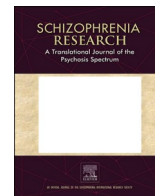


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Schizophrenia Research

journal homepage: www.elsevier.com/locate/schres

Differences in psychosocial functioning between psychotic disorders in the Finnish SUPER study

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ARTICLE INFO

Keywords:

Schizophrenia
 Schizoaffective disorder
 Bipolar disorder
 Psychotic depression
 Level of functioning
 Outcome

ABSTRACT

Background: Psychotic disorders differ in their impact on psychosocial functioning. However, few studies have directly compared psychosocial functioning and its determinants between schizophrenia, schizoaffective disorder (SAD), bipolar disorder (BD), and major depressive disorder with psychotic features (psychotic MDD).

Objective: We compared rates of independent living, employment, marriage, and having children between these diagnostic groups in a large national sample of participants with psychotic disorders in Finland.

Methods: A cross-sectional substudy of participants ($N = 9148$) aged 18 to 65 years in the Finnish SUPER study, recruited nationwide from health- and social care settings and with advertisements. Psychosis diagnoses, age of onset, and hospitalizations were collected from healthcare registers. Participants were interviewed for psychosocial functioning. Associations of age of onset, hospitalizations, gender, and education with psychosocial functioning were analyzed using logistic regression models.

Results: Of participants, 13.8% were employed or studying, 72.0% living independently and 32.5% had children. Overall, BD was associated with best, SAD and psychotic MDD with intermediate, and schizophrenia with worst level of psychosocial functioning. Greatest differences were found in independent living (OR 4.06 for BD vs. schizophrenia). In multivariate models, gender and number of hospitalizations predicted employment, marriage, and independent living in all diagnostic categories, and age of onset in some diagnostic categories.

Conclusions: Level of functioning and psychosocial outcomes differed markedly between psychotic disorders, particularly in independent living. Outcomes were worst for schizophrenia and best for BD. Across all psychotic disorders, female gender and lifetime number of hospitalizations had strong independent associations with marriage, employment, and independent living.

Abbreviations: SAD, schizoaffective disorder; BD, bipolar disorder; psychotic MDD, psychotic major depressive disorder.

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<https://doi.org/10.1016/j.schres.2022.04.008>

Received 20 December 2021; Received in revised form 16 March 2022; Accepted 30 April 2022

Available online 7 May 2022

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1. Introduction

Mental illnesses rank among the leading causes of disability-adjusted life-years lost among adults globally (GBD 2019 Diseases and Injuries Collaborators, 2020). Despite treatment, only 1 in 7 individuals with schizophrenia meet criteria for recovery (Jääskeläinen et al., 2012). Other psychotic disorders, such as schizoaffective disorder (SAD) (Tondo et al., 2016), bipolar disorder (BD) (Holm et al., 2021), and major depressive disorder with psychotic features (psychotic MDD) (Heslin et al., 2016), are thought to be associated with less, albeit significant disability. However, few studies have directly compared the entire spectrum of affective and schizophrenia spectrum psychoses, especially the relatively less studied categories of psychotic MDD and SAD (Heslin et al., 2016; Jääskeläinen et al., 2018; Owoeye et al., 2013; Rink et al., 2016; Tondo et al., 2016).

Besides differences between diagnostic groups, several illness-related or other characteristics may predict psychosocial functioning within or irrespective of diagnostic group. Previous research has identified the following as factors of interest in recovery in schizophrenia and BD: age of onset (Immonen et al., 2017; Jääskeläinen et al., 2015), number of hospitalizations (Tse et al., 2014), and education and school performance (Jääskeläinen et al., 2015; Tse et al., 2014). Previous evidence for gender as a predictor of functional recovery in schizophrenia is inconsistent (Ayasa-Arriola et al., 2020; Jääskeläinen et al., 2012; Santesteban-Echarri et al., 2017), although it is thought to influence presentation in mood disorders (Diflorio and Jones, 2010). Predictors of functional recovery are less well known for other diagnostic categories of psychotic illness (Heslin and Young, 2018; Pagel et al., 2013). Whether their roles differ between diagnostic groups remains obscure.

We investigated the association of age of onset, gender, number of hospitalizations, and education with psychosocial functioning, represented in this study by independent living, employment, marital status and having children, in different diagnostic categories of psychotic disorders. While the above represent individual choices and opportunities, they also represent aspects of psychosocial functioning and are outcomes of interest in psychosis research. We present results of a large cross-sectional study exploring data on these aspects of functioning in schizophrenia, SAD, BD, and psychotic MDD in a large national sample of Finnish patients with psychotic illness.

