

Title	Suicide and deliberate self harm in older Irish adults
Authors	Corcoran, Paul;Reulbach, Udo;Perry, Ivan J.;Arensman, Ella
Publication date	2010-08-18
Original Citation	Corcoran, P., Reulbach, U., Perry, I. J. and Arensman, E. (2010) 'Suicide and deliberate self harm in older Irish adults', International Psychogeriatrics, 22(08), pp. 1327-1336. <a href="http://dx.doi.org/10.1017/S1041610210001377">http://dx.doi.org/10.1017/S1041610210001377</a>
Type of publication	Article (peer-reviewed)
Link to publisher's version	<a href="http://dx.doi.org/10.1017/S1041610210001377">10.1017/S1041610210001377</a>
Rights	© International Psychogeriatric Association 2010
Download date	2023-09-28 04:26:10
Item downloaded from	<a href="https://hdl.handle.net/10468/2916">https://hdl.handle.net/10468/2916</a>



**CAMBRIDGE**  
**UNIVERSITY PRESS**

**Suicide and deliberate self harm in older Irish adults**

Journal:	<i>International Psychogeriatrics</i>
Manuscript ID:	IPG-03-10-047.R1
Manuscript Type:	Original Research Article
Date Submitted by the Author:	n/a
Complete List of Authors:	Corcoran, Paul; National Suicide Research Foundation; University of Oviedo, Psychiatry Reulbach, Udo; National Suicide Research Foundation Perry, Ivan; University College Cork, Epidemiology & Public Health Arensman, Ella; National Suicide Research Foundation
Keyword:	Suicide, Epidemiology, Depression



Only

## Suicide and deliberate self harm in older Irish adults

*Paul Corcoran<sup>1,2</sup>, Udo Reulbach<sup>1</sup>, Ivan J Perry<sup>3</sup>, Ella Arensman<sup>1</sup>*

### **Affiliations**

<sup>1</sup> National Suicide Research Foundation, 1 Perrott Avenue, College Road, Cork, Ireland

<sup>2</sup> Department of Psychiatry, School of Medicine, University of Oviedo, Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM), Julian Claveria 6, 33006 Oviedo, Spain

<sup>3</sup> Department of Epidemiology and Public Health, University College, Cork, Ireland

**Corresponding author:** Paul Corcoran, National Suicide Research Foundation, 1 Perrott Avenue, College Road, Cork, Ireland. Email: paul.nsr@iol.ie Telephone: +353 21 4277499  
Fax: +353 21 4277545

*Suicidal behavior in older Irish adults*

## ABSTRACT

**Background** Hospital-treated deliberate self harm and suicide among older adults have rarely been examined at a national level.

**Methods** The Irish Central Statistics Office provided suicide and undetermined death data for 1980-2006. The National Registry of Deliberate Self Harm collected data relating to deliberate self harm presentations made in 2006-2008 to all forty Irish hospital emergency departments.

**Results** Rates of female suicide among older adults (over 55 years) were relatively stable in Ireland during 1980-2006 whereas male rates increased in the 1980s and decreased in more recent decades. Respectively, the annual male and female suicide and undetermined death rate was 22.1 and 7.6 per 100,000 in 1997-2006. Male and female deliberate self harm was 3.0 and 11.0 times higher at 67.4 and 83.4 per 100,000, respectively. Deliberate self harm and suicide decreased in incidence with increasing age. Deliberate self harm generally involved drug overdose (male: 72%; female 85%) or self-cutting (male: 15%; female 9%). The most common methods of suicide were hanging (41%) and drowning (29%) for men and drowning (39%) and drug overdose (24%) for women. City and urban district populations had the highest rates of hospital-treated self harm. The highest suicide rates were in urban districts.

**Conclusions** Older Irish adults have high rates of hospital-treated deliberate self harm but below average rates of suicide. Drowning was relatively common as a method of suicide. Restricting availability of specific medications may reduce both forms of suicidal behavior.

**Abstract word count:** 237

**Keywords:** Suicide, undetermined death, deliberate self harm, suicidal behavior, older adults

**Running title:** Suicidal behavior in older Irish adults

**Manuscript word count:** 3,596

*Suicidal behavior in older Irish adults***Introduction**

Suicide is among the 10 leading causes of death worldwide and with approaching 1.5 million people dying from suicide each year, it is expected to represent 2.4% of global mortality by 2020 (Bertolote and Fleischmann, 2002). In most industrialized countries, suicide in older adults increased since the 1980s (Kaplan *et al.*, 1998), while older people also constitute the fastest growing population in most **developed** countries (Conwell *et al.*, 2002). Therefore, the number of suicides in older people is expected to increase even more in the future. Moreover, in many European countries, older men are at highest risk of suicide (Cattell and Jolley, 1995) although the pattern of increasing suicide rates with increasing age was not evident in Ireland when previously examined (Kelleher *et al.*, 1997).

It has been suggested that deliberate self harm in older people can frequently be regarded as a failed suicide attempt (Dennis *et al.*, 2007). This suggestion is supported by the lower case fatality rate observed in older people. In a WHO/EURO multicenter study on suicidal behavior (De Leo *et al.*, 2001), the ratio between fatal (suicide) and non-fatal (deliberate self harm) behaviors was 1:2. More recent studies from the UK (Hawton and Harriss, 2008b) and Ireland (Corcoran *et al.*, 2003) showed the rate ratio of deliberate self harm to suicide to decrease markedly with increasing age. The former also showed there to be a higher proportion of high suicidal intent cases of deliberate self harm in the older adults. Self harm is the strongest risk factor for suicide (Hawton and van Heeringen, 2009) and particularly so in older people (Cooper *et al.*, 2005; Hawton and Harriss, 2006; Hawton *et al.*, 2003). This has significant implications for clinicians involved in assessment and management of patients who present to hospital due to deliberate self harm (Kapur, 2006; Reulbach and Bleich, 2008).

