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RESEARCH

Long term mental health outcomes of Finnish children evacuated to Swedish families during the second world war and their non-evacuated siblings: cohort study

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Abstract

Objectives To compare the risks of admission to hospital for any type of psychiatric disorder and for four specific psychiatric disorders among adults who as children were evacuated to Swedish foster families during the second world war and their non-evacuated siblings, and to evaluate whether these risks differ between the sexes.

Design Cohort study.

Setting National child evacuation scheme in Finland during the second world war.

Participants Children born in Finland between 1933 and 1944 who were later included in a 10% sample of the 1950 Finnish census ascertained in 1997 (n=45 463; women: n=22 021; men: n=23 442). Evacuees in the sample were identified from war time government records.

Main outcome measure Adults admitted to hospital for psychiatric disorders recorded between 1971 and 2011 in the Finnish hospital discharge register.

Methods We used Cox proportional hazards models to estimate the association between evacuation to temporary foster care in Sweden during the second world war and admission to hospital for a psychiatric disorder between ages 38 and 78 years. Fixed effects methods were employed to control for all unobserved social and genetic characteristics shared among siblings.

Results Among men and women combined, the risk of admission to hospital for a psychiatric disorder did not differ between Finnish adults evacuated to Swedish foster families and their non-evacuated siblings (hazard ratio 0.89, 95% confidence interval 0.64 to 1.26). Evidence suggested a lower risk of admission for any mental disorder (0.67, 0.44 to 1.03) among evacuated men, whereas for women there was no association between evacuation and the overall risk of admission for a psychiatric disorder (1.21, 0.80 to 1.83). When admissions for individual psychiatric disorders were analyzed, evacuated girls were significantly more likely than their non-evacuated sisters to be admitted to hospital for a mood disorder as an adult (2.19, 1.10 to 4.33).

Conclusions The Finnish evacuation policy was not associated with an increased overall risk of admission to hospital for a psychiatric disorder in adulthood among former evacuees. In fact, evacuation was associated with a marginally reduced risk of admission for any psychiatric disorder among men. Among women who had been evacuated, however, the risk of being admitted to hospital for a mood disorder was increased.

Introduction

Children displaced as a result of armed conflicts, human rights abuses, and natural disasters account for up to 5% of the global refugee population; in 2012 alone, more than 21 000 asylum claims were lodged for displaced children.[1] Policy responses to this problem must balance two competing factors: the protection of children and the preservation of the family. Wars and natural disasters have direct impacts on children that are harmful to their development[2-4]; shielding children from these direct impacts often entails separation from their biological parents, but such separation is in itself harmful.[5-7] Weighing these alternatives requires a better understanding of the long term consequences, but follow-up studies of long duration are scarce, particularly ones that can overcome strong selection biases associated with the vulnerabilities of families and children.[8]

We investigated the risk of admission to hospital for a psychiatric disorder among adults who as children experienced

separation from their families because of a policy designed to shield them from the direct impact of war and whether this risk differed between the sexes. Between 1941 and 1945, approximately 49 000 Finnish children aged 1 to 10 years were evacuated to Swedish foster families to protect them from the direct harms of war, such as air raids, malnutrition, and deaths of family members. Whether this policy conferred long term psychological harms brought about by separation from parents, adjustments to foster families who often spoke an unfamiliar language, and other stressors associated with displacement has been difficult to determine. Our expectation based on early studies of children in war time[9] and on contemporary studies of parental loss and separation in the general population, is that these exposures increase the risk of mental health problems, including mood, anxiety, and substance use disorders.[10-13] However, the net psychiatric effect of this policy could be either protective or adverse depending on which of the two conflicting needs outweighs the other. In addition, given previous research indicating sex differences in response to the experiences of war,[14 15] it is important to evaluate whether the long term mental health consequences of evacuation differs between men and women.

