)	0.41 (0.24-0.69)	0.29 (0.17-0.50)	
Substance-induced psychotic disorder	32	0.42 (0.30-0.59)‖	0.82 (0.58-1.17)‡	0.07 (0.02-0.23)	0.43 (0.31-0.60)
Alcohol-induced	31	0.41 (0.29-0.57)	0.79 (0.55-1.14)‡	0.07 (0.02-0.23)	
Other substance-induced	2	0.03 (0.01-0.11)	0.06 (0.01-0.23)	0	
Psychotic disorder due to a GMC	23	0.21 (0.14-0.32)	0.04 (0.01-0.18)‡	0.36 (0.23-0.55)	0.22 (0.15-0.34)
Any psychotic disorder	249	3.06 (2.66-3.51)‖	3.11 (2.53-3.82)	3.01 (2.54-3.57)	3.48 (3.06-3.96)

Abbreviations: BPI, bipolar I; GMC, general medical condition; LTP, lifetime prevalence; MDD, major depressive disorder; NOS, not otherwise specified.
*Data are given as percentages and are presented as lifetime prevalence (95% confidence interval), unless otherwise indicated.
†Calculated for diagnostic groups, not for specific diagnoses, except for schizophrenia.
‡Difference between sexes was statistically significant at $P<.05$.
§Includes BPI disorder with or without psychotic features.
‖In the estimated prevalence, each individual has only been counted once.

scription Register for using anticonvulsants, 1 had psychosis due to GMC and 3 had substance-induced psychoses. None of the 4 selected by the CIDI comment section had a psychotic disorder. One of the controls had a diagnosis of psychotic disorder due to dementia and was included in the total LTP estimates. None of the controls with screen-negative results had functional psychotic disorder.

Table 6 presents the concordance between the different screening methods and the best-estimate diagnoses of psychotic disorders. The κ values were best for registers and lower for other screens. Registers were the most sensitive screens, whereas the sensitivity of other screens was rather poor. The specificity and negative predictive value of all of the screens were comparably high. The positive predictive values of the National Hospital Discharge Register, self-reported psychoses, and psychoses assessed by a physician were good, but the last 2 had low sensitivity.

COMMENT

The PIF Study is, to our knowledge, the most comprehensive general population survey of the prevalence of psychotic disorders, in terms of diagnostic assessment and diagnostic coverage. Our study is also the first to report the prevalences of specific psychotic disorders separately. Finally, we were able to compare the different screening methods of psychotic disorders.

The LTP of all psychotic disorders was high, at 3.06% and 3.48% when register diagnoses of nonresponders were included. Only 1 survey has obtained a higher estimate,[37] but this was based on CIDI diagnoses of possible psychotic disorders, whose reliability is questionable. In our study, the LTPs of nonaffective psychoses and schizophrenia were higher than in most recent general population studies that have used modern community sampling techniques and operational diagnostic criteria.[2-4] The LTP of schizophrenia has varied from 0.12% to 1.6%.[2-4,12,23,38,39] Older studies have found even higher prevalences, but comparison with them is difficult owing to changes in diagnostic criteria. Concordance between diagnoses made using *DSM-III* and more recent operational criteria and those using more historical definitions are only modest.[40] Previous Finnish studies, all including register data, have found comparably high prevalences of schizophrenia.[12,41-43] However, it is likely that the prevalence of schizophrenia in other recent population surveys would also have been considerably higher if the authors had had access to register and case note information.

Consistent with the review by Saha et al,[1] there was no sex difference in the prevalence of schizophrenia, which is discordant with the higher incidence[44] and morbid risk[45] of schizophrenia in men. However, the age at onset of schizophrenia is lower for men and their mortality is higher,[46] particularly during the first years after the onset of the disorder.[47] On the other hand, most of the late-onset cases are female. Thus, it seems that in our study the inclusion of older women has raised the prevalence in this group, whereas higher mortality among men has lowered the prevalence in men. Congruent with this, the mean age of subjects with schizophrenia was 50 years for men and 56 years for women. Nevertheless, the incidence[48] and prevalence[41] of schizophrenia among men and women have also been equal in many previous Finnish studies.

