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Suicide and self-harm in adults with a history of out-of-home care—a Swedish national cohort study

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ABSTRACT

Background: Exposure to childhood out-of-home care (OHC, foster family and residential care) is associated with an increased risk of suicide in youth and young adulthood, but the life course and clinical psychiatric implications of this risk have not yet been well elucidated.

Methods: This was a national cohort study generated from linkage of a range of population-based registers, resulting in a national cohort of 838 714 where 24 628 (2.9%) had a history of OHC. The study population, born 1972–1981, was followed from age 18 to age 39–48 years for suicide death and hospitalized self-harm.

Results: Exposure to OHC accounted for 14% of all suicide deaths in the cohort. The age-adjusted Hazard Ratios (HRs) for exposure to OHC on suicide death were 5.04 (95% C.I. 4.50–5.64) for men and 7.21 (6.13–8.48) for women compared with the same gender in the general population. After adjusting for year of birth, childhood SES and parental morbidity these risks were attenuated to 3.39 (2.99–3.85) for men and 4.23 (3.50–5.12) for women. For hospitalized self-harm the adjusted HRs were 4.47 (4.18–4.79) for men and 4.25 (4.00–4.52) for women. These risks remained similarly high from age 18 years to 48 years. Exposure to childhood OHC carried a higher risk of suicide also among psychiatric inpatients, age-adjusted HR 1.70 (1.50–1.94).

Conclusion: Exposure to OHC during childhood is a major predictor for suicide and self-harm in young and middle-aged adults as well as among adult psychiatric patients.

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Out-of-home care; suicide; mortality; foster care; middle age

Introduction

Exposure to out-of-home care (OHC, foster family and residential care) in childhood has been shown to be associated with an increased risk of ill-health and disability in adulthood [1,2]. A recent meta-analysis of prospective cohort studies, in birth cohorts ranging from the 1930s to the millennium, found that people with a history of childhood care on average experienced a doubling in the rate of total mortality compared with same-aged, unexposed peers [3]. Cardiovascular disease, associated with an unhealthy lifestyle, has been shown to contribute to this increased mortality in the middle aged [4], but the main causes behind this increase at younger ages seem to be external; accidental poisoning, violence and suicide, as suggested by a recent Danish national cohort study [5]. The risks of death associated with OHC have been similar in men and women in most previous studies [3], while the recent study by [5] reported a higher risk in women compared with men.

Three to fourfold increased risks of suicide death have been reported in previous Scandinavian studies of suicide in youth and young adults with a history of OHC [5,6]. Elevated risks for hospital admissions after self-harm were also demonstrated in Swedish birth cohorts from 1953 [7] and the 1970s and 1980s [8] and in Finnish birth cohorts from the 1980s and 1990s [9]. Studies in Australia, New Zealand, the U.K., Canada, the U.S., and Finland, have shown that children and young people placed into OHC are at a high risk of suicidal behavior while in care [10] and a Canadian study, in retrospective data, suggested that adults with a history of childhood OHC more often commit suicide attempts over the life course.

Although the link between psychiatric disorder and childhood adversity has been confirmed in a large number of retrospective studies [11] and in Scandinavian longitudinal studies [12, 2016, 9], but no previous study, as far as we know, have looked at suicide risk among psychiatric patients with a history of OHC. In this study we used register data on a national cohort of adult Swedish residents to investigate the risk of suicide in young and middle-aged adults with a history of out-of-home care in a gender and life course perspective, with a particular focus on OHC as a risk marker for suicide in psychiatric inpatient care.

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Methods

This study is based on information from the Swedish national registers, containing data with high validity and low attrition rates. These registers are based on the unique personal identity number assigned to all Swedish residents at birth (or time of immigration), which allows for linkage of data from different registers with practically no attrition [13]. Our study was approved by the ethics committee in the Stockholm region in 2020 (No. 2020–00250).

The study population comprised men and women born in Sweden between 1972 and 1981, who were born in Sweden and were alive and resident in the country on their 18th birthday without any record of emigration according to the Register of the Total Population [14]. Birth and adoptive parents of these individuals were identified in the Multi-Generation Register [15].