2. Material and methods

2.1. Study participants

SUPER-Finland recruited 10,474 Finnish participants with a history of at least one clinically diagnosed episode of psychotic illness between 2016 and 2018, as part of the Stanley Global Neuropsychiatric Genetics initiative. The complete SUPER study protocol will be detailed in a separate cohort profile manuscript that has not yet been published. We studied participants in the SUPER-Finland study aged 18–65 years ($N = 9148$).

Study participants were recruited from in- and outpatient psychiatric hospitals and clinics, primary care, and supported housing units, and additionally with newspaper advertising. Participants had schizophrenia (ICD-10 code F20), SAD (F25), BD (F30, F31), psychotic MDD (F32.3 or F33.3), or other ICD-10 psychotic disorders (other psychoses), diagnostic codes for which are detailed in the supplement. The study protocol was approved by the Ethics Committee of the Hospital District of Helsinki and Uusimaa (Reference number 202/13/03/00/15). Participants gave written informed consent. Exclusion criteria were age under 18 years and inability to give informed consent. Interviewing was performed by research nurses using a set interview form. The interview was conducted in person at a participating clinic, hospital or the participant's home or place of residence. Interview protocol adherence was monitored biannually. Potential participants from clinics or supported housing were always contacted first by staff. The proportion of those

who did not indicate interest to participate in the study is unknown.

2.2. Diagnoses and illness-related variables

Diagnostic information for participants was retrieved from the Finnish National Care Register for Health Care, (Hyperlink: <https://web.archive.org/web/20200220103956/https://thl.fi/en/web/thlfi-en/statistics/information-on-statistics/register-descriptions/care-register-for-health-care>), a continuation of the Finnish Hospital Discharge Register (Sund, 2012), which includes data for inpatient treatment episodes with clinical discharge diagnoses since 1967, as well as specialized psychiatric outpatient treatment. Diagnostic information for participants was retrieved from this register. These registry-based clinical diagnoses were used in the study.

Diagnoses were considered in the following order of preference, according to the SUPER study protocol: 1. schizophrenia, 2. SAD, 3. BD, 4. psychotic MDD, 5. other psychoses, which category included all other ICD-10 psychosis diagnoses as detailed in the supplement. Health record-based and self-reported diagnosis data were also available. These were used for a small minority of participants for whom registry-based diagnoses were not available.

Participant age was recorded in the interview. Age of onset is the participant's earliest age of any included psychotic diagnosis in electronic health records; however, for SAD, BD, and psychotic MDD, age of onset was calculated from the first mood disorder episode (F32–F39), if this came before the psychosis diagnosis. The number of hospitalizations was calculated from the Care Register for Health Care, using a previously published algorithm (Suokas, 2020). Only hospitalizations where there was at least 1 day when the participant was not hospitalized between episodes were considered separate.

2.3. Psychosocial and level of functioning outcomes

The participants were interviewed for psychosocial functioning using questions from the Finnish Health 2000 general population survey (Aromaa and Koskinen, 2004). The interviewer asked about current living arrangements, main activity (working full- or part-time, studying, pensioned due to illness or age, unemployed, taking care of household, in military service, or other) during the past 12 months, current marital status, having children, and the highest level of education completed. This information was coded into preset categories by the interviewer, or, for living or working status, if the categories did not apply, reported as free text.

As detailed below, four binary variables were formed to characterize psychosocial functioning, covering living arrangements, working status, marital status and parenting status. Living arrangements were coded by the interviewer as living alone, living with a spouse and/or children, living with parents or siblings, living in supported housing with part-time or full-time supervision, or other, the latter as free text. Here, living in any type of supervised housing, long-term hospitalization, or not having a place of permanent residence was considered as not living independently, and any other response as living independently. Free-form text information ($N = 636$) was coded manually. Homelessness was recorded from free text information, as no items queried homelessness. Free text answers that explicitly mentioned or directly implied homelessness (e.g. reports “overnight shelter” as place of residence) were recorded as homeless. Where no determination could be made (e.g. reports “I live with a friend”), data were considered missing.

Working status was coded into one of 10 categories during the interview. Reporting full-time employment, part-time employment, or studying was coded as working or studying and any other response as not working or studying.

Marital status was coded as either married or in a registered partnership, cohabiting, divorced, widowed, or unmarried in the interview. Any other response than never married was coded as having been married or cohabiting. Information on children was binary (yes or no).

Education was coded according to the Health 2000 study protocol (Aromaa and Koskinen, 2004). No variables were missing for more than 4.9% of values. To avoid bias (Janssen et al., 2010), missing values for independent variables were imputed using multiple imputation. Missing value frequencies and analysis are presented in the supplementary material.