A recent review reflecting on deliberate self harm in older adults (Chan *et al.*, 2007), underlined the requirement for more population-based studies with adequate sample size. The aim of the present population-based study was to examine the incidence and nature of

*Suicidal behavior in older Irish adults*

1  
2  
3 hospital-treated deliberate self harm and suicide mortality among people aged 55 years and  
4  
5 older in Ireland.  
6  
7

**Methods***Suicide data*

10  
11  
12 The Irish Central Statistics Office (CSO) provided data relating to all deaths by suicide and  
13  
14 deaths of undetermined intent (respectively, codes E950-959 and E980-989 of the Ninth  
15  
16 Revision of the International Classification of Diseases, Injuries and Causes of Death (ICD-  
17  
18 9)) registered as occurring in 1980-2006, inclusively (2006 being the most recent year for  
19  
20 which complete data were available).  
21  
22  
23  
24  
25  
26

*Deliberate self harm data*

27  
28 The Irish National Registry of Deliberate Self Harm collected data on deliberate self harm  
29  
30 presentations to all forty hospital emergency departments (EDs) operating in Ireland in 2006-  
31  
32 2008. The definition of deliberate self harm used was that developed by the former  
33  
34 WHO/Euro Multicentre Study on Parasuicide (Platt *et al.*, 1992):  
35  
36

37  
38 'An act with a non-fatal outcome, in which an individual deliberately initiates a non-habitual  
39  
40 behavior that, without intervention from others, will cause self-harm, or deliberately ingests a  
41  
42 substance in excess of the prescribed or generally recognised therapeutic dosage, and  
43  
44 which is aimed at realising changes which the subject desired via the actual or expected  
45  
46 physical consequences.'  
47  
48

49 While the definition was associated with the term parasuicide, the Registry utilises the term  
50  
51 deliberate self harm. All data were collected **and coded** by **trained data** registration officers  
52  
53 following the Registry's standardised methodology, described in detail in its Annual Reports  
54  
55 (National Suicide Research Foundation, 2009). This involves the classification of the method  
56  
57 of self harm according to the ICD-10 codes for intentional injury (X60-X84). **Quality control**  
58  
59 **measures include regular team meetings to reinforce the standardised application of**  
60

*Suicidal behavior in older Irish adults*

1  
2  
3 **case-definition and ascertainment criteria as well as cross-checking exercises which**  
4  
5 **have shown high levels of agreement (Kappa statistic > 0.9) and reliability across**  
6  
7 **registration officers.** The Registry was granted ethical approval by the National Research  
8  
9  
10 Ethics Committee of the Faculty of Public Health Medicine.

*Setting and population data*

11  
12  
13  
14  
15  
16  
17 The Republic of Ireland, population 4.24 million according to the 2006 census, is made up of  
18  
19 26 counties and five cities. Dublin is by far the largest city and its expansion has urbanised  
20  
21 all of Dublin county where 28% (1.19 million) of the country resides. The four other cities  
22  
23 (Cork, Galway, Limerick and Waterford) account for 8% (0.29 million) of the country's  
24  
25 population. There are 54 urban districts across the country accounting for almost 10% (0.40  
26  
27 million) of the population and the remainder of the country consists of rural districts where  
28  
29 more than half of the country's population live (2.36 million, 56%).  
30  
31

32  
33  
34 Population data from the 1981, 1986, 1991, 1996, 2002 and 2006 national censuses and  
35  
36 population estimates for intercensal years were obtained from the CSO website  
37  
38 (<http://www.cso.ie/>). Small-area level population data were obtained from the 2002 and 2006  
39  
40 censuses and aggregated to provide figures for the population of Dublin, the other four Irish  
41  
42 cities, the urban districts and the rural districts. Population estimates were extrapolated and  
43  
44 interpolated for the intercensal years in the period 1997-2008 by assuming that the  
45  
46 population change between the two censuses reflected a trend that applied across the twelve  
47  
48 years.  
49  
50

*Calculation of rates*

51  
52  
53  
54  
55 Annual rates per 100,000 of male and female (aged over 55 years) suicide, suicide plus  
56  
57 undetermined deaths and deliberate self harm were calculated and age-adjusted using the  
58  
59 European standard population (Waterhouse *et al.*, 1976). Annual age-sex-specific rates were  
60

*Suicidal behavior in older Irish adults*

1  
2  
3 calculated for each five-year age group. The calculation of incidence rates for deliberate self  
4  
5 harm only considered one presentation per person per calendar year. For 3.5% of all  
6  
7 deliberate self harm presentations by adults over 55 years of age, no address was recorded.  
8  
9 A further 5.5% of presentations by residents of institutions such as prisons and hospitals, by  
10  
11 homeless people and non-residents of the country were also not included in the rate  
12  
13 calculations by geographic area.  
14  
15  
16  
17

18 To help assess rate differences, 95% confidence intervals (CIs) were calculated. Assuming  
19  
20 that the number of deaths or persons presenting with deliberate self harm (x) followed a  
21  
22 Poisson distribution, 95% CIs for the rates were calculated using the Normal approximation,  
23  
24 i.e.  $CI = (x \pm 2 \cdot \sqrt{x}) * 100,000 / \text{population}$ . The 95% CIs are presented as error bars in some  
25  
26 charts.  
27  
28  
29  
30

*Statistical analysis*

31  
32  
33 Poisson regression analysis assessed the magnitude and statistical significance of rate  
34  
35 differences and associations with sex, age group and area type. Whether associations  
36  
37 differed due to an interaction factor was tested by fitting Poisson regression models with and  
38  
39 then without the relevant interaction term and performing a likelihood ratio test (LRT). Rate  
40  
41 differences assessed by Poisson regression were reported as incidence rate ratios (IRRs)  
42  
43 with their 95% CIs and p-values. Poisson regression was carried out using Stata version 6.0  
44  
45 (StataCorp, 1999).  
46  
47  
48  
49  
50

51 The ICD-9 external cause of death codes recorded in the mortality data for suicide and  
52  
53 undetermined death and the ICD-10 intentional injury codes recorded in the Registry data for  
54  
55 deliberate self harm were reclassified into comparable categories as follows: Drug overdose  
56  
57 (ICD-9: E950.0-950.5, E980.0-980.5; ICD-10: X60-64); Poisoning, excluding alcohol (ICD-9:  
58  
59 E950.6-950.9, E951-952, E980.6-980.9, E981-982; ICD-10: X66-69); Self-cutting or piercing  
60  
(ICD-9: E956, E986; ICD-10: X78); Hanging or strangulation (ICD-9: E953, E983; ICD-10:



*Suicidal behavior in older Irish adults*

1  
2  
3 X70); Drowning (ICD-9: E954, E984; ICD-10: X71); Firearms (ICD-9: E955, E985; ICD-10:  
4  
5 X72-74); Other (ICD-9: E957-959, E987-989; ICD-10: X75-77, X79-84). Chi-square tests  
6  
7 were used to assess whether method of self harm differed in deliberate self harm and suicide  
8  
9 and by gender. Whereas only one method of self harm was recorded in the mortality data,  
10  
11 multiple methods were sometimes recorded for deliberate self harm.  
12  
13

14  
15  
16 All analyses were carried out for suicide deaths only and for suicide plus undetermined  
17  
18 deaths. If it was not possible to present findings for both clearly, results from the latter were  
19  
20 presented.  
21  
22

