

# NATIONAL SUICIDE PREVENTION STRATEGIES

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In 1996, the United Nations published guidelines to assist and stimulate countries to develop national strategies aimed at reducing morbidity, mortality, and other consequences of suicidal behaviour. These guidelines emphasised the need for inter-sectorial collaboration, multi-disciplinary approaches, and continued evaluation and review. The United Nations identified several elements that should increase the effectiveness of suicide prevention strategies, including:

- *Support from government policy,*
- *A conceptual framework,*
- *Well established aims and goals,*
- *Measurable objectives,*
- *Identification of organisations capable of implementing objectives,*
- *Ongoing monitoring and evaluation.*

Furthermore, the United Nations advocated a number of activities and approaches to meet the aims of national strategies, including:

- *Promote the early identification, assessment, treatment and referral of persons at risk of suicidal behaviours for professional care;*
- *Increase public and professional access to information about all aspects of preventing suicidal behaviour;*

- *Support the establishment of integrated data collection system, which serves to identify at-risk groups, individuals, and situations;*
- *Promote public awareness with regard to issues of mental well-being, suicidal behaviour, the consequences of stress and effective crisis management;*
- *Maintain a comprehensive training programme for identified gatekeepers (e.g. police, educators, mental health professionals);*
- *Adopt culturally appropriate protocols for the public reporting of suicidal events;*
- *Promote increased access to comprehensive services for those at risk for, or affected by, suicidal behaviour;*
- *Provide supportive and rehabilitative services to persons affected by suicide/suicidal behaviour;*
- *Reduce the availability, accessibility, and attractiveness of the means for suicidal behaviour;*
- *Establish institutions or agencies to promote and coordinate research, training and service delivery with respect to suicidal behaviour.*

Taylor et al. (1997) reviewed suicide prevention policies worldwide and found that five countries either had comprehensive national strategies for suicide prevention or were in the process of establishing such a strategy. These countries were Australia, Finland, New Zealand, Norway, and Sweden. A national strategy was defined by a set of integrated activities that were multifaceted. Several countries also had what Taylor et al. (1997) termed 'prevention programmes', which consisted of one or more targeted activities with no planned co-ordination between activities. Countries with prevention programmes were the Netherlands, England, United States, France, and Estonia. Since Taylor's review, comprehensive national strategies have evolved in England, the United States, Denmark, and most recently Germany.

Finland was the first country to develop a national suicide prevention strategy, which commenced in the mid 1980's. The Finnish strategy was implemented in four stages, commencing with a comprehensive analysis of 1,397 suicides to identify appropriate target groups and issues (1986-1991), and followed by the creation of an action programme (1992), implementation of the programme (1992-1996), and evaluation (1997-1998) (Upanne, 1999).

In 1995, Australia's Commonwealth Department of Health and Aged Care published the *National Youth Suicide Prevention Strategy*. The administration of the strategy was co-ordinated by the Department of Health and Aged Care with an ongoing consultation process involving a broad range of government and non-government stakeholders (Mitchell, 2000). In 1999, a *National Suicide Prevention Strategy* (NSPS) was introduced to build on the former *National Youth Suicide Prevention Strategy* (NYSPS). This is administered by the Australian Government Department of Health and Ageing.

Sweden established the National Council for Suicide Prevention in 1993, followed by the founding of the Swedish National Centre for Suicide Research and Prevention of Mental Ill-Health in 1994. A national programme to develop suicide prevention was drawn up by the Swedish National Centre for Suicide Research, the Swedish National Board of Health and Welfare and the National Institute of Public Health over the period 1993 – 95. This programme is now implemented across the whole country, and consists of individual and population strategies. The National Council for Suicide Prevention is responsible for initiating, monitoring and evaluating Sweden's suicide prevention programme, which was published in 1995.

In 1994 the Norwegian Government provided funding for the development and implementation of *The National Plan for Suicide Prevention* over a 5-year period from 1994 to 1998. The Norwegian Board of Health was responsible for implementing Norway's *National Plan for Suicide Prevention*.

In 1998, New Zealand's *Youth Suicide Prevention Strategy* was published, following collaboration between the Ministry of Youth Affairs, Ministry of Maori Development, and the Ministry of

Health. The Ministry of Youth Affairs has had the responsibility of implementing the Strategy since 2001.

In 2002, the Department of Health in England published the *National Suicide Prevention Strategy* for England. The Strategy follows the earlier publication of the *Our Healthier Nation Strategy*, which sets a target of a 20% reduction in suicide mortality by 2010. The National Institute will head the implementation of the *National Suicide Prevention Strategy* in England.

The United States Surgeon General made a 'call to action' on suicide prevention in 1999. The collaboration of researchers, clinicians, survivors and other stakeholders has led to the development of *The National Strategy for Suicide Prevention*. The Strategy's Goals and Objectives for Action were published by the Department of Health and Human Services in 2001.

## COMPONENTS OF NATIONAL SUICIDE PREVENTION STRATEGIES

National suicide prevention strategies differ in the target groups that are emphasised. For example, strategies in Norway and England focus strongly on the needs of high-risk individuals, whereas both the Australian and New Zealand Strategies have a broader public health focus. Australia's first national strategy and New Zealand's current strategy primarily address the needs of young people, while Finland, Norway, Sweden and Australia's second *National Suicide Prevention Strategy* have a lifespan approach.

Despite differences in target populations, the themes covered in the various countries strategies have considerable similarity. Table 14, expanded from Taylor's review (1997), shows themes of suicide prevention strategies for a variety of countries. Detailed information was not obtainable on the contents of Sweden's strategy. Particular themes are evident across all countries that have implemented national suicide prevention strategies. All countries incorporate improved detection and treatment of mental illness as a core feature of their strategies, with a particular emphasis on depression. Reducing access to lethal means, improved reporting of suicide in the media, school-based programmes, treatment of drug and alcohol misuse, enhanced access to mental health services, and training for professionals are

components of all national suicide prevention strategies. However, countries differ in the relative weight given to each component. For example, Australia's *National Youth Suicide Prevention Strategy* placed a strong emphasis on early intervention programmes that aim to address risk factors for suicide, Finland's strategy identified substance misuse as a central feature of its activities, and the strategies in Norway and England give considerable attention to follow-up treatment for high-risk individuals. The majority of countries have also included post-vention, systematic assessment of attempted suicide, crisis intervention services, and work and unemployment activities. Finland is the only country to incorporate activities targeting physical illness.

Table 14. Comparison of National Suicide Prevention Strategies

Component	Finland	New Zealand	Norway	Australia*	England	United States
Detection and treatment of depression/other mental illness	+	+	+	+	+	+
Reduced access to lethal means	+	+	+	+	+	+
Media and public education	+	+	+	+	+	+
School-based programmes	+	+	+	+	+	+
Alcohol and drugs	+	+	+	+	+	+
Enhanced access to mental health services	+	+	+	+	+	+
Training	+	+	+	+	+	+
Post-vention	+	+	+	+	+	-
Physical illness	+	-	-	-	-	-
Assessment of attempted suicide	+	+	-	+	+	+
Crisis intervention	+	-	+	+	+	-
Work and Unemployment	+	+	+	-	+	-

\* Refers to National Youth Suicide Prevention Strategy

## IMPACT OF NATIONAL SUICIDE PREVENTION STRATEGIES ON SUICIDE RATES

Figures 65 through 68 shows the rates of suicide for all ages and adolescents (15-24 years) in countries with national suicide prevention strategy and the years in which the national suicide prevention strategy was implemented. The implementation of strategies was preceded by substantial increases in suicide rates among males and static rates among females in Finland, Australia, and Norway (adolescence and all ages). Sweden was witnessing declining rates prior to the introduction of their plan in males and females. In the years following the introduction of a strategy, reductions in suicide among males occurred in Finland and Australia, and increased or stabilised in Norway and Sweden. Rates in young females increased in Norway and Sweden following the implementation of their national strategies.

*Figure 65. Suicide rates before and after the implementation of the National Youth Suicide Prevention Strategy in Australia.*

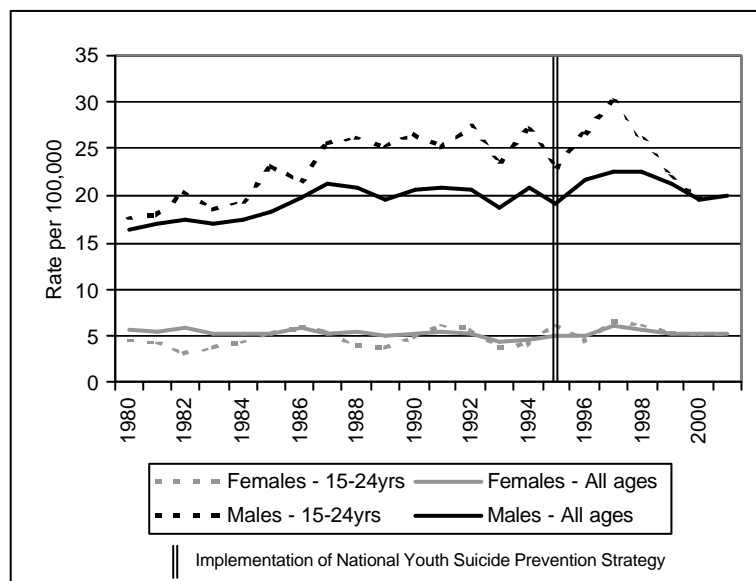


Figure 66. Suicide rates before and after the implementation of the National Suicide Prevention Strategy in Finland.

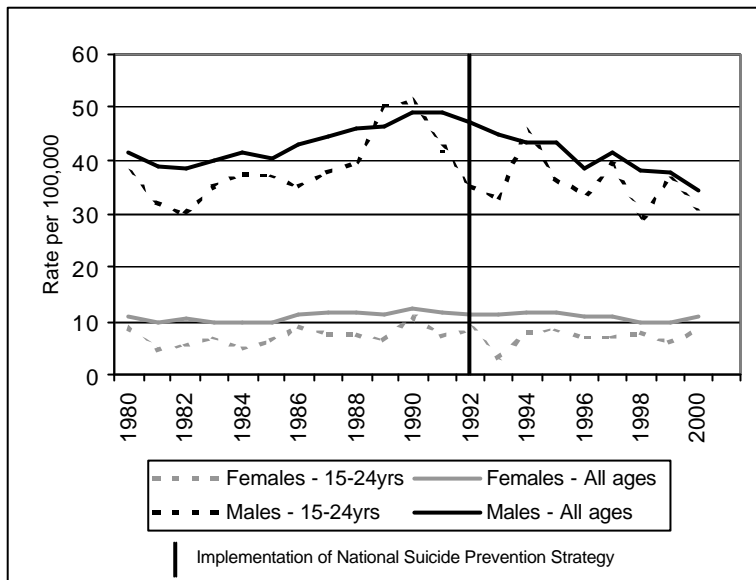


Figure 67. Suicide rates before and after the implementation of National Suicide Prevention Strategy in Sweden.

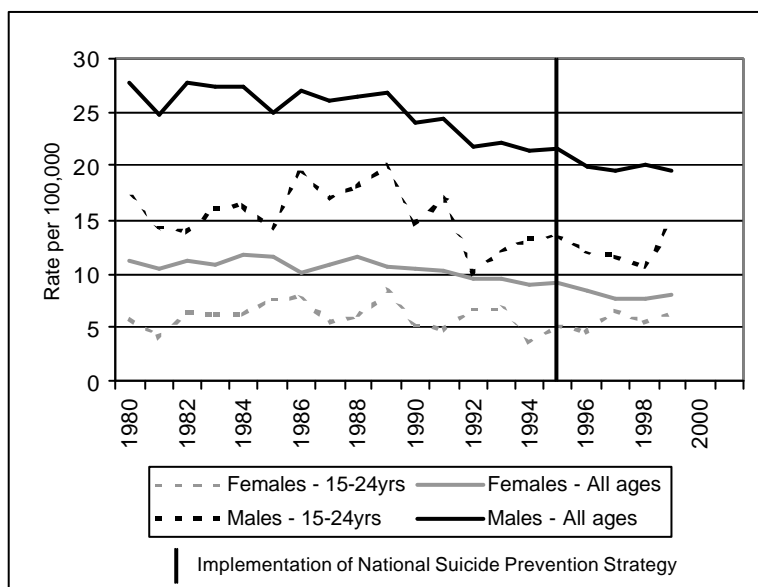
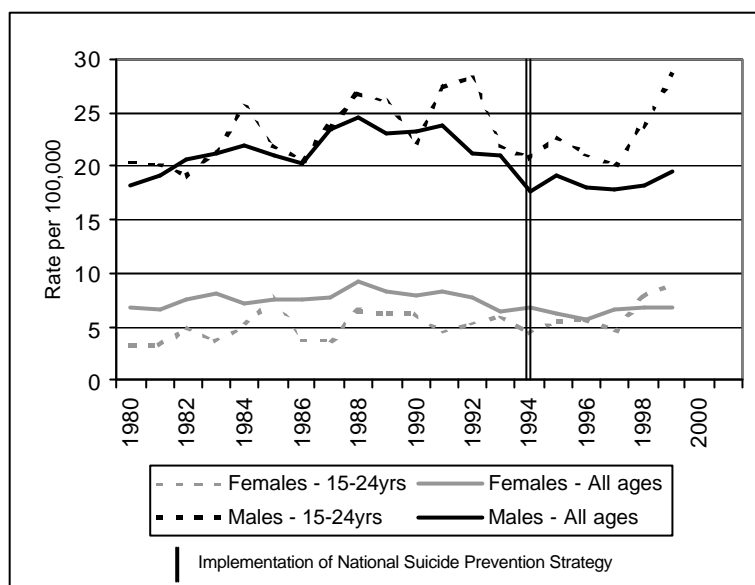


Figure 68. Suicide rates before and after the implementation of National Suicide Prevention Strategy in Norway.



To examine the impact of national suicide prevention plans on suicide mortality, the average rates and trends in the five years before and after the implementation of the strategy were compared<sup>2</sup>. Analysis considered changes in rates and trends for all ages and for the 15-24 year age group. For example, in Australia, the average rate for the 1990 through 1994 was compared to the average rate for 1995-1999. Average rates are calculated based on the aggregated numbers and populations for the 5-year period. Trends were calculated via linear regression and indicate the direction and magnitude of the slope created by rates in the 5-year period. The direction (upward or downward) is indicated by the presence of a symbol + or - while the value of the slope indicates the magnitude or the trend. T-values indicated whether the change in average suicide rates or slopes are significant ( $p < 0.05$ ) or non-significant (n.s.).

<sup>2</sup> A statistically significant reduction in the slope of post-implementation suicide mortality trends as compared to that related to pre-implementation suicide mortality trends was adopted as an indicator of a probable positive impact of national suicide prevention strategies. It should be noted, however, that the correlational nature of the present study and analysis does not allow us to draw reliable conclusions regarding the presence of a causal relationship between national suicide plans and suicide mortality trends. Furthermore, the adopted indicator of impact was based on the assumption that the suicide mortality trends observed across five years before the implementation were stationary (i.e. would have remained the same across time if the national suicide prevention strategies had not been introduced).

### *Adolescents*

Table 15 presents a summary of analysis for the impact of national suicide prevention strategies on suicide rates among adolescents. In Norway, there was a significant change in suicide mortality trend among adolescent females following the introduction of the national strategy. Mortality trends changed from a negative slope (indicating declining rates) before the plan to a positive slope (suggesting increasing rates) after. Similar but non-significant changes in slope (from negative to positive) were revealed in Australian females, Norwegian males, and Swedish males and females. In Finland, male and female rates appeared to continue the upward trend that was evident in the years preceding the national strategy implementation. This analysis suggests that national suicide prevention strategies have had little or no impact on reducing suicide rates among the young.

### *All ages*

Table 16 provides a summary of the all-ages analyses involving the implementation of national suicide prevention strategies. Analysis of trends before and after the adoption of strategies yields varying results for different countries. Among Australian females, the suicide mortality trend increased after the implementation of the national youth strategy. In Finland, changes from positive slopes preceding the implementation to negative slopes following were revealed. In Norway and Sweden (among males and females), downward trends were evident in the five years before the national suicide prevention strategies were introduced. Subsequently, downward slopes remained, but of smaller magnitude, suggesting a possible stabilising effect. Thus, based on these findings, with the possible exception of Finland, reductions in suicide mortality were not associated with the implementation of national strategies.

