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Factors associated with suicide after parasuicide in young people

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Abstract

Objective—To determine factors associated with completed suicide in young parasuicide patients.

Design—Case-control study.

Setting—Regional poisoning treatment centre in a teaching general hospital.

Subjects—Patients who, between 1968 and 1985 when aged 15-24 years, were admitted to the regional poisoning treatment centre because of deliberate self poisoning or self injury. Cases (n=62) consisted of those who by the end of 1985 had died locally from either suicide (n=41) or possible suicide (n=21). Controls (n=124) were patients who were known not to have died locally during the study period. Two controls were selected for each case, matched by sex, age (within two years), and length of follow up.

Main outcome measures—Possible predictors of completed suicide.

Results—Univariate analysis (conditional logistic regression) showed that risk of death due to suicide and possible suicide was associated with six factors: social class V (odds ratio 2.7, 95% confidence interval 1.1 to 6.7), unemployment (2.8, 1.4 to 5.8), previous inpatient psychiatric treatment (4.9, 2.2 to 10.9), substance misuse (3.3, 1.6 to 6.8), personality disorder (2.1, 1.03 to 4.4), and previous attempted suicide (2.3, 1.2 to 4.4). Multivariate analysis identified two factors as significantly contributing to the model that best discriminated between the cases and controls: substance misuse (alcohol or drugs, or both) (adjusted odds ratio 3.9) and previous inpatient psychiatric treatment (3.7). These factors seemed to be associated with suicide after attempted suicide in both the short term (less than 12 months) and the long term (one year or more) and were also identified when the analysis was restricted to subjects who definitely died by suicide and their controls.

Conclusions—Suicide after parasuicide in young people is associated with substance misuse. This suggests that prevention of suicide in young people who attempt suicide might be improved by close liaison between general hospital services for patients who have attempted suicide and services for young substance misusers and by measures aimed at preventing substance misuse in young people.

Introduction

In the United Kingdom parasuicide (attempted suicide) is common in young people, particularly

teenage girls and young men.¹⁻³ After parasuicide there is a considerable risk of eventual suicide. Within a year after a suicide attempt about 1% of adults die by suicide, and this risk remains increased several years later.^{4,5} The risk of suicide after parasuicide in adolescents, while probably lower than that of adults, is still considerable. In a group of 16-20 year old self poisoners followed up for a mean of 2.8 years in Oxford, suicide or probable suicide occurred in 0.32%.⁶ An increased risk of suicide has been found in other studies, probably reflecting different characteristics of the initial cohort; for example, suicides occurred in 4.3% of Swedish adolescents who attempted suicide and were followed up for 10-15 years.⁷

If positive steps are to be made towards achieving targets in *The Health of the Nation* regarding suicide prevention⁸ it is important to try to identify risk factors for suicide after parasuicide in the young, especially in the light of the recent rise in rates of completed suicide by young men⁹ and the high proportion of young people who commit suicide who have previously attempted suicide.¹⁰ Although there is considerable knowledge of risk factors for suicide after parasuicide by adults,^{5,11-13} this is not so for the young, among whom only relatively older age, male sex, violent attempts, and bipolar or psychotic (probably schizophrenic) disorder have so far been identified as risk factors.^{6,7}

We report a case-control study of suicide after parasuicide in young people (15-24 years). Cases had died by suicide or likely suicide after parasuicide. Controls were selected from patients who had attempted suicide, matching for age, sex, and length of follow up (up to 18 years). Our objective was to identify factors associated with future suicide.

Method

SOURCE OF DATA

Subjects for the study were identified from the computerised data file maintained until recently by the Medical Research Council Unit for Epidemiological Studies in Psychiatry in Edinburgh for monitoring parasuicide patients referred to the Regional Poisoning Treatment Centre at Edinburgh Royal Infirmary. Earlier work showed that about 83% of attenders at the Royal Infirmary's accident and emergency department whose behaviour met the definition for parasuicide (see below), were admitted to the centre.¹⁴ Of those admitted, about 91% were interviewed by a psychiatrist, who

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recorded on a standardised coding sheet detailed information about social, clinical, and treatment aspects of each episode. Limited information was available on patients not interviewed. This was insufficient for comparison of interviewed and non-interviewed cases to assess for possible "non-response" bias.

