6-23-2012

Suicide in young men

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Suicide 2

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Suicide is second to only accidental death as the leading cause of mortality in young men across the world. Although suicide rates for young men have fallen in some high-income and middle-income countries since the 1990s, wider mortality measures indicate that rates remain high in specific regions, ethnic groups, and socioeconomic groups within those nations where rates have fallen, and that young men account for a substantial proportion of the economic cost of suicide. High-lethality methods of suicide are preferred by young men: hanging and firearms in high-income countries, pesticide poisoning in the Indian subcontinent, and charcoal-burning in east Asia. Risk factors for young men include psychiatric illness, substance misuse, lower socioeconomic status, rural residence, and single marital status. Population-level factors include unemployment, social deprivation, and media reporting of suicide. Few interventions to reduce suicides in young men have been assessed. Efforts to change help-seeking behaviour and to restrict access to frequently used methods hold the most promise.

Lancet 2012; 379: 2383–92

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This is the second in a **Series** of three papers about suicide

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Introduction

Suicide risk has historically been described to increase with age, with older men being identified as the group at highest risk. However, in the 1970s in some high-income countries, suicide became increasingly common in young adults, especially in young men.[1] Although the focus of concerns is now shifting to middle-aged men, who are the group at highest risk in many countries, the lower life expectancy of working-age men remains a major problem.[2] In the context of the global financial crisis and the propagation of new suicide methods, such as charcoal burning, policy responses are needed. In this review, we aim to provide an updated perspective on the burden of suicide in young men, specific risk factors, and evidence-based interventions, using published international evidence from 2000–11. We chose to focus on data for men aged 19–30 years, which is the most common age group used for young men in population research.

Historical patterns of suicide in young men

50 years ago suicide accounted for 10% of deaths of people aged 10–24 years in countries in the Organisation for Economic Co-operation and Development (OECD) countries, against a backdrop of 2% or fewer globally.[3] By the mid-1980s suicide had become a leading cause of death in men aged 25–34 years in high-income countries, accounting for up to a third of mortality in young men.[1] Until this point elderly men had been regarded as the group at highest risk of death by suicide. However, between 1950 and 1999 the highest suicide rates shifted from elderly people towards middle-aged people (those aged 35–45 years), and in some countries to younger age groups (those aged 15–25 years).[4] Concerns about suicide at the turn of the 21st century related not only to WHO's report of a 60% global increase in recorded suicide mortality during the previous 45 years,[4] but specifically a 7% global increase in death by suicide in men from 1960 to 1999.[5] This increase was attributed to an increase in suicide in young men accompanied by a decrease in suicide in older men.[5] Also, suicide became increasingly more common in men than in women in people aged 15–29 years in Europe, the USA, Asia, Australasia, and some Latin American countries.[1] Comparison of 1970 and 1985–86 WHO data show that although the highest rates were seen in men older than 60 years, suicide rates in men aged 15–29 years in Australia, New Zealand, Mexico, Canada, the USA, and Ireland had reached parity with (or in some cases surpassed) those in men aged 30–59 years.[1] These international patterns seemed to suggest that suicide, although a rare event, had become a serious problem in young men in some parts of the world.

Search strategy and selection criteria

We searched Medline using the MeSH term "suicide" and the subheading "epidemiology", and publication date restrictions of January, 2000, to August, 2011; we restricted our search to studies written in English and including data for men. Age group limitations were defined with Medline age groups "Young Adult 19 to 24 years" or "Adult 19 to 44 years". We repeated the search with minor variations on Embase (using "Human Age Groups Adult 18 to 64 years") and CINAHL (using "Age Groups Adult~ 19–44 years"). We chose these age ranges to identify articles relevant to the age-range 19–30 years, taking into account WHO definitions of youth as individuals aged 15–24 years, teenagers as those aged 15–19 years, and young adult men as those aged 20–24 years, as well as WHO publications describing young adults as aged 15–34 years,[4] and previous *Lancet* studies defining young adolescence,[10–14] late adolescence,[15–19] and young adulthood.[8,20–24] For inclusion of additional, more up-to-date papers, we did a key word search on PubMed for the year 2011. Key references from the last 10 years were sought from international experts in the field of suicidology. We also did secondary searching of references cited in identified articles and key textbooks. Papers were restricted to those reporting fatal outcomes. Additional references were suggested by the peer reviewers.