Exposures

The study population was linked to records of OHC *via* the Swedish Child Welfare Register [16]. Any care record before the age of 18, regardless of length of stay, denoted exposure to OHC. There were 12 708 men and 11 920 women who fulfilled these criteria. Accumulated time in OHC and age at first entry into care were calculated with dates of start and termination of episodes in OHC in the register.

Outcomes

Suicide was defined as having an underlying cause of death in the Causes of Death Register [17] coded according to the WHO International Classification of Diseases (ICD) as suicide (ICD-9: E950-E959; ICD-10: X60-X84) or as a self-inflicted death with uncertain intent (ICD-9: E980-E989; ICD-10: Y10-Y34). We used the same codes to define hospitalized self-harm in the Patient Discharge Register [18]. The aim with our broad definition of suicide, that included deaths with uncertain intent, was to minimize spatial and secular trends in detecting and classifying cases of suicide [19]. In Sweden, the intent in suicide deaths is assessed by forensic specialists after autopsy [17], while the suicide intent in hospitalised self-inflicted injuries is assessed by the hospital physician in charge of the care [18].

The study population was followed in these two registers from their 18th birthday until December 31'st 2020, when they were in the age of 39–48 years.

Socio-economic and parental mental health covariates

The socioeconomic index of the household in the National Census of 1990 was retrieved and maternal country of birth were retrieved from the Longitudinal Integration Database for Health Insurance and Labour Market Studies in 1990 [20].

The socio-economic index was categorized into five classes as suggested by Statistics Sweden [21]. Maternal country of birth was dichotomized as Swedish and Other.

Parental morbidity

Indicators for the parental risk factors—parental alcohol use disorders, drug use disorders and psychiatric disorder without substance use—were retrieved from the National Patient Register [18] and the Cause of Death Register [17]. All parental factors were analyzed for mothers and fathers separately and were treated as binary variables (yes/no) and defined by at least one recorded incident during 1973–2020. Parental alcohol and/or drug use disorder was indicated by any entry of alcohol and/or drug related death or hospital admission. Parental psychiatric disorder was indicated by hospitalization or cause of death records with diagnoses indicating a psychiatric illness and/or self-inflicted injuries without substance use. The WHO ICD-8 (1973-86), ICD-9 (1987-96) and ICD-10 (1997–2008) classifications were used for the creation of these indicators.

Statistical analysis

Age-adjusted hazard ratios with 95% confidence intervals (CIs) were estimated using Cox proportional hazards models with suicide death and self-harm, defined above, as the two outcome variables. The proportional hazards assumption was confirmed in Kaplan–Meier tables for both outcomes. Time in the study for suicide death was calculated from the 18th birthday until the date of death, while time in the study for self-harm was calculated from the 18th birthday to the first hospital admission recorded in the National Patient Register which fulfilled the criteria of the outcome, or date of death recorded in the National Cause of Death Register, or December 31, 2020, whichever came first.

Since interaction analyses indicated significant gender difference between the OHC study group and the general population for suicide death, all analyses were stratified by gender. All hazard ratios were adjusted for year of birth as a continuous variable. A fully adjusted model was adjusted also for socio-economic index of the household, maternal country of birth and the six parental morbidity variables defined above. Statistical analysis was conducted using SPSS (IBM SPSS Statistics version 27.0, [SPSS, Inc., IBM Corp., Armonk, NY, USA]).

Results

There were 868 342 individuals that fulfilled the criteria of the study, of which 24 628, 2.9%, had a history of OHC before the age of 18 years. Socio-demographic information about the study groups is presented in Table 1. Individuals with a history of OHC were much more likely to have parents with a history of hospital admissions with a diagnosis of substance use and/or psychiatric disorders than the general population and more often were living in a household with a low socio-economic index in 1990. Men and women in both the OHC study group and the general population had very similar sociodemographic and parental disorder patterns (not in table).

Those exposed to OHC accounted for 13.9% of all suicide deaths and 16.2% of hospitalized self-harm in the cohort. The

Table 1. Sociodemographic characteristics of the study groups.