2.4. Statistical analysis

Odds ratios were calculated using IBM SPSS LOGISTIC REGRESSION, version 25 using pooled multiply imputed data. Two multivariate logistic regression models were used, and analyses were run as follows: 1. within-groups logistic regression models were run for every psychosocial functioning variable and every diagnostic category using all independent variables except diagnostic category, and 2. between-groups analysis was performed using a logistic regression model for every psychosocial functioning variable with all independent variables and diagnostic category included as a predictor variables in the model. Box-Tidwell procedures were used to test linearity with the significance threshold here adjusted for multiple comparisons. Goodness of fit was tested using the Hosmer-Lemeshow test. Multicollinearity was tested using variance inflation factors, with a cut-off value of 5. Participant age was split into five quintiles, and hospitalizations were transformed using a base-10 logarithm transformation due to considerations of model fit and linearity. Variable transformations and outlier exclusions are detailed in the supplement. Several analyses excluded moderate outliers for statistical reasons, but no associations changed statistical significance or direction as a result. The final analyses were performed primarily to describe differences between diagnostic groups in the sample, and therefore, the results were not adjusted for multiple comparisons. P-values and 95% confidence intervals for the results were reported where appropriate. Non-overlapping 95% confidence intervals were used as a basis for statements about differences between pairs of diagnostic groups other than schizophrenia.

3. Results

We found low rates of employment and marriage in all diagnostic categories of psychotic illness. However, only a minority of individuals in all diagnostic categories were unable to live independently (Table 1).

Significant differences emerged between diagnostic groups in number of hospitalizations, current age, age of onset, and functioning. Participants with schizophrenia had the earliest mean age of onset (25.6 years), a longer mean duration of illness (20.0 years), and a higher median number of hospitalizations (n = 5) than the other diagnostic groups, although the last was not significantly different from SAD. Most participants who had schizophrenia were male, while most participants

with SAD or affective psychoses were female. Schizophrenia was also associated with the lowest education.

All diagnostic categories had left-skewed distributions for hospitalizations, with some individuals re-hospitalized numerous times, with a maximum of 149 hospitalizations. Reporting homelessness was rare in this study; only 41 individuals reported homelessness, of whom 24 (0.5%) in the schizophrenia group, 3 (0.3%) in the SAD group, 4 (0.3%) in the BD group, and 10 (1.1%) in the other psychoses group. However, for 287 subjects (3.1%) a determination of homelessness could not be made based on their description of living status.

Schizophrenia was associated with the lowest level of functioning and BD with the highest, while SAD, psychotic MDD, and other psychoses were generally intermediate between schizophrenia and BD (Table 2). Age of onset, number of hospitalizations, female gender, and education had multiple significant associations with functioning (Table 3). Later age of onset was associated with improved odds of psychosocial functioning in all diagnostic categories, except BD and psychotic MDD (non-affective psychoses), but not in BD for living

Table 2
Associations of diagnostic category with functioning. Odds of higher psychosocial functioning compared with schizophrenia. *p* < 0.01 for all observations.

	OR	95% CI		p
Living independently				
Schizoaffective disorder	2.45	2.01 –	2.99	<0.001
Bipolar disorder	4.06	3.30 –	4.99	<0.001
Psychotic depression	2.13	1.62 –	2.81	<0.001
Other psychosis	1.44	1.18 –	1.75	<0.001
Working or studying				
Schizoaffective disorder	1.51	1.20 –	1.89	<0.001
Bipolar disorder	2.12	1.77 –	2.53	<0.001
Psychotic depression	1.56	1.19 –	2.04	0.001
Other psychosis	1.79	1.47 –	2.19	<0.001
Ever married/cohabited				
Schizoaffective disorder	1.97	1.68 –	2.32	<0.001
Bipolar disorder	3.89	3.38 –	4.47	<0.001
Psychotic depression	2.06	1.68 –	2.54	<0.001
Other psychosis	1.48	1.25 –	1.76	<0.001
Having children				
Schizoaffective disorder	2.11	1.77 –	2.51	<0.001
Bipolar disorder	3.47	2.96 –	4.07	<0.001
Psychotic depression	2.00	1.52 –	2.63	<0.001
Other psychosis	1.52	1.24 –	1.87	<0.001

Note: Adjusted for age of onset, number of hospitalizations, gender, education, and age.

Table 1
Sociodemographic characteristics and psychosocial functioning by diagnostic group (age 18–65, N = 9148).

