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RESEARCH

Suicide rates in young men in England and Wales in the 21st century: time trend study

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ABSTRACT

Objectives To explore trends in suicide in young people to investigate the recent observation that after year on year rises in the 1970s, 1980s, and early 1990s, rates in young men are now declining.

Design Time trend analysis.

Setting England and Wales, 1968-2005.

Population Men and women aged 15-34 years.

Results Since the 1990s, rates of suicide in young men have declined steadily and by 2005 they were at their lowest level for almost 30 years. This decline is partly because of a reduction in poisoning with car exhaust gas as an increased number of cars have catalytic converters; but there have been declines in suicides from all common methods, including hanging, suggesting a more pervasive effect. Other risk factors for suicide, such as unemployment and divorce, have also decreased. Possible recent reductions in alcohol use among young men and increases in prescribing of antidepressants do not seem to be temporally related to the decline in suicide.

Conclusions Suicide rates in young men have declined markedly in the past 10 years in England and Wales. Reductions in key risk factors for suicide, such as unemployment, might be contributing to lower rates.

INTRODUCTION

One of the most striking features of the epidemiology of suicide in the late 20th century was the epidemic rise in suicide among young men in most industrialised nations.[1] From 1950 to 1998 in England and Wales, rates of suicide in men aged under 45 doubled, while rates in women and older men declined.[2] During the 1990s, rates in young men aged 15-24 reached an all time high and were at their highest since the 1920s in men aged 25-34 years. Suicide accounted for about a fifth of all deaths in young men,[3] and men aged 25-34 had the highest rate of all age-sex groups.[2] Such trends have led to suicide becoming a major contributor to premature mortality[4] and are thought to indicate deteriorating mental wellbeing in younger people.

The cause for these rises is uncertain, though time series data show parallel increases in a range of risk factors including unemployment, divorce, substance misuse, and income inequality.[2] Furthermore, changes in the availability and use of common methods of suicide, particularly domestic gas, barbiturates, and motor vehicle exhaust gases, have had an important impact on suicide rates and trends in the past 50 years.[5-7]

There is a popular notion that rates of suicide in young people have continued to rise. A sharp downward trend in suicide in young men, however, has been reported in Australia,[8] and preliminary data suggest similar findings in England and Wales.[3] We explored recent trends in overall suicide, suicide by specific methods, and risk factors for suicide among young people.

METHODS

We used data from the Office for National Statistics on suicide in men and women aged 15-24 and 25-34 for the period 1968-2005. These data are based on the year of death registration in the years up to 1992 and, from 1993 onwards, the actual date of death. Because of the formal inquest process for possible suicides, registration might not occur until many months after the death occurred. We included all deaths with a coroner's verdict of intentional self harm or of injury or poisoning of undetermined intent (open verdict) as most of these deaths in adults were self inflicted but there was insufficient evidence to prove that they intended to kill themselves.[9] This is the routine approach taken for government suicide statistics.[3 10] For simplicity, we have used the term "suicide" to refer to deaths in both these categories throughout.

Three successive revisions of the International Classification of Diseases (ICD-8 to ICD-10) covered the period examined. Previous analysis has shown that there is no impact on the total number of suicides between revisions,[3] but there are differences in how method of injury is classified. We identified seven consistently coded methods of suicide: poisoning by solid or liquid (including drug poisoning); other poisoning (including domestic gas supply and vehicle exhaust); hanging (including suffocation); drowning; firearms (including explosives); jumping; and other (including injury from sharp object) (see table A on bmj.com). We also analysed trends in deaths recorded as accidental poisonings (ICD-8 E850-E877; ICD-9 E850-E869; ICD-10 X40-X49) to investigate whether

any decreases in suicide rates might be attributable to changes in coroners' recording practices rather than changes in the incidence of suicide; verdicts of "accidental death" are the most likely alternative to suicide or open verdicts.

