Life events and psychosocial factors in elderly suicides – a case–control study

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ABSTRACT

Background. Stressful life events, such as family conflicts, separation, bereavement, somatic illness and financial problems are common antecedents of suicide. Studies on suicide among younger persons dominate the literature, despite the fact that a large proportion of suicides occur among elderly persons.

Methods. The occurrence of stressful life events was investigated among elderly suicide cases and population controls. The study was conducted in the southwestern part of Sweden and included 85 persons (46 males and 39 females) 65 years and above who had committed suicide from January 1994 to May 1996. Population controls (84 males and 69 females) were randomly selected. Interviews were carried out with the controls and with informants for the suicide cases. Questions on sociodemographic background, mental and somatic health status, and life events (0–6, 7–12 and 13–24 months preceding suicide/interview) were included in the interviews.

Results. Somatic illness, family discord and financial trouble were significant risk factors during all three time periods. Other risk factors were mental disorder, lower education, feelings of loneliness and previous suicide in the family. Factors associated with a decreased risk included active participation in organizations and having a hobby. Variables that remained in the multivariate logistic regression model were mental disorder (men, odds ratio (OR) = 62·4, 95 % CI 17·9–217·5; women, OR = 55·9, 95 % CI 14·1–222·3) and family discord (men, OR = 10·0, 95 % CI 1·7–59·8; women, OR = 9·2, 95 % CI 1·9–44·8).

Conclusions. Mental disorder and family discord were the two major risk factors for suicide among elderly men and women.

INTRODUCTION

Suicide is one of the major public health problems in Sweden. Around 1600 suicide deaths occur annually. Compared with other industrialized countries, the rate is at an intermediate level. Studies on suicide among younger persons dominate the literature. In this age group suicide is the cause of death that costs most potential years of life lost. However, the elderly have the highest suicide rates, in almost all industrialized countries. The 1996 suicide rate in Sweden for persons 65 years old and above was 41·4/100000 for men and 15·5/100000 for women. This means that about 400 suicides occur annually among persons aged 65 years and over, accounting for one-quarter of the total suicides in the country.

Previous studies have shown that stressful life events commonly precede suicide (McMahon & Pugh, 1965; Bolin *et al.* 1968; Bunch *et al.* 1971; Bunch, 1972; Rorsman, 1973; Shaffer *et al.* 1974; Pokorny & Kaplan, 1976; Humphrey, 1977; Hagnell & Rorsman, 1980; Fernando & Storm, 1984; Stensman & Sundqvist-Stensman, 1988; Heikkinen *et al.* 1992, 1994). These include family conflicts, separation or bereavement, work problems, somatic illness and financial problems. Recently, several studies have investi-

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gated the importance of life events in elderly suicides. Conwell *et al.* (1990) showed that physical illness and loss became more common with increasing age, while job or financial trouble and family discord became less prominent. Heikkinen *et al.* (1992) studied life events during the last 3 months preceding suicide in 400 suicides cases and found that medical illness was the most common life event among those aged 45 and above. In a nationwide total suicide population Heikkinen & Lönnqvist (1995) compared 219 suicide cases aged 60 years and above, with 803 cases aged 20 to 59 years. They found that family discord, separation, financial trouble and job problems were more common among the younger suicides. Somatic illness was more common among the elderly suicides, especially among men. However, somatic illness is common even among the elderly who do not commit suicide. The suicide risk associated with somatic illness and other stressors remains unclear because controlled studies are lacking. So far no studies have investigated life events in elderly suicides in relation to a reference group representative of the elderly population.

In the present study the occurrence of stressful life events and mental and somatic disorders was investigated among elderly suicide cases and population controls.

METHOD

Study area

The study was conducted in southwestern Sweden, and comprised the counties of Göteborg-Bohuslän and Älvsborg. The area includes several industrial cities, surrounded by farmlands and forests and the city of Göteborg, the second largest city in Sweden.

Study population

The study population comprised Scandinavian-born men and women in the area, aged 65 years and above. The total elderly ($\geqslant 65$) population in the area was 210 703 persons at the beginning of the study.