Global patterns in suicide in young men

The number of suicide deaths in young men is probably substantially underestimated. Wide international variations in the quality of suicide data are explained by underreporting and misclassification of suicide (partly related to legal and cultural factors), inconsistent conventions and discontinuities in the coding of deaths, and differing categories of death included in suicide analyses.[6] WHO has little suicide mortality data for many low-income and middle-income countries (LMICs), and a proportion of accidental death and undetermined death registrations internationally should be assumed to be suicide deaths. This potential is increased in young men, in view of their high rates of accidental death.[2,7]

Findings from studies done since 2000 show that suicide is among the top three to five causes of mortality in young men in most high-income and middle-income countries sampled,[2] and that accidental death remains the leading cause of death in young men for countries at all levels of economic development.[8] Analysis of mortality patterns in 44 countries across all continents (with data for 1997–2003) shows that suicide was among the top three causes of death for young men (aged 15–44 years) in 25 of those countries, and accidents were the leading cause of death in 38 countries.[2] Suicide accounts for a much greater proportion of total deaths in young men in high-income countries than it does for those in LMICs (figure 1), but absolute rates of suicide in young men are about the same in high-income countries and LMICs, because of the greater contribution of violence and traffic accidents in LMICs.[8]

Temporal trends since the 1990s show that suicide rates in young men have decreased in countries such as Australia,[9] New Zealand,[10] China,[11] Thailand,[12] the USA,[13,14] Italy,[15] Austria,[16] the Czech Republic,[17,18] Scotland,[19] England and Wales,[20] and other western European countries.[17,21,22] Meanwhile, rates have risen in countries such as Brazil,[23] Singapore,[24] South Korea,[25] Lithuania,[26] Ireland,[27] and Northern Ireland.[28,29] However, this division is a potentially misleading oversimplification of a complex public health problem, involving a very different evolution of risk and protective factors in each country. The dichotomy also erroneously implies that suicide in young men is no longer a problem in countries where rates have fallen. Apparent decreases in suicide rates in young men at a national level mask rising suicide rates in young men at the sub-national level. This difference is apparent by region[30] and by remote residence in the UK,[30] by socioeconomic status in Australia,[30,31] and by ethnic origin in South Africa.[32,33] Additionally, decreases in the number of suicides in young men in New Zealand are only moderate progress towards the low rates seen in the mid-1960s.[1,10,17]

The economic and social cost of suicide in younger age-groups is rarely reported, despite the greater contribution deaths in young people make to life-years lost. The cost of each young man dying by suicide in England has been valued as £1·67 million (2009 prices),[34] but has not yet been calculated in any LMICs. Despite their ageist bias, measures such as potential years of life lost (PYLL) are sensitive to changes in the demographic structure, revealing the wider effect of suicide even when the youth suicide rate is low or falling. In south India, local surveillance data show that suicides of men aged 15–29 years account for the greatest proportion of PYLL when compared with men in all other age groups, exceeded by only women aged 15–29 years.[35] Taiwanese national mortality statistics show that the greatest proportion of PYLL due to suicide is seen in men and women aged 25–39 years (figure 2), although the greatest number of suicide deaths occur between the ages of 40 years and 59 years.[36]

Economic data also show that although media reports have tended to focus on suicides in young men, the burden of suicide in young women and middle-aged men are serious public health problems. In Taiwan, during the period 1997–2007 the greatest increases in PYLL were seen in men aged 40–59 years.[36] Other epidemiological studies show that although Sri Lanka and Russia rank highest internationally for suicide rates in young men,[37] the greatest total numbers of suicides in Sri Lanka are seen in men aged 41–55 years and women

