

Suicides and serious suicide attempts: two populations or one?

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ABSTRACT

Background. Few studies have examined the extent to which populations of suicides and attempted suicides are similar, or different. This paper compares suicides and serious suicide attempts in terms of known risk factors for suicidal behaviour.

Methods. Using case-control methodology, risk factors for suicidal behaviour were examined in 202 individuals who died by suicide, 275 individuals who made medically serious suicide attempts and 984 randomly selected control subjects. Based on data from significant others, measures used spanned sociodemographic factors, childhood experiences, psychiatric morbidity and psychiatric history, exposure to recent stressful life events and social interaction.

Results. Multiple logistic regression identified the following risk factors that were common to suicide and serious suicide attempts: current mood disorder; previous suicide attempts; prior out-patient psychiatric treatment; admission to psychiatric hospital within the previous year; low income; a lack of formal educational qualifications; exposure to recent stressful interpersonal, legal and work-related life events. Suicides and suicide attempts were distinguished in the following ways: suicides were more likely to be male (OR = 1.9, 95% CI 1.1, 3.2); older (OR = 1.03, 95% CI 1.02, 1.04); and to have a current diagnosis of non-affective psychosis (OR = 8.5, 95% CI 2.0, 35.9). Suicide attempts were more likely than suicides to have a current diagnosis of anxiety disorder (OR = 3.5, 95% CI 1.6, 7.8) and to be socially isolated (OR = 2.0, 95% CI 1.2, 3.5). These findings were confirmed by discriminant function analysis, which identified two functions that described the three subject groups: the first function discriminated the two suicide groups from control subjects on a dimension corresponding to risk factors for suicide; the second function discriminated suicide from suicide attempt subjects on a series of factors including gender, non-affective psychosis and anxiety disorder.

Conclusions. Suicides and medically serious suicide attempts are two overlapping populations that share common psychiatric diagnostic and history features, but are distinguished by gender and patterning of psychiatric disorder.

INTRODUCTION

Since the work of Stengel & Cook in 1958 there has been continuing interest in the extent to which those who die by suicide and those who make serious suicide attempts represent the same population of individuals who differ merely in the lethality of the suicide attempt, or whether they form two populations distinguished by

differing aetiological factors. Despite continued interest in this question, it appears that few studies have attempted to address this issue by examining similarities and differences between those dying by suicide and those making serious suicide attempts.

None the less, the available evidence suggests some differences between the two groups. For example, the excess of males among suicides has long been noted (Stengel & Cook, 1958; Dorpat & Boswell, 1963; Dorpat & Ripley, 1967; Linehan, 1981, 1986), and a number of authors

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have speculated that suicides may be distinguished from attempted suicides in terms of a series of risk factors including: age (suicides older than attempted suicides); intent to die (stronger in suicides than attempted suicides); lethality of method used (more lethal in suicides); the extent of depressive pathology (more extensive in suicides); the extent of hopelessness (more extensive in suicides), and the extent of impulsive suicidal behaviour (more extensive in attempted suicides) (Stengel & Cook, 1958; Dorpat & Boswell, 1963; Motto, 1965; Dorpat & Ripley, 1967; Beck *et al.* 1974; Pallis & Sainsbury, 1976; Kreitman, 1977; Lester *et al.* 1979; Farmer, 1980; Linehan, 1981, 1986; Pallis *et al.* 1982; Michel, 1987).

Against this background, this paper reports findings from a case-control study of a consecutive series of 202 individuals who died by suicide, a consecutive series of 275 individuals who made medically serious, but non-fatal, suicide attempts, and a control series of 984 randomly selected control subjects.

This research design makes it possible: to examine risk factors for suicide and for serious suicide attempts, and to compare the similarity of the risk factors between the two groups; and, to compare suicides and serious suicide attempts to determine the extent to which there are differences between the two groups in terms of known risk factors for suicidal behaviour. More generally, the aims of the paper were to identify the social, familial, individual and psychiatric factors associated with serious suicide attempts and suicide, and to examine the extent to which suicides and attempted suicides differed in their exposure to these factors.

