



Original article

Impact of the economic recession and subsequent austerity on suicide and self-harm in Ireland: An interrupted time series analysis

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Abstract

Background: The recent economic recession has been associated with short-term increases in suicide in many countries. Data are lacking on the longer-term effect on suicide and on the impact on non-fatal suicidal behaviour.

Methods: Using interrupted time series analyses, we have assessed the impact of economic recession and austerity in Ireland on national rates of suicide mortality and self-harm presentations to hospital in 2008–12.

Results: By the end of 2012, the male suicide rate was 57% higher [+8.7 per 100 000, 95% confidence interval (CI), 4.8 to 12.5] than if the pre-recession trend continued, whereas female suicide was almost unchanged (+0.3 per 100 000, 95% CI, –1.1 to 1.8). Male and female self-harm rates were 31% higher (+74.1 per 100 000, 95% CI, –6.3 to 154.6) and 22% higher (+63.2 per 100 000, 95% CI, 4.1 to 122.2), respectively. There were 476 more male (95% CI, 274 to 678) and 85 more female (95% CI, –9 to 180) suicide deaths and 5029 more male (95% CI, 626 to 9432) and 3833 more female (95% CI, 321 to 7345) self-harm presentations to hospital in 2008–12 than if pre-recession trends had continued. Men aged 25–64 years were affected in terms of suicide and self-harm with the greatest impact observed in 25–44 year-olds. The increase in self-harm by women was among 15–24 year-olds.

Conclusions: Five years of economic recession and austerity in Ireland have had a significant negative impact on rates of suicide in men and on self-harm in both sexes.

Key words: Suicide, self-harm, economic recession, interrupted time series analysis

Key Messages

- Five years of economic recession and austerity in Ireland have had a significant negative impact on national rates of suicide and hospital-treated self-harm.
- There were 476 and 85 more male and female suicide deaths and 5029 and 3833 more male and female self-harm presentations to hospital, respectively, in the 5-year period 2008–12, approximately equivalent to an excess of one complete year of suicide and self-harm.
- Men aged 25–44 years were the most affected group in terms of both suicide and self-harm.
- Reliable and well-standardized data are needed on suicide, self-harm and determinants of suicidal behaviour in the population in order to guide policy on how best to mitigate the effects of economic crises on mental health and well-being.

Introduction

Suicide may be the cause of death most likely to increase in times of economic crisis.^{1–3} Increased suicide was observed during the Great Depression in the USA,⁴ during the economic crises of the late 1990s in Russia⁵ and Southeast Asia⁶ and in periods of rapidly increasing unemployment between 1970 and 2007 in Europe.² The recent economic recession has been associated with increased suicide in many countries. An analysis of 54 countries showed an excess in 2009 of 4884 suicides compared with the number expected if the trend in 2000–07 had continued.⁷ Studies assessing the impact of the economic recession on suicide over the 3 years 2008–10 have found an excess of 680 suicides in Spain, 1000 suicides in England and 4750 suicides in the USA.^{8–10}

Ireland has been profoundly affected by the global economic recession. Ireland's gross domestic product (GDP) had doubled in the 10 years from 1997 to 2007 with unemployment constant at about 4% for 2000–07. The economy slowed in 2007 and deep recession followed, with eight consecutive quarters of negative GDP growth (see [Figure S1](#), available at *IJE* online). Unemployment doubled in 2008. In September 2008 the Irish government guaranteed all liabilities held by the six main Irish banks. Austerity budgets followed, with tax increases and cuts to government spending, but in November 2010, Ireland followed Greece in seeking an international bail-out. Unemployment peaked at 15% in early 2012, by which time Ireland had the highest emigration rate and was one of the most indebted of the 27 European Union Member States.

The austerity measures in Ireland were characterized by increases in taxation and reductions in public expenditure, primarily the latter, with cuts to welfare including significant reductions in unemployment benefits for young people, cuts in public sector staffing and pay (with parallel and deeper cuts in the private sector) and substantial cuts in health care spending and cost-shifting onto

households.^{11,12} These measures were implemented against a backdrop of falling house prices, high levels of negative equity and personal debt and increasing unemployment with a collapse in the male-dominated construction sector and increased emigration.