Cases

One hundred consecutive suicide cases who underwent forensic examination at the Göteborg Institute of Forensic Medicine from January 1994 to May 1996 were considered possible study cases. The forensic examiner classified 83

deaths as suicides (ICD E950–959, WHO, 1977) and the remainder as undetermined deaths (ICD E980–989). Only undetermined deaths rated by the second author and a senior suicidologist as 'almost certain suicide' according to the Rating Scale for Determining the Degree of Certainty of Suicide (Lönnqvist, 1977) were included. This group was dominated by lethal overdoses of prescription medication without a suicide note.

Next-of-kin, as designated in the police report, were located for 98 of the 100 suicide cases. They were contacted by telephone and informed in detail about the study. Informants for 85 individuals agreed to participate. These included 23 spouses, 27 adult children, seven siblings, nine other relatives, nine close friends, and 10 caregivers. The study cases included 46 men and 39 women. The median age was 73 years (range 65–94) for the male and 73 (range 65–97) for the female suicides. The study cases did not differ significantly from the 15 cases without an informant interview in terms of sex ratio (males/females 1·18 *v.* 1·14), median age (73 *v.* 74·5 years) and proportion with a positive post-mortem screening for antidepressants or lithium (38 % *v.* 40 %).

Population controls

Two control persons were randomly chosen from the roster of the regional tax authorities for each case. The controls were selected from the same area, with the same sex and birth year (± 2 years). If a control person declined participation, another was invited to take part in the study (a maximum of eight persons were invited per case). Six potential control persons could not be traced and 81 declined participation (49 men, median age 76 years and 38 women, median age 78 years). A final number of 153 control persons (84 men, 69 women) participated in the study. The median age was 76·5 years (range 67–98) for male and 77 years (range 67–100) for female controls. Due to a time lag between the suicides and the interviews with the controls, the controls were somewhat older than the suicide cases by the time of the interview.

Interviews

Personal interviews were performed based on a structured questionnaire. The interviews were made with the controls, and with the informants for the suicide cases. Informants were also

Table 1. *Frequencies (%) of life events 0–6, 7–12 and 13–24 months preceding suicide (or interview) in 85* suicide cases (46 males, 39 females) and 153† population controls (84 males, 69 females), and age adjusted odds ratios (ORs) with 95% confidence intervals*

	0–6 months			7–12 months			13–24 months			0–24 months		
	Suicides %	Controls %	OR‡ (95% CI)	Suicides %	Controls %	OR‡ (95% CI)	Suicides %	Controls %	OR‡ (95% CI)	Suicides %	Controls %	OR (95% CI)
Somatic illness	77·6	57·5	2·8 (1·5–5·2)	70·6	54·2	2·2 (1·2–3·9)	64·7	49·0	2·1 (1·2–3·7)	78·8	62·7	2·3 (1·2–4·4)
Illness in family	27·4	23·7	1·2 (0·6–2·2)	25·0	25·0	1·0 (0·5–1·8)	25·0	20·4	1·3 (0·7–2·5)	36·9	30·3	1·3 (0·7–2·3)
Death	7·2	9·9	0·9 (0·3–2·6)	7·2	11·8	0·6 (0·2–1·7)	8·4	11·8	0·7 (0·3–1·7)	21·7	27·0	0·9 (0·4–1·6)
Separation	2·4	0	—§	2·4	0	—§	0	0·7	—§	3·6	0·7	5·4 (0·5–55·2)
Family discord	45·2	3·9	18·8 (7·4–47·8)	36·9	3·3	15·9 (5·8–43·7)	36·9	4·6	11·5 (4·7–28·2)	46·4	5·9	13·0 (5·8–29·4)
Residence change	4·8	4·6	0·9 (0·3–3·4)	3·6	4·6	0·7 (0·2–2·9)	3·6	4·6	0·9 (0·2–3·7)	11·9	12·4	1·0 (0·4–2·2)
Financial trouble	13·6	1·3	9·1 (1·9–43·0)	9·9	1·3	6·5 (1·3–32·0)	8·6	1·3	5·6 (1·1–28·5)	13·6	1·3	9·0 (1·9–42·7)
Criminal offence	1·2	0	—§	0	0	—§	1·2	0	—§	2·4	0	—§
Any event	95·3	71·9	8·7 (3·0–25·6)	90·6	71·2	4·1 (1·8–9·2)	85·9	67·3	3·2 (1·6–6·6)	96·5	80·4	7·3 (2·1–25·1)