		General population		Out-of-home care	
		N	%	N	%
Sex					
	Men	434 756	51.8	12 708	51.6
	Women	403 958	48.2	11 920	48.4
Year of birth					
	1972–1975	362 764	43.3	10 685	43.4
	1976–1978	238 469	28.4	6707	27.2
	1979–1981	237 481	28.3	7236	29.4
Socioeconomic index 1990					
	0	118 671	14.1	5958	24.2
	1	124 948	14.9	6804	27.6
	2	141 279	16.8	4016	16.3
	3	105 712	12.6	2555	10.4
	4	190 671	22.7	3336	13.5
	5	157 433	18.8	1959	8.0
Maternal country of birth					
	Sweden	773 788	92.3	22803	92.6
	Other	64 926	7.7	1825	7.4
Parental hospital admissions					
	Father				
	Alcohol use	62 877	7.5	6823	27.7
	Drug use	9162	1.1	2143	8.7
	Psychiatric	47 598	5.7	4179	17.0
	Mother				
	Alcohol	22 400	2.7	5201	21.1
	Drug use	6944	0.8	2714	11.1
	Psychiatric	54 980	6.6	7995	32.5
	All	*838 714*	*100.0*	*24 628*	*100.0*
	Age at entry into care				
		0–10 years	–	13 221	53.7
		11–18 years	–	11 407	46.3
	Time in care				
		0–6 months	–	7227	29.5
		7–24 months	–	6112	24.8
		25–60 months	–	5100	20.7
		60 + months	–	6143	24.9

cumulated incidence of suicide death from age 18 years to the end of follow-up at age 39–48 years was 2.75% in men and 1.55% in women exposed to OHC, compared with 0.56% and 0.22% respectively in the general population (Table 2).

The cumulated incidence for having one or more hospital admissions because of self-harm, was 10.6% in men and 13.8% in women exposed to OHC, compared with 1.5% and 2.2% respectively in the general population (Table 2). In those exposed to OHC, 4.4% of men and 6.7% of women had at least two hospital admissions because of self-harm compared with only 0.5% of men and 0.8% of women in the general population (Supplemental Tables S1 and S2).

Cox regression models of suicide and self-harm

Table 3 presents the Cox regression analyses. In model 1, adjusting for year of birth only, the Hazard Ratios (HRs) for exposure to childhood OHC on suicide death were 5.04 (95% C.I. 4.50-5.64) for men and 7.21 (6.13-8.48) for women. In model 2, adjusting further for childhood SES, immigrant status and parental psychiatric and addictive disorders, these HRs were attenuated to 3.39 (2.99- 3.85) for men and 4.23 (3.50-5.12) for women.

Table 2. Cumulated incidence of suicide death and hospital admission for self-harm by sociodemographic characteristics.

		Men		Women	
		Death	Self-harm	Death	Self-harm
		%	%	%	%
Study groups					
	General population	0.56	1.53	0.22	2.22
	Out-of-home care	2.75	10.61	1.55	13.78
Year of birth					
	1972–1975	0.66	1.72	0.28	2.57
	1976–1978	0.61	1.76	0.25	2.53
	1979–1981	0.60	1.94	0.22	2.57
Socio-economic index 1990					
	Unclassified	0.69	2.10	0.30	3.00
	1	0.83	2.77	0.31	3.57
	2	0.65	2.00	0.27	2.73
	3	0.57	1.76	0.21	2.34
	4	0.57	1.36	0.21	2.12
	5	0.50	1.14	0.21	1.91
Maternal country of birth					
	Sweden	0.63	1.78	0.22	2.55
	Other	0.63	1.92	0.26	2.62
Parental hospital admissions					
	Father				
	Alcohol use	1.23	4.24	0.55	5.14
	Drug use	1.48	6.73	1.03	7.62
	Psychiatric	1.25	3.86	0.45	4.79
	Mother				
	Alcohol use	1.32	4.69	0.72	6.61
	Drug use	1.60	6.46	1.06	8.22
	Psychiatric	1.41	6.73	0.75	7.62
	All	*0.63*	*1.79*	*0.26*	*2.56*

Table 3. Hazard ratios (HRs) of suicide and self-harm.

a. Suicide

	Men		Women	
	Model 1	Model 2	Model 1	Model 2
	HR (95% C.I.)	HR (95% C.I.)	HR (95% C.I.)	HR (95% C.I.)
General population	1	1	1	1
Out-of-home care	5.04 (4.50–5.64)	3.39 (2.99–3.85)	7.21 (6.13–8.48)	4.23 (3.50–5.12)

b. Self-harm

	Men		Women	
	Model 1	Model 2	Model 1	Model 2
	HR (95% C.I.)	HR (95% C.I.)	HR (95% C.I.)	HR (95% C.I.)
General population	1	1	1	1
Out-of-home care	7.34 (6.92–7.78)	4.47 (4.18–4.79)	6.64 (6.30–7.00)	4.25 (4.00–4.52)

Model 1 is adjusted for sex and age of birth.
Model 2 is adjusted for sex, age of birth, maternal country of birth, socioeconomic index in 1990, maternal and paternal substance abuse and psychiatric disorder.