METHOD

The Canterbury Suicide Project is a case-control study of suicide (202 cases), medically serious suicide attempt (302 cases) and 1028 randomly selected control subjects of all ages. This paper compares characteristics and risk factors for suicide and serious suicide attempts among those subjects from this study for whom data was available from interviews with 'significant others' (individuals who knew the subjects well). Significant others were used as the source of information in order to provide a similar basis for comparison for all three subject groups. A

previous paper from this study has suggested that the risk factors associated with serious suicide attempts were similar, irrespective of whether these risk factors were assessed on the basis of self-report or significant other report (Beautrais *et al.* 1999). These findings are clearly suggestive of the fact that significant other reports do have predictive validity in the area of suicidal behaviour.

Subjects

Suicides

Suicides were a consecutive series of 202 individuals of all ages who received coroners' verdicts of suicide from 1991 to 1995, in the Christchurch city and Canterbury region in New Zealand. Christchurch city has a population of 315000 and the Canterbury region has a population (including Christchurch city) of approximately 430000. In New Zealand, all suspected suicides are investigated by a district coroner, who has the power to order an autopsy and to gather all information necessary to reach a verdict on cause of death. During the study period, 217 individuals died by suicide; the families of 202 agreed to participate in the study, giving a response rate of 93.1%.

Age, gender and method of suicides

Of the 202 individuals who died by suicide, 157 (77.7%) were men and 45 (22.3%) were women. The mean age of those who died by suicide was 36.8 years (s.d. = 16.2 years, range = 14–88 years) (men, mean = 35.6 years, s.d. = 15.6 years, range = 14–87 years; women, mean = 40.9 years, s.d. = 17.6 years, range = 15–88 years). The major methods of suicide were: vehicle exhaust gas (36.1%; $N = 73$); hanging (29.2%; $N = 59$); self-poisoning (13.9%; $N = 28$); and firearms (11.4%; $N = 23$).

Medically serious suicide attempts

Cases were a consecutive series of 275 individuals of all ages who made medically serious suicide attempts during 1991 to 1994, in the Christchurch city and Canterbury region. A medically serious suicide attempt was defined as one that required hospital admission, via the sole regional Emergency Department at Christchurch Hospital, for > 24 h and met one of the following treatment criteria: (i) treatment in specialized units including the Intensive Care

Unit, the Hyperbaric Unit and the Burns Unit: (ii) surgery under general anaesthesia (superficial cuts that did not require surgical repair were excluded); (iii) extensive medical treatment (beyond gastric lavage, activated charcoal, or routine neurological observations) including antidotes for drug overdoses, telemetry or repeated tests or investigations. In addition, individuals who attempted suicide by methods with a high risk of fatality, specifically, hanging or gunshot, who were hospitalized for more than 24 h but did not meet the preceding treatment criteria, were also included in the group of persons with serious suicide attempts.

Cases were identified by daily calls to the Emergency Department, Psychiatric Emergency Service, and relevant admitting wards. Independent checks with all three locations provided a daily triple-check to ensure identification of all eligible cases. In total, 317 individuals made serious suicide attempts during the study period. Of these, 302 agreed to participate in the study, with 275 agreeing to interview information being obtained from a significant other, giving a response rate of 91.1% for significant other informants.

Age, gender and method of medically serious suicide attempts

Of the 275 individuals who made serious suicide attempts, 124 (45.1%) were men, and 151 (54.9%) were women. The mean age of those making serious suicide attempts was 30.0 years (S.D. = 14.2, range = 13–88) (men, mean = 29.6 years, S.D. = 13.9, range = 13–88; women, mean = 30.2 years, S.D. = 14.5, range = 13–81). The majority of serious suicide attempts involved self-poisoning (78.2%; $N = 236$). Other methods included: vehicle exhaust gas (9.3%; $N = 28$); cutting or stabbing (6.3%; $N = 19$); and hanging (3%; $N = 9$).

Control subjects

Control subjects were selected from electoral rolls for the Canterbury region. An age and gender stratified sample was obtained: the six age strata were 18–24 years; 25–29 years; 30–39 years; 40–49 years; 50–59 years; and 60 years and older. The number of subjects in each age-by-gender stratum was proportional to the known age-by-gender distribution of the population aged 18 years and older. In total, 1200

subjects were selected for the control group, 1028 agreed to participate in the study, with 984 agreeing to interview information being obtained from a significant other. The estimated response rate for significant other informants for the control sample was therefore 82%.

