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The Finnish Paradox: Equal opportunities for education but increasing educational inequalities in psychiatric hospitalization

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Abstract

Background

The aim of this study was to investigate the education-specific trends in employment rates and hospitalization due to psychiatric disorders among 30–65 year-old Finnish men and women between 1976 and 2010.

Methods

Participants were randomly selected from the Statistics Finland population database from seven independent consecutive national cohorts (n=2 865 746). These data were linked to diagnosis-specific records on hospitalizations, drawn from the National Hospital Discharge Registry using personal identification numbers. Employment rates by educational credentials were drawn from the Statistics Finland employment database.

Results

We found an increasing trend in psychiatric hospitalization rates among the population with only elementary school education and a decreasing trend in those with higher educational credentials. The employment rate of population with only elementary school education decreased more than that of those with higher educational credentials, offering the main mechanism behind the increased educational inequality in hospitalization for psychiatric disorders.

Conclusions

Equal opportunities for education, such as the policies introduced in Finland over the past four decades, are not enough but need to be complemented by strong labor market policies in order to reduce educational inequalities in major mental disorders.

Strengths and limitations of this study

* Strengths include the population-based setting with individual-level data on hospitalizations, time span of 35 years and the size of the cohorts.

* Major limitation of this study is its reliance on aggregate-level data of employment rates.

INTRODUCTION

The evidence shows that socioeconomic position plays a major role in various types of psychopathology[1, 2]. For example in the 1980s in Finland, hospitalization for some psychiatric diagnoses was two to three times higher among those with less than 10 years of formal education compared to those with more than 12 years of formal education[3]. Historically the rate of psychiatric hospital admissions in a population has been associated with social factors such as urban environment[4], economic cycles[5], and unemployment[6] and is considered to be one indicator of population mental health[7]. Currently mental disorders account globally for a quarter of all years lived with disability[8]. Nevertheless, research on education-specific long-term trends in severe psychiatric disorders is relatively rare. To the best of our knowledge, no previous study has examined long-term changes in national hospitalization trends for psychiatric disorders by educational credentials.

Over the past four decades Finnish educational system has become one of the best in the world, and Finland has systematically ranked high in the PISA study comparing national educational systems every three years since 2000[9]. During this period the Finnish strategy has been to offer uniform

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basic education for the whole population. In order to achieve educational equality without selecting or streaming students during their basic education, Finland introduced a compulsory nine-year comprehensive school with no tuition fees and with free school meals and subsidised transportation services in 1972. By 1977 the comprehensive school system covered the area of whole Finland and has remained without major reforms ever since.

The deep economic recession in the beginning of 1990s opened a window of opportunity for severe austerity policies in Finland[10]. The considerable spending cuts under recession were not allocated evenly across all public spending but were more heavily concentrated on the services for people with least power to resist them, the non-working population[11]. Along with the cuts to health and social care services and welfare, incremental changes of labor market liberalization[12] and wider welfare state retrenchment[13, 14] started reshaping the Finnish society and its social stratification. Furthermore, the rapid technological development and the increasing transfer of manufacturing blue-collar jobs out of Finland[15] made the labor market position of the population with only elementary school education vulnerable to the negative health effects of low income and job insecurity.

In this study, we examined the education-specific trends in employment rates and hospitalization for psychiatric disorders separately for men and women in the Finnish 30–65 year-old population between 1976 and 2010. Our hypothesis is that even if the Finnish comprehensive school system has offered tax-funded and uniform basic education for the whole population since 1970s, the education-specific changes in employment conditions during the past three decades have produced a higher rate of psychiatric hospitalisations among those with low educational credentials. We predict that even one of the world's most egalitarian comprehensive school systems has not been able to prevent increasing educational inequalities in mental health outcomes under changing political and economic context.

METHODS

Databases

The individual-level data were obtained from a population database maintained by Statistics Finland in which every Finnish resident is registered under a personal identification number. From these data we selected a 25% random sample of the 18–64 year-old population with a recorded occupational title in seven independent consecutive cohorts (1976–1980, 1981–1985, 1986–1990, 1991–1995, 1996–2000, 2001–2005, 2006–2010). The present study included only those aged 30 or over (n=2 865 746) because in Finland education is usually completed by this age. Education was measured at the start of the follow-up, with the same classifications used at all points of measurement. The participants were categorised according to their highest completed educational credentials: 1 elementary school or lower, 2 secondary education, and 3 college degree or higher. Information on the age and sex of the participants was collected from the population database.

Table 1 presents the background characteristics of the participants.

Data on hospitalizations were obtained from the National Hospital Discharge Register (NHDR) maintained by the National Institute for Health and Welfare. Every person permanently residing in Finland who has received hospital treatment in a public sector hospital is recorded in this register with a personal identification number. The NHDR has been shown to cover the hospitalization rates of the Finnish population well and to register hospitalization rates accurately, and this high accuracy also applies to psychiatric diagnoses[16]. In this study, we recoded the psychiatric diagnoses categorised according to the International Classification of Diseases (ICD) 8th and 9th revision (codes 291–319) to correspond to the classification of ICD-10 (codes F04–F99). We monitored the

1 NHDR data of the participants collected from the population database over a five-year period in
2 each of the seven cohorts. The first register follow-up on hospitalizations started on 1 January 1976
3 and ended on 31 December 1980 for the first cohort. The follow-up for the second cohort started the
4 next day. The follow-up of the seventh cohort ended on 31 December 2010.
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10 Employment rates for the 30–65 year-old population between 1986 and 2010 were drawn from an
11 employment database maintained by Statistics Finland.
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20 **Statistical Analysis**

21 The follow-up began on 1 January at beginning of each cohort and ended on the day the participant
22 was hospitalised or died. For the rest of the participants, the follow-up period ended five years after
23 it began, on December 31st. Annual age-adjusted (age groups 30–34, 35–39, 40–44, 45–49, 50–54,
24 55–59 and 60–64) incidence rates were calculated during the five-year follow-up per 10,000
25 participants separately for men and women in each of the three educational levels in seven
26 independent cohorts $((\text{cases} * 10\ 000) / (\text{person days} / 365))$. Employment rates (%) were calculated for
27 five cohorts (1986–1990, 1991–1995, 1996–2000, 2001–2005, 2006–2010) and are presented
28 separately for men and women stratified by educational credentials. To test the educational
29 differences in hospitalizations, we analysed the education-specific risk of psychiatric disorders
30 within each cohort using Cox proportional hazard models. Persons with a college degree was used
31 as a reference group. The results are communicated as Hazard Ratios (HR) and their 95%
32 Confidence Intervals (CI).
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57 **RESULTS**

The decreasing number of working age population with only elementary school education in Finland between 1976 and 2010 was clearly evident in our data when the participants' educational credentials were compared between the cohorts. Between the first (1976–1980) and the last (2006–2010) cohort, the proportion of those with only elementary school education decreased from 66.8% to 18.6% (Table 1).

Table 1. Baseline characteristics of the study population in seven cohorts.

	1976– 1980 Cohort	1981– 1985 Cohort	1986– 1990 Cohort	1991– 1995 Cohort	1996– 2000 Cohort	2001– 2005 Cohort	2006– 2010 Cohort	Total
Men								
Elementary school								
Sample size (% of cohort)	125 653 (66.4)	113 794 (56.6)	102 717 (47.4)	87 360 (38.7)	59 992 (30.0)	56 802 (25.1)	47 940 (20.9)	594 258 (39.9)
Mean age in years (SD)	45.19 (9.17)	44.75 (9.17)	45.05 (8.84)	45.90 (8.60)	46.57 (8.19)	47.40 (8.57)	48.40 (9.13)	45.79 (8.95)
Secondary education								
Sample size (% of cohort)	31 552 (16.7)	45 442 (22.6)	61 781 (28.5)	76 998 (34.1)	77 255 (38.6)	94 425 (41.7)	100 347 (43.8)	487 800 (32.8)
Mean age in years (SD)	40.32 (8.74)	39.19 (8.19)	39.30 (7.60)	40.30 (7.58)	41.22 (7.63)	42.76 (8.03)	44.24 (8.53)	41.50 (8.22)
College degree								
Sample size (% of cohort)	31 899 (16.9)	41 682 (20.7)	52 029 (24.0)	61 120 (27.1)	62 898 (31.4)	75 124 (33.2)	80 735 (35.3)	405 487 (27.3)
Mean age in years (SD)	41.23 (8.95)	40.67 (8.54)	41.18 (8.16)	42.25 (8.16)	42.93 (8.11)	43.93 (8.60)	44.98 (9.08)	42.83 (8.66)
Women								
Elementary school								
Sample size (% of cohort)	103 717 (67.3)	105 574 (59.1)	98 551 (49.0)	83 032 (38.8)	54 427 (28.1)	47 162 (21.9)	35 767 (16.2)	528 230 (38.3)
Mean age in years (SD)	45.46 (9.05)	45.54 (9.15)	45.68 (8.87)	46.67 (8.35)	47.75 (7.63)	49.14 (7.92)	50.61 (8.41)	46.62 (8.79)
Secondary education								
Sample size (% of cohort)	28 816 (18.7)	42 371 (23.7)	59 372 (29.5)	74 142 (34.6)	72 209 (37.3)	82 208 (38.2)	86 026 (38.9)	445 144 (32.3)
Mean age in years (SD)	41.53 (8.81)	40.76 (8.66)	40.51 (8.08)	41.35 (7.81)	42.53 (7.72)	44.20 (8.02)	45.97 (8.48)	42.80 (8.39)
College degree								
Sample size (% of cohort)	21 538 (14.0)	30 585 (17.1)	43 377 (21.5)	56 960 (26.6)	66 883 (34.6)	85 990 (39.9)	99 494 (45.0)	404 827 (29.4)
Mean age in years (SD)	40.17 (8.44)	40.02 (8.21)	40.36 (7.86)	41.20 (7.90)	41.98 (7.85)	43.06 (8.27)	44.25 (8.69)	42.24 (8.36)

Abbreviation: SD, standard deviation.

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Figure 1 shows the employment rates and the age-adjusted incidence rates for psychiatric hospitalization per 10,000 individuals separately for men and women stratified by educational credentials. Among men with elementary school education, the age-adjusted incidence rate decreased from 38 in 1976–1980 to 32 in 1986–1990, then increased to 45 in 1990–1995 and remained fairly stable until 2006–2010 (overall increase 17%). The employment rate of men with elementary school education decreased from 67% in 1986–1990 to 55% in 1990–1995 and remained fairly stable until 2006–2010 (overall decrease 17%). Among men with secondary education, the incidence rate decreased from 43 in 1976–1980 to 31 in 1981–1986, then increased to 42 in 1991–1995, and decreased again to 36 in 2006–2010 (overall decrease 15%). The employment rate of men with secondary education decreased from 83% in 1986–1990 to 70% in 1990–1995 and then increased to 74% in 2006–2010 (overall decrease 12%). The incidence rate among men with a college degree increased from 29 in 1976–1980 to 37 in 1986–1990, decreased to 33 in 1996–2000, and further decreased to 23 in 2006–2010 (overall decrease 21%). The employment rate of men with a college degree decreased from 91% in 1986–1990 to 82% in 1990–1995 and then increased to 85% in 2006–2010 (overall decrease 7%).