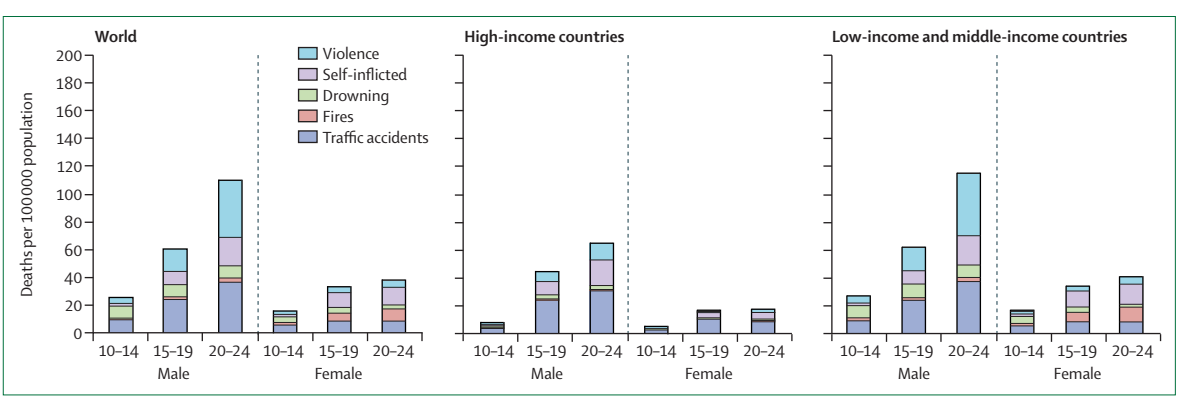

Figure 1: **Causes of death by injury, by sex, age-group, and region**
Adapted with permission from Patton and colleagues.[8] Violence refers to deaths from violence in and outside of war.

aged 21–45 years,[38] and in Russia are seen in men aged 45–54 years.[39]

The historical pattern of suicide risk increasing with age (but representing a decreasing proportion of total deaths) still applies in many LMICs and high-income countries in Europe, the Americas, Israel, India, and the far east.[7,10,11,24,35,40–52] International comparisons of the most up-to-date data from 44 high-income and middle-income countries show median suicide rates rising through successive age-groups: 14·4 per 100 000 men aged 15–24 years, 21·9 per 100 000 men aged 25–34 years, and 24·7 per 100 000 men aged 35–44 years.[2] Similarly, although an excess of suicide deaths in men holds true in young people globally,[2,50] the ratio is reversed for young women in two of the most populous countries: China[37,40,44,53–56] and India.[35,57,58] This occurrence is likely to be a consequence of high rates of suicide in women in rural areas,[54] but does draw attention to the importance of exploring sub-national trends and of comparing mortality indicators across all age groups in both sexes. Indeed, one of the most striking characteristics of the studies reviewed was the restricted range of mortality indicators presented and the substantial variability in the comparison groups used. Such restriction hampered an assessment of the suicide burden in young men compared with other groups. Future epidemiological studies will have greater use for policy makers if they present national suicide rates in the context of other mortality indicators, to identify groups at highest risk of suicide.

Suicide methods used by young men

International variations in the frequency of suicide methods relate generally to local data availability. The WHO databank does not specify method-specific suicides, which means that global patterns in suicide methods have to be derived from individual countries' data.[21] Unfortunately, few studies disaggregate data by age group and sex. Hanging is the leading method in young men in Europe and Australasia, and patterns of its use are closely associated with changes in suicide rates for this group,[9,19–21,59–62] Exceptions are New Zealand, where the proportion of men aged 15–24 years using hanging has been rising (despite concurrent falls in this group's suicide rate),[10] and Italy, where suicide rates for men aged 15–24 years and 25–44 years decreased from the mid-1990s despite a rise in hanging and jumping from a height in young men.[15] Japanese data for 1999 show that hanging accounted for 63% of suicides in men aged 20–39 years, and jumping from height accounted for 14%.[47] In the USA, however, firearms (followed by hanging or suffocation) is the most common method of suicide in men aged 15–24 years,[14] accounting for 55% of suicides in men aged 20–39 years; hanging accounts for 26%.[47] Patterns at the sub-national level show that young men in specific indigenous groups prefer specific suicide methods: firearms in the USA, hanging or asphyxiation in Canada, and hanging in Australia.[63]