Characteristic	Schizophrenia	Schizoaffective disorder	Bipolar disorder	Psychotic depression	Other psychosis	Overall sample
Total (% of study population)	5120 (55.2%)	885 (9.5%)	1585 (17.1%)	533 (5.7%)	1025 (11.2%)	9148
Age, mean (SD)	45.7 (12.3)	42.2 (12.0)*	43.3 (12.6)*	41.9 (14.5)*	37.8 (13.3)*	43.8 (12.8)
Age of onset, mean (SD)	25.6 (7.93)	26.9 (8.64)*	32.1 (11.2)*	31.8 (12.7)*	30.6 (11.3)*	27.6 (9.7)
Duration of illness, mean (SD)	20.0 (11.7)	15.3 (8.9)*	11.1 (7.4)*	9.7 (7.9)*	7.1 (8.3)*	16.2 (11.4)
Hospitalizations, median (P _{90%})	5 (22)	5 (20)	3 (13)*	3 (12)*	2 (7)*	4 (18)
Female	2132 (41.6%)	548 (61.9%)*	989 (62.4%)*	330 (61.9%)*	466 (45.5%)	4465 (48.8%)
Intermediate or higher education	3124 (61.5%)	685 (77.5%)*	1270 (80.3%)*	389 (73.1%)*	714 (70.1%)*	6182 (68.0%)
Living independently	3041 (60.8%)	722 (83.4%)*	1425 (91.3%)*	446 (85.1%)*	813 (81.1%)*	6447 (72.0%)
Working or studying	410 (8.1%)	129 (14.8%)*	353 (22.5%)*	97 (18.5%)*	256 (25.3%)*	1245 (13.8%)
Full-time employment	128 (2.5%)	42 (4.7%)*	195 (12.3%)*	52 (9.8%)*	100 (9.8%)*	517 (5.7%)
Part-time employment	151 (2.9%)*	36 (4.1%)*	69 (4.4%)*	10 (1.9%)	44 (4.3%)	310 (3.4%)
Ever married or cohabited	1407 (27.9%)	400 (45.8%)*	1000 (63.6%)*	258 (49.2%)*	345 (34.1%)*	3410 (37.8%)
Currently married or cohabiting	369 (7.3%)	148 (17.0%)*	394 (25.0%)*	108 (20.6%)*	121 (11.9%)*	1140 (12.6%)
Divorced	652 (12.9%)	151 (17.3%)*	375 (23.8%)*	87 (16.6%)*	110 (10.9%)	1375 (15.2%)
Has children	1175 (23.3%)	353 (40.6%)*	874 (55.7%)*	230 (43.7%)*	301 (29.7%)*	2933 (32.5%)

* Statistically significant difference vs. schizophrenia group (*p* < 0.05; one-way ANOVA, Mann–Whitney *U* or z-test as appropriate).

Table 3
Associations between sociodemographic and illness-related variables and functioning within diagnostic categories.

	Living independently				Working or studying				Having married				Having children							
	OR	95%	CI	p	OR	95%	CI	p	OR	95%	CI	p	OR	95%	CI	p				
Schizophrenia																				
Age of onset	1.04	1.03	–	1.04	<0.01	1.02	1.00	–	1.04	0.04	1.03	1.02	–	1.04	<0.01	1.09	1.08	–	1.10	<0.01
Hospitalizations	0.43	0.37	–	0.50	<0.01	0.40	0.30	–	0.54	<0.01	1.80	1.53	–	2.11	<0.01	2.07	1.73	–	2.48	<0.01
Female gender	1.38	1.22	–	1.56	<0.01	1.34	1.08	–	1.66	<0.01	3.18	2.79	–	3.63	<0.01	2.59	2.24	–	3.00	<0.01
Education	2.26	1.99	–	2.56	<0.01	2.08	1.60	–	2.70	<0.01	1.38	1.20	–	1.59	<0.01	0.96	0.82	–	1.12	0.59
Schizoaffective disorder																				
Age of onset	1.05	1.02	–	1.09	<0.01	0.99	0.95	–	1.03	0.53	1.05	1.03	–	1.08	<0.01	1.07	1.05	–	1.10	<0.01
Hospitalizations	0.36	0.21	–	0.61	<0.01	0.17	0.09	–	0.31	<0.01	1.35	0.91	–	2.02	0.14	1.73	1.13	–	2.64	0.01
Female gender	1.68	1.13	–	2.49	<0.01	1.40	0.92	–	2.13	0.12	2.02	1.49	–	2.73	<0.01	1.94	1.41	–	2.68	<0.01
Education	3.96	2.65	–	5.93	<0.01	1.99	1.14	–	3.50	0.02	1.24	0.86	–	1.78	0.26	0.96	0.65	–	1.42	0.85
Bipolar disorder																				
Age of onset	1.00	0.97	–	1.03	0.94	1.00	0.98	–	1.02	0.85	1.02	1.01	–	1.04	<0.01	1.06	1.04	–	1.08	<0.01
Hospitalizations	0.14	0.08	–	0.24	<0.01	0.32	0.22	–	0.48	<0.01	0.93	0.69	–	1.25	0.62	1.26	0.92	–	1.72	0.14
Female gender	1.72	1.17	–	2.53	<0.01	1.04	0.80	–	1.36	0.76	1.61	1.28	–	2.02	<0.01	1.93	1.52	–	2.45	<0.01
Education	2.45	1.62	–	3.70	<0.01	3.14	2.08	–	4.75	<0.01	1.24	0.94	–	1.65	0.13	1.20	0.89	–	1.61	0.24
Psychotic major depressive disorder																				
Age of onset	1.02	0.99	–	1.06	0.22	1.01	0.97	–	1.05	0.61	1.01	0.98	–	1.05	0.37	1.02	0.99	–	1.05	0.13
Hospitalizations	0.22	0.11	–	0.46	<0.01	0.36	0.18	–	0.74	<0.01	0.76	0.43	–	1.35	0.35	0.99	0.56	–	1.74	0.96
Female gender	3.02	1.76	–	5.19	<0.01	1.34	0.82	–	2.19	0.25	2.21	1.45	–	3.37	<0.01	1.96	1.28	–	2.99	<0.01
Education	2.46	1.42	–	4.24	<0.01	1.45	0.82	–	2.57	0.21	1.68	1.04	–	2.72	0.03	1.31	0.80	–	2.14	0.28
Other psychoses																				
Age of onset	1.00	0.98	–	1.03	0.78	0.98	0.95	–	1.00	0.10	1.02	1.00	–	1.05	0.04	1.03	1.01	–	1.05	<0.01
Hospitalizations	0.18	0.10	–	0.32	<0.01	0.24	0.13	–	0.42	<0.01	0.55	0.33	–	0.92	0.02	0.87	0.52	–	1.46	0.60
Female gender	1.85	1.28	–	2.66	<0.01	1.16	0.85	–	1.59	0.35	2.97	2.19	–	4.03	<0.01	2.50	1.81	–	3.44	<0.01
Education	2.11	1.45	–	3.07	<0.01	1.98	1.35	–	2.91	<0.01	1.30	0.91	–	1.87	0.15	1.01	0.69	–	1.47	0.97