Table 15. Changes in average suicide rates and trends following the implementation of national suicide prevention strategies, 15-24 years.

Country (year implemented)	Average rate and (95% CI) for 5 years before	Average rate and (95% CI) for 5 years after	Trend [slope and (SE)] for 5 years before	Trend [slope and (SE)] for 5 years after	Difference between slopes [t-value and (p)]
Australia (1995)*					
Females	4.87 (2.82 – 6.94)	5.75 (4.08 – 7.43)	-0.37 (.31)	0.01 (.31)	-1.68 (ns)
Males	25.96 (24.61 – 27.30)	25.57 (22.76 – 28.38)	-0.07 (.54)	-0.31 (1.13)	0.13 (ns)
Finland (1992)					
Females	7.98 (6.42 – 9.53)	6.90 (4.97 – 8.83)	0.28 (.61)	0.21 (.78)	0.06 (ns)
Males	44.20 (38.77 – 49.63)	36.85 (32.34 – 41.35)	1.99 (1.90)	0.11 (1.84)	0.22 (ns)
Norway (1994)					
Females	5.62 (4.47 – 5.86)	5.60 (4.44 – 6.77)	-0.16 (.27)	0.58 (.34)	-3.31 (.02)
Males	25.12 (22.48 – 27.75)	21.70 (20.40 – 23.00)	-0.20 (1.07)	0.34 (.49)	-0.33 (ns)
Sweden (1995)					
Females	5.42 (4.24 – 6.59)	5.63 (4.90 – 6.37)	-0.18 (.46)	0.31 (.23)	-1.48 (ns)
Males	13.36 (11.02 – 15.71)	12.50 (11.05 – 13.95)	-0.79 (.84)	0.14 (.59)	-0.74 (ns)

\*National Youth Suicide Prevention Strategy.

Table 16. Changes in average suicide rates and trends following the implementation of national suicide prevention strategies, all ages.

Country (year implemented)	Average rate and (95% CI) for 5 years before	Average rate and (95% CI) for 5 years after	Trend [slope and (SE)] for 5 years before	Trend [slope and (SE)] for 5 years after	Difference between slopes [t-value and (p)]
Australia (1995)*					
Females	5.04 (4.64 – 5.45)	5.35 (4.97 – 5.73)	-0.21 (.11)	0.07 (.15)	-7.09 (<.001)
Males	20.35 (19.48 – 21.22)	21.42 (20.10 – 22.75)	-0.16 (.34)	0.54 (.44)	-0.98 (ns)
Finland (1992)					
Females	11.80 (11.48 – 12.12)	11.36 (10.97 – 11.74)	0.09 (.12)	-0.07 (.15)	3.67 (.01)
Males	47.08 (45.31 – 48.85)	43.56 (40.77 – 46.35)	1.17 (.25)	-1.85 (.39)	11.46 (<.001)
Norway (1994)					
Females	7.74 (7.08 – 8.41)	6.42 (6.01 – 6.83)	-0.41 (.14)	-0.02 (.17)	-6.72 (<.001)
Males	22.44 (21.34 – 23.54)	18.12 (17.62 – 18.62)	-0.60 (.29)	-0.03 (.20)	-3.81 (.009)
Sweden (1995)					
Females	9.71 (9.16 – 10.27)	8.24 (7.67 – 8.81)	-0.38 (.05)	-0.32 (.14)	-2.44 (.05)
Males	22.79 (21.58 – 24.00)	20.16 (19.48 – 20.84)	-0.76 (.23)	-0.34 (.19)	-3.81 (.009)

\*National Youth Suicide Prevention Strategy.

## *Limitations*

There are several limitations to the current analysis. Firstly, the wide variation in suicide rates in a five-year period results in a large degree of error in any statistical analysis. These fluctuations mean that substantial decreases in suicide mortality can fail to reach statistical significance. Secondly, determining the most appropriate point of 'implementation' of a strategy is an imprecise task. Particular activities may be well underway before the introduction of a formal strategy has been developed that ties these activities together. On the other hand, it may take several years before all the elements of a strategy are put into effect. Thirdly, only a small number of countries have implemented suicide prevention strategies. With the exception of Sweden, the introduction of the each country's strategy followed historically unprecedented levels of suicide mortality that may have been unsustainable in the long term. Hence, a contraction in rates may be misconstrued as evidence for an effective intervention. Additional analysis over a longer period and with a greater number of countries will be needed in the future to draw more convincing conclusions. Such an analysis will probably not be feasible for a further five to ten years as strategies in countries such as the England, Germany, New Zealand, and the United States come into effect.

While enthusiasm for anti-suicide activities is increasing throughout the world, this analysis suggests that declines in suicide seen in Australia and abroad cannot be validly attributed to the introduction of national suicide prevention strategies. Even if national plans are partly responsible for recent reductions, the component of those plans that have contributed to the reduction cannot currently be identified. There is little evidence to support the efficacy of any particular approaches or strategies. The effectiveness of prevention activities in reducing suicide mortality and morbidity has been the subject of recent literature reviews and commentaries (De Leo, 2002ab; Gunnell & Frankel, 1994; Hawton et al., 1998). These documents indicate that scientifically sound evaluations of suicide prevention activities are scarce. Those evaluations that do exist generally lack sufficient sample size to detect meaningful effects and have inadequately defined outcome measures and control conditions.

Limiting access to means is an approach to suicide prevention that has the strongest evidence for efficacy in suicide prevention (Gunnell & Frankel, 1994) and is a core component of all national suicide prevention strategies. Potentially beneficial activities in this regard include detoxifying domestic (De Leo et al., 2002b; Kreitman, 1976) and car exhaust gases (Toseland, 1999; McClure, 2000), limiting the quantity of medications per pack (Hawton et al., 2001) and reducing prescriptions of lethal medications (Buckley et al., 1995; Ohberg et al., 1995), erecting barriers on bridges (Cantor & Hill, 1990), and limiting firearm ownership (Brent et al., 1991; Lambert & Silva, 1998). The rationale of restricting access to means is that by delaying death a person has an opportunity to reconsider their actions. However, the utility of these approaches have not been subjected to controlled studies and some have argued that restricted methods may be substituted by other more readily available methods (Amos et al., 2001; Lester, 1991; Rich et al., 1990). At any rate, restricting commonly used methods such as hanging is unrealistic beyond institutional settings such as prisons and hospitals (Cantor et al., 1996; Jordan et al., 1987).

Improved detection and treatment of depression has also been suggested as a potentially efficacious approach to suicide prevention, and is also a major component of all suicide prevention strategies. An educational programme for general practitioners coincided with a 60% reduction in suicide mortality on the island of Gotland in Sweden (Rutz et al., 1989, 1992). However, suicide mortality rates were found to rise in the years following the education programme, suggesting other factors may have contributed to the initial reduction. Furthermore, this investigation may have been biased by the small size of the populations involved, and consequently by the extremely limited number of cases that defined as positive the outcome of the programme (two cases). In addition, the experience apparently had results only with female subjects (General Practitioners were educated for recognition and treatment of depression, and since female patients consult more frequently than males with their doctor, this may have contributed to explain results).

Promising approaches to prevention of suicide include problem solving therapy (Hawton et al., 1998), emergency access cards (Morgan et al, 1993), dialectical behaviour therapy (Linehan, 1993), neuroleptic medication (Montgomery et al, 1983), and telephone active outreach in the aged (De Leo et al, 1995; 2002c). However, these approaches need further examination through large-scale controlled trials to demonstrate their effectiveness. To date, most studies on the effectiveness of suicide prevention activities have used deliberate self-harm as an outcome measure. While deliberate self-harm is a significant risk factor for suicide, it is not analogous to completed suicide. Activities that have been shown to be effective in preventing self-harm must be evaluated for their potential to prevent suicide deaths before being widely adopted.

# MENTAL HEALTH AND MENTAL HEALTH PROGRAMMES

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Very rarely does a single causative factor result in suicide; rather a multiplicity of interrelated influences may bring about the conditions that render an individual feeling desperate and hopeless. Notwithstanding, suicide occurs most often in the context of a pre-existing psychiatric (and/or comorbid) condition. Psychological autopsy studies show that close to 90% of individuals who complete suicide has at least one diagnosable psychiatric disorder at the time of death (Appleby et al, 1999; Cavanagh et al, 1999; Henriksson et al, 1993). However only a small proportion of individuals with major psychopathology take their own life (Bostwick & Pankratz, 2000; Hendin, 1991; Moscicki, 1995), and psychiatric disorders alone should not necessarily be considered as sufficient predictors of suicide. The risk of suicide associated with the four most common categories of psychiatric disorder (affective, psychotic, anxiety, and personality) is considered below. Substance use disorders are considered in the next section of the report.

## MENTAL CONDITIONS AS RISK FACTOR FOR SUICIDE

### *Mood Disorders*

Affective disorders are the most frequently observed psychiatric disorder among those who die by suicide. Depressive disorders are found in 30-90% of completed suicides (Lönnqvist, 2000) with an average of 60% of suicide victims found to have a depressive disorder across studies (Cavanagh et al., 2003). The lifetime risk of suicide in individuals with an affective disorder was originally estimated to be between 15 and 19% (Goodwin & Jamison, 1990; Guze & Robins, 1970). However, the studies were based on longitudinal investigations of hospitalised depressed patients and had several other methodological biases that inflated the report lifetime risk of suicide (Blair-West et al., 1997; Bostwick & Pankratz, 2000).

More recent estimates have suggested the lifetime risk of suicide among depressed individuals (including inpatients and outpatients) to be 2.2-2.4% (Bostwick & Pankratz, 2000; Boardman & Healy, 2001). This figure compares to a lifetime suicide risk of 0.5% or less in those without an affective disorder. According to a meta-analysis by Harris and Barraclough (1997), the highest risk of suicide is seen among individuals with major depressive disorder (SMR=20.35), followed by bipolar disorder (SMR=15.05), and dysthymia (SMR=12.12).

The risk of suicide may be particularly high at different points in the course of an affective illness (Pokorny, 1983; Goldacre et al, 1993). Suicide risk is highest during the years immediately following the onset of the disorder (Amaddeo et al, 1995). Depressive patients with a history of hospitalisation, particularly when suicidal, have a particularly elevated risk of suicide (8.4% lifetime risk) (Bostwick & Pankratz, 2000). Discharge is another point at which suicide risk is particularly high, with discharged patients being 100 times more likely to complete suicide in the proceeding month than the general population (Goldacre et al., 1993). However, this elevated risk of suicide decreases as the time since discharge increases (Goldacre et al., 1993; Davies et al, 1998).

### *Psychotic Disorders*

Among the psychotic disorders, the only routinely studied disorder has been schizophrenia. While some studies have reported elevated rates of suicide associated with other psychotic states these conditions are usually later diagnosed as schizophrenia (Jorgensen & Mortensen, 1992). It has been estimated that 9-13% of individuals with schizophrenia die by suicide (Meltzer, 1999), with the relative risk highest at the time when schizophrenia is first diagnosed (Rossau & Mortensen, 1997). A psychiatric diagnosis of schizophrenia, particularly the paranoid subtype, carries a particularly high risk for suicidal behaviour (De Leo & Spathonis, 2003) compared to schizophrenia subtypes that are typified by prominent negative symptoms (Fenton et al., 1997). Among patients with psychosis, the risk of dying by suicide is also increased by the presence of depression (Axelsson & Lagerkvist-Briggs, 1992; Heilä et al., 1997), and alcohol abuse disorder (Meltzer, 1998). Harris and Barraclough (1997) reported a relative risk of 8.45 for individuals with schizophrenia across studies.

### *Anxiety Disorders*

The risk of suicide among patients with anxiety disorders, regardless of diagnostic type, is higher than in the general population by a factor of ten or more (Khan et al, 2002). Harris and Barraclough (1997) reported a relative risk of suicide of 11.54 for obsessive-compulsive disorder and 10.00 for panic disorder. Posttraumatic stress disorder also carries a particularly high risk for suicide compared to other diagnosable anxiety disorders (Kessler, 2000). However, anxiety disorders commonly co-exist with depression (Kessler et al., 1994), with this co-morbidity increasing the risk of suicide in panic disorder, posttraumatic stress disorder, obsessive-compulsive disorder, and social anxiety disorder (Dunner, 2001).

### *Personality Disorders*

Psychological autopsy studies have reported that approximately one third of suicide victims meet the criteria for a diagnosis of personality disorder (Henriksson et al, 1993). In particular, borderline personality disorders (BPD), and to a lesser extent antisocial personality disorders (ASPD), present a significant risk of suicide. A diagnosis of personality disorder is found in 9%-28% of completed suicides and follows depression, schizophrenia, and alcoholism in order of importance as a major risk factor (Hirschfeld & Davidson, 1988). Longitudinal investigations report suicide rates in BPD ranging from 3-9%, comparable to affective and schizophrenic disorders (Mehlum et al, 1994). A diagnosis of antisocial personality disorders has been reported in 5% of completed suicides (Frances et al, 1988).

## INTERNATIONAL RESPONSES TO MENTAL ILLNESS AND MENTAL HEALTH POLICIES

Currently, mental health problems represent five of the 10 leading causes of disability worldwide, amounting to 12% of the total global burden of disease in 1999. Despite the fact that mental and behavioural disorders affect individuals in all groups of society in all countries, the poor are disproportionately affected by these disorders in both developed and developing countries (WHO, 2001a). The burden of such disorders is immense, and is substantiated through suffering, disability and loss of social role for the individual, and economic loss and reduced productivity for the community, as well as burden placed on

families in terms of emotional and financial hardship, lost productivity and diminished quality of life (WHO, 1999).

The World Health Organisation has developed a number of initiatives underscoring the need for countries to prioritise mental health within national policy and programme contexts in order to reduce the burden associated by mental and behavioural disorders. During the year 2002, a number of initiatives to guide countries in the development of national mental health policy were formulated, including the *Nations for Mental Health: Final Report*, the *Mental Health Global Action Programme (mhGAP)* and *Working with Countries: Mental Health Policy and Service Development Projects*.

A national mental health policy, which is specifically devised by the governmental Ministry of Health, contains the goals for improving the mental health situation of the country, the priorities among those goals and the main directions for attaining them. A mental health policy defines a vision for the future that helps to establish a blueprint for the prevention and treatment of mental illnesses, the rehabilitation of people with mental disorders, and the promotion of mental health in the community. Such policies specify the standards that need to be applied across all programmes and services, linking them all with a common vision, objectives and purpose. Without this overall coordination, programmes and services are likely to be inefficient and fragmented (WHO, 2001a). The common elements of a national mental health programme, as recommended by the World Health Organization (1998), are:

- *Educate, support and resource primary care in its essential role of helping the majority of people with mental health problems;*
- *Develop effective links between primary and secondary care, with well-developed criteria for referral, methods of shared care, adequate information systems and communication, etc;*
- *Develop comprehensive local specialist health and social services;*
- *Develop mental health legislations that protect human rights and control the circumstances under which patients can be held in hospital or treated without consent;*
- *Develop good practice guidelines on effective interventions in primary and secondary care, and on interagency collaboration;*

- *Develop a package of public health measures to reduce suicides and homicides by mentally ill people;*
- *Develop a research and development strategy for mental health;*
- *Develop a mental health promotion strategy embracing generic settings such as the workplace, schools and general health care system;*
- *Develop a mental health promotion strategy embracing generic settings such as the workplace, schools and general health care system;*
- *Involve users and carers in policy development and in service development and delivery;*
- *If resources permit, develop mental health information systems in secondary care, incorporating core clinical minimum data sets and outcome measures that satisfy data protection and confidentiality requirements, in consultation with service users;*
- *Develop effective links between the policy makers, the scientific community and the mental health delivery system.*

Only recently have some countries recognised and accepted that the widespread and serious nature of mental health conditions require attention at a national level. According to the *WHO Project Atlas*, a national mental health programme is present in almost 70% of Member States of the WHO (covering 92.8% of the world's population), with more than 50% of countries having implemented a programme within the last 10 years, and of these, 63.7% formulated within the last 5 years (WHO, 2001b). Table 17 indicates the presence or absence of a national mental health programme in selected countries of interest.