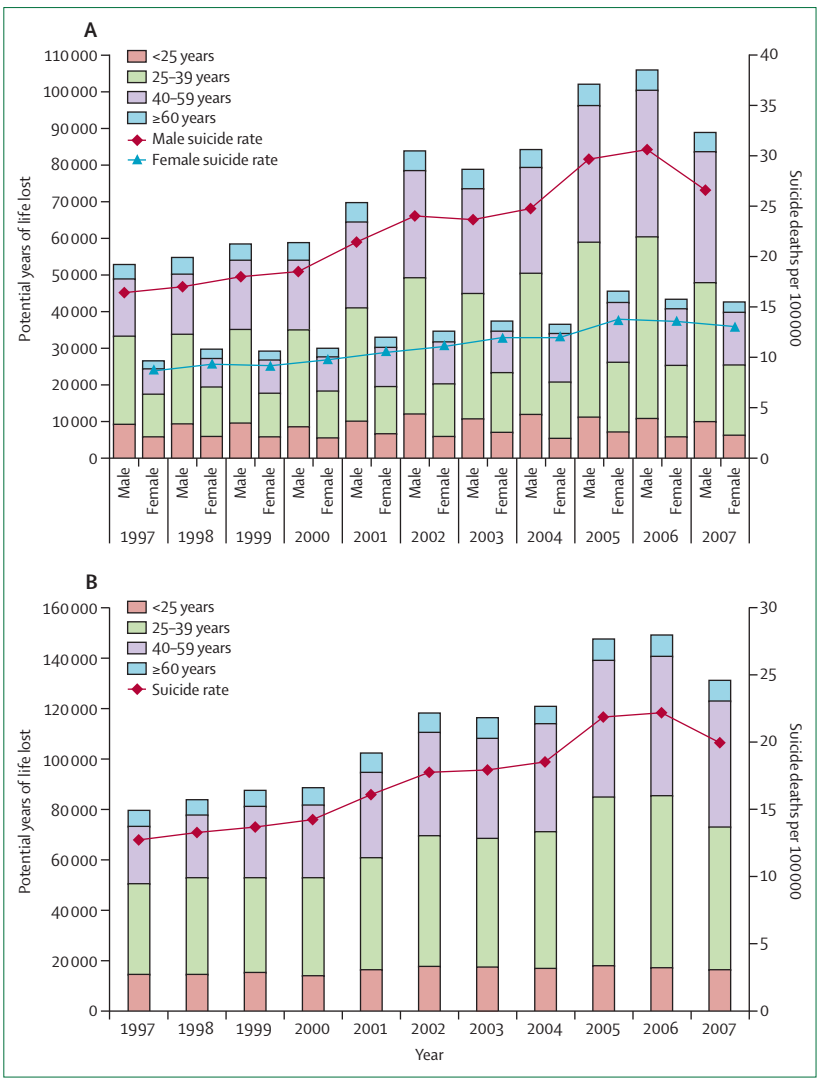

Figure 2: **Effect of suicide in Taiwan, 1997–2007**
(A) Sex-specific suicide rate and potential years of life lost. (B) Suicide rate and potential years of life lost due to suicide for both sexes. Reproduced from reference 36 with permission of Hogrefe Publishing.

In South Africa, hanging and firearms are the most-used methods in men aged 15–34 years.[33] High case-fatality ratios for intentional self-harm are seen in many Asian countries. For example, in China an estimated 82% of suicide deaths are due to poisoning, although data are not specific to young men.[64] In India pesticide poisoning is the leading method of suicide for young men, accounting for 58% of suicides in men (and 25% in women) aged 21–30 years.[65] In Sri Lanka, acute poisoning (including pesticides) is the leading method used by men (and women) in all age groups.[38] New and highly lethal suicide methods have emerged in east Asia, including home-manufactured hydrogen sulphide[66] and other chemical suicide methods. Charcoal-burning has rapidly increased as a new method in Taiwan and Hong Kong, especially in men (and women) aged 24–39 years, with

little evidence for substitution of older methods.[67] In Taiwan, charcoal-burning suicide rates during 2001–06 rose most sharply in the age group 25–44 years, with an odds ratio of 1·3 (95% CI 1·2–1·4) for men dying by this method compared with women.[68] Overall it accounted for 34% of suicide deaths in Taiwan during 2006.[68] There are concerns about the proliferation of new media driving the popularity of new methods,[66] especially in young people.[66,69]

Individual-level risk factors for suicide in young men

Several suicide risk factors that are well established in the wider population have not been investigated specifically in relation to young men. The absence of such investigation is because large sample sizes of young men are needed to achieve adequate statistical power, and risk factors cannot necessarily be inferred from wider studies that treat age group and sex as separate variables. A meta-analysis of international psychological autopsy studies, in which men had a mean age of 28·5 years (SD 12·8), showed higher odds of childhood disorders (odds ratio=4·95 [95% CI 2·7–9·3), substance-related problems (3·58 [2·8–4·6]), and personality disorders (2·01 [1·4–3·0]) for suicides in men, but lower odds of any affective disorders (0·66 [0·5–0·8]).[70] A case-control study of Canadian men (with a mean age of 28·9 years [SD 8·4]) identified the psychiatric comorbidities with the highest odds ratios for suicide as drug dependence (13·51 [odds ratio 3·11–58·82]), major depression (10·75 [3·69–31·25]), borderline personality disorder (9·71 [2·86–33·33]), and depression not otherwise specified (9·43 [1·20–76·92]).[71] A Chinese psychological autopsy study of individuals aged 15–24 years showed that mental illness at time of death was an important predictor of suicide in men (odds ratio 14·0 [2·6–76·5]) but not in women.[64]

