Netta Mäki

Premature mortality after suicide attempt and the risk in relation to socioeconomic status. Register-based study in Finland in 1988–2007

Extended abstract

INTRODUCTION

Suicide is a common cause of death worldwide, and every year almost one million people die by suicide.(1) For every completed suicide there are dozens of attempted suicides, and the worldwide lifetime prevalence of suicide attempt has been estimated to be 2.7 per cent.(2) Several studies have shown that individuals with a history of suicide attempt form a high-risk mortality group. Compared to the general population, standardized total mortality ratio for the suicide attempters has been found to vary, for example, from 3.2-fold among women and 4.1-fold among men in the UK(3) and about 7.0-fold among men and women in Taiwan(4) to as high as 9.4- and 14.6-fold among women and men, respectively, in Finland.(5)

Completed suicide is the main cause of the excess mortality among suicide attempters, and accordingly, risk of suicide has been found to be almost 20-fold in men and women together in the UK,(3,6) 30-fold in Denmark,(7), 48 times higher in New Zealand(8) and about 59-fold in Finland(5) and in Taiwan.(4) Variability in the results may reflect the length of the follow-up as the mortality risk is the highest soon after the suicide attempt. During the first year following the attempt, suicide mortality has been shown to be particularly high(5,7,9–11) being up to over 100-fold in Taiwan.(4)

Excess mortality risk for other causes of death is much less studied, but high standardized mortality ratios have been found especially for accidents,(3–5) accidental poisoning(3,4) and alcohol related causes.(7) In addition, mortality for diseases has been found to be elevated among the suicide attempters, and high risks seem to relate at least to mental disorders,(3,12) diabetes mellitus(4) and to diseases of digestive system(3,12) which are partly alcohol inflicted.

Even though suicide attempt is not a rare event, the relevance of different social resources people possess that may buffer the harmful effects of the attempt or the hospitalisation has been studied very little. Socioeconomic resources, like education, occupational social class and income, and the features they carry might alleviate the negative effects of suicide attempt and hospitalisation. However, while it is well established that low socioeconomic status increases suicide risk in the general population(13,14), a few studies suggest that in the suicide attempt population, the association between socioeconomic status and suicide is non-existent or even reversed. Utilising individual-level measures of socioeconomic status, Danish studies(10,15,16) found that when psychiatric admission was adjusted for, the association between socioeconomic status and suicide decreased or disappeared. Agerbo et al.(17) assessed the interaction effect between hospital admission status and income on suicide. While income was inversely associated with suicide risk in the general population, the association was direct among those with a history of hospital admission due to mental illness. Two studies have used information on area level deprivation and the results are inconsistent. In the UK(3), no relationship was found for external causes of death meanwhile in Scotland,(12) people from affluent areas were at high risk of subsequent suicide death. The lack of the association between socioeconomic status and suicide among the suicide attempters could denote that in this population those with a high socioeconomic status form the most vulnerable groups possibly because of worse mental health status before being hospitalised or because the admission is more stigmatising for them.

Altogether, excess mortality and the causes of death among the suicide attempters as well as the relevance of socioeconomic resources are not sufficiently studied. Some of the previous studies have simply observed mortality in the suicide attempt population and lacked comparison data on the general population. Otherwise, the previous research is often based on selected populations. For example, some studies have included suicide attempts by certain methods only, some have included patients from single hospitals or the data have been limited to residents of specific cities. Also, mostly owing to lack of appropriate data, the importance of socioeconomic resources is still little studied and the pathways and mechanisms are poorly understood.

To address some of these shortages in research, this study analyses random sample data covering all Finns with register-based information on suicide attempts nursed in hospital and on date and cause of death from the beginning of year 1988 to the end of year 2007. The specific research questions were:

1. To what extent is total and cause-specific mortality increased among those with a history of suicide attempt and how is mortality related to time since the discharge from hospital?
2. Do the socioeconomic resources buffer the negative effects of suicide attempt and hospitalisation?

DATA AND METHODS

Data

The target population consisted of men and women residing in Finland at least one of the years between 1988 and 2007 and aged at least 15 years at that time. The individual level data set used was based on a two-part sample: an 11% random sample obtained from a Statistics Finland population-register data file with a random oversample of death certificates covering 80% of all deaths. Both samples include detailed sociodemographic information. Using personal identification codes Statistics Finland linked these data with information on causes of hospitalization provided by the National Institute for Health and Welfare (ethics approval TK-53-1519-09). In order to take into account the sampling design, weights were constructed from the known sampling probabilities.