Note: Age of onset: odds per one-year increase. Hospitalizations: odds per one-unit increase on the logarithmic scale. Female gender: odds vs. reference category of male gender. Education: odds for higher or intermediate education vs. lower education. Adjusted for age.

independently or working, and not in psychotic MDD for any of the outcomes. Older age (Table 4) was generally associated with higher odds of having married or cohabiting or having children, but lower odds of living independently or employment for all diagnostic categories.

4. Discussion

In this national study of psychotic disorders in Finland, we found marked differences in functioning between the diagnostic groups investigated. Substantial differences emerged in psychosocial functioning, particularly between schizophrenia and BD.

Overall levels of employment, working or studying, and independent living of patients with psychotic disorders were markedly below the general population rates. 13.8% of individuals overall were working or studying and 72.0% living independently. 37.8% had been married or had cohabited, and 12.6% were currently married. Altogether 32.5% had children. For comparison, in the Finnish Health 2011 Survey (Koskinen et al., 2012) with a representative general population sample of 7964 individuals aged over 30 years, 75% of men and 71% of women aged 30–64 were working, and fewer than 5% reported receiving assistance in activities of daily living. Only 11.2% of men and 9.2% of women reported being unmarried, and 79% of women aged 30–54 had given birth. Overall, the poor level of psychosocial functioning compared to the general population survey is striking.

Compared with the outcomes of schizophrenia and affective psychoses in the Psychoses in Finland (PIF) study (Perälä et al., 2008), a sample of the Finnish population with psychoses drawn from a general population survey, we found similar levels of employment in schizophrenia (8.1% vs. 6.9%), but a higher frequency of never having been married (72.1% vs. 56.5%). In affective psychoses, we had a rate of 21.4% employment, compared with 47.2% reported in PIF, and 40.0% unmarried, compared with 12.3% reported in PIF. A higher proportion of participants with schizophrenia, but a lower proportion of

participants with BD in our study were working or studying than in a recent population-based study in Sweden, which reported 34% employment among those with BD (Holm et al., 2021). We also had a lower rate of working in non-affective psychoses and BD than a recent population-based case-control study in Finland (Hakulinen et al., 2020). Some of these differences are likely due to the method of recruitment, as detailed in Section 4.5. A previous survey of 2959 Finnish patients with psychiatric disorders and care providers showed that 72% of people with psychiatric illness were living independently (Hynynen et al., 2012), while the proportion in this study was 72.0%.

We found higher age to be associated with not being employed and not living independently across all diagnostic groups, but this may have been affected by the method of recruitment. We furthermore cannot exclude generational differences in opportunities for individuals living with mental illness as an explanation.