Studies to date have generally assessed the short-term impact of the recession on suicide. Data are lacking on the medium-term impact and on the impact on national rates of non-fatal suicidal behaviour. Ireland's National Registry of Deliberate Self Harm is the world's first national registry focused specifically on non-fatal suicidal behaviour presenting to hospital emergency departments.¹³ It provides a unique opportunity to assess, at a national level, the impact of the recession on a well-defined form of medically serious suicidal behaviour. We sought to assess the impact of economic recession and austerity in Ireland over the 5 years 2008–12 on national rates of both suicide and self-harm.

Methods

Suicide data

The Irish Central Statistics Office provided data relating to suicide deaths (ICD-9 codes E950-959 for 1980–2006 and ICD-10 codes X60-84 for 2007–12) and deaths of undetermined intent (ICD-9 codes E980-989 for 1980–2006 and ICD-10 codes Y10-34 for 2007–12) occurring in Ireland in 1980–2012. We calculated the directly age-standardized annual male and female rate of suicide and of suicide plus undetermined death per 100 000 persons aged over 15 years. We calculated the standard error of the age-standardized rates using the normal approximation to Poisson rate sums.¹⁴ We present results of the analysis with suicide (circa 500 deaths annually) as the dependent variable. The analysis was replicated using suicide plus deaths of undetermined intent (circa 500 plus 92 deaths annually) as the dependent variable ([Tables S4-6](#), available at *IJE* online).

Joinpoint regression analysis

We used the Joinpoint Regression Program v3.5.4¹⁵ to identify linear trends and corresponding joinpoints in suicide rates during 1980–2012. The age-standardized suicide rate was used as the dependent variable. In particular, we wanted a period of consistent linear trend before the economic recession to be the focus of the interrupted time series analysis.

Self-harm data

The Irish National Registry of Deliberate Self Harm records data on self-harm presentations to all hospital emergency departments (EDs) in Ireland, using an internationally-recognized operational definition of self-harm that includes non-fatal suicide attempts and episodes of self-harm with little or no suicide intent.¹³ The 9-year period 2004–12 was used for self-harm data as the Registry achieved near complete (estimated at 94%) national coverage in 2004. A weighting was applied to adjust for the lack of data from two hospitals in 2004–05. All 40 Irish EDs contributed fully in 2006–12. We calculated monthly male and female directly age-standardized rates of self-harm presentations to hospital per 100 000 population (aged over 15 years). Ethical approval for the Irish National Registry of Deliberate Self-harm was granted by the National Research Ethics Committee of the Faculty of Public Health Medicine, Dublin.

Interrupted time series analysis

We used interrupted time series analysis¹⁶ to test if the recession impacted on the level and the trend of suicide and self-harm. We took the first time period of 2008 as the advent of the recession. We repeated the analysis using two different recession starting points (Quarter 3 / July of 2007 and Quarter 3 / July 2008) in order to assess the sensitivity of the results (Tables S7–12, available at *IJE* online). The joinpoint regression analysis of suicide determined that 2000–12 should be the focus of the interrupted time series analysis. With approximately 500 suicide deaths annually, we chose quarter year as the time unit of analysis, thereby providing 52 time periods. With 11 000–12 000 deliberate self-harm presentations to hospital EDs annually in Ireland, we chose month as the unit of time. The period 2004–12 provided 108 months.

We used Prais-Winston regression with the Cochrane-Orcutt transformation to adjust for first-order serial autocorrelation. Values of the Durbin-Watson statistic close to 2.00 indicate the absence of serial autocorrelation.¹⁶ Across the 20 primary regression analyses (i.e. regression

of the overall rate and of four age-specific rates for men and women in relation to both suicide and self-harm), the Durbin-Watson statistic was, on average, 0.08 from 2.00 after adjustment for first-order serial autocorrelation compared with an average difference of 0.31 from 2.00 without adjustment. We included month or quarter to adjust for seasonality. We present the results of modelling rates (age-standardized over 15 years and age-specific) but observed similar results when we modelled the numbers of suicides and self-harm presentations. We used coefficients from the interrupted time series analysis to estimate the difference in rates by the end of 2012. The cumulative difference in rates was used to estimate the excess of suicide deaths and self-harm presentations that occurred during the 5 years 2008–12. We did this by comparing the recession-affected rate first with the rate that would have been observed if the pre-recession trend continued, and then with the rate that would have been observed if the pre-recession trend levelled off.