Selected information about all deaths in Edinburgh classified officially (by the Registrar General's Office of Scotland) as "suicide" (*International Classification of Diseases*, 8th and 9th revisions, E950-E959) or "undetermined whether accidentally or purposely inflicted" (E850-E859) was supplied in confidence to the unit for each year, starting in 1968. After deaths among patients not resident in Edinburgh were excluded, data concerning age, sex, usual residence, marital status, occupation, social class, date of death, and method of death were transferred to a computer database (the suicide dataset). By searching the regional poisoning treatment centre's database it was possible to check whether, and on how many occasions, each person in the suicide dataset had been admitted to the centre during or after 1968. This information was added to the suicide database. From among the deaths by suicide and undetermined suicide in which there had been an admission to the centre a subset was selected for the present study, consisting of people who were aged 15-24 years at the time of their admission (or at least one of their admissions if there had been several).

DEFINITION OF PARASUICIDE

"Parasuicide" is defined in Edinburgh as a non-fatal act in which an individual deliberately causes self injury or takes a substance in excess of any prescribed or generally recognised therapeutic dosage.⁴ The apparent purpose or motivation underlying the act is not taken into account when making the "diagnosis," so that people with differing levels of suicidal intent and ideation are included. Individuals intoxicated with alcohol alone are excluded.

SUBJECTS

The study population was derived from the regional poisoning treatment centre's monitoring service data file on Edinburgh residents aged 15-24 years with a history of parasuicide between 1968 and 1985. Two groups of subjects were identified, cases and controls.

Cases were subjects who, after one or more episodes of parasuicide, were known according to official records to have died during the study period while resident in Edinburgh either from suicide, or from "possible suicide" (that is, an "undetermined" cause).

For each of the cases two controls were identified, matched by sex and age within two years. The first control was the last matched subject admitted before the index case and the second was the first matched subject admitted after the index case. Thus there was matching for approximate date of admission and hence for length of follow up. For cases who repeated parasuicide while aged 15-24 years, the controls were selected for the final admission of the cases up to age 24—admissions after 24 were disregarded. Whether there had been previous suicide attempts was considered as a possible explanatory variable (see below).

VARIABLES EXAMINED

The variables examined from the regional poisoning treatment centre's data file for the index parasuicide episodes for both cases and controls are listed in the box. For repeaters the information was based on that available at the last appropriate admission. For the analysis all non-binary variables were converted to binary form. This was for two main reasons. Firstly, there were changes in the nature of the coding of some

variables during the study period which necessitated recoding to a binary form to make each variable consistent throughout the period. Secondly, for a few variables there were small numbers in individual categories and binary recoding provided more reliable estimates of the odds ratio.⁵

STATISTICAL ANALYSIS

Data relating to cases and controls were compared by using conditional logistic regression.¹⁵ EGRET statistical software was used as it is particularly valuable in fitting such models.¹⁶ Univariate comparisons were made between the cases and controls for each of the possible explanatory variables listed in the box. Statistical significance and 95% confidence intervals associated with estimated odds ratios were examined. Explanatory variables identified as differing significantly ($p < 0.05$, two tailed likelihood ratio test) between cases and controls in the univariate analyses were then entered into a multivariate analysis designed to identify a model that best discriminated between cases and controls.

Explanatory variables were selected for the model in a stepwise fashion. Initially the variable with the smallest p value < 0.05 , from a score test, was selected and fitted. Then the model was extended by each of the remaining variables that were identified from the univariate analysis and the variable with the smallest p value from a score test was selected and fitted. The model was extended until none of the remaining variables were associated with a score test $p < 0.05$. Finally, when this model was identified, we extended the selected model by each of the variables not entered into the multivariate model selection process to determine whether any was associated with a score test $p < 0.05$.

Variables examined in comparing cases and controls

Sociodemographic variables:

Marital status (married and cohabiting v rest)
Social class (V v I-IV)
Living situation (with relatives or friends v rest)
Overcrowding (≤ 1.5 persons per room v > 1.5)
Unemployment
Debt
Violence to others (in past five years)
Violence received (in past five years)
Criminal record
Current police proceedings

Background:

Permanent separation from mother $<$ age 15 years
Permanent separation from father $<$ age 15 years
Family member(s) treated for psychiatric disorder
Parasuicide by family member
Suicide by family member

Psychiatric variables:

Previous inpatient psychiatric treatment
Previous outpatient psychiatric treatment
Receiving psychotropic medication
Psychiatric disorder
Personality disorder
Alcohol misuse
Drug misuse (intravenous, opiates, cocaine, LSD, stimulants, sedatives)
Substance misuse (alcohol or drug misuse, or both)

Parasuicide:

Previous episodes
Method (self poisoning or self injury)
Alcohol involved
Coma level
Aftercare (any psychiatric care v rest)