4.1. Differences between diagnostic groups

BD was associated with the best functioning and schizophrenia with the worst. We found psychotic MDD to be associated with worse functioning than BD. Compared with psychotic BD, a recent systematic review and meta-analysis of previous studies (Jääskeläinen et al., 2018) noted no differences in global functioning and a small difference in unemployment and disability pensions in favor of psychotic MDD. Our results concerning poor functioning in psychotic MDD were unexpected and warrant further research.

Previously, SAD has been described in the literature as either a distinct disorder, as comorbidity or atypical forms of mood disorders and schizophrenia, a heterogeneous group of, or an intermediate part of a psychosis continuum from BD to schizophrenia (Cheniaux et al., 2008). In our study, SAD was associated with intermediate functioning and schizophrenia-like characteristics in some variables, such as number of hospitalizations and age of onset, and psychotic MDD-like

Table 4
Associations between current age and functioning within diagnostic categories.

	Living independently				Working or studying				Having married				Having children							
	OR	95%	CI	p	OR	95%	CI	p	OR	95%	CI	p	OR	95%	CI	p				
Schizophrenia																				
Age 18–24	1.25	0.91	–	1.71	0.18	2.05	1.39	–	3.04	<0.01	0.36	0.21	–	0.62	<0.01	0.17	0.06	–	0.47	<0.01
Age 35–44	1.11	0.91	–	1.36	0.29	0.76	0.58	–	1.01	0.05	1.29	1.03	–	1.61	0.03	1.54	1.19	–	2.00	<0.01
Age 45–54	0.76	0.62	–	0.92	<0.01	0.31	0.22	–	0.43	<0.01	1.34	1.07	–	1.67	0.01	1.52	1.18	–	1.97	<0.01
Age 55–65	0.42	0.34	–	0.51	<0.01	0.09	0.06	–	0.15	<0.01	2.07	1.67	–	2.58	<0.01	2.32	1.80	–	2.98	<0.01
Schizoaffective disorder																				
Age 18–24	0.80	0.39	–	1.66	0.55	1.77	0.90	–	3.45	0.10	0.15	0.04	–	0.50	<0.01	0.07	0.01	–	0.55	0.01
Age 35–44	1.22	0.68	–	2.18	0.51	0.58	0.34	–	0.99	0.05	1.65	1.09	–	2.51	0.02	1.24	0.79	–	1.96	0.36
Age 45–54	1.01	0.53	–	1.92	0.98	0.33	0.17	–	0.66	<0.01	1.91	1.20	–	3.04	<0.01	2.62	1.60	–	4.27	<0.01
Age 55–65	0.42	0.21	–	0.83	0.01	0.14	0.05	–	0.38	<0.01	2.15	1.25	–	3.70	<0.01	2.56	1.45	–	4.51	<0.01
Bipolar disorder																				
Age 18–24	0.39	0.20	–	0.77	<0.01	1.72	1.05	–	2.81	0.03	0.48	0.29	–	0.78	<0.01	0.56	0.31	–	1.02	0.05
Age 35–44	1.72	0.87	–	3.41	0.12	0.47	0.33	–	0.68	<0.01	2.35	1.70	–	3.26	<0.01	3.05	2.18	–	4.26	<0.01
Age 45–54	1.28	0.61	–	2.69	0.51	0.30	0.19	–	0.48	<0.01	2.50	1.69	–	3.70	<0.01	2.98	2.01	–	4.43	<0.01
Age 55–65	0.77	0.34	–	1.74	0.52	0.16	0.09	–	0.29	<0.01	2.94	1.82	–	4.72	<0.01	3.30	2.03	–	5.36	<0.01
Psychotic major depressive disorder																				
Age 18–24	0.87	0.38	–	1.99	0.74	4.07	1.94	–	8.52	<0.01	0.34	0.15	–	0.79	0.01	0.08	0.02	–	0.36	<0.01
Age 35–44	1.17	0.43	–	3.20	0.76	0.93	0.42	–	2.08	0.86	2.06	1.07	–	3.96	0.03	1.87	0.97	–	3.61	0.06
Age 45–54	0.83	0.30	–	2.27	0.71	0.63	0.26	–	1.54	0.31	3.45	1.69	–	7.04	<0.01	3.27	1.63	–	6.56	<0.01
Age 55–65	0.53	0.17	–	1.59	0.26	0.39	0.14	–	1.14	0.08	6.08	2.58	–	14.3	<0.01	4.11	1.84	–	9.17	<0.01
Other psychoses																				
Age 18–24	1.35	0.79	–	2.32	0.27	1.48	0.96	–	2.30	0.08	0.35	0.20	–	0.63	<0.01	0.20	0.09	–	0.46	<0.01
Age 35–44	1.20	0.67	–	2.13	0.54	0.91	0.57	–	1.45	0.69	2.16	1.39	–	3.34	<0.01	2.52	1.60	–	3.97	<0.01
Age 45–54	0.97	0.52	–	1.82	0.94	0.62	0.35	–	1.11	0.11	1.65	0.99	–	2.73	0.05	2.85	1.72	–	4.73	<0.01
Age 55–65	0.63	0.29	–	1.35	0.23	0.29	0.13	–	0.63	<0.01	1.96	1.08	–	3.54	0.03	2.32	1.29	–	4.17	<0.01