Separate interrupted time series models were estimated for age-sex-specific groups, and coefficients from these models were compared using Wald statistics to formally test for age differences in the impact of the recession on suicide and self-harm.¹⁷

Results

There were three periods of linear trend in the male suicide rate (Figure 1), with the joinpoints in 2000 [95% confidence interval (CI), 1983 to 2003] and 2007 (95% CI, 1995 to 2010). During 1980–2000, male suicide increased 0.75 per 100 000 annually (95% CI, 0.61 to 0.88, $P < 0.001$), then decreased from 2000 to 2007 (annual change, -0.86 per 100 000, 95% CI, -1.72 to 0.00 , $P = 0.060$) before increasing with the advent of economic recession in 2008 (annual change from 2007–12, 0.68 per 100 000, 95% CI, -0.36 to 1.72 , $P = 0.214$). The female rate was constant throughout 1980–2012 (annual change, -0.01 per 100 000, 95% CI, -0.03 to 0.02 , $P = 0.554$).

For men and women, Figure 2 illustrates the observed rates and the seasonally-adjusted linear trends of quarterly suicide during 2000–12 and of monthly self-harm presentations to hospital during 2004–12. Interrupted time series regression analysis estimated that during 2000–07, male suicide was decreasing by -0.2 per 100 000 per quarter (95% CI, -0.3 to -0.1 , $P < 0.001$; Table 1). This trend was reversed by the recession (trend change, 0.3 per 100 000 per quarter, 95% CI, 0.1 to 0.6 , $P = 0.006$). For women, the recession was associated with a 1.7 per 100 000 step increase in suicide (95% CI, 0.7 to 2.6 , $P < 0.001$) but there was a decreasing trend during 2008–12 of -0.1 per 100 000 per quarter (95% CI, -0.2

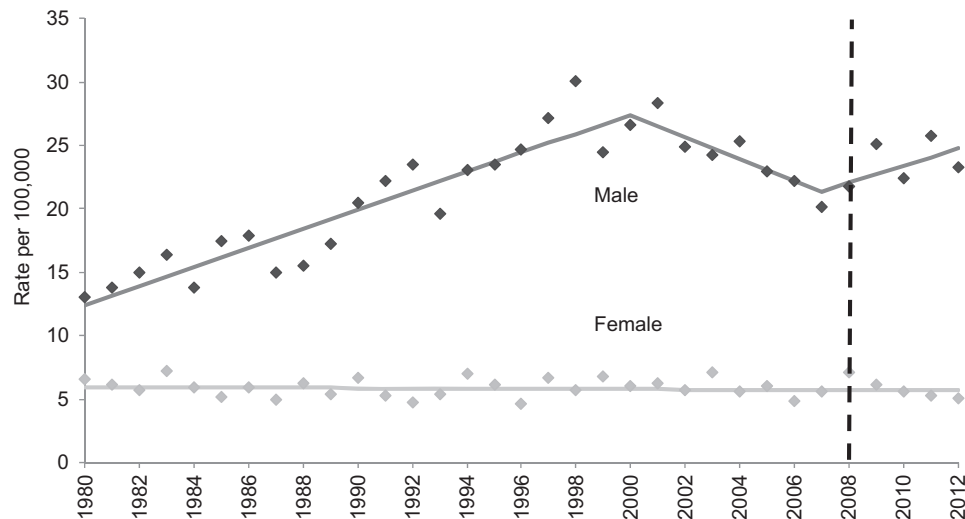


Figure 1. Male and female suicide in Ireland, 1980–2012 (age-standardized rate for persons aged over 15 years) with linear trends estimated by join-point regression. Provisional data were used for 2012. Advent of economic recession in 2008 indicated by dashed line.