Figure 1. here.

Among women with elementary school education, the age-adjusted incidence rate increased from 24 in 1976–1980 to 28 in 1991–1995, then decreased to 22 in 1996–2000, and increased again to 30 in 2006–2010 (overall increase 29%). The employment rate of women with elementary school education decreased from 63% in 1986–1990 to 54% in 1990–1995 and to 50% in 2006–2010 (overall decrease 21%). Among women with secondary education, the incidence rate remained fairly stable over time, at 25 in 1976–1980 and 22 in 2006–2010 (overall decrease 11 %). The employment rate of women with secondary education decreased from 79% in 1986–1990 to 69% in 1990–1995 and then increased to 72% in 2006–2010 (overall decrease 10%). Among women with a

college degree, the incidence rate decreased from 22 in 1976–1980 to 20 in 2006–2010, with very little variation during the study period (overall decrease 8 %). The employment rate of women with a college degree decreased from 88% in 1986–1990 to 81% in 1990–1995 and then increased to 84% in 2006–2010 (overall decrease 4%).

Table 2 shows the age-adjusted hazard ratios of hospitalization separately for men and women with elementary school education and secondary education and compares them to those of the men and women with a college degree. Among men with elementary school education, the difference to men with a college degree remained fairly stable between 1976 and 1990 (HR 1.62–1.66), increased during 1991–1995 (HR 1.78), decreased during 1996–2000 (HR 1.59), and then increased between 2001 and 2010 (HR 1.95–2.06). Among men with secondary education, the difference to men with a college degree followed a similar secular path but with lesser variation (HR 1.43–1.75) over time.

Table 2. Age-adjusted proportional hazard ratios (HR) and their 95% confidence intervals for psychiatric hospitalization in relation to men and women with a college degree in seven cohorts.

	1976–1980 Cohort	1981–1985 Cohort	1986–1990 Cohort	1991–1995 Cohort	1996–2000 Cohort	2001–2005 Cohort	2006–2010 Cohort
Men							
Elementary school							
HR	1.66	1.62	1.66	1.78	1.59	1.95	2.06
(CI)	(1.51–1.82)	(1.48–1.78)	(1.52–1.80)	(1.65–1.92)	(1.45–1.73)	(1.78–2.13)	(1.87–2.27)
Secondary education							
HR	1.48	1.43	1.48	1.54	1.4	1.71	1.75
(CI)	(1.33–1.66)	(1.29–1.59)	(1.35–1.61)	(1.42–1.67)	(1.28–1.52)	(1.58–1.86)	(1.61–1.90)
Women							
Elementary school							
HR	1.35	1.26	1.42	1.49	1.33	1.39	1.56
(CI)	(1.18–1.54)	(1.12–1.43)	(1.27–1.58)	(1.35–1.64)	(1.20–1.49)	(1.25–1.54)	(1.39–1.76)
Secondary education							
HR	1.22	1.12	1.22	1.25	1.32	1.31	1.26
(CI)	(1.04–1.42)	(0.98–1.28)	(1.09–1.37)	(1.14–1.38)	(1.20–1.45)	(1.20–1.43)	(1.15–1.38)

Among women with elementary school education, the difference to women with a college degree was rather small in 1981–1985 (HR 1.26), increased between 1986 and 1995 (HR 1.42–1.49),

1 decreased during 1996–2000 (HR 1.33), and then increased between 2001 and 2010 (HR 1.39–
2 1.56). Among women with secondary education, the difference to women with a college degree
3 remained fairly stable (HR 1.12–1.32) over time.
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10 11 12 **DISCUSSION**

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17 In this study of the Finnish working-age population, we found decreasing psychiatric hospitalization
18 rates for men and women with secondary or higher education and increasing hospitalization rates
19 for men and women with elementary school education in 1976–2010. In 1976–1980, the age-
20 adjusted hazard ratios of psychiatric hospitalization among men was 1.66 and among women 1.35
21 in the elementary school education group compared with the population with a college education,
22 whereas in 2006–2010 the corresponding figures were 2.06 among men and 1.56 among women.
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24 The result confirms our hypothesis: not even one of the world’s most egalitarian comprehensive
25 school system could prevent increasing educational inequalities in mental health outcomes under
26 changing political and economic, in particular labor market, contexts.
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39 The main mechanism behind the diverging long-term trends in psychiatric hospitalization is likely
40 to be the more starkly decreasing employment rate of those with only elementary school education.
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42 In 1986–1990, the employment rate among men was 1.3-fold and among women 1.4-fold in the
43 college educated group compared with the population with only elementary school education,
44 whereas in 2006–2010 the corresponding figures were 1.5 among men and 1.7 among women.
45
46 During the deep economic crisis in Finland at the beginning of the 1990s, psychiatric
47 hospitalization increased the most among men with elementary school education, as a massive loss
48 of blue-collar jobs took place in traditional male industries such as manufacturing and
49 construction[10, 15]. During the global economic recession after 2008, the decreasing employment
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1 rate has been a likely contributor to increasing hospitalization for psychiatric disorders among men
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3 and women with elementary school education.
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8 A secondary mechanism accelerating the diverging long-term trends in psychiatric hospitalization
9 between populations with different educational credentials is employment-dependent access to
10 outpatient mental health services. Almost 90% of the Finnish working population is offered
11 occupational health services (including prescribing and occupational psychologist services) with
12 short waiting times and completely free of charge[17]. The non-working population is excluded
13 from these services and limited to municipal mental health services, with internationally
14 comparative high client fees and long waiting times[18], unless they can afford to buy out-of-pocket
15 services from the private sector. The occupational health services are subsidised by state-taxation
16 via Social Insurance Institution of Finland and their volume and expenditure increased 5-fold
17 between 1975 and 2010[17]. On the contrary, the municipal services financed mainly by municipal-
18 taxation faced severe austerity policies in most parts of Finland in the beginning of 1990s[10, 11]
19 and never fully recovered before the next big hit of the global economic recession at 2008[19].
20 Therefore, psychiatric hospitalization has become an outcome of lack of primary mental health care
21 among the non-working population with low educational credentials.
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42 A third mechanism behind the diverging long-term trends in psychiatric hospitalization might be
43 related to the decreasing number of working age population with only elementary school education.
44 However, we found no scientific evidence to suggest that this group would have become more
45 selected over the past four decades. From the year 2004 a fourth mechanism is likely to be the
46 policy on alcohol, where the reduction of prices in 2004 increased the number of alcohol-related
47 harms considerably, and the most among those of the lower social classes[20].
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In this study we used a wide category of all hospitalizations for psychiatric disorders, as the definitions of many psychiatric illnesses lack specific biological and pathological markers, and are instead based on a convergence of symptoms and familial aggregation patterns, causing different labelling for similar conditions[21]. The data used in this study were based on a national sample and are well-suited for epidemiological research[16]. There was no loss to follow-up and the changes in the International Classification of Diseases were recoded to correspond to the classification used in our analysis. The data used in this study cannot address the causation-selection issue of educational level and psychiatric morbidity, but this issue has been investigated elsewhere using a different study design, showing that causation is a more powerful factor, in particular with education that does not tend to change over the adult life of these cohorts and thus is immune to selection processes[1,2].

CONCLUSIONS

The present results indicate that educational inequalities in severe mental illness have widened in the Finnish working-age population. The results showed increasing psychiatric hospitalization rates among men and women with elementary school education and decreasing psychiatric hospitalization rates among men and women with secondary or higher education. The mechanisms behind these diverging long-term trends may lie in the structures of the Finnish labor markets and health care system, and should be examined further in the future. We conclude that equal opportunities for education are not enough but need to be complemented by strong labor market and health care policies in order to reduce inequalities in severe mental illness.

FOOTNOTES

Contributors:

LK was involved in designing the hypothesis and drafting the manuscript for content, including analysis and interpretation of data. CM was involved in designing the hypothesis and revising the manuscript for content. AKos was involved in analysis of data and revising the manuscript for content. AKou, PV and AV were involved in revising the manuscript for content and critically reviewing drafts of the article. All authors have approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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Competing interests:

The authors declare that they have no competing interests.

Ethics approval:

The study was approved by the Ethics Committee of the Finnish Institute of Occupational Health.

Data sharing statement:

The authors confirm that, for approved reasons, some access restrictions apply to the data underlying the findings. Our study utilizes administrative record linkage and all data used in the present manuscript were obtained from third parties. Interested researchers need to obtain these data directly from them. Data on the background characteristics of the participants were obtained from the population database maintained by Statistics Finland. The employment rates were drawn from an employment database maintained by Statistics Finland and the dates of death were obtained from the National Death Register also kept by Statistics Finland. Hospitalization data were obtained from

1 the Finnish Hospital Discharge Register that is maintained by the National Institute for Health and
2 Welfare in Finland. Record linkage was conducted by Statistics Finland. Contact details for
3 organizations that own the data: Data on hospitalizations: National Institute for Welfare and Health
4 Arto Vuori, Development Manager THL Information Department arto.vuori@thl.fi tel. +358 29 524
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11 7035. Other register data used in this study: Statistics Finland Registrar's Office Sanna Malinen,
12 Statistician kirjaamo@stat.fi tel. +358 29 551 2564.
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Figure 1. The employment rates in five cohorts and the age-adjusted incidence rates for psychiatric hospitalization per 10,000 individuals in seven cohorts.

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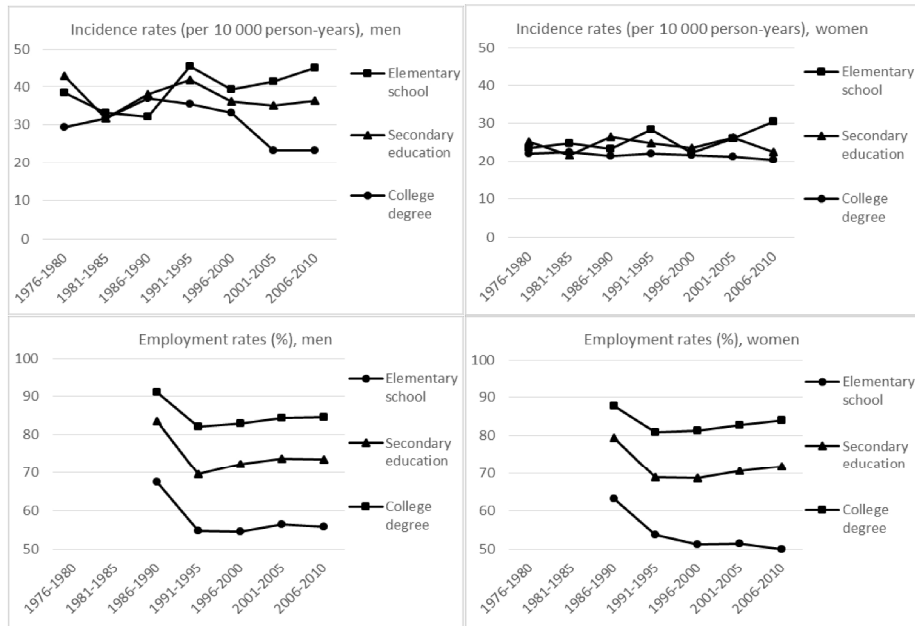


Figure 1. The employment rates in five cohorts and the age-adjusted incidence rates for psychiatric hospitalization per 10,000 individuals in seven cohorts.
297x210mm (300 x 300 DPI)

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses

Continued on next page

Results

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure <i>Cross-sectional study</i> —Report numbers of outcome events or summary measures
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

Discussion

Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results

Other information

Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based
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*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Welfare state retrenchment and increasing mental health inequality by educational credentials in Finland

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Welfare state retrenchment and increasing mental health inequality by educational credentials in Finland

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Abstract

Objectives

Epidemiological studies have shown an association between educational credentials and mental disorders, but have not offered any explanation for the varying strength of this association in different historical contexts. In this study we investigate the education-specific trends in hospitalization due to psychiatric disorders in Finnish working-age men and women between 1976 and 2010, and offer a welfare state explanation for the found secular trends.