There are only a few general population studies of the prevalence of schizoaffective[49] and delusional[50,51] disor-

Table 4. Prevalences of Psychotic Disorders by Age Groups and Sex

Diagnosis	Prevalence by Age Group, % (95% CI)			
	30-44 y	45-54 y	55-64 y	≥65 y
All Subjects				
Nonaffective psychotic disorders	1.27 (0.89-1.82)	2.29 (1.79-2.94)	2.26 (1.56-3.26)	2.32 (1.67-3.21)*
Schizophrenia	0.64 (0.39-1.03)	1.15 (0.78-1.69)	0.86 (0.46-1.60)	0.92 (0.58-1.45)
Schizoaffective disorder	0.22 (0.10-0.50)	0.52 (0.29-0.94)	0.47 (0.21-1.04)	0.11 (0.03-0.45)
Schizophreniform disorder	0.07 (0.02-0.30)	0.16 (0.05-0.48)	0	0
Delusional disorder	0	0.05 (0.01-0.37)	0.31 (0.11-0.82)	0.46 (0.24-0.89)*
Brief psychotic disorder	0.04 (0.01-0.27)	0.05 (0.01-0.37)	0	0.11 (0.03-0.46)
Psychotic disorder NOS	0.30 (0.15-0.59)	0.31 (0.14-0.69)	0.62 (0.31-1.23)	0.72 (0.40-1.29)
Affective psychoses	0.52 (0.32-0.87)	0.73 (0.44-1.21)	0.55 (0.26-1.13)	0.57 (0.32-1.01)
BPI disorder	0.22 (0.10-0.50)	0.36 (0.17-0.77)	0.23 (0.08-0.73)	0.14 (0.05-0.39)
MDD with psychotic features	0.30 (0.15-0.59)	0.36 (0.18-0.75)	0.31 (0.11-0.83)	0.43 (0.23-0.81)
Substance-induced psychotic disorder	0.60 (0.37-0.96)	0.63 (0.35-1.12)	0.16 (0.04-0.62)	0.11 (0.03-0.45)*
Psychotic disorder due to a GMC	0.04 (0.01-0.26)	0	0.16 (0.04-0.62)	0.74 (0.47-1.17)*
Any psychotic disorder	2.43 (1.92-3.09)	3.54 (2.84-4.40)	2.96 (2.16-4.05)	3.55 (2.72-4.61)
Men				
Nonaffective psychotic disorders	1.37 (0.82-2.26)	1.66 (1.04-2.64)	2.12 (1.20-3.73)	1.71 (0.98-2.96)
Schizophrenia	0.83 (0.45-1.54)	0.83 (0.43-1.61)	0.82 (0.34-1.94)	0.78 (0.32-1.85)
Schizoaffective disorder	0†	0.21 (0.05-0.83)	0.49 (0.16-1.50)	0
Schizophreniform disorder	0.15 (0.04-0.60)	0.21 (0.05-0.83)	0	0
Delusional disorder	0	0.10 (0.01-0.73)	0.33 (0.08-1.29)	0.23 (0.05-1.00)
Brief psychotic disorder	0.08 (0.01-0.54)	0.10 (0.01-0.73)	0	0.16 (0.02-1.10)
Psychotic disorder NOS	0.30 (0.11-0.78)	0.10 (0.01-0.74)	0.49 (0.16-1.50)	0.54 (0.20-1.46)
Affective psychoses	0.38 (0.16-0.89)	1.14 (0.65-2.01)†	0.82 (0.34-1.94)	0.70 (0.28-1.72)
BPI disorder	0.08 (0.01-0.54)	0.62 (0.28-1.38)	0.49 (0.16-1.53)	0.16 (0.02-1.10)
MDD with psychotic features	0.30 (0.12-0.79)	0.52 (0.22-1.22)	0.33 (0.08-1.30)	0.54 (0.20-1.49)
Substance-induced psychotic disorder	1.14 (0.61-2.13)†	0.93 (0.49-1.78)†	0.33 (0.08-1.30)	0.31 (0.08-1.22)
Psychotic disorder due to a GMC	0	0	0.16 (0.02-1.15)	0.08 (0.01-0.56)†
Any psychotic disorder	2.81 (2.03-3.89)	3.74 (2.68-5.19)	3.10 (1.98-4.85)	2.80 (1.80-4.34)
Women				
Nonaffective psychotic disorders	1.18 (0.69-2.00)	2.93 (2.04-4.18)	2.39 (1.49-3.82)	2.67 (1.86-3.81)
Schizophrenia	0.44 (0.20-0.96)	1.46 (0.88-2.42)	0.90 (0.41-1.95)	1.00 (0.57-1.75)
Schizoaffective disorder	0.44 (0.20-0.98)	0.84 (0.43-1.61)	0.45 (0.14-1.38)	0.18 (0.05-0.72)
Schizophreniform disorder	0	0.10 (0.01-0.74)	0	0
Delusional disorder	0	0	0.30 (0.07-1.18)	0.59 (0.28-1.24)
Brief psychotic disorder	0	0	0	0.09 (0.01-0.65)
Psychotic disorder NOS	0.30 (0.11-0.79)	0.52 (0.21-1.24)	0.75 (0.31-1.77)	0.81 (0.45-1.47)
Affective psychoses	0.67 (0.35-1.25)	0.31 (0.10-0.96)	0.30 (0.07-1.18)	0.50 (0.25-0.97)
BPI disorder	0.37 (0.15-0.89)	0.10 (0.01-0.74)	0	0.14 (0.04-0.41)
MDD with psychotic features	0.30 (0.11-0.77)	0.21 (0.05-0.82)	0.30 (0.07-1.18)	0.36 (0.15-0.84)
Substance-induced psychotic disorder	0.15 (0.04-0.59)	0.10 (0.01-0.74)	0	0
Psychotic disorder due to a GMC	0.27 (0.16-0.52)	0	0.15 (0.02-1.05)	1.13 (0.71-1.80)
Any psychotic disorder	2.07 (1.43-2.99)	3.34 (2.35-4.74)	2.84 (1.80-4.43)	3.98 (2.99-5.29)