### ***The impact of mental health plans on suicide rates***

To date there is only one empirical study investigating the impact of national mental health programmes on reducing suicide rates. Burgess and colleagues (submitted for publication) recently performed an ecological study of 100 nations with mental health programmes, plans or legislations implemented [data were extracted from the WHO Mental Health Atlas

(WHO, 2001)]. Contrary to expectation, analyses revealed that implementation of mental health programmes was associated with increases in male, female and total suicide rates in the year implemented and in subsequent years (Burgess et al., submitted for publication). Furthermore, male and total suicide rates increased following introduction of mental health policies and legislation.

To further examine the possible impact of national mental health programmes, a series of analyses were conducted which compared suicide mortality trends in the five years preceding the introduction of these plans, and the five years following<sup>3</sup> for adolescents (Table 18) and all-ages (Table 19).

### *Adolescents*

The possible impact of the national mental health programme was revealed among females in Greece, where rates changed direction from a positive trend pre-implementation to a negative trend post-implementation. Furthermore, decreases in suicide mortality trend were witnessed in the Russian Federation, and among males in Greece and in France. Conversely, trends increased in magnitude upon the already positive trend in suicide mortality among males in Belgium following the introduction of the mental health plan in that country in 1990. Likewise, trends increased in males in Singapore post-implementation. The implementation of national mental health plans may have had a possible positive impact on suicide mortality trends in a few countries; however, the lack of consistency across nations suggests changes in suicide mortality are due to other factors.

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<sup>3</sup> A statistically significant reduction in the slope of post-implementation suicide mortality trends as compared to that revealed to pre-implementation suicide mortality trends was adopted as an indicator of a probable positive impact of national mental health programmes. It should be noted, however, that the correlational nature of the present study and analysis does not allow us to draw reliable conclusions regarding the presence of a causal relationship between mental health plans and suicide mortality trends. Furthermore, the adopted indicator of impact was based on the assumption that the suicide mortality trends observed across five years before the implementation of the national strategies were stationary (i.e., would have remained the same across time if the national mental health programmes had not been introduced).

Table 17. Countries with national mental health programmes and their year of implementation

<b>Country</b>	<b>National Mental Health Programme</b>	<b>Year of implementation</b>
Old World Anglo		
England-Wales	Yes	1999
Northern Ireland	No	-
Scotland	No	-
Ireland	Yes	1984
New World Anglo		
Canada	No	-
Australia	Yes	1993
United States	Yes	1946
New Zealand	Yes	1997
Scandinavia		
Finland	Yes	1999
Norway	Yes	1999
Denmark	Yes	1997
Sweden	No	-
Eastern Europe		
Latvia	Yes	Unknown
Hungary	Yes	2001
Bulgaria	Yes	2001
Lithuania	No	-
Russian Federation	Yes	1995
Southern Europe		
Greece	Yes	1984
Italy	Yes	1999
Portugal	Yes	1996
Spain	No	-
Western Europe		
Austria	No	-
Belgium	Yes	1990
France	Yes	1985
Netherlands	Yes	1999
Germany	Yes	1988
Switzerland	No	-
Latin America		
Brazil	Yes	1991
Asia		
China	Yes	1992
Japan	Yes	1950
Hong Kong	Yes	1993
South Korea	Yes	1995
Singapore	Yes	1993

Date source: WHO Atlas Project.

Table 18. Changes in average suicide rates and trends following the implementation of national mental health programme, 15-24 years

<b>Country (year implemented)</b>	<b>Average rate and (95% CI) for 5 years before</b>	<b>Average rate and (95% CI) for 5 years after</b>	<b>Trend [slope and (SE)] for 5 years before</b>	<b>Trend [slope and (SE)] for 5 years after</b>	<b>Difference between slopes [t-value and (p)]</b>
Australia (1993)					
Females	2.38 (0.66 – 4.11)	2.38 (0.45 – 4.32)	0.14 (.30)	-0.12 (.35)	1.05 (ns)
Males	9.91 (7.01 – 12.81)	12.31 (9.24 – 15.39)	1.44 (.84)	0.82 (1.16)	0.25 (ns)
Ireland (1984)					
Females	4.86 (3.92 – 5.76)	5.01 (2.46 – 7.56)	0.58 (.19)	0.61 (.30)	-0.24 (ns)
Males	26.11 (25.29 – 26.93)	26.13 (23.64 – 28.62)	0.22 (.31)	1.24 (.72)	-1.39 (ns)
Belgium (1990)					
Females	4.50 (3.90 – 5.11)	4.42 (3.65 – 5.19)	-0.27 (.19)	-0.17 (.29)	-0.72 (ns)
Males	15.60 (14.55 – 16.65)	17.90 (14.73 – 21.07)	0.60 (.25)	2.09 (.47)	-4.31 (.005)
France (1985)					
Females	5.01 (4.21 – 5.80)	4.43 (3.96 – 4.90)	-0.21 (.08)	-0.06 (.08)	-4.44 (.005)
Males	15.67 (14.94 – 16.39)	15.47 (14.38 – 16.55)	0.31 (.24)	-0.46 (.35)	3.60 (.01)
Germany (1988)					
Females	5.31 (4.00 – 6.61)	4.03 (2.94 – 5.12)	-0.35 (.13)	-0.33 (.06)	-0.93 (ns)
Males	18.65 (17.66 – 19.64)	14.46 (13.52 – 15.41)	-0.58 (.22)	-0.62 (.15)	0.42 (ns)
Russian Federation (1995)					
Females	7.51 (6.57 – 8.46)	9.17 (8.64 – 9.71)	0.63 (.12)	0.01 (.22)	8.22 (<.001)
Males	36.63 (28.71 – 44.55)	53.38 (52.52 – 54.24)	5.40 (.86)	-0.02 (.35)	5.19 (.002)
Greece (1984)					
Females	1.53 (.88 - 2.19)	1.57 (1.03 – 2.11)	0.37 (.16)	-0.33 (.11)	15.08 (<.001)
Males	3.50 (2.64 – 4.35)	4.79 (4.38 – 5.20)	0.40 (.27)	0.07 (.16)	2.75 (.03)
Hong Kong(1993)					
Females	6.29 (5.62 – 6.60)	6.20 (4.54 – 7.86)	-0.08 (.27)	-0.05 (.68)	-0.04 (ns)
Males	7.42 (6.21 – 8.64)	9.66 (8.45 – 10.87)	0.77 (.22)	0.56 (.37)	0.94 (ns)
Singapore (1993)					
Females	9.06 (5.16 – 12.96)	6.70 (4.51 – 8.88)	-2.19 (.97)	-0.09 (.89)	-1.02 (ns)
Males	11.89 (10.25 – 13.52)	9.55 (8.70 – 10.41)	-1.00 (.34)	-.04 (.35)	-3.38 (.015)
Sth Korea (1995)					
Females	5.51 (5.03 – 5.99)	8.32 (7.56 – 9.08)	0.23 (.14)	0.16 (.30)	0.52 (ns)
Males	10.87 (10.27 – 11.46)	13.14 (11.76 – 14.52)	0.25 (.19)	0.20 (.55)	0.12 (ns)

Table 19. Changes in average suicide rates and trends following the implementation of national mental health programme, all ages

Country (year implemented)	Average rate and (95% CI) for 5 years before	Average rate and (95% CI) for 5 years after	Trend [slope and (SE)] for 5 years before	Trend [slope and (SE)] for 5 years after	Difference between slopes [t-value and (p)]
Australia (1993)					
Females	5.33 (5.12 – 5.54)	5.04 (4.52 – 5.56)	0.00 (.08)	0.33 (.09)	-18.36 (<.001)
Males	20.49 (20.01 – 20.96)	20.59 (19.06 – 22.11)	0.09 (.19)	0.86 (.37)	-3.65 (.011)
Ireland (1984)					
Females	3.84 (3.24 – 4.43)	3.69 (3.43 – 3.94)	0.27 (.18)	0.03 (.10)	4.64 (.004)
Males	9.53 (8.37 – 10.69)	11.02 (9.93 – 12.12)	0.77 (.17)	0.18 (.44)	2.25 (ns)
Belgium (1990)					
Females	13.42 (12.18 – 14.66)	11.15 (10.68 – 11.62)	-0.86 (.09)	0.07 (.19)	-18.27 (<.001)
Males	30.18 (28.20 – 31.95)	28.46 (26.10 – 30.82)	-1.11 (.42)	1.42 (.50)	-4.87 (.003)
France (1985)					
Females	11.73 (11.16 – 12.29)	12.32 (11.82 – 12.82)	0.38 (.07)	-0.32 (.08)	49.66 (<.001)
Males	30.15 (28.48 – 31.82)	31.67 (30.50 – 32.84)	1.16 (.14)	-0.78 (.16)	36.98 (<.001)
Germany (1988)					
Females	12.79 (11.91 – 13.67)	10.39 (10.04 – 10.75)	-0.60 (.09)	-0.12 (.13)	-16.32 (<.001)
Males	28.05 (26.89 – 29.20)	24.45 (23.84 – 25.06)	-0.64 (.29)	-0.07 (.25)	-3.22 (.02)
Russian Fed. (1995)					
Females	11.97 (10.94 – 13.00)	12.59 (11.89 – 13.28)	0.67 (.16)	-0.25 (.24)	8.97 (<.001)
Males	56.59 (44.35 – 68.82)	68.28 (64.77 – 71.79)	8.38 (1.25)	-1.40 (1.18)	2.75 (.033)
Greece (1984)					
Females	2.00 (1.91 – 2.09)	2.24 (2.07 – 2.41)	0.05 (.02)	-0.01 (.07)	9.43 (<.001)
Males	4.77 (4.28 – 5.26)	5.85 (5.72 – 5.97)	0.33 (.06)	0.05 (.04)	42.39 (<.001)
Hong Kong(1993)					
Females	10.04 (9.42 – 10.67)	9.27 (8.15 – 10.39)	0.36 (.15)	-0.36 (.41)	3.22 (.018)
Males	13.14 (11.43 – 14.85)	13.44 (11.90 – 14.97)	1.09 (.31)	0.24 (.61)	1.51 (ns)
Singapore (1993)					
Females	10.67 (8.67 – 12.67)	7.69 (6.47 – 8.91)	-1.13 (.49)	-0.12 (.49)	-1.72 (ns)
Males	14.22 (12.06 – 16.37)	12.65 (10.81 – 14.48)	-1.51 (.12)	0.27 (.73)	-2.69 (.04)
Sth Korea (1995)					
Females	5.14 (4.43 – 5.85)	8.21 (6.77 – 9.64)	0.47 (.10)	1.05 (.26)	-7.25 (<.001)
Males	11.37 (10.11 – 12.64)	19.42 (15.39 – 23.46)	0.82 (.20)	2.19 (1.06)	-1.00 (ns)

## All ages

The implementation of national mental health plans may have had a possible impact on suicide trends in some countries. In France, suicide mortality trends changed direction from upward slopes pre-implementation to downward slopes post-implementation for males and females, suggesting a possible positive impact of that country's national mental health programme. Furthermore, significant reductions in the slope of post-implementation trends (as compared to pre-implementation trends) were identified in Ireland males only, the Russian Federation males and females, Greece males and females, and among males in Hong Kong. In contrast, increases in suicide mortality trend were revealed in Australia (males and females), Germany (males and females), Singapore (males), South Korea (males), and Belgium (females). Among Belgian males, suicide mortality trends changed direction from a downward trend preceding the national mental health plan to an upward trend after the plan had been introduced. Therefore, the marked differences in trends in suicide mortality following the implementation of national mental health programmes suggest that there is no evidence of an impact on suicide.

The failure of mental health programmes, policies, and legislation to have a desired impact on suicide rates necessitates examination of the utility of such programmes in suicide prevention. While some mental health problems are a core risk factor for suicide, suicide prevention requires an integrated approach. This approach is one, which acknowledges the interrelatedness of all risk and protective factors for suicide, and which targets both individual and populations levels. An approach to suicide prevention must acknowledge the importance of other related initiatives and their impact on suicide rates. The main problem, however, is that the linkages between mental health and other related strategies (for example, drug and alcohol, crime prevention, suicide prevention, media strategies, and national injury programmes etc) is not always clearly understood.

More consideration must therefore be given to clarifying the linkage between mental health problems and suicide in understanding the impact of mental health strategies on suicide rates. One area addressed by mental health programmes is stigma (awareness, knowledge and attitudes towards mental illness). The stigma associated with having a mental illness in many countries might have a significant influence on the role that mental health problems have in suicidal behaviour. Stigmatised conditions may prevent at-risk persons seeking or receiving the help that they need (Mechanic, 2002).

Stigma exists both within the general community, and at the intervention level such as in medical and psychiatric settings. Practitioners have called for the inclusion of decreasing stigma associated with psychiatric illness in suicide prevention policies (Eagles et al., 2003). For this to be achieved, however, health care providers' attitudes must be modified and changes must be made to the nature of inpatient settings of care (Raingruber, 2002). Thus mental health programmes, which target reduction of stigma and discrimination of people with mental illness, may impact indirectly on suicide rates by increasing community awareness, reducing the overall negative view of mental health problems, and thereby, increasing the likelihood and acceptability of sufferers to seek help.

However, the stigma often attached to mental illness in particular countries has placed a significant barrier upon the governmental prioritisation of mental health issues. In these countries, a positive and concerted act of political will is required to modify the culture by reducing negative attitudes, increasing knowledge and overcoming such stigma. The concerted efforts of sectors outside of the realms of health, is also necessary in countries where mental health policies and programmes are to be implemented.

Mental health programmes, policies and legislation throughout the world overall have largely been neglected. While recent data have revealed that several countries in the last decade have started to develop plans and initiate actions and strategies from these, such action appears to have had little impact on influencing suicide rates. Thus it should be clear that mental health problems are not the only factor associated with suicide risk, but that other risk factors (not related to mental health) may interrelate either in the absence or presence of mental health problems, to result in suicide. These findings strongly support the need to increase understanding of the relations between mental health and suicide, and the impact of mental health and other related strategies (regarding other risk factors for suicide) on reducing suicide rates.

# SUBSTANCE ABUSE AND SUBSTANCE ABUSE POLICIES

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Substance abuse or dependence heightens an individual's risk of suicide (Harris & Barraclough, 1997), particularly if that individual has another mental illness (Flavin et al, 1990). In some cases, suicide may be directly attributable to the harmful effects of the substance, as in intentional drug overdose. On the other hand, substance abuse may indirectly heighten suicide risk by inducing other psychiatric symptoms (e.g. depression) and stressful life events (e.g. interpersonal losses) (Weiss & Hufford, 1999). In addition, psychoactive substances may be instrumental in the act of suicide by decreasing inhibitions and increasing impulsive behaviour (Marzuk and Mann, 1988). A variety of substances have been associated with an elevated risk of suicide, the most widely studied being opiates (Gronbladh et al., 1990; Oyefeso et al., 1999; Perucci et al., 1991; Segest et al., 1990), cannabis (Andreasson & Allebeck, 1990; Beautrais et al., 1999), and alcohol (Andreasson et al., 1988; Arikian et al, 1999; Murphy & Wetzel, 1990; Murphy et al., 1992). Suicide risk among cocaine and amphetamine users has not been systematically investigated. The estimated risk of suicide associated with each of these substances is considered below.

## SUBSTANCE ABUSE AS A RISK FACTOR FOR SUICIDE

### *Opiates*

Current evidence supports the view that opiate users are exposed to a substantially increased risk of suicide. In a meta-analytic study, Harris and Barraclough (1997) found that the average risk of suicide among opiate abusers was 14 times greater than the general population. However, risk ratios varied widely with opiate users shown to have a suicide risk between 3 and 36 times the general population across studies. One contribution to the wide variation may be the difficulties faced when determining suicide among opiate users. Opiate use carries a high risk of accidental overdose. In the absence of corroborating information, suicide deaths among opiate users may be misclassified as accidental death

(Cantor et al., 2001). Hence, the risk of suicide associated with opiate use may be underestimated.

Several factors may explain the increased risk of suicide among opiate users, including impaired social functioning (Segest, et al., 1990), unemployment (Segest et al., 1990), legal problems (Bukstein et al., 1993), and psychiatric co-morbidity (Brent et al., 1993). The use of antidepressants and methadone may also increase the risk of suicide among opiate users (Oyefeso et al., 1999).