Setting

Population-based setting with 25% random sample of 30–65 year-old population in seven independent consecutive cohorts (1976–1980, 1981–1985, 1986–1990, 1991–1995, 1996–2000, 2001–2005, 2006–2010).

Participants

Participants were randomly selected from the Statistics Finland population database (n=2 865 746). These data were linked to diagnosis-specific records on hospitalizations, drawn from the National Hospital Discharge Registry using personal identification numbers. Employment rates by educational credentials were drawn from the Statistics Finland employment database.

Primary and secondary outcome measures

Hospitalization and employment.

Results

We found an increasing trend in psychiatric hospitalization rates among the population with only elementary school education and a decreasing trend in those with higher educational credentials.

1 We propose that restricted employment opportunities is the main mechanism behind the increased
2 educational inequality in hospitalization for psychiatric disorders, while several secondary
3 mechanisms (lack of outpatient health care services, welfare cuts, decreased alcohol duty) further
4 accelerated the diverging long-term trends. All of these inequality increasing mechanisms were
5 activated by welfare state retrenchment, which included the liberalization of financial markets and
6 labor markets, severe austerity measures and narrowing down public sector employment
7 commitment.
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20 *Conclusions*

21 It seems that welfare state retrenchment weakened the position of those with low educational
22 credentials and these changes also increased the inequality in mental health in Finland. We
23 conclude that strong intersectoral policies are needed in order to reduce educational inequalities in
24 severe mental illness.
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37 **Strengths and limitations of this study**

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40 * Strengths include the population-based setting with individual-level data on hospitalizations, time
41 span of 35 years and the size of the cohorts.
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45 * Major limitations of this study are its reliance on aggregate-level data on employment rates and
46 its inability to take all theoretically possible confounding factors, such as social support and
47 childhood socio-economic position, into account.
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INTRODUCTION

The evidence shows that socioeconomic position plays a major role in various types of psychopathology[1, 2]. For example in the 1980s in Finland, hospitalization for some psychiatric diagnoses was two times higher among those with less than 10 years of formal education compared to those with more than 12 years of formal education[3]. Historically the rate of psychiatric hospital admissions in a population has been associated with social factors such as urban environment[4], economic cycles[5], and unemployment[6] and is considered to be one indicator of population mental health[7]. Currently mental disorders account globally for a quarter of all years lived with disability[8]. Nevertheless, research on education-specific long-term trends in severe psychiatric disorders is rare. To the best of our knowledge, no previous study has examined long-term changes in national hospitalization trends for psychiatric disorders by educational credentials. Furthermore, our study was also motivated by a recent paper showing that there was no educational gradient in mental illness among monks and nuns in cloisters [9]. This might suggest that educational credentials do not play an important role outside market economies and that in market economies the association between education and severe psychiatric disorders might be highly determined by available labor market positions.

Welfare state retrenchment and mechanisms increasing inequality

In all democratic societies, the acceptable level of inequalities is set in politics [10], and even the advanced welfare state economies have different levels of health inequality due to their different political traditions [11, 12]. The Finnish welfare state was created as a particular polity under Social Democratic and Agrarian League ruled governments in a specific geopolitical position – between the East and the West – in the early post-war period as a way of structuring the labor market and regulating capitalism. Although the phrase welfare state is in conventional epidemiological studies

1 used in a narrow sense, as referring to provision of welfare services and social transfers, we
2
3 consider it more broadly as a specific form of state balancing the power between labor and capital,
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5 and structuring the society and its stratifications [13]. Furthermore, we argue that it is very difficult
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7 to understand the changing impact of educational credentials on psychiatric disorders without
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9 understanding the significance and role of education in the broader political and labor market
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11 context.
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17 Even if the foundation for the Finnish welfare state was set right after the World War II, Finland did
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19 not implement most of the universal “Nordic” policies until 1960s and 70s, decades after Sweden
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21 and Denmark [14]. In Finland the universal Health Insurance was adopted as late as 1964. It was
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23 based on the German model, including sickness allowances (compensation for loss of income
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25 during incapacity for work) and an insurance compensation covering a share of the costs of private
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27 health care service use, medicines and illness-related transportation. In order to achieve educational
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29 equality without selecting or streaming students during their basic education, Finland introduced a
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31 compulsory nine-year comprehensive school with no tuition fees and with free school meals and
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33 subsidised transportation services in 1972. By 1977 the comprehensive school system covered the
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35 area of whole Finland and has remained without major reforms ever since. In order to achieve
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37 equity in health services coverage, Finland adopted the Public Health Law in 1972. This law
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39 introduced primarily tax-funded municipal health centers as the basic unit of service provision for
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41 all citizens. The Occupational Health Convention in 1971 had only included people with permanent
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43 job contracts and the Health Insurance Law in 1964 had only met the health service needs of those
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45 living in Southern Finland and being able to pay the deductibles when purchasing services from the
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47 private sector.
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55 Finnish financial markets remained closed until 1986, when the Bank of Finland decided to
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57 suddenly liberalize the financial markets without any public debate [15, 16]. Prior to 1986 lending
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1 money from foreign investors was subject to license. The abrupt liberalization of financial markets
2 led to massive lending of cheap money by Finnish banks and businesses, and also the amount of
3 loans per citizen rose by over 100 percent within a year. This existence of loose money led to a
4 textbook example of casino economy; the speculative increase of the value of houses, offices and
5 stocks and the birth of a stock market bubble capitalized by market predators [17]. After the burst of
6 the bubble, the overpriced houses lost over one half of their value between 1989 and 1993, whereas
7 the mortgage rates rose even 5-fold and the unemployment rate increased from 3.5 percent to 18
8 percent [18]. During the economic crises almost 400,000 people lost their jobs, and the recession hit
9 the hardest the people with low educational credentials.

10 Even if the size of the Finnish public sector or social expenditure never rose above the OECD-
11 average during the golden age of 1980s [19], the expansion of the welfare state was claimed to be
12 the root cause for Finnish financial problems and the economic recession opened a window of
13 opportunity for severe austerity policies[20]. The conservative government of 1991–1995
14 implemented considerable spending cuts that were not allocated evenly across all public spending
15 but were more heavily concentrated on the services for people with least power to resist them, the
16 non-working population[21]. The level of unemployment benefits was lowered and the Health
17 Insurance was affected by decreasing the sickness allowances and raising the deductibles of
18 medicines [22]. In addition, the state subsidy for municipal health care provision was cut. As a
19 result the access to health care services became more difficult for those not having access to
20 occupational health care or not being able to pay the deductibles for using the private sector
21 services. By 1999 Finnish residents already paid 20 percent of health care costs out of pocket
22 compared to for example 16 percent in the United States [23].

23 Along with these severe cuts to health and social care services and welfare, labor market
24 liberalization[24], increasing transfer of manufacturing blue-collar jobs out of Finland[25] and the
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1 narrowing down of public sector employment commitment [26] made the labor market position of
2 those with only elementary school education more vulnerable. As a result, the core labor force
3 became more highly educated, the labor markets became more selective based on educational
4 credentials and the social mobility diminished especially for those with the lowest educational
5 credentials [27-29]. All in all, the economic crisis highly accelerated welfare state retrenchment that
6 had already been on the neoliberal agenda from the beginning of 1980s [30] and started reshaping
7 the Finnish society and its social stratification. The income inequality between population groups
8 grew significantly but the most radical restructuring took place between the labor and the capital.
9 Whereas labor income as a percentage of national income was in Finland as high as 76 percent in
10 1991, was it only 57 percent in 2000, at the same level as right after the World War II [31].
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26 After the economic crisis, the coalition government in 1995–1999 did not introduce any radical
27 policy changes. The same applies to the three following governments between 1995 and 2010 who
28 continued the incremental welfare state restructuring within the pre-existing policy paradigms
29 towards labor market flexibility, welfare pluralism, supply-side economics, and efforts at
30 minimizing social expenditures [32, 33]. However, the accession to the European Union (EU) in
31 1995 meant that the legislation governing many health policy decisions was now determined by the
32 EU, and national powers of decision making were narrowed in scope. For example, the Finnish
33 alcohol policy changed dramatically over night when Estonia joined the EU in 2004. In the fear of a
34 considerable increase in Finnish visitors' import of alcohol from Estonia due to free movement of
35 goods, Finland decreased its alcohol excise duty rates by 33% and within a year alcohol related
36 mortality rose by 20% [34]; the most notable increase was among those in the social classes with
37 lower income [35].
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55 **The aim of the study**

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In this paper, we first described the welfare state retrenchment in Finland (liberalization of financial and labor markets, efforts for minimizing social expenditures and narrowing down of public sector employment commitment). We also identified the main mechanism (low employment opportunities leading to low income and job insecurity) and secondary mechanisms (lack of outpatient health care services, welfare cuts, and decreased alcohol duty) through which this changing macro-context might deteriorate the mental health of those with low educational credentials. We examine the plausibility of those mechanisms with the analysis of education-specific trends in employment rates and hospitalization due to psychiatric disorders among 30–65 year-old Finnish men and women between 1976 and 2010. In the discussion part we will then describe the potential role of the secondary mechanisms explaining these secular trends. Our hypothesis is that even if the Finnish comprehensive school system has offered tax-funded and uniform basic education for the whole population since 1970s, the welfare state retrenchment and its education-specific impacts have produced an increasing rate of psychiatric hospitalisations among those with low educational credentials. We predict that even one of the world's most egalitarian comprehensive school systems has not been able to prevent increasing educational inequalities in mental health outcomes under this rapidly changing political and economic context. Furthermore, the global economic crises after 2008 may have further increased hospitalization for psychiatric disorders among those with low educational credentials.