Abbreviations: See Table 3.
*Statistically significant difference ($P<.05$) across age groups in the total group of both sexes.
†Statistically significant difference ($P<.05$) between sexes in the age group.

ders in community samples. The LTP of schizoaffective disorder was approximately half of that for schizophrenia[52] and, as in previous studies,[49,53] it was more common in women. The LTP of delusional disorder was 0.18%, whereas previous estimates range from 0.02% to 0.04%.[50,51] Delusional disorder was found only in the group 45 years or older. The estimate reported herein is probably still an underestimation: patients are not inclined to seek treatment because of the lack of insight associated with the disorder while they still have a relatively well-preserved functional capacity. Because delusions in this disorder are nonbizarre, it is extremely difficult to assess in a single interview whether they are genuine delusions if no other source of information is available.

Schizophreniform and brief psychotic disorders were rare. With a long enough follow-up, most subjects with a psychotic episode experience relapse. This accords with a 3-year follow-up of subjects with *ICD-10* acute and transient psychoses in which the diagnosis remained unchanged in only 34% of the subjects.[54]

The LTP of BPI disorder was 0.24%, lower than in most previous studies in which the LTP has varied from 0.2% to 3.3%.[6-8,10,14,55] However, general population studies using fully structured interviews (CIDI) to diagnose BPI disorder have found LTPs twice as high as studies using other diagnostic instruments.[18] This is explainable by the false-positive diagnoses produced by the CIDI.[19,27] Overall, our findings and previous ones imply that prevalences of BPI

Table 5. Subjects With a Diagnosis of Psychotic Disorder Found by Specific Screens in the PIF Study

Diagnosis	Subjects With Disorder, No. (%)						
	National Registers		Baseline Study		CIDI Section		
	Hospital Discharge	Other*	Self-reported Psychosis	Physician-Assessed Psychosis	G	F	P
Nonaffective psychotic disorders (n = 153)	124 (81.0)	111 (72.5)	51 (33.3)	37 (24.2)	47 (30.7)	9 (5.9)	27 (17.6)
Affective psychoses (n = 49)	37 (75.5)	28 (57.1)	7 (14.3)	2 (4.1)	9 (18.4)	7 (14.3)	3 (6.1)
Substance-induced psychotic disorder (n = 32)	19 (59.4)	5 (15.6)	2 (6.3)	1 (3.1)	10 (31.3)	3 (9.4)	6 (18.8)
Psychotic disorder due to a GMC (n = 23)	11 (47.8)	10 (43.5)	1 (4.3)	1 (4.3)	1 (4.3)	0	1 (4.3)
Any psychotic disorder (n = 249)	186 (74.7)	149 (59.8)	61 (24.5)	41 (16.5)	66 (26.5)	19 (7.6)	36 (14.5)

Abbreviations: CIDI, Composite International Diagnostic Interview; GMC, general medical condition; PIF, Psychoses in Finland.
*Includes the Medication Reimbursement Register of the Finnish Social Insurance Institution and the Pension Register of the Finnish Centre for Pensions.