Altogether, 6 648 men and 4 958 women included in the sample were admitted to the hospital due to non-fatal suicide attempt at least once during the study period. In case a person was admitted to the hospital due to suicide attempt, the mortality follow-up began on the date he/she was discharged. For those not hospitalized, the follow-up began on the 1st of January 1988. Among both populations the follow-up ended at the day of death or 31st December 2007 at the latest. Those who emigrated were censored at the end of the emigration year. The mean follow-up time was 6.47 years among the suicide attempt population and 12.45 years among the general population. Those with a history of suicide

attempt were somewhat younger: their mean age was 43 years while it was 55 years in the general population. Table 1 states the ICD10 (1996–2007) codes for the causes of death studied, and corresponding ICD9 codes were used for the years 1988–1995.

Education, occupational social class and income were used as indicators for socioeconomic status. Because socioeconomic status is not well established at very young ages, we included only those aged 25 years or more in the analyses on socioeconomic resources. Education comprised three groups: those with basic schooling or lower-secondary education (ISCED-1997: 0–2), upper-secondary education (ISCED-1997: 3–4) and tertiary education (ISCED-1997: 5–6). Occupational social class was composed of the categories of upper and lower non-manual, manual and others including, e.g., entrepreneurs and farmers. Those working at home were classified according to the occupation of the head of the household, and economically inactive persons such as pensioners and the unemployed whose occupation was not available each year were classified according to their occupation in earlier time points. As we included both dwelling and institutional populations, personal income was used instead of household income. In addition to wages, it consists of other income sources liable to state taxation, including pension income, unemployment benefits and most other social security benefits, as well as possible entrepreneurial income. For the analyses income was categorised into quartiles.

Education and income were measured yearly since 31st December 1987 and occupational social class in 5-year intervals. Education and social class were treated as time-variant variables, but in order to avoid reverse causality, i.e. decreasing income due to ill-health, income was measures at the first possible time point. For the most, that was at the end of 1987. The distribution of socioeconomic indicators for both the general and suicide attempt populations are shown in Tables 2 and 3.

In order to better understand the pathways between socioeconomic resources, suicide attempt and later mortality, we aimed to assess the mental health status at the time of being hospitalised. The data did not include any direct indicator for health status, whereupon as measures of the severity of ill-health we used the length of the hospital stay as well as the place the patient was discharged to (other institution/home) the idea being

that those discharged home were in better health also when hospitalised. In addition, we compared the distributions of socioeconomic indicators in the general and suicide attempt populations. If the distributions are notably different in the suicide attempt population, those patients in categories with smaller proportions could be interpreted to be more selected and probably also in worse health.

Methods

Mortality rates were directly sex- and age-adjusted in five-year age-groups using the total population as the standard population. To assess the excess mortality among the suicide attempt population, we used Poisson regression models which were estimated by STATA V.11.2 software. The results are presented as risk ratios for men and women combined in order to avoid chance results caused by small number of deaths. We run separate models for disease and suicide mortality, and among the suicide attempters we divided the follow-up time in two covering the first year after suicide attempt and the time after that.

All models were adjusted for sex, age, calendar year and on the information whether a person belonged to the dwelling or institutional population. For those admitted to the hospital due to suicide attempt, we estimated a second model where, in addition to the variables above, the two indicators of the severity of ill-health were adjusted for.

RESULTS

All-cause mortality was highest during the first weeks and months following the suicide attempt (Figure 1), but the risk remained elevated during the whole follow-up period. Compared to the general population, excess mortality in the suicide attempt population was 25- and 17-fold higher among men and women, respectively, during the first four weeks following the hospital discharge. The risk decreased in time, but was still at least 7-fold higher during the first six months. Altogether, excess mortality during the first year among the suicide attempt population was 10.7- and 7.6-fold among men and women, respectively. When suicide was considered, the risk ratio following the first year after hospital discharge was as high as 98-fold among men and women combined (results not shown).