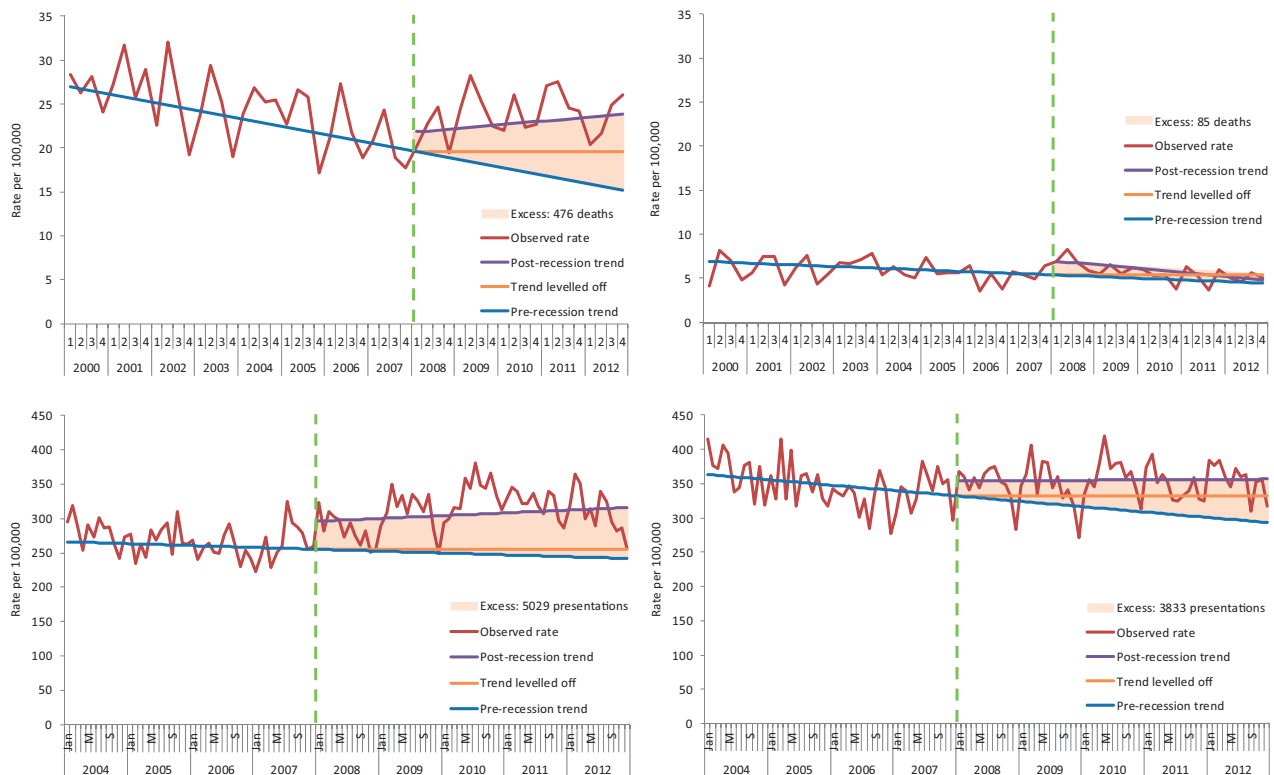


Figure 2. Rates of suicide by men (top left) and women (top right) and self-harm by men (bottom left) and women (bottom right) in Ireland. Advent of economic recession in 2008 indicated by dashed green line. Age-standardized rates >15 years. Provisional suicide data for 2012.

to -0.1 , $P < 0.001$). The advent of the recession was associated with an increase in self-harm (Figure 2, Table 1). The increase among men (40.5 per 100 000, 95% CI, 11.5 to 69.4, $P = 0.007$) was approximately twice the magnitude of the increase among women (21.2 per 100 000, 95% CI, -0.8 to 43.2, $P = 0.059$).

By the end of 2012, the estimated male suicide rate was 23.8 per 100 000, 8.7 per 100 000 (95% CI, 4.8 to 12.5, $P < 0.001$) and 57% higher than if the pre-recession trend had continued, which indicates that an excess of 476 male suicide deaths occurred over the 5-year period 2008–12 (95% CI, 274 to 678, $P < 0.001$; Table 2A). Compared