We used age specific population estimates for England and Wales for the years 1968-2005 to calculate rates and the most up to date populations revised to take account of the 2001 census. The main analysis plotted trends in overall rates and rates for specific methods for men and women aged 15-24 and 25-34 separately. Time series data specific for age and sex for divorce and unemployment (www.statistics.gov.uk/), self reported data on alcohol use from the general household survey,[11] and UK data on antidepressant prescribing (selective serotonin re-uptake inhibitors, tricyclics, and other related antidepressants) from IMS Health (Intercontinental Medical Statistics) (http://research.imshealth.com/contactus.htm) were also obtained and plotted. These were compared with patterns in suicide to identify possible associations. Age groups could not be matched exactly. Unemployment data were not available for those aged 16 and 17, alcohol data were available only for those aged 16-24 and 25-44, and prescribing data were available for those aged 20-29.

Continuous data series were not available for a sufficient time period to enable us to undertake a full multivariable time series analysis. To crudely assess associations of changing levels of risk factors with suicide rates we calculated correlations between differences in suicide and difference in levels in consecutive years. This approach takes account of the well known problem with time series data—serial autocorrelation (non-independence) of data from consecutive years.

RESULTS

Suicide trends in young men

Suicide rates in young men in England and Wales more than doubled from the early 1970s and to the 1990s. Rates peaked in 1990 in 15-24 year olds and 1998 in 25-34 year olds and have since shown a steady decline in both age groups (fig 1). The year on year declines began around 1998-2000 in both age groups. By 2005, the rate in men aged 15-24 had fallen to almost half the peak rate (16.6 per 100 000 in 1990) and was 8.5 per 100 000. In men aged 25-34, the rate had decreased by a third from the peak rate of 27.8 per 100 000 in 1998 to 15.7 per 100 000. These were the lowest rates since 1974 and 1978, respectively. Rates for specific methods show a decline in all common methods, including hanging—the most commonly used method by young men.

The greatest decrease has been in suicides by "other poisoning," which previous analysis found was mainly due to the fall in deaths from exposure to motor vehicle exhaust gas.[3] Among 15-24 year old men "other poisoning deaths" declined from 4.8 per 100 000 in 1990 to 0.2 per 100 000 in 2005 (absolute reduction 4.6 per 100 000); in this age group such reductions therefore accounted for half of the decrease in overall suicide rates from 16.6 per 100 000 in 1990 to 8.5 per 100 000 in 2005 (absolute reduction 8.1 per 100 000). Among 25-34 year old men overall suicide rates declined from 22.2 per 100 000 in 1990 to 15.7 per