(Figure 1 here)

As the trajectories were very similar among men and women, we combined the sexes for the following analyses. Table 1 shows total and cause specific mortality rates. All-cause mortality was 11.8 per 1000 in the general population, but 35 per 1000 in the suicide attempt population. The highest differences in mortality between the general and suicide attempt populations were for external causes of death and especially for suicide. While mortality for these causes of death was less than 1 per 1000 in the general population, it was 9.3 per 1000 for suicide, 1.2 for accidental poisonings and 2.5 for other accidents and violence. Also mortality for many diseases was higher in the suicide attempt populations than in the general populations. There were notable differences in mortality for alcohol related diseases, respiratory cancers and diseases of circulatory system.

(Table 1 here)

When the general population was studied, socioeconomic status was inversely associated with both disease and suicide mortality: better educated, those in higher social class categories and those with higher income had notably lower mortality risk (Tables 2 & 3). However, when the suicide attempt population was considered, the results were different. During the first year after the hospital discharge, socioeconomic status was either not associated (education and social class) with disease mortality or the association was weaker (income) than in the general population. After the first year, basic and lower secondary education was related to increased disease mortality, but the association was only weak. Income, on the other hand, was almost as distinctly associated with all-cause mortality as in the general population.

(Table 2 here)

For suicide mortality, clear differences between the two populations appeared. In the general population, the inverse association between socioeconomic status and mortality was even stronger than for disease mortality. In the suicide attempt population, the

association was either direct and statistically significant (education and the lowest income quartile) or lacking (social class and other income groups) during the first year following the discharge. After the first year, the socioeconomic associations with suicide risk were mostly lacking (education, income and most social class groups).

Next we tried to assess whether the higher suicide mortality risk among those with better education seen in the suicide attempt population is because of worse health status among them when hospitalised. As measures of the severity of ill-health we used the length of the hospital stay and the place the patient was discharged to. The results for both indicators were similar and we only show the model including both (model 2 in Tables 2 and 3). The effect of the adjustment on risk ratios was negligible. However, the comparison of the distributions of socioeconomic status among the general and suicide attempt populations shows notable differences. While the proportion with tertiary education was 18% in the general population, it was only 13% in the suicide attempt population. This, on the other hand, does support the interpretation that those with the highest level of education had worse health status when hospitalised.

(Table 3 here)

DISCUSSION

For this study, we had access to comprehensive population registration data that enables us establish premature mortality after suicide attempt and the risk in relation to socioeconomic status.

Premature mortality is extremely high after suicide attempt especially soon after the discharge. Our results do not support the idea that socioeconomic resources ameliorate the effects of suicide attempt on subsequent mortality. These issued will be discussed more thoroughly in the presentation. In conclusion, suicide prevention should focus on designing adequate aftercare following attempts, and it should be targeted also for those in better socioeconomic position.

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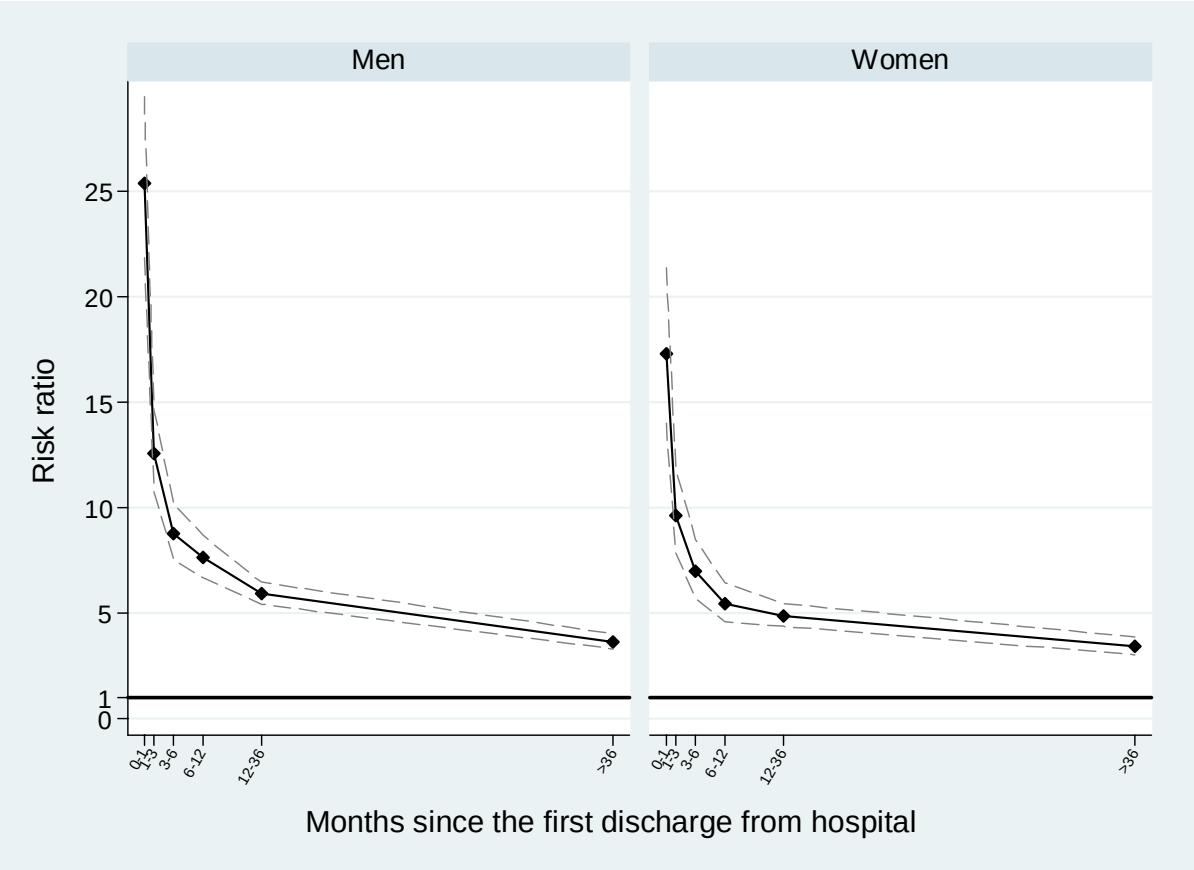