Table 1. Interrupted time series regression analysis of the impact of the economic recession and subsequent austerity on suicide and self-harm in Ireland

| | Base rate (95% CI) | Pre-recession trend (95% CI) | Rate change (95% CI) | Trend change (95% CI) | Post-recession trend (95% CI) |
|------------------|------------------------|------------------------------|-----------------------|-----------------------|-------------------------------|
| Suicide | | | | | |
| Male | 27.2 (25.3 to 29.2) | -0.2*** (-0.3 to -0.2) | 1.9 (-0.5 to 4.3) | 0.3** (0.1 to 0.6) | 0.1 (-0.1 to 0.3) |
| Female | 6.9 (6.1 to 7.8) | -0.1* (-0.1 to -0.0) | 1.7*** (0.8 to 2.6) | -0.1 (-0.1 to 0.0) | -0.1*** (-0.2 to -0.1) |
| Self-harm | | | | | |
| Male | 266.3 (235.8 to 296.8) | -0.2 (-1.1 to 0.7) | 40.5** (11.9 to 69.1) | 0.6 (-0.6 to 1.7) | 0.3 (-0.3 to 1.0) |
| Female | 363.9 (341.7 to 386.0) | -0.7 (-1.3 to 0.0) | 21.2 (-0.5 to 42.9) | 0.7 (-0.1 to 1.5) | 0.1 (-0.3 to 0.4) |

Base rate for suicide refers to quarter 1 2000 and for self-harm refers to January 2004. Recession arrived in January 2008. Dependent variables were the quarterly rate of suicide and monthly rate of self-harm presentations to hospital, age-standardized (>15 years) per 100 000. Adjustment was made for season (quarter year or calendar month) in all models.

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Table 2. Estimated impact of the economic recession and subsequent austerity on suicide and self-harm in Ireland, 2008–12

| Scenario | Rate by end 2012 | | | | Cumulative excess over 2008–12 Number (95% CI) | |
|---|-------------------|----------------|------------------------|----------------------|---|---------------------|
| | Without recession | With recession | Difference (95% CI) | % difference | | |
| A. If pre-recession trends continued | Suicide | | | | Deaths | |
| | Male | 15.2 | 23.8 | 8.7*** (4.8 to 12.5) | 57% | 476*** (274 to 678) |
| | Female | 4.5 | 4.8 | 0.3 (-1.1 to 1.8) | 7% | 85 (-9 to 180) |
| | Self-harm | | | | Hospital presentations | |
| Male | 241.9 | 316.0 | 74.1 (-6.3 to 154.6) | 31% | 5029* (626 to 9432) | |
| Female | 293.3 | 356.5 | 63.2* (4.1 to 122.2) | 22% | 3833* (321 to 7345) | |
| B. If pre-recession trends levelled off | Suicide | | | | Deaths | |
| | Male | 19.8 | 23.8 | 4.0** (1.1 to 6.9) | 20% | 264*** (121 to 407) |
| | Female | 5.4 | 4.8 | -0.6 (-1.5 to 0.3) | -12% | 41 (-24 to 105) |
| | Self-harm | | | | Hospital presentations | |
| Male | 255.4 | 316.0 | 60.6*** (26.3 to 94.8) | 24% | 4426*** (2185 to 6668) | |
| Female | 332.5 | 356.5 | 24.0* (2.3 to 45.6) | 7% | 2038* (275 to 3800) | |

Recession arrived in January 2008. Dependent variables were the quarterly rate of suicide and monthly rate of self-harm presentations to hospital, age-standardized (>15 years) per 100 000. Adjustment was made for season (quarter year or calendar month) in the all models. The precision of estimates from the two scenarios A and B cannot be directly compared because of differing model specifications. The model for scenario A has more parameters estimated and consequently yields wider confidence intervals than that for scenario B.

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

with the scenario where the pre-recession trend levelled off (Table 2B), the male suicide rate had increased by 4.0 per 100 000 (95% CI, 1.1 to 6.9, $P = 0.009$), i.e. 20% higher with an excess of 264 male deaths (95% CI, 121 to 407, $P < 0.001$). By the end of 2012, the estimated female suicide rate was similar to what would have been observed if the pre-recession trend had continued or if it had levelled off. For the former scenario, there was an estimated excess of 85 female suicide deaths (95% CI, -9 to 180, $P = 0.075$).

By the end of 2012, male self-harm was estimated at 74.1 per 100 000 higher (95% CI, -6.3 to 154.6, $P = 0.074$), i.e. 31% higher than if the pre-recession trend continued, whereas female self-harm was estimated at 63.2 per 100 000 higher (95% CI, 4.1 to 122.2, $P = 0.039$),

i.e. 22% higher (Table 2A). The associated excess of hospital-treated self-harm in 2008–12 was 5029 male (95% CI, 626 to 9432, $P = 0.026$) and 3833 female (95% CI, 321 to 7345, $P = 0.033$) presentations. Estimates for each of the 5 years show how the excess numbers of suicides and self-harm presentations accumulated during the 5-year period of economic recession and austerity (Table S2, available at *IJE* online). Taking the approach of assuming a levelling-off of pre-recession trends (Table 2B), the estimated excess was 4426 male (95% CI, 2185 to 6668, $P < 0.001$) and 2038 female (95% CI, 275 to 3800, $P = 0.024$) self-harm presentations.