National Electoral Roll Office estimates suggested 95.5% of the eligible population were enrolled on Canterbury electoral rolls during the data collection period of the study. Subjects selected from electoral rolls were mailed a letter of introduction explaining the study. The study interviewer then called at subjects' homes, discussed the study, and arranged to return to the home to conduct an interview with the subject at a convenient time. Each subject was asked to nominate a significant other who knew him/her well. This individual was then contacted and interviewed, in person, by the study interviewer.

The study was approved by the ethics committees of the Canterbury Area Health Board and the Southern Regional Health Authority. Written informed consent was obtained from all study participants after the aims and procedures of the study had been fully explained.

Data collection

For all cases and control subjects, trained, experienced interviewers personally conducted a semi-structured interview with a significant other, to retrospectively construct a life history and to obtain information about potential risk factors for suicidal behaviour. For all three subject groups, significant others were predominantly close family members (including spouse or partner, parents, siblings or children) (suicides, 95%; serious suicide attempts, 77.9%; control subjects 75.3%).

Measures

The following measures were used in the present analysis. (These variables were selected from a much larger data set in preliminary analysis. In the interests of brevity, only those measures that made significant contributions to risk of suicide or serious suicide attempts are included here.)

Sociodemographic measures

The following measures were used: low income, i.e. < \$NZ20000 p.a. (after tax, annual income during the year prior to interview); no formal

Table 1. *Logistic regression analysis for comparison of suicides and control subjects*

Risk factor (%)	Suicides (N = 202)	Control subjects (N = 984)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Psychiatric factors				
DSM-III-R diagnosis in prior month				
Mood disorders	56.4	6.7	18.1*** (12.4, 26.2)	10.9*** (6.5, 18.5)
Substance use disorders	31.2	10.0	4.1*** (2.9, 5.9)	NS
Anxiety disorders	6.9	5.1	NS	NS
Eating disorders	2.5	0.3	8.3** (2.0, 35.0)	NS
Non-affective psychosis	5.9	0.2	31.0*** (6.9, 139.7)	7.3** (1.1, 47.4)
Lifetime history of antisocial behavior	14.9	4.3	3.9*** (2.4, 6.4)	NS
Previous suicide attempts	17.3	1.0	20.4*** (9.9, 42.0)	9.5*** (3.0, 29.7)
Psychiatric hospital admission in prior year	17.3	0.3	68.5*** (20.8, 225.4)	21.9*** (4.8, 99.7)
History of out-patient psychiatric treatment	58.4	16.0	7.4*** (5.3, 10.3)	NS
Sociodemographic and psychosocial factors				
Male	77.7	48.4	3.7*** (2.6, 5.3)	7.8*** (4.4, 13.6)
No formal educational qualifications	41.6	26.6	2.0*** (1.4, 2.7)	2.1** (1.3, 3.4)
Low income	63.9	35.7	3.2*** (2.3, 4.4)	2.9*** (1.8, 4.6)
Poor parental relationship during childhood	30.7	11.5	3.4*** (2.4, 4.9)	2.3** (1.3, 4.0)
Recent stressful interpersonal life events	69.3	27.5	5.9*** (4.3, 8.3)	2.7*** (1.7, 4.4)
Recent stressful legal life events	16.3	1.2	15.8*** (8.0, 31.2)	5.4*** (2.3, 12.8)
Recent stressful work related life events	36.1	15.5	3.1*** (2.2, 4.3)	2.5** (1.5, 4.2)

** $P < 0.0025$; *** $P < 0.0001$; NS $P > 0.0025$.

educational qualification (no secondary school, tertiary or trade qualification).

Childhood measures

The following measures were used (with childhood defined, for all measures, as the period up to 16 years): parental separation or divorce; poor parental relationship (subjects were classified as having a poor parental relationship if their parents got along together either 'not very well' or 'poorly').

