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Association between parity and risk of suicide among parous women

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ABSTRACT

Background: There are limited empirical data to support the theory of a protective effect of parenthood against suicide, as proposed by Durkheim in 1897. I conducted this study to examine whether there is an association between parity and risk of death from suicide among women.

Methods: The study cohort consisted of 1 292 462 women in Taiwan who had a first live birth between Jan. 1, 1978, and Dec. 31, 1987. The women were followed up from the date of their first birth to Dec. 31, 2007. Their vital status was ascertained by means of linking records with data from a computerized mortality database. Cox proportional hazard regression models were used to estimate hazard ratios of death from suicide associated with parity.

Results: There were 2252 deaths from suicide during 32 464 187 person-years of follow-up. Suicide-related mortality was 6.94 per 100 000 person-years. After adjustment for age at first birth, marital status, years of schooling and place of delivery, the adjusted hazard ratio was 0.61 (95% confidence interval [CI] 0.54–0.68) among women with two live births and 0.40 (95% CI 0.35–0.45) among those with three or more live births, compared with women who had one live birth. I observed a significantly decreasing trend in adjusted hazard ratios of suicide with increasing parity.

Interpretation: This study provides evidence to support Durkheim's hypothesis that parenthood confers a protective effect against suicide.

Childbearing is considered to have long-term effects on women's health.[1] However, little is known about the relation between parity and mortality among women except for cancers of the reproductive organs.[2]

In his book on suicide published in 1897, Durkheim concluded that the rate of death from suicide was lower among married women than among unmarried women because of the effect of parenthood and not marriage per se.[3] Three studies since then have explored Durkheim's hypothesis. In the first, published almost 100 years later, Hoyer and Lund conducted a prospective study in Norway involving 989 949 married women aged 25 years or older who were followed up for 15 years.[4] They reported a negative association between suicide-related mortality and number of children. In a nested case–control study in Denmark involving 6500 women who committed suicide between Jan. 1, 1981, and Dec. 31, 1997, and 130 000 matched control subjects, Qin and Mortensen found a significantly decreased risk of suicide with increasing number of children.[5] In the third study, 12 055 pregnant women in Finland were followed up from delivery in 1966 until 2001; the authors found a decreasing trend in suicide-related mortality with increasing parity.[1]

One reason for the limited empirical evidence exploring Durkheim's hypothesis may have to do with sample size and study design.[4] Only studies involving representative suicides from the general population could make it possible to achieve sufficient power to detect the effect of parity on rare events such as suicide.[1,4,5] Even in the prospective study involving 989 949 women followed for 15 years, only 11 deaths from suicide occurred among women with six or more children.[4]

In Taiwan, suicide is the eighth leading cause of death among men and the ninth among women. The age-adjusted rate of death from suicide was 19.7 per 100 000 among men and 9.7 among women in 2007.[6] Suicide rates in Western countries have been generally lower than those in Asian countries.[7] A consistent increase in the suicide rate since 1999 has been found in Taiwan.[6] However, most Western countries have had stable or slightly decreasing rates during the 1990s.[8,9] The male:female ratio of suicide is frequently greater than 3:1 in Western countries,[7] whereas it is 2:1 in Taiwan.[10] High suicide rates among Chinese women have been well documented.[11] One explanation is that Chinese women do not benefit from marriage as much as their male counterparts.[12] The sex difference in suicide rates is largely driven by a high rate of suicide among women in Chinese societies.[11] In many Western countries, the trend over the past several years has been in the opposite direction: rates among women have been stable or decreasing, whereas rates among men have been increasing.[12] Furthermore, in an epidemiologic study of suicides in Chinese communities, the prevalence of mental illness among people committing suicide was much lower in those communities than in Western societies.[13]

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Because the previous studies that related parity and suicide-related mortality were carried out in economically developed countries and because different cultural settings might influence suicide patterns,[3] I undertook the present study in Taiwan, using a cohort of women who had a first and singleton live birth between Jan. 1, 1978, and Dec. 31, 1987, to explore further Durkheim's hypothesis.

Methods

Study population and data source

The study cohort consisted of 1 292 462 women in Taiwan who had a first and singleton live birth between Jan. 1, 1978, and Dec. 31, 1987, that was recorded in the Birth Registration System. The start date was chosen because the Birth Registration System began computerizing data on live births at that time.

In Taiwan, births are registered within 15 days by the parents or the family at a local household registration office, which in turn submits the data to the Birth Registration System. The registration form, completed by the physician attending the delivery, provides information on maternal age, education, parity, gestational age, date of delivery, and infant sex and birth weight.

Data from the Birth Registration System are considered complete, reliable and accurate because most deliveries in Taiwan take place either in hospital or at a clinic,[14] the birth certificates are completed by the attending physicians, and registration of all live births is mandatory at local household registration offices.[15,16]

Follow-up

Women were followed up to Dec. 31, 2007. Information on any subsequent births was retrieved from the Birth Register System with the use of each woman's unique personal identification number. Their vital status was ascertained through the linking of records with the computerized mortality database, identifying the date and cause of any deaths.