The step increase in the male suicide rate associated with the advent of the recession varied by age ($P = 0.044$)

Table 3. Estimated impact of the economic recession and subsequent austerity on age-specific suicide and self-harm in Ireland, 2008–12, compared to pre-recession trends continuing

| | Rate by end 2012 | | | | Cumulative excess over 2008–12 |
|------------------|-------------------|----------------|------------------------|--------------|--------------------------------|
| | Without recession | With recession | Difference (95% CI) | % difference | Number (95% CI) |
| Male suicide | | | | | Deaths |
| 15–24 yrs | 23.2 | 24.6 | 1.4 (–7.3 to 10.1) | 6% | 0 (–73 to 73) |
| 25–44 yrs | 12.7 | 26.0 | 13.3*** (7.2 to 19.3) | 104% | 336*** (179 to 493) |
| 45–64 yrs | 14.9 | 25.6 | 10.7** (4.3 to 17.1) | 72% | 185** (67 to 304) |
| >65 yrs | 11.4 | 13.0 | 1.7 (–7.7 to 11) | 15% | –17 (–85 to 50) |
| Female suicide | | | | | |
| 15–24 yrs | 4.0 | 4.7 | 0.7 (–2.6 to 4) | 17% | 18 (–18 to 54) |
| 25–44 yrs | 4.6 | 6.3 | 1.8 (–0.9 to 4.4) | 39% | 49 (–23 to 122) |
| 45–64 yrs | 5.9 | 5.1 | –0.8 (–4.3 to 2.7) | –14% | 13 (–50 to 77) |
| >65 yrs | 1.3 | 0.0 | –1.3 (–4.7 to 2.1) | –101% | 8 (–26 to 42) |
| Male self-harm | | | | | Hospital presentations |
| 15–24 yrs | 502.8 | 578.8 | 75.9 (–101.9 to 253.8) | 15% | 1151 (–415 to 2716) |
| 25–44 yrs | 264.3 | 381.4 | 117.1* (11.3 to 223) | 44% | 3064* (644 to 5484) |
| 45–64 yrs | 161.3 | 221.8 | 60.5** (17.6 to 103.4) | 38% | 881* (156 to 1605) |
| >65 yrs | 59.8 | 50.2 | –9.6 (–45.6 to 26.4) | –16% | –51 (–325 to 223) |
| Female self-harm | | | | | |
| 15–24 yrs | 601.3 | 744.4 | 143.1* (10.7 to 275.4) | 24% | 1398* (122 to 2675) |
| 25–44 yrs | 279.8 | 360.1 | 80.3 (–3.2 to 163.8) | 29% | 1854 (–117 to 3826) |
| 45–64 yrs | 232.2 | 265.9 | 33.8 (–32.7 to 100.3) | 15% | 616 (–471 to 1702) |
| >65 yrs | 64.1 | 57.7 | –6.3 (–47.9 to 35.2) | –10% | –13 (–396 to 370) |

Recession arrived in January 2008. Dependent variables were the age-sex-specific quarterly rates of suicide and monthly rates of self-harm presentations to hospital per 100 000. Adjustment was made for season (quarter year or calendar month) in the all models.

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

as did the step increase ($P = 0.019$) and change in trend ($P = 0.035$) for male self-harm. Compared with over-65 year-olds, the increase in male suicide during 2008–12 was greater among 25–44 (+10.1 per 100 000, 95% CI, 2.1 to 18.0, $P = 0.011$) and 45–64 year-olds (+8.5 per 100 000, 95% CI, 0.2 to 16.8, $P = 0.040$). Thus, the impact of the recession on male suicide was only evident among 25–44 and 45–64 year-olds (Table 3). The 25–44 year-old male suicide rate was twice what it would have been (104% higher) if the pre-recession trend continued with an associated excess of 336 deaths (95% CI, 179 to 493, $P < 0.001$). The 45–64 year-old male suicide rate was 72% higher and there was an excess of 185 deaths (95% CI, 67 to 304, $P = 0.003$).