### *Cannabis*

Heavy cannabis use was associated with a four-fold increase in completed suicide in a 15-year follow-up of 45,540 Swedish conscripts (Andreasson & Allebeck, 1990). Medically serious suicide attempters were found to be ten times more likely to be regular cannabis users than general population controls in a New Zealand sample (Beautrais et al., 1999). In both studies, socio-demographic and psychiatric risk factors were found to explain the large majority of the differences in suicide risk among heavy cannabis users. However, it is difficult to determine the degree to which cannabis use, socio-demographic, and psychiatric risk factors contribute to each other.

### *Alcohol*

Alcohol abuse has long been considered a risk factor for suicide and the evidence linking alcohol to suicide is very strong. Using the same Swedish conscript sample above, Andreasson et al (1988) found heavy drinking (>250g/week) to be associated with a three-fold increase in suicide mortality at 15-year follow-up. A two-fold increase in the risk of suicide associated with alcohol remained after controlling for social factors. In a review of alcoholism and suicide, Murphy & Wetzel (1990) concluded that the risk of suicide among individuals with an alcohol abuse disorder might be as much as 60 to 120 times the risk among individuals without a mental illness. Alcohol use is believed to be a contributing factor in approximately one quarter of all suicides in the United States (Murphy & Wetzel, 1990). Suicide in alcoholism is also significantly dependent on the co-occurrence of a depressive disorder (Murphy & Wetzel, 1990).

### *Cocaine*

There have been some reports of heightened suicide risk among cocaine users. For example, an examination of toxicological findings from suicides in New York found cocaine to be present in approximately 20% of suicides compared to the 3-5% prevalence of cocaine use in the general population (Marzuk et al., 1992). There have also been several reported case studies identifying cocaine as a contributing factor in suicide (Fowler, et al., 1986; Sperry & Sweeney, 1989) but no firm data supporting a link between cocaine use and suicide has been reported to date.

### *Amphetamines*

Self-injurious behaviour has been reported as a potential risk among individuals with amphetamine-induced psychosis (Kratofil et al., 1996). However, there is very limited data available on suicide among amphetamine users and no studies providing a valid indication of the suicide risk associated with amphetamine use or abuse. Only one study examining the relationship between amphetamine use and suicide was located. In this investigation of 26 amphetamine-related deaths in Canada, higher rates of external causes of death (including suicide) among amphetamine users was observed compared to the general population of the same age (Kalant & Kalant, 1975).

Although a variety of substances may be associated with a heightened risk of suicide, substance use occurs at different rates within the population. Table 20 presents the estimated use of the most commonly abused substances in a range of countries. Undoubtedly, alcohol is the most widely used substance. Among the countries examined, 60% to 90% of the population used alcohol in the last year (WHO, 1999) compared to only 0.1% to 1.8% using opiates, 0.1% to 3.6% using amphetamines, 0.1% to 2.6% using cocaine, and 0.1% to 18% using cannabis (UNODCCP, 2001). Across most countries, cannabis is the mostly commonly used illicit substance, followed by cocaine, amphetamines, and opiates (UNODCCP, 2001). However, there are important regional differences in illicit substance use, such as the relatively frequent use of cannabis in New and Old World countries, particularly Australia and New Zealand, and the very low prevalence of cocaine use in Eastern European countries.

The relatively infrequent use of opiates, cannabis, amphetamines, and cocaine in the general population of most countries means that these substances are likely to have only a small influence on overall suicide trends. Any influence of these substances on trends would be primarily on the young as the use of these substances decreases dramatically with increasing age (WHO, 2001). In contrast, alcohol, which is very frequently used in most countries and is associated with an increased risk of suicide, may have a more substantial impact on suicide trends.

*Table 20. Annual prevalence of substance use as a percentage of the adult population of selected countries*

	<b>Opiates<sup>#</sup></b>	<b>Cannabis<sup>#</sup></b>	<b>Amphetamines<sup>#</sup></b>	<b>Cocaine<sup>#</sup></b>	<b>Alcohol<sup>*</sup></b>
United Kingdom	0.6	9.4	1.9	1.7	-
Canada	0.3	8.9	0.8	1.0	72.3
Australia	0.8	17.9	3.6	1.4	76.0
United States	0.5	8.3	0.9	2.6	64.9
New Zealand	0.7	18.0	2.0	0.4	87.0
Finland	0.1	2.5	0.2	0.2	86.0
Norway	0.3	3.8	0.5	0.5	85.1
Denmark	0.3	4.4	1.0	0.5	-
Sweden	0.1	1.0	0.4	<0.1	-
Latvia	0.1	3.1	0.6	<0.1	-
Hungary	0.3	2.1	0.3	<0.1	86.0
Bulgaria	0.7	1.2	0.2	<0.1	-
Lithuania	0.1	2.3	0.3	<0.1	-
Russian Federation	1.8	3.9	0.1	<0.1	-
Greece	0.5	4.4	0.1	0.5	85.6
Italy	0.6	6.0	0.3	0.8	-
Portugal	0.6	3.7	0.4	0.6	76.0
Spain	0.4	7.0	0.7	1.5	85.0
Austria	0.3	5.0	0.3	0.6	-
Belgium	0.2	5.5	0.7	0.8	-
France	0.4	7.4	0.1	0.2	-
Netherlands	0.2	4.1	0.4	0.7	82.4
Germany	0.2	6.0	0.6	0.9	-
Switzerland	0.5	7.0	0.5	0.4	83.5
Brazil	0.1	5.8	0.7	0.8	-
China	0.1	0.5	-	-	61.1
Japan	<0.1	<0.1	1.8	-	69.0
Hong Kong	0.3	0.6	<0.1	-	-
Singapore	0.1	<0.1	<0.1	<0.1	-

*Data source: #UNODCCP, 2001; \*WHO, 1999.*

## ***Comparing alcohol consumption and suicide***

Because of the inherent characteristics of the data collected over time (time series), simple regression techniques are inappropriate for examining relationships between two series of data. This is because spurious correlations may be observed if both series have similar characteristics, such as linear or exponential increase in value, or cyclical component (Gottman, 1981). To solve these problems, the time series can be modelled.

The time series of suicide rates and per capita alcohol consumption were modelled using ARIMA (Auto Regressive Integrated Moving Average), with the SPSS Institute (2000) SPSS trends 11.0 statistical package. An ARIMA model can be expressed by three parameters (AR, I, MA). When describing each procedure that is required to de-trend the data, each parameter is assigned a value of 0 when no modelling is needed, 1 when one component is needed and so on. The auto-regression (AR) component indicates that each value is influenced by the preceding values, and that modelling is needed in order to remove autocorrelation and partial autocorrelation from a series. Autocorrelation is assessed by the Box-Ljung Q statistic. The second component is known as integration (I) and indicates whether modelling is needed to eliminate a steady trend, and hence obtain a stationary series that neither increases nor decreases in value. The third component is the moving average (MA), which is determined by the degree to which each value in a series is influenced by one or more of the preceding disturbances in the series, thus controlling for short-term fluctuations rather than long-term trends. In the estimation stage, the coefficients of the model were identified, and the ARIMA programme created the fitted values and the residuals from the model. The residuals were then plotted and diagnosed to ensure that they were without pattern and their autocorrelation and partial autocorrelation at each lag were not significant. Finally, since significant associations are likely to be found in time series, even after modelling, we decided to use a significance level of  $p < 0.01$ .

When first-order autocorrelations were controlled for, a positive association between per capita alcohol consumption and suicide was identified for Sweden and Finland (see Table 21). That is, when alcohol consumption increased in those two countries, suicide rates also increased. Conversely, in Australia, increases in per capita alcohol consumption are associated with decreasing rates of suicide.

Table 21. Impact of per capita alcohol consumption on suicide rates, selected countries

Country	ARIMA model	AR (1)	Per capita alcohol consumption
France	(1,0,0)	.95 <sup>**</sup>	-.09
Australia	(1,0,0)	.40 <sup>**</sup>	-.64 <sup>**</sup>
Sweden	(1,0,0)	.81 <sup>**</sup>	1.87 <sup>**</sup>
Finland	(1,0,0)	.74 <sup>**</sup>	1.15 <sup>**</sup>
United Kingdom	(1,0,0)	.94 <sup>**</sup>	-.17
Spain	(1,0,0)	.98 <sup>**</sup>	-.09
Canada	(1,0,0)	.96 <sup>**</sup>	.84

\*\* -  $p < .01$

AR(1) denotes first-order auto-regression

These considerations indicate that alcohol may be less relevant as a risk factor for suicide than others. Cultural factors including attitudes and norms related to behaviour, religious beliefs, and political and other ideologies may regulate alcohol use differently in various regions (Simpura & Partanen, 1987). Furthermore, alcohol consumption patterns are not the best indicator when assessing the influence of alcohol on suicide. Patterns of consumption are more relevant given that heavy use and alcohol use disorders are associated with increased suicide risk (Harris and Barraclough, 1997) rather than use per se.

In some parts of the world, for example in many Southern European, Latin and Asian countries, the intake of alcoholic beverages is a very common social custom that rarely results in drinking related problems. In China for example, alcohol is considered a normal food and is regularly consumed with meals, at social gatherings, at religious ceremonies, in the market place and at home. Similarly in France, wine is a culturally acceptable food said to 'cleanse the blood' and 'build a strong body' and children at a young age are taught to consume wine with meals. Conversely, in most Scandinavian, New World and Old World countries alcohol (typically beer and spirits) is often consumed in binge patterns, where drinking occurs less often but in heavier quantities. Often, heavy volumes of alcohol are consumed on rare occasions and social gatherings (e.g. weekend parties, weddings, holiday festivals), and drinking generally takes place in public settings such as bars, pubs or taverns (Cheung & Erickson, 1995; Nyberg & Allebeck, 1995; Drug Information

Clearinghouse, 2002). Heavy sessional intake and 'drinking to get drunk' have been an integral part of British drinking culture for generations, and are reported centuries ago among the Vikings (IAS, 2003). In contemporary United Kingdom, binge drinking has increased markedly among 18-24 year olds (IAS, 2003).

Variations in alcohol consumption patterns are broadly reflected in the prevalence rates of alcohol use disorders across countries (see Table 22). There is a high prevalence of alcohol use disorders in Scandinavia (Finland, Norway), the Old World (United Kingdom) and the New World (Australia, Canada, and the United States) compared to Southern Europe (Spain), Latin America (Puerto Rico, Brazil), and China. This international pattern of alcohol-related psychopathology is generally mirrored by the pattern of suicide rates, where suicide rates are higher in Scandinavia (Finland, Norway) and the New World (Australia, Canada, United States) than in Southern Europe (Spain) and Latin America (Puerto Rico, Brazil).

Hence, alcohol consumption patterns may lead alcohol consumption to be a risk factor for suicide in only some countries. Despite this correlation, however, the interaction of additional influences such as socio-cultural and environmental factors as well as differences in the prevalence of other psychiatric conditions (e.g. depression), are also likely to significantly influence overall suicide rates in different countries. Furthermore, alcohol may have some influence on suicide across all countries as the abuse of alcohol may turn an ambivalently conceived self-destructive act into a completed act either by decreasing inhibition, impairing judgement, or increasing risk taking behaviours (Marzuk & Mann, 1988).

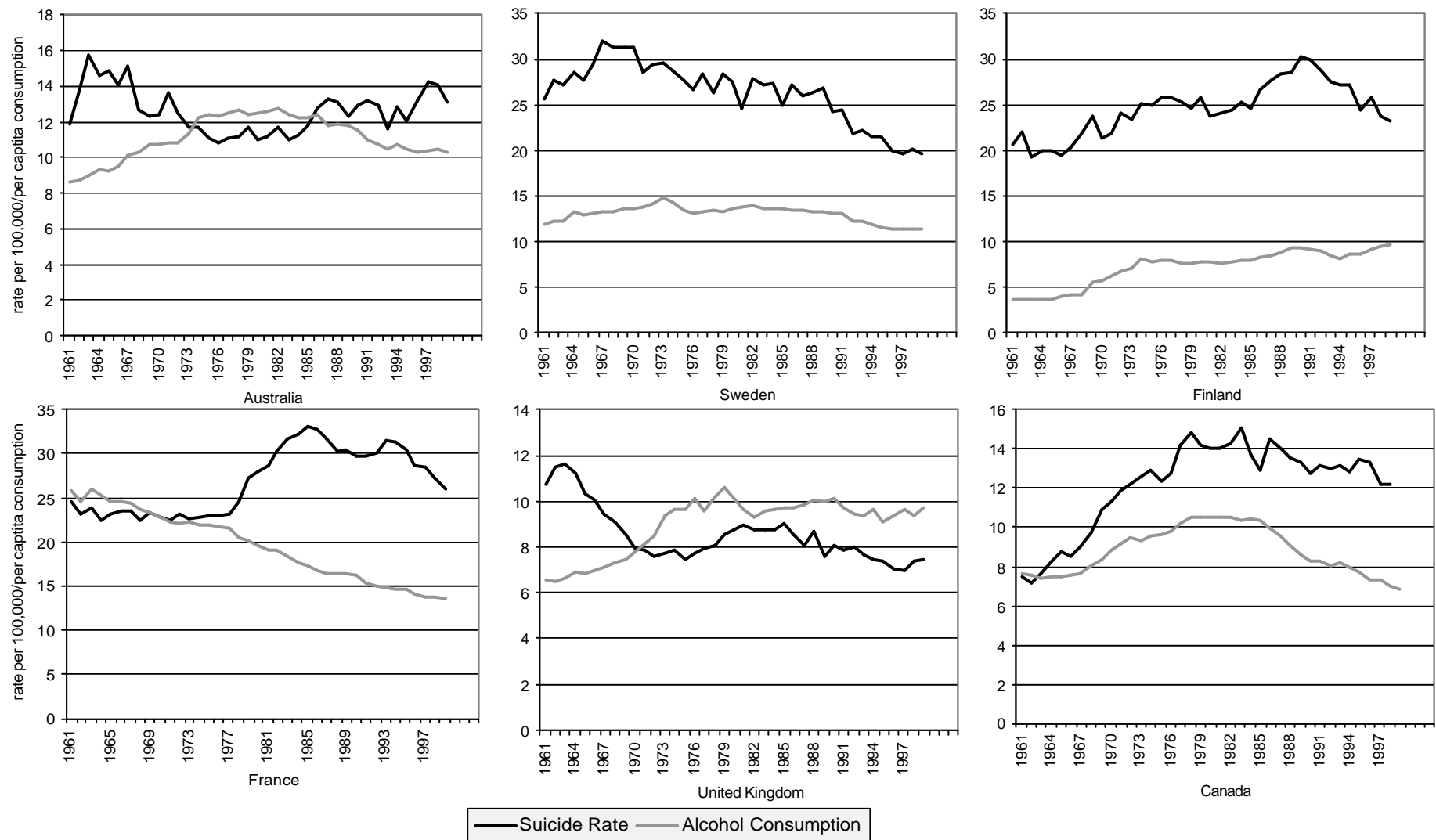


Figure 69. Suicide rates and per capita alcohol consumption in selected countries, 1961-1999.

