

Suicide and marital status in Northern Ireland

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Received: 19 January 2009 / Accepted: 6 August 2009
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Abstract

Introduction Studies show marriage to be protective against suicide though with variation in the extent to which suicide rates are higher among the never married, separated or divorced and widowed. We examined suicide in Northern Ireland by marital status and examined whether the observed variation differed by sex and age.

Methods Data relating to all 1,398 suicide deaths (ICD-9 E950-959 and ICD-10 X60-84) registered in 1996–2005 were analysed using Poisson regression.

Results The total, male and female age-standardised suicide rates were 8.4, 13.6 and 3.3 per 100,000, respectively. Never marrying increased male suicide risk and its effect increased with age (incidence rate ratio (IRR) among 20–34 year-olds = 1.47, 95% confidence interval (CI) = 1.19–1.84; IRR among over 55 year-olds = 2.33, 95% CI = 1.55–3.50). Never marrying was a risk factor for women only if aged 20–34 years (IRR = 3.05, 95% CI = 1.70–5.47). Among over 55 year-olds, widowhood increased risk of male suicide only (IRR = 2.47, 95% CI = 1.64–3.70) whereas divorce was associated with an almost threefold increase in male (IRR = 2.61, 95%

CI = 1.39–4.88) and female (IRR = 2.57, 95% CI = 0.89–7.42) suicide relative to married persons. The effect of divorce was far more pronounced in 20–34 year-old men (IRR = 5.59, 95% CI = 3.58–8.67) and women (IRR = 9.46, 95% CI = 3.81–23.37).

Conclusions In Northern Ireland, marriage protects both sexes against suicide though men more so than women. Divorced young men, in particular, are a population at high risk of suicide.

Keywords Suicide · Marital status · Divorce

Introduction

In Northern Ireland, as in many European countries, suicide has become recognised as a significant social and public health problem leading to the development and implementation of a national prevention and action plan [8]. There were increases in the rate of suicide in Northern Ireland before the 1990s [20] and very recently published figures indicate that a further increase has occurred [21]. Suicide is associated with a wide range of factors from the socioeconomic, demographic, psychiatric, substance misuse and familial domains [18, 24, 27]. The significance of mental illness as a risk factor for suicide in Northern Ireland was highlighted by a controlled psychological autopsy study [12]. Area-level differences in Northern Irish suicide rates have been shown [8, 22] though such differences have been found to be predominantly due to individual and household factors.

Marital status and suicide incidence at a national level have been examined in a number of countries [13, 15, 17, 19, 22, 24, 31, 32]. Findings have generally been consistent with marriage being protective against suicide though there

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has been variation in the extent to which the suicide rate is higher among the never married, separated or divorced and widowed populations. Variation in suicide rates by marital status has been shown to differ by gender—marriage more often protective for men [15, 17, 32]—and by age—widowhood early in life being associated with greater increased risk [17, 19, 28, 33].

A recent, national, 5-year, record-linkage study in Northern Ireland showed a protective effect of marriage and cohabiting [22]. Whether this protective effect applied to men and women and to young and old was not investigated. We aimed to examine variation in suicide rates in Northern Ireland by marital status and to examine whether the observed variation differed by sex and age over the 10-year period, 1996–2005.

Methods

Study population

The General Register Office (GRO) for Northern Ireland provided data electronically relating to all deaths by suicide (respectively, codes E950-959 and X60-84 of the Ninth and Tenth Revisions of the International Classification of Diseases, Injuries and Causes of Death) that were registered in the period 1996–2005, inclusively. The data included the sex, 5-year age group and marital status of the deceased. Annual population data (disaggregated by sex and 5-year age group) and 2001 Census data (disaggregated by sex, 5-year age group and marital status) were obtained from the website of the Northern Ireland Research and Statistics Agency (<http://www.nisra.gov.uk/>).

Statistical analysis

Total, male female and age–sex-specific suicide rates were calculated. Where relevant, the rates were age-standardised using the European standard population [30]. Assuming that the number of suicide deaths (x) followed a Poisson distribution, 95% confidence intervals (CIs) for the rates were calculated using the Normal approximation, i.e., $CI = (x \pm 2 \times \sqrt{x}) \times 100,000/\text{population}$.