Figure 1. Age-adjusted excess mortality among the suicide attempt population in relation to time since the first discharge from hospital. Risk ratios and 95% confidence intervals from Poisson regression models (in the general population RR = 1.00).

Table 1. Age and sex standardised total and cause-specific mortality per 1000 in the general and suicide attempt populations, Finnish men and women aged 15 years and over

		General population			Suicide attempt population		
	Number of person-years	64 677 874			294 709		
Cause of death	ICD-10 code	Number of deaths	Mortality	(95% CI)	Number of deaths	Mortality	(95% CI)
Cancers of lung, larynx, trachea and bronchus	C32-C34	30 432	0.47	(0.46-0.48)	153	0.87	(0.72-1.03)
Other cancers	C00-C31, C35-D48	133 278	2.06	(2.05-2.07)	429	2.51	(2.24-2.78)
Ischaemic heart disease	I20-I25	206 144	3.18	(3.17-3.19)	845	5.92	(5.48-6.35)
Other diseases of circulatory system	I00-I19, I26-I425; I427-I99	139 954	2.16	(2.14-2.17)	571	3.71	(3.58-3.87)
Alcohol related diseases and accidental poisoning by alchol	F10, G312, G4051, G621, G721, I426, K292, K70, K860, K8600, O354, P043, X45	20 994	0.33	(0.32-0.33)	975	2.89	(2.70-3.09)
All other diseases		174 951	2.70	(2.69-2.71)	982	6.14	(5.70-6.58)
Accidental poisonings (Excl. Accidental poisoning by alcohol)	X40-X44, X46-X49, Y10-Y15	3 309	0.05	(0.05-0.05)	405	1.23	(1.10-1.37)
Suicide	X60-X84, Y870	17 042	0.26	(0.26-0.27)	2 622	9.28	(8.87-9.70)
Alcohol-associated suicides		*10 693*	*0.17*	*(0.16-1.17)*	*1 781*	*6.75*	*(5.11-5.78)*
Non-alcohol associated suicides		*6 349*	*0.10*	*(0.09-1.10)*	*841*	*2.53*	*(2.32-2.73)*
All other accidents and violence		36 988	0.56	(0.56-0.57)	705	2.47	(2.25-2.68)
Total mortality		763 092	11.77	(11.75-11.80)	7 687	35.06	(34.17-35.95)

Table 2. Socioeconomic differences in disease mortality among the general and suicide attempt population
Finnish men and women aged 25 years and over