Statistical analysis

The person-years of follow-up were calculated for each woman from the date of first birth to the date of death or Dec. 31, 2007. Death rates were calculated by dividing the number of deaths from suicide by the number of person-years of follow-up. Cox proportional hazard regression models were used to estimate hazard ratios (HRs) of death from suicide associated with parity (the number of children recorded in the last childbirth record of each woman registered during follow-up); 95% confidence intervals (CIs) were also calculated. Suicide was defined according to ICD-9 (International Classification of Diseases, 9th revision) codes E950–E959. The variables in the final model included age at first birth (≤ 25, 26–30 or > 30 years), parity (one, two, or three or more children), marital status (married v. unmarried), years of schooling (≤ 9 v. > 9 years) and place of delivery (hospital or clinic v. home or other location). The proportional hazards assumption was assessed for all above-mentioned variables, and no violations were observed. All statistical tests were two-sided; p values of less than 0.05 were considered to be statistically significant.

Results

Overall, 1 292 462 primiparous women with complete information were included in the analysis. A total of 32 464 187 person-years of follow-up were observed. There were 2252 deaths from suicide, for a mortality of 6.94 cases per 100 000 person-years. Most of the suicides were committed by women less than 12.7 years after their last birth (mean age at birth of last child 28.6 [SD 4.3] years; mean age at suicide 39.6 [SD 8.1] years).

Table 1 gives the number of person-years of follow-up and deaths from suicide by age at first birth, parity, marital status, years of schooling and place of delivery. The rate of death from suicide was 11.01 per 100 000 person-years among women who had given birth to one child, 7.14 per 100 000 among those who had had two children, and 5.66 per 100 000 among those who had given birth to three or more children.

After adjustment for age at first birth, marital status, years of schooling and place of delivery, the adjusted hazard ratio was 0.61 (95% confidence interval [CI] 0.54–0.68) among women with two

Table 1: Demographic characteristics and rate of death from suicide among 1 292 462 women in Taiwan who had a first live birth between Jan. 1, 1978, and Dec. 31, 1987

Characteristic	No. of women	No. of person-years of follow-up*	No. of suicides (rate per 100 000 person-years)
Age at first birth, yr			
≤ 25	859 942	21 899 734	1 744 (7.96)
26–30	372 895	9 147 488	441 (4.82)
> 30	59 625	1 416 965	67 (4.73)
Parity			
1	157 207	3 869 368	426 (11.01)
2	564 727	14 023 208	1 001 (7.14)
≥ 3	570 528	14 571 611	825 (5.66)
Marital status			
Married	1 260 615	31 660 143	2 149 (6.79)
Not married	31 847	804 044	103 (12.81)
Years of schooling			
≤ 9	722 518	18 450 569	1 500 (8.13)
> 9	569 944	14 013 618	752 (5.37)
Place of delivery			
Hospital or clinic	1 245 925	31 212 223	2 143 (6.87)
Home or other	46 537	1 251 963	109 (8.71)

*Follow-up was from date of first birth until death or Dec. 31, 2007.

live births and 0.40 (95% CI 0.35–0.45) among women with three or more births, compared with women who had one child. There was a significant decreasing trend in the adjusted hazard ratios of suicide with increasing parity (Table 2).

Interpretation

In this cohort study, I found a clear tendency toward decreasing suicide rates with increasing number of children after controlling for age at first birth, marital status, years of schooling, and place of delivery. My finding of a reduced rate of death from suicide associated with higher parity is in agreement with findings from previous studies[1,4,5] and is in line with Durkheim's hypothesis.[3]

Parity is not usually considered a possible determinant of women's risk of suicide. Only three previous studies reported an association between parity and suicide.[1,4,5] The Finnish study involved 12 055 women and examined a limited number of suicide-related deaths (n = 47) during the follow-up period;[1] it therefore likely has limited statistical power. The number of suicide-related deaths in my study (n = 2252) is twice that in the Norwegian study (n = 1190).[4] In addition, the Finnish study did not adjust for potential confounding factors such as socio-economic status (marital status and educational levels), which was adjusted for in the other studies[4,5] and the current study.

The age range at the start of follow-up was 25 to more than 75 years in the Norwegian study.[4] Suicide-related deaths occurred between ages 18 and 75 years in the Danish study.[5] Women included in my study tended to be younger than those in the Norwegian and Danish studies.

One study emphasized a higher reduction in suicide-related mortality for each additional child among postmenopausal women (26% reduction per child) than among premenopausal women (18% reduction per child).[4] The evidence suggests that the protective effect from children may differ at various stages during a woman's life. The Danish study showed a trend of decreasing risk of suicide with increasing number of children: relative to nulliparous women, the odds ratios were 1.02 for one child, 0.97 for two children, 0.84 for three to four children, and 0.62 for five or more. My study found a 39% decrease in suicide-related mortality among women with two live births and a 60% decrease among women with three or more births compared with women with one child. The protective effect of parity on risk of death from suicide was much stronger than previously reported estimates.[4,5] Given that the women included in this study were young (the large majority of suicide-related deaths occurred before premenopausal age) and were among the youngest reported for any country, this finding is particularly noteworthy.