**Results**

23  
24  
25  
26  
27  
28 Since 1980, the female suicide rate among over 55 year-olds in Ireland has been relatively  
29  
30 stable whereas the male rate has fluctuated (Figure 1). It increased during most of the 1980s  
31  
32 with a decrease of smaller magnitude in the 1990s and some evidence of a further decrease  
33  
34 in recent years. The addition of deaths of undetermined intent made a significant difference  
35  
36 to the male and female rates in the 1980s. During the 1990s, rates of undetermined death  
37  
38 (UD) diminished greatly but were notable again by the end of that decade.  
39  
40  
41  
42

43  
44 Figure 1 here  
45  
46

47  
48  
49 During the 10 years 1997-2006, there were 921 suicides (male: 691 (75.0%); female: 230  
50  
51 (25.0%)) and 175 deaths of undetermined intent (male: 110 (62.9%); female: 65 (37.1%))  
52  
53 among the population aged over 55 years in Ireland. The annual age-adjusted male suicide  
54  
55 rate was 19.1 per 100,000, approximately three times the female rate (5.9 per 100,000; ratio  
56  
57 = 3.2). The three-fold difference remained when UDs were added (male rate: 22.1 per  
58  
59 100,000; female rate: 7.6 per 100,000; ratio = 2.9).  
60

*Suicidal behavior in older Irish adults*

1  
2  
3 In 2006-2008, 2,352 deliberate self harm presentations were made to hospital by over 55  
4 year-olds, the majority by women (1,019 (43.3%) by men; 1,332 (56.7%) by women; sex  
5 unknown in one case). Respectively, 715, 813 and 824 deliberate self harm presentations  
6 were made in 2006, 2007 and 2008 by 592, 640 and 699 individuals. **The average number  
7 of presentations per person per year was 1.22 (maximum = 13). Only one presentation  
8 per year was made by 85.4% of patients, two presentations per year were made by  
9 11.0%, three were made by 2.2% and more than three presentations were made by  
10 1.4% of patients.** The annual age-adjusted male deliberate self harm rate was 67.4 per  
11 100,000 (95% CI = 62.8-72.1 per 100,000). At 83.4 per 100,000 (95% CI = 78.8-88.1 per  
12 100,000), the female rate was significantly higher (+24%).  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26

27 The incidence of older male deliberate self harm was therefore 3.5 times the 19.1 per  
28 100,000 rate of suicide and 3.0 times the 22.1 per 100,000 rate of suicide + UD. For older  
29 women, the incidence of deliberate self harm was 14.0 times the 5.9 per 100,000 rate of  
30 suicide and 11.0 times the 7.6 per 100,000 rate of suicide + UD.  
31  
32  
33  
34  
35  
36  
37

38 **With increasing age, there was a stepped decrease in the incidence of both suicide +**  
39 **UD and deliberate self harm (Figure 2).** The age association with suicide + UD differed  
40 significantly from that with deliberate self harm (LRT chi-square = 24.14, df = 6, p < 0.001)  
41 because older age was associated with greater decrease in the incidence of deliberate self  
42 harm. The male rate of suicide + UD was significantly higher than the female rate in each  
43 five-year age group by a ratio of 2.6-4.7:1 (Table 1). **The male rate of deliberate self harm**  
44 **was 19-29% lower than the female rate in 55-59, 60-64 and 65-69 year-olds whereas**  
45 **among over 85 year-olds, the male rate was almost three times higher.**  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56

57 Figure 2 here  
58  
59  
60

Table 1 here

*Suicidal behavior in older Irish adults*

1  
2  
3  
4  
5 The method of self harm causing death differed significantly between men and women (Chi-  
6 square = 130.2, df = 5,  $p < 0.001$ ; Table 2). Hanging was the most common method used by  
7 men (40.6%), followed by drowning (28.7%) which was the most common method used by  
8 women (39.3%). Drug overdose was the external cause of almost one in four female deaths  
9 compared to just 7.6% of male deaths. While relatively uncommon, 9.0% of the male deaths  
10 involved firearms as opposed to just one female death. A similarly significant gender  
11 difference was evident when only officially-classified suicides were considered (Chi-square =  
12 123.2, df = 5,  $p < 0.001$ ) with the most common methods used - hanging by men (46.5%)  
13 and drowning by women (45.2%) – even more pronounced.  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26

27 Drug overdose was by far the most common method involved in hospital-treated self harm  
28 and especially so among women (Table 2; Chi-square = 56.18, df = 1,  $p < 0.001$ ). The only  
29 other method that was relatively common was self-cutting and this was used by men more  
30 than women (Chi-square = 18.50, df = 1,  $p < 0.001$ ). More lethal methods of self harm were  
31 rare but two were more commonly used by men (Hanging: chi-square = 6.26, df = 1,  $p =$   
32 0.012; Drowning: chi-square = 19.37, df = 1,  $p < 0.001$ ). Other methods were also more often  
33 associated with male deliberate self harm (Chi-square = 13.46, df = 1,  $p < 0.001$ ). In addition,  
34 alcohol was more often involved in male acts of deliberate self harm (Male: 45.9%; Female:  
35 34.4%; Chi-square = 32.22, df = 1,  $p < 0.001$ ).  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48

49 Table 2 here  
50  
51  
52

53 The methods of self harm involved in suicide + UD differed markedly from those involved in  
54 hospital-treated deliberate self harm. The latter involved a higher proportion of drug overdose  
55 and self-cutting whereas hanging, drowning, firearms and poisoning were significantly more  
56 common in acts of suicide + UD (all  $p < 0.001$ ).  
57  
58  
59  
60

*Suicidal behavior in older Irish adults*

1  
2  
3 Figure 3 here  
4  
5  
6

7  
8 The incidence of suicide + UD varied markedly by geographic area (Figure 3). For both  
9  
10 sexes, there were particularly high rates in the urban district populations, about twice the rate  
11  
12 in rural districts (Table 3). The rate of suicide + UD was lower in Dublin for men only. Among  
13  
14 women, the rate suicide + UD was significantly elevated in cities other than Dublin.  
15  
16

17  
18 Table 3 here  
19  
20

21  
22 There was also a marked urban-rural difference in the male and female incidence of hospital-  
23  
24 treated deliberate self harm. Compared to rural districts, the male rate of self harm was twice  
25  
26 as high in Dublin and 2.5 times higher in other cities and urban districts. Relative to rural  
27  
28 districts, the female rate of deliberate self harm was almost twice as high in cities other than  
29  
30 Dublin and about 2.5 times higher in Dublin and urban districts.  
31  
32  
33  
34  
35  
36  
37