	General population			Suicide attempt population							
				Time since discharge							
				≤ 1 year ago				>1 year age			
	%	Model 1[a]		%	Model 1[a]		Model 2[b]		Model 1[a]		Model 2[b]	
Education												
Tertiary	18	1		13	1		1		1		1	
Upper secondary	25	1.26	(1.24-1.28)	36	1.14	(0.81-1.59)	1.11	(0.80-1.55)	1.03	(0.85-1.24)	1.03	(0.85-1.24)
Basic & Lower secondary	57	1.50	(1.48-1.52)	51	1.31	(0.96-1.78)	1.27	(0.94-1.72)	1.30	(1.09-1.55)	1.31	(1.09-1.56)
Occupation-based social class												
Upper non-manual	11	1		8	1		1		1			
Lower non-manual	24	1.20	(1.18-1.22)	23	1.25	(0.84-1.85)	1.21	(0.82-1.79)	0.97	(0.78-1.20)	0.98	(0.79-1.22)
Manual	42	1.48	(1.45-1.50)	52	1.33	(0.93-1.89)	1.27	(0.89-1.80)	1.15	(0.95-1.40)	1.16	(0.95-1.41)
Others	23	1.36	(1.34-1.39)	17	1.39	(0.93-2.06)	1.34	(0.90-1.98)	1.13	(0.90-1.43)	1.15	(0.91-1.45)
Income at the beginning of the follow-up												
Highest quartile	25	1		20	1		1		1		1	
Second quartile	25	1.28	(1.49-1.53)	27	0.97	(0.73-1.30)	0.97	(0.72-1.30)	1.02	(0.86-1.20)	1.03	(0.87-1.22)
Third quartile	25	1.63	(1.80-1.85)	26	1.39	(1.06-1.82)	1.35	(1.03-1.78)	1.35	(1.15-1.60)	1.36	(1.15-1.61)
Lowest quartile	25	1.73	(1.98-2.04)	27	1.19	(0.89-1.58)	1.14	(0.85-1.51)	1.57	(1.32-1.88)	1.58	(1.33-1.88)

[a] Adjusted for sex, age, year and whether dwelling or institutional population

[b] Adjusted for sex, age, year, whether dwelling or institutional population and the severity of ill-health

Table 3. Socioeconomic differences in suicide mortality among the general and suicide attempt population
Finnish men and women aged 25 years and over

	General population			Suicide attempt population					
				Time since discharge					
				≤ 1 year ago			>1 year age		
	%	Model 1[a]		%	Model 1[a]	Model 2[b]		Model 1[a]	Model 2[b]
Education									
Tertiary	18	1		13	1	1		1	1
Upper secondary	25	1.80	(1.71-1.90)	36	0.74 (0.59-0.94)	0.76 (0.60-0.95)		0.86 (0.71-1.05)	0.87 (0.71-1.06)
Basic & Lower secondary	57	2.14	(2.03-2.26)	51	0.68 (0.54-0.85)	0.71 (0.56-0.89)		0.84 (0.69-1.03)	0.87 (0.72-1.06)
Occupation-based social class									
Upper non-manual	11	1		8	1	1		1	1
Lower non-manual	24	1.44	(1.34-1.54)	23	0.98 (0.71-1.34)	0.97 (0.70-1.34)		1.40 (1.07-1.83)	1.42 (1.09-1.87)
Manual	42	2.32	(2.17-2.47)	52	0.93 (0.69-1.23)	0.91 (0.68-1.21)		1.07 (0.83-1.39)	1.08 (0.83-1.39)
Others	23	1.84	(1.72-1.98)	17	1.00 (0.73-1.38)	0.95 (0.69-1.32)		1.36 (1.03-1.80)	1.33 (1.00-1.76)
Income at the beginning of the follow-up									
Highest quartile	25	1		20	1	1		1	1
Second quartile	25	1.45	(1.38-1.51)	27	0.93 (0.75-1.15)	0.93 (0.75-1.16)		0.98 (0.81-1-18)	0.98 (0.81-1.19)
Third quartile	25	2.05	(1.96-2.15)	26	0.83 (0.66-1.04)	0.81 (0.64-1.02)		0.96 (0.79-1.17)	0.94 (0.77-1.15)
Lowest quartile	25	2.13	(2.03-2.25)	27	0.79 (0.62-0.99)	0.75 (0.59-0.96)		0.99 (0.81-1.21)	0.97 (0.79-1.18)

[a] Adjusted for sex, age, year and whether dwelling or institutional population

[b] Adjusted for sex, age, year, whether dwelling or institutional population and the severity of ill-health