Table 22. Prevalence of alcohol use disorders in selected countries

Country	Prevalence	Definition	Sample	Source
Finland	14.7% (point)	Score of 2 or more (F) or 3 or more (M) on CAGE	544 (20-60yr)	Aalto et al., 1999
Korea	12.0% (lifetime)	DSM-III abuse or dependence	5100 (18-65yr)	Lee et al., 1987
Norway	10.6% (annual)	DSM-III-R abuse or dependence	2066 (15-65yr)	Kringlen et al., 2001
Germany	8.3% (lifetime)	DSM-IV abuse or dependence AUDIT Score of 10 or more	4093 (18-65yr)	Meyer et al., 2000
United Kingdom	7.4% (annual)	SAD-Q score of 4 or more	8538 (16-74yr)	Singleton et al., 2001
United States	6.9% (annual)	DSM-III-R abuse or dependence	8098 (15-54yr)	Kessler et al., 1997
Australia	6.5% (annual)	SAD-Q score of 4 or more	10641(18yr+)	Hall et al., 1999
Canada	5.8% (annual)	Score of 2 or more on CAGE	12155(15yr+)	Poulin et al., 1997
Spain	5.4% (point)	Score of 2 or more CAGE	2500 (14-70yr)	Alvarez & Del Rio, 1994
Netherlands	5.2%(monthly)	DSM-III-R abuse or dependence	7076 (18-64yr)	Bijl et al., 1998
China	4.6% (point)	DSM-III-R abuse or dependence	23513 (15-65yr)	Wei et al., 1999
Brazil	4.5% (annual)	ICD-10 harmful use or dependence	1464 (18yr+)	Andrade et al., 2002
Puerto Rico	4.2% (annual)	DSM-IV abuse or dependence	4709 (15-64yr)	Colon et al., 2001

### ***Substance Abuse Policies***

Over time, international and national responses to specific drug related issues that may inadvertently impact upon suicide rates have emerged. During the last decade, international activities have taken place to assist countries in the development of alcohol policies. For example, in 1996, *The Dublin Principles of Cooperation Among the Beverage Alcohol Industry, Governments, Scientific Researchers, and the Public Health Community* were established. These principles acknowledge alcohol consumption as a shared social responsibility that requires effective policy responses. Similarly, the *Alcohol Policy Development: Partnership in Practice* developed by the International Centre for Alcohol Policies (ICAP), acknowledges partnership involving all relevant sectors of society as equals as a critical feature of effective alcohol policy. In the year 2000, *The Geneva Partnership on Alcohol Towards a Global Charter* formulated general principles regarding the role of alcohol in society. The charter addresses individual and social responsibilities with respect to

alcohol and its consumption and acknowledges both the positive and negative effects for individuals, communities and societies.

In addition to alcohol-specific policies, global efforts to control the use of illicit substances have also taken place. In 1961, the first *United Nations Single Convention on Narcotic Drugs* was initiated to develop international cooperation and common policies among a number of signatory countries, including Australia. All participating nations to the 1961 Convention agreed to deal internationally, in the ways defined in the Convention, with all the scheduled drugs, including illicit drugs such as heroin and cannabis. In 1988, the *Convention Against Illicit Trafficking in Narcotic Drugs and Psychotropic Substances* amended the previous 1961 Convention, through the explicit prohibition of all action on which use depends (i.e. growing, manufacture, transport, export, import, sale, purchase and possession of all scheduled drugs) (Moffitt et al, 1998).

Prior to the Convention in 1961, only 1.6% of countries had devised a national substance abuse policy (WHO, 2001). However, within the two decades following, the impact of substance abuse slowly became acknowledged in countries around the world, and it was not until after the second United Nations Convention in 1988 that increasing numbers of countries began implementing national substance abuse policies, with the majority having done so within the last 10 years. Currently, over 55% of countries have a substance abuse policy (WHO, 2001). Western European and Asian countries have been faster to adopt substance abuse policies than countries in most other regions. Table 23 outlines the presence of national substance abuse for the 33 countries being considered in this report, according the World Health Organisation's Atlas Project.

### ***The impact of national substance abuse policies on suicide trends***

The degree to which national substance abuse policies influence suicide is difficult to assess because there are likely to be wide variations in the components of policies and the way they are translated into specific initiatives. Substance abuse policies do not explicitly address suicide prevention as an objective. Conversely, all national suicide prevention strategies incorporate initiatives to address substance abuse. In particular, the Finnish strategy identifies substance abuse initiatives as a core component of suicide prevention.

Table 23. Countries with national substance abuse policies and their year of implementation

Country	Substance abuse policy	Year of implementation
<b>Old World (Anglo)</b>		
England-Wales	No	-
Northern Ireland	No	-
Scotland	Yes	1998
Ireland	Yes	1983
<b>New World (Anglo)</b>		
Canada	Yes	1998
Australia	Yes	1985
United States	Yes	1988
New Zealand	Yes	1998
<b>Scandinavia</b>		
Finland	Yes	1997
Norway	Yes	1991
Denmark	Yes	1994
Sweden	No	-
<b>Eastern Europe</b>		
Latvia	Yes	1998
Hungary	Yes	2000
Bulgaria	Yes	2001
Lithuania	No	-
Russian Federation	Yes	1995
<b>Southern Europe</b>		
Greece	Yes	1970
Italy	Yes	1990
Portugal	Yes	1999
Spain	Yes	1985
<b>Western Europe</b>		
Austria	Yes	1997
Belgium	Yes	1921
France	Yes	1970
Netherlands	Yes	1995
Germany	Yes	1990
Switzerland	Yes	1990
<b>Latin America</b>		
Brazil	Brazil	2000
<b>Asia</b>		
China	Yes	1987
Japan	Yes	1953
Hong Kong	Yes	1965
South Korea	Yes	1970
Singapore	Yes	1973

*Data source: WHO Atlas Project.*

Nevertheless, evidence from a natural study conducted in Russia (Wasserman et al., 1994; 1998) suggests that national substance use policies could have the potential to reduce suicide rates, particularly policies that address the consumption of alcohol. The *Perestroika* era in Russia (1985-1986) resulted in economic reform that effectively resulted in increased sale prices of alcoholic beverages and led to a reduction in alcohol consumption. During

the four-years following *Perestroika*, a reduction of alcohol consumption coincided with a significant decrease in suicide rates among men (32%) and women (19%). Wasserman et al. (1994, 1998) investigated the experience and observed that in republics of the former Soviet Union with high alcohol consumption (Slavic and Baltic), suicide rates were also high. In the Caucasian republics studies, low alcohol consumption was associated with low suicide rates. Wasserman and colleagues found that in these regions, alcohol consumption levels and suicide rates were positively correlated for both males and females. It was concluded that economic reforms that reduced alcohol consumption contributed to the observed reduction in suicide mortality. However, they also acknowledged that reduced consumption of alcohol was one effect of widespread economic, political, and social reforms that may have also contributed to the reduction.

An ecological study of 100 countries that provided information for the WHO Project Atlas study (WHO, 2001) and reliable suicide statistics was undertaken to evaluate the impact of the substance abuse policies on suicide rates (Burgess et al., submitted for publication). Analyses revealed that countries that have adopted a substance abuse policy were associated with decreases in suicide mortality rates in the subsequent years (Burgess et al., submitted for publication), although mental health policies and programmes were associated with increases in suicide mortality. However, this regression model did not allow for the potential interactive effect of other factors that may have reduced suicide rates (e.g. national suicide prevention strategies).

The possible impact of substance abuse policies on suicide mortality was examined in a series of analyses comparing trends in the five years before and five years following the adoption of national substance abuse policies in 15 countries<sup>4</sup>. Analyses were conducted on the adolescent age group (15-24 years) and all-ages group.

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<sup>4</sup> A statistically significant reduction in the slope of post-implementation suicide mortality trends as compared to that related to pre-implementation suicide mortality trends was adopted as an indicator of a probable positive impact of substance abuse policy. It should be noted, however, that the correlational nature of the present study and analysis does not allow us to draw reliable conclusions regarding the presence of a causal relationship between substance abuse policy and suicide mortality trends. Furthermore, the adopted indicator of impact was based on the assumption that the suicide mortality trends observed five years before the implementation of the policy were stationary (i.e. would have remained the same across time if the substance abuse policies had not been introduced).

### *Adolescents*

In Australia, there was no change in the suicide trend in males, yet the female trend continued to decline (Table 24). Significant reductions in post-implementation trends were identified in the United States, the Russian Federation, among females in Italy, and males in the Netherlands. Despite this possible evidence of an impact on suicide rates, other countries revealed continued upward trends following substance abuse policy introduction [e.g. Norway (females), France (females), Spain (males)], increases [e.g. Greece, Italy (males)], and many nations had no changes in trends at all. Therefore, the definitive impact of national substance abuse policies is yet to be determined.

### *All Ages*

In Australia, there was no change in trends among all-aged females and males (Table 25). Trends decreased from pre-policy to post-policy in Ireland (males and females), United States (males and females), Norway (males and females), the Russian Federation (males and females), Spain (males and females), Greece (males), France (males), and the Netherlands (males). Trends in Italian males changed direction from an upward slope pre-policy to a downward slope post-policy, suggesting a negative impact of the national substance abuse policy. Furthermore, increases in suicide mortality trends were revealed in Greece (females), Germany (males and females), and the Netherlands (females). The implementation of national substance abuse policies may have had a positive impact on suicide trends in some countries; however, consistent findings between nations has not been revealed, thus the efficacy of national substance abuse policies for suicide prevention has not been determined.

Table 24. Changes in average suicide rates and trends following the implementation of national substance abuse policy, 15-24 years

Country (year implemented)	Average rate and (95% CI) for 5 years before	Average rate and (95% CI) for 5 years after	Trend [slope and (SE)] for 5 years before	Trend [slope and (SE)] for 5 years after	Difference between slopes [t-value and (p)]
Australia (1985)					
Females	3.99 (3.44 – 4.54)	4.87 (4.03 – 5.72)	-0.10 (.22)	-0.49 (.19)	3.83 (.009)
Males	18.74 (17.74 – 19.75)	24.38 (22.68 – 26.08)	0.40 (.34)	0.86 (.49)	-1.09 (ns)
Ireland (1983)					
Females	2.28 (1.57 – 3.00)	2.58 (1.71 – 3.46)	-0.07 (.29)	-0.14 (.35)	0.28 (ns)
Males	8.20 (6.31 – 10.08)	12.25 (9.23 – 15.28)	0.73 (.64)	-0.50 (1.2)	0.55 (ns)
United States (1988)					
Females	4.32 (4.24 – 4.41)	3.98 (3.75 – 4.21)	0.02 (.03)	-0.16 (.01)	98.61 (<.001)
Males	20.72 (19.67 – 21.77)	21.99 (21.85 – 22.12)	0.62 (.24)	-0.04 (.05)	9.29 (<.001)
Norway (1991)					
Females	5.28 (4.02 – 6.56)	5.11 (4.51 – 5.72)	0.75 (.28)	0.14 (.23)	3.81 (.009)
Males	23.77 (21.48 – 26.05)	24.19 (21.17 – 27.21)	0.56 (.88)	-1.69 (.75)	1.40 (ns)
Denmark (1994)					
Females	3.50 (2.81 – 4.18)	3.31 (2.23 – 4.39)	-0.46 (.09)	0.10 (.44)	-2.36 (ns)
Males	13.33 (12.38 – 14.27)	12.07 (10.63 – 13.51)	-0.39 (.31)	0.04 (.59)	-0.80 (ns)
Russian Fed.(1995)					
Females	7.51 (6.57 – 8.46)	9.18 (8.64 – 9.71)	0.63 (.12)	0.01 (.22)	8.22 (<.001)
Males	36.63 (28.71 – 44.55)	53.38 (52.52 – 54.24)	5.40 (.86)	-0.02 (.35)	5.19 (.002)
Greece (1970)					
Females	2.40 (1.59 – 3.20)	1.63 (1.38 – 1.88)	-0.52 (.13)	0.01 (.10)	-15.70 (<.001)
Males	3.34 (2.79 – 3.89)	2.49 (1.87 – 3.11)	-0.22 (.18)	0.40 (.10)	-11.59 (<.001)
Italy (1990)					
Females	1.44 (1.33 – 1.56)	1.72 (1.52 – 1.92)	0.05 (.04)	-0.06 (.07)	13.35 (<.001)
Males	5.07 (4.96 – 5.17)	6.56 (5.88 – 7.25)	-0.02 (.04)	0.45 (.10)	-32.69 (<.001)
Spain (1985)					
Females	1.35 (1.18 – 1.52)	1.77 (1.52 – 2.02)	0.12 (.02)	0.12 (.08)	-0.31 (ns)
Males	5.00 (4.39 – 5.61)	7.06 (5.85 – 8.28)	0.46 (.14)	0.79 (.19)	-6.54 (<.001)

Table 24. Changes in average suicide rates and trends following the implementation of national substance abuse policy, 15-24 years (Cont.)

<b>Country (year implemented)</b>	<b>Average rate and (95% CI) for 5 years before</b>	<b>Average rate and (95% CI) for 5 years after</b>	<b>Trend [slope and (SE)] for 5 years before</b>	<b>Trend [slope and (SE)] for 5 years after</b>	<b>Difference between slopes [t-value and (p)]</b>
France (1970)					
Females	4.05 (3.57 – 4.53)	4.37 (4.05 – 4.69)	0.26 (.13)	0.14 (.10)	3.60 (0.02)
Males	7.76 (7.02 – 8.51)	10.45 (9.68 – 11.22)	0.51 (.08)	0.53 (.07)	-1.62 (ns)
Germany (1990)					
Females	4.79 (4.35 – 5.24)	3.65 (3.29 – 4.02)	-0.28 (.08)	-0.15 (.12)	-4.98 (.003)
Males	17.02 (15.35 – 18.69)	13.66 (12.88 – 14.43)	-1.16 (.13)	-0.26 (.28)	-7.87 (<.001)
Netherlands (1995)					
Females	3.69 (3.48 – 3.90)	3.88 (3.04 – 4.72)	0.09 (.07)	-0.16 (.33)	1.84 (ns)
Males	9.31 (8.57 – 10.04)	9.33 (8.30 – 10.36)	0.73 (.48)	-0.56 (.25)	3.70 (.01)
Switzerland (1990)					
Females	8.64 (7.53 – 9.21)	5.76 (5.14 – 6.39)	-0.43 (.24)	-0.36 (.15)	-0.79 (ns)
Males	27.82 (26.83 – 28.81)	25.81 (23.41 – 28.22)	-0.20 (.39)	1.00 (.79)	-1.27 (ns)
Hong Kong (1965)					
Females	9.67 (6.83 – 12.51)	8.49 (7.18 – 9.80)	1.04 (.99)	0.56 (.42)	0.34 (ns)
Males	10.14 (8.59 – 11.68)	6.89 (5.35 – 8.44)	-0.61 (.52)	-0.35 (.60)	-0.35 (ns)
Singapore (1973)					
Females	9.68 (7.57 – 11.79)	9.82 (7.50 – 12.15)	0.05 (.86)	-0.52 (.85)	0.32 (ns)
Males	8.31 (6.59 – 10.03)	9.18 (7.05 – 11.31)	0.66 (.59)	-0.20 (.86)	0.66 (ns)

Table 25. Changes in average suicide rates and trends following the implementation of national substance abuse policy, all ages

Country (year implemented)	Average rate and (95% CI) for 5 years before	Average rate and (95% CI) for 5 years after	Trend [slope and (SE)] for 5 years before	Trend [slope and (SE)] for 5 years after	Difference between slopes [t-value and (p)]
Australia (1985)					
Females	5.48 (5.22 – 5.74)	5.42 (5.18 – 5.67)	-0.11 (.09)	-0.09 (.08)	-1.08 (ns)
Males	17.00 (16.62 – 17.38)	19.93 (18.90 – 20.96)	0.20 (.11)	0.36 (.37)	-0.90 (ns)
Ireland (1983)					
Females	3.61 (3.14 – 4.08)	3.80 (3.36 – 4.24)	0.13 (.18)	-0.25 (.11)	7.28 (<.001)
Males	8.51 (7.26 – 9.76)	11.11 (10.00 – 12.22)	0.82 (.19)	0.08 (.45)	2.56 (.043)
United States (1988)					
Females	5.32 (5.21 – 5.44)	4.80 (4.65 – 4.94)	-0.04 (.04)	-0.10 (.02)	22.83 (<.001)
Males	19.99 (19.45 – 20.52)	20.04 (19.79 – 20.29)	0.35 (.07)	-0.07 (.09)	25.21 (<.001)
Norway (1991)					
Females	8.19 (7.57 – 8.81)	7.10 (6.36 – 7.84)	0.14 (.24)	-0.47 (.13)	6.81 (<.001)
Males	22.92 (21.53 – 24.30)	20.53 (18.49 – 22.58)	0.54 (.47)	-1.27 (.40)	3.98 (.007)
Denmark (1994)					
Females	16.34 (14.65 – 18.03)	10.14 (8.76 – 11.51)	-0.92 (.44)	-0.95 (.11)	0.13 (ns)
Males	30.98 (28.97 – 32.99)	23.46 (21.42 – 25.50)	-1.33 (.30)	-1.39 (.23)	0.38 (ns)
Russian Fed. (1995)					
Females	11.97 (10.94 – 13.00)	12.59 (11.89 – 13.28)	0.67 (.16)	-0.25 (.24)	8.97 (<.001)
Males	56.59 (44.35 – 68.82)	68.28 (64.77 – 71.79)	8.38 (1.25)	-1.40 (1.18)	2.75 (.033)
Greece (1970)					
Females	2.13 (1.85 – 2.40)	1.91 (1.31 – 2.52)	-0.03 (.05)	0.11 (.09)	-10.82 (<.001)
Males	4.67 (4.25 – 5.08)	4.36 (4.04 – 4.67)	0.21 (.12)	-0.07 (.12)	8.22 (<.001)
Italy (1990)					
Females	4.44 (4.18 – 4.69)	4.06 (3.92 – 4.20)	-0.16 (.05)	-0.08 (.03)	-21.07 (<.001)
Males	11.59 (11.19 – 11.99)	11.99 (11.50 – 12.48)	-0.27 (.05)	0.30 (.10)	-37.54 (<.001)
Spain (1985)					
Females	2.72 (2.28 – 3.15)	3.84 (3.62 – 4.05)	0.31 (.02)	0.12 (.05)	47.53 (<.001)
Males	7.80 (6.63 – 8.96)	10.78 (10.12 – 11.44)	0.77 (.16)	0.44 (.09)	7.94 (<.001)

Table 25. Changes in average suicide rates and trends following the implementation of national substance abuse policy, all ages (Cont.)