Table 6. Concordance Between the Screens and the *DSM-IV* Diagnoses of Any Psychotic Disorders in the PIF Study

Screen	No. of Subjects by Findings*				κ Value (95% CI)	Percentages†			
	TP	FN	FP	TN		Sensitivity	Specificity	PPV	NPV
National registers									
All registers‡	214	35	125	7138	0.72 (0.68-0.76)	86.1	98.3	63.8	99.5
Psychotic disorder in National Hospital Discharge Register	186	63	25	7238	0.80 (0.76-0.84)	75.3	99.7	88.4	99.2
Psychotic disorder in other registers§	149	100	106	7157	0.58 (0.52-0.63)	60.9	98.5	58.2	98.7
CIDI section									
All sections‖	60	91	282	5582	0.25 (0.19-0.30)	43.5	95.1	19.7	98.4
G, psychotic symptoms	66	95	165	5699	0.32 (0.25-0.38)	41.5	97.1	28.5	98.4
F, manic symptoms	19	142	100	5764	0.12 (0.06-0.17)	12.1	98.3	16.0	97.6
P, other symptoms related to psychosis	36	125	55	5809	0.27 (0.20-0.35)	22.4	99.1	40.0	97.9
Baseline study									
Psychosis assessed by physicians	41	130	4	6165	0.37 (0.29-0.45)	24.5	99.9	91.0	98.0
Self-reported psychoses	61	181	14	7107	0.38 (0.31-0.44)	26.7	99.9	81.8	97.6

Abbreviations: CI, confidence interval; CIDI, Composite International Diagnostic Interview; FN, false negative; FP, false positive; NPV, negative predictive value; PIF, Psychoses in Finland; PPV, positive predictive value; TN, true negative; TP, true positive.
*The total number of subjects for each screen included all participants in that particular phase of the baseline study. Subjects in the nonresponse group were excluded. True-positive findings include positive screening and *DSM-IV* findings; FN findings, negative screening and positive *DSM-IV* findings; FP findings, positive screening and negative *DSM-IV* findings; and TN findings, negative screening and negative *DSM-IV* findings.
†Calculated using the data weighted back to the total general population.
‡Includes the National Hospital Discharge Register, the Medication Reimbursement Register of the Finnish Social Insurance Institution, and the Pension Register of the Finnish Centre for Pensions.
§Includes the National Medication Reimbursement Register and the Pension Register of the Finnish Centre for Pensions.
‖Includes CIDI sections G, F, and P.

disorder based on fully structured interviews such as the CIDI should be interpreted with caution.[19]

We screened BPI disorder from multiple sources. However, the LTP may still be conservative. There were probably previously undiagnosed subjects who denied having had manic symptoms in the CIDI.[19] Previous manic episodes among subjects with a major depressive episode may also be underdiagnosed in clinical practice.[56,57] Those with a diagnosis of nonpsychotic depression in hospitals were not selected for our reassessment, but all subjects with a disability pension or reimbursed medication for MDD were reassessed. Manic symptoms were sometimes poorly described in the case notes. If all subjects who received a diagnosis of bipolar disorder not otherwise specified because of insufficient information had BPI disorder, its prevalence would rise to 0.39%. The inclusion of register diagnoses of BPI disorder for the nonresponse group would lift the prevalence to 0.42%. However, our low prevalence accords with previous Finnish studies.[58-61]

The LTP of MDD with psychotic features also fell in the lower range of the few previously published studies.[62,63] There were no differences between the sex and age groups, which was unexpected because MDD was less common in men and in older age groups.[31]

Substance-induced psychotic disorders were frequent in men aged 30 to 54 years. Most had alcohol-induced psychotic disorders; the prevalence of other substance-induced psychoses was only 0.03%. Comparisons with previous studies are difficult to make, because substance-induced psychotic disorders are not included in recent general population studies of psychoses. Of first-admission patients with psychotic disorders in the study by Cantwell et al,[64] 8.4% were substance induced. The

higher prevalence of alcohol-induced psychoses in men accords with the higher prevalence of alcohol dependence in men.[31] The low prevalence of psychotic disorders caused by substances other than alcohol reflects the low frequency of their use in the Finnish population who are 30 years or older.[65]

The LTP of psychotic disorders due to a GMC began increasing in the group 65 years or older and was 1.71% among subjects 80 years or older. Most subjects (92.9%) with psychotic disorder due to GMC in the group 80 years or older had dementia. The LTP of psychotic disorders due to a GMC is clearly an underestimation because many somatic diseases are associated with psychotic symptoms that are rarely diagnosed and reported separately. Overall, the prevalence of psychotic disorders was highest in the elderly. This accords with previous studies of the population who were older than 65 years[66] or older than 80 years.[26]

Screening based on multiple sources was essential to achieve the highest possible coverage of subjects with psychotic disorders. Registers were the most important and reliable source of information, as in a previous Finnish study.[12] The κ value of 0.80 for the National Hospital Discharge Register, similar to that in a previous Finnish study,[67] indicates that, although register information on psychotic disorders is good, it is not excellent for case ascertainment. The lower concordance of other registers was the result of different coding of diagnoses and their inclusion of subjects with MDD. In this study, all other screens added only 25.0% and 13.7% of the subjects with psychotic disorders to those selected by the National Hospital Discharge Register, or all the registers, respectively. Using all other screens except the registers would have located only 52.4% of subjects with psychotic disorders.