Stressful life events

The short list of Threatening Life Experiences (Brugha *et al.* 1985) was used as a basis to evaluate life events that had occurred during the previous year. For the purposes of the present analysis, measures of life events were classified into a series of categories of related events that

included: serious interpersonal difficulties including separation or divorce; serious financial problems; serious problems with the law or with police; serious work related stresses or problems.

Psychiatric morbidity

The interview for each subject included a modified version of the SCID interview (Spitzer *et al.* 1988) to generate DSM-III-R diagnoses (American Psychiatric Association, 1988) of selected mental disorders. The information was integrated in a diagnostic conference (which always included the principal investigator (A. B.) and at least one psychiatrist (P. J. or R. M.) to produce, for each subject, best estimate diagnoses of mental disorders (according to DSM-III-R criteria). In the present analysis the following diagnostic groupings, for disorders in the month prior to the suicide event (or

Table 2. Logistic regression analysis for comparison of serious suicide attempts and control subjects

Risk factor (%)	Serious suicide attempts (<i>N</i> = 275)	Control subjects (<i>N</i> = 984)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Psychiatric factors				
DSM-III-R diagnosis in prior month				
Mood disorders	78.2	6.7	49.8*** (34.1, 72.9)	17.6*** (10.4, 29.6)
Substance use disorders	38.9	10.0	5.8*** (4.2, 7.2)	NS
Anxiety disorders	23.3	5.1	5.7*** (3.8, 8.4)	NS
Eating disorders	7.6	0.3	27.0*** (8.0, 91.4)	NS
Lifetime history of antisocial behaviour	30.9	4.3	10.0*** (6.7, 15.0)	NS
Previous suicide attempts	23.6	1.0	30.1*** (15.2, 59.6)	14.2*** (4.7, 43.1)
Psychiatric hospital admission in prior year	22.9	0.3	97.2*** (30.2, 312.4)	15.0** (3.2, 71.4)
History of out-patient psychiatric treatment	70.9	16.0	7.4*** (5.3, 10.3)	NS
Sociodemographic and psychosocial factors				
Age	(Mean age, 30.0 years)	(Mean age, 43.5 years)	—	1.04*** (1.02, 10.5)
No formal educational qualifications	53.8	26.6	2.0*** (1.4, 2.7)	3.0*** (1.8, 5.0)
Low income	72.0	35.7	3.2*** (2.3, 4.4)	3.5*** (2.1, 5.8)
Recent stressful interpersonal life events	74.9	27.5	5.9*** (4.3, 8.3)	2.2** (1.3, 3.6)
Recent stressful legal life events	18.9	1.2	15.8*** (8.0, 31.2)	3.6* (1.4, 9.5)
Recent stressful work related life events	38.2	15.5	3.1*** (2.2, 4.3)	2.8** (1.6, 4.8)
Low social contact	36.4	5.8	9.3*** (6.5, 13.4)	2.8** (1.5, 5.2)

* $P < 0.05$; ** $P < 0.005$; *** $P < 0.0001$; NS $P > 0.05$.

Table 3. Logistic regression analysis for comparison of suicides and serious suicide attempts

Risk factor (%)	Suicides (<i>N</i> = 202)	Serious suicide attempts (<i>N</i> = 275)	Unadjusted ORs (95% CI)	Adjusted ORs (95% CI)
Psychiatric factors				
DSM-III-R diagnosis in prior month				
Anxiety disorder	6.9	23.3	4.1*** (2.2, 7.5)	3.5** (1.6, 7.8)
Non-affective psychosis	5.9	1.1	5.7** (1.6, 20.6)	8.5** (2.0, 35.9)
Demographic and psychosocial factors				
Mean age (years)	36.8	30.0	—	1.03*** (1.02, 1.04)
Male	77.7	45.1	4.2*** (2.8, 6.4)	1.9* (1.1, 3.2)
Poor social contact	22.8	36.4	1.9** (1.3, 2.9)	2.0* (1.1, 3.5)

* $P < 0.05$; ** $P < 0.005$; *** $P < 0.0001$.

interview) were used: mood disorders (including major depression, bipolar I, bipolar II disorders); substance use disorders (alcohol, cannabis, other psychoactive substance abuse or dependence); anxiety disorders (panic disorder, agoraphobia, obsessive-compulsive disorder, simple phobia, social phobia); eating disorders (anorexia nervosa, bulimia nervosa); non-affective psychosis (schizophrenia, schizoaffective disorder, psychotic disorder not otherwise specified). For antisocial disorder (conduct disorder or antisocial personality disorder) a lifetime history was obtained. Multiple diagnoses were permitted on Axis I.