**Discussion**

38  
39 The significance of suicidal behavior has become well recognised with many countries  
40  
41 implementing national prevention strategies. Studies have found deliberate self harm in older  
42  
43 adults generally involves greater suicidal intent (Hawton and Harriss, 2008b) than in the  
44  
45 young and that the link between deliberate self harm and suicide is also stronger in older  
46  
47 adults (Cooper *et al.*, 2005; Hawton and Harriss, 2006; Hawton *et al.*, 2003). However, the  
48  
49 incidence of both forms of suicidal behavior have rarely been compared. To our knowledge,  
50  
51 only one previous study has compared the incidence of deliberate self harm and suicide at a  
52  
53 national level in older adults (Shah, 2009b).  
54  
55  
56  
57  
58

59 *Methodological issues*  
60

*Suicidal behavior in older Irish adults*

1  
2  
3 The national perspective of this study is one of its strengths **although there was limited**  
4 **overlap between the years with available suicide mortality data and deliberate self**  
5 **harm data.** Suicide and deliberate self harm in older adults have previously been compared  
6  
7 in 10 urban centers across Europe (De Leo *et al.*, 2001) and in Western Australia (Lawrence  
8 *et al.*, 2000). The incidence of deliberate self harm reported in this paper was based on  
9  
10 persons presenting to hospital emergency departments. This is an improvement on studies  
11  
12 based on deliberate self harm that results in admission to a hospital ward (Shah, 2009a)  
13  
14 because admission rates following self harm presentation vary greatly between hospitals  
15  
16 (Bennewith *et al.*, 2004) thereby leading to significant bias. Our self harm data suffered some  
17  
18 bias, however, as untreated deliberate self harm and that treated in other settings were  
19  
20 unavailable.  
21  
22  
23  
24  
25  
26  
27  
28

29 The geographic comparisons made in this paper are an added strength and a rare feature of  
30  
31 study of older adult suicidal behavior (Shah *et al.*, 2009). We distinguished between Dublin,  
32  
33 other cities, urban districts and rural districts. While this independent stratification has  
34  
35 justification, it classifies some Irish towns and suburban areas as rural which is a limitation.  
36  
37 Furthermore, small-area postcodes do not exist in Ireland thereby hampering the geocoding  
38  
39 of addresses. The mortality data, in particular, were geocoded with more limited resources.  
40  
41 As a result, unreliable geocoding must be borne in mind as a potential contributor to the  
42  
43 geographic differences in suicide rates illustrated by this study.  
44  
45  
46  
47  
48

49 Suicide research is greatly hampered by the question of data reliability due to the difficulty  
50  
51 inherent in establishing suicide as a cause of death (Claassen *et al.*, 2010). Misclassification  
52  
53 of suicide deaths has most often been associated with the cause of death category 'deaths of  
54  
55 undetermined intent' (Cooper and Milroy, 1995; Jouglu *et al.*, 2002; Ohberg and Lonnqvist,  
56  
57 1998). We carried out all analyses using data related to officially-classified suicides and  
58  
59 suicides plus undetermined deaths in order to show that the findings were robust to the  
60  
effects of misclassification. **However, adjustment was not made for misclassification to**

*Suicidal behavior in older Irish adults*

1  
2  
3 **other causes of death including natural causes. This may be more common among**  
4  
5 **older persons with severe and/or terminal illness who bring about their deaths**  
6  
7 **through the cessation of vital medication.**  
8  
9

*Incidence rates*

10  
11  
12 The incidence of deliberate self harm among older adults in Ireland is higher than that  
13  
14 reported for a range of states in the USA (Center for Disease Control, 2007). Other  
15  
16 comparable studies have had predominantly urban catchment areas. The Irish rates of  
17  
18 deliberate self harm among older adults in urban districts and cities appear similar to those of  
19  
20 Oxford, England (Hawton and Harriss, 2008a) which had previously ranked third highest of  
21  
22 15 European centers (De Leo *et al.*, 2001). Thus, hospital-treated deliberate self harm  
23  
24 among older adults in Ireland is likely to be high in the European context.  
25  
26  
27  
28  
29  
30

31 Ireland's suicide rate among older adults is lower than most European countries. Older Irish  
32  
33 suicide also has a different age association because the Irish rate decreases with age  
34  
35 whereas the opposite is seen in many other European countries  
36  
37 ([http://www.who.int/mental\\_health/prevention/suicide/country\\_reports/en/index.html](http://www.who.int/mental_health/prevention/suicide/country_reports/en/index.html)). **Ireland**  
38  
39 **and the UK are similar in terms of the age pattern in suicide rates but the peak in**  
40  
41 **young men is more pronounced in Ireland. The rapid social change that Ireland has**  
42  
43 **experienced in recent decades seems relevant. Older Irish adults lived most of their**  
44  
45 **lives in an Ireland where the Catholic Church was dominant and suicide was strongly**  
46  
47 **sanctioned religiously and legally. This may have created a cohort who associate**  
48  
49 **such stigma and shame with suicide that their suicide rate is relatively low (Cleary and**  
50  
51 **Brannick, 2007). Younger Irish adults have grown up in a secular Ireland where the**  
52  
53 **Church has little or no (positive or negative) influence on their lives and suicide is far**  
54  
55 **less stigmatised. In times of despair when older generations may have turned to the**  
56  
57 **Church or their religion for support they do not and seem far more likely to resort to**  
58  
59 **suicide.**  
60

*Suicidal behavior in older Irish adults*

1  
2  
3  
4  
5 The incidence of deliberate self harm among older adults also decreased with increasing age  
6 and at a greater rate than for suicide. Therefore, the ratio of non-fatal to fatal suicidal  
7 behavior was lowest among the very oldest as has been shown elsewhere (Hawton and  
8 Harriss, 2008b).  
9  
10  
11  
12

13  
14  
15  
16 There was a 3:1 male:female rate ratio in relation to suicide deaths whereas the older female  
17 rate of deliberate self harm was 24% higher than the male rate. These gender differences  
18 are similar to those found previously across a range of European centers (De Leo *et al.*,  
19 2001) although an absence of a gender difference in older adult deliberate self harm has  
20 recently been reported from Oxford, England (Hawton and Harriss, 2008a).  
21  
22  
23  
24  
25  
26  
27  
28