* Missing data for 1 case about illness in family, family discord, residence change and criminal offence, 2 cases about death and separation, 4 cases about financial trouble.
† Missing data for 1 control about illness in family, death, separation and financial trouble (except for 0–6 months).
‡ OR calculated with those who had reported the event during the given time period and all others who had not reported the event at any time during 0–12 months.
§ Non significant (Fischer's exact test).

interviewed for 11 control persons. Ten of them suffered from dementia, and one from paranoid psychosis. The informants of the suicide cases who agreed to an interview were sent a letter with more detailed information about the study. Usually the interview took place in the informant's home, but in a few cases at the informant's workplace or at the hospital. In eight cases telephone interviews were carried out, in accordance with the informant's wish. All interviews with the informants of the suicide cases were carried out by a psychiatrist (M. W.).

The potential controls received a letter with information about the study, and were later contacted by telephone. The interviews with the controls and informants of the controls were made by a geriatrician (K. W.), a psychiatric nurse or a psychiatric occupational therapist, all with experience in interview technique. The interviews usually took place in the home of the subjects. The interviews usually lasted 1 to $1\frac{1}{2}$ hours. The interviews with the suicide informants were somewhat longer, as additional items focusing on the suicide and the informants' reactions to the suicide were included.

The interview questionnaire included questions on life events according to a list based on the Recent Life Change Questionnaire developed by Paykel *et al.* (1969), modified by Rahe (1977), Lehtinen *et al.* (1985) and Heikkinen & Lönnqvist (1995). Initially 33 structured questions on adult life were included, but Heikkinen & Lönnqvist merged the questions into 13 categories, which were used in the present study with some minor modifications. A question on imprisonment was replaced by one on criminal offence and three questions on job problems were replaced by one on retirement. The life events used in this study are shown in Table 1 (retirement is not shown). The occurrence of events during the 0–6, 7–12 and 13–24 months prior to the suicide/interview was explored by questions on whether the events had been present or not during these time periods. All life events, including 'somatic illness', were self-reported (informant-reported for the suicide cases). As in the study by Heikkinen & Lönnqvist, the 'death' category included deaths of both family members and close friends. Family discord was considered to be present when interpersonal problems within the family were reported.

Depending on the type of event, the same person could report the same event during more than one time period (for example family discord) or only on one occasion (for example death).

In addition, the questionnaire included questions on family situation, educational level, profession, active hobbies and organization memberships, assistance in daily living, early separation, feelings of loneliness, earlier suicide attempts, suicide among first-degree relatives and past and current mental health. 'Early separation' was defined as separation prior to age 18 from a parent or other significant person due to death, divorce, adoption or illness. At that time adolescents often moved away from home to find employment, and that was not considered separation in this study.

Rating psychiatric illness

Records from psychiatric facilities, primary care, and other relevant disciplines were reviewed for the suicide cases. The controls were asked about previous health care contacts, and medical records were requested on the basis of this information. The second author used both interview and case record data to make retrospective past month diagnoses according to the algorithms of the DSM-IV Axis I. A symptom was rated as present if acknowledged by any source. Somatic symptoms that could be attributed to concomitant physical illness were not counted as symptoms of depression. Psychiatric illness burden was rated according to the Cumulative Illness Rating Scale for Geriatrics (CIRS-G) (Miller *et al*. 1992). The scale ranges from 0 (no psychiatric problem or history thereof) to 4 (current mental illness requiring psychiatric hospitalization/severe dementia/ severe substance abuse).

Statistical analyses

The SPSS package system was used for statistical analyses. Odds ratios (ORs) for committing suicide were calculated with logistic regression. All variables that significantly affected OR (including life events, psychosocial variables and mental health) were analysed in a multivariate logistic regression model (forward, conditional). In the multivariate analyses the occurrence of life events were pooled over 24 months. Adjustments for age were made in all analyses of OR.