The reliability of the best estimate diagnostic procedure was ascertained by a re-evaluation of a random sample of 20% of all cases and comparison subjects. The test-retest agreement was high with kappa coefficients (Fleiss, 1981) for the principal diagnostic categories (mood disorders, substance use disorders, anxiety disorders, eating disorders, non-affective psychosis, antisocial disorders) ranging from 0.95 to 0.99.

Mental health history

The following measures were used: previous suicide attempt (a lifetime history of at least one previous suicide attempt); psychiatric hospital admission within the previous year (at least one admission to a psychiatric hospital or substance abuse clinic during the previous year); out-patient psychiatric care (lifetime history of out-patient psychiatric treatment).

Social interaction

The Interview Schedule for Social Interaction (ISSI) (Henderson *et al.* 1980) was used as a basis to evaluate the extent of current social interaction. For the purposes of this analysis the measure was dichotomized to give measures of high and low social interaction.

Statistical analysis

Data were analysed as three case-control designs. The first case-control analysis compared suicides and control subjects (Table 1); the second analysis compared serious suicide attempts and control subjects (Table 2), and the third compared suicides and serious suicide attempts (Table 3). For each case-control analysis estimates of unadjusted and adjusted odds ratios (ORs) and 95% confidence intervals

(CI) are reported. Estimates of the adjusted ORs were obtained by fitting logistic regression models in which all variables shown in the analysis were included in the model. The parameters and standard errors of the logistic regression model were transformed (by exponentiation) to produce corresponding estimates of the adjusted ORs and 95% CIs. In all cases where tests of significance are reported these are based upon the chi-squared test of independence (for unadjusted results) or the log likelihood chi-square (for adjusted results). Finally, to examine the differences among the three groups (suicides, suicide attempts, controls) the data were analysed using discriminant function analysis.

RESULTS

Factors associated with suicide

Table 1 compares the 202 suicides and 984 control subjects on a series of measures of sociodemographic background, childhood and family factors and current psychiatric diagnoses and history. For ease of interpretation all factors were expressed in dichotomous form and the association between suicidal status (case/control) and each risk factor is described by the odds ratio (OR) and 95% confidence interval (CI). The table also reports adjusted ORs. Age, measured in years, and gender were included in all analyses. Because the unadjusted results involve multiple comparisons a Bonferroni-corrected significance of $P < 0.0025$ was used for Tables 1 to 3 (Grove & Andreasen, 1982). (It should be noted that since the adjusted results take account of the multivariate distribution of the data a Bonferroni-corrected P value is not appropriate for these.)

Table 1 shows that risks of suicide were related to a series of factors that included mental disorders and sociodemographic and psychosocial factors. The individual's current psychiatric state and history of psychiatric disorder proved to be the strongest predictors of case status with the significant predictors including: current mood disorder (OR = 10.9; CI 6.5, 18.5); current non-affective psychosis (OR = 7.3, CI 1.1, 47.4); previous suicide attempt (OR = 9.5; CI 3.0, 29.7); psychiatric hospital admission in the preceding year (OR = 21.9; CI 4.8, 99.7); history of out-patient psychiatric treatment (OR = 1.9; CI 1.1, 3.2). These results

convey the clear impression that those who died by suicide had higher rates of current disorders, notably, mood disorders and non-affective psychosis, and higher rates of previous psychiatric care and contact.