	No (%) of cases*	No (%) of controls*	Odds ratio (95% confidence interval)	p Value
Social class V	14/41 (34)	11/71 (16)	2.7 (1.1 to 6.7)	0.024
Unemployment	36/53 (68)	43/100 (43)	2.8 (1.4 to 5.8)	0.004
Previous inpatient psychiatric treatment	29/56 (52)	22/110 (20)	4.9 (2.2 to 10.9)	<0.001
Substance misuse (alcohol or drugs, or both)	31/55 (56)	31/108 (29)	3.3 (1.6 to 6.8)	<0.001
Personality disorder	34/53 (64)	47/102 (46)	2.1 (1.03 to 4.4)	0.035
Previous parasuicide	38/60 (63)	51/118 (43)	2.3 (1.2 to 4.4)	0.011

*Percentages for each variable based on total number of matched sets of cases and controls for which there was information for each case and at least one control. The number of matched sets for each variable is indicated by the denominator for the cases.

This method of analysis takes full account of the matched structure of the data and makes allowance for any missing values on any variable. Full details relating to these statistical methods may be obtained from a standard textbook.¹⁵

Results

STUDY POPULATION

In total there were 62 cases, consisting of 41 suicides and 21 possible suicides, and 124 controls. Of both the cases and controls, 56% were male and 69% were aged 20-24 years at the time of parasuicide.

UNIVARIATE ANALYSIS

Six variables (out of 28 examined) significantly discriminated between the cases and the controls (table). The variable drug misuse was a significant discriminator (odds ratio 2.6, 95% confidence interval 1.2 to 5.9) and the variable alcohol misuse was of borderline significance (2.0, 0.9 to 4.4), but the two variables were combined (substance misuse) because of the known association and overlap between them, especially in young people. The combined variable provided better discrimination between the two groups than either component by itself.

MULTIVARIATE ANALYSIS

Five of the six variables identified in the univariate analysis (unemployment, previous inpatient psychiatric treatment, substance misuse, personality disorder, previous parasuicide) were entered into the multivariate analysis. Social class was omitted because of the relatively large number of cases for which the information on this item was missing; its inclusion would have substantially reduced the number of matched sets available for analysis since matched sets for which information was missing for either the case or both controls were automatically excluded from the analysis. Furthermore, several variables that are highly correlated with social class (overcrowding, unemployment, debt) had been examined separately in the univariate analysis. The multivariate analysis was based upon 48 matched sets of cases and controls.

Two factors significantly contributed to the model that best discriminated between cases and controls. The first was substance misuse (adjusted odds ratio 3.9) and the second was previous inpatient psychiatric treatment (3.7). One or both of these variables was positive in 77% (37/48) of the cases and 40% (38/94) of the controls included in the multivariate analysis. Drug misuse was present in 37% (17/46) of cases and 14% (13/92) of controls, alcohol misuse in 35% (16/46) of cases and 19% (18/94) of controls, and substance misuse (drugs or alcohol, or both) in 58% of cases (28/48) and 26% (24/94) of controls. (Information specifically on drug misuse was missing for two cases and on alcohol misuse for a further two cases.) There was a history of previous inpatient psychiatric treatment in 52% of cases (25/48) and 21% (20/94) of controls.

All explanatory variables not included in the multi-

variate selection process were used separately to extend the final model selected from the multivariate analysis. A score test was used to determine whether, after explaining variation due to substance misuse and previous inpatient psychiatric treatment, any of the variables were significantly associated with risk of suicide; none were. Therefore the model arising from the multivariate analysis remained unchanged.

A further analysis was conducted in which the time interval between the final act of parasuicide for each individual when aged 15-24 years and death (suicide or possible suicide) was entered together with substance misuse and previous inpatient psychiatric treatment. The aim was to determine whether there was evidence of an interaction between time to suicide and either of the two variables identified from the multivariate analysis. The cases (and their controls) were divided into two groups: in the first group of cases (n=27) the time interval between parasuicide and death was less than a year and in the second (n=35) the time interval was one year or more. There was no evidence of an interaction between time interval and either substance misuse or previous inpatient psychiatric treatment. Thus substance misuse and previous inpatient psychiatric treatment seem to be risk factors for suicide and possible suicide in both the short term and the long term.

SUICIDES ALONE

In a separate analysis based on the 41 definite suicides and their controls, three of the six variables that significantly discriminated between the cases and controls in the main analysis still did so: previous inpatient psychiatric treatment (5.2; 2.0 to 13.2), substance misuse (3.5; 1.4 to 8.5), and previous parasuicide (2.7; 1.2 to 5.9). When these three variables were entered into a multivariate analysis, previous inpatient psychiatric treatment (adjusted odds ratio=4.6) and substance misuse (3.2) again contributed to the model that best discriminated between cases and controls.