METHODS

Databases

The individual-level data were obtained from a population database maintained by Statistics Finland in which every Finnish resident is registered under a personal identification number. From these

1 data we selected a 25% random sample of the 18–64 year-old population with a recorded
2 occupational title in seven independent consecutive cohorts (1976–1980, 1981–1985, 1986–1990,
3 1991–1995, 1996–2000, 2001–2005, 2006–2010). The present study included only those aged 30 or
4 over (n=2 865 746) because in Finland education is usually completed by this age. Education was
5 measured at the start of the follow-up, with the same classifications used at all points of
6 measurement. The participants were categorised according to their highest completed educational
7 credentials: 1 elementary school or lower, 2 secondary education, and 3 college degree or higher.
8 Information on the age and sex of the participants was collected from the population database.
9 Table 1 presents the background characteristics of the participants.
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24 Data on hospitalizations were obtained from the National Hospital Discharge Register (NHDR)
25 maintained by the National Institute for Health and Welfare. Every person permanently residing in
26 Finland who has received hospital treatment in a public sector hospital is recorded in this register
27 with a personal identification number. The NHDR has been shown to cover the hospitalization rates
28 of the Finnish population well and to register hospitalization rates accurately, and this high accuracy
29 also applies to psychiatric diagnoses[36]. In this study, we recoded the psychiatric diagnoses
30 categorised according to the International Classification of Diseases (ICD) 8th and 9th revision
31 (codes 291–319) to correspond to the classification of ICD-10 (codes F04–F99). We monitored the
32 NHDR data of the participants collected from the population database over a five-year period in
33 each of the seven cohorts. The first register follow-up on hospitalizations started on 1 January 1976
34 and ended on 31 December 1980 for the first cohort. The follow-up for the second cohort started the
35 next day. The follow-up of the seventh cohort ended on 31 December 2010.
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51 Employment rates for the 30–65 year-old population between 1986 and 2010 were drawn from an
52 employment database maintained by Statistics Finland.
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Statistical Analysis

The follow-up began on 1 January at beginning of each cohort and ended on the day the participant was hospitalised or died. For the rest of the participants, the follow-up period ended five years after it began, on December 31st. Annual age-adjusted (age groups 30–34, 35–39, 40–44, 45–49, 50–54, 55–59 and 60–64) incidence rates were calculated during the five-year follow-up per 10,000 participants separately for men and women in each of the three educational levels in seven independent cohorts $((\text{cases} * 10\ 000) / (\text{person days} / 365))$. Employment rates (%) were calculated for five cohorts (1986–1990, 1991–1995, 1996–2000, 2001–2005, 2006–2010) and are presented separately for men and women stratified by educational credentials. To test the educational differences in hospitalizations, we analysed the education-specific risk of psychiatric disorders within each cohort using Cox proportional hazard models adjusted for age and marital status. Persons with a college degree was used as a reference group. The results are communicated as Hazard Ratios (HR) and their 95% Confidence Intervals (CI). The analysis was performed using the SAS 9.2 program package and the IBM SPSS Statistics for Windows, version 20.0 software package.

RESULTS

The decreasing number of working age population with only elementary school education in Finland between 1976 and 2010 was clearly evident in our data when the participants' educational credentials were compared between the cohorts. Between the first (1976–1980) and the last (2006–2010) cohort, the proportion of those with only elementary school education decreased from 66.8% to 18.6% (Table 1).

Table 1. Baseline characteristics of the study population in seven cohorts.

	1976– 1980 Cohort	1981– 1985 Cohort	1986– 1990 Cohort	1991– 1995 Cohort	1996– 2000 Cohort	2001– 2005 Cohort	2006– 2010 Cohort	Total
Men								
Elementary school								
Sample size (% of cohort)	125 653 (66.4)	113 794 (56.6)	102 717 (47.4)	87 360 (38.7)	59 992 (30.0)	56 802 (25.1)	47 940 (20.9)	594 258 (39.9)
Mean age in years (SD)	45.19 (9.17)	44.75 (9.17)	45.05 (8.84)	45.90 (8.60)	46.57 (8.19)	47.40 (8.57)	48.40 (9.13)	45.79 (8.95)
Secondary education								
Sample size (% of cohort)	31 552 (16.7)	45 442 (22.6)	61 781 (28.5)	76 998 (34.1)	77 255 (38.6)	94 425 (41.7)	100 347 (43.8)	487 800 (32.8)
Mean age in years (SD)	40.32 (8.74)	39.19 (8.19)	39.30 (7.60)	40.30 (7.58)	41.22 (7.63)	42.76 (8.03)	44.24 (8.53)	41.50 (8.22)
College degree								
Sample size (% of cohort)	31 899 (16.9)	41 682 (20.7)	52 029 (24.0)	61 120 (27.1)	62 898 (31.4)	75 124 (33.2)	80 735 (35.3)	405 487 (27.3)
Mean age in years (SD)	41.23 (8.95)	40.67 (8.54)	41.18 (8.16)	42.25 (8.16)	42.93 (8.11)	43.93 (8.60)	44.98 (9.08)	42.83 (8.66)
Women								
Elementary school								
Sample size (% of cohort)	103 717 (67.3)	105 574 (59.1)	98 551 (49.0)	83 032 (38.8)	54 427 (28.1)	47 162 (21.9)	35 767 (16.2)	528 230 (38.3)
Mean age in years (SD)	45.46 (9.05)	45.54 (9.15)	45.68 (8.87)	46.67 (8.35)	47.75 (7.63)	49.14 (7.92)	50.61 (8.41)	46.62 (8.79)
Secondary education								
Sample size (% of cohort)	28 816 (18.7)	42 371 (23.7)	59 372 (29.5)	74 142 (34.6)	72 209 (37.3)	82 208 (38.2)	86 026 (38.9)	445 144 (32.3)
Mean age in years (SD)	41.53 (8.81)	40.76 (8.66)	40.51 (8.08)	41.35 (7.81)	42.53 (7.72)	44.20 (8.02)	45.97 (8.48)	42.80 (8.39)
College degree								
Sample size (% of cohort)	21 538 (14.0)	30 585 (17.1)	43 377 (21.5)	56 960 (26.6)	66 883 (34.6)	85 990 (39.9)	99 494 (45.0)	404 827 (29.4)
Mean age in years (SD)	40.17 (8.44)	40.02 (8.21)	40.36 (7.86)	41.20 (7.90)	41.98 (7.85)	43.06 (8.27)	44.25 (8.69)	42.24 (8.36)

Abbreviation: SD, standard deviation.

Figure 1 shows the employment rates and the age-adjusted incidence rates for psychiatric hospitalization per 10,000 individuals separately for men and women stratified by educational credentials. Among men with elementary school education, the age-adjusted incidence rate decreased from 38 in 1976–1980 to 32 in 1986–1990, then increased to 45 in 1990–1995 and remained fairly stable until 2006–2010 (percentual increase during 1976–2010 17%). The employment rate of men with elementary school education decreased from 67% in 1986–1990 to 55% in 1990–1995 and remained fairly stable until 2006–2010 (percentual decrease during 1976–

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2010 17%). Among men with secondary education, the incidence rate decreased from 43 in 1976–1980 to 31 in 1981–1986, then increased to 42 in 1991–1995, and decreased again to 36 in 2006–2010 (percentual decrease during 1976–2010 15%). The employment rate of men with secondary education decreased from 83% in 1986–1990 to 70% in 1990–1995 and then increased to 74% in 2006–2010 (percentual decrease during 1976–2010 12%). The incidence rate among men with a college degree increased from 29 in 1976–1980 to 37 in 1986–1990, decreased to 33 in 1996–2000, and further decreased to 23 in 2006–2010 (percentual decrease during 1976–2010 21%). The employment rate of men with a college degree decreased from 91% in 1986–1990 to 82% in 1990–1995 and then increased to 85% in 2006–2010 (percentual decrease during 1976–2010 7%).

Figure 1. here.

Among women with elementary school education, the age-adjusted incidence rate increased from 24 in 1976–1980 to 28 in 1991–1995, then decreased to 22 in 1996–2000, and increased again to 30 in 2006–2010 (percentual increase during 1976–2010 29%). The employment rate of women with elementary school education decreased from 63% in 1986–1990 to 54% in 1990–1995 and to 50% in 2006–2010 (percentual decrease during 1976–2010 21%). Among women with secondary education, the incidence rate remained fairly stable over time, at 25 in 1976–1980 and 22 in 2006–2010 (percentual decrease during 1976–2010 11 %). The employment rate of women with secondary education decreased from 79% in 1986–1990 to 69% in 1990–1995 and then increased to 72% in 2006–2010 (percentual decrease during 1976–2010 10%). Among women with a college degree, the incidence rate decreased from 22 in 1976–1980 to 20 in 2006–2010, with very little variation during the study period (percentual decrease during 1976–2010 8 %). The employment rate of women with a college degree decreased from 88% in 1986–1990 to 81% in 1990–1995 and then increased to 84% in 2006–2010 (percentual decrease during 1976–2010 4%).

Table 2 shows the hazard ratios of hospitalization adjusted for age and marital status separately for men and women with elementary school education and secondary education and compares them to those of the men and women with a college degree. Among men with elementary school education, the difference to men with a college degree remained fairly stable between 1976 and 1990 (HR 1.63–1.67), increased during 1991–1995 (HR 1.78), decreased during 1996–2000 (HR 1.59), and then increased between 2001 and 2010 (HR 1.94–2.05). Among men with secondary education, the difference to men with a college degree followed a similar secular path but with lesser variation (HR 1.39–1.74) over time.

Table 2. Proportional hazard ratios (HR) adjusted for age and marital status and their 95% confidence intervals for psychiatric hospitalization in relation to men and women with a college degree in seven cohorts.

	1976–1980 Cohort	1981–1985 Cohort	1986–1990 Cohort	1991–1995 Cohort	1996–2000 Cohort	2001–2005 Cohort	2006–2010 Cohort
Men							
Elementary school							
HR	1.67	1.63	1.66	1.78	1.59	1.94	2.05
(CI)	(1.52–1.84)	(1.48–1.79)	(1.52–1.80)	(1.64–1.92)	(1.45–1.73)	(1.77–2.12)	(1.87–2.26)
Secondary education							
HR	1.48	1.43	1.46	1.53	1.39	1.71	1.74
(CI)	(1.32–1.65)	(1.28–1.59)	(1.34–1.60)	(1.41–1.65)	(1.28–1.51)	(1.57–1.85)	(1.60–1.90)
Women							
Elementary school							
HR	1.34	1.24	1.38	1.45	1.30	1.36	1.53
(CI)	(1.17–1.54)	(1.10–1.40)	(1.24–1.54)	(1.31–1.59)	(1.17–1.45)	(1.22–1.51)	(1.37–1.72)
Secondary education							
HR	1.22	1.12	1.21	1.22	1.29	1.29	1.24
(CI)	(1.04–1.42)	(0.98–1.28)	(1.08–1.36)	(1.11–1.35)	(1.19–1.41)	(1.19–1.41)	(1.14–1.36)

Among women with elementary school education, the difference to women with a college degree was rather small in 1981–1985 (HR 1.24), increased between 1986 and 1995 (HR 1.38–1.45), decreased during 1996–2000 (HR 1.30), and then increased between 2001 and 2010 (HR 1.36–1.53). Among women with secondary education, the difference to women with a college degree remained fairly stable (HR 1.12–1.30) over time.