<b>Country (year implemented)</b>	<b>Average rate and (95% CI) for 5 years before</b>	<b>Average rate and (95% CI) for 5 years after</b>	<b>Trend [slope and (SE)] for 5 years before</b>	<b>Trend [slope and (SE)] for 5 years after</b>	<b>Difference between slopes [t-value and (p)]</b>
France (1970)					
Females	8.10 (7.72 – 8.48)	8.77 (8.48 – 9.07)	.25 (.06)	.08 (.11)	8.79 (<.001)
Males	23.21 (22.82 – 23.60)	22.76 (22.47 – 23.04)	-.05 (.16)	-.00 (.12)	-1.00 (ns)
Germany (1990)					
Females	11.47 (10.51 – 12.42)	9.74 (8.89 – 10.58)	-.66 (.08)	-.58 (.08)	-4.93 (.003)
Males	26.24 (24.28 – 28.21)	23.91 (22.99 – 24.83)	-1.34 (.21)	-.59 (.16)	-8.78 (<.001)
Netherlands (1995)					
Females	7.04 (6.67 – 7.42)	6.56 (6.39 – 6.74)	-.21 (.09)	-.08 (.05)	-9.40 (<.001)
Males	13.56 (12.88 – 14.23)	13.21 (12.93 – 13.49)	.35 (.18)	-.09 (.10)	8.34 (<.001)
Switzerland (1990)					
Females	13.63 (12.82 – 14.43)	11.76 (11.12 – 12.39)	-.42 (.22)	-.11 (.25)	-2.34 (ns)
Males	33.72 (32.46 – 34.98)	31.57 (30.07 – 33.07)	-.59 (.39)	-.56 (.52)	-.06 (ns)
Hong Kong (1965)					
Females	8.80 (8.42 – 9.19)	8.40 (6.83 – 9.96)	-.11 (.15)	.54 (.56)	-1.61 (ns)
Males	12.68 (12.08 – 13.28)	11.17 (9.74 – 12.59)	-.13 (.23)	-.00 (.58)	-.27 (ns)
Singapore (1973)					
Females	7.91 (6.99 – 8.84)	9.25 (8.63 – 9.87)	.09 (.37)	-.02 (.25)	.43 (ns)
Males	12.38 (10.92 – 13.83)	12.07 (11.21 – 12.93)	.19 (.58)	-.29 (.31)	.91 (ns)

# THE IMPACT OF ANTIDEPRESSANTS USE

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Depression is the most common psychological disorder in the general population, effecting up to 20% of the population at some point in life (Jacobs, 1999; Wittchen, et al, 1994). Depression can have far reaching effects on an individual, including disruptions to health, work, and relationships and is associated with a particularly high risk of suicide. Mental health disorders, particularly depressive illnesses are considered as major risk factors of suicide. Psychological autopsy studies show that a depressive disorder is present in 60 per cent of suicides and a psychological disorder is present in approximately 90% of all suicides (Cavanagh et al., 2003). It has been estimated that individuals with an affective disorder have a life-time risk of suicide of 2.2-2.4% (Boardman & Healy, 2001; Bostwick & Pankratz, 2000) compared to a life-time risk of suicide of 0.5 per cent among individuals with no affective disorder (Bostwick & Pankratz, 2000). Individuals with a hospitalisation for an affective disorder have a lifetime risk of 8.6% (Bostwick & Pankratz, 2000).

Many researchers and policy makers have argued that improved diagnosis and treatment of depression is critical to the prevention of suicide (Isometsa et al., 1994; Isacsson et al., 1997). Several studies have noted that the majority of individuals who suicided were not receiving treatment for a psychological disorder at the time of the suicide. For example, Isometsa et al. (1994) found that out of 71 cases of suicide by individuals with a current major depressive episode only 30 per cent were receiving an antidepressant. A review of toxicology findings in a sample of 5,281 of suicides in Sweden revealed that 45.3 per cent of suicide completers had psychotropic medication and 16.5 per cent had an antidepressant in their system at the time of death (Isacsson et al., 1999). On the basis of these findings and the strong association between depression and suicide, all national suicide prevention strategies have adopted activities aimed at improving diagnosis and treatment of depression.

General practitioners are considered the first line of treatment for the majority of physical and psychological illnesses, including depression. As such, general practitioners are viewed

as one of the most important professional groups in the prevention of suicide. The critical role of General Practitioners in the prevention of suicide is reinforced by research showing that almost half of all suicide completers see a primary health care professional in the month prior to death while only one fifth consult a mental health specialist (Luoma et al., 2003). The General Practitioner's role in suicide prevention has largely been directed toward the detection and treatment of depression. General Practitioners commonly use pharmacotherapy as the primary treatment for depression and frequently have limited knowledge of and do not refer patients for psychotherapy. However, concerns have been raised that General Practitioners tend to prescribe doses that are below the therapeutic dose for depression (Isometsa et al., 1998; McManus et al., 2003). Given the importance attached to the treatment of depression in the prevention of suicide and the use of antidepressants as the most common approach to the treatment of depression, the impact of antidepressants on suicidal behaviour needs to be understood.

Several classes of antidepressants have emerged over the last 50 years. Each class of antidepressants operates via a different mechanism of action, but all classes essentially act to increase the transmission of neurochemicals that are considered relevant to the development and maintenance of depression. The first antidepressants to be developed were monoamine oxidase inhibitors (MAOIs) (e.g. phenelzine and tranylcypromine). These medications were effective in the alleviation of depression, but had several adverse side effects including a high toxicity and overdose potential. MAOIs were soon followed by tricyclic antidepressants (TCAs) (e.g. imipramine, amitriptyline and doxepin), which were less toxic, but still retained many side effects. The successful treatment of depression with MAOIs and TCAs encouraged greater research into depression, which led to more refined theories on the biological mechanisms underlying depression. These theories gave rise to a new class of antidepressants known as selective serotonin reuptake inhibitors (SSRIs) (e.g. paroxetine, sertraline, fluoxetine), which became available in the late 1980s. SSRIs typically have fewer adverse side effects and normally require a single daily dose, improving compliance rates over older antidepressants. Moreover, SSRIs have a low overdose potential compared to older classes [see Bazire (2001) for a review of antidepressant side effects]. While SSRIs specifically target serotonin, antidepressants that target multiple neurochemicals are now being investigated and developed. The most recent addition to antidepressant medications is the Serotonin and Norepinephrine Reuptake Inhibitor (SNRI) known as venlafaxine.

There has been a rapid increase in the use of antidepressants in the developed world since the introduction of SSRIs in the late 1980s (McManus et al, 2000). Studies in Australia (McManus et al, 2000) and the United Kingdom (Middleton et al., 2001) show the use of SSRIs has increased exponentially since their introduction, resulting in a marked increase in overall antidepressant use. The use of TCAs has increased to a far lesser extent in Australia and declined in the United Kingdom. Increased use of antidepressants in the last decade may be related to a variety of factors including changes in the prevalence of depression, consultation and prescription habits, detection and treatment of depression, patterns of help seeking behaviour, and the relative safety of and compliance with SSRIs. Changes in data collection methods may also have some bearing on trends; however, a variety of studies using different data collection methods all confirm recent increase. While a variety of factors may be involved in the increasing use of antidepressants the ultimate effect is that the exposure to antidepressants in the general population is far greater now than any time in the past. Of all antidepressants prescribed in Australia and the United Kingdom, approximately 90% are prescribed by a general practitioner (McManus et al., 2003; Middleton et al., 2001).

Treatment outcome studies have demonstrated that antidepressants are an effective treatment for depressive symptoms. A recent meta-analysis of clinical trials of antidepressants found that both TCAs and SSRIs were associated with an average treatment success of 60% (Einarson et al., 1999). The range of treatment success across studies involving TCAs was 20 to 94%, and in studies involving SSRI was 38 to 100%. SNRIs have achieved somewhat better treatment success at 74% (range is 67 to 81%), although only a small number of studies were reviewed and all involved outpatients. Drop out rates associated with drug side effects differed depending on the class of antidepressant, ranging from 8 to 44% for TCAs (average of 23%), 7 to 41% for SSRIs (average of 17%), and 10 to 12% for SNRIs (average of 11%).

Although antidepressants may be effective in the treatment of depressive symptoms, the current evidence strongly suggests that antidepressants have no effect in reducing the risk of suicide attempts or completions. In evaluating the impact of antidepressants on suicidal behaviour, considerable attention has been given to epidemiological studies that compare trends in antidepressant sales with trends in suicide rates. Investigations in Sweden (Carlsten et al., 2001; Isacson, 2000), Australia (Hall et al., 2003), and Hungary (Rihmer et

al., 2000) have suggested a reduction in suicide rates associated with increased sales of antidepressant medications. However, the attention given to these studies is unwarranted given that they have several major limitations. The studies do not indicate changes in the proportion of suicide completers receiving antidepressants. Reductions in suicide seem to pre-date increases in antidepressant sales (De Leo & Cerin, 2003). Furthermore, results are not consistent across age and gender groups. For example, in the Swedish studies the greatest increase in antidepressant sales occurred among the older aged while decreases were predominately among the young. Similarly, in the Australia study, the increase in antidepressant sales occurred across all age groups, but reductions in suicide rates were only observed among the aged (De Leo & Cerin, 2003).

Randomised control trials have consistently found no reduction in suicide attempts or suicide completions among individuals prescribed antidepressants, compared to individuals prescribed a placebo (Table 26). Two separate controlled trials of mianserin (a tetracyclic antidepressant) in the treatment of repeat suicide attempters found no difference in the rate of future attempts between individuals treated with a placebo and individuals treated with either 60mg of mianserin (Hirsch et al., 1982) or 30mg of mianserin (Montgomery et al., 1983). These early studies were completed on small samples of repeat attempters (114 and 58 respectively). However, more recent data from large-scale clinical trials have led to the same conclusion. Khan and colleagues (2000; 2001; 2003) conducted three meta-analyses of clinical trials involving SSRIs, other antidepressants, and placebo conditions. Both analyses included pooled data from randomly assigned participants with depression. The first analysis involved 19,639 participants, the second involved 23,201 participants and the third involved 48,277 participants. The results showed no significant differences between SSRIs, other antidepressants, and placebo conditions on either completed suicides or suicide attempts. The limitation of these analyses is that the participants' histories of suicidal behaviour were not reported.

The increasing use of SSRIs in the treatment of depression, particularly among suicidal individuals, may actually be detrimental to suicide prevention efforts. Concerns have been raised that SSRIs may increase the risk of suicide attempts and completed suicides

Table 26. Attempted and completed suicide among individuals treated with an antidepressant and placebo in randomised control trials (RCTs).

Reference	Sample	Follow-up period	Rate of attempted <sup>a</sup> or completed <sup>b</sup> suicide (%)		Statistical difference
			Antidepressant	Placebo	
Khan et al., 2003	48,277 with depression	Not stated. Annual rate.	0.15 <sup>b#</sup> ; 0.20 <sup>b*</sup>	0.10 <sup>b</sup>	No
Khan et al., 2001	23,201 with depression	Not stated. Annual rate.	0.60 <sup>b</sup> ; 6.30 <sup>a</sup>	0.50 <sup>b</sup> ; 6.70 <sup>a</sup>	No
Khan et al., 2000	19,639 with depression	Not stated. Annual rate.	0.40 <sup>b</sup> ; 2.70 <sup>a</sup>	0.80 <sup>b</sup> ; 2.80 <sup>a</sup>	No
Montgomery et al., 1983	58 with personality disorders and attempted suicide	6 months	47.1 <sup>a</sup>	57.1 <sup>a</sup>	No
Hirsch et al., 1982	114 with attempted suicide	12 weeks	21.1 <sup>a</sup>	13.2 <sup>a</sup>	No

#SSRI; \*Other Antidepressant

when compared to TCAs. A follow-up study of 2,776 suicide attempters found that the likelihood of a future suicide attempt was more than two times greater among recipients of a SSRI compared to recipients of a TCA (Donovan et al., 2000). A recently published review of randomised control trials and epidemiological studies also found a two-fold increase in the risk of suicide attempts and completions among individuals prescribed a SSRI compared to those prescribed a TCA (Healy, 2003). However, this matter is still being debated and the issues involved are complex. Due to their lower toxicity, SSRIs may be prescribed more often than TCAs to individuals at high risk of self-harm, increasing the likelihood of self-harm incidents among individuals that are prescribed SSRIs. There may also be differences in the conditions for which particular classes of antidepressants are prescribed. Furthermore, the medical effects of a TCA overdose remain more severe than an overdose with a SSRI (Donovan et al., 2000).

Over the last 10 years, interest has grown regarding the possibility that lithium (a mood stabiliser typically used in the treatment of Bipolar Disorder) is particularly effective in lowering suicide risk (Tondo et al, 1997). Significant evidence obtained from a diversity of studies, consistently supports the lower rate of suicidal behaviour (almost 7-fold) during maintenance treatment with lithium compared to risk prior to treatment, and up to a 22-fold lower risk than that which was encountered soon after discontinuing treatment

(Baldessarini & Tondo, 1999). A 8.3-fold lower cumulative risk of suicide by up to 15-years follow-up on lithium has also been observed (Baldessarini & Tondo, 1999), suggesting that long-term lithium treatment may contribute to reducing suicide among individual treated patients. However, caution must be taken when considering such findings, since many of the reports analysed possess significant limitations (Tondo et al, 1997). Furthermore, lithium is associated with toxic side effects and requires close monitoring by a psychiatrist. These considerations would make the wide spread use of lithium unfeasible within the general population.

Current evidence suggests that the treatment of depression among suicidal individuals should not be restricted to the use of antidepressants (De Leo, 2003). There are a variety of reasons why antidepressants may not be an effective treatment for suicidal individuals. For example, antidepressants of all classes carry a risk of overdose and therefore increase access to means of suicide, their therapeutic effects are not immediate and may take several weeks to emerge, they are not an effective treatment for depression in a sizeable proportion of individuals, they are associated with side effects that hinder compliance, and they are associated with a high level of relapse once the medication is withdrawn.

Another line of reasoning underlines the activating effect of antidepressants, particularly of SSRI's, which lack an appreciable sedative component (mainly expressed in TCAs by their anti-histaminergic effects). Activation in vulnerable individuals may transform in disinhibition, dangerously lowering the threshold for aggressive/violent behaviour (Mann & Kapur, 1991). Antidepressant substances can sometimes force patients out of their state of lethargy, abulia, and psychomotor inhibition, without the underlying dysphoric feeling produced (Teicher et al., 1993). An early evidence of this possible effect came from a double-blind controlled trial with maprotiline, a noradrenergic antidepressant (Rouillou et al., 1989). That experience showed a higher incidence of suicide attempts in the group of patients receiving maprotiline than in those receiving placebo. Although maprotiline is not an SSRI, that trial clearly demonstrated the possibility of such a paradoxical effect during antidepressant tests held under controlled conditions. In any case, case reports on patients showing increased suicidal tendencies have been described since the sixties (Schifano & DeLeo, 1998).