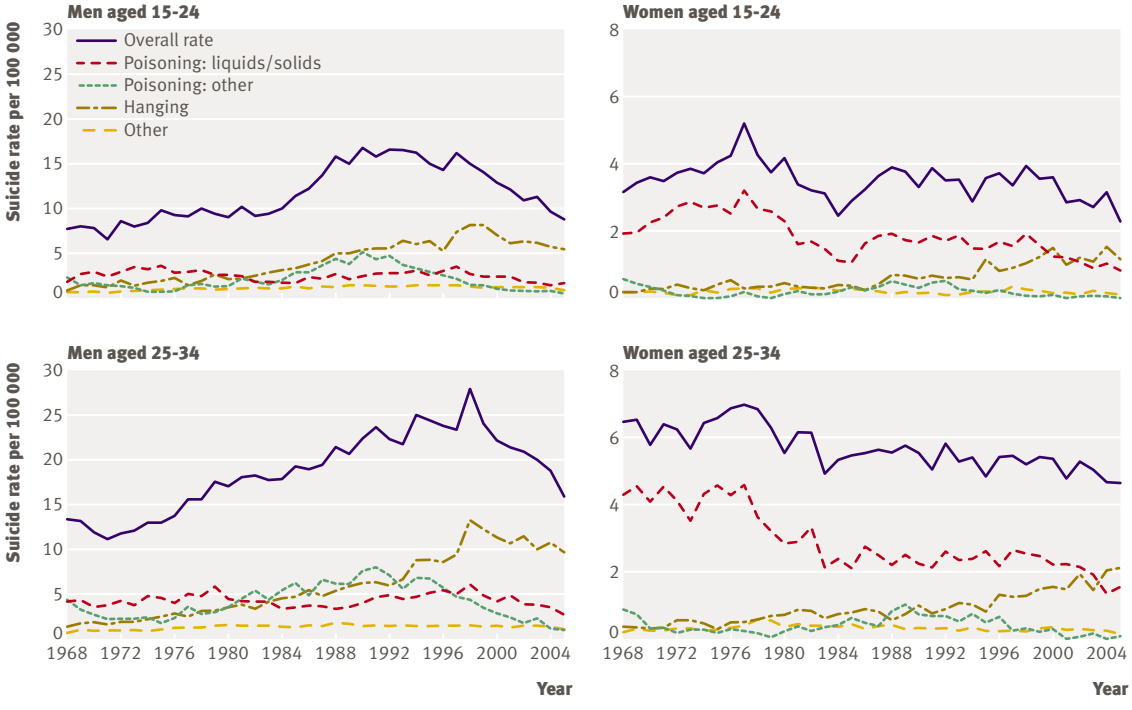

Fig 1 | Overall rates and rates for specific methods of suicide: England and Wales, 1968-2005. "Other" includes drowning, firearms, jumping, and sharp object

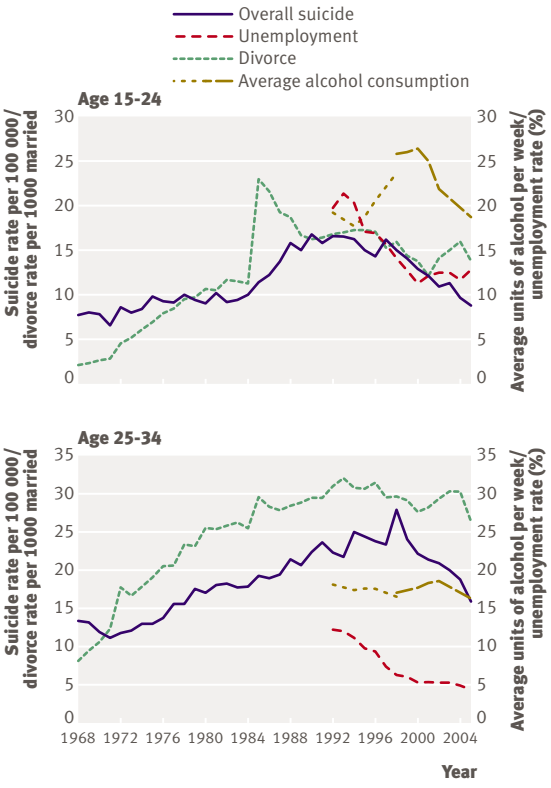

Fig 2 | Secular trends in suicide, divorce, unemployment, and alcohol consumption in men aged 15-34. Rise in divorce in 1972 corresponds to introduction in 1971 of the Divorce Reform Act 1969 and rise in 1985 to the Matrimonial and Family Proceedings Act 1984, which allowed divorce after one year. Unemployment rates shown are for those aged 18-24 and 25-34. Alcohol consumption rates are for those aged 16-24 and 25-44; dotted brown line represents data weighted to account for non-response, dashed brown line represents unweighted consumption (general household survey, 2005, appendix D)

100 000 in 2005 (absolute reduction 6.5 per 100 000); an equivalent reduction occurred in "other poisoning deaths"—from 7.3 per 100 000 to 0.7 per 100 000 (absolute reduction 6.6 per 100 000) over this period. Recent reductions in suicides by hanging and poisoning with liquids and solids have also contributed to the overall decline in suicide in men as the use of these methods had continued to rise well into the mid to late 1990s after the reduction in "other poisoning deaths" had already commenced.

Suicide trends in young women

Suicide rates in young women have shown more stability over time (fig 1). Rates in the 21st century, however, are at the lowest recorded over the time period analysed. Suicide by hanging has increased among young women since the mid-1990s and in recent years has overtaken self poisoning as the most common method. In 1968, deaths by hanging accounted for just 5.7% of suicides in women aged 15-34. In 2005 this proportion was 47.3%. The corresponding proportions of self poisoning with solids or liquids were 64.1% in 1968 and 35.5% in 2005.

Accidental poisonings

From 1968 to 2005 rates of accidental poisoning in young men show a parallel pattern to that of overall suicide rates over the same period. In 15-24 year old men rates declined from a peak of 5.1 per 100 000 in 1997 to 1.9 per 100 000 by 2005; in 25-34 year old men rates peaked in 1996 (7.1 per 100 000) and declined to 5.5 per 100 000 by 2005 (see fig A on bmj.com). This provides some evidence that the recent downward trend in rates is not because of an increased use of accidental verdicts by coroners.