The fundamental challenge to evaluating the Finnish policy of child evacuation is identifying a credible comparison group. Simple comparisons of rates of psychiatric disorders between adults evacuated or not evacuated as children cannot be interpreted as the causal effects of evacuation unless it is assumed that both groups were equally likely to be evacuated. However, the historical records suggest that this was not the case—though the war led to adverse conditions for children from all social and economic backgrounds,[16] evacuation was likely contingent on a wide range of familial and child characteristics that could be independent risks for psychopathology. The Finnish evacuation policy, according to government guidelines from 1941, targeted children in the following categories: family displaced from the areas ceded to the Soviet Union in 1940 (Karelia), father wounded in battle, family home destroyed in bombings, and father died in the war or parents lost in bombings. Children of mothers working full time or those at risk of air raids were also considered eligible from 1942 onwards.[17] Supplementary appendix A provides more detail on the evacuation policy; in particular the historical background, the evacuation from Finland to Sweden, and the placement of children in foster families in Sweden.

Determining the long term mental health consequences of the Finnish evacuation is important for understanding the potential benefits and harms associated with such a policy and remains relevant to today's policy decisions on child refugees globally.[18]

Methods

This study used a within sibling design to evaluate the psychiatric consequences of the Finnish evacuation. We obtained a random sample of the 1933-44 birth cohort followed up to adulthood, compared rates of admissions to hospital for psychiatric disorders between evacuees and their non-evacuated siblings, and investigated sex differences in the association between evacuation and risk of admission for a psychiatric disorder. This design minimizes the selection biases to which small, unrepresentative samples are susceptible[19-25] and eliminates a broad category of potential confounding factors: all aspects of the family environment shared among siblings, which could have increased the likelihood of evacuation and independently conferred risk for psychiatric disorders.[26]

Study sample

The study sample included all people born between 1 January 1933 and 31 December 1944 who participated in the 1950 Finnish census and were selected for inclusion in a 10% follow-up sample conducted by Statistics Finland (n=71 788, sampling was conducted in 1997).[27] Using the participants' social security numbers, we linked their census record to the Finnish hospital discharge register (administered by the National Institute of Health and Welfare), providing data on admissions to hospital covering the years 1971-2011, and to the Finnish causes of death register (administered by Statistics Finland), providing data on the time of death covering the years 1971-2011. The current study included all people in the 10% follow-up sample who had at least one sibling also born between 1933 and 1944 and was living in Finland through 1970.

We determined each individual's evacuation status by comparing the first and last names and exact birth date of participants to the Finnish national archives' registry of child evacuees, which covers the entire population of evacuees (n=48 682).[17] To construct family covariates on background, we also linked the participants' records to the census data of their parents and their siblings born before 1933; this was done using family identifier variables that were available in the 10% follow-up sample of the 1950 Finnish census. After excluding those with a missing family identifier (n=1136), those who had died or emigrated from Finland before the 1970 census (n=4037), and those in sibling groups of one (n=19 738), our analytic sample consisted of 46 877 people, of whom 1425 had been evacuated to foster families in Sweden during the second world war. Supplementary appendix B provides more detail on the acquisition of data.

Measures

Evacuation

Exposure was defined as a binary variable; we assigned participants a value of 1 if they had been evacuated to foster families in Sweden during the second world war according to the complete child evacuee registry of the Finnish national archives and a value of 0 otherwise.

Admissions to hospital for psychiatric disorders

Our main outcome of interest was admission to hospital for a psychiatric disorder, obtained from the Finnish hospital discharge register between 1971 and 2011. The register contains information on the exact date of admission and discharge for all inpatient stays of residents in Finland. We used the primary and subsidiary diagnosis codes from the eighth, ninth, and 10th revisions[28-30] of the international classification of diseases and deaths (see supplementary table for specific ICD codes).

We conducted analyses of admission to hospital for any psychiatric disorder, as well as admission specifically for substance use and for psychotic, mood, and anxiety disorders. The validity of data from the Finnish hospital discharge register has been shown to range from satisfactory to very high, with positive predictive values for common diagnoses ranging between 75% and 98%[31]; the positive predictive values for mental disorders are 98%,[32] for psychotic disorder are 84-100%,[33] and for psychotic and bipolar disorders are 88%.[34] The psychiatric follow-up period 1971-2011 covered the ages of 38-78 years—that is, the oldest people in the sample were aged 38 in 1971.