The relative risk of suicide in men younger than 35 years with a psychiatric disorder has been estimated from meta-analysis of studies in high-income and middle-income countries, and ranked as follows: schizophrenia (relative risk=13·66 [95% CI 5·18–36·04]), affective disorders (9·26 [4·99–17·19]), substance use disorders (5·09 [2·81–9·25]), personality disorders (4·14 [2·81–9·25]), and anxiety disorders (3·31 [1·53–7·18]).[72] Population attributable risk (PAR) of suicide for each psychiatric disorder (but for men of all ages) show slightly different rankings: 26% for affective disorder, 19% for substance abuse, 15% for personality disorder, 7% for schizophrenia, and 5% for anxiety disorder.[72] This conveys the public health importance of addressing untreated depression, although psychiatric illness, particularly depression, has been suggested to make a greater contribution to suicide risk with increasing age, especially in individuals older than 45 years.[73] International studies of help-seeking patterns suggest that male sex and age below 45 years predict lower help-seeking in depression.[74] Only one study has investigated risk of suicide following self-harm, finding that in England men aged 10–24 years are at lower risk of suicide following self-harm than are older men after self-harm.[75] Ecological data describe the effect of population-level alcohol consumption on suicide rates in men aged 15–29 years, finding that (after controlling for macro-socioeconomic variables) national alcohol consumption was not related to suicide rates in young men.[22] However, an association absent at an aggregate level might exist at the individual level.

Evidence that homosexuality is a risk factor for suicide in men derives from Danish data showing that men in same-sex, legalised partnerships had a suicide risk nearly eight times greater than men in heterosexual marriages, and double that of men who had never married.[76] Studies specific to young men who have sex with men are needed, notwithstanding difficulties in establishing sexual orientation. In the wider population, specific occupational groups (doctors, farmers) and unemployed individuals are cited as higher-risk groups for suicide. A study of doctors in England and Wales recorded suicide rates for male doctors in all age groups to be two-thirds that of men in the general population, but showed increased rates in their female counterparts.[77] Although suicide risk in young male farmers is often mentioned in newspaper reports from the Indian subcontinent and West Africa, no quantitative epidemiological studies have addressed this group. Australian studies, however, show high rates of suicide in young male agricultural workers.[78,79] In the USA, Britain, and France, there are conflicting findings in relation to the risk of suicide in young men in the army depending on which age groupings are assessed.[80–82] Data from the USA show an increased risk in male army veterans aged 18–34 years, with suicide rates twice that of the general population,[80] whereas data from the UK show a reduced suicide risk for men in the armed forces in all age groups older than 20 years.[81] In France, men in the army have a reduced risk of suicide compared with the general population, but the suicide incidence rate ratio for those younger than 25 years is twice that for men aged 25–29 years.[82]

Ethnic origin and indigenous group also predict suicide risk in young men. Worldwide, the highest suicide rates in young men are seen in white men in South Africa;[32,33] first-generation Eastern European and Caribbean immigrants to England and Wales,[83] indigenous Sami in Arctic Norway,[84] Māori men aged 15–24 years in New Zealand,[10] indigenous men aged 15–34 years in Australia,[63,85,86] Inuit men aged 15–24 years in Canada,[87] and Native American men aged 15–24 years[88] and 20–39 years[47] in the USA. There is also evidence suggesting that young Aboriginal men in Canada[89] and Ethiopian immigrants to Israel[90] might be high-risk groups although more data specific to this sex and age group are needed. Interpretation of all studies of ethnic minority groups should take into account the possible under-estimation of youth suicide owing to differential misclassification.[63,88,91] Although suicide rates

might be higher in some minority ethnic groups, this minority status could actually be protective in neighbourhoods with large minority populations. This so-called relative misery hypothesis has been used to explain higher suicide rates in young Aborigines and Torres Strait Islanders compared to their white peers in mainstream Australian schools.[63]