Selection effects are likely to be an important explanation for this association. Psychiatric illness may affect opportunities for marriage and motherhood and decisions about subsequent childbearing.[17–20] Women who are depressed are less likely to have stable relationships, probably because of the impact of the illness on their behaviour.[21] Research has shown that men become depressed when their wives are depressed.[22] These factors may lead to a decreased desire to

have a child or more children.[23,24] The higher suicide rate among women with one child than among women with two or more children may be due in part to selection effect, because the group of women with one child will include those with problems, including ones related to first pregnancy, which prevented or discouraged them from having more children. On the contrary, women in better health, physically and mentally, or who generally lead happier lives are more likely to have children.[5]

It is difficult to explain whether the presence of children per se offers protection against suicide. Veevers[25] suggested that the presence of children is protective against suicide only as long as they are cared for by their parents and that the protective effect disappears after the children leave home. In the current study, most of the suicides were committed by women less than 12.7 years after their last birth. The presence of young children may increase the mother's feelings of self-worth, possibly based on her perception of being needed.[5] Consequently, the possibility was high that young children played a role in a woman's decision not to commit suicide. My data may help to support the theory proposed by Veevers.[25] Another explanation might be that children can provide emotional and material support to the mother when she has difficulties or setbacks.[5] In addition, motherhood may enhance social networks, provide a positive social role and a potentially important source of social support, especially over the long term.[26]

Table 2: Association between parity, and hazard ratio of death from suicide over a 29-year follow-up period

Variables	Hazard ratio (95% CI)	
	Crude	Adjusted*
Age at first birth, yr		
≤ 25	1.00 (ref)	1.00 (ref)
26–30	0.63 (0.56–0.70)	0.60 (0.54–0.67)
> 30	0.63 (0.49–0.81)	0.47 (0.37–0.61)
p value for linear trend	< 0.001	< 0.001
Parity		
1	1.00 (ref)	1.00 (ref)
2	0.65 (0.58–0.72)	0.61 (0.54–0.68)
≥ 3	0.50 (0.45–0.56)	0.40 (0.35–0.45)
p value for linear trend	< 0.001	< 0.001
Marital status		
Married	1.00 (ref)	1.00 (ref)
Not married	1.87 (1.54–2.28)	1.51 (1.23–1.84)
Years of schooling		
≤ 9	1.00 (ref)	1.00 (ref)
> 9	0.68 (0.63–0.75)	0.69 (0.63–0.76)
Place of delivery		
Hospital or clinic	1.00 (ref)	1.00 (ref)
Home or other	1.19 (0.98–1.44)	1.12 (0.92–1.36)

Note: CI = confidence interval, ref = reference group.
*Each variable was adjusted for other variables in the table.

Limitations

My study design allowed for the study of mortality among only parous women. A previous study compared suicide rates among nulliparous and parous women. Hoyer and Lund[4] reported that, compared with married nonparous women, parous married women had a lower rate of death from suicide in all age groups. I was unable to examine the possible role of nulliparity on suicide rates because the birth registry ascertained data on births rather than pregnancies. The generalizability of my findings is thus limited. Women aged 65 and older had the highest rates of suicide in Taiwan.[27] Because the population in my study was still young and had not reached the age that was associated with the highest risk of suicide, the generalizability of the findings are thus also limited.

In the event of a death in Taiwan, the decedent's family is required to obtain a death certificate from the hospital or local community clinic, which then must be submitted to the household registration office. It is also mandatory to register all deaths at local household registration offices; therefore, the death registration is reliable and complete.[15,16] This study had no selection bias because of the complete population coverage and follow-up made possible by the national identification number.

In Taiwan, death certificates must be completed by physicians. If a cause is uncertain, whether it is suicide, an unintentional injury, a homicide, or a natural cause of death, the police will require a forensic medical examination. In this circumstance, a death verdict is jointly assigned by a prosecutor and coroner, whose main concern is the possibility of homicide.[13] Therefore, a suicide verdict helps in excluding this possibility. Nonetheless, it cannot be ruled out that some suicides have been misclassified as accidental deaths. However, the misclassification would unlikely to be related to parity and would probably lead to an underestimation of the results.

Employment and participation in social organizations and religious activities are protective factors against suicide.[28,29] I was unable to adjust for these factors in the current study owing to the lack of available data. However, it is reasonable to believe that the protective effect of a social network will vary substantially in different cultures.[4] My study population was less likely to participate in social organizations and religious activities compared with populations in northern European countries (Norway, Denmark and Finland), probably because of cultural factors. The confounding effect from these two factors should be small or none at all. Furthermore, if the association between these two potential confounding variables and suicide is not as strong as the one that has been observed for parity, adjustment of these two variables will not qualitatively change the conclusion. Little is known about the suicide protection offered by employment because information on when unemployment occurred, how long it persisted and how the timing of employment is related to suicide is not always available. However, it is reasonable to believe that unemployment is not common enough to have a substantial impact on the general protective effect associated with parity.

Conclusion

I found that increasing parity was associated with decreasing rates of death from suicide. This finding adds evidence to support Durkheim's hypothesis that parenthood confers a protective effect against suicide.

This article has been peer reviewed.

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