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Suicides after pregnancy in Finland, 1987-94: register linkage study

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Abstract

***Objective*—To determine rates of suicide associated with pregnancy by the type of pregnancy.**

***Design*—Register linkage study. Information on suicides in women of reproductive age was linked with the Finnish birth, abortion, and hospital discharge registers to find out how many women who committed suicide had had a completed pregnancy during her last year of life.**

***Setting*—Nationwide data from Finland.**

***Subjects*—Women who committed suicide in 1987-94.**

***Results*—There were 73 suicides associated with pregnancy, representing 5.4% of all suicides in women in this age group. The mean annual suicide rate was 11.3 per 100 000. The suicide rate associated with birth was significantly lower (5.9) and the rates associated with miscarriage (18.1) and induced abortion (34.7) were significantly higher than in the population. The risk associated with birth was higher among teenagers and that associated with abortion was increased in all age groups. Women who had committed a suicide tended to come from lower social classes and were more likely to be unmarried than other women who had had a completed pregnancy.**

***Conclusions*—The increased risk of suicide after an induced abortion indicates either common risk factors for both or harmful effects of induced abortion on mental health.**

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Introduction

Childbirth has an impact on the mental health of women. Short term postnatal "blues" are experienced by 45-70% of women.[1 2] An increased risk of non-psychotic depression after a delivery has been reported.[3 4] The incidence of puerperal psychosis is 1.7 per 1000 live births.[5] The initial stress effect of having a child, however, is transitional, and overall having a child has positive effects on women's mental health.[6]

Reports of mental complications after an induced abortion are controversial. Puerperal psychosis is rare (0.3 per 1000 abortions), but depression is more common (13-41%).[5] Long term follow up studies, however, have documented more positive reactions and fewer undesirable feelings than short term studies.[7]

Less is known about the effects of miscarriage on mental health. A normal grief period is said to be from 6 to 12 months, but in some cases delayed, unresolved, and pathological grief may remain for years.[8]

There are only a few studies on suicides associated with pregnancy.[9] The main reason may be the difficulty of getting reliable information on pregnancy before death[10] and the relative rarity of suicides compared with other mental problems. The most reliable way to collect information on deaths related to pregnancy seems to be register linkage.[11]

We determined the incidence of suicides up to one year after the end of a pregnancy by using national health registers. We analysed suicide rates by the type of pregnancy (birth, induced abortion, or miscarriage) and by background characteristics of the mothers.

Subjects and methods

Information on all deaths (n=9192) of women of childbearing age (15-49 years) in Finland in 1987-94 was extracted from the register of death certificates. Of these, 1347 had suicide as the main cause of death. No death had suicide as a contributing cause. The suicides were linked to the medical birth register (519 139 births in 1987-94), to the abortion register (117 139 abortions in 1986-94), and to the hospital discharge register (9 881 254 discharges in 1986-94) by using the mother's unique identification number to find evidence of termination of a pregnancy in the year before her death. The follow up period of one year was chosen according to the current definition of late maternal death.[12] We found 73 suicides associated with pregnancy. Ten violent and 16 non-violent deaths with unclear cause and 55 accidents associated with pregnancy were not included in the analysis.

The death certificate register, collected by Statistics Finland, is based on death certificates written by physicians. All the death certificates are checked by forensic specialists and by medical experts at Statistics Finland. Information on age, cause of death, residence, and occupation (in 1987) was gathered from the death certificates.

Table 1—*Basic statistics of Finnish women with ended pregnancies, 1987-94*. Figures are numbers (percentages) of women unless stated otherwise*

Detail	Births	Abortions	Miscarriages
No of women	519 139	93 807	83 726
Mean (SD) age (years):	29.2 (5.2)	27.6 (9.0)	33.8 (7.2)
<20	14 333 (2.8)	15 266 (16.3)	2978 (3.6)
⩾35	70 256 (13.7)	21 038 (22.4)	22 693 (27.0)
Marital status:			
Married	373 827 (72.0)	25 932 (27.7)	NA
Cohabiting	95 346 (18.4)	58 079 (61.9)	NA
Single	28 887 (5.6)		NA
Widowed or divorced	5674 (1.1)	9733 (10.4)	NA
Social class†:			
I	11 029 (16.9)	1321 (1.4)	NA
II	41 382 (63.4)	52 124 (55.6)	NA
III	12 803 (19.6)	38 067 (40.6)	NA
First pregnancy	155 277 (29.9)	35 527 (37.9)	NA

NA = information not available.
Missing data not shown.
*Data from medical birth register, abortion register, and hospital discharge register.
†Social class in abortion register is based on its own classification and in medical birth register on mothers' education (in 1991 only); they are not comparable with each other.