Rural or remote residence is shown to increase the risk of suicide in young men in Australia,[92–95] China,[92] Denmark,[96] Austria,[97] and England and Wales.[30,98] The overall decline in suicide rates for Australian men aged 20–34 years (from 40 per 100 000 in 1997–98 to 20 per 100 000 in 2003[9]) masks the continued rise in suicide rates in young men in remote areas[93] as well as in lower socioeconomic groups.[31] Explanations relate to the migration of healthy workers to cities, and the increasing economic disparity between men in rural and urban areas. In relation to marital status, evidence from high-income countries shows that marital status in men interacts with age, such that being separated increases suicide risk in young men to a greater extent than in older men.[99] In high-income countries, young men who are divorced,[99] have never married[100] or are widowed[101–103] are at higher risk of suicide than if married. Good academic performance in school has been shown to protect against suicide in young men (but not young women) in Swedish record linkage studies.[104]

Population-level effects on suicide in young men

Cultural and socioeconomic variables, such as rising unemployment, are suggested as area-level effects on suicide in young men, and are likely to mediate individual-level risk factors. A pan-European study has shown a non-significant negative association between a 1% rise in unemployment and suicide in men aged 15–29 years, but a significant positive association for women of the same age.[105] At the national level, a positive association between unemployment and suicide applies to young men in England and Wales,[106] Ireland,[107] and Asia.[108] In Australia, this positive association seems to be more pronounced in younger men than it is in older men,[109] as does the association between lower socioeconomic status and suicide risk.[110] In England, social deprivation is positively associated with suicide risk for men aged 10–29 years.[111] Evidence from England and Wales suggests that suicide risk for men aged 15–44 years is highest in the most socially fragmented areas,[112,113] but this effect might be more pronounced in men aged 45–64 years.[114] Such studies might not be generalisable to low-income countries.

Period effects in the past three decades likely to have affected suicide rates in young men internationally include war, natural disasters, the introduction of new means of suicide,[67,68] and new substances of misuse, policies restricting specific means of suicide, specific youth suicide prevention policies, the expansion of new media (and its effect on suicide contagion), and economic downturn. Cohort effects affecting suicide rates in young men will derive from the relative size of that birth cohort in each country; exposure to childhood trauma (eg, civil war); psychotropic prescribing patterns; and the effect of the media (on young people's attitudes to the social acceptability of suicide, in raising their expectations unrealistically, and affecting preference for specific suicide methods). The media has been implicated in the social modelling of suicidal behaviour in young people and the spread of new means of suicide. In Taiwan, for example, extensive news reporting of a 59-year-old male celebrity's suicide was associated with an increase in suicides in men younger than 35 years.[115]

Interventions to reduce suicides in young men

As with risk factor studies, research specifically assessing the effect of interventions on young men is restricted. Population-based strategies with the potential to reduce suicides in young men are those that reduce the proportion of young men with suicide risk factors, and those that reduce the availability of methods often used by this group. Unfortunately, the methods common in high-income countries (especially hanging) are also the hardest to restrict.[73] Nonetheless, a decrease in poisoning deaths, predominantly in men and younger age groups, followed the withdrawal of co-proxamol in Scotland.[116] Legislation to restrict firearms has not been associated with a reduction in firearm suicides in young men in the USA,[117] but is associated with statistically significant declines in Canadian men aged 15–34 years.[118] Falls in firearm suicides in young Australian men, and concurrent increases in suicides by hanging in this age group, preceded firearm legislation, suggesting cultural explanations for method substitution rather than solely the effects of the intervention.[119] Controls on pesticide imports to Sri Lanka have been followed by substantial declines in suicide in men aged 17–35 years.[120]

Untreated depression is another target for intervention, especially in view of the high PAR associated with affective disorder.[72] However, the evidence for antidepressant treatment remains mixed as to the appropriate balance of risks in young people. A Swedish ecological study covering 1977–87 detected an association between increased sales of selective serotonin reuptake inhibitors (SSRIs) and a decrease in suicide rates in both men and women, with the largest reduction in 15–44 year-old individuals of both sexes.[121] A US cohort study measuring non-fatal suicide attempts in a veterans sample (where only 8% were women) recorded a protective effect of SSRI monotherapy compared with no antidepressant, with the caveat that these results might not hold for completed suicides.[122] The US Food and Drug Administration (FDA) has published a meta-analysis of antidepressant trials showing a non-significantly increased risk of suicide in adults under 25 years prescribed antidepressants for any indication.[123] Labelling of antidepressants in the USA has been

amended to draw attention to the strong age-related risk in individuals younger than 25 years, which seems to be neutralised between the ages of 25 years and 64 years.[123]