Poisson regression analysis was used to estimate age, sex and marital status effects on the incidence of suicide in Northern Ireland. For the analyses including marital status, only data relating to persons over 20 years was considered. All suicides under this age involved persons who had never married. Age was collapsed into three age groups: 20–34 years, 35–54 years and over 55 years. Evidence of interaction (effect modification) between age, gender and marital status in relation to suicide rates was assessed by fitting Poisson regression models with and then without the

relevant interaction term and performing a likelihood ratio test. Main effects, interaction effects and their combined effects are reported as incidence rate ratios (IRRs) with their 95% CIs and P values.

Multivariate Poisson regression models were derived separately for male and female suicide. The models estimated the independent main effects of age and marital status and their interaction effects. No interaction term was included in the models for widowed persons aged 20–34 years as there was only one suicide in this population. Goodness-of-fit tests were carried out to ensure that the models provided a fair representation of the data. The Poisson regression analyses were carried out using Stata version 6.0 [29]. The incidence of male and female suicide was calculated by age group and marital status. For each age-marital status subgroup, suicide in excess of the baseline rate (that of married persons over 55 years) was apportioned in order to show the increase associated with age (main effect) and the increase associated with marital status (combined main and interaction effects).

Results

During 1996–2005, 1,398 suicides were registered in Northern Ireland, an average of 140 per year (ranging from 118 in 1997 to 186 in 2005). Men accounted for four times as many suicide deaths as women (male: 1,119, 80%; female: 279, 20%). The total, male and female age-standardised suicide rates were 8.4, 13.6 and 3.3 per 100,000, respectively.

The incidence of suicide among men showed marked variation by age (Fig. 1). The highest rates were among men aged 20–34 years, approximately double the overall male rate (25–27 vs. 13.6 per 100,000). After this age, the

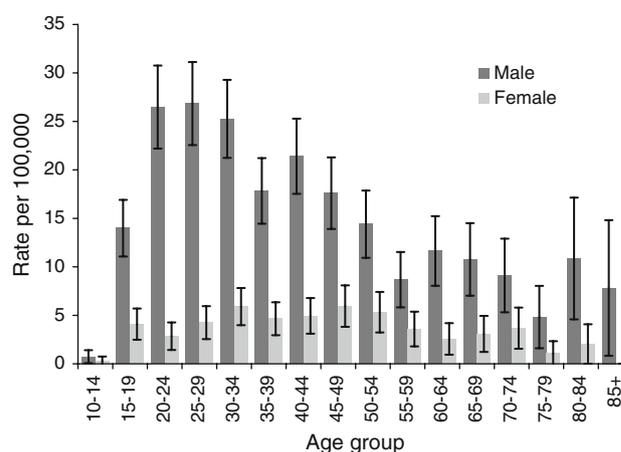


Fig. 1 Male and female suicide rates in Northern Ireland by 5-year age group, 1996–2005. Error bars represent the 95% CIs for the rates

rate of suicide decreased with increasing age, albeit with some fluctuations. There was no clear age pattern in female suicide rates. The likelihood ratio test for interaction indicated that the age pattern of male and female suicide was significantly different ($\chi^2 = 28.15$, $df = 13$, $P = 0.009$). This was largely due to the particularly high rates among men in their twenties relative to similarly-aged women. In 20–24 and 25–29 year-olds, respectively, suicide was nine times and six times more common in men than in women.

Of the 1,398 suicides registered in 1996–2005, 1,273 (91%) were aged over 20 years. Of these, 538 (42.3%) were married, 553 (43.4%) had never married, 114 (9.0%) were divorced and 68 (5.3%) were widowed.

Independent of marital status, the respective suicide rates of men aged 20–34 years and 35–54 years were almost three times (IRR = 2.84, 95% CI = 2.14–3.77, $P < 0.001$) and twice (IRR = 2.04, 95% CI = 1.60–2.61, $P < 0.001$) the rate of men over 55 years of age (Table 1). Women aged 35–54 years also had twice the suicide rate of over 55 year-olds (IRR = 2.00, 95% CI = 1.25–3.20, $P = 0.004$) after adjustment for marital status whereas young women had virtually the same rate (IRR = 0.92, 95% CI = 0.47–1.78, $P = 0.792$).