Family sociodemographic characteristics

We obtained information on the sociodemographic characteristics of the families from the 1950 census, which contained questions for the specific purpose of retrospectively surveying the pre-war conditions of families—that is, as of 1 September 1939. Family socioeconomic status as of 1 September 1939 was based on the father's occupation (or mother's occupation if the father's occupation was missing), defined as entrepreneurs, white collar workers, blue collar workers, homemakers, and unemployed or out of the labor force. Parental education was defined by whether the father or mother had continued his or her education beyond primary school. Using the birth dates of each child in the family we obtained the number of children in the family as of 1940 and birth order from the 1950 census. Native language was defined by whether the family spoke Finnish or Swedish. We also included county of residence as of 1 September 1939 (including pre-war Karelia as one county). Supplementary appendix C provides the geographical distribution of study sample households across counties in 1939 and 1950.

Data analysis

Cox proportional hazards regression was used to estimate the risk of a being admitted to hospital for a psychiatric disorder during the follow-up period. The risk set included person time, beginning on the participants' 38th birthday until the date of first hospital admission, death, or until the end of the follow-up period (31 December 2011), when the oldest participants were aged 78 years. Person time contributed by those who were not admitted to hospital for a psychiatric disorder as of 31 December 2011 was censored on this date or on date of death if death occurred before the end of the follow-up period. Further, we excluded from the analysis those who experienced their first episode or died before age 38 but after 1971 (n=1414). In the analyses of specific categories of mental disorders, participants who were admitted for other disorders were censored on the date of admission. The analyses were performed using Stata 12. Hazard ratios are presented with 95% confidence intervals. The primary exposure variable in these analyses was evacuation status (coded 1 for former evacuees, 0 otherwise).

Our empirical strategy was to analyze the entire sample using conventional cohort analyses and to compare these findings with results from within sibling analyses. The conventional cohort analyses included controls for family background factors (father's socioeconomic status as of 1939, parental education, number of children in the family as of 1940, native language, birth order, and preintervention region of residence as of 1939). We then carried out within sibling analyses using fixed effect models in which the baseline hazard within siblings was held constant while allowing it to differ between those who were not siblings.[35] This way we adjusted for all sibling invariant factors (both the family characteristics adjusted for in the cohort analysis and the unobserved ones). The advantage of the within sibling model is that all genetic factors shared by siblings (roughly 50% of all genetic factors) and all shared (observed and unobserved) family background characteristics are held constant. This tackles concerns about confounding by unmeasured family factors that are known predictors of evacuation (for example, whether the father had died or was wounded in the war). Throughout the analyses we adjusted variance estimates to account for within family dependence (each family forms a cluster) because cluster specific effects, such as within sibling fixed effects, will in general not completely control for within cluster error correlation or heteroskedasticity.[36]

To test sex differences in the association between evacuation to foster families and mental disorders in adulthood, we included a sex by evacuation status interaction term in the model. We then used the regression coefficients from the main effects of evacuation, sex, and their interaction to examine whether evacuation contributed to a higher risk of mental disorders in adulthood among women than among men and to generate sex specific effects of the evacuation.

Results

A total of 4341 people, of whom 2456 were men, had episodes of mental disorders during the follow-up period that were severe enough to warrant or contribute to hospital treatment. Roughly 3% of the participants had been evacuated to Sweden during the second world war and spent on average two years living with a foster family. Table 1⇓ presents the sample characteristics for the participants by sex (supplementary appendix D presents these by exposure status for both sexes).

Table 2⇓ compares education, occupation, family size, and native language of parents of evacuee and non-evacuee households using the unrestricted sample (including households with one child) and the analytic sample collapsed to household level. The presented estimates are derived from linear probability models (with a binary dependent variable coded 1 if at least one child in the family was evacuated, 0 otherwise) and can be interpreted as percentage point changes (or absolute changes). A similar pattern emerged for both samples, indicating that parents from evacuee households were more likely to have a blue collar occupation, speak native Swedish, and have many children, and less likely to have continued education beyond primary school. Hence the participants of the evacuation program seem to be selected on observable dimensions of family background.