The age adjusted HRs for exposure to OHC on hospital admission because of self-harm were 7.34 (6.92-7.78) for men and HR 6.64 (6.30-7.00) for women (Model 1) relative to the general population. In the fully adjusted Model 2 the HRs were attenuated to 4.47 (4.18- 4.79) for men and 4.25 (4.00–4.52) for women. As Figures 1 and 2 demonstrate, the HRs for suicide and self-harm in the OHC study group remained at a high level all the way from age 18–25 years to age 41–48 years.

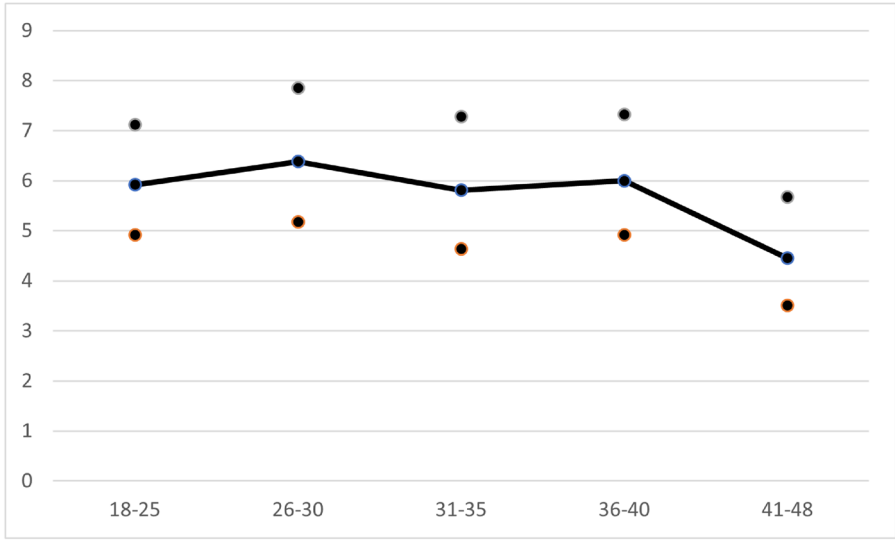

Figure 1. Hazard ratios and 95% confidence intervals of suicide by age (in years) in those exposed to out-of-home care compared with the general population.

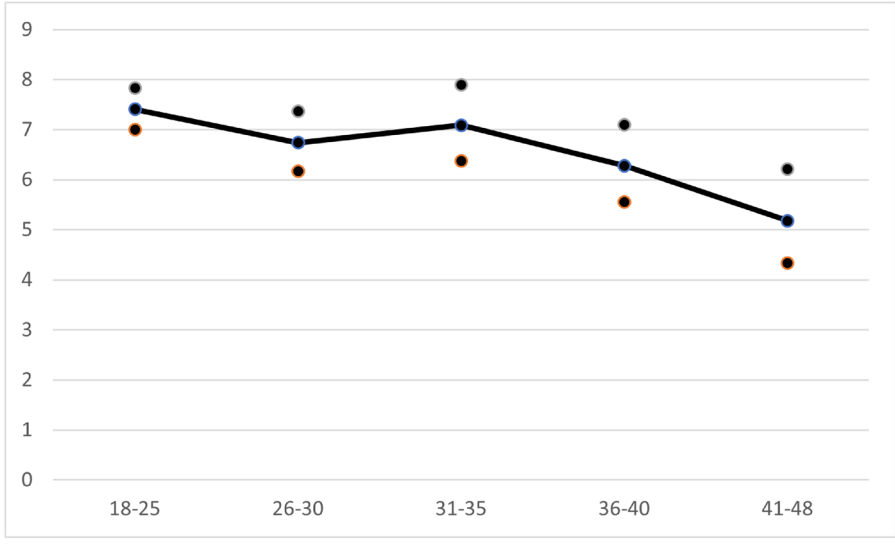

Figure 2. Hazard ratios and 95% confidence intervals of hospitalized self-harm by age (in years) in those exposed to out-of-home care compared with the general population.