In addition to the marked contribution to suicide risk made by psychiatric factors, there were also smaller contributions from a range of other factors including: gender (OR = 7.8, CI 4.4, 13.6); lack of formal educational qualifications (OR = 2.1; CI 1.3, 3.4); low income (OR = 2.9, CI 1.8, 4.6); poor parental relationship during childhood (OR = 2.3, CI 1.3, 4.0); recent stressful interpersonal life events (OR = 2.7; CI 1.7, 4.4); recent stressful legal life events (OR = 5.4; CI 2.3, 12.8), and recent stressful work related life events (OR = 2.5; CI 1.5, 4.2). The general impressions conveyed by these results are that, in addition to psychiatric factors, those most at risk of suicide tended to be male, from socially disadvantaged backgrounds and to have experienced recent stressful life events.

Factors associated with medically serious suicide attempts

Table 2 shows a parallel analysis of the 275 individuals who made serious suicide attempts and the 984 control subjects. The Table shows that risks of serious suicide attempts were related to a series of risk factors that included psychiatric disorders and sociodemographic and psychosocial factors. Those making serious suicide attempts were characterized by higher rates of current mood disorders (OR = 17.6; CI 10.4, 29.6), previous suicide attempt (OR = 14.2; CI 4.7, 43.1), psychiatric hospital admission in the previous year (OR = 15.0; CI 3.2, 71.4), and previous out-patient psychiatric treatment (OR = 1.8; CI 1.1, 3.1). In general, these results suggest that those making serious suicide attempts were characterized by high rates of current psychiatric disorder, notably mood disorders, high rates of previous suicide attempts, and had elevated rates of contact with psychiatric in-patient and out-patient services.

In addition to the strong contribution of psychiatric factors, those making serious suicide attempts differed from control subjects on a number of measures including age (OR = 1.04; CI 1.02, 1.05), lack of educational qualifications (OR = 3.0; CI 1.8, 5.0), low income (OR = 3.5; CI 2.1, 5.8), recent stressful interpersonal life

events (OR = 2.2; CI 1.3, 3.6), recent stressful legal life events (OR = 3.6; CI 1.4, 9.5), recent stressful work related life events (OR = 2.8; CI 1.6, 4.8) and low levels of social contact (OR = 2.8; CI 1.5, 5.2). In general, these results convey the clear impression that, in addition to their higher rates of psychiatric difficulties, those making serious suicide attempts tended to come from socially disadvantaged backgrounds, to have been exposed to recent life stresses and to have limited social contacts.

Comparison of factors associated with suicides and serious suicide attempts

The results in Tables 1 and 2 suggest strong similarities in the aetiological models predicting suicide and serious suicide attempts. Both models suggest that rates of suicidal behaviour were elevated among those with current psychiatric disorders, a history of previous psychiatric care, a history of prior attempts, exposure to social disadvantage and recent stressful life events. None the less, there were some differences between these aetiological models. These differences include the facts that: (a) non-affective psychosis was a predictor of suicide but not of serious suicide attempts; (b) gender was a predictor of suicide but not of serious suicide attempts; (c) a poor parental relationship during childhood was predictive of suicide but not of serious suicide attempts, and (d) social isolation was predictive of serious suicide attempts but not of suicide. These differences suggest that while the risk factors for suicide and serious suicide attempts were very similar, there were some possible differences between these two groups. This issue is examined in Table 3, which reports on the factors that discriminated between serious suicide attempts and suicide.

As for Tables 1 and 2, Table 3 reports both unadjusted and adjusted ORs. Table 3 shows that those making serious suicide attempts were distinguished from suicides in the following ways: suicides tended to be older (OR = 1.03; CI 1.02, 1.04), were more often male (OR = 1.9; CI 1.2, 3.2) and had higher rates of non-affective psychosis (OR = 8.5; CI 2.0, 35.9). Serious suicide attempters tended to have higher rates of anxiety disorder (OR = 3.5; CI 1.6, 7.8) and were more likely to be socially isolated (OR = 2.0, CI 1.2, 3.5).

Discriminant analysis

To provide further insight into the results described in Tables 1 to 3, a discriminant function analysis was performed (Rao, 1977). In this analysis all variables that were found to distinguish between: (a) suicides and control subjects; (b) suicide attempts and control subjects; and (c) suicides and suicide attempts, were included in the analysis.

