# The emergence of socioeconomic and gender gaps in mental health: A longitudinal population study, 1900-1960 in Sweden.

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**Abstract**

The objective of this study is to assess whether socioeconomic and gender gaps in mental health has changed from 1900-1960 in Sweden. We use historical longitudinal micro-data with all necessary demographic information, data on individual occupational attainment and onsets of mental illnesses (N = 2,484)  in a population of 193,323. Changes over time was tested using multilevel Cox proportional hazard models.  We test how gender specific risk of mental illness change and how gender-specific socioeconomic status was related to risks of attaining mental illness later in life. We find a reversal in gender gaps in mental health over the study period. Women had lower risk than men in 1900 and higher risks in 1960. For men we find positive gradient in SES risks in 1900 and a negative gradient in 1960. For women we find no clear SES gradient in mental illness risks. These findings suggest that the contemporary patterns in socioeconomic and gender gaps in mental health emerged in Sweden in the early 20th century, coinciding with the growth of institutional psychiatry.

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# Introduction

Across the globe, social inequalities in mental health have increased and are now one of the most persistent features of contemporary society. In the western world, women are reported having worse mental health than men, and poor people suffer more than rich. Sweden is no exception; over the last decades, gender and socioeconomic inequalities in mental health have increased (Folkhälsomyndigheten, 2018). This study goes back in time to investigate whether socioeconomic and gender inequalities in mental health is a persistent feature of health disparities using individual-level data on occupation and mental illness between 1900-1960 or if it has changed over time in Sweden.

Since the 1990s socioeconomic and gender gaps in self-rated mental health and psychiatric diagnosis have increased in Sweden. Mental illness has increased among the poorest within the population and decreased among the richest. Similarly, the mental health of women has worsened in comparison to men (Folkhälsomyndigheten, 2018). The negative relationship between socioeconomic status and mental health is one of the most replicated findings in social science. Globally, the gradient is reported over many types of SES indicators - education, income or occupation, and many types of mental illnesses (Fiske, Wetherell, & Gatz, 2009; Hudson, 1988; Reiss, 2013). Equally consistent findings are shown for gender differences in mental health. Women are reported having higher risks of mental illness than men in most western countries (Culbertson, 1997; Whiteford, Ferrari, Degenhardt, Feigin, & Vos, 2015; WHO Department of Gender, Women and Health, 2002). However, reported differences in self-rated mental health and psychiatric diagnosis do not capture the full burden of distress. Instead, the overall burden of mental disorders is equal between genders. Differences between men and women are found in how they respond to mental distress. Affective disorders, such as depression or anxiety, are more common among women while behavioural disorders, like substance abuse and antisocial behaviours, are more common among men (Hill & Needham, 2013; Seedat et al., 2009). Women are also more likely to report poor health than men, independently of their state of distress (Kessler, 2000).

Although there are numerous studies of SES and gender differences in mental health in contemporary populations, less is known about the long-term trends. Historically, men have been seen as the mentally weaker sex; madness was thus associated with masculinity in historical sources (Foucault, 2003) During the 19th century, the gender balance shifted, as female mental health was increasingly pathologised, where femaleness was associated with

nervous syndrome and psychiatric frailty (Porter, 1987). One of the earliest works on socioeconomic differences is Fairs and Dunham's study on mental illness in 1920s Chicago and an American mental hygiene study from 1934 on Maryland. The Chicago study finds an ecological connection, where people from poor neighbourhoods had higher risks of hospitalisation than others (Faris & Dunham, 1939). The Maryland study finds an association on an individual level, among the lowest income groups, mental disorders were six times more common than among the high-income groups. The study was replicated on other American states finding correlations between socioeconomic status and mental conditions (Fee, 1987). Walton (1979) found similar SES patterns for incarceration rates in 1850s Lancashire, where lower-skilled workers or those without family support were over-represented in the asylum. However, the evidence is not clear cut. Confinement has also been shown to be associated with strong family ties and low geographical mobility (Adair, Melling, & Forsythe, 1997). Furthermore, the modern SES gaps in mental health are mirrored in differences in life expectancy (Crimmins & Saito, 2001). However, in historical populations, studies find the opposite pattern among men, high-status men had lower life expectancy than those with low status (Edvinsson & Broström, 2012; Edvinsson & Lindkvist, 2011).

## Theory

There are two main explanations to the negative relationship between socioeconomic status and mental health, social causation and social drift. Social causation asserts that low SES groups have poorer mental health due to economic deprivation. They would have fewer resources, both financial and social, that exposes them to higher risks of mental illness (Brown & Harris, 2012; Hudson, 2005). The alternative hypothesis is that poor mental health leads to a social downward-drift, where people who have mental illness have higher risks of unemployment and financial problems, that creates the negative relationship.

Furthermore, the patterns are also affected by geographical drift, where people with poor mental health are more likely to move to low SES areas, where the economic and social opportunities for upward mobility are fewer (Glymour, Avendano, & Kawachi, 2014). Empirical findings, adjusting for selection effects, support for both hypotheses, low SES has higher risks of mental illness, and people with mental illnesses have a higher risk of a downward drift (Hudson, 2005; Reiss, 2013). As the economic deprivation was even worse in historical population, one can assume that the gaps were larger before the emergence of the welfare state.

Gender gaps in health have been proposed to be related to differences in role-based exposures to mental illness risks and role-based responses to mental distress. Women are exposed to more situations that induce stress, lack of trust, financial insecurity and lack of independence which increases the risk of mental illness, caused by labour market inequalities and division of household labour (Hill & Needham, 2013; R. W. Simon, 1995). However, empirical findings show that the overall burden of distress is equal among genders. These gender gaps have been explained by differences in role-based responses to distress (Robin W. Simon, 2002; R. W. Simon, 1995). Men and women respond differently to mental distress based upon gendered perceptions of accepted behaviours. Gendered norms of behaviour make it easier for women to internalise problems and express them in the form of depression or anxiety, while it makes it easier for men to externalise problems and express them through substance abuse, alcohol abuse and antisocial behaviours (Hill & Needham, 2013; R. W. Simon, 1995).

Changes in mental illness between men and women could reflect either a change in exposures, for example as women started to participate in the workforce, or by changes in expectations of appropriate behaviour in response to distress. Women are more likely to develop a mental disorder than men, much because the majority of people mired in poverty are women and that the risk of poverty among women can largely be explained by women's, in general, larger lack of social and economic power (Belle, 1990). These circumstances were even more present historically, where women had less employment and income opportunities and were even more exposed to economic stress as single mothers and providers. Responses would shift as gender norms on emotional behaviours changed, for example, through an increased pathologisation of women's mental health.

## Aim

The lack of micro-data has limited most historical studies of SES, gender variations in mental illness. We used digitised Swedish historical church records, that contains information on both occupational careers as well as mental disorders. The aim of this study was to examine (1) whether there were gender differences in risks of attaining a mental disorder and if it varies over time; (2) whether there were gender-specific socioeconomic differences in risks of attaining a mental disorder and if it varies over time. Using this longitudinal data, we investigate how gender and SES was related to the risk of mental disorders later in life. The differences were explored using Cox proportional hazard regression, while adjusting these

assessments for other selection mechanisms such as geographical drift, socioeconomic context or family situation.

# Method

## Research design and data

We use longitudinal microdata from POPLINK, composed of digitised Swedish parish registers from Västerbotten county (1900–60), digitalised by the Demographic Database at Umeå university (Westberg, Engberg, & Edvinsson, 2016). The area consists of 12 parishes in surrounding two small towns Skellefteå and Umeå located around outlet of major rivers at the shores of the Gulf of Bothnia, see Figure 1. The population grows from around 80,000 in 1900 to 160,000 in 1960. Over the study period, the region experiences extensive economic and social transformations, the economy shift from an agricultural based economy to an industrial one.
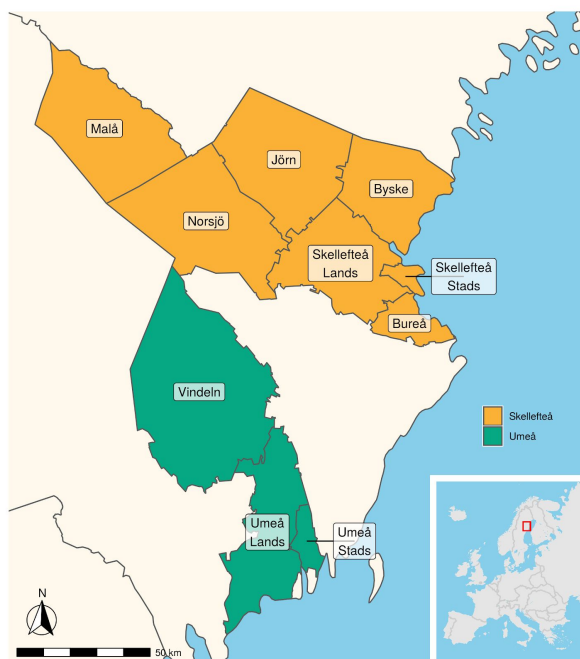


**[Figure 1: Map of study area.]**

The sample consists of all individuals in the sample region aged 15 and over, who do not have a reported mental disorder when entering the study, N = 193,323, where some 2,484 attain a reported mental disorder over their lifecourse. By using the temporal order of events in the longitudinal data, we can assure that the onset of disorder occurs after experiencing a particular SES. The overarching research design is thus to examine how socioeconomic

status experienced prior in life was related to the risk of a disorder later on in life. A higher relative risk of a disorder for lower SES groups compared to higher SES group would indicate a causal relationship between SES and the risk of mental illness, while no difference would indicate no causal relationship.

## Measurement of mental disorders

Information on mental health is collected from notes on individual impairments in the parish registers. Until the 1950s, it was the ministers' duty to record statistical information on the population in their parish (Westberg et al., 2016). These sources have been digitised and linked on an individual level by the Demographic database, creating a historical longitudinal population register, with continuous information on not only birth, deaths and marriages but also on migration, household structure, occupation and impairment (Lyte). In order to perform these duties, the minster followed detailed instructions provided by the state on how to record and categorise everything from migration to occupational titles and disability. These instructions were printed, thought in the priest seminars and updates were distributed among the ministers throughout the country.

According to the instructions, the ministers should differentiate between people who were blind, deaf, mute, deafmute, epileptic (fallandesot), physically disabled and mentally disabled. In regards to mental disabilities, the instructions obliged the minster to differentiate between two types: "sinnesssjukdom" (mental illness) and "sinnesslöhet" (feeblemindedness). For the most part, the minster used these groups to classify individuals with disabilities. However, they also used older terms such as insane (galen) or idiot. We use these notes to classify the disability notations using keyword searches, into seven groups: blind, deaf, mute, epileptic, physical disability, intellectual disability and mental disability. The verify the keyword classification the groups were compared to groups created through unsupervised topic modelling, an LDA model. Latent Dirichlet Allocation is used in quantitative text analysis to extract topics from large corpora of text. The model allocates a document, (in this case, a disability notation) into a group by finding clusters of co-occurring words (Blei et al. 2003; Blei 2012). In this case, we let the model extract seven topics from the corpus of notes and compared these topics to the ones created by the keyword search. Approximately 93 per cent psychiatric disability notations fall into psychiatric related topics. This shows that the keyword classification reflects the patterns of co-occurring words in the notes, that also separate between intellectual and psychiatric disability notes.

The instructions to the minster define someone with a mental illness as one who has lost their mind, while someone who is feebleminded had since childhood been mentally slow (Wannerdt, 1947). It is clear from the instructions that the minster should separate between mental illnesses that are innate (such as autism or Downs syndrome) and those that are attained through life (such as depression, anti-social disorders or schizophrenia). The difference between intellectual (innate) illness and psychiatric (attained) illness is evident when we look at the age distribution of the first mark of impairment in the sample.
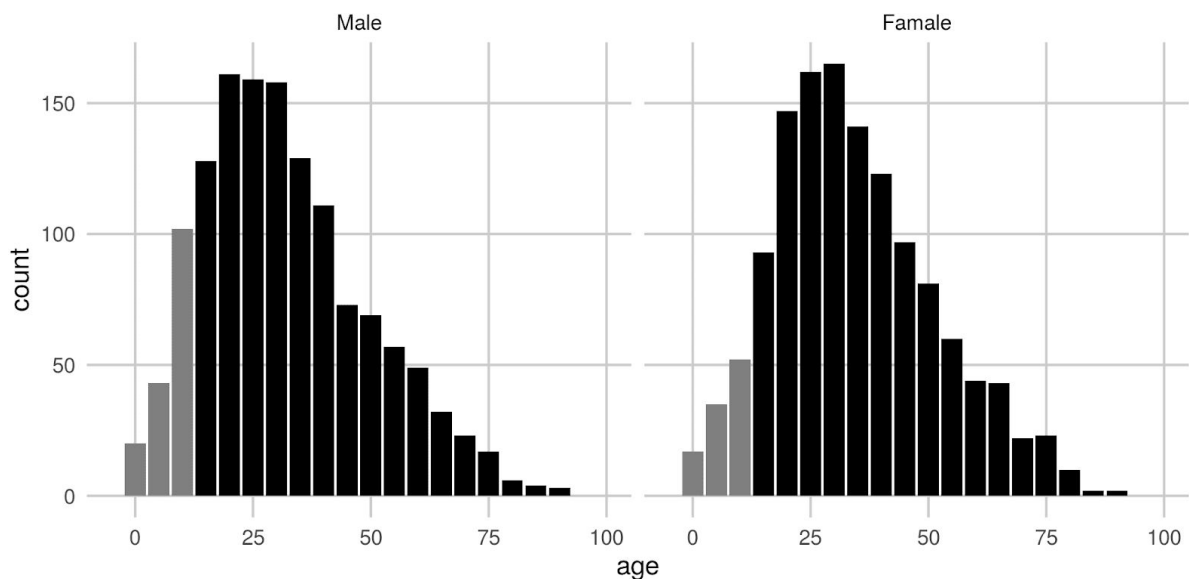


**[Figure 2: Male and Female age distribution of first reported mental disorder in Västerbotten, Sweden, 1900-1960.]**

In this study, we are interested in the psychiatric notations, which primarily occur between age 15 and 35 with a peak between ages 20 and 35, seen in Figure 2. We compare the historical age distribution to the modern one using data from the Global Burden of Disease study (James et al., 2018). As seen in Figure 3, the age distribution of first reported mental illness in Sweden in 2017 peaks around age 25, similarly to the historical sample. However, in the modern data the incidence in the older age groups are much higher. Sweden has a rapidly aging population, some of these differences are thus caused by changes in population structure. The distribution of age of onset of mental illness is consistent with the median onset age of mood disorder, anxiety disorders and substance abuse, but later than

the onset of behavioural disorders such as ADHD which occur prior to age 15 (Kessler et al., 2007). Although performed in different settings, the ministers reporting of mental illness in the first half of the 20th century mirrored that of modern day register data, at least in terms of age of onset.
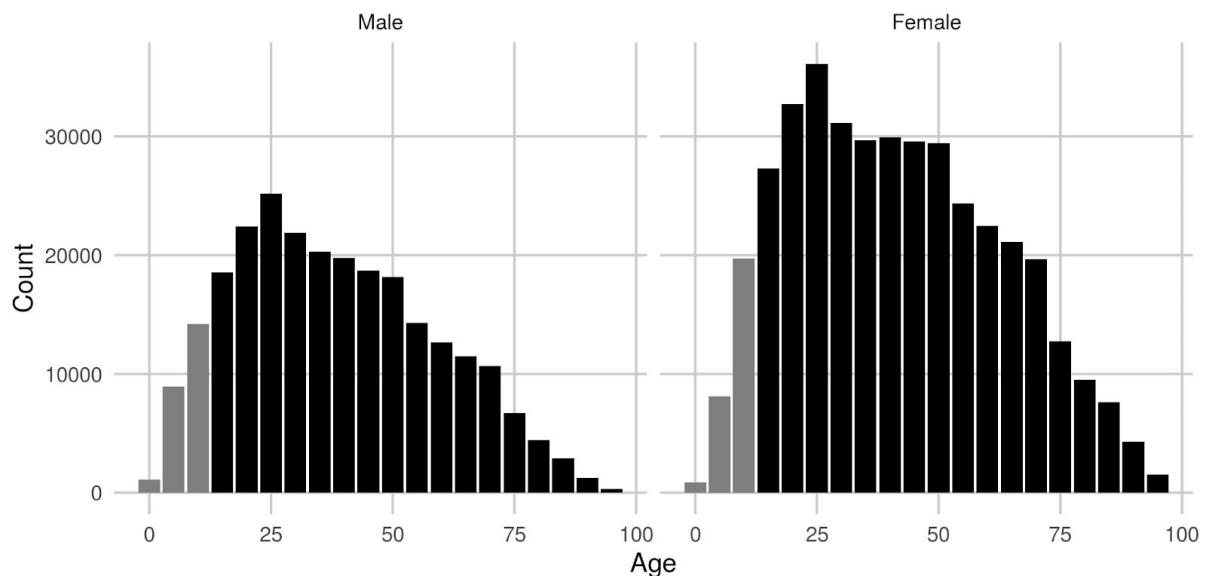


**[Figure 3: Age distribution of first reported mental disorder in Sweden in 2017. Including behavioural, anxiety, depressive and substance abuse disorders.]**

## Measurements of socioeconomic status

Socioeconomic status is derived from occupational information from the parish registers. Due to the longitudinal design of the data, it is possible to follow occupational careers of individuals. Thus, it is possible to assert when in life a person had a specific occupation, and most importantly, what occupation they had before they received a mental illness notation. Information on socioeconomic status is attained by classifying the occupational titles into HISCO codes and then grouping them into classes using the Social Power (SOCPO) schema (Leeuwen, Maas, & Miles, 2002; Van de Putte & Miles, 2005). The SOCPO scheme divides the occupations into six hierarchical groups, from Elite to unskilled workers. To create larger, more comparable groups, we have combined the six groups into four and added another group of those without any occupational information, see Table 1. Women's

occupation was under-registered and, if they were married, their status was often dependent on their husbands' occupation. Thus, when defining individual SES, for men, we use only their own occupation while for women, we use both their own (and if married) their husband's occupation.

**Table 1: Socioeconomic status classification**

| nr | SOCPO | Condensed SOCPO |
|----|-------|-----------------|
| 6 | Elite | Elite/Middle Class |
| 5 | Middle Class | |
| 4 | Farmers | Farmers |
| 3 | Skilled workers | Skilled workers |
| 2 | Semi-skilled workers | |
| 1 | Unskilled workers | Unskilled workers |
| 0 | | No occupation |

# Measurements of confounding factors

Although the longitudinal design enables a temporal separation of SES exposure and onset of risk, the different groups have different social and contextual compositions, see Table 1 in Appendix for a description of compositional differences in the sample. The estimate are balanced for a number of confounding factors which could induce selection effects. The risk of attaining a mental disorder and aching higher socioeconomic status peaks at different ages, thus each risk-set is conditioned on achieving a certain age. Migration can also confound the estimates; healthy individuals are often more likely to migrate and have better occupational careers than stayers (Pekkala & Tervo, 2002), hence, we differentiate between stayers and migrants. Marital status also has a significant impact on mental health. While being married have a positive effect on mental health, divorce and widowhood increases risks of attaining disorders (Robin W. Simon, 2002). Importantly, marital rates have significant socioeconomic patterns (Sandström, 2017) and could thus be a potential mechanism confounding the SES mental health relationship. Finally, socioeconomic groups are not evenly distributed geographically. People tend to cluster together with people who are similar to themselves (McPherson, Smith-Lovin, & Cook, 2001). Low SES individuals have a higher likelihood to live and move to a low SES area. Low SES areas often have

lower levels of trust and social cohesiveness, which in turn increases risks of poor mental health (I. Kawachi, Takao, & Subramanian, 2013). This selection effect is handled by balancing the estimated risks for contextual factors such as population density on neighbourhood level as well as parish specific and neighbourhood specific risks.

The sampled area consists of 12 parishes and the population is dispersed over 1,148 villages and towns. Neighbourhoods was created by subdividing each parish into smaller areas consisting of neighbouring villages and towns. The process, which follows the same methodology as described in Junkka (2018),  creates 229 neighbourhoods, see Table 2 in Appendix for further details on the geographical level. Local socioeconomic structures was created by calculated the yearly SES distribution on a neighbourhood level, and then classifying each parish by year into one type of distribution using k-means clustering, creating 4 types of local SES structures: Urban, Semi-urban, Working-class and Farmers. Individuals without a known place of residence besides being present in the parish were categorised as a fifth group.

## Statistical Analysis

Before testing the associations using regression-based methods, we explore the differences in prevalence by socioeconomic status and gender. Yearly prevalence rates were obtained by calculating the proportion of people who had ever been reported with a mental illness in relation to the total population at risk that year.

We tested how socioeconomic status and gender were related to mental illness using multilevel Cox proportional hazard models. Individuals entered the study when they are first observed in the sources from age 15 and followed until they receive their first reported mental illness or until they were censored. We tested for both overall gender differences as well as gender-specific socioeconomic differences. Variations over time were tested by interacting gender and socioeconomic status with calendar time. The models were tested for non-linearity and non-proportionality. We further tested the increations with calendar-time for non-linearity by specifying calendar time as non-linear spline and stratified by decade. Although there is a slight curve-linear effect of calendar-time the nonlinear specifications do not add any significant explanatory power to the model, or change the relative differences between gender and SES groups in comparison to a specification of calendar-time as a linear function. To assess how the differences changed over the study period (1900-1960) we extracted the predicted relative hazard  for women compared to men, and in the

gender-specific socioeconomic analysis compared to Farmers, the largest group in the sample

The multilevel models allow us to make these estimated while controlling for both confounding individual differences as well as contextual differences at different geographical levels. The effect of migration, marital status, neighbourhood level socioeconomic structure and the log of population density was specified as fixed effects while neighbourhood-level and parish-level unobserved geographical heterogeneity were specified as random effects. The models were constructed and evaluated using the statistical programing language R and the coxme packages (R Core Team, 2019; Therneau, 2012).

# Results

Figure 4 shows the prevalence rates of mental illness by gender. Overall the prevalence of mental illness increases over time, from around 0.4 per cent to 1.5 per cent of the population over 15. The general trend shows a modest increase until 1925 and then a stronger increase until the late 1940s, after which the prevalence stabilized. Men had a higher prevalence of mental illness until the late 1950s, when the proportion of women continued to increase while men did not.
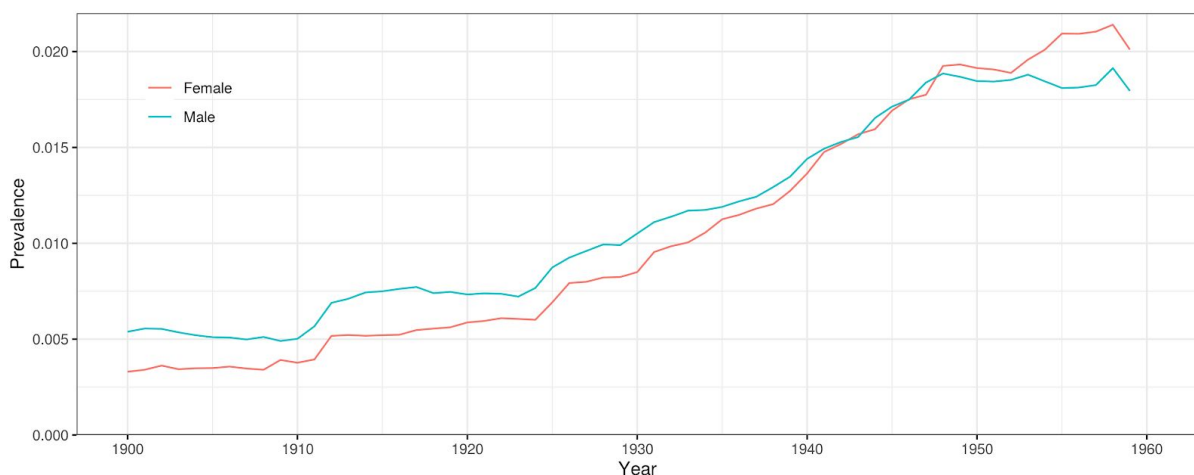


**[Figure 4: Gender-specific prevalence of mental illness, in Västerbotten, Sweden, 1900-1959.]**

In terms of socioeconomic differences, in Figure 5 we see that the prevalence is stable among the Middle-class/Elite while it increases for all other groups, most for Farmers. In 1900 Middle-class/Elite had the highest rates (around 1 per cent), while there were small

differences among the other socioeconomic groups. In 1960 we see a clear gradient in mental health by socioeconomic status, from the Elite/Middle Class with the lowest prevalence to the working class with the higher and Farmers with the highest prevalence.



**[Figure 5: Mental illness prevalence by SES, in Västerbotten, Sweden, 1900-1959.]**
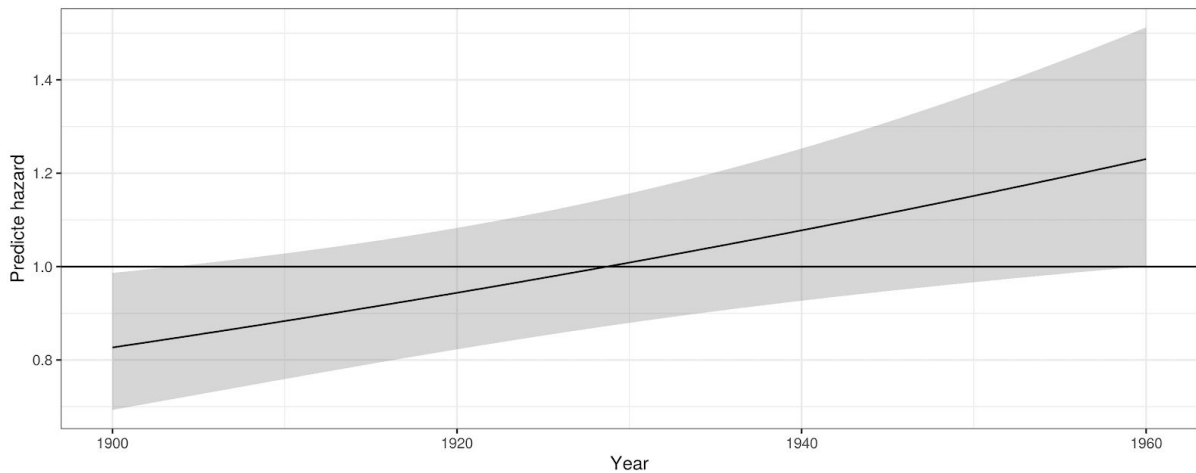


**[Figure 6: Predicted relative hazard of mental illness for women compared to men in Västerbotten, Sweden, 1900-1960. Estimated using Cox proportional hazard models adjusted for individual and contextual factors. See Table 5 in the Appendix for further details]**

Figure 6 shows the predicted relative hazard of receiving a mental illness for women compared to men. After adjusting for compositional and contextual differences, we see that women had a ~20 per cent lower risk than men in 1900 and that the gap between the

genders closed over time, even showing a higher risk (about 20 per cent) for women in 1960 than men. However, although the interactions were statistically significant, the difference between genders at the end of the study period was not.

Among the men, there was a reversal in the socioeconomic gradient in mental health risks (see Figure 7). In 1900 Elite/Middle-class men had the highest risk than all other groups. The relative risk of Elite/Middle-class men (in comparison to farmers) declined over time, while it increased for Unskilled workers and those without an occupation, showing a clear positive socioeconomic gradient in mental health risk. The results for women do not show the same pattern, see Figure 8. In 1900, the relative risk of working-class women declined in comparison to farmers while it increased for Elite/Middle class and those without an occupation. The largest overall difference between groups is between women without an occupation (or with unemployed husbands) and women with an occupation. This also is the overall similarities for both men and women; we see an emergent gap between the lowest status group (those without an occupation) and everyone else.
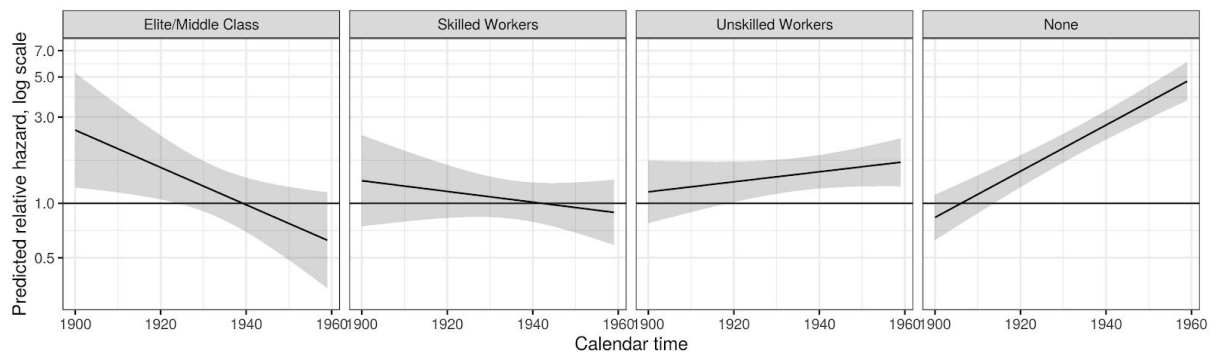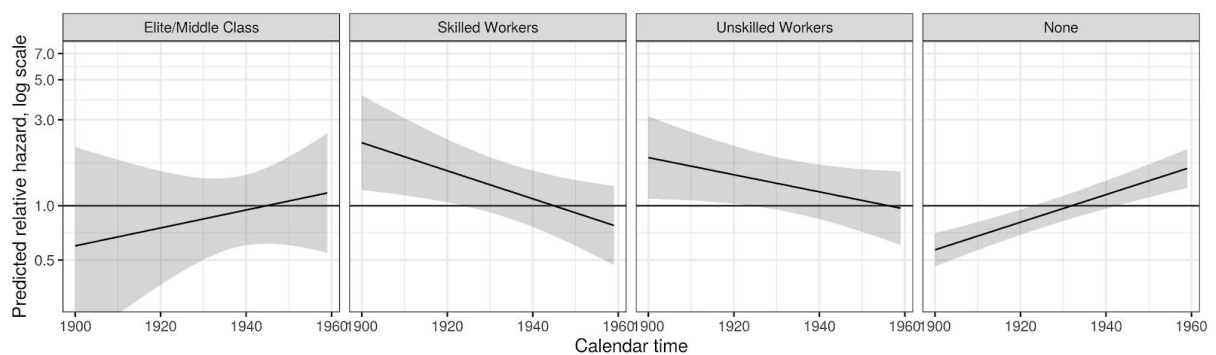


**[Figure 7: Predicted relative hazard of mental illness by male socioeconomic status, compared to farmers, in Västerbotten, Sweden, 1900-1960. Estimates from gender-specific Cox proportional hazard models adjusting for individual and contextual level confounding factors. See Table 3 in the Appendix. ]**

**[Figure 8: Predicted relative hazard of mental illness by female socioeconomic status, compared to farmers, in Västerbotten, Sweden, 1900-1960. Estimates from gender-specific Cox proportional hazard models adjusting for individual and contextual level confounding factors. See Table 4 in the Appendix. ]**

# Discussion

This study suggests that socioeconomic and gender gaps in health emerged between 1900 and 1960. We find that women had a lower risk of mental illness than men in 1900. However, over time, the gap decreased until 1930 when found no difference between genders. The results also indicate that women's risk increased afterwards until 1960, however, the differences are not statistically significant.

For men, we find a reversal of the socioeconomic gradient in mental illness risks. In 1900 the highest SES groups also had the highest risks and in 1960 the lowest. Furthermore, we find minimal differences in risks between the other groups in 1900 and increasing gaps over time. In 1960, we found the results similar to the contemporary positive socioeconomic gradient in mental illness risks. For women we do not find the same clear patterns, in 1900 there were large gaps between socioeconomic groups where working-class and especially farmers had higher risks than others, over time the gaps decreased for all except those without an occupation, where the risk increased. The gender-specific results show that SES had a greater impact on men's mental health than women's and that low social status was increasingly a risk factor for both genders. Due to the longitudinal design of this study, we can determine that the risks of a mental disorder were related to an individual's exposure to a particular SES prior in life, and not by a social downward-drift after the attainment of a mental disorder.

Our findings show that, in contrast to contemporary populations, there were very small or even reversed gaps between genders and socioeconomic groups in early 20th century Sweden (Culbertson, 1997; Fiske et al., 2009; Folkhälsomyndigheten, 2018; Hudson, 1988; Reiss, 2013; WHO Department of Gender, Women and Health, 2002). The modern patterns seem to have started to emerge during the 1930s in Sweden. Even though relative economic deprivation was even larger at the beginning of the study period than in the end, we do not find that the socioeconomic gradient was larger. Instead, for men, we find that high status men had higher risks. Although this is not in line with studies of contemporary populations, this reverse gap among men is mirrored in studies of long-term developments of

socioeconomic differences in life expectancy. In the early 20th century and before, high-status men had lower survival chances than low-status men. For women, there were small if any socioeconomic differences (Edvinsson & Broström, 2012; Edvinsson & Lindkvist, 2011). Our findings suggest that this was also mirrored in mental health, at least until the 1930s.

That men had higher risks in the early 20th century is consistent with historical studies of madness and gender. Both Foucault and Porter find that men were perceived as the mentally weaker sex and madness were associated with masculinity. The reversal has been argued to occur during the 19th century (Foucault, 2003; Porter, 1987). Our findings suggest that it, in Sweden, it occurred later, in the 20th century. The reversal coincides with the emergence of modern institutional psychiatry and the increased pathologisation of women's mental health. The increase in women's risks of mental illness could be an effect of the redefinition of gender role-based responses to distress within psychiatry (Ek, 2017; R. W. Simon, 1995). However, the period is also characterised by an increase in women's workforce participation. Women worked at low wage jobs with limited autonomy while the burden of household work continued on theirs, which increased exposure to mental health risks (Hirdman, 1992; Therborn, 2004). In this study, we cannot determine whether women's increasing relative risk is caused by changes in role-based responses to distress or by increased exposure to distress, merely report the changes in relative risks.

This study has several limitations. First, we rely on reported mental illness and not experienced distress. Reported illness does not always reflect actual experiences, men's mental distress is often underestimated in official reporting. Second, the identification of mental illness relies on notes on impairments by the ministers and not by trained professionals. As the identification process differs between ministers and health professionals, the reporting could be biased in the historical sample by, for example, class and gender-specific views on mental health and stigma. However, the age-distribution of reported mental illness is similar to contemporary populations suggesting that the reporting reflect similar types of distress as in modern data. Additionally, the tendency for reporting higher rates among men and higher status individuals in the early period is contrary to what we would expect if the reporting was biased. The minister had more reasons to be vary of reporting a socially stigmatized condition such as mental health problem regarding individuals that had higher social status and moved in the same social circles as the minister. The fact that we find the opposite pattern of higher rates of a higher reported prevalence of mental problems in the upper social strata make it more unlikely that such

social concerns influenced the reporting done by the church organization. Third, the study is based on a geographically limited population. There might be differences between locations farther away caused by contextual factors. Fourth, despite the adjustment of measures of both individual and contextual differences, there remains the possibility for unmeasured confounders, especially in regards to individual and collective social support such as the proximity of family and kin.

Overall our findings suggest that the contemporary socioeconomic and gender gaps in mental health are not a historically persistent feature, but rather that it emerged during the early 19th century simultaneously as the Swedish welfare system took form. During the period 1900-1960, institutional psychiatric care expanded rapidly from around 4600 beds in 1900 to around 16000 beds in the 1960s. The gaps emerged hand in hand with the social hygiene movement, where both medicine and public policy came to focus on the mental health of women and lower classes. When considering the origin of contemporary inequalities in mental health, one must take into account the historical context of when it emerged and how it might have influenced the development of current gaps.

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# Appendix

Table 1: Descriptive statistic of study population with or without ever having a reported mental illness in 12 parishes Västerbotten county 1900-1960. Subjects enter from age 15 onward and followed until attaining a mental illness or they are censored.

| Variable | Level | Without a reported mental illness | | With a reported mental illness | |
|---|---|---|---|---|---|
| | | Mean | Count | Mean | Count |
| Events | | 0.00 | | 1.00 | |
| Individuals | | | 193323 | | 2484 |
| Age at entry | | 19.91 | | 18.71 | |
| Age at exit | | 40.17 | | 38.70 | |
| Year of entry | | 1926.54 | | 1921.20 | |
| Year of exit | | 1935.34 | | 1933.98 | |
| Follow-up time | | 20.26 | | 20.00 | |
| Event | | 0.00 | 193323 | 1.00 | 2484 |
| Gender | Man | 0.48 | 93515 | 0.48 | 1193 |
| | Women | 0.52 | 99808 | 0.52 | 1291 |
| Marital status | married | 0.49 | 94292 | 0.38 | 944 |
| | divorced | 0.00 | 374 | 0.00 | 10 |
| | Unmarried | 0.50 | 96441 | 0.59 | 1471 |
| | widowed | 0.01 | 2216 | 0.02 | 59 |
| Migrant | FALSE | 0.39 | 75946 | 0.47 | 1178 |
| | TRUE | 0.61 | 117377 | 0.53 | 1306 |
| Birth-date | | 1900.63 | 193323 | 1896.18 | 2484 |
| SES | Middle Class | 0.07 | 13297 | 0.04 | 107 |
| | Middle Class: Farmers | 0.19 | 36542 | 0.19 | 475 |
| | None | 0.36 | 69715 | 0.45 | 1106 |
| | Skilled Workers | 0.14 | 26421 | 0.09 | 223 |
| | Unskilled Workers | 0.24 | 47348 | 0.23 | 573 |
| Local SES structure | 0 | 0.07 | 13365 | 0.09 | 222 |
| | 1 | 0.12 | 24103 | 0.13 | 330 |
| | 2 | 0.47 | 91327 | 0.34 | 839 |
| | 3 | 0.06 | 11280 | 0.09 | 217 |
| | 4 | 0.28 | 53248 | 0.35 | 876 |
| Log of population density | | 0.18 | 193323 | 0.15 | 2484 |
| Decade | 1900 | 0.27 | 52326 | 0.11 | 271 |
| | 1915 | 0.17 | 33517 | 0.21 | 522 |
| | 1930 | 0.27 | 51948 | 0.45 | 1127 |
| | 1945 | 0.29 | 55532 | 0.23 | 564 |

Table 2: Descriptive statistics of geographical units

| Unit | Variable | Mean | 25th | Median | 50th |
|---|---|---|---|---|---|
| Parish (N=12) | Population | 72.72 | 3819.01 | 5953.04 | 9131.43 |
| | Area | 19656.77 | 179610.2 | 1256401.26 | 2e+06 |
| | Density | 9.9e-05 | 0.0034 | 0.0077 | 0.015 |
| Neighbourhood (N=229) | Population | 1 | 45 | 120 | 285 |
| | Area | 5390.47 | 16706.59 | 28041.58 | 54852.45 |
| | Density | 0.0015 | 0.11 | 0.3 | 0.66 |

Table 3: Hazard of receiving a reported mental illness for men in Skellefteå and Umeå regions 1900-1960

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| Variable | HR | P-value | HR | P-value | HR | P-value |
| Farmers | 0.458 | 0.037 | 0.336 | 0.005 | 0.393 | 0.020 |
| None | 0.366 | 0.005 | 0.290 | 0.001 | 0.329 | 0.003 |
| Skilled Workers | 0.537 | 0.147 | 0.513 | 0.130 | 0.525 | 0.154 |
| Unskilled Workers | 0.615 | 0.195 | 0.406 | 0.020 | 0.455 | 0.048 |
| Calendar time, centered at 1900 | 1.008 | 0.402 | 1.021 | 0.032 | 1.032 | 0.002 |
| Farmers * Calendar time | 1.028 | 0.010 | 1.027 | 0.015 | 1.024 | 0.037 |
| None * Calendar time | 1.056 | 0.000 | 1.057 | 0.000 | 1.055 | 0.000 |
| Skilled Workers * Calendar time | 1.019 | 0.110 | 1.018 | 0.145 | 1.017 | 0.177 |
| Unskilled Workers * Calendar time | 1.029 | 0.006 | 1.032 | 0.003 | 1.031 | 0.007 |
| Migrant | | | 0.765 | 0.000 | 0.730 | 0.000 |
| Divorced | | | 3.841 | 0.001 | 3.566 | 0.002 |
| Unmarried | | | 2.674 | 0.000 | 2.795 | 0.000 |
| Widowed | | | 1.015 | 0.949 | 1.017 | 0.941 |
| Local SES: Urban | | | 0.662 | 0.001 | 0.701 | 0.408 |
| Local SES: Semi-urban | | | 0.358 | 0.000 | 0.194 | 0.000 |
| Local SES: Working-class | | | 1.556 | 0.002 | 2.100 | 0.088 |
| Local SES: Rural | | | 0.900 | 0.332 | 0.976 | 0.954 |
| Log of population density | | | 0.875 | 0.000 | 0.841 | 0.000 |
| SD Neighborhood-level effect | | | | | 0.418 | |
| SD parish-level effect | | | | | 0.254 | |
| N neighborhoods | | | | | 229.000 | |
| N parishes | | | | | 12.000 | |
| N events | 562487.000 | | 562487.000 | | 562487.000 | |
| Events | 1193.000 | | 1193.000 | | 1193.000 | |
| P-value | 0.000 | | 0.000 | | 0.000 | |
| AIC | 24213.252 | | 23850.461 | | 23714.491 | |

Table 4: Hazard ratio (HR) of receiving a reported mental illness for women in Skellefteå and Umeå regions 1900-1960

| Variable | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | HR | P-value | HR | P-value | HR | P-value |
| Farmers | 0.952 | 0.916 | 1.188 | 0.720 | 1.341 | 0.552 |
| None | 0.747 | 0.506 | 0.918 | 0.850 | 1.022 | 0.962 |
| Skilled Workers | 1.065 | 0.908 | 1.085 | 0.886 | 1.015 | 0.980 |
| Unskilled Workers | 1.495 | 0.367 | 1.832 | 0.186 | 2.187 | 0.096 |
| Calendar time, centered at 1900 | 1.043 | 0.000 | 1.061 | 0.000 | 1.072 | 0.000 |
| Farmers * Calendar time | 1.004 | 0.757 | 1.001 | 0.962 | 1.000 | 0.973 |
| None * Calendar time | 1.019 | 0.102 | 1.016 | 0.180 | 1.014 | 0.246 |
| Skilled Workers * Calendar time | 0.997 | 0.833 | 0.996 | 0.755 | 0.997 | 0.865 |
| Unskilled Workers * Calendar time | 0.993 | 0.554 | 0.990 | 0.393 | 0.987 | 0.290 |
| Migrant | | | 0.928 | 0.231 | 0.839 | 0.010 |
| Divorced | | | 1.442 | 0.467 | 1.327 | 0.574 |
| Unmarried | | | 2.468 | 0.000 | 2.462 | 0.000 |
| Widowed | | | 0.957 | 0.806 | 0.927 | 0.674 |
| Local SES: Urban | | | 0.671 | 0.001 | 0.702 | 0.401 |
| Local SES: Semi-urban | | | 0.407 | 0.000 | 0.192 | 0.000 |
| Local SES: Working-class | | | 1.400 | 0.016 | 1.737 | 0.194 |
| Local SES: Rural | | | 0.847 | 0.125 | 0.898 | 0.796 |
| Log of population density | | | 0.915 | 0.000 | 0.906 | 0.013 |
| SD Neighborhood-level effect | | | | | 0.413 | |
| SD parish-level effect | | | | | 0.307 | |
| N neighborhoods | | | | | 229.000 | |
| N parishes | | | | | 12.000 | |
| N events | 570557.000 | | 570557.000 | | 570557.000 | |
| Events | 1291.000 | | 1291.000 | | 1291.000 | |
| P-value | 0.000 | | 0.000 | | 0.000 | |
| AIC | 26069.972 | | 25766.074 | | 25584.735 | |

Table 5: Hazard ratio (HR) of receiving a reported mental illness in Skellefteå and Umeå regions 1900-1960. Interaction between gender and calendar time

|  | Model 1 | | Model 2 | | Model 3 | |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **HR** | **P-value** | **HR** | **P-value** | **HR** | **P-value** |
| Women | 0.894 | 0.286 | 0.871 | 0.201 | 0.849 | 0.134 |
| Calendar time, centered at 1900 | 1.043 | 0.000 | 1.061 | 0.000 | 1.073 | 0.000 |
| Women * Calendar time | 1.006 | 0.028 | 1.007 | 0.016 | 1.007 | 0.013 |
| Divorced | | | 2.205 | 0.013 | 2.029 | 0.026 |
| Unmarried | | | 2.530 | 0.000 | 2.598 | 0.000 |
| Widowed | | | 0.977 | 0.870 | 0.958 | 0.762 |
| Farmers | | | 1.061 | 0.586 | 1.138 | 0.239 |
| None | | | 1.785 | 0.000 | 1.878 | 0.000 |
| Skilled Workers | | | 0.919 | 0.474 | 0.923 | 0.494 |
| Unskilled Workers | | | 1.313 | 0.010 | 1.400 | 0.002 |
| Migrant | | | 0.845 | 0.000 | 0.787 | 0.000 |
| Local SES: Urban | | | 0.684 | 0.000 | 0.694 | 0.417 |
| Local SES: Semi-urban | | | 0.388 | 0.000 | 0.168 | 0.000 |
| Local SES: Working-class | | | 1.521 | 0.000 | 2.282 | 0.067 |
| Local SES: Rural | | | 0.889 | 0.124 | 1.000 | 1.000 |
| Log of population density | | | 0.895 | 0.000 | 0.903 | 0.002 |
| SD Neighborhood-level effect | | | | | 0.476 | |
| SD parish-level effect | | | | | 0.322 | |
| N neighborhoods | | | | | 229.000 | |
| N parishes | | | | | 12.000 | |
| N events | 1133044.000 | | 1133044.000 | | 1133044.000 | |
| Events | 2484.000 | | 2484.000 | | 2484.000 | |
| P-value | 0.000 | | 0.000 | | 0.000 | |
| AIC | 53934.792 | | 53134.563 | | 52751.170 | |