Men who never married had a higher suicide rate (IRR = 2.33, 95% CI = 1.55–3.50, $P < 0.001$) than married men. This effect was less evident among young men aged 20–34 years (Interaction term IRR = 0.63, 95% CI = 0.40–1.00, $P = 0.052$) though never marrying was still associated with a statistically significant increased risk of suicide in this population (IRR = 1.47 (i.e., 2.33×0.63), 95% CI = 1.19–1.84, $P < 0.001$). The

opposite was the case for women. In general, never marrying did not significantly affect female suicide rates (IRR = 1.42, 95% CI = 0.61–3.32, $P = 0.414$). However, it was a significant risk factor among young women (Interaction term IRR = 2.15, 95% CI = 0.77–6.00, $P = 0.145$) as they had three times the suicide rate of young women who had married (IRR = 3.05 (i.e., 1.42×2.15), 95% CI = 1.70–5.47, $P < 0.001$).

Widowhood was associated with an increased risk of suicide in men (IRR = 2.47, 95% CI = 1.64–3.70, $P < 0.001$) but not in women and there was a lack of evidence to suggest that the effect of widowhood varied by age.

Divorce was associated with an almost threefold increase in male (IRR = 2.61, 95% CI = 1.39–4.88, $P = 0.003$) and female (IRR = 2.57, 95% CI = 0.89–7.42, $P = 0.082$) suicide rates relative to married persons. Among young men, this rate increase was doubled (Interaction term IRR = 2.14, 95% CI = 0.99–4.61, $P = 0.053$) whereas it was almost quadrupled among young women (Interaction term IRR = 3.68, 95% CI = 0.91–14.86, $P = 0.068$). As a result, the respective suicide rates of divorced young men and women were 5.6 (IRR = 5.59 (i.e., 2.61×2.14), 95% CI = 3.58–8.67, $P < 0.001$) and 9.5 (IRR = 9.46 (i.e., 2.57×3.68), 95% CI = 3.81–23.37, $P < 0.001$) times higher than the rates of married young men and women.

Figure 2 illustrates the marked variation in Northern Irish suicide rates by sex, age group and marital status. The higher male suicide rate, the protective effect of marriage and the elevated rate of suicide among the divorced are evident across all strata. For men and women, divorced

Table 1 Effect of age, marital status and their interaction on male and female suicide rates in Northern Ireland, 1996–2005

Factor	Group	Male		Female	
		IRR	(95% CI)	IRR	(95% CI)
Age	20–34 years	2.84***	(2.14–3.77)	0.92	(0.47–1.78)
	35–54 years	2.04***	(1.60–2.61)	2.00**	(1.25–3.20)
	55 years+	1.00	(Ref. group)	1.00	(Ref. group)
Marital status	Married	1.00	(Ref. group)	1.00	(Ref. group)
	Never married	2.33***	(1.55–3.50)	1.42	(0.61–3.32)
	Divorced	2.61**	(1.39–4.88)	2.57	(0.89–7.42)
	Widowed	2.47***	(1.64–3.70)	1.43	(0.80–2.57)
Age × marital status interaction	20–34 years × never married	0.63	(0.40–1.00)	2.15	(0.77–6.00)
	20–34 years × divorced	2.14	(0.99–4.61)	3.68	(0.91–14.86)
	20–34 years × widowed ^a	–	–	–	–
	35–54 years × never married	0.86	(0.54–1.37)	0.95	(0.35–2.62)
	35–54 years × divorced	0.91	(0.45–1.84)	1.09	(0.34–3.48)
	35–54 years × widowed	1.27	(0.56–2.85)	1.54	(0.52–4.52)

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$

^a The effect of being widowed was not estimated for this age group as there was just one suicide death