DISCUSSION

In this study of the Finnish working-age population, we found decreasing psychiatric hospitalization rates for men and women with secondary or higher education and increasing hospitalization rates for men and women with elementary school education. In 1976–1980, the hazard ratios of psychiatric hospitalization among men was 1.67 and among women 1.34 in the elementary school education group compared with the population with a college education, whereas in 2006–2010 the corresponding figures were 2.05 among men and 1.53 among women. The result supports our hypothesis: not even one of the world's most egalitarian comprehensive school systems offering uniform basic education for the whole population could prevent increasing educational inequalities in mental health outcomes under changing political and economic context.

The main mechanism behind the diverging long-term trends in psychiatric hospitalization is likely to be the more starkly decreasing employment rate of those with only elementary school education, leading to low income, job insecurity and narrowing social participation. In 1986–1990, the employment rate among men was 1.3-fold and among women 1.4-fold in the college educated group compared with the population with only elementary school education, whereas in 2006–2010 the corresponding figures were 1.5 among men and 1.7 among women. During the deep economic crisis in Finland at the beginning of the 1990s, psychiatric hospitalization increased the most among men with elementary school education, as a massive loss of blue-collar jobs took place in traditional male industries such as manufacturing and construction[20, 25]. During the global economic recession after 2008, the decreasing employment rate has been a likely contributor to increasing hospitalization for psychiatric disorders among men and women with elementary school education.

1 A secondary mechanism accelerating the diverging long-term trends in psychiatric hospitalization
2 between populations with different educational credentials is employment-dependent access to
3 outpatient mental health services. Almost 90% of the Finnish working population is offered
4 occupational health services. Almost 90% of the Finnish working population is offered
5 occupational health services (including prescribing and occupational psychologist services) with
6 short waiting times and completely free of charge[37]. The non-working population is excluded
7 from these services and limited to municipal mental health services, with internationally
8 comparative high client fees and long waiting times[38], unless they can afford to buy out-of-pocket
9 services from the private sector. The occupational health services are subsidised by tax-like funding
10 via Social Insurance Institution of Finland and their volume and expenditure increased 5-fold
11 between 1975 and 2010[37]. On the contrary, the municipal services financed mainly by municipal-
12 taxation and state-taxation faced severe austerity policies in most parts of Finland in the beginning
13 of 1990s[20, 21] and never fully recovered before the next big hit of the global economic recession
14 at 2008[39]. It is likely that psychiatric hospitalization has become an outcome of lack of primary
15 mental health care among the non-working population with low educational credentials.
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35 Third mechanism, welfare cuts (cuts in unemployment benefits, sickness allowances and medicine
36 reimbursements) [14, 22], made losing a job and losing access to occupational health services even
37 more damaging for mental health during the economic crisis of 1990s. The fourth mechanism,
38 reduction of alcohol duty in 2004, increased drinking and alcohol related harms; the effect was
39 largest among those with low educational credentials and particularly those outside the core labor
40 force [35].
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51 A fifth mechanism behind the diverging long-term trends in psychiatric hospitalization might be
52 related to the decreasing number of working age population with only elementary school education.
53 Even if we found no scientific evidence to suggest that this group would have become more
54 selected over the past four decades it may well be so, as back in 1970s two thirds of the 18–65 year-
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1 old population had only elementary school education, but in 2000s only about one fifth. This might
2 suggest that the population with only elementary school education has become more determined by
3 their mental health and mental health supporting environment during childhood, as previous studies
4 have found that psychiatric disorders during adolescence may affect education [40, 41], and labor
5 market position at young adulthood [42] and at later adulthood [43]. However, it is crucial to note
6 that this mechanism of health selection is not mutually exclusive with the mechanisms of low
7 employment opportunities, lack of health care services and low social security but that they are
8 complementary and may reinforce each other. The individuals with poor mental health during
9 childhood who obtained low labor market position during adulthood were even more likely to be
10 left out of work, excluded from outpatient health services, enjoy lower level of social security, and
11 to end up in psychiatric hospital after the welfare state retrenchment.
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28 All in all, our study showed that also in advanced welfare state economies like Finland, the
29 historical points in time differ in ways that may accentuate or diminish the role of individual's
30 educational credentials in shaping their mental health. As researchers attempt to track evidence of
31 the causal association between educational credentials and mental health, it is crucial to take the
32 macro-context into consideration and to draw implications from empirical results in a contextually
33 specific manner. Recent studies using within-monozygotic twins method to control for unobserved
34 factors shared by identical twins support this standpoint by indicating significant pro-health effects
35 of education in some regional contexts [44] but not in others [45]. As educational inequalities do
36 not seem to exist to the same extent within all regional and historical contexts we propose future
37 studies to explore more under what conditions educational credentials affect mental health, instead
38 of just the dichotomous question if education is related to mental health, still nurtured by large scale
39 epidemiological studies [46]. This kind of shift in research question might help us to better
40 understand the bigger picture and the mechanisms which create, eliminate, exacerbate or suppress
41 the inequalities in specific historical and regional contexts.
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4 For decades public health researchers have identified social factors that explain health inequalities,
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6 some of which are amenable to policy interventions. Most existing public health studies, however,
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8 have focused only on the more downstream social determinants, such as interpersonal relationships.
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10 These factors, although important and amenable to study with epidemiological study designs, do not
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12 explain the root causes of health inequalities, because the inequalities are also influenced by macro-
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14 level (political, economic, cultural) factors [11, 47, 48]. Therefore, we suggest that a greater
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16 investment in studying macro-level determinants has a high potential to make a significant
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18 contribution to the public health agenda. This kind of perspective may even enable us to think as a
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20 way that “transforms personal health problems into political and public issues” [49], indeed the very
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22 basis for building the Finnish welfare state after the World War II [14, 31].
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28 Major limitations of this study are its reliance on aggregate-level data on employment rates and its
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30 inability to take all theoretically possible confounding factors, such as social support and childhood
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32 socio-economic position, into account. In this study we used a wide category of all hospitalizations
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34 for psychiatric disorders, as the definitions of many psychiatric illnesses lack specific biological and
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36 pathological markers, and are instead based on a convergence of symptoms and familial aggregation
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38 patterns, causing different labelling for similar conditions[50]. The data used in this study were
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40 based on a national sample and are well-suited for epidemiological research[36]. There was no loss
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42 to follow-up, except emigration from Finland. The annual number of people who emigrated from
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44 Finland varied between 5884 and 18,209 during 1976–2010. This represents only 0.1–0.4 percent of
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46 the Finnish population. The changes in the International Classification of Diseases were recoded to
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48 correspond to the classification used in our analysis. The data used in this study cannot address the
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50 causation-selection issue of educational level and psychiatric morbidity, but this issue has been
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52 investigated elsewhere using a different study design. These studies in adult population have
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54 showed that causation is a more powerful factor than selection, in particular with education that
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2 does not tend to change considerably over the adult life and thus is rather immune to selection
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4 processes[1,2].
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10 **CONCLUSIONS**

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15 The present results indicate that educational inequalities in severe mental illness have widened in
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17 the Finnish working-age population. The results showed increasing psychiatric hospitalization rates
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19 among men and women with elementary school education and decreasing psychiatric
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21 hospitalization rates among men and women with secondary or higher education. The mechanisms
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23 behind these diverging long-term trends lie in the structures of the Finnish labor markets, health
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25 care system, welfare system, and alcohol policy, and were activated by welfare state retrenchment.
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27 We conclude that together with equal opportunities for education, such as the policies introduced in
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29 Finland over the past four decades, strong labor market, health care, welfare, and other public
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31 policies are needed in order to reduce inequalities in severe mental illness. Attention should also be
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33 given to intersectoral structures for taking inequalities into account in all policies, to raise the
34
35 standing of health inequalities on the political agenda, and to induce political solutions through
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37 often contentious and divisive political policy processes.
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46 **FOOTNOTES**

47 **Contributors:**

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51 LK was involved in designing the hypothesis and drafting the manuscript for content, including
52
53 analysis and interpretation of data. CM was involved in designing the hypothesis and revising the
54
55 manuscript for content. AKos was involved in analysis of data and revising the manuscript for
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1 content. AKou, PV and AV were involved in revising the manuscript for content and critically
2 reviewing drafts of the article. All authors have approved the final version of the manuscript and
3
4
5 agree to be accountable for all aspects of the work.
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17 **Competing interests:**

18 The authors declare that they have no competing interests.
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24 **Ethics approval:**

25 The study was approved by the Ethics Committee of the Finnish Institute of Occupational Health.
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31 **Data sharing statement:**

32 The authors confirm that, for approved reasons, some access restrictions apply to the data
33 underlying the findings. Our study utilizes administrative record linkage and all data used in the
34 present manuscript were obtained from third parties. Interested researchers need to obtain these data
35 directly from them. Data on the background characteristics of the participants were obtained from
36 the population database maintained by Statistics Finland. The employment rates were drawn from
37 an employment database maintained by Statistics Finland and the dates of death were obtained from
38 the National Death Register also kept by Statistics Finland. Hospitalization data were obtained from
39 the Finnish Hospital Discharge Register that is maintained by the National Institute for Health and
40 Welfare in Finland. Record linkage was conducted by Statistics Finland. Contact details for
41 organizations that own the data: Data on hospitalizations: National Institute for Welfare and Health
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Figure 1. The employment rates in five cohorts and the age-adjusted incidence rates for psychiatric hospitalization per 10,000 individuals in seven cohorts.

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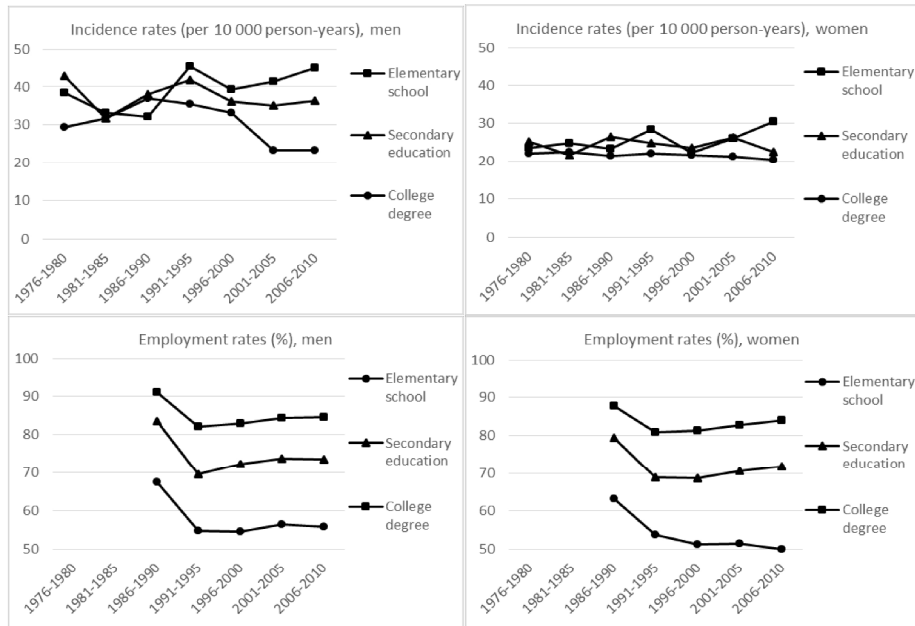


Figure 1. The employment rates in five cohorts and the age-adjusted incidence rates for psychiatric hospitalization per 10,000 individuals in seven cohorts.
297x210mm (300 x 300 DPI)

Review only

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses

Continued on next page

Results

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure <i>Cross-sectional study</i> —Report numbers of outcome events or summary measures
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

Discussion

Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results

Other information

Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based
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*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Welfare state retrenchment and increasing mental health inequality by educational credentials in Finland: a multi-cohort study

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Welfare state retrenchment and increasing mental health inequality by educational credentials in Finland: a multi-cohort study

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Abstract

Objectives

Epidemiological studies have shown an association between educational credentials and mental disorders, but have not offered any explanation for the varying strength of this association in different historical contexts. In this study we investigate the education-specific trends in hospitalization due to psychiatric disorders in Finnish working-age men and women between 1976 and 2010, and offer a welfare state explanation for the found secular trends.