Table 3⇓ reports hazard ratios for participants admitted to hospital for mental disorders by evacuation status from the conventional cohort analyses, adjusting for observed background characteristics of the families (0.94, 95% confidence interval 0.79 to 1.12), and from the within sibling analyses adjusting for all observed and unobserved family characteristics shared among siblings (0.89, 0.64 to 1.26). These hazard ratios do not indicate any association between the evacuation and the likelihood of hospital admission for a psychiatric disorder in adulthood. However, the risk of admission for any psychiatric disorder associated with the evacuation differed significantly between men and women (for interaction between evacuation and sex in conventional cohort analysis χ^2=4.54, df=1, P=0.033; in the within sibling analysis χ^2=4.93, df=1, P=0.026). This was primarily due to the sex×evacuation interaction in the risk of admission to hospital for mood disorders (χ^2=4.00, df=1, P=0.046). Therefore the second and third groups of columns in table 3 present hazard ratios for admissions for psychiatric disorders for men and women separately. Among men, the risk of any hospital admission for a psychiatric disorder was marginally lower between former evacuees and their non-evacuated siblings (hazard ratio 0.67, 95% confidence interval 0.44 to 1.03). Hazard ratios for men were most pronounced for admissions involving substance use and psychotic disorders, though in the within sibling analyses these were estimated imprecisely. Among women, there was no association between evacuation and the risk of admission for any psychiatric disorder (1.21, 0.80 to 1.83). However, evacuation was associated with a significantly increased risk of admissions for a mood disorder (2.19, 1.10 to 4.33).

Supplementary table E-1 presents subgroup analyses by age at evacuation and table E-2 the duration of evacuation.

Discussion

This study evaluated the long term risks of admission to hospital for any type of psychiatric disorder of adults who as children were evacuated to foster care during the second world war compared with their non-evacuated siblings. Overall, evacuation was not a significant predictor of admission to hospital for a psychiatric disorder. Though the conventional cohort results suggest no association between evacuation and risk of being admitted to hospital for mental disorders, the sibling comparisons suggested that the policy was associated with a lower risk of being admitted for a mental disorder among men. Girls who were evacuated, however, had a significantly increased risk of hospital admission for a mood disorder in adulthood. Our study provides evidence from the first representative sample of Finnish evacuees on the long term mental health outcomes associated with Finland's child evacuation policy during the second world war.

Strengths and limitations of this study

Our collection of nationally representative longitudinal census data is unique and makes the data particularly well suited for evaluating long term outcomes of the Finnish child evacuation policy. Firstly, the availability of social security numbers for a random sample of the 1950 census allows for unusually long follow-ups of the participants and thus avoids the problem of potential recall bias that arises when childhood characteristics are retrospectively reported. Secondly, the ability to link participants' data to the census records of participants' families provided family background variables for the conventional cohort analysis dating back to the period before the second world war. Thirdly, additional leverage is gained by linking this existing census sample with individual level war time data from a child evacuee registry.

In contrast, other studies have reported mixed results between the Finnish child evacuation policy and mental health outcomes,[21-24] varying between large adverse associations and none. These studies analyzed the mental health outcomes in adulthood of smaller and unrepresentative samples of former Finnish evacuees and were not able to deal with the fundamental problem of selection into the program—that is, that family background affected the probability of being evacuated, which we tackled here using a within sibling design.[21-24]