Data on births since 1987 were obtained from the medical birth register. Information on the mother's marital status, occupation (since October 1990), education (in 1991), and on the newborn's perinatal health was derived from this source. The register is complete, and its quality of data is high.[13] Data on abortions and on women's marital status and social class on the basis of the women's own occupations were gathered from the register on abortions. More than 99% of abortions are registered, and the quality of data is high for the variables used in this study.[14]

The Finnish Hospital Discharge Register gave information on all miscarriages (*International Classification of Diseases*, ninth revision, codes 630-632, 634, and 637) and extrauterine pregnancies (code 633) treated in hospitals.[15] In 1986, data on 5% of all admissions to hospital were missing, but 99% of admissions for mental disorders and all admissions related to pregnancy, childbirth, or puerperium were reported correctly.[15] Information on hospital admissions and diagnoses was collected from this register. Because the number of extrauterine pregnancies was low they were combined with miscarriages. If a woman had been pregnant when she committed suicide the case could have been found in our data only if she was admitted to hospital at some time during pregnancy or if the pregnancy was mentioned in the death certificate. As no such cases were found, suicides during pregnancy were not included in our analysis.

Suicides occurring within a given year were calculated per 100 000 births, abortions, and miscarriages by age groups. The annual suicide rate per 100 000 women in the age group 15-49 years and in each age group was used as a reference.[16] The risks of suicide by the outcome of pregnancy were compared with odds ratios. Differences in timing of the suicide and socioeconomical differences were tested with χ^2 test. Table 1 gives details of Finnish women who were pregnant during the study period.

Table 2—*Distribution of suicides by amount of time since birth, abortion, or miscarriage in Finland, 1987-94**

	Months						
Detail	1-2	3-4	5-6	7-8	9-10	11-12	Total
Birth	7	4	7	5	3	4	30
Abortion	9	3	1	5	7	4	29
Miscarriage	4	1	1	4	2	2	14
Total	20	8	9	14	12	10	73

*Differences between age groups 35-39 and 20-34, 15-19 and 20-24, and 15-19 and 30-34 are significant (P<0.05).

Table 3—*Proportion of all suicides in women that were related to pregnancy and risk per pregnancy by age in Finland, 1987-94*

	Age group						
Detail	15-19	24-24	25-29	30-34	35-39	40-49	Total
All suicides in women	60	120	147	187	248	585	1347
No (%) of suicides related to pregnancy*	6 (10.0)	10 (8.3)	21 (14.3)	13 (7.0)	19 (7.7)	4 (0.6)	73 (5.4)
No of ended pregnancies*	30 198	126 919	228 440	171 146	81 001	27 868	667 572
Suicides per 100 000 ended pregnancies*	19.9	7.9	9.2	7.5	23.5	14.4	10.9

*Births, abortions, and miscarriages.

Results

Among the women of childbearing age 1347 suicides represented 15% of all deaths. In the 73 suicides associated with pregnancy in our data information on outcome of pregnancy was mentioned in only 11% of the death certificates. Two suicides were connected with infanticide, and one suicide was connected with a preterm birth resulting in a neonatal death. In total, 30 suicides were committed after women gave birth (42%), 29 after an abortion (40%), and 14 after a miscarriage (19%), of which two were after an extrauterine pregnancy. The risk of suicide was at its highest during the two first months after the end of pregnancy (table 2). The difference between the two first months and two following months was significant (P<0.05). Of all suicides in women aged 15-49 every 19th was related to an ended pregnancy (table 3). For each pregnancy the risk of a suicide was 11 per 100 000 ended pregnancies. This risk was highest in the age group 35-39 and lowest in age group 30-34.

Among younger women, who overall had a lower risk of suicide but higher rates of pregnancy, suicides associated with pregnancy were proportionally more common.The suicide rate associated with birth was 5.9 per 100 000 births and for associated abortions was 34.7 per 100 000 abortions, giving an odds ratio of 5.9 compared with births (95% confidence interval 3.6 to 9.9). The suicide rate associated with miscarriages was 18.1 (3.3; 1.8 to 6.3).

Among women aged less than 20 years, the suicide rates both after a birth and after an abortion were higher than in the same age group in the general population (table 4, figure 1). In the age group 20-34 the rate of suicide associated with birth was lower than the total suicide rate and the rate associated with abortions and miscarriage. After the age 35, the suicide rate increased for abortions. The same was true for miscarriages in the age group 40-49.