Setting

Population-based setting with 25% random sample of 30–65 year-old population in seven independent consecutive cohorts (1976–1980, 1981–1985, 1986–1990, 1991–1995, 1996–2000, 2001–2005, 2006–2010).

Participants

Participants were randomly selected from the Statistics Finland population database (n=2 865 746). These data were linked to diagnosis-specific records on hospitalizations, drawn from the National Hospital Discharge Registry using personal identification numbers. Employment rates by educational credentials were drawn from the Statistics Finland employment database.

Primary and secondary outcome measures

Hospitalization and employment.

Results

We found an increasing trend in psychiatric hospitalization rates among the population with only elementary school education and a decreasing trend in those with higher educational credentials.

1 The employment rate of population with only elementary school education decreased more than that
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4 of those with higher educational credentials.
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8 *Conclusions*

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10 We propose that restricted employment opportunities is the main mechanism behind the increased
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12 educational inequality in hospitalization for psychiatric disorders, while several secondary
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14 mechanisms (lack of outpatient health care services, welfare cuts, decreased alcohol duty) further
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16 accelerated the diverging long-term trends. All of these inequality increasing mechanisms were
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18 activated by welfare state retrenchment, which included the liberalization of financial markets and
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20 labor markets, severe austerity measures and narrowing down public sector employment
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22 commitment.
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35 **Strengths and limitations of this study**

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38 * Strengths include the population-based setting with individual-level data on hospitalizations, time
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40 span of 35 years and the size of the cohorts.
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44 * Major limitations of this study are its reliance on aggregate-level data on employment rates and
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46 its inability to take all theoretically possible confounding factors, such as social support and
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48 childhood socio-economic position, into account.
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INTRODUCTION

The evidence shows that socioeconomic position plays a major role in various types of psychopathology[1, 2]. For example in the 1980s in Finland, hospitalization for some psychiatric diagnoses was two times higher among those with less than 10 years of formal education compared to those with more than 12 years of formal education[3]. Historically the rate of psychiatric hospital admissions in a population has been associated with social factors such as urban environment[4], economic cycles[5], and unemployment[6] and is considered to be one indicator of population mental health[7]. Currently mental disorders account globally for a quarter of all years lived with disability[8]. Nevertheless, research on education-specific long-term trends in severe psychiatric disorders is rare. To the best of our knowledge, no previous study has examined long-term changes in national hospitalization trends for psychiatric disorders by educational credentials. Furthermore, our study was also motivated by a recent paper showing that there was no educational gradient in mental illness among monks and nuns in cloisters [9]. This might suggest that educational credentials do not play an important role outside market economies and that in market economies the association between education and severe psychiatric disorders might be highly determined by available labor market positions.

Welfare state retrenchment and mechanisms increasing inequality

In all democratic societies, the acceptable level of inequalities is set in politics [10], and even the advanced welfare state economies have different levels of health inequality due to their different political traditions [11, 12]. The Finnish welfare state was created as a particular polity under Social Democratic and Agrarian League ruled governments in a specific geopolitical position – between the East and the West – in the early post-war period as a way of structuring the labor market and regulating capitalism. Although the phrase welfare state is in conventional epidemiological studies

1 used in a narrow sense, as referring to provision of welfare services and social transfers, we
2
3 consider it more broadly as a specific form of state balancing the power between labor and capital,
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5 and structuring the society and its stratifications [13]. Furthermore, we argue that it is very difficult
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7 to understand the changing impact of educational credentials on psychiatric disorders without
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9 understanding the significance and role of education in the broader political and labor market
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11 context.
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17 Even if the foundation for the Finnish welfare state was set right after the World War II, Finland did
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19 not implement most of the universal “Nordic” policies until 1960s and 70s, decades after Sweden
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21 and Denmark [14]. In Finland the universal Health Insurance was adopted as late as 1964. It was
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23 based on the German model, including sickness allowances (compensation for loss of income
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25 during incapacity for work) and an insurance compensation covering a share of the costs of private
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27 health care service use, medicines and illness-related transportation. In order to achieve educational
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29 equality without selecting or streaming students during their basic education, Finland introduced a
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31 compulsory nine-year comprehensive school with no tuition fees and with free school meals and
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33 subsidised transportation services in 1972. By 1977 the comprehensive school system covered the
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35 area of whole Finland and has remained without major reforms ever since. In order to achieve
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37 equity in health services coverage, Finland adopted the Public Health Law in 1972. This law
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39 introduced primarily tax-funded municipal health centers as the basic unit of service provision for
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41 all citizens. The Occupational Health Convention in 1971 had only included people with permanent
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43 job contracts and the Health Insurance Law in 1964 had only met the health service needs of those
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45 living in Southern Finland and being able to pay the deductibles when purchasing services from the
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47 private sector.
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55 Finnish financial markets remained closed until 1986, when the Bank of Finland decided to
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57 suddenly liberalize the financial markets without any public debate [15, 16]. Prior to 1986 lending
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1 money from foreign investors was subject to license. The abrupt liberalization of financial markets
2 led to massive lending of cheap money by Finnish banks and businesses, and also the amount of
3 loans per citizen rose by over 100 percent within a year. This existence of loose money led to a
4 textbook example of casino economy; the speculative increase of the value of houses, offices and
5 stocks and the birth of a stock market bubble capitalized by market predators [17]. After the burst of
6 the bubble, the overpriced houses lost over one half of their value between 1989 and 1993, whereas
7 the mortgage rates rose even 5-fold and the unemployment rate increased from 3.5 percent to 18
8 percent [18]. During the economic crises almost 400,000 people lost their jobs, and the recession hit
9 the hardest the people with low educational credentials.

10 Even if the size of the Finnish public sector or social expenditure never rose above the OECD-
11 average during the golden age of 1980s [19], the expansion of the welfare state was claimed to be
12 the root cause for Finnish financial problems and the economic recession opened a window of
13 opportunity for severe austerity policies[20]. The conservative government of 1991–1995
14 implemented considerable spending cuts that were not allocated evenly across all public spending
15 but were more heavily concentrated on the services for people with least power to resist them, the
16 non-working population[21]. The level of unemployment benefits was lowered and the Health
17 Insurance was affected by decreasing the sickness allowances and raising the deductibles of
18 medicines [22]. In addition, the state subsidy for municipal health care provision was cut. As a
19 result the access to health care services became more difficult for those not having access to
20 occupational health care or not being able to pay the deductibles for using the private sector
21 services. By 1999 Finnish residents already paid 20 percent of health care costs out of pocket
22 compared to for example 16 percent in the United States [23].

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55 Along with these severe cuts to health and social care services and welfare, labor market
56 liberalization[24], increasing transfer of manufacturing blue-collar jobs out of Finland[25] and the
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1 narrowing down of public sector employment commitment [26] made the labor market position of
2 those with only elementary school education more vulnerable. As a result, the core labor force
3 became more highly educated, the labor markets became more selective based on educational
4 credentials and the social mobility diminished especially for those with the lowest educational
5 credentials [27-29]. All in all, the economic crisis highly accelerated welfare state retrenchment that
6 had already been on the neoliberal agenda from the beginning of 1980s [30] and started reshaping
7 the Finnish society and its social stratification. The income inequality between population groups
8 grew significantly but the most radical restructuring took place between the labor and the capital.
9 Whereas labor income as a percentage of national income was in Finland as high as 76 percent in
10 1991, was it only 57 percent in 2000, at the same level as right after the World War II [31].
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26 After the economic crisis, the coalition government in 1995–1999 did not introduce any radical
27 policy changes. The same applies to the three following governments between 1995 and 2010 who
28 continued the incremental welfare state restructuring within the pre-existing policy paradigms
29 towards labor market flexibility, welfare pluralism, supply-side economics, and efforts at
30 minimizing social expenditures [32, 33]. However, the accession to the European Union (EU) in
31 1995 meant that the legislation governing many health policy decisions was now determined by the
32 EU, and national powers of decision making were narrowed in scope. For example, the Finnish
33 alcohol policy changed dramatically over night when Estonia joined the EU in 2004. In the fear of a
34 considerable increase in Finnish visitors' import of alcohol from Estonia due to free movement of
35 goods, Finland decreased its alcohol excise duty rates by 33% and within a year alcohol related
36 mortality rose by 20% [34]; the most notable increase was among those in the social classes with
37 lower income [35].
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55 **The aim of the study**

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In this paper, we first described the welfare state retrenchment in Finland (liberalization of financial and labor markets, efforts for minimizing social expenditures and narrowing down of public sector employment commitment). We also identified the main mechanism (low employment opportunities leading to low income and job insecurity) and secondary mechanisms (lack of outpatient health care services, welfare cuts, and decreased alcohol duty) through which this changing macro-context might deteriorate the mental health of those with low educational credentials. We examine the plausibility of those mechanisms with the analysis of education-specific trends in employment rates and hospitalization due to psychiatric disorders among 30–65 year-old Finnish men and women between 1976 and 2010. In the discussion part we will then describe the potential role of the secondary mechanisms explaining these secular trends. Our hypothesis is that even if the Finnish comprehensive school system has offered tax-funded and uniform basic education for the whole population since 1970s, the welfare state retrenchment and its education-specific impacts have produced an increasing rate of psychiatric hospitalisations among those with low educational credentials. We predict that even one of the world's most egalitarian comprehensive school systems has not been able to prevent increasing educational inequalities in mental health outcomes under this rapidly changing political and economic context. Furthermore, the global economic crises after 2008 may have further increased hospitalization for psychiatric disorders among those with low educational credentials.