Discussion

This is one of the first studies in which a large number of adolescents and young adults who attempted suicide have been followed up long term and the factors associated with death by suicide identified. Clearly, the key factors that emerged are unlikely to be the only ones associated with increased risk of suicide after parasuicide in this age group, the investigation being restricted to the variables included in the monitoring forms used by the regional poisoning treatment centre. Matching the cases and controls in terms of sex and age eliminated the possibility of assessing the predictive power of these two factors. However, both are already known to be associated with suicide risk in young people who have attempted suicide.^{6,7}

A further methodological limitation is that, for practical reasons, deaths from suicide were ascertained only for subjects who were resident in Edinburgh at the time of death. Parasuicide patients who completed suicide after having moved from Edinburgh were not identified. This incompleteness presents two potential problems. Firstly, some controls may have completed suicide after having moved from Edinburgh. The effect of such misclassification (that is, cases being regarded as controls) will be to underestimate the odds ratio associated with explanatory variables. At most one or two cases will be present because of the small absolute risk of suicide after parasuicide in young people.^{6,7} Secondly, and more importantly, if the aetiology of suicide of subjects no longer resident in Edinburgh were different from that of individuals who

remained in the city—for example, with regard to personality factors—then bias might be present. Thus conclusions drawn from our findings must be regarded as provisional and requiring confirmation in a cohort that has been followed up completely.

The main finding is the association of suicide after parasuicide in young people with current substance misuse, including misuse of alcohol or drugs, or both. Substance misuse was important as a risk factor in both the short term and the long term. Alcohol misuse refers to alcohol addiction or chronic alcoholism, drug misuse refers to the habitual misuse (by any route) of mood altering drugs (including opiates, cocaine, LSD, stimulants, sedatives, and solvents). It is also known from previous research that both alcohol and drug misuse are general risk factors for suicide in young people.¹⁷⁻²¹ Substance misuse might be determined by other factors more directly associated with suicide risk. Personality difficulties are perhaps the most likely, although personality disorder did not emerge as a factor in the multivariate analysis in our study. Even if other factors are relevant our findings and the previously recognised associations between substance misuse and suicidal behaviour mean that this factor is important as it seems to identify a high risk group. Thus there is a need for better prevention of alcohol and drug misuse through educational programmes in, for example, schools and the media; earlier detection and treatment of young substance misusers; and close links between general hospital services for parasuicide patients and substance misuse services so that as many as possible substance misusers can have the opportunity of receiving prompt treatment.²²⁻²³

The other main factor associated with future suicide in this study was previous inpatient psychiatric admission. This could reflect predisposition to develop psychiatric disorder, although if so it is surprising that psychiatric disorder (excluding substance misuse) identified at the time of the index suicide attempt was not associated with eventual suicide. This may be because formally diagnosed psychiatric illness is more effectively treated than personality disorder or social chaos. A proportion of the previous admissions may have been due to substance misuse, but we were not able to refer back to detailed information about the admissions to clarify this point.

Some of the factors that in the univariate analysis significantly discriminated between the cases and controls did not contribute to the final model in the multivariate analysis, but this does not mean that they are unimportant in terms of risk of eventual suicide. If larger numbers of subjects could have been included in the study then these factors may have emerged as statistically significant. Unemployment is associated with both parasuicide²⁴⁻²⁶ and suicide,²⁷ although the causal interpretation is unclear.²⁸ Similarly, personality disorder in adults has been linked with both parasuicide and suicide.²⁹⁻³⁰ A previous suicide attempt is a major risk factor for eventual suicide in adults^{5 11 12} and in patients with various psychiatric disorders.³¹ Although low socioeconomic status is associated with greatly increased risk of parasuicide,³ it has not previously been linked to increased risk of subsequent suicide. Low socioeconomic status did not contribute significantly ($p=0.097$) to our multivariate model after substance misuse and previous inpatient psychiatric treatment had been fitted. However, a large proportion of patients had data missing on this variable because they had no occupation by which they could be allocated to a social class category.

The low base rate of suicide after parasuicide and the relatively low power of known risk factors to discriminate between those with high risk of eventual suicide and those with lower risk mean that prevention of suicide through detection and treatment of risk factors

is a daunting task.³¹⁻³³ However, the findings of this study suggest that focusing therapeutic attention on misuse among young people referred to hospital because of parasuicide could have several benefits, not the least being a possible contribution to *The Health of the Nation's* suicide targets through prevention of suicide in the young.

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