Note: Adjusted for age of onset, number of hospitalizations, gender, and education. Reference category for all analyses is age 25–34 years.

characteristics in others such as gender and functioning. Our results are most harmonious with a continuum view of SAD.

The other psychoses group showed lesser differences from schizophrenia than the other diagnostic groups. This group might include patients who have not yet received a diagnosis of schizophrenia.

4.2. Independent living

Inability to live independently is a major source of societal illness burden and costs caused by psychotic disorders. Diagnostic category was strongly associated with independent living, as 60.8% of participants with schizophrenia were living independently, while for BD the percentage was 91.3%. This difference remained significant after adjusting for sociodemographic and illness-related variables.

A low number of hospitalizations was associated with independent living across all diagnostic categories. Female gender was also associated with living independently, with the largest effect in psychotic MDD. Later age of onset was significantly associated with independent living in schizophrenia and SAD. A similar association between schizophrenia, number of days hospitalized, and supported housing has been previously described in Denmark (Nordentoft et al., 2012).

Self-reported homelessness was rare in this study, with the highest prevalence of 1.1% in the other psychoses group. However, homelessness is generally rare in Finland, with a point prevalence of 0.088% as of 2020 (Asumisen rahoitus- ja kehittämiskeskus, 2021), and the rates were therefore several-fold those of the general population.

In summary, living in supported housing and homelessness were much more common among patients with psychotic disorders than in the Finnish general population. However, we found marked differences between diagnostic groups and gender effects.

4.3. Working or studying

In general, only a minority of the participants were working or studying. Diagnostic category was strongly associated with working, as 22.5% of patients with BD were working, but only 8.1% of those in the schizophrenia group. However, working or studying was also strongly predicted by other factors. A higher number of hospitalizations across all diagnostic categories had a large effect. Having achieved at least intermediate education was also significantly associated with working. Female gender was modestly associated with working or studying in schizophrenia. Age of onset had a positive association with working or studying in schizophrenia only. Apart from gender, these findings are largely in line with previous research (Bond and Drake, 2008; Holm et al., 2021; Immonen et al., 2017; Tse et al., 2014). The literature on gender is more equivocal. Gender differences may exist in substance use and comorbidity (Ochoa et al., 2012; Suominen et al., 2009) and use of medication (Jääskeläinen et al., 2015), which may impact psychosocial functioning. Repeated hospitalization was a strikingly strong predictor of not working or studying, likely representing illness severity.

4.4. Marriage, cohabitation, and having children

Patients with psychotic disorders are over the course of their lifetime much less likely to marry and have children than the general population. Diagnostic category significantly predicted marriage and having children, with only 27.9% of those with schizophrenia and 63.6% of those with BD (OR 3.89) having ever been married. Higher age of onset was also associated with these outcomes, except in psychotic depression.

Having had a higher number of hospitalizations was associated with higher odds of having been married in schizophrenia and other psychoses and having children in schizophrenia and SAD. A previous population registry-based case-control study in Denmark found a similar gender difference in favor of females (Agerbo et al., 2004), but a higher frequency of being single among those who had been re-hospitalized for schizophrenia. In our study, due to a large part of the study recruitment

having been conducted through healthcare services, an explanation might be that a family may support staying in healthcare. Long-term hospitalization might also be less likely for those with family, possibly leading to a higher number of short-term hospitalizations.

Female gender was associated with a higher likelihood of being married or having children, especially prominent in schizophrenia. Previously, several studies have found a higher likelihood for women with a history of psychosis to be in a relationship or to have children (Ayasa-Arriola et al., 2020; Bhatia et al., 2004; Morgan et al., 2014).

In summary, significant differences were present between diagnostic categories in marriage and having children. Women were significantly more likely to marry and have children regardless of the diagnostic category.