Fisher's exact test was used to analyse differences in proportions, when ORs could not be calculated.

Ethics

The study was approved by the Ethics Committee for Medical Research at Göteborg University. The participants had given their informed consent, after they had received oral and written information about the study, including an assurance that they could withdraw from the study at any time. For persons suffering from dementia, a close relative gave consent by proxy.

RESULTS

Table 1 shows the frequencies of life events in suicides and controls, and ORs in relation to the different types of events. Life events that were significant risk factors for committing suicide were somatic illness, family discord and financial trouble. Somatic illness was common among the suicides but also among the controls and the OR was 2·3 (95% CI 1·2–4·4) for the whole time period. Family discord was the strongest risk factor of the life events. Whereas almost half of the suicides (46·4%) had experienced family discord during the last 24 months it was only reported by 5·9% of the controls. The OR was 18·8 (7·4–47·8) for events occurring up to six months prior to the suicide, compared with 11·5 (4·7–28·2) for events during the last 13–24 months. Financial trouble was uncommon in both groups, but over-represented in the suicides (13·6% *v*. 1·3%) during the past 24 months (OR = 9·0; 1·9–42·7).

Illness in family members and death were not risk factors for suicide. Separation, residence change and criminal offence (drunken driving in two suicides cases) were uncommon events, and did not differ between the groups. No person had reported retirement as a significant life event, and it was thus not included in the table. Almost all those who committed suicide had experienced at least one life event but this was also the case for a large majority of the controls. The OR for 'any event' was 7·3 (2·1–25·1) for the whole time period. The average number of events for the suicide cases was 2·1 (S.D. 1·1) and for the controls 1·4 (S.D. 1·0) (*P* < 0·001).

The life events with significantly increased

Table 2. *Frequencies (%) of life events 0–6, 7–12 and 13–24 months preceding suicide (or interview) in 46† men who committed suicide and 84‡ population controls, and age adjusted odds ratios (ORs) with 95% confidence intervals*

	0–6 months			7–12 months			13–24 months			0–24 months		
	Suicides %	Controls %	OR§ (95% CI)	Suicides %	Controls %	OR§ (95% CI)	Suicides %	Controls %	OR§ (95% CI)	Suicides %	Controls %	OR (95% CI)
Somatic illness	80·4	56·0	3·4 (1·4–8·1)	76·1	57·1	2·6 (1·1–5·9)	69·6	53·6	2·2 (1·0–4·8)	82·6	60·7	3·2 (1·3–7·9)
Family discord	44·4	1·2	64·3 (8·1–507·7)	31·1	1·2	34·9 (4·4–279·6)	28·9	3·6	11·0 (2·9–42·3)	44·4	3·6	22·5 (6·0–84·6)
Financial trouble	13·3	0	—**	11·1	0	—**	8·9	0	—*	13·3	0	—**
Any event	97·8	69·0	22·9 (2·9–177·6)	93·5	70·2	6·7 (1·9–24·1)	87·0	67·9	3·3 (1·2–8·9)	97·8	72·6	19·3 (2·5–149·9)

† Missing data for 1 case about family discord and financial trouble.
‡ Missing data for 1 control about financial trouble (except for 0–6 months).
§ OR calculated with those who had reported the event during the given time period and all others who had not reported the event at any time during 0–12 months.
* $P < 0.05$; ** $P < 0.01$ (Fisher's exact test).