Risk factors: divorce, unemployment, alcohol use, and antidepressants

With the exception of the marked increase in divorces in 1972 after the Divorce Reform Act 1969 came into effect, rates of divorce closely followed trends in suicide in young men at the end of the 20th century. Both increased into the 1990s and then showed a decline up to 2001 (fig 2). Unlike the trends seen for suicide, however, divorce rates increased from 2001 to 2004 but have since fallen once more. Continuous time series data, specific for age and sex, were not readily available for unemployment and alcohol consumption before the 1990s. Published data show that unemployment rose steeply in the early 1980s and then showed a period of decline before rising again and peaking in the early 1990s.[2] Recent age specific data show that unemployment rates also show a decline in parallel with declining suicide rates (fig 2), although the decline preceded the decline in suicide by several years and ceased in 2000. Data from the general household survey indicate that an upward trend in alcohol consumption throughout the 1990s may have peaked early in the 21st century with recent declines postdating declining rates of suicide (fig 2).

Figure 3 shows time trends in antidepressant prescribing in relation to changes in suicide. Increases in prescribing that began in the early 1990s corresponded to the levelling off of suicide rates in men aged 15-24 but predated the decline in those aged 25-34 by almost a decade.

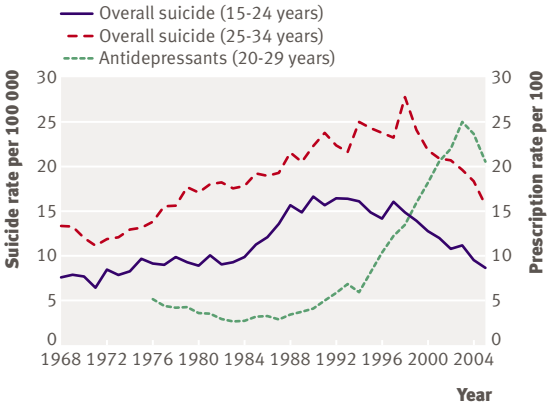

Fig 3 | Secular trends in suicide in men aged 15-24 and 25-34 and antidepressant prescribing in men aged 20-29, 1968-2005

Correlations between changes in levels of risk factors and changes in suicide rates in young men between 1992-2005 were relatively uninformative; among 15-24 year olds correlations with suicide were r=−0.32 (P=0.29) for divorce, r=0.12 (P=0.69) for unemployment, r=0.27 (P=0.56) for alcohol use, and r=0.18 (P=0.57) for antidepressant prescribing. Equivalent correlations for those aged 25-34 were r=0.21 (P=0.50) for divorce, r=−0.23 (P=0.45) for unemployment, r=−0.02 (P=0.96) for alcohol use, and r=−0.10 (P=0.74) for antidepressants.

DISCUSSION

Main findings

Suicide rates in young men have declined markedly over the past decade. Rates in 2005 were the lowest they have been since the mid-1970s. These reductions are apparent for all common methods of suicide, including hanging, suggesting a more pervasive change than that attributable to the changing availability of particular methods. So, while the decline in carbon monoxide poisoning after legislation on car exhaust emission in 1993[5] contributed to the falls in suicide, particularly in men aged 25-34, other factors underlie declines in suicides by other methods. Rates in young women are also at their lowest level for many years. One noteworthy feature of recent trends in young women is that deaths by hanging have increased and this is now the most commonly used method. These data thus indicate an important recently emerging change in epidemiological trends in suicides in young people, especially young men.

Strengths and limitations

To investigate possible explanations for the recent decline in suicide young men in England and Wales we used the most up to date national data on suicide and possible contributory factors. Nevertheless, there are several limitations to our analysis. Firstly, while changes in known risk factors may contribute to variations in suicide rates, such trends should be interpreted cautiously in aggregate (ecological) analyses of population data as causality cannot be proved. Secondly, age specific data on relevant risk factors span too few years to enable a multivariable time series analysis of factors independently associated with recent trends. Thirdly, age specific data on unemployment and alcohol consumption spanning the entire period of our analysis were not available. Furthermore we did not have secular trend data on two key risk factors for suicide: mental illness and self harm. It is noteworthy, however, that data from Oxford[12] indicate that after peaking in 1994-5 rates of self harm in men aged 15-24 and 25-34 decreased by around 40% by 2005, a pattern in keeping with that seen in our analysis of suicide trends. Lastly, interpretation of time trends in divorce is problematic. The appropriate denominator for examining such trends is the number of married individuals, but recent declines in marriage mean that the population at risk has also declined. From 2001 to 2005 less than 20% of young men aged 16-34 were married (www.statistics.gov.uk/STATBASE/ssdataset.asp?vlnk=9535) and divorce rates do not take into account the larger proportion of young men who cohabit and subsequently separate from their partner. Declines in divorce rates may therefore signal either a general increase in the stability of relationships or a selection into marriage of people who are the least likely to divorce.