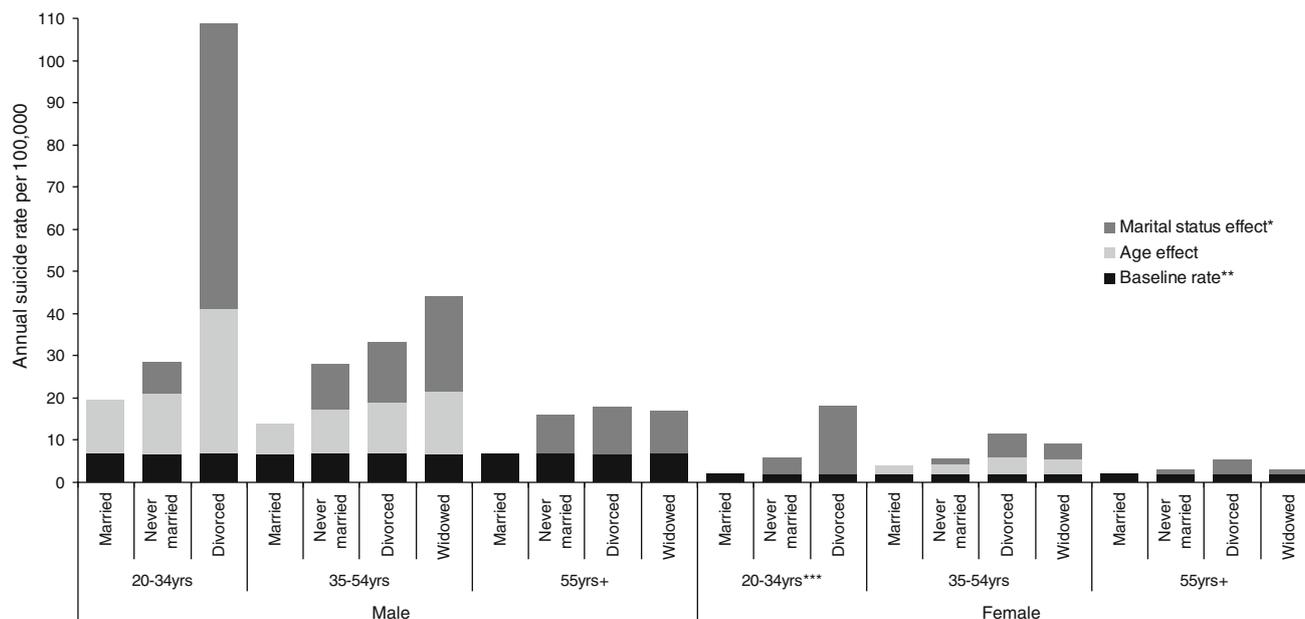


Fig. 2 Incidence of suicide in Northern Ireland by sex, age group and marital status showing the rate increase due to age and marital status effects. * Combined main and interaction effects; ** rate among

persons aged 20–34 years had by far the highest suicide rate and this was associated primarily with their marital status rather than their age. At 109 per 100,000, the incidence of suicide among young divorced men clearly identified them as a high-risk group.

Discussion

Suicide rates in Northern Ireland in the 10-year period 1996–2005 varied markedly by sex, age and marital status. Men had four times the suicide rate of women. Age effects were more apparent in men, with young men having the highest rate. Marriage appeared protective against suicide for both genders, but more so for men. In particular, widowhood was associated with increased suicide only in men. Men who never married had higher rates than married men and the margin of difference increased with age. In contrast, never marrying was associated with increased risk of female suicide only in 20–34 year-olds. For both genders, divorce was associated with an almost threefold increased risk of suicide compared to being married but this was far more pronounced among the young. With an annual suicide rate exceeding 100 per 100,000, divorced young men clearly constituted a high-risk group.

In most European countries, male and female suicide rates increase with age (http://www.who.int/mental_health/prevention/suicide/country_reports/en/index.html). We have shown the peak male suicide rate in Northern Ireland to be among 20–34 year-olds after which increasing age was

associated with decreasing suicide risk. For women, the age pattern was less clear but higher rates were associated with 30–34 and 45–49 year-olds. Our findings are consistent with a recent study that showed the age pattern of suicide to be similar in England and Wales, Northern Ireland and Scotland [26]. The peak male rate was among 25–34 year-olds in each country followed by decreasing rates with increasing age in Northern Ireland and Scotland. In these two countries, the peak female suicide rate was among 25–54 year-olds. The same age pattern of male and female suicide also applies in the Republic of Ireland [5].

The general finding of a protective effect of marriage is consistent with previous studies of marital status and suicide. That the association was stronger in men than women has also been noted [15, 19, 31, 32]. Considering the particular non-married groups, we found widowhood to be associated with increased male suicide only but we lacked statistical power in testing whether the association varied by age. Widowhood has been found to be a stronger risk factor for suicide in men than in women and, especially in early adulthood [17, 19, 28, 33]. Being widowed is a highly significant loss event that is expected to occur late in life with the woman most often widowed. Such a life course perspective has been cited as relevant in explaining the stronger effect of widowhood on suicide in men and in younger adults [4, 17, 23].