*Geographic differences*

29  
30  
31 We have shown striking geographic differences in suicide and deliberate self harm rates  
32 among older adults in Ireland. The latter had 2-2.5 times higher rates in the Irish city and  
33 urban district populations than in rural districts. Given that hospital emergency departments  
34 are situated in urban centers, proximity may partly explain the higher rate of self harm  
35 presentations by urban populations. However, we have previously shown evidence that the  
36 distribution of socioeconomic deprivation is strongly associated with the geographic  
37 differences in rates of deliberate self harm (Corcoran *et al.*, 2007). In relation to suicide, the  
38 highest rates were in urban districts and especially so for men. As mentioned above,  
39 unreliable geocoding of mortality data cannot be discounted as a potential confounder of  
40 these findings. However, the extent of the differences warrants further investigation. We  
41 observed lower incidence of suicide among older men in Dublin. An artefactual reason may  
42 be behind this finding as we previously showed the lower Dublin suicide rate to be due to  
43 deficits in the operation of the suicide recording system in Dublin (National Suicide Research  
44 Foundation, 2007).  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

*Suicidal behavior in older Irish adults**Methods of self harm*

Expectedly, the more lethal methods of self harm (hanging and drowning) were commonly involved in suicide deaths rather than in hospital-treated deliberate self harm. Hanging is the commonest method of suicide in most European countries but drowning is relatively rare (Biermann *et al.*, 2009; Chen *et al.*, 2009; Varnik *et al.*, 2008), whereas it was involved in about 30% and 40% of the older male and female suicide deaths in this study, respectively. Drug overdose was involved in the vast majority of deliberate self harm presentations and especially so in female acts. It was also involved in a significant minority of suicide deaths. Drug overdose is consistently found to be the predominant method used by older adults who self harm (Chan *et al.*, 2007; De Leo *et al.*, 2001; Shah, 2009a). While less common, self-cutting and hanging were more often associated with male than female deliberate self harm, as has been previously shown for older adults in Europe (De Leo *et al.*, 2001).

**Conclusions**

Older adults in Ireland have high rates of hospital-treated deliberate self harm but below average rates of suicide. Both forms of suicidal behavior decrease in incidence with increasing age, especially deliberate self harm. There are striking geographic differences with particularly high rates among urban populations that are worthy of further investigation. Drug overdose was involved in the vast majority of older adult deliberate self harm and a significant minority of suicides. Previous success in suicide prevention through means restriction (Daigle, 2005; Hawton *et al.*, 2009; Hawton *et al.*, 2004) suggests that restriction of specific medications may be an effective approach to the prevention of suicidal behavior in older Irish adults.



*Suicidal behavior in older Irish adults*

1  
2  
3  
4  
5 **Conflicts of interest:** None  
6  
7  
8

9  
10 **Description of authors' roles:** All authors contributed to formulating the research questions.  
11 IJ Perry and P Corcoran designed the Registry upon which much of the study is based. P  
12 Corcoran carried out the statistical analysis and drafted the manuscript. U Reulbach drafted  
13 the Introduction. All authors contributed to completing the paper.  
14  
15  
16  
17

18  
19  
20 **Acknowledgements**  
21

22 We would like to acknowledge the staff of the Irish Central Statistics Office for their work in  
23 compiling the mortality and population data used in this paper. We would like to thank all who  
24 contribute to the Irish National Registry of Deliberate Self Harm, in particular Ms Eileen  
25 Williamson, Executive Director, the data managers and data registration officers. The  
26 Registry is funded by the Irish Health Service Executive's National Office for Suicide  
27 Prevention.  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

*Suicidal behavior in older Irish adults***References**

- Bennewith, O., Gunnell, D., Peters, T., Hawton, K. and House, A.** (2004). Variations in the hospital management of self harm in adults in England: observational study. *British Medical Journal*, 328, 1108-1109.
- Bertolote, J. M. and Fleischmann, A.** (2002). Suicide and psychiatric diagnosis: a worldwide perspective. *World Psychiatry*, 1, 181-185.
- Biermann, T., Sperling, W., Bleich, S., Kornhuber, J. and Reulbach, U.** (2009). Particularities of suicide in the elderly. A population-based study. *Aging Clinical Experimental Research*, 21, 470-474.
- Cattell, H. and Jolley, D. J.** (1995). One hundred cases of suicide in elderly people. *British Journal of Psychiatry*, 166, 451-457.
- Center for Disease Control** (2007). Nonfatal self-inflicted injuries among adults aged > or = 65 years--United States, 2005. *Morbidity Mortality Weekly Report*, 56, 989-993.
- Chan, J., Draper, B. and Banerjee, S.** (2007). Deliberate self-harm in older adults: a review of the literature from 1995 to 2004. *International Journal of Geriatric Psychiatry*, 22, 720-732.
- Chen, Y. Y., Park, N. S. and Lu, T. H.** (2009). Suicide methods used by women in Korea, sweden, taiwan and the United States. *Journal of the Formosan Medical Association*, 108, 452-459.
- Claassen, C. A., Yip, P. S., Corcoran, P., Bossarte, R. M., Lawrence, B. A. and Currier, G. W.** (2010). National suicide rates a century after Durkheim: A staged model to estimate mortality rate error. *Suicide and Life-Threatening Behavior*, (in press).
- Cleary, A. and Brannick, T.** (2007). Suicide and changing values and beliefs in Ireland. *Crisis*, 28, 82-88.
- Conwell, Y., Duberstein, P. R. and Caine, E. D.** (2002). Risk factors for suicide in later life. *Biological Psychiatry*, 52, 193-204.
- Cooper, J., et al.** (2005). Suicide after deliberate self-harm: a 4-year cohort study. *American Journal of Psychiatry*, 162, 297-303.