This analysis showed that the three subject groups (suicides, suicide attempts, control subjects) could be described by two discriminant functions. The first discriminant function had high regression coefficients on a series of factors describing risk of suicidal behaviour (current depression, $\beta = 0.87$; previous suicide attempts, $\beta = 0.22$; low socio-economic status, $\beta = 0.22$). The second factor appeared to be a combination of variables which distinguished between suicides and suicide attempts, with key factors including: gender, $\beta = 0.67$; anxiety disorder, $\beta = 0.42$; limited social contact, $\beta = 0.29$; non-affective psychosis, $\beta = -0.50$ and age, $\beta = -0.35$.

Evaluation of the group centroids of the discriminant function led to the following conclusions.

(i) Control subjects had a low mean score (-0.89) on the first discriminant function (risk of suicidal behaviour) and an average score (0.03) on the second discriminant function (suicide *versus* suicide attempt behaviour).

(ii) Suicide attempters had a high score (2.12) on the first discriminant function (risk of suicidal behaviour) and a positive score (0.41) on the second discriminant function (suicide *versus* suicide attempt behaviour).

(iii) Finally, suicides had an elevated score (1.46) on the first discriminant function (risk of suicidal behaviour) and a negative score (-0.71) on the second discriminant function (suicide *versus* suicide attempt behaviour).

More generally, these results show that: (a) those who died by suicide and those who made serious suicide attempts were strongly discriminated from control subjects on the basis of the first discriminant function; and (b) those who made serious suicide attempts and those who died by suicide were discriminated from each other on the second discriminant function.

DISCUSSION

There have been longstanding debates about the extent to which suicides and attempted suicide form two populations or one. The results of the present study clearly suggest that suicides and serious suicide attempts form two overlapping populations. The evidence in support of this conclusion is as follows: first and foremost, the case-control analyses of suicide and serious suicide attempts show that a very similar pattern of risk factors predicts both outcomes. The common predictors of both suicide and serious suicide attempts include the presence of current psychiatric disorder, history of previous suicide attempts, previous psychiatric care and contact, social disadvantage and exposure to recent stressful life events. This congruency clearly suggests that the risk factors and life processes that lead to suicide are similarly evident for those making serious suicide attempts.

However, despite this strong aetiological overlap there were some differences between the two populations. Those at high risk who are more likely to die by suicide include those who are male with non-affective psychosis. Conversely, those with high risk factor exposure who are less likely to die by suicide are females with anxiety disorder and with poor social contact.

The strong similarities between those making serious suicide attempts and suicides suggest that, for all practical intents and purposes, these two groups may be considered to contain the same high risk population characterized by high rates of psychiatric disorder, social disadvantage and exposure to life stresses. The fact that high rates of previous suicidal attempt behaviour are reported for both serious suicide attempts and suicides clearly suggests the importance of developing management and treatment strategies that focus upon the longer term care and maintenance of those making serious suicide attempts in efforts to reduce the risk of the recurrence of suicidal behaviour.

There are some possible limitations of these findings: first, the basis on which suicides, suicide attempts and control subjects may be compared is by using significant other data for all three subject groups. It is possible that significant other data may not accurately reflect the data

that would be obtained if it were possible to interview subjects themselves. However, research which compared reports obtained from subjects who had made serious suicide attempts and from significant others found considerable consistency between them (Beautrais *et al.* 1999), suggesting that the reports of significant others may be regarded as yielding responses broadly similar to those which would be obtained if it were possible to interview suicide subjects.

A second possible limitation arises from the fact that a larger proportion of significant others of suicides were family members (95%) than were significant others of suicide attempters (77.9%), perhaps leading to a bias in reports of risk factors for the two subject groups, since significant others who were family members might have more detailed knowledge of some factors than informants who were not family members. Bias could also arise from the fact that significant other reports for suicides were made in the context of a death having occurred (while deaths did not occur for suicide attempters), leading perhaps to a greater effort to identify risk factors for suicide cases than for suicide attempters. However, the findings above suggest remarkable similarity in the risk factors reported for suicides and suicide attempters, suggesting that if such biases exist their effects are likely to be small.

Notwithstanding these limitations, the major findings of this study clearly suggest that suicides and serious suicide attempts form two overlapping populations that are far more alike than different.

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