Section G of the CIDI has been used to screen for psychotic disorders in recent general population studies of nonaffective psychoses.[2-4] Besides producing false-positive results, the section G screen produced a large number of false-negative results. Only 26.6% of subjects with psychotic disorders would have been recognized if the only screen had been CIDI section G, and the prevalence of schizophrenia would have been 0.28%, which is quite similar to that of other studies using the same method.[2-4] Thus, the CIDI alone is not sufficient for screening psychotic disorders. The CIDI mania section was equally unreliable, finding only 25.0% of the subjects with BPI disorder. A self-reported or psychotic disorder assessed by a physician produced only a few false-positive cases, ie, the specificity was excellent, supporting previous results.[68] However, the sensitivity of these screens was poor.

Obtaining case notes was important for making diagnoses in subjects who did not participate in the SCID-I, but also for accurately making diagnoses in subjects who did participate in it. Previous incidence and family studies of psychoses with access to case notes or to other longitudinal information in addition to semistructured interviews have also been able to ascertain more subjects with psychotic disorders than studies using only interview information.[66,69-72]

In this study, we were able to overcome many of the methodological problems inherent in general population studies of psychotic disorders. Register information enables estimation of nonresponse to be included in prevalence rates. Although the response rate in the Health 2000 Study was exceptionally high, the prevalence estimate was 12% higher when subjects with a register diagnosis of psychosis in the nonresponse group were included in the calculations. Our study also included homeless subjects. Homelessness is very rare in Finland; our screen identified 2 of the 25 subjects without a permanent address in the entire Health 2000 Study population. Institutionalized persons, another subpopulation often excluded from general population surveys, were included in our study. Being institutionalized was defined as staying in an institution longer than 3 months, and only 14 (5.7%) of the subjects with any psychotic disorder diagnosis fulfilled this definition. However, these findings cannot be generalized to other studies because rates of nonresponse, institutionalization, and homelessness are highly variable.

The exclusion of adults younger than 30 years limits the comparison with previous studies. Among young adults, the incidence of schizophrenia and bipolar disorders is high,[73,74] but the prevalence could be lower than in older groups. In terms of overall prevalence, this was probably compensated for by the higher mortality of subjects with psychotic disorders.[46,47] However, the inclusion of older groups and exclusion of young adults might also have affected the observed sex differences in disorders other than schizophrenia: patients with late onset, who were predominantly female, raised the prevalence of delusional disorder, psychotic disorder not otherwise specified, and MDD with psychotic features, whereas exclusion of young men lowered the prevalence of substance-induced psychotic disorders.

One particular problem related to the inclusion of the oldest group is that the subjects might not have remembered psychotic symptoms if they had had them decades ago. This recall bias was partially overcome by register data and case notes, which we obtained on a lifetime basis.

The number of cases in many disorders was small and the CIs were large. Our LTP estimates are still conservative because there were probably undetected cases among those nonresponders without a register diagnosis of psychotic disorder and also among Health 2000 Study participants with screen-negative findings. This particularly concerns the milder forms of psychotic disorders. There were also subjects in the diagnosis-deferred category for whom a psychotic disorder was suspected but could not be confirmed. Moreover, the LTP of psychotic disorder not otherwise specified was high, indicating insufficient information to assign a specific diagnosis for some of these subjects. However, our prevalence estimates are high, which suggests that our screen was able to detect most of the subjects with psychotic disorders.

The exact prevalences we report apply only to Finland, a Nordic country with a relatively low immigration rate and no large cities. However, we believe that our prevalence estimates are more accurate than those in previous studies and that screening from nationwide health care registers and use of case note information would have increased the case detection substantially in other general population studies as well.

In conclusion, our results support previous suggestions that multiple sources of information are essential to estimate the LTP of psychotic disorders. Psychotic disorders are among the most severe and impairing conditions; with an LTP exceeding 3%, these disorders are a major public health concern.

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