Young men feature as a high-risk group in many nations' suicide prevention strategies, but evidence is scarce as to which interventions reduce this risk. The 1995–97 Australian National Youth Suicide Prevention Strategy (NYSPS) sought to reduce risk factors in young men through a comprehensive set of targeted and population-level interventions, but a controlled study showed no effect on suicide rates in men (or women) aged 20–34 years.[124] Novel targeted approaches are based on the theoretical effect of efforts to change young men's help-seeking behaviour, often involving sporting role models and outreach to sports clubs, pubs, and workplaces (panel 1). Their effect on suicides in the target group has not yet been assessed. There is also potential for media guidelines on suicide reporting and supportive internet sites to reduce suicides in young men, but these again will need specific investigation.

Improving responsiveness to emerging risk groups

An improved understanding of how the burden of suicide compares between age groups for each sex can be provided by studies that define narrower and more consistent age ranges than has previously been done, especially in view of the different suicide patterns seen in adolescents and young adults.[10] WHO might consider establishing minimum standards on the range of descriptive statistics presented in published studies for every group investigated: suicide rates (both crude and

Panel 1: **International programmes to address suicide risk in young men (effect on suicide in young men not assessed)**

For more on **It's a Goal** see http://www.itsagoal.org.uk

It's a Goal! (England and Scotland)
An 11-week self-development programme for men aged 16–35 years, which originated in Macclesfield Town Football Club. It now operates as a social franchise, with programmes emphasising teamwork, communication, motivation, and assertiveness. These programmes are based in local football clubs across England and Scotland.

For more on **PAPYRUS** see http://www.papyrus-uk.org/more/news/368/

PAPYRUS Ambassador scheme (England)
Appointment of a young male television actor as an Ambassador for PAPYRUS, a national suicide prevention charity, on the basis that young people are more likely to listen to their peers. The message he publicises is for those in distress to seek help using PAPYRUS' free national helpline HOPELineUK, and to encourage young people to look out for each other.

For more on **Samaritans We're In Your Corner** see http://www.samaritans.org/default.aspx?page=8789

Samaritans: We're In Your Corner (Northern Ireland)
A campaign that uses the theme of sport, and involves local sporting personalities, to raise awareness of the Samaritans helpline, specifically targeting men and aiming to prevent suicides on the local rail network. It also provides support and training for employees of Translink Northern Ireland who at times encounter people in distress at railway sites.

For more on **Breathing Space** see http://www.breathingspacescotland.co.uk

Breathing Space (Scotland)
A national telephone helpline service targeting men aged 16–40 years who experience low mood, depression, or anxiety. It forms part of the Choose Life national suicide prevention strategy, and has been publicised via television adverts emphasising the value for young men in talking through their problems.

For more on **Talk, Listen, Change** see http://www.suicideorsurvive.ie

Talk, Listen, Change (Ireland)
A campaign launched by the charity Suicide or Survive via advertising at national football and hurling league matches. By raising awareness through sport it aims to encourage young people to talk about their difficulties and seek support.

For more on **The Iron Dog Suicide Prevention Campaign** see http://www.hss.state.ak.us/suicideprevention/irondog/default.htm

Life is a Team Effort! The Iron Dog Suicide Prevention Campaign (Alaska, USA)
A campaign that uses professional snowmobilers and the image of teamwork to encourage people to use an Alaskan telephone helpline, as part of an Alaskan suicide prevention campaign.

For more on **Read the Signs** see http://www.lifeline.org.au/About-Lifeline/Learning---Development/ReadtheSigns-Program/Readthesigns/

Read the Signs (Australia)
A suicide prevention and mental health promotion programme for members of the retail motor trades and allied industries, most of whom are young men, developed in collaboration with the charity Lifeline. Its website provides information about sources of help, including how to help a friend in distress.

For more on **Mensline Australia** see http://www.mensline.org.au/home.aspx

Mensline Australia (Australia)
A 24-h crisis support line for men with relationship and family problems. This service is promoted as part of the Australian National Suicide Prevention Strategy, in which men are designated an at-risk group.