The cumulated incidence of suicide death among those who had ever been admitted to a hospital because of self-harm was 10.4% for men and 6.3% for women exposed to childhood OHC, compared with 7.4% and 4.0% in the general population. This amounts to an age-adjusted HR of 1.48 (1.28-1.70) (Supplemental Table S2).

Psychiatric disorder and suicide

Having been discharged from a hospital with a main psychiatric diagnosis was much more common among the former OHC alumnae, 27.9% vs 5.2% in the general population, age-adjusted HR 5.43 (5.27–5.59). Nonetheless, OHC was associated with an increased risk for suicide death also among psychiatric inpatients, HR 1.70 (1.50–1.94). Looking at suicide death in relation to the diagnosis at the latest discharge among psychiatric patients, OHC was a significant predictor for all diagnoses with the exception of psychotic disorders, (Supplemental Table 3).

Gender and OHC

Gender differentials were analyzed in interaction analyses in the entire study population for the two outcomes. The HR was found to be significantly higher for women ($p<0.001$) for suicide death in both the age-adjusted and the fully adjusted models but not in any model for self-harm. The HRs for suicide death among the psychiatric patients were similar in men and women.

Predictors associated with the OHC

The risk of suicide death and self-harm was higher in those who entered OHC late, at 11–18 years, age-adjusted HRs 1.79 (1.42–2.60) and 2.21 (1.96–2.50) for men and 1.85 (1.31–2.60)

Table 4. Hazard ratios (HRs) of duration and age at entry into out-of-home care.

a. Suicide

		Men		Women	
		%	HR (95% C.I.)	%	HR (95% C.I.)
Duration of care	0–5 years	2.72	1	1.45	1
	>5 years	2.75	1.30 (1.00–1.69)	1.58	1.48 (1.01–2.17)
Age at entry in care	0–10 years	2.13	1	1.17	1
	11–18 years	3.46	1.79 (1.42–2.60)	1.83	1.85 (1.31–2.60)

b. Self-harm

		Men		Women	
		%	HR (95% C.I.)	%	HR (95% C.I.)
Duration of care	0–5 years	9.6	1	12.6	1
	>5 years	10.8	1.25 (1.09–1.43)	13.8	1.33 (1.16–1.55)
Age at entry in care	0–10 years	7.2	1	9.7	1
	11–18 years	14.5	2.21 (1.96–2.50)	17.7	2.10 (1.87–2.35)

Model is adjusted for sex and age of birth.

and 2.10 (1.87–2.35) for women, compared to those who entered care before 11 years of age. Longer cumulated duration of care (>5 years) increased the risk of suicide death and self-harm slightly, age-adjusted HRs 1.30 (1.00–1.69) and 1.25 (1.09–1.43) for men and 1.48 (1.01–2.17) and 1.33 (1.16–1.55) for women (Table 4).

Discussion

In this study in a Swedish national cohort of 838 714 individuals, including 2.9% with a childhood history of OHC, we investigated the risk of suicide death and hospitalized self-harm associated with this history from age 18 years to age 48 years. We found a five- to seven-fold increase for both suicide outcomes that remained on a high level all the way up to age 48 years. The former OHC-alumnae also had a very high burden of psychiatric morbidity, as expressed in a five-fold increase in psychiatric inpatient care experience, but exposure to OHC was an important predictor of suicide death also among psychiatric inpatients, accounting for a 70% increase compared with the general population and 50% for hospitalized self-harm.

The high risk of suicide found in all age groups from 18–25 years to 41–48 years indicates that the high risk found in previous studies of exposure to OHC in youth and young adults [2,13] remain high also in middle aged. Adoption studies have indicated that heritable as well as environmental factors are important predictors for suicide [22]. The descriptive data in Table 1 shows that former OHC alumnae more often are exposed both to childhood socioeconomic adversity and heritable risk factors for psychiatric morbidity. However, adjusting the analysis for indicators of these risk factors only moderately attenuated the increased risk associated with OHC. The remaining risk could be explained by residual confounding, but we cannot completely exclude the possibility that exposure to OHC itself carries an increased risk for suicide as has been suggested in some previous Swedish studies with a sibling design [23].