The results of this study should be interpreted in the context of the several limitations. Though the sibling design eliminates a large class of potential confounding factors (those shared by siblings), this study's results cannot be inferred as causal. Placing a causal interpretation of our within sibling estimates of evacuation requires that exposure—in this case the parental decision to evacuate a specific sibling—was uncorrelated with unobserved sibling specific endowments.[26 37] We included age and birth order to adjust for differences between siblings in the family context that potentially could bias our evacuation estimate. None the less the possibility of residual confounding remains. In particular, such confounding could arise if families disproportionately selected their most resilient, or most vulnerable, child for evacuation. The available anecdotal evidence based on recollections of child evacuees does not suggest that this was the case.[38] However, neither the child evacuee registry nor official war time documents concerning the evacuee policy provide details about selective behavior within families that evacuated only some of their children; the

actual evacuation decision was considered to be a family matter.[39]

Low statistical power is a common concern in studies using sibling designs because such designs rely on variations within the family for both exposure and outcome. Thus, in sibling based studies that fail to detect a significant association between exposure and outcome, it is particularly important to evaluate whether this was simply due to lack of power—that is, an imprecisely estimated null hazard ratio value of 1. Even though the sibling sample size was large with 43 665 sibling pairs, only the discordant pairs contributed to the identification of the population variables. Out of 43 665 sibling pairs, 1321 pairs were discordant for evacuation status. The power calculation for a sibling design with varying numbers of siblings per family and time to event outcome is non-trivial.[40 41] Thus the absence of a formal test of statistical power suggests caution in the interpretation of the within sibling results.

Within sibling analyses may also be particularly susceptible to measurement error in the exposure variable.[42 43] However, the evacuation status of participants in the current sample is known with virtually complete accuracy. Only 87 ambiguous matches were found while linking the entire war time registry including 48 628 child evacuees to the 71 788 people of the 1950 census sample belonging to the 1933-44 cohorts. Among these, 71 cases were such that the mismatch seemed to indicate a spelling error in the individuals' names in either or both of the data sources. These cases were kept in the analysis, but the results remained unchanged when all 87 ambiguous observations were omitted.

A potential weakness is that follow-up in this sample began at age 38; it is possible that we might have underestimated the associations between evacuation in childhood and later hospital admission. The extent of this potential underestimation depends on the long term stability of the increased risk of hospital admission among former evacuees. Previous research documents that parental loss strongly increases the risk of juvenile onset of depression but that the risk decreases over time.[44] However, a study comparing the decrease in risk for psychopathology after parental death with the same risk after parental separation showed that decline in risk only played a role when bereavement was secondary to death, whereas the risk after parental separation was constant over time.[45]

Importantly, the current study did not account for differences in children's experiences during their time in Sweden. The historical record makes clear that there was wide variation in the socioeconomic status of the foster families, given that families from all socioeconomic backgrounds were encouraged to become foster parents—44% were farmers, 27% were from academia, and 16% were working class.[16] While this is a strength of the current study in terms of causal inference, in that assignment to specific foster families was effectively random for parent or child characteristics,[16] understanding variations in children's experiences while in foster care in relation to their long term mental health remains an important area for further study.

Conclusions

The temporary evacuations from Finland intended to protect children from the adversities of war that we studied took place over half a century ago in the context of a world war that permeated throughout Europe. Given the uniqueness of that situation, and that every war arises from different historical and political circumstances,[46 47] it is important to consider what lessons can be learned from the experiences of the Finnish

children that may be relevant for contemporary child protection policies, particularly because of the scarcity of long term follow-up studies of young people exposed to war.[48] Perhaps the most directly relevant circumstances today include those in which there are opportunities to remove children from contexts of high exposure to adversity. For example, follow-up studies of children in the Bucharest Early Intervention Project have shown that a foster care intervention significantly improved the social and neurodevelopmental outcomes of children who were previously staying in institutions.[49 50] However, that situation is unique in that the Romanian orphans were abandoned at birth and placed in extremely deprived institutions, in contrast with the Finnish children who were sent to foster care from intact families. Foster care is almost always favored over admitting children to the care of an institution in emergency situations, and modern guidelines establish a framework for structuring and monitoring foster care received by displaced children,[51] many of which were adhered to in Sweden; our results show that such foster care programs can have important protective effects, especially for younger boys, but possibly less so for girls in the case of depression. That said, these protective effects will invariably be contingent on a positive balance of risk versus protective factors for children's development that are present during foster care.[52] In light of this, it is important to consider potential mechanisms behind the sex differences we observed. There is no evidence to suggest that women were more likely than men to be exposed to abuse during foster care, but this possibility needs to be guarded against in current situations given evidence of higher risks for abuse of girls in foster care situations.[53 54]