Men in Northern Ireland who never married had a higher suicide rate than those who did. This differential was least pronounced in young men and became more apparent with increasing age. Durkheim's hypothesis that marriage leads

to greater social integration and more supportive social networks may be applicable to these findings [10]. It was one of several theories tested recently from a sociological theory perspective in a cross-national study, the results of which supported the relevance of social integration in explaining differences in the age-specific suicide rates of married and non-married persons and especially so for male suicide [6, 7]. The matrimonial selection hypothesis [13, 28], which suggests that people at lower risk of suicide are more likely to become married, would also contribute to explaining why never married persons had higher suicide rates. It would also be consistent with the difference becoming more pronounced with increasing age, as we found for men. Over the life span, fewer people remain unmarried but, under the matrimonial selection hypothesis, the concentration of persons at-risk of suicide among them would increase.

Only among the age group 20–34 years did we find never marrying to be associated with more female suicide. Marriage may appear protective for this age group of women because a higher proportion of married women will have a young child which has been found to be highly protective against female suicide [25]. It is also plausible that older women who do not marry have independently developed strong social support networks and are therefore not disadvantaged by the lack of social support and integration that might have resulted from being married.

Divorced was the marital status associated with the greatest increased risk of suicide in this study, particularly because of its effect on young adults, though it increased suicide risk in all age groups of both sexes. Of three recent studies of marital status and suicide, a longitudinal study in Taiwan also found the divorced to have the greatest increased risk [31], an Italian study observed only a small increase in male and female suicide risk associated with divorce/separation [19] while in England and Wales, divorce increased risk of suicide in both genders though its effect was most pronounced in men aged 25–44 years [13]. An earlier national longitudinal study in the USA found divorce to be associated with increased suicide risk in men only [15] which the author associated with the losses generally experienced by men following divorce in the USA—losing custody of his children, his home and a large proportion of his income—factors that could contribute to depression and poor mental health [16]. Confounding may also be involved as factors such as socioeconomic status, alcohol dependence and mental health problems may be associated with increased risk of both marital breakdown [3] and suicide [14]. Our findings suggest that whatever the nature of the losses associated with divorce in Northern Ireland, both genders, and especially the young, are at increased risk of suicide.

This study had a number of limitations. Statistical power was reduced in the analysis of the female data due to the lower number of female suicides despite using a 10-year study period. Similarly, it was not possible to fully examine suicide among young widowed persons. The study lacked data regarding other factors known to be associated with suicide (such as socioeconomic factors, alcohol consumption and mental health), but there was also a lack of data relating to the marital status of those who died by suicide. No data were available regarding the length of time individuals were in their particular marital status before they died and it was not possible to examine suicide risk among separated persons as they were included with the married in the suicide data, a fact that may have resulted in our study underestimating the increased suicide risk in the divorced relative to married persons.

In England and Wales, a trend of falling suicide rates has been associated with a secular trend of decreasing divorce rates [2] and decreasing suicide rates among divorced persons [33]. During the study period, the annual number of divorces registered in Northern Ireland was relatively constant, at approximately 2,500. The preceding 20 years saw a fivefold increase in divorce and in 2007 almost 3,000 divorces were registered [21]. Further increases in divorce rates cannot be assumed to lead to increased suicide as high divorce rates have been associated with low suicide rates in ecological studies [9]. A multivariate time-series study would be of interest to establish the ecological association between rates of divorce and suicide in Northern Ireland.

Divorce is a civil and legal process and thereby offers opportunity for intervention. During the process of divorce, support should be offered and made available to those struggling to cope with their distress and loss. Such support should not be confined to the adults involved. Parental divorce is associated with increased risk of adolescent suicidal behaviour [11] and for every divorce in Northern Ireland there is, on average, one child under 18 years who is directly affected [21]. Similarly, there may be need for intervention following widowhood for those whose bereavement has caused intense and prolonged grief. There is a need for friends, family and family doctors to be aware that such bereaved people are at increased risk of negative outcomes such as suicide, depression and substance misuse and that bereavement support and other interventions may be needed.

Further study of the association between marital breakdown and suicidal behaviour is warranted, particularly if we recognise that many of the factors associated with marital breakdown (substances misuse, emotional and physical abuse, personality problems, employment and financial problems) are themselves risk factors for suicide irrespective of marital status [1]. Studies of routine

mortality data, like this study, are limited by the available data. Dedicated empirical research studies are required including qualitative and quantitative information related to the marital status of the subjects, such as the extent and nature of the marital disharmony and length of the relationship and marriage taking into account factors related to mental health, alcohol and substance misuse and social support.

Acknowledgments We would like to acknowledge that the suicide data were supplied with the permission of the Register General for Northern Ireland.

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