The strong links between psychiatric disorders and suicidal behavior are well known [5]. Studies from several western countries have shown that children in OHC and adults with OHC experience from their childhood have a high burden of mental health problems in comparisons with majority population peers [24]. The findings in this study confirms the magnitude of this burden with 17% of men and 22% of women with a history of OHC having been in psychiatric inpatient care. Thus, this high psychiatric morbidity is probably the most important factor behind the high risk of suicide in adults with a history of OHC. However, in this study we found that OHC experience is a risk marker for an elevated risk of suicide death also among those that previously have been diagnosed with a psychiatric disorder, with the exception of psychotic disorder, and for patients who have been hospitalized for self-harm. These risks point in the same direction as a national cohort study of disability pension among adults with a history of childhood OHC, with a follow-up age of 23–35 years [25]. The vast majority in this study had been awarded disability pension due to mental health problems. In comparisons with majority population peers who were receiving disability pension, those exposed to childhood OHC had a far higher incidence of hospitalizations with a self-harm diagnosis.

Women with a childhood history of OHC had higher age-adjusted HRs for suicide death exposed to OHC but not for hospitalized self-harm compared with men exposed to OHC. This gender differential is in line with the recent Danish mortality study by [26], but not with most previous studies of mortality and suicide in adults exposed to childhood OHC [3]. The reasons behind these gender differentials in Denmark and Sweden need to be addressed in further research.

The discovery of an increased risk of suicide in individuals placed in OHC during adolescence aligns with previous Swedish research, which has demonstrated adverse social and health consequences among adult care leavers who were placed during their teenage years. It seems likely that this is linked, at least in part, to behavioral issues and a harmful lifestyle, including substance abuse, which are more prevalent reasons for placement during adolescence compared to those placed at a younger age. It should be noted that Swedish child welfare covers child protection, the provision of family services, but also interventions aimed at juvenile delinquents, interventions that in many other countries falls under the jurisdiction of the criminal justice system. Thus, the higher risk of suicide associated with adolescent OHC found in our study may not be generalizable to countries where juvenile delinquents are primarily cared for in the criminal justice system.

Strengths and limitations

This study used multiple high-quality Swedish national registers to create the large cohort necessary to study a low-frequency outcome like suicide death. A particular strength with a register design relative to clinical studies is the minimal and unselected attrition. A further strength is the

Swedish legal framework around unexpected deaths outside of hospitals that calls for an autopsy by a forensic specialist [9].

A major limitation to this study is the lack of information about the reasons for why children were taken into OHC in the Swedish Child Welfare Register [27]. This made it impossible to look at the connection between specific childhood adversities, such as child abuse and neglect, and suicide.

Implications

This study demonstrates that a history of childhood OHC is a robust indicator of increased suicide risk in psychiatric in-patients. Thus, questions about childhood OHC could potentially be useful in routine suicide assessments of patients in psychiatric in-care.

Our data points to psychiatric disorder as the main risk factor behind the high risks for suicide throughout the life course of former OHC-children. There are indications that many adolescents in OHC are suffering from treatable psychiatric conditions that often go undetected [21]. In a groundbreaking US study, Kessler and colleagues (2008) showed that enhanced quality of societal care with adequate health services can make a remarkable difference in mental health outcomes in adult age. There have been calls from the scientific community during the last 50 years for screening/clinical assessments of mental health of all children in OHC, for prioritized access to mental health services while in care and for systematic guidance about mental health issues when leaving state care [20,24,28]. The alarmingly high suicide rates found in this study in young as well as middle aged adults with a history of childhood OHC provide strong support to the implementation of such resources for children and youth in OHC.

Author contributions

LB initiated and funded the study, interpreted the results, revised the manuscript and have approved the final version. AH created the dataset from multiple register sources, analyzed the data, wrote the first draft of the article, interpreted the results, revised the manuscript and have approved the final version. BV interpreted the results, revised the manuscript and have approved the final version.

Conflict of interest

None.

Data access

Due to Swedish legislation we cannot share our register-based data with second parties.

Role of funder

Swedish Research Council for Health, Working Life and Welfare had no role in the design and conduct of the study

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