Table 3. *Frequencies (%) of life events 0–6, 7–12 and 13–24 months preceding suicide (or interview) in 39* women who committed suicide and 69 population controls, and age adjusted odds ratios (ORs) with 95% confidence intervals*

	0–6 months			7–12 months			13–24 months			0–24 months		
	Suicides %	Controls %	OR† (95% CI)	Suicides %	Controls %	OR† (95% CI)	Suicides %	Controls %	OR† (95% CI)	Suicides %	Controls %	OR (95% CI)
Somatic illness	74·3	59·4	2·2 (0·9–5·5)	64·1	50·7	1·9 (0·8–4·4)	59·0	43·5	2·1 (0·9–4·9)	74·4	65·2	1·7 (0·7–4·1)
Family discord	46·2	7·2	9·5 (3·1–29·7)	43·6	5·8	11·2 (3·3–38·4)	46·2	5·8	12·3 (3·6–41·5)	48·7	8·7	8·4 (2·9–24·7)
Financial trouble	13·9	2·9	3·4 (0·6–19·5)	8·3	2·9	1·9 (0·3–12·7)	8·3	2·9	1·9 (0·3–12·7)	13·9	2·9	3·4 (0·6–19·5)
Any event	92·3	75·4	4·1 (1·1–15·4)	87·2	72·5	2·5 (0·8–7·5)	84·6	66·7	3·2 (1·1–9·1)	94·8	89·9	1·9 (0·4–10·6)

* Missing data for 3 cases about financial trouble.
† OR calculated with those who had reported the event during the given time period and all others who had not reported the event at any time during 0–12 months.

Table 4. *Psychosocial variables and mental health in 85 suicide cases (46 males, 39 females) and 153 controls (84 males, 69 females) and age adjusted odds ratios (ORs) with 95% confidence intervals*

	Men			Women		
	Suicides N (%)	Controls N (%)	OR (95% CI)	Suicides N (%)	Controls N (%)	OR (95% CI)
Education level						
> 7 years	11 (23·9)	43 (51·2)	1·0	10 (27·0)	36 (52·2)	1·0
⩽ 7 years	35 (76·1)	41 (48·8)	4·0 (1·7–9·1)	27 (73·0)	33 (47·8)	2·9 (1·2–7·1)
Profession						
Higher employees/self-employed	9 (19·6)	24 (28·6)	1·0	7 (18·4)	10 (14·5)	1·0
Assistant/intermediate employees	7 (15·2)	24 (28·6)	0·7 (0·2–2·2)	8 (21·1)	22 (31·9)	0·5 (0·1–1·9)
Skilled workers	12 (26·1)	23 (27·4)	1·2 (0·4–3·4)	9 (23·7)	11 (15·9)	1·2 (0·3–4·8)
Unskilled workers	18 (39·1)	13 (15·5)	3·2 (1·1–9·4)	14 (36·8)	26 (37·7)	0·8 (0·3–2·8)
Early separation (prior to age 18)						
No	27 (67·5)	67 (80·7)	1·0	23 (65·7)	50 (72·5)	1·0
Yes	13 (32·5)	16 (19·3)	2·1 (0·9–5·1)	12 (34·3)	19 (27·5)	1·4 (0·5–3·4)
Living alone						
No	32 (69·6)	55 (65·5)	1·0	11 (28·2)	30 (43·5)	1·0
Yes	14 (30·4)	29 (34·5)	0·9 (0·4–2·0)	28 (71·8)	39 (56·5)	2·2 (0·9–5·2)
Assistance in daily living						
No	32 (71·1)	59 (74·7)	1·0	26 (68·4)	53 (84·1)	1·0
Yes	13 (28·9)	20 (25·3)	2·1 (0·8–5·3)	12 (31·6)	10 (15·9)	6·3 (1·8–21·7)
Feelings of loneliness						
No	22 (56·4)	74 (89·2)	1·0	11 (32·4)	53 (77·9)	1·0
Yes	17 (43·6)	9 (10·8)	6·8 (2·6–18·0)	23 (67·6)	15 (22·1)	8·4 (3·2–22·3)
Children						
No	14 (30·4)	13 (15·5)	1·0	10 (25·6)	13 (18·8)	1·0
Yes	32 (69·6)	71 (84·5)	0·38 (0·15–0·93)	29 (74·4)	56 (81·2)	0·59 (0·22–1·6)
Active club/organization member						
No	33 (76·7)	54 (64·3)	1·0	28 (87·5)	44 (63·8)	1·0
Yes	10 (23·3)	30 (35·7)	0·42 (0·17–1·0)	4 (12·5)	25 (36·2)	0·23 (0·07–0·74)
Active hobby						
No	30 (65·2)	38 (45·2)	1·0	27 (69·2)	35 (50·7)	1·0
Yes	16 (34·8)	46 (54·8)	0·34 (0·16–0·75)	12 (30·8)	34 (49·3)	0·27 (0·11–0·69)
Parent/sibling suicide						
No	23 (82·1)	78 (94·0)	1·0	24 (92·3)	66 (98·5)	1·0
Yes	5 (17·9)	5 (6·0)	3·7 (0·95–14·2)	2 (7·7)	1 (1·5)	8·2 (0·63–108·3)
Suicide in adult children						
No	32 (88·9)	71 (100)		31 (93·9)	56 (98·2)	1·0
Yes	4 (11·1)	0	—*	2 (6·1)	1 (1·8)	2·5 (0·21–28·8)
Serious mental disorder†						
No	5 (13·0)	78 (92·9)	1·0	4 (10·3)	60 (87·0)	1·0
Yes	41 (87·0)	6 (7·1)	99·8 (28·5–349·0)	35 (89·7)	9 (13·0)	61·6 (16·7–227·1)