A further and very important consideration in the use of antidepressants as a treatment for suicidal individuals is that antidepressants do not address the variety of psychosocial factors that are strongly related to suicide and depression. A recent comparison of psychotherapy with pharmacotherapy suggested that improvement in psychosocial functioning is independent from and slower than improvement in depressive symptoms (Hirschfeld et al., 2002). Furthermore, individuals with depression show greater improvement in psychosocial functioning when pharmacotherapy is combined with psychotherapy than when pharmacotherapy is used alone. There are strong arguments for the increased use of psychotherapy in the treatment of suicidal individuals, as the sole treatment approach or as an adjunct to pharmacotherapy. Psychotherapy (i.e. cognitive therapy) is equally effective as pharmacotherapy in the treatment of depression, is superior for long term relapse prevention, and the combination of psychotherapy and pharmacotherapy is more effective in the treatment of depression than either approach used alone (Dobson, 1989; Fava et al., 1998a; Fava et al., 1998b; Paykel et al., 1999). However, there is little reliable evidence to suggest that psychotherapies are effective in the treatment of suicidal behaviour, with the possible exception of Dialectical Behaviour Therapy for individuals with Borderline Personality Disorder (Linehan, 1993). The combination of psychotherapy and pharmacotherapy in the treatment of suicidal individuals may prove more promising. Randomised control trials of a combined approach are overdue.

# UNEMPLOYMENT AND SUICIDE

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The last 100 years have seen considerable theoretical debate and empirical research into the impact of unemployment on suicide. A recent review of the evidence in this area concluded that ‘there is an increased risk of suicide and deliberate self harm amongst the unemployed, which may be compatible with both causal and self-selection processes’ (Platt & Hawton, 2000). This underlines one of the central areas of debate – does job loss / lack of work lead to increased risk of suicide or are people with psychological problems that predispose them to suicide at greater risk of losing their jobs (reverse causality)?

The research evidence investigating these issues comes from a number of different countries and uses a range of different study designs. The strongest evidence comes from two research designs: i) time series analyses which examine similarities in temporal patterns of suicide and unemployment, and which take account of secular trends in other influences on suicide, and ii) prospective cohort studies. Both approaches have their limitations. Here we will review key findings from some of the larger and better-conducted studies.

## TIME SERIES ANALYSES

Arguably the clearest evidence for a link between unemployment and suicide comes from studies that examine the effects of fluctuations in levels of unemployment on national rates of suicide over long time periods. Some of the studies spanning the longest time periods are those of Morrell and colleagues in Australia (1993), for the period 1907 – 1990, Weyerer and Wiedenmann in Germany (1995), for 1881 to 1989, Gunnell et al in England & Wales (1999), for 1921 to 1995, and Yang and Lester in the United States (1995), for 1933 to 1985. These studies show that associations exist between trends in unemployment and suicide even after taking account of the effects of war and changes in the lethality of commonly available methods of suicide (Gunnell et al., 1999; Weyerer & Wiedenmann, 1995). Associations are seen in men and women and there is some evidence that

associations are stronger in younger individuals (Gunnell et al., 1999; Morrell et al., 1993). At the time of the great depression in the United Kingdom two fold increases in levels of unemployment were associated with approximately 50% rises in suicide (Gunnell et al., 1999).

The major strength of using time series analyses resides in the ability to investigate causal pathways between two phenomena, however it does not provide information, for example, on the aspects of unemployment that may contribute to suicide. On the one hand, rises in unemployment followed by rises in suicide provide some evidence of a causal link. However, in comparing trends in unemployment and suicide, it is not possible to distinguish the specific effects of high levels of unemployment from other factors such as job insecurity, relationship stresses, bankruptcy and poverty - associated with economic recessions. To determine the specific association of unemployment with suicide, cohort studies of individuals are necessary.

## COHORT STUDIES

Relatively few cohort studies are of sufficient size to investigate associations between unemployment and suicide. The main studies that have examined this issue have been large national record linkage-based studies set in Europe and the United States (Iversen et al., 1987; Johansson & Sundquist, 1997; Kposowa, 2001; Lewis & Sloggett, 1998; Martikainen & Vlkonen, 1996; Moser et al., 1984; Platt et al., 1992; Qin et al., 2000). These studies generally indicate that suicide risk in relation to unemployment is greater in men than women, although there is some inconsistency in the research record (Iversen et al., 1987; Kposowa, 2001; Lewis & Sloggett, 1998). In males unemployment is associated with a two to threefold increased risk of suicide, whereas risks amongst females are around 50% higher than those in employment. Associations remain, but are often attenuated after adjustment for a range of possible confounding factors, including ill health (Johansson & Sundquist, 1997), social class and marital status (Johansson & Sundquist, 1997; Lewis & Sloggett, 1998), and a range of variables, including psychiatric illness (Qin et al., 2000).

The advantages of person-based observational studies are, however, tempered by their deficiencies. Reverse causation may occur, where the pre-existing personality or mental health problems that led to suicide may cause the unemployment rather than unemployment causing suicide. They are also prone to under-estimation. Employment status is usually measured only at the outset of long-term follow-up studies, but, unlike other relatively fixed characteristics of an individual, a person's employment status is subject to changes over follow-up. These latter effects would attenuate observed associations between unemployment and suicide and this may in part explain variations in the strength of reported associations across different studies. This phenomenon is illustrated in Kposowa's analysis of unemployment and suicide in the United States (Kposowa, 2001). The relative risk of suicide amongst unemployed males in the first 2 years of follow-up was 2.30 (CI 1.16 to 4.54) and at 5 years this had fallen to 1.16 (CI 0.78 to 1.72). Similar effects were seen in women (Kposowa, 2001).

There is some evidence that the strength of association between unemployment and mortality is weaker in times of high unemployment, possibly indicating that there are differences in the suicide 'proneness' of individuals who are unemployed at times when there is no shortage of jobs and those who lose their jobs in times of economic recession.

Taken together, the evidences from time series and prospective investigations suggest that there may be a close association between suicide and unemployment in males and females. The strength of the observed associations suggests that social and economic policy measures in times of recession may be an effective means of reducing the numbers of suicides in younger people at these times.

# THE INFLUENCE OF PERIOD AND COHORT EFFECTS ON SUICIDE RATES

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The impact over time of period and cohort effects upon rates of suicide have been investigated in a number of countries. *Period effects* influence suicide rates extensively, whereby living in a particular time period affects (suicide) risk similarly in all groups in the population, regardless of age and birth-cohort (Snowdon & Hunt, 2002). Whereas a *cohort effect* exists if individuals born in a particular year or successive years have suicide rates peculiar to that cohort (Snowdon & Hunt, 2002), which they carry with them as they age. A cohort effect could arise as a result of the exposure of particular generations to factors during their development or early adult life that have a long-term impact on their risk of suicide throughout life (Gunnell et al, 2003). Often, cohort effects reflect the unique historical conditions experienced by a cohort, and the cohort's contribution to social change through the reinterpretation of cultural values, attitudes and beliefs (Bowling, 1997).

## PERIOD EFFECTS

### *War and Economic Recession*

In the late 1800s the effect of war on suicide rates was firstly identified by Emile Durkheim (1897/1951), who described low suicide rates and higher social integration during times of war when people were presumably united in a common cause. Moreover, during times of war, the degree to which individuals in a society are bound together in support of each other and against the common enemy typically increases (Durkheim, 1897/1951). High suicide rates were to be expected during times of economic dislocation and uncertainty. In accordance with this, various cohort analyses have identified a significant period effect where suicide rates in many countries rose sharply during the years of Great Depression

(1892-1933) and fell substantially during World War II (1940-1945) in a number of countries (Barnes et al, 1986; Newman & Dyck, 1988; Morrell et al, 2002).

Suicide rates among males during times of war also tend to decrease significantly due to their active participation in war actions and relative isolation from other events, which may be the possible origin of stress (Somasundaram & Rajadurai, 1995). As well as this, areas directly affected by war may experience significantly lower rates of suicide as opposed to those areas indirectly affected (Grubišić-Ilic et al, 2002). The method of suicide employed during wartime may also differ significantly. For example, during the war period in Croatia from 1991-1996, areas directly affected by war demonstrated a significantly greater number of suicides occurring through the use of weapons or explosive devices and by drowning, whereas in non-war areas a significantly greater percentage of suicides were by hanging and throwing in front of a car or train (Grubišić-Ilic et al, 2002).

Economic recession may significantly elevate suicide rates in many regions. For example, high suicide rates during economic recession in Japan were documented during the post World War II period, 1975-1990 (Goto et al, 1994). In times of economic recession unemployment might result in loss of identity and self-respect with suicide a possible outcome (Platt, 1984). Contrary evidence however was observed during the economic upswing in Finland between 1985-90, where an increase in suicide among both males and females was observed, followed by a subsequent decline in rates during economic recession from 1990-95 (Hintikka et al., 1999).

#### *Cohort Size and the 'Baby Boom Generation'*

Increased fertility rates and large birth-cohort sizes may result in an increased risk of suicide. Trends in fertility patterns prior to, during and following World War II resulted in different birth-cohort sizes that have posed an increased risk of suicide for individuals born into large cohorts. During the economic depression of the 1930s, low birth rates were observed, followed by an unexpectedly sharp increase in fertility in the 1950s, an equally unexpected and sudden drop in fertility in the mid-1960s, and a levelling-off of the decline and small increase in fertility during the 1980s. This has led to uneven age structures and contrasting cohort sizes in high-income nations (Calot and Blayo, 1982). Among high-income nations, the United States, Canada, Australia and New Zealand, and to a lesser

extent other European nations (Bourgeois-Pichat, 1981) experienced the greatest post-World War II increases in fertility (Lesthaeghe, 1983).

Apparently, the increased rate of fertility in the 20 years following World War II coincided with an increased rate of suicide, depression and substance abuse observed among individuals born during the post-war period, i.e. the 'baby-boom generation' (Klerman, 1988). This observation was confirmed in a study conducted of 18 high-income nations from 1953 to 1986 (Pampel, 1996). Generally across countries, suicide rates declined during the 1950s, reaching lowest levels in 1959, and then rose until 1986. Cohort size was found to increase the risk of suicide for the young and middle-aged, but reduced it for the older aged. As a result, large cohort size was found to be significantly associated with an increased risk of suicide, in that individuals born during the baby-boom era (1939-1945) experienced significantly elevated rates of suicide (Pampel, 1996).

The benefits and consequences of birth-cohort size (on suicide rates) have been speculated. On the one hand, some evidence suggests that large birth-cohorts may enjoy greater advantages in political expression and economic power, such as the ability to influence public policy and garner consumer resources (Preston, 1984), as opposed to smaller birth-cohorts. However, this may be at the social and economic detriment of individuals born into smaller successive birth-cohorts, with members of the previous larger cohort occupying most job positions (Preston, 1984).

On the other hand, it has been speculated that members of a large cohort face competition for increasingly scarce resources, such as a shortage of teachers and schools when young, labour market competition and unemployment in early adulthood, low pay and slow promotion during adulthood, and tight public retirement benefits in old age (Easterlin, 1978; 1987). These factors combined may increase the likelihood of late marriage, low fertility, alienation, divorce, homicide and suicide (Easterlin, 1978; 1987). On the contrary, smaller birth-cohorts may endure greater economic success, a more stable and satisfying family life, and lower rates of suicide (Easterlin, 1978; 1987).

### *Legislative Restriction of Suicide Means*

In many countries, the introduction of legal prohibitions on the availability of lethal means of suicide has resulted in period effects where subsequent decreases in suicide by sanctioned methods in all age groups were observed.

During the 1960s in both Australia and New Zealand, the prescription of barbiturates was increasing (Oliver & Hetzel, 1973), and peaked in 1968 when an estimated 27 million doses of barbiturates (excluding phenobarbitone) were prescribed (Clinical Services Letter, 1981). Legislation in Australia, which sanctioned the dosage of barbiturates prescribable to patients, was introduced in 1967 and coincided with a corresponding decline in suicide rates, particularly among females, suggesting that the availability of barbiturates was one of the determinants of female suicide during this period (Goldney & Katsikitis, 1983). Similarly, in New Zealand, barbiturate prescription also declined during the same period. However, warnings by the Department of Health on the dangers of barbiturates and the unwillingness of doctors to prescribe barbiturates to patients contributed to the decline as opposed to legislative influences. It was not until 1980 that legal sanctions were placed upon the prescription of barbiturates in New Zealand. Nonetheless, the effect of the reduced availability of barbiturates during the 1957-1986 period was evidenced by the decline in suicide by overdosing, and the increase in hanging and carbon monoxide poisoning among both males and females.

The introduction of gun control legislation in a number of societies has resulted in periodic decreases in suicide rates. Lester and Leenars (1994) investigated the effect on suicide rates following the introduction of Canada's Criminal Law Amendment Act in 1978 (Lester, 1993; Lester and Leenars, 1994). Suicide rates were found to decrease during the period following the introduction of the Act (1978-1985) compared to former rates between 1969-1976. Specifically, both the rate of suicide by firearms and the percentage of suicides using firearms showed a significant decrease, with the lowest rates observed in 1985. However, when age-specific suicide rates were investigated, the percentage of suicides using firearms decreased only for individuals aged 15-64 years, while it increased for those aged 65 years and older (Leenaars and Lester, 1997).

### *Media Coverage of Suicide*

Sensational media coverage of suicide and lethal means may contribute significantly to increase both the rate of suicide and the incidence of suicides that adopt the same method. In 1974, it was reported that the publication of suicide stories on the front page of the New York Times newspaper may have impacted upon increasing the suicide rate, by as much as 3% per average story published (Phillips, 1974). Evidence from a recent meta-analysis has found that the suicide of celebrity entertainers may have the greatest impact upon copycat suicides in the mass public, presenting a 14.3 times higher risk of copycat effect (Stack, 2002). However, the extent to which suicides depicted in mass media may result in copycat effects may be mediated by age. For example, age categories can be related to level of social integration and other suicidogenic conditions, making categories high or low in suicidal moods. Young (15 to 35 years) and old (more than 65 years) groups are receptive to suicide stories and copycat effects, but middle-aged groups are not (Phillips & Carstensen, 1988; Stack, 1991). Middle-aged people may be shielded because they are highly integrated into society by having the highest incomes, strongest ties to marriage and family, lowest unemployment rate, and holding most of the power positions in society (Stack, 1991). Whereas younger cohorts may experience a higher incidence of suicidogenic conditions such as unemployment, high marital instability and low religiosity (Stack, 1991). However, the copycat effect is greatest for the elderly, a group with a high rate of suffering in terms of physical illness, economic pressures, and loss of significant others through death (Stack, 1991).

The role of the media in influencing the choice of a given suicide method is also pertinent. For example, in 1774, the published novel 'The Sorrows of Young Werther' written by Johann Wolfgang von Goethe depicted a hero who finally shot himself after a sentimental, hopeless love affair. Following the launch of the novel, a vast imitation effect was observed, which led to an increase in suicide of the same type. As a result, authorities in Denmark, Saxony and Milan banned the book (Phillips, 1974). In England, during the week after the broadcasting of an episode of the soap opera 'Eastenders', in which a leading female character took an overdose, an increased number of patients were admitted to the hospital having taken an overdose (Ellis & Walsh, 1986).

During 1984 and 1985, the number of deaths that resulted from drinking the poisonous parquat in Japan increased dramatically from 594 to 1021. Among the 1021 deaths in 1985,

96.5% were suicides (National Police Agency, 1986). The sharp increase in suicide by paraquat was attributed to the extensive media presentation of a criminal act in which 17 innocent victims consumed soft drinks from vending machines contaminated by paraquat. Following this period of sharp increase, the misuse of paraquat was addressed through national policy in 1986, and since then, the restricted availability of the agent generated a consequent decline in suicides employing this method.