Previous studies

The reductions in suicides in young men corresponded to periods of decline in three risk factors for suicide—unemployment, divorce, and alcohol consumption—and an increase in antidepressant prescribing, although rates of decline in unemployment have since levelled off and divorce rates increased in 2002-4 (fig 2). The impact on suicide of declining alcohol consumption is also uncertain as the reductions postdated the decrease in suicide. In addition, as the alcohol data are self reported, changes may be caused by an increased reluctance among young people to report heavy drinking.[11] Furthermore, although alcohol related mortality in men aged 15-34 peaked in 2001, rates remain higher than those recorded before substantial rises in the 1990s and figures show that young men continue to drink to excess.[13 14] Prescribing of selective serotonin reuptake inhibitors increased rapidly from the early 1990s but the increases did not correspond to the timing of the declines in suicide. Furthermore, there is uncertainty regarding whether these rises have had a beneficial impact on suicide rates,[15] and any such effects may be stronger in older than in younger adults.[2 16]

Other possible influences on secular trends in suicide are changes in income inequality and the prevalence of substance misuse.[2] Income inequality fell from 2000-1 to 2004-5 (www.statistics.gov.uk/cci/nugget.asp?id=332), but these falls were slight and postdated the decline in suicide. There are no reliable data on time trends in the incidence of drug misuse. Trends in mortality related to drug misuse (only 20% of which are suicides), however, indicate that after year on year rises throughout the 1990s, deaths in men decreased by over

WHAT IS ALREADY KNOWN ON THIS TOPIC

There was an epidemic rise in suicide among young men in most industrialised nations in the late 20th century

In 1998, suicide in young men in England and Wales reached its highest level since the 1920s and men aged 25-34 had the highest rate of all age-sex groups

Such trends transformed suicide into a major contributor to premature mortality

WHAT THIS STUDY ADDS

Suicide rates in young men in England and Wales peaked during the 1990s and have since shown a steady decline; in 2005 rates were at the lowest level since the mid-1970s

These recent reductions are apparent for all common methods of suicide

Factors contributing to the decline include reductions in suicides using car exhaust gas after legislation in 1993, favourable changes in known risk factors for suicide such as unemployment, and, possibly, health policy focus on preventing suicide

20% in 2001-4. This decline was most pronounced in those aged 20-39.[17]

The possible association between declining rates of suicide and unemployment is contrary to the results of an analysis of similar declines in men in Australia.[8] This found a break in the association between unemployment and suicide and the authors instead attribute reductions to a major government strategy to prevent suicide in young people. The major policy initiatives on suicide prevention in England and Wales have been government targets for suicide reduction, first set in 1992 (the Health of the Nation white paper[18]) and, in 2002, the launch of National Suicide Prevention Strategy for England.[10] The period of increased policy focus on suicide has been associated with the levelling off and subsequent declines in suicide, although it is not possible to determine causality.

Just as no single factor was clearly associated with the rise in suicide in young men in the 1950s-1990s,[2] favourable changes in several different factors—levels of employment, substance misuse, and antidepressant prescribing as well as policy focus on suicide and vehicle exhaust gas legislation—may have contributed to the recent reductions in England and Wales. It is also possible that the reductions in several factors, including suicide, relate to some broader societal change not captured in this analysis.

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Contributors: LB and DG had the idea for the study and developed the study hypotheses. LB and AB identified relevant data sources and collated the data. LB and STB summarised and plotted the data. LB wrote the first draft of the paper. All authors contributed to revising the paper for intellectual content and approved the final draft. LB and DG are guarantors.
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