4.5. Study strengths and weaknesses

A strength of this study is the large sample of patients with clinically established and registry-confirmed diagnoses of a variety of psychotic disorders, with registry-based information on course of illness. Hospital discharge diagnoses for schizophrenia (Pihlajamaa et al., 2008) and BD (Kieseppä et al., 2000) have previously shown good reliability in Finland. Age of onset was registry-based, not self-reported, likewise the number of hospitalizations. Recall of previous psychiatric history is not always reliable (Simon and VonKorff, 1995), so this is an advantage. Sufficient participants per diagnostic category for logistic regression analysis allowed inclusion of sociodemographic factors, age of onset, and number of hospitalizations in the model, an important issue given that these factors differed between diagnostic groups and were associated with psychosocial functioning. We were able to investigate the less studied groups of SAD and psychotic MDD with high confidence. Diagnoses were handled unambiguously. An issue in research in psychotic MDD is the poor long-term consistency of the diagnosis (Baryshnikov et al., 2020; Ruggero et al., 2011). The psychotic MDD group in our study had an average duration of illness approaching 10 years, and participants who had ever had a diagnosis of BD, SAD, or schizophrenia were excluded from the psychotic MDD group. A recent study in Finland found that most of the cumulative diagnostic change from psychotic MDD to BD and SAD had happened by 10 years (Baryshnikov et al., 2020). Thus, the MDD group was diagnostically precisely defined.

There are several limitations to our study. Firstly, it is a sample of convenience mostly from healthcare settings and residential facilities. Due to the method of sampling, participants are more likely to be those who are still in treatment than those who have recovered. Therefore, this sample may over-represent the disability associated with psychotic disorders. The average duration of illness was 15.9 years, and this sample therefore represents, on average, long-term illness (Morgan et al., 2014). Presumably, those who are still symptomatic would have been more likely to be recruited into our study from healthcare settings. Therefore, older participants in our study would be more likely to be those who have a more chronic and severe course of the disorder, possibly accounting for the effects of aging on psychosocial functioning in this study. This effect would be expected to be more pronounced in the affective psychoses group, where remission or an intermittent course is more likely. Indeed, psychosocial functioning in our sample was comparable to the Health 2011 Survey (Koskinen et al., 2012) for those with schizophrenia, but worse for those with affective psychoses. Therefore, our results likely are generalizable to clinical populations but less so to general populations.

Secondly, we used differences in mode of habitation, employment, marital status, and having children between diagnostic categories and between our study population and the general population as proxies for psychosocial functioning. However, living arrangements, employment, marriage, and having children also reflect individual values and choices; a lack of these does not necessarily reflect poor functioning. More nuanced measures are needed to address questions of potential differences in, for example, desire to work as opposed to ability to work.

Finally, the diagnoses used in this study were clinical diagnoses, which have several limitations.

5. Conclusions

Levels of psychosocial functioning differ markedly between different psychotic disorders, particularly in independent living. Outcomes are generally worst for schizophrenia, best for BD, and intermediate for SAD and psychotic MDD. Across all psychotic disorders, female gender and lifetime number of psychiatric hospitalizations have strong independent associations with marriage, employment, and independent living. Our results highlight the major societal burden imposed by long-term serious mental illness and the importance of continuing the development of rehabilitation and treatment of patients with psychoses.

CRedit authorship contribution statement

Author JA conducted literature searches and all the statistical analyses, plus drafted the manuscript as the first author. Authors TK and EI supervised statistical analyses and writing of the manuscript, and study design with authors JA, JS and KS. Authors TK, JS, KS, MH, AW, AAO, KH, OK, ML, TP, JT, ATH and EI have contributed to the national collection of the SUPER-Finland data. All authors have critically reviewed and commented on the manuscript.

Funding

The SUPER-Finland study has been funded by the Stanley Global Neuropsychiatric Genetics initiative.

Declaration of competing interest

None.

Acknowledgments

We would like to thank the collaborating SUPER study group: Aarno Palotie, Erik Cederlöf, Mark Daly, Amanda Elliott, Willehard Haaki, Katriina Hakakari, Elina Hietala, Jarmo Hietala, Steve Hyman, Tuomas Jukuri, Risto Kajanne, Jaakko Keinänen, Martta Kerkelä, Tuomo Kiiskinen, Aija Kytälä, Kaisla Lahdensuo, Sari Lång-Tonteri, Nina Lindberg, Jonne Lintunen, Jouko Lönnqvist, Ville Mäkipelto, Teemu Männynsalu, Atiqul Mazumder, Zuzanna Misiewicz, Julia Moghadampour, Arto Mustonen, Benjamin Neale, Solja Niemelä, Jussi Niemi-Pynttari, Olli Pietiläinen, Susanna Rask, Noora Ristiluoma, Elmo Saarentaus, Anssi Solismaa, Andre Sourander, Heidi Taipale, Marjo Taivalantti, Antti Tanskanen, Auli Toivola, Lea Urpa, Imre Västriik, and Juha Veijola for the SUPER study data and support.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.schres.2022.04.008>.

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