In 63% (46) of all suicides associated with pregnancy women were living in urban areas. This equals the proportion of all women giving birth, but it is smaller than the proportion who have abortions (74%; P=0.09). The stated reasons for the abortion in suicide cases did not differ from those for all abortions; over 80% were performed because of social reasons. In our data on suicide no abortion was performed for fetal abnormality.

Six per cent of women who gave birth were single and 1% divorced, but among women who committed suicide 19% were single (P=0.001) and 7% divorced (P<0.001). For suicides after an abortion the proportion of unmarried (that is, single or cohabiting) women was 41% compared with 62% of all women who had had an abortion (P=0.011). The proportion of divorced women, however, was reversed: 24% compared with 10% (P=0.004).

Table 4—*Odds ratios (95% confidence intervals) for suicide after birth, abortion, or miscarriage compared with general suicide rate specific for age by age group in Finland, 1987-94*

Detail	Age group						Total
	15-19	20-24	25-29	30-34	35-39	≥40	
Birth	2.87 (1.02 to 8.04)	0.11 (0.01 to 0.82)	0.52 (0.18 to 1.49)	0.34 (0.11 to 1.03)	1.03 (0.51 to 2.09)	0.76 (0.39 to 1.49)	0.52 (0.19 to 1.41)
Abortion	4.51 (1.69 to 12.03)	3.39 (1.65 to 6.97)	4.76 (2.41 to 9.38)	1.87 (0.94 to 3.73)	4.84 (2.79 to 8.41)	*	3.08 (1.57 to 6.03)
Miscarriage	*	2.33 (1.09 to 4.97)	2.25 (1.07 to 4.72)	1.97 (0.99 to 3.90)	1.21 (0.61 to 2.38)	2.01 (1.17 to 3.44)	1.61 (0.70 to 3.38)

*No suicides.

Complete information on social class was available only for suicides associated with abortion: 61% of these women belonged to the lowest of three social groups, while 41% of all women who had had an abortion belonged to this group (P=0.06)

Discussion

In this study information from death certificates was linked with national health registers to find out the recent reproductive history of women of childbearing age who had committed suicide. In only 11% of suicides was an ended pregnancy mentioned in the death certificate. This shows that the data linkage was necessary to get complete information.

Our data may underestimate the number of suicides associated with pregnancy. We used the official cause of death to define a suicide. Apart from the 73 pregnancy associated suicides, there were also 26 pregnancy associated deaths with an unclear cause and 55 accidents. Some of these cases might have been suicides, but it would be difficult to re-examine the actual cause of death after the event. Other studies suggest that the official rate of suicide is underestimated by up to 10%.[17]

In total, 15% of all deaths in women were suicides. This equals the proportions in Sweden and in Norway (15-16% of all deaths among women aged 15-44) but is higher than in some other countries in northern Europe, Australia, and the United States (6-12%) and in southern Europe (1-4%).[18]

Our data showed that the suicide rate associated with birth was half of the general suicide rate in women aged 15-49. This suggests that childbearing prevents suicide or that women capable of giving birth are not at high risk for suicide. The only exception might be teenage mothers, whose suicide rate associated with birth was three times the general rate in this age group. This is, however, a tentative finding because of small numbers.

The suicide rate after an abortion was three times the general suicide rate and six times that associated with birth. Similarly, the rate of psychiatric admissions within three months after the end of pregnancy was 53% higher in women who delivered than in women who had had an induced abortion in a Danish register study.[19]

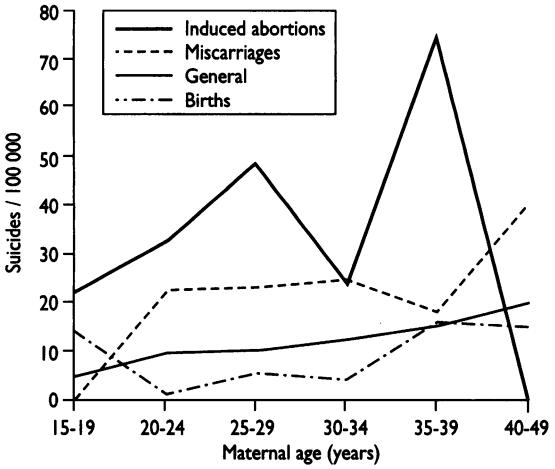

Fig 1—*Suicides for different age groups per 100 000 births, abortions, and miscarriages compared with annual general suicide rate per 100 000 women, Finland 1987-94*

We were not able to assess an exact suicide rate after miscarriage because only those women who were admitted to hospital for miscarriage are registered. Our estimate is unbiased if we assume that the site of care is not correlated to the risk of suicide. The suicide rate was found to be slightly higher than the general suicide rate and higher than the rate after a birth. Our data suggest that miscarriage is not as important a risk factor as abortion but clearly more important than birth.