METHODS

Databases

The individual-level data were obtained from a population database maintained by Statistics Finland in which every Finnish resident is registered under a personal identification number. From these

1 data we selected a 25% random sample of the 18–64 year-old population with a recorded
2 occupational title in seven independent consecutive cohorts (1976–1980, 1981–1985, 1986–1990,
3 1991–1995, 1996–2000, 2001–2005, 2006–2010). The present study included only those aged 30 or
4 over (n=2 865 746) because in Finland education is usually completed by this age. Education was
5 measured at the start of the follow-up, with the same classifications used at all points of
6 measurement. The participants were categorised according to their highest completed educational
7 credentials: 1 elementary school or lower, 2 secondary education, and 3 college degree or higher.
8 Information on the age and sex of the participants was collected from the population database.
9 Table 1 presents the background characteristics of the participants.
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24 Data on hospitalizations were obtained from the National Hospital Discharge Register (NHDR)
25 maintained by the National Institute for Health and Welfare. Every person permanently residing in
26 Finland who has received hospital treatment in a public sector hospital is recorded in this register
27 with a personal identification number. The NHDR has been shown to cover the hospitalization rates
28 of the Finnish population well and to register hospitalization rates accurately, and this high accuracy
29 also applies to psychiatric diagnoses[36]. In this study, we recoded the psychiatric diagnoses
30 categorised according to the International Classification of Diseases (ICD) 8th and 9th revision
31 (codes 291–319) to correspond to the classification of ICD-10 (codes F04–F99). We monitored the
32 NHDR data of the participants collected from the population database over a five-year period in
33 each of the seven cohorts. The first register follow-up on hospitalizations started on 1 January 1976
34 and ended on 31 December 1980 for the first cohort. The follow-up for the second cohort started the
35 next day. The follow-up of the seventh cohort ended on 31 December 2010.
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51 Employment rates for the 30–65 year-old population between 1986 and 2010 were drawn from an
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Statistical Analysis

The follow-up began on 1 January at beginning of each cohort and ended on the day the participant was hospitalised or died. For the rest of the participants, the follow-up period ended five years after it began, on December 31st. Annual age-adjusted (age groups 30–34, 35–39, 40–44, 45–49, 50–54, 55–59 and 60–64) incidence rates were calculated during the five-year follow-up per 10,000 participants separately for men and women in each of the three educational levels in seven independent cohorts $((\text{cases} * 10\ 000) / (\text{person days} / 365))$. Employment rates (%) were calculated for five cohorts (1986–1990, 1991–1995, 1996–2000, 2001–2005, 2006–2010) and are presented separately for men and women stratified by educational credentials. To test the educational differences in hospitalizations, we analysed the education-specific risk of psychiatric disorders within each cohort using Cox proportional hazard models adjusted for age and marital status. Persons with a college degree was used as a reference group. The results are communicated as Hazard Ratios (HR) and their 95% Confidence Intervals (CI). The analysis was performed using the SAS 9.2 program package and the IBM SPSS Statistics for Windows, version 20.0 software package.

RESULTS

The decreasing number of working age population with only elementary school education in Finland between 1976 and 2010 was clearly evident in our data when the participants' educational credentials were compared between the cohorts. Between the first (1976–1980) and the last (2006–2010) cohort, the proportion of those with only elementary school education decreased from 66.8% to 18.6% (Table 1).

Table 1. Baseline characteristics of the study population in seven cohorts.

	1976– 1980 Cohort	1981– 1985 Cohort	1986– 1990 Cohort	1991– 1995 Cohort	1996– 2000 Cohort	2001– 2005 Cohort	2006– 2010 Cohort	Total
Men								
Elementary school								
Sample size (% of cohort)	125 653 (66.4)	113 794 (56.6)	102 717 (47.4)	87 360 (38.7)	59 992 (30.0)	56 802 (25.1)	47 940 (20.9)	594 258 (39.9)
Mean age in years (SD)	45.19 (9.17)	44.75 (9.17)	45.05 (8.84)	45.90 (8.60)	46.57 (8.19)	47.40 (8.57)	48.40 (9.13)	45.79 (8.95)
Secondary education								
Sample size (% of cohort)	31 552 (16.7)	45 442 (22.6)	61 781 (28.5)	76 998 (34.1)	77 255 (38.6)	94 425 (41.7)	100 347 (43.8)	487 800 (32.8)
Mean age in years (SD)	40.32 (8.74)	39.19 (8.19)	39.30 (7.60)	40.30 (7.58)	41.22 (7.63)	42.76 (8.03)	44.24 (8.53)	41.50 (8.22)
College degree								
Sample size (% of cohort)	31 899 (16.9)	41 682 (20.7)	52 029 (24.0)	61 120 (27.1)	62 898 (31.4)	75 124 (33.2)	80 735 (35.3)	405 487 (27.3)
Mean age in years (SD)	41.23 (8.95)	40.67 (8.54)	41.18 (8.16)	42.25 (8.16)	42.93 (8.11)	43.93 (8.60)	44.98 (9.08)	42.83 (8.66)
Women								
Elementary school								
Sample size (% of cohort)	103 717 (67.3)	105 574 (59.1)	98 551 (49.0)	83 032 (38.8)	54 427 (28.1)	47 162 (21.9)	35 767 (16.2)	528 230 (38.3)
Mean age in years (SD)	45.46 (9.05)	45.54 (9.15)	45.68 (8.87)	46.67 (8.35)	47.75 (7.63)	49.14 (7.92)	50.61 (8.41)	46.62 (8.79)
Secondary education								
Sample size (% of cohort)	28 816 (18.7)	42 371 (23.7)	59 372 (29.5)	74 142 (34.6)	72 209 (37.3)	82 208 (38.2)	86 026 (38.9)	445 144 (32.3)
Mean age in years (SD)	41.53 (8.81)	40.76 (8.66)	40.51 (8.08)	41.35 (7.81)	42.53 (7.72)	44.20 (8.02)	45.97 (8.48)	42.80 (8.39)
College degree								
Sample size (% of cohort)	21 538 (14.0)	30 585 (17.1)	43 377 (21.5)	56 960 (26.6)	66 883 (34.6)	85 990 (39.9)	99 494 (45.0)	404 827 (29.4)
Mean age in years (SD)	40.17 (8.44)	40.02 (8.21)	40.36 (7.86)	41.20 (7.90)	41.98 (7.85)	43.06 (8.27)	44.25 (8.69)	42.24 (8.36)

Abbreviation: SD, standard deviation.

Figure 1 shows the employment rates and the age-adjusted incidence rates for psychiatric hospitalization per 10,000 individuals separately for men and women stratified by educational credentials. Among men with elementary school education, the age-adjusted incidence rate decreased from 38 in 1976–1980 to 32 in 1986–1990, then increased to 45 in 1990–1995 and remained fairly stable until 2006–2010 (percentual increase during 1976–2010 17%). The employment rate of men with elementary school education decreased from 67% in 1986–1990 to 55% in 1990–1995 and remained fairly stable until 2006–2010 (percentual decrease during 1976–

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2010 17%). Among men with secondary education, the incidence rate decreased from 43 in 1976–1980 to 31 in 1981–1986, then increased to 42 in 1991–1995, and decreased again to 36 in 2006–2010 (percentual decrease during 1976–2010 15%). The employment rate of men with secondary education decreased from 83% in 1986–1990 to 70% in 1990–1995 and then increased to 74% in 2006–2010 (percentual decrease during 1976–2010 12%). The incidence rate among men with a college degree increased from 29 in 1976–1980 to 37 in 1986–1990, decreased to 33 in 1996–2000, and further decreased to 23 in 2006–2010 (percentual decrease during 1976–2010 21%). The employment rate of men with a college degree decreased from 91% in 1986–1990 to 82% in 1990–1995 and then increased to 85% in 2006–2010 (percentual decrease during 1976–2010 7%).

Figure 1. here.

Among women with elementary school education, the age-adjusted incidence rate increased from 24 in 1976–1980 to 28 in 1991–1995, then decreased to 22 in 1996–2000, and increased again to 30 in 2006–2010 (percentual increase during 1976–2010 29%). The employment rate of women with elementary school education decreased from 63% in 1986–1990 to 54% in 1990–1995 and to 50% in 2006–2010 (percentual decrease during 1976–2010 21%). Among women with secondary education, the incidence rate remained fairly stable over time, at 25 in 1976–1980 and 22 in 2006–2010 (percentual decrease during 1976–2010 11 %). The employment rate of women with secondary education decreased from 79% in 1986–1990 to 69% in 1990–1995 and then increased to 72% in 2006–2010 (percentual decrease during 1976–2010 10%). Among women with a college degree, the incidence rate decreased from 22 in 1976–1980 to 20 in 2006–2010, with very little variation during the study period (percentual decrease during 1976–2010 8 %). The employment rate of women with a college degree decreased from 88% in 1986–1990 to 81% in 1990–1995 and then increased to 84% in 2006–2010 (percentual decrease during 1976–2010 4%).

Table 2 shows the hazard ratios of hospitalization adjusted for age and marital status separately for men and women with elementary school education and secondary education and compares them to those of the men and women with a college degree. Among men with elementary school education, the difference to men with a college degree remained fairly stable between 1976 and 1990 (HR 1.63–1.67), increased during 1991–1995 (HR 1.78), decreased during 1996–2000 (HR 1.59), and then increased between 2001 and 2010 (HR 1.94–2.05). Among men with secondary education, the difference to men with a college degree followed a similar secular path but with lesser variation (HR 1.39–1.74) over time.

Table 2. Proportional hazard ratios (HR) adjusted for age and marital status and their 95% confidence intervals for psychiatric hospitalization in relation to men and women with a college degree in seven cohorts.

	1976–1980 Cohort	1981–1985 Cohort	1986–1990 Cohort	1991–1995 Cohort	1996–2000 Cohort	2001–2005 Cohort	2006–2010 Cohort
Men							
Elementary school							
HR	1.67	1.63	1.66	1.78	1.59	1.94	2.05
(CI)	(1.52–1.84)	(1.48–1.79)	(1.52–1.80)	(1.64–1.92)	(1.45–1.73)	(1.77–2.12)	(1.87–2.26)
Secondary education							
HR	1.48	1.43	1.46	1.53	1.39	1.71	1.74
(CI)	(1.32–1.65)	(1.28–1.59)	(1.34–1.60)	(1.41–1.65)	(1.28–1.51)	(1.57–1.85)	(1.60–1.90)
Women							
Elementary school							
HR	1.34	1.24	1.38	1.45	1.30	1.36	1.53
(CI)	(1.17–1.54)	(1.10–1.40)	(1.24–1.54)	(1.31–1.59)	(1.17–1.45)	(1.22–1.51)	(1.37–1.72)
Secondary education							
HR	1.22	1.12	1.21	1.22	1.29	1.29	1.24
(CI)	(1.04–1.42)	(0.98–1.28)	(1.08–1.36)	(1.11–1.35)	(1.19–1.41)	(1.19–1.41)	(1.14–1.36)

Among women with elementary school education, the difference to women with a college degree was rather small in 1981–1985 (HR 1.24), increased between 1986 and 1995 (HR 1.38–1.45), decreased during 1996–2000 (HR 1.30), and then increased between 2001 and 2010 (HR 1.36–1.53). Among women with secondary education, the difference to women with a college degree remained fairly stable (HR 1.12–1.30) over time.

DISCUSSION

In this study of the Finnish working-age population, we found decreasing psychiatric hospitalization rates for men and women with secondary or higher education and increasing hospitalization rates for men and women with elementary school education. In 1976–1980, the hazard ratios of psychiatric hospitalization among men was 1.67 and among women 1.34 in the elementary school education group compared with the population with a college education, whereas in 2006–2010 the corresponding figures were 2.05 among men and 1.53 among women. The result supports our hypothesis: not even one of the world's most egalitarian comprehensive school systems offering uniform basic education for the whole population could prevent increasing educational inequalities in mental health outcomes under changing political and economic context.