* *P* = 0·011 (Fischer's exact test).
† Level 3 or 4 endorsement on the Cumulative Illness Rating Scale – Geriatrics (Miller *et al.* 1992).

ORs for suicide are reported for the sexes separately in Tables 2 and 3. Somatic illness was a stronger risk factor for men than for women. Regarding family discord the occurrence was consistently high among female suicides over the three time periods. For male suicides the occurrence gradually increased to reach the same high level as for women during the last 6 months (44·4 % in males *v.* 46·2 % in females). In the controls, the occurrence was higher in females than males over the whole time period. The OR was thus higher in men, especially during the last 6 months.

A majority of the suicide cases (3/4) had an education level at or below the mandatory 6–7 years, while more than half of the controls had an education level beyond that (Table 4). Lower level of education was associated with suicide in both men and women. Male suicides were more often workers than intermediate/higher employees, while the opposite was seen for the male controls.

Feelings of loneliness was a risk factor for both men and women (Table 4). Living alone did not, however, significantly affect the OR. Women lived alone more often than men. The need of assistance in daily living was associated with a higher risk for women but not for men. A higher proportion of the male controls had children compared to the male suicides, but the difference was not significant in women. Hobbies and active engagement in organizations appeared to be protective factors for both sexes.

The experience of early separation was not a significant risk factor in this study, although it tended to be over-represented in the suicides (Table 4). The occurrence of suicide among parents, siblings or adult children was not uncommon in the suicide cases. Altogether 15·3 % of the suicide cases and 4·6 % of the controls had lost a close family member to suicide (OR = 3·8 ; 1·4–10·4).

Serious mental disorder was over-represented in the suicides, and the proportion reached almost 90 % in both men and women in the suicide group. The most common mental disorder in the suicides was major depression (46 % in both males and females) followed by current substance abuse (30 % in males, 23 % in females). Dementia was the most common diagnosis in the control group (9 %). A history of suicide attempt was noted in 42 % of the suicides cases

Table 5. *Multivariate logistic regression analyses (stepwise) between life events (0–24 months), sociodemographic variables and mental health and suicide in men (N = 130) and women (N = 108), aged 65 years and over. Odds ratios (OR) with 95 % confidence intervals*

	Men OR (95 % CI)	Women OR (95 % CI)
Family discord	10·0 (1·7–59·8)	9·2 (1·9–44·8)
Mental disorder*	62·4 (17·9–217·5)	55·9 (14·1–222·3)

* Level 3 or 4 endorsement on the Cumulative Illness Rating Scale – Geriatrics (Miller *et al.* 1992).

(males 30 %, females 56 %). Twenty per cent made an attempt during the final year of life (males 15 %, females 28 %). Only one of the control subjects had a history of a suicide attempt.

Table 5 shows the results of the multivariate analyses. The variables that remained in the model as risk factors for both men and women were family discord and mental disorder.

DISCUSSION

The main findings of this study was that family discord and mental disorder were major risk factors for suicide among the elderly. One could easily assume that family discord was generated by the mental disorder, but