*Suicidal behavior in older Irish adults*

- 1  
2  
3 **Cooper, P. N. and Milroy, C. M.** (1995). The coroner's system and under-reporting of  
4 suicide. *Medicine, Science and Law*, 35, 319-326.  
5  
6  
7 **Corcoran, P., Arensman, E. and Perry, I. J.** (2007). The area-level association between  
8 hospital-treated deliberate self-harm, deprivation and social fragmentation in Ireland. *Journal*  
9 *of Epidemiology and Community Health*, 61, 1050-1055.  
10  
11 **Corcoran, P., Keeley, H. S., O'Sullivan, M. and Perry, I. J.** (2003). Parasuicide and suicide  
12 in the south-west of Ireland. *Irish Journal of Medical Science*, 172, 107-111.  
13  
14 **Daigle, M. S.** (2005). Suicide prevention through means restriction: assessing the risk of  
15 substitution. A critical review and synthesis. *Accident; Analysis and Prevention*, 37, 625-632.  
16  
17 **De Leo, D., et al.** (2001). Attempted and completed suicide in older subjects: results from the  
18 WHO/EURO Multicentre Study of Suicidal Behaviour. *International Journal of Geriatric*  
19 *Psychiatry*, 16, 300-310.  
20  
21 **Dennis, M. S., Wakefield, P., Molloy, C., Andrews, H. and Friedman, T.** (2007). A study of  
22 self-harm in older people: mental disorder, social factors and motives. *Aging and Mental*  
23 *Health*, 11, 520-525.  
24  
25 **Hawton, K., et al.** (2009). Effect of withdrawal of co-proxamol on prescribing and deaths  
26 from drug poisoning in England and Wales: time series analysis. *British Medical Journal*,  
27 338, b2270.  
28  
29 **Hawton, K. and Harriss, L.** (2006). Deliberate self-harm in people aged 60 years and over:  
30 characteristics and outcome of a 20-year cohort. *International Journal of Geriatric Psychiatry*,  
31 21, 572-581.  
32  
33 **Hawton, K. and Harriss, L.** (2008a). The changing gender ratio in occurrence of deliberate  
34 self-harm across the lifecycle. *Crisis*, 29, 4-10.  
35  
36 **Hawton, K. and Harriss, L.** (2008b). How often does deliberate self-harm occur relative to  
37 each suicide? A study of variations by gender and age. *Suicide and Life-Threatening*  
38 *Behavior*, 38, 650-660.  
39  
40 **Hawton, K., et al.** (2004). UK legislation on analgesic packs: before and after study of long  
41 term effect on poisonings. *British Medical Journal*, 329, 1076.  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

*Suicidal behavior in older Irish adults*

- 1  
2  
3 **Hawton, K. and van Heeringen, K.** (2009). Suicide. *Lancet*, 373, 1372-1381.
- 4  
5 **Hawton, K., Zahl, D. and Weatherall, R.** (2003). Suicide following deliberate self-harm:  
6  
7 long-term follow-up of patients who presented to a general hospital. *British Journal of*  
8  
9 *Psychiatry*, 182, 537-542.
- 10  
11 **Jouglu, E., Pequignot, F., Chappert, J., Rossollin, F., Le Toullec, A. and Pavillon, G.**  
12  
13 (2002). [Quality of suicide mortality data]. *Revue d'Epidemiologie et de Sante Publique*, 50,  
14  
15 49-62.
- 16  
17 **Kaplan, M. S., Adamek, M. E. and Rhoades, J. A.** (1998). Prevention of elderly suicide.  
18  
19 Physicians' assessment of firearm availability. *American Journal of Preventive Medicine*, 15,  
20  
21 60-64.
- 22  
23 **Kapur, N.** (2006). Self-harm in the general hospital. *Clinical Medicine*, 6, 529-532.
- 24  
25 **Kelleher, M. J., Keohane, B., Corcoran, P. and Keeley, H. S.** (1997). Elderly suicides in  
26  
27 Ireland. *Irish Medical Journal*, 90, 72, 74.
- 28  
29 **Lawrence, D., Almeida, O. P., Hulse, G. K., Jablensky, A. V. and Holman, C. D.** (2000).  
30  
31 Suicide and attempted suicide among older adults in Western Australia. *Psychological*  
32  
33 *Medicine*, 30, 813-821.
- 34  
35 **National Suicide Research Foundation** (2007). Inquested deaths in Ireland: a study of  
36  
37 routine data and recording practices. Cork: National Suicide Research Foundation.
- 38  
39 **National Suicide Research Foundation** (2009). National Registry of Deliberate Self Harm  
40  
41 Ireland Annual Report 2008. Cork: National Suicide Research Foundation.
- 42  
43 **Ohberg, A. and Lonnqvist, J.** (1998). Suicides hidden among undetermined deaths. *Acta*  
44  
45 *Psychiatrica Scandinavica*, 98, 214-218.
- 46  
47 **Platt, S., et al.** (1992). Parasuicide in Europe: the WHO/EURO multicentre study on  
48  
49 parasuicide. I. Introduction and preliminary analysis for 1989. *Acta Psychiatrica*  
50  
51 *Scandinavica*, 85, 97-104.
- 52  
53 **Reulbach, U. and Bleich, S.** (2008). Suicide risk after a suicide attempt. *British Medical*  
54  
55 *Journal*, 337, a2512.
- 56  
57  
58  
59  
60

*Suicidal behavior in older Irish adults*

1  
2  
3 **Shah, A.** (2009a). Attempted suicide in the elderly in England: age-associated rates, time  
4 trends and methods. *International Psychogeriatrics*, 1-7.  
5

6  
7 **Shah, A.** (2009b). Does improvement in the treatment of those who attempt suicide  
8 contribute to a reduction in elderly suicide rates in England? *International Psychogeriatrics*,  
9 21, 768-773.  
10  
11

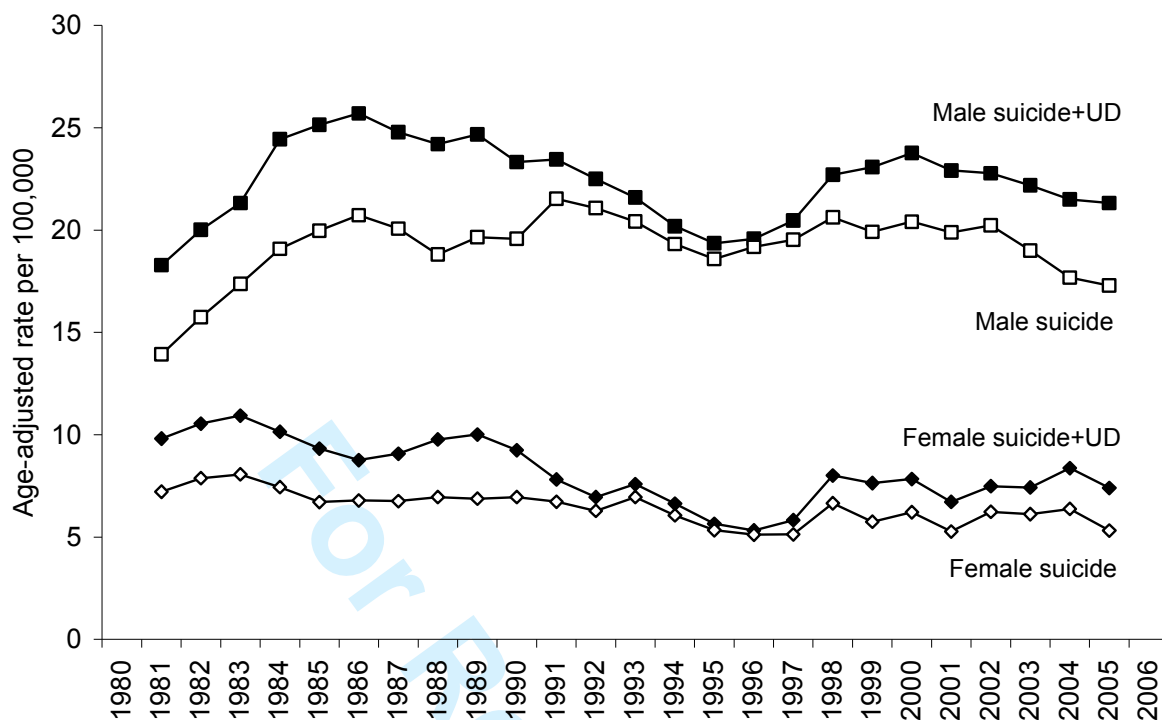
12  
13 **Shah, A., Sinha, T. and Makena, R.** (2009). The relationship between elderly suicide rates,  
14 population density and room density. *International Psychogeriatrics*, 1-2.  
15  
16