The main mechanism behind the diverging long-term trends in psychiatric hospitalization is likely to be the more starkly decreasing employment rate of those with only elementary school education, leading to low income, job insecurity and narrowing social participation. In 1986–1990, the employment rate among men was 1.3-fold and among women 1.4-fold in the college educated group compared with the population with only elementary school education, whereas in 2006–2010 the corresponding figures were 1.5 among men and 1.7 among women. During the deep economic crisis in Finland at the beginning of the 1990s, psychiatric hospitalization increased the most among men with elementary school education, as a massive loss of blue-collar jobs took place in traditional male industries such as manufacturing and construction[20, 25]. During the global economic recession after 2008, the decreasing employment rate has been a likely contributor to increasing hospitalization for psychiatric disorders among men and women with elementary school education.

1 A secondary mechanism accelerating the diverging long-term trends in psychiatric hospitalization
2 between populations with different educational credentials is employment-dependent access to
3 outpatient mental health services. Almost 90% of the Finnish working population is offered
4 occupational health services. Almost 90% of the Finnish working population is offered
5 occupational health services (including prescribing and occupational psychologist services) with
6 short waiting times and completely free of charge[37]. The non-working population is excluded
7 from these services and limited to municipal mental health services, with internationally
8 comparative high client fees and long waiting times[38], unless they can afford to buy out-of-pocket
9 services from the private sector. The occupational health services are subsidised by tax-like funding
10 via Social Insurance Institution of Finland and their volume and expenditure increased 5-fold
11 between 1975 and 2010[37]. On the contrary, the municipal services financed mainly by municipal-
12 taxation and state-taxation faced severe austerity policies in most parts of Finland in the beginning
13 of 1990s[20, 21] and never fully recovered before the next big hit of the global economic recession
14 at 2008[39]. It is likely that psychiatric hospitalization has become an outcome of lack of primary
15 mental health care among the non-working population with low educational credentials.
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35 Third mechanism, welfare cuts (cuts in unemployment benefits, sickness allowances and medicine
36 reimbursements) [14, 22], made losing a job and losing access to occupational health services even
37 more damaging for mental health during the economic crisis of 1990s. The fourth mechanism,
38 reduction of alcohol duty in 2004, increased drinking and alcohol related harms; the effect was
39 largest among those with low educational credentials and particularly those outside the core labor
40 force [35].
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51 A fifth mechanism behind the diverging long-term trends in psychiatric hospitalization might be
52 related to the decreasing number of working age population with only elementary school education.
53 Even if we found no scientific evidence to suggest that this group would have become more
54 selected over the past four decades it may well be so, as back in 1970s two thirds of the 18–65 year-
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1 old population had only elementary school education, but in 2000s only about one fifth. This might
2 suggest that the population with only elementary school education has become more determined by
3 their mental health and mental health supporting environment during childhood, as previous studies
4 have found that psychiatric disorders during adolescence may affect education [40, 41], and labor
5 market position at young adulthood [42] and at later adulthood [43]. However, it is crucial to note
6 that this mechanism of health selection is not mutually exclusive with the mechanisms of low
7 employment opportunities, lack of health care services and low social security but that they are
8 complementary and may reinforce each other. The individuals with poor mental health during
9 childhood who obtained low labor market position during adulthood were even more likely to be
10 left out of work, excluded from outpatient health services, enjoy lower level of social security, and
11 to end up in psychiatric hospital after the welfare state retrenchment.
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28 All in all, our study showed that also in advanced welfare state economies like Finland, the
29 historical points in time differ in ways that may accentuate or diminish the role of individual's
30 educational credentials in shaping their mental health. As researchers attempt to track evidence of
31 the causal association between educational credentials and mental health, it is crucial to take the
32 macro-context into consideration and to draw implications from empirical results in a contextually
33 specific manner. Recent studies using within-monozygotic twins method to control for unobserved
34 factors shared by identical twins support this standpoint by indicating significant pro-health effects
35 of education in some regional contexts [44] but not in others [45]. As educational inequalities do
36 not seem to exist to the same extent within all regional and historical contexts we propose future
37 studies to explore more under what conditions educational credentials affect mental health, instead
38 of just the dichotomous question if education is related to mental health, still nurtured by large scale
39 epidemiological studies [46]. This kind of shift in research question might help us to better
40 understand the bigger picture and the mechanisms which create, eliminate, exacerbate or suppress
41 the inequalities in specific historical and regional contexts.
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4 For decades public health researchers have identified social factors that explain health inequalities,
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6 some of which are amenable to policy interventions. Most existing public health studies, however,
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8 have focused only on the more downstream social determinants, such as interpersonal relationships.
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10 These factors, although important and amenable to study with epidemiological study designs, do not
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12 explain the root causes of health inequalities, because the inequalities are also influenced by macro-
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14 level (political, economic, cultural) factors [11, 47, 48]. Therefore, we suggest that a greater
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16 investment in studying macro-level determinants has a high potential to make a significant
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18 contribution to the public health agenda. This kind of perspective may even enable us to think as a
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20 way that “transforms personal health problems into political and public issues” [49], indeed the very
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22 basis for building the Finnish welfare state after the World War II [14, 31].
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28 Major limitations of this study are its reliance on aggregate-level data on employment rates and its
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30 inability to take all theoretically possible confounding factors, such as social support and childhood
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32 socio-economic position, into account. In this study we used a wide category of all hospitalizations
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34 for psychiatric disorders, as the definitions of many psychiatric illnesses lack specific biological and
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36 pathological markers, and are instead based on a convergence of symptoms and familial aggregation
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38 patterns, causing different labelling for similar conditions[50]. The data used in this study were
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40 based on a national sample and are well-suited for epidemiological research[36]. There was no loss
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42 to follow-up, except emigration from Finland. The annual number of people who emigrated from
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44 Finland varied between 5884 and 18,209 during 1976–2010. This represents only 0.1–0.4 percent of
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46 the Finnish population. The changes in the International Classification of Diseases were recoded to
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48 correspond to the classification used in our analysis. The data used in this study cannot address the
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50 causation-selection issue of educational level and psychiatric morbidity, but this issue has been
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52 investigated elsewhere using a different study design. These studies in adult population have
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54 showed that causation is a more powerful factor than selection, in particular with education that
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1 does not tend to change considerably over the adult life and thus is rather immune to selection
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4 processes[1,2].
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10 **CONCLUSIONS**

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15 The present results indicate that educational inequalities in severe mental illness have widened in
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17 the Finnish working-age population. The results showed increasing psychiatric hospitalization rates
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19 among men and women with elementary school education and decreasing psychiatric
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21 hospitalization rates among men and women with secondary or higher education. The mechanisms
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23 behind these diverging long-term trends lie in the structures of the Finnish labor markets, health
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25 care system, welfare system, and alcohol policy, and were activated by welfare state retrenchment.
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27 We conclude that together with equal opportunities for education, such as the policies introduced in
28
29 Finland over the past four decades, strong labor market, health care, welfare, and other public
30
31 policies are needed in order to reduce inequalities in severe mental illness. Attention should also be
32
33 given to intersectoral structures for taking inequalities into account in all policies, to raise the
34
35 standing of health inequalities on the political agenda, and to induce political solutions through
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37 often contentious and divisive political policy processes.
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46 **FOOTNOTES**

47 **Contributors:**

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51 LK was involved in designing the hypothesis and drafting the manuscript for content, including
52
53 analysis and interpretation of data. CM was involved in designing the hypothesis and revising the
54
55 manuscript for content. AKos was involved in analysis of data and revising the manuscript for
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1 content. AKou, PV and AV were involved in revising the manuscript for content and critically
2 reviewing drafts of the article. All authors have approved the final version of the manuscript and
3
4
5 agree to be accountable for all aspects of the work.
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17 **Competing interests:**

18 The authors declare that they have no competing interests.
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24 **Ethics approval:**

25 The study was approved by the Ethics Committee of the Finnish Institute of Occupational Health.
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31 **Data sharing statement:**

32 The authors confirm that, for approved reasons, some access restrictions apply to the data
33 underlying the findings. Our study utilizes administrative record linkage and all data used in the
34 present manuscript were obtained from third parties. Interested researchers need to obtain these data
35 directly from them. Data on the background characteristics of the participants were obtained from
36 the population database maintained by Statistics Finland. The employment rates were drawn from
37 an employment database maintained by Statistics Finland and the dates of death were obtained from
38 the National Death Register also kept by Statistics Finland. Hospitalization data were obtained from
39 the Finnish Hospital Discharge Register that is maintained by the National Institute for Health and
40 Welfare in Finland. Record linkage was conducted by Statistics Finland. Contact details for
41 organizations that own the data: Data on hospitalizations: National Institute for Welfare and Health
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Figure 1. The employment rates in five cohorts and the age-adjusted incidence rates for psychiatric hospitalization per 10,000 individuals in seven cohorts.

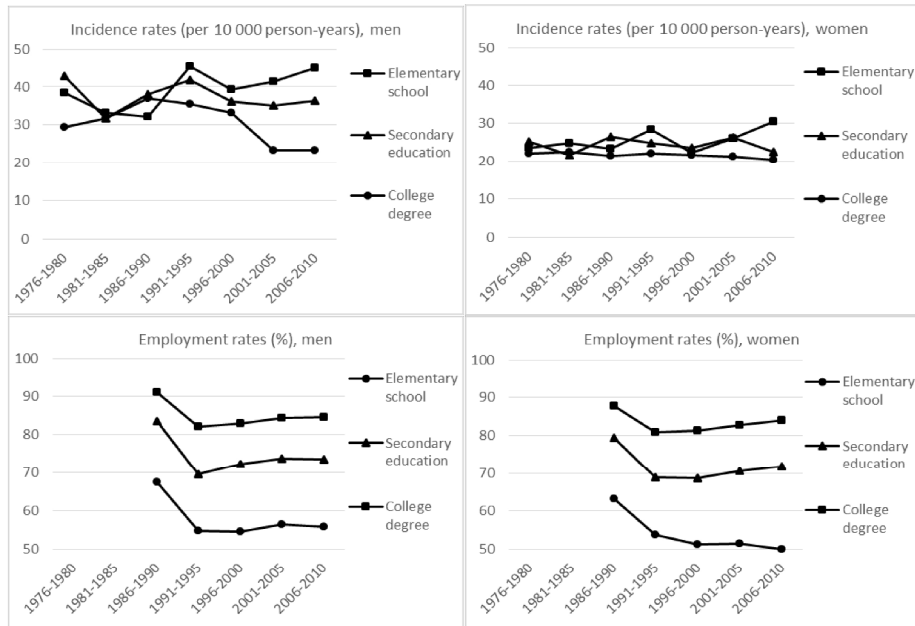


Figure 1. The employment rates in five cohorts and the age-adjusted incidence rates for psychiatric hospitalization per 10,000 individuals in seven cohorts.
297x210mm (300 x 300 DPI)

Review only

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses

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Results

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure <i>Cross-sectional study</i> —Report numbers of outcome events or summary measures
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

Discussion

Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results

Other information

Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based
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*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.