#### *Adverse psychosocial problems among youth*

Up to the mid 1990s, the rate of suicide among youth has increased particularly among males, and more so in Australia, New Zealand, Canada and the United States (Gulbinat, 1995). Such increases in youth suicide may have reflected the combination of societal changes that have occurred in most developed societies since the end of World War II (Lynskey et al, 2000). In Australia, for example, the increasing rate of suicide among individuals born from 1964 to 1969, 1970 to 1984, and 1985 to 1997 (with the most elevated suicide risk observed among those aged 19-24 years), may have reflected period effects associated with increased psychosocial problems, including affective disorders (Cross National Collaborative Group, 1992; Fombonne, 1995), antisocial behaviours (Robins et al, 1991; Smith, 1995), and substance use disorders (Hall et al, 1999; Silbereisen et al, 1995). Similarly in the United States, significant evidence suggests that coming to maturity in the period 1960-1975 seems to have had an adverse impact on the likelihood of depressive illness, drug abuse and alcoholism (Klerman, 1988). Social and economic problems, and biological and environmental risk factors (e.g. genetic predisposition) were thought to interact with familial factors, changes related to year of birth, and gender to increase the rates of depression among more recent birth-cohorts in the United States (Klerman, 1988).

#### *Limitations of Studies*

Studies that have been conducted to investigate the effect of periods on suicide rates are faced with several methodological difficulties. In a number of countries, official suicide rates may be grossly underestimated and the degree of under-reporting may vary between

jurisdictions and within and between countries. Inquiry into suicidality among the population may be significantly limited by the reluctance of individuals to provide personal information regarding suicidal behaviour due to the social stigma and (in some regions) legal and religious sanctions that prohibit suicide. Thus, suicides are often underreported in legal and medical departments. As a result, the determination of period effects across ages and population groups may be severely hindered by the inability to derive reliable data on a representative sample of the general population. In addition, the observation of period and cohort effects between genders may be complicated by the fact that the prevalence of suicide among females is markedly lower than that of males, and difficulty ascertaining fluctuations in rates based on few events may subsequently render an unclear indication of such effects upon female suicide rates (Gunnell et al, 2003).

## COHORT EFFECTS

A number of epidemiological studies have investigated cohort effects on suicide rates over time to determine whether birth-cohorts could carry with them their increased predisposition to suicide as they age. However, major methodological difficulties have hampered the findings of many studies that have investigated cohort effects and suicidal behaviour. For example, the incongruity of successive birth-cohort sizes selected for analysis between studies (e.g. 5-year, 8-year and 10-year intervals between successive birth-cohorts) thus far has rendered the results of cohort studies in different countries and regions mostly incomparable. As well as this, cohort effects are often studied in conjunction with the impact of age (such as the increasing risk of suicide with age) and period on suicide rates (Murphy et al, 1986; Skegg & Cox, 1991; Solomon & Hellon, 1980). Additional methodological difficulties associated with studies investigating age-period-cohort (APC) effects on suicide rates relate to the different statistical analysis techniques that have been employed in different studies, particularly for those that have applied Poisson Regression Modelling to investigate this (La Vecchia et al, 1986; Lynskey et al, 2000; Newman & Dyck, 1988; Surtees & Duffy, 1989). As a result, many inherent problems are associated with cohort studies because each of the three dimensions, namely age, period and cohort, are a function of the other two, so that independent effects are difficult to distinguish (Snowdon & Hunt, 2002). This difficulty is referred to as the 'identification problem'.

Nonetheless, a number of studies have investigated the influence of cohort effects on suicide rates over time, with an element of commonality among findings from studies conducted between countries. National mortality data obtained up to the early 1990s for the United States (Murphy & Wetzel, 1980), Canada (Solomon & Hellon, 1980), Italy (La Vecchia et al, 1986), New Zealand (Skegg & Cox, 1991), Spain (Granizo et al, 1996), Sweden (Allebeck et al, 1996), Belgium (Moens et al, 1987), and England and Wales (Gunnell et al, 2003) have depicted, through different analytical approaches and statistical techniques, a pattern where, at least up until the 1970 birth-cohort, each successive post-war cohort of males has experienced a higher suicide rate than its predecessor. Indications of these findings suggest that if such trends were to continue into middle- and old-age they would lead to a great increase in overall male suicide rates. On the other hand, the analysis of successive Danish birth-cohorts, up to 1971 births, found no evidence of a cohort effect (Bille-Brahe & Jessen, 1994). This is similar to earlier findings obtained from a study of Australian cohorts under the age of 45 years (Goldney and Katsikitis, 1983), where limited evidence of a cohort effect, except in the youngest (1955 and 1960) birth-cohorts were identified. In a more recent study of data from the Australian Bureau of Statistics, the influence of cohort effects on suicide rates in New South Wales, Australia, during the period 1865-1998 (Morrell et al, 2002) was investigated. Age-specific suicide rates over time were the highest for males aged 60 years or older for most of the period studied, but declined steadily since reaching a peak of more than 100 per 100,000 in the 1890s. Suicides among young male age groups (15-19, 20-24 years) tended to remain mostly stable during the period leading up to World War II, but have steadily increased, particularly in the 20-24 year age group thereafter. Hence, after controlling for age and period together, an increasing cohort effect was identified among male suicides in cohorts born after 1935-1939, and increases in youth suicide rates in New South Wales since the 1960s are more likely to be the result of external periodic effects (Morrell et al, 2002). Additionally, Snowdon and Hunt (2002) observed similar findings of the impact of cohort effects on suicide rates in Australia as a whole.

The influence of cohort effects on suicide rates among women however, is less clear. A decline in the suicide rates of successive post-war birth-cohorts in Britain has been observed (Surtees & Duffy, 1989), compared to observed increases in successive female birth-cohorts in the United States (Murphy & Wetzel, 1980), Canada (Solomon & Hellon, 1980), Belgium (Moens et al, 1987) and, to a lesser extent, Australia (Goldney & Katsikitis,

1983). In New South Wales, Australia, over the period 1865-1998, Morrell et al (2002) also found that suicide rates tended to remain relatively stable during the 1800s, until increasing during the sanctioning of the prescription of sedatives during the 1960s. Accordingly, increases among more recent female birth-cohorts in young age groups and decreases in older age groups were observed (Morrell et al, 2002). No significant cohort effects have been observed in investigations undertaken in New Zealand (Skegg & Cox, 1991), Denmark (Bille-Brahe & Jessen, 1994), Italy (La Vecchia et al, 1986), Sweden (Allebeck et al, 1996) or England and Wales (Gunnell et al, 2003).

#### *Impact of the Detoxification of Domestic Gas, 1963*

Prior to the early 1960s, carbon monoxide poisoning was one of the most popular methods of suicide, particularly among the middle-aged and older aged populations. However, the (international) conversion of domestic gas to a methane-based product during the 1960s resulted in the decline of deaths by suicide by this method, with a particularly dramatic reduction in carbon monoxide poisoning among older age groups (Farberow & Simon, 1969; Murphy et al, 1986; Whitlock, 1975). Following the introduction of legislation in England and Wales, a decline of suicide rates among successive cohorts over 45 years of age in 1980, especially among men, was observed. Compared to older age groups, youth tended to substitute the no-longer-available suicide method of gas poisoning with other forms of poisoning, mostly drug overdoses, whereas older aged individuals were not inclined to adopt alternative suicide methods. Hence, the apparent unwillingness of cohorts over 45 years of age to adopt alternative suicide methods, paralleled with a subsequent and dramatic decline in suicide in this age group, was referred to as a 'maturity-onset' factor that seemed to be capable of exerting a lasting influence on suicide rates in the right circumstances, thus creating the observed cohort effect (Murphy et al, 1986).

#### *Possible Explanations for Birth-cohort Effects*

Cohort effects observed in rates of suicide could reflect the long-term impact of changing levels of exposure in childhood or early adulthood to particular environmental influences on long-term mental health status (Gunnell et al, 2003). For example, increasing levels of

parental separation (Agid et al, 1999), increased substance misuse (Christophersen et al, 1998), or changes in the labour market such as increased female participation (Platt & Hawton, 2000) represent environmental factors that recent generations are exposed to, which may have a long-term impact on the risk of suicide throughout life.

Corresponding increases in substance abuse and other psychiatric disorders may be associated with higher rates of suicide among successive birth-cohorts since the 1970s. For example, in Australia, the successive increases in drug overdose observed, whereby the rate of overdose in the 1975-1979 cohort was approximately 20 times higher than the corresponding rate for the 1940-1944 cohort, may reflect a cohort effect dependent on historical changes in recent cohorts' exposure to heroin use (Hall et al, 1999). However, changes to the purity of heroin and the propensity for illicit drugs to be 'cut' with toxic substances, and the increasing accessibility of a number of other drugs, particularly prescription medications, may also have contributed to the successive increase in drug overdose in Australia. In the United States, increasing cumulative rates of depressive illness and, particularly, earlier age of onset among each successive birth-cohort in the twentieth century has been observed (Klerman et al, 1985). Specifically, it has been found that cohorts born after 1936, who reached their adulthood after World War II, have early age of onset and higher rates of depression than the cohorts born earlier in the century (Regier et al, 1984). Important cohort effects with regard to drug abuse have also been observed among the 'baby-boom' generation (Fowler et al, 1986; Murphy et al, 1986). However, the perception that the overall rates of psychiatric disorders may be increasing over time may be skewed by a number of other factors, such as changes in official diagnostic and classification systems for mental disorders, the growing number of mentally ill older aged persons and by the enormous increase in life expectancy. Reducing rates of stigma associated with mental illnesses in some countries may also result in the number of individuals who seek professional assistance, which may affect the perceived as opposed to the actual prevalence of psychiatric conditions over time.

Changing trends in the motives and methods of suicide may have fashioned a cohort effect in some regions of the world. In Micronesia (the United States Trust Territory of the Pacific Islands), the epidemic-like increases in adolescent suicide rates of successive birth-cohorts since 1960 (post-war generation), particularly among males aged 15-24 years, represent the influence of a cohort effect that has culturally patterned motives and methods

which are now characteristic of this age group (Rubinstein, 1983). This has been attributed to differences in the socialisation of adolescents prior to and following World War II. Prior to World War II in Micronesia, traditional adolescent socialization consisted of village-level subsistence activities organized around communal lineage-houses. Hence, socialization in addition to that provided by the family served as a cultural solution to the residential and psychological distance that, after having progressed through puberty, males maintained from their families. Whereas after the conclusion of World War II, communal village organisation in Micronesia largely disintegrated, resulting in adolescent socialization functions being absorbed by the nuclear family (Rubinstein, 1983). Thereafter, consequent outcomes of domestic discord were the primary social triggers for adolescent suicide (Rubinstein, 1983).

Another explanation for peculiarities in suicide rates among birth-cohorts may relate to the popularity of a particular method of suicide in successive generations (Gunnell et al, 2003). For example, it is possible that the increased rates of suicide in successive male birth-cohorts in the United Kingdom may be attributable to a greater preference for hanging as a method of suicide, which, as opposed to other common methods such as overdose and carbon monoxide poisoning, is usually more fatal (Pounder, 1993). In addition, the media portrayal of particular methods of suicide may contribute to developing a (societal) preference for specific suicide methods. The expanding availability and accessibility of knowledge about lethal suicide methods via the Internet may also contribute to increased rates of suicide, particularly among younger generations.

Suicide in youths may also be influenced by the portrayal of idealistic lifestyles through media sources that may invoke unrealistic expectations of life and a distorted perception of reality. Such incongruence between expectation and reality among youth may increase suicide risk (Gunnell et al, 2003). As well as this, the media portrayal of suicide as a common and acceptable solution to overcoming life problems (cultural normality) may in turn impact upon the attitudes of young people and increase the likelihood that younger generations will consider ending their own life in times of turmoil, thus increasing the rates of suicide (Gunnell et al, 2003).

# CONCLUSIONS

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This report shows that Australia has observed declining trends in suicide mortality among males and females across all age groups since 1997 and earlier in some age groups (e.g. late adulthood). However, these declines have been seen in most countries in the world. While declines in Australia have been more marked than in other New World nations (New Zealand, Canada, and United States), suicide rates in these countries were declining for several years before Australia.

National suicide prevention strategies appear to have had limited impact on recent trends in suicide mortality. The introduction of national suicide prevention strategies has not significantly altered national suicide rates or trends, with the possible exception of Finland. Furthermore, recent declines in suicide have occurred both in countries with strategies (e.g. Australia, Finland) and without strategies (eg. Ireland, United States, Netherlands). The introduction of mental health plans and substance abuse policies has also shown no consistent impact on suicide mortality. While mental health plans and substance abuse policies address significant risk factors for suicide, neither specifically targets suicide prevention as an outcome.

The analysis presented in this report is by no means conclusive and has a number of limitations. A stronger analysis of the impact of strategies on suicide mortality could be conducted in 5 to 10 years time, once data are available for countries in which strategies are now be introduced (e.g. New Zealand, Germany, United States, the United Kingdom). However, this analysis will still not provide a valid indication of the components that should be included in a national strategy. On the basis of this report the following conclusions are drawn:

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## **SUBSTANCE USE**

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Substance abuse appears a particularly important risk factor for suicide. However, alcohol is likely to have the greatest impact on suicide trends because, unlike other psychoactive substances, it is used by a large majority of the population. Even though alcohol may be instrumental in suicide across all countries, alcohol may only be a significant problem in some countries, particularly those in which binge drinking and alcohol dependence is common. The failure of substance abuse policies to have a significant impact on suicide rates may reflect the relative importance of substance abuse as a risk factor for suicide in different countries. Substance abuse policies may also have limited impact on suicide mortality because these policies typically address the abuse of illegal substances rather than alcohol.

Alcohol was identified as a particularly relevant risk factor for suicide in Finland and given prominence in their suicide prevention strategy. Finland was the only country to show a potential impact of a national strategy on suicide rates in this report. Furthermore, previous analysis has shown that the lower consumption of alcohol in Russia during Perestroika may have contributed to a reduction in suicide mortality. It is therefore recommended that the importance of substance abuse as a risk factor for suicide should be investigated in Australia, with particular attention given to alcohol use. If such an investigation identifies alcohol as a relevant factor for suicide in Australia, more consideration should be given to addressing the problem within the national suicide prevention strategy.

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## **DETECTION AND TREATMENT OF DEPRESSION**

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The detection and treatment of mental illness is a cornerstone of most suicide prevention strategies and considerable responsibility is often placed upon General Practitioners in this regard. The need for this component is well supported by research showing that up to 90% of individuals who complete suicide have at least one diagnosable mental illness, usually depression. While this component should remain in national strategies, the reliance of general practitioners on antidepressants in the treatment of suicidal individuals may be unsound. Several studies have failed to support the efficacy of antidepressants in the

prevention of suicide among depressed samples (Hirsch et al., 1982; Khan et al., 2003; Montgomery et al., 1983), although their benefit in treating depression is well recognised. Greater consideration should be given to the psychosocial factors (e.g. financial, unemployment, interpersonal difficulties, marital separation), which are particularly common among the depressed and highly influential in suicide. The combined use of antidepressants and psychosocial interventions may be a more promising approach. This could be achieved through greater coordination between general practitioners and allied health professionals (e.g. psychologists, social workers, psychiatric nurses) in the treatment of high-risk individuals.

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## **UNEMPLOYMENT**

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There is mixed evidence regarding the impact of unemployment on suicide. However, studies seem to indicate that unemployment is a risk factor for suicide, particularly among the young. Recent loss of employment appears to be more important in this respect than chronic unemployment. Greater emphasis on unemployment should be given consideration in national strategies, particularly during time of economic recession, and in interpreting the effects of national strategies on trends.

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## **EFFICACY OF SUICIDE PREVENTION ACTIVITIES**

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The lack of evidence supporting any particular approaches to suicide prevention is a particular concern (De Leo, 2002b; Gunnell & Frankel, 1994; Hawton et al., 1998). Although there are potentially promising approaches to suicide prevention (e.g. restricting access to means, detection and treatment of depression, problem solving therapy, emergency access cards, dialectical behaviour therapy, and neuroleptic medication), none have been systematically investigated. Investment in scientifically valid investigations (eg. randomised control trials) to assess the efficacy of specific suicide prevention activities or packages of activities is imperative. These investigations will lead to more refined and targeted activities. In the absence of such investigations, valuable financial and organisational resources may be wasted and the impetus for suicide prevention may be lost.

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