The rate increase in male self-harm was greater in 25–44 year-olds than in 45–64 year-olds (+45.1 per 100 000; 95% CI, 2.2 to 88.0, $P = 0.036$) and over-65 year-olds (+51.9 per 100 000, 95% CI, 12.1 to 91.7, $P = 0.009$). The significant impact on male self-harm was also most evident in these age groups with 3064 (95% CI, 644 to 5484, $P = 0.014$) and 881 (95% CI, 156 to 1605, $P = 0.018$) excess self-harm presentations by 25–44 and

45–64 year-old men, respectively. The recession's impact on female suicidal behaviour was confined to self-harm among 15–24 year-olds for whom there were 1398 (95% CI, 122 to 2675, $P = 0.032$) more presentations to hospital than if pre-recession trends had persisted.

Sensitivity analyses showed that findings for suicide were similar irrespective of the starting point used, whereas for self-harm the impact was greater when July 2007 was used and less when July 2008 was used (Tables S7–12, available at *IJE* online). In addition, the excess estimated by the analysis of suicide plus undetermined-intent deaths was 265 male deaths (95% CI, 32 to 497, $P = 0.027$) which was lower than the 476 estimated excess for male suicide alone (Table S5, available at *IJE* online).

Discussion

We have shown that 5 years of economic recession and austerity in Ireland has had a significant negative impact on national rates of suicide and hospital-treated self-harm. The male and female suicide rates were 57% and 7% higher and the male and female self-harm rates were 31%

and 22% higher, respectively, by the end of 2012 than if pre-recession trends had continued. In absolute terms, there were 476 and 85 more male and female suicide deaths and 5029 and 3833 more male and female self-harm presentations to hospital in the 5-year period 2008–12, respectively. This is approximately equivalent to an excess of one complete year of suicide and self-harm. Even when it was assumed that pre-recession trends would have levelled off, there was an estimated excess of 264 male suicide deaths and 4426 male and 2038 female self-harm presentations to hospital. Men aged 25–64 years were most affected in terms of suicide and self-harm, whereas the increase in self-harm by women was among 15–24 year-olds. Finding that the effect of recent recession on suicide was primarily associated with men of working age is consistent with the findings of a recent international study.⁷ Uniquely, we have shown that both sexes were affected in terms of medically serious non-suicidal behaviour, but again the effect on men was greater.

Previous studies

Studies that have estimated the impact of the recent recession on suicide have given rise to debate, and there have been conflicting reports for some countries including Greece,^{18,19} England,^{8,20} Spain and Portugal^{21,22} and Iceland.^{7,22} Some of the contention has arisen from issues related to data analysis. The most popular approach deployed in studies assessing the impact of the recent recession has been a form of regression of annual data including a linear trend for pre-recession years and a dummy variable for the post-recession year/period, coefficients of which are used to estimate the number of suicides expected if the pre-recession trend had continued. Excess has then been calculated by subtraction from the actual observed number of suicides.^{7,8} It has been suggested that this leads to increased type I error because the variance of the observed number of suicides is not taken into account.²³ The approach also ignores serial autocorrelation, often present in time series data, which may increase type I error.²⁴ Furthermore, some countries will have had non-linear trends in suicide before the recession. Modelling these with a linear trend is inappropriate and will result in spurious findings. As a consequence of these issues, it is likely that the most global assessment of the recession and suicide overstated the significance of the effect for some of the 54 countries studied.⁷ This approach yielded an estimated excess of 82 (95% CI, 70 to 94, $P < 0.001$) male and 15 (95% CI, 8 to 23, $P < 0.001$) female Irish suicide deaths in 2009.⁷ Our analysis of data to the end of 2009 gave an estimated excess of 97 (95% CI, 68 to 127, $P < 0.001$) male and 20 (95% CI, 1 to 39, $P = 0.044$) female Irish suicide deaths in 2009. Thus, both analyses yield

consistent estimates but the precision for the former is overstated, as confirmed by the authors.²⁵

Strength and limitations of the study

Our study has a number of strengths: we have assessed long-term suicide trends; we have assessed well-defined national measures of both fatal and medically serious non-fatal suicidal behaviour over the medium term (5 years); we have used Prais–Winstone regression with the Cochrane–Orcutt transformation to adjust for first-order serial autocorrelation; we have used robust standard errors which result in conservative inferences; we have analysed monthly or quarterly data rather than annual data only; we have examined age-specific changes; we have considered potential confounding associated with misclassification; we have examined whether the findings are sensitive to the choice of starting point for the recession (Tables S7–12, available at *IJE* online); and we have also estimated excess suicide and self-harm compared with two scenarios—pre-recession trends continuing and pre-recession trends levelling off.

The study has a number of limitations. Because Ireland has a relatively small population, its suicide rates are less stable than those of more populous countries with consequent reductions in the statistical precision of our estimates. Cause of death classification according to ICD-10 was introduced in Ireland in 2007. This only affected the cause of death codes assigned to suicides, but no double-coding exercise was carried out so we cannot entirely dismiss the possibility of an impact on the number of recorded suicides. We found greater negative impact on suicide than on suicide plus deaths of undetermined intent (Table S5, available at *IJE* online). In Ireland, some but not all deaths of undetermined intent are suicide deaths where there was insufficient evidence of suicide intent. Thus one might expect to see a weaker effect of recession and austerity on suicides and undetermined intent deaths combined than on suicide deaths alone. However, we cannot rule out possible confounding due to changes in suicide misclassification during the study period.

Unanswered questions and future research

Increased unemployment is synonymous with economic recession, as has been demonstrated for the recent global economic recession.²⁶ However, the relationship between unemployment and suicide is complex, and unemployment is just one negative experience that affected many people during the recent recession.^{27–29} A cross-national analysis of 20 EU countries highlighted the unemployment-suicide association for men and also highlighted active labour

programmes and social capital as protective factors.³⁰ However, ecological studies such as ours cannot assess the contribution that unemployment or other factors make to an individual's risk of engaging in suicidal behaviour. A recent Irish psychological autopsy study of suicide found an overrepresentation of unemployed men and workers from the construction and production sectors, the sectors most severely affected by the recession. However other factors, such as history of self-harm, depression and substance abuse, were even more prevalent.³¹ Large-scale longitudinal studies and psychological autopsy studies using a case-control design are needed to assess the specific risk of suicidal behaviour conferred by unemployment and other experiences brought by the recession and subsequent austerity. Such studies will come from a small number of countries like the Scandinavian countries with their longitudinal national registers which allow the linking of a wide range of health and socioeconomic data. It is unfortunate that so few countries give sufficient priority to national data systems that can inform health research and policy.

A Swedish national register study of 3.4 million people showed that unemployment experience did not increase risk of suicide during their deep recession in the early 1990s but it did increase risk in the period after the recession.³² Scandinavian countries have been cited as the notable European exceptions to the phenomenon of increased suicide in times of economic recession, an observation attributed to the high level of social support provided in these countries.² The suggestion has been made that whereas recession can hurt, austerity kills.³³ Austerity has been central to the response of Irish governments. However, we can never know whether this exacerbated the situation relating to national rates of suicidal behaviour and whether an alternative approach would have led to a better outcome. In this context it should also be noted that the most recent recession has been associated with increased male suicide in Scandinavian countries.⁷ Forthcoming international studies may be able to assess the role that governmental responses to the economic recession had in relation to suicidal behaviour and other health outcomes.

In summary, the current study provides compelling evidence that the profound economic recession from which Ireland is now emerging has led to increased suicide mortality in men and increased non-fatal suicidal behaviour by men and women. This provides a stark reminder of the tragic human costs of policy failure in economic management by governments and other institutions at national and international levels. The findings also highlight the need for reliable and well-standardized data on suicide, self-harm and determinants of suicidal behaviour in the population, to guide policy on how best to

mitigate the effects of economic crises on mental health and well-being.

Supplementary Data

Supplementary data are available at *IJE* online.

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P.C. and E.G. compiled the data, P.C. and T.P.F. designed the data analysis and P.C. did the analysis. P.C. and E.G. reviewed the literature and drafted the paper. E.A. and I.J.P. oversaw the design of the study. E.A., T.P.F. and I.J.P. facilitated interpretation of the findings and helped draft the paper. All authors approved the final version of the paper; P.C. will act as a guarantor.

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