The current results are less directly relevant to situations in which children are considered unaccompanied ("children who have been separated from both parents and other relatives and are not being cared for by an adult"[51]). This category of children is also at increased risk for mental health problems over the long term, which may be tackled by effective intervention.[55-57]

In summary, we provide the first exploration of the association between evacuations to foster care arranged by the Finnish evacuation policy and mental disorders in adulthood using nationally representative data and a research design that substantially mitigates selection bias commonly induced by unobserved confounding factors related to family background. We found that the policy was associated with a reduced overall risk of hospital admission for mental disorders in adulthood among men, but with an increased risk of hospital admission for a mood disorder among women.

Our finding of opposing signs of the association between evacuation and hospital admission for a psychiatric disorder between men and women is particularly concerning but consistent with studies of mental health interventions for children in conflict situations[58] and several recent reviews.[18 59] At face value it suggests that sex specific strategies need to be considered when dealing with situations in which children are exposed to war related conflict and family separation. The Finnish evacuation policy was essentially a complex intervention,[60] involving multiple components (including separation from parents, removal from war related exposure and danger, adjustment to foster families, and readjustment to own families after the war). Evidence also suggests that girls may have a heightened risk of adverse outcomes when separated from their parents, particularly for depression.[15 61] Thus in future studies it remains critically important to investigate whether components of interventions being considered have opposing effects between the sexes.

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What is already known on this topic

Refugee children carry a major burden of risk for poor mental health, yet limited research has been done to tackle such mental health needs

During the second world war, Finland evacuated around 49 000 children to Swedish foster families to protect them from the direct harms of war

Previous studies evaluating the long term effects of the Finnish evacuation policy were subject to confounding biases: evacuation was highly dependent on family characteristics that were themselves likely to increase the risk for mental health problems in children

What this study adds

The Finnish evacuation policy was not significantly predictive of admission to hospital for a psychiatric disorder during adulthood

The policy was associated with a reduced risk of admission to hospital for any mental disorder in adulthood among males, whereas among females the risk of admission for mood disorders was increased

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Tables

Table 1| Characteristics of sample by sex. Values are numbers (percentages) unless stated otherwise

Characteristics	Women (n=22 021)	Men (n=23 442)
Hospital admission for any mental disorder	1885 (8.6)	2456 (10.5)
Mean years of follow-up		
Mean (SD) No not admitted to hospital (censored)	33.69 (5.81) (n=20 136)	31.52 (7.98) (n=20 986)
Mean (SD) first hospital admission for episode	17.55 (10.48) (n=1885)	17.32 (10.16) (n=2456)
Evacuation program		
Not evacuated	21 385 (97.1)	22,653 (96.6)
Not evacuated (within evacuee families)	492 (2.2)	528 (2.3)
Evacuated	636 (2.9)	789 (3.4)
Mean (SD) duration of evacuation (years)	1.81 (1.10) (n=634)	1.83 (1.09) (n=783)
Duration groups (years):		
≤2	421 (66.40)	516 (65.90)
>2	213 (33.60)	267 (34.10)
Mean (SD) age at evacuation (years)	6.27 (2.53) (n=634)	6.22 (2.45) (n=784)
Age groups (years):		
<4	139 (21.9)	154 (19.6)
4-6	235 (37.1)	329 (42.0)
7-11	260 (41.0)	301 (38.4)
Family background		
Socioeconomic status in 1939*:		
Entrepreneur	6621 (30.1)	7090 (30.2)
White collar worker	2079 (9.4)	2292 (9.8)
Blue collar worker	6505 (29.5)	6789 (29.0)
Homemaker	1941 (8.8)	1976 (8.4)
Unemployed or out of labor force	4875 (22.1)	5295 (22.6)
Parental education†:		
Primary school or less	20 541 (93.3)	21 731 (92.7)
Beyond primary school	1480 (6.7)	1711 (7.3)
Mean (SD) No of children in family in 1940	1.90 (1.80) (n=22 021)	1.95 (1.81) (n=23 442)
Native language:		
Finnish	20 859 (94.7)	22 125 (94.4)
Swedish	1162 (5.3)	1317 (5.6)

*Based on father's occupation; if missing, replaced by mother's occupation.