A literature review for years 1943-80 showed that 1.8% of women who committed suicide and were of childbearing age were pregnant.[9] If this figure were true now in Finland, the number of women committing suicide while pregnant would be 24, and a quarter of cases would be missing from our data, which included only completed pregnancies.

Low social class and poor social support have been connected with risk factors for suicide after birth. The risk for postnatal depression is greater for women with low income or with occupational instability,[20 21] and puerperal psychoses are more common among young mothers and women with poor social support.[5] Social class has also been found to be associated with all mental disorders after an abortion.[19 22] Data from the abortion register showed that women in the lowest social class were highly over-represented among women who committed suicide. We did not, however, have complete information on social class in our data. No control group for social class after birth and miscarriage and for the general population was available. In addition, the social class was based only on the mother's occupation.

The proportion of divorced women who commit suicide was more than double after an abortion and eightfold after a birth, which suggests that low social support is associated with suicide. Similarly, in a Danish study, a fivefold rate in admissions to psychiatric hospitals after abortion was found for separated, divorced, or widowed women compared with that of other women.[19]

The relation between suicide, mental disorders, life events, social class, and social support is a complex one.[23] Abortion might mean a selection of women at higher risk for suicide because of reasons like

Key messages

- About 5% of suicides in women of childbearing age are associated with an ended pregnancy
- The risk of suicide after birth is half of that among women of reproductive age in general
- Suicides are more common after a miscarriage and especially after an induced abortion than in the general population
- Increased risk for suicide after an abortion indicates either common risk factors for both or harmful effects of induced abortion on mental health

depression. Another explanation for the higher suicide rate after an abortion could be low social class, low social support, and previous life events or that abortion is chosen by women who are at higher risk for suicide because of other reasons. Increased risk for a suicide after an induced abortion can, besides indicating common risk factors for both, result from a negative effect of induced abortion on mental wellbeing. With our data, however, it was not possible to study the causality more carefully. Our data clearly show, however, that women who have experienced an abortion have an increased risk of suicide, which should be taken into account in the prevention of such deaths.

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Association of cardiovascular disease risk factors with socioeconomic position during childhood and during adulthood

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Abstract

***Objective*—To investigate strength of associations between risk factors for cardiovascular disease and socioeconomic position during childhood and adulthood.**

***Design*—Cross sectional analysis of status of cardiovascular risk factors and past and present social circumstances.**

***Subjects*—5645 male participants in the west of Scotland collaborative study, a workplace screening study.**

***Main outcome measures*—Strength of association between each risk factor for cardiovascular disease (diastolic blood pressure, serum cholesterol concentration, level of recreational physical exercise, cigarette smoking, body mass index, and FEV_1 score (forced expiratory volume in one second as percentage of expected value) and social class during childhood (based on father's main occupation) and adulthood (based on own occupation at time of screening).**

***Results*—All the measured risk factors were significantly associated with both father's and own social class ($P<0.05$), apart from exercise and smoking (not significantly associated with father's social class) and body mass index (not significantly associated with own social class). For all risk factors except body mass index, the regression coefficient of own social class was larger than the regression coefficient of father's social class. The difference between the coefficients was significant for serum cholesterol concentration, cigarette smoking, body mass index, and FEV_1 score (all $P<0.001$).**

***Conclusions*—Subjects' status for behavioural risk factors (exercise and smoking) was associated primarily with current socioeconomic circumstances, while status for physiological risk factors (serum cholesterol, blood pressure, body mass index, and FEV_1) was associated to varying extents with both past and present socioeconomic circumstances.**

Introduction

The current debate about the origins of cardiovascular disease in early life has important implications for health promotion and preventing cardiovascular disease. If risk of disease in adulthood is substantially influenced by either biological programming in utero[1 2] or circumstances in early life[3-5] then what remains for attempts to encourage healthy lifestyles in adults? Should such attempts be abandoned or amended in line with more recent information?

Previous studies of the relation between childhood social circumstances and adult cardiovascular disease provide uncertain guidance because each study, from this point of view, is limited in some respect: the number of risk factors for cardiovascular disease included in the analyses is restricted,[6-9] social circumstances during adulthood are excluded,[10 11] or social circumstances during childhood are so different from those in most industrialised countries that generalisation is difficult.[12 13]

We addressed these issues in an industrial population and compared the influence of childhood and adult social circumstances on six widely accepted risk factors for cardiovascular disease. Our intention was to estimate the strength of the associations between these risk factors and adult socioeconomic circumstances, after childhood circumstances had been taken into account (and vice versa), in order to determine where