For more on **MATES in Construction** see http://www.matesinconstruction.com.au

MATES in Construction (eastern Australia)
A programme set up to address the high rates of suicide in the Queensland construction industry, the majority of which are in men. It uses a helpline and on-site individuals called Connectors, who have received gatekeeper training to provide support to construction workers in distress.

age-adjusted), absolute numbers of suicides, proportional mortality ratios (PMRs), the ranking of suicide as a cause of death, and PYLL. This multidimensional picture would improve research cost-effectiveness and allow a more responsive approach to suicide prevention, in view of the fact that high-risk groups are constantly evolving.

Other areas for improving future research on the burden of suicide in any group include the avoidance of presenting confounded associations and group-level associations. Studies investigating risk factors would be more useful if they explored associations in specific groups, where sufficient power permitted this. Case-control studies are probably the best means of investigating rare outcomes such as suicide but they will always be subject to residual confounding. Cohort studies that quantify the PAR of specific risk factors for completed suicide in different age groups and sexes in local settings are likely to be most helpful in planning interventions. WHO might also consider commissioning rapid analysis of its datasets to reduce the substantial time lag between suicide data collection and its translation into evidence-based preventive interventions.

Policy responses

The striking variations seen in suicide rates in young men, both within and between countries, reflect the heterogeneity of young male populations and the complexity of contributing factors to each completed suicide. These findings indicate the need for a tailored policy response in each country, taking into account the population structure and the differential interaction between socioeconomic and religious variables in each culture. The improvements we suggest above in relation to descriptive epidemiology would assist each country to achieve the first policy priority of identifying the highest sub-groups at risk at a national and regional level. These improvements would also help inform strategies to tackle accidental death, the leading cause of mortality in young men. Accidental death in itself shows much international variation in mortality rates and specific causes,[2] shares common risk factors with suicide, and might be easier to prevent. A second policy priority would be to identify suicide risk factors specific to young men in each cultural setting, in view of the inappropriateness of extrapolating suicide risk factors established for other age groups or for young men in other cultural settings. This valuable investment in the research evidence would inform the development of interventions, which could then be assessed for their contribution to each nation's suicide prevention strategy.

Conclusions

In this review, we have drawn attention to wide socio-geographic variations in the epidemiology of suicide, and a rapidly changing picture in relation to the direction of temporal trends. In countries where decreases in suicides in young men have been seen, studies investigating suicide risk at a sub-national level have shown rates to be rising in specific sub-groups defined by geography, ethnic origin, and socioeconomic status.[30–33] Comparisons of suicide rates in young men at the national level might therefore be misleading, conveying little of the variations apparent at a local level. Several studies suggest that in some parts of the world suicides in middle-aged men or young women could outnumber those in young men.[37] Suicide risk factors specific to young men (panel 2) include psychiatric illness, substance misuse, ethnic origin, lower socioeconomic status, rural residence, and single marital status. Population-level factors shown to affect rates of suicide in young men in specified parts of the world include unemployment, social deprivation, and the media's reporting of suicide. This review underlines the importance of the development of regionally and nationally tailored approaches to reducing suicide, and remaining abreast of key mortality indicators to identify the groups at highest risk of premature death.

***Panel 2:* Evidence-based risk factors for suicide in young men**

Individual-level

- Psychiatric disorder
- Substance misuse
- Occupational group (agricultural workers in Australia; army veterans in the USA)
- Ethnicity and indigenous group
- Rural or remote residence (in Australia, China, Denmark, Austria, England, and Wales)
- Lower socioeconomic status (Australia)
- Single marital status: separated, divorced, never married, or widowed (high-income countries)

Population-level

- Unemployment (England and Wales, Ireland, Asia, Australia)
- Social deprivation and social fragmentation (England and Wales)
- Media influences—eg, reporting of suicides (Taiwan)

Contributors

AP did the search of available studies. AP and KK retrieved and reviewed all and wrote the first draft of this paper, which was reviewed by DO and MK. All authors contributed to the revision of drafts.

Conflicts of interest

We declare that we have no conflicts of interest.

Acknowledgments

We thank Ruth Muscat, Knowledge Resources Librarian, Royal Free Hospital Medical Library (UCL Medical School) for help undertaking the database searches. AP is supported by a Medical Research Council Population Health Scientist Fellowship. The views expressed in this review are those of the authors.

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