17  
18 **StataCorp** (1999). Stata Statistical Software: Release 6.0. College Station: Stata  
19 Corporation.  
20  
21

22  
23 **Varnik, A., et al.** (2008). Suicide methods in Europe: a gender-specific analysis of countries  
24 participating in the "European Alliance Against Depression". *Journal of Epidemiology and*  
25 *Community Health*, 62, 545-551.  
26  
27

28  
29 **Waterhouse, J., Muir, C., Correa, P. and Powell, J.** (1976). *Cancer incidence in five*  
30 *continents*. Lyon: IARC.  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

Suicidal behavior in older Irish adults



Note: 3-year moving averages are shown

Figure 1. Trends in male and female suicide and suicide plus undetermined death (UD) among over 55 year-olds in Ireland, 1980-2006

Suicidal behavior in older Irish adults

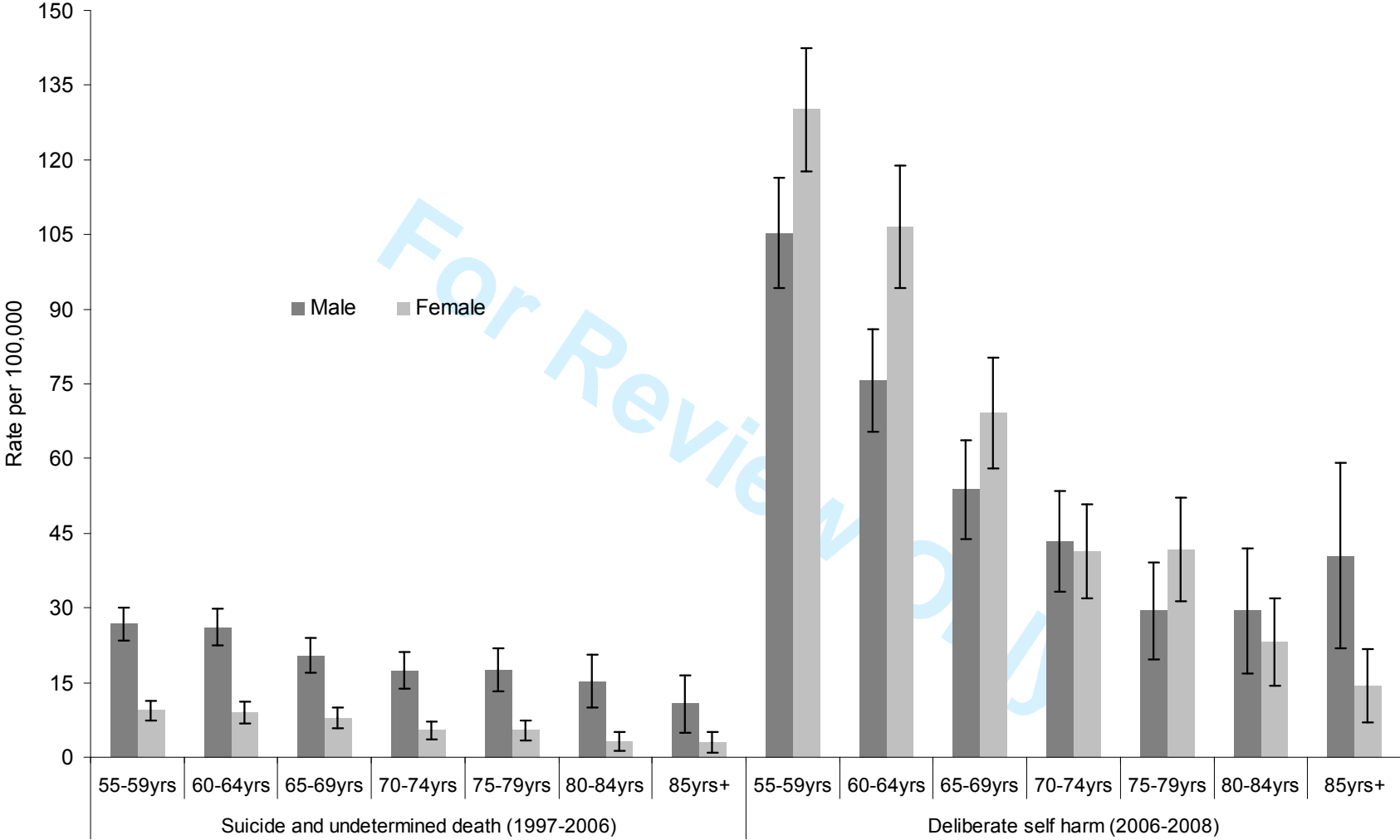


Figure 2. Annual age-sex-specific rate of suicide and undetermined death and hospital-treated deliberate self harm among over 55 year-olds in Ireland

*Suicidal behavior in older Irish adults*

Table 1. Gender difference by age in the incidence of suicide and undetermined death and hospital-treated deliberate self harm among over 55 year-olds in Ireland

	Suicide and undetermined death, 1997-2006		Deliberate self harm, 2006-2008	
	IRR <sup>1</sup>	(95% CI)	IRR <sup>1</sup>	(95% CI)
55-59 years	2.84***	(2.23-3.61)	0.81**	(0.70-0.93)
60-64 years	2.91***	(2.22-3.81)	0.71***	(0.60-0.85)
65-69 years	2.59***	(1.88-3.55)	0.78*	(0.61-0.99)
70-74 years	3.23***	(2.17-4.82)	1.05	(0.76-1.44)
75-79 years	3.26***	(2.09-5.07)	0.70	(0.47-1.06)
80-84 years	4.68***	(2.42-9.03)	1.27	(0.73-2.22)
85 years+	3.49**	(1.51-8.07)	2.82**	(1.43-5.55)

<sup>1</sup> Incidence rate ratio of the male rate to the female rate.