†Highest level of schooling of either mother or father.

Table 2| Evidence on evacuee selection: regressing an indicator variable for whether evacuees in household (value of 1 if yes) on family background characteristics

Variables	All households		Households with >1 sibling	
	Control mean	Dependent variable: evacuee status of household	Control mean	Dependent variable: evacuee status of household
Parental education (past primary school=1)	0.078	–0.015 (0.004)	0.078	–0.019
No of children in family as of 1940	1.31	0.017 (<0.001)	1.73	0.014 (0.001)
Swedish speaking	0.069	0.046 (0.007)	0.062	0.069 (0.012)
Occupation (blue collar worker=1)	0.308	0.038 (0.003)	0.294	0.052 (0.004)
No of observations	37 193	38 765	17 993	19 027

Sample means of background characteristics for control group of households without evacuees and linear probability model estimates for all households are reported with robust standard errors of estimates in parentheses.

Table 3| Hazard ratios (95% confidence intervals) for risk of hospital admission for a psychiatric disorder between ages 38 and 78 (1971-2011) according to evacuee status as a child during second world war

Mental disorder	Evacuee status*	Full sample (n=45 463)		Women (n=22 021)		Men (n=23 442)	
		Cohort	Within sibling	Cohort	Within sibling	Cohort	Within sibling
Any disorder	Evacuee	0.94 (0.79 to 1.12)	0.89 (0.64 to 1.26)	1.16 (0.90 to 1.49)	1.21 (0.80 to 1.83)	0.80 (0.63 to 1.02)	0.67 (0.44 to 1.03)
Substance misuse	Evacuee	0.85 (0.65 to 1.11)	0.58 (0.33 to 1.03)	0.93 (0.58 to 1.47)	0.70 (0.33 to 1.49)	0.82 (0.59 to 1.13)	0.52 (0.25 to 1.08)
Psychosis	Evacuee	0.81 (0.55 to 1.19)	0.67 (0.35 to 1.29)	1.00 (0.60 to 1.64)	1.13 (0.46 to 2.81)	0.64 (0.35 to 1.17)	0.44 (0.18 to 1.09)
Mood	Evacuee	1.09 (0.83 to 1.43)	1.39 (0.82 to 2.37)	1.38 (0.97 to 1.97)	2.19 (1.10 to 4.33)	0.83 (0.54 to 1.27)	0.90 (0.44 to 1.83)
Anxiety	Evacuee	1.20 (0.86 to 1.67)	1.36 (0.73 to 2.54)	1.37 (0.88 to 2.12)	1.55 (0.72 to 3.36)	1.03 (0.63 to 1.70)	1.14 (0.52 to 2.52)

Effects by sex were derived from one model by including an interaction with evacuee status. Sex composition of analytic sample (n=45 463) reported in table; 1321 sibling pairs were discordant for exposure. Cohort analysis adjusted for sex and its interaction with evacuee status, parental education, native language, number of children in 1940, five categorical variables for socioeconomic status in 1939 and county of residence in 1939, interaction terms between sex and each of five categorical socioeconomic variables, age (birth cohort), birth order, and region of residence (1939) (full sample results in first two columns omit interaction terms with sex). Within sibling analyses used a sibling group specific baseline hazard. All family background covariates—parental education, native language, number of children in 1940, five categorical variables for socioeconomic status in 1939, and county of residence in 1939—cancel out in within sibling analysis. Cluster robust standard errors are adjusted for familial clustering.

*Reference category is non-evacuated participants.