*Suicidal behavior in older Irish adults*

Table 2. Methods of self harm involved in suicide and undetermined death and hospital-treated deliberate self harm among over 55 year-olds in Ireland

	Suicide and undetermined death				Deliberate self harm			
	Male		Female		Male		Female	
	n	(%)	n	(%)	n	(%)	n	(%)
Drug overdose	61	(7.6)	71	(24.1)	732	(71.8)	1126	(84.5)
Poisoning	65	(8.1)	17	(5.8)	29	(2.8)	36	(2.7)
Self-cutting	0	(0)	0	(0)	149	(14.6)	119	(8.9)
Hanging	325	(40.6)	51	(17.3)	36	(3.5)	25	(1.9)
Drowning	230	(28.7)	116	(39.3)	62	(6.1)	33	(2.5)
Firearms	72	(9.0)	1	(0.3)	4	(0.4)	1	(0.1)
Other	48	(6.0)	39	(13.2)	48	(4.7)	27	(2.0)

Note: Multiple methods of self harm were involved in some cases of deliberate self harm and therefore the percentages sum to more than 100%.

Suicidal behavior in older Irish adults

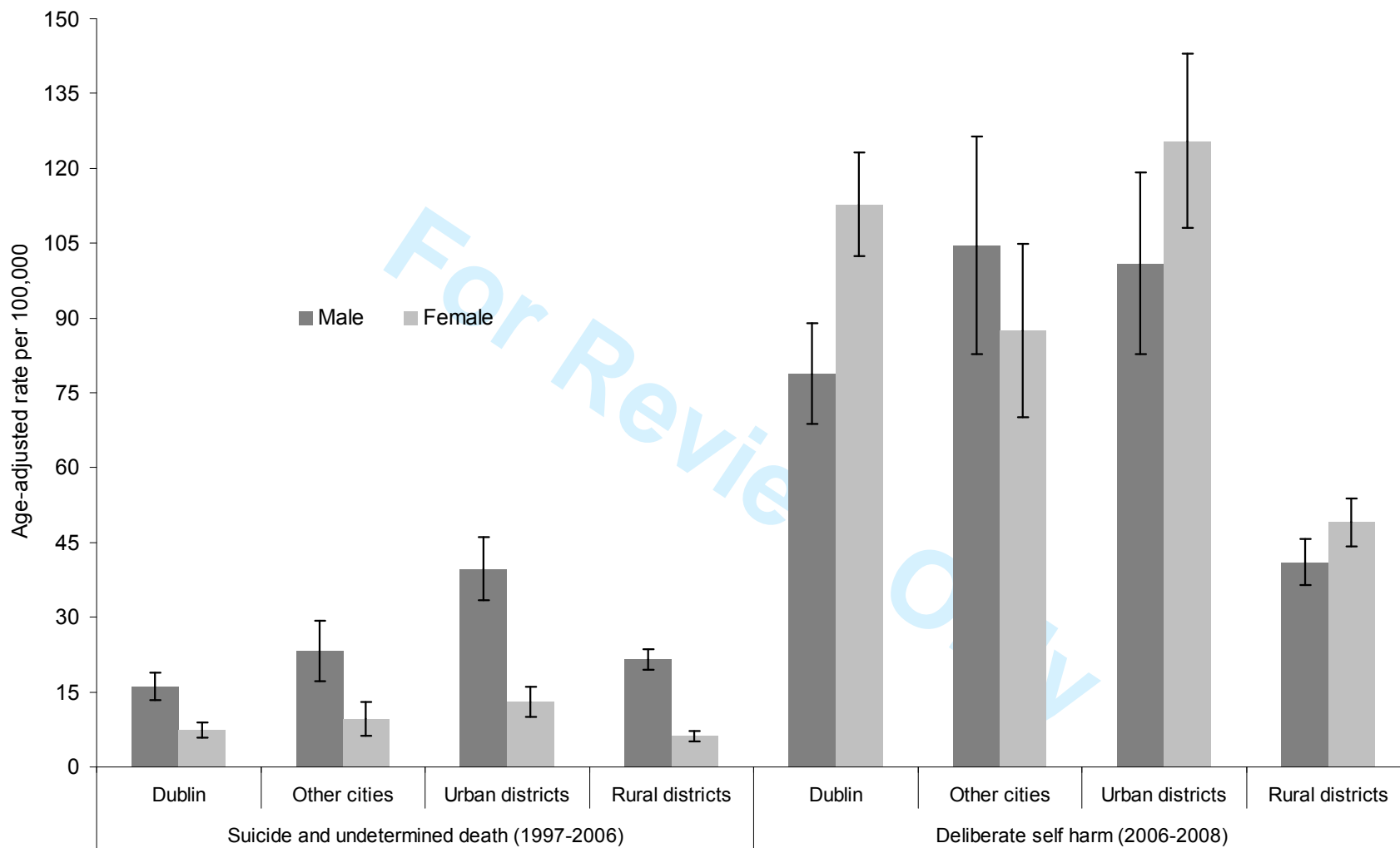


Figure 3. Annual age-adjusted rate of suicide and undetermined death and hospital-treated deliberate self harm among over 55 year-olds by area type in Ireland

*Suicidal behavior in older Irish adults*

Table 3. Geographic variation in the incidence of suicide and undetermined death and hospital-treated deliberate self harm among over 55 year-olds in Ireland.

	Suicide and undetermined death, 1997-2006				Deliberate self harm, 2006-2008			
	Male		Female		Male		Female	
	IRR <sup>1</sup>	(95% CI)	IRR <sup>1</sup>	(95% CI)	IRR <sup>1</sup>	(95% CI)	IRR <sup>1</sup>	(95% CI)
Dublin	0.75**	(0.62-0.90)	1.19	(0.90-1.58)	1.96***	(1.66-2.31)	2.32***	(2.01-2.68)
Other cities	1.07	(0.81-1.40)	1.61*	(1.08-2.40)	2.54***	(1.99-3.22)	1.83***	(1.43-2.32)
Urban districts	1.85***	(1.55-2.22)	2.11***	(1.55-2.86)	2.46***	(1.98-3.04)	2.57***	(2.13-3.10)
Rural districts	1.00	---	1.00	---	1.00	---	1.00	---

<sup>1</sup> Incidence rate ratio of age-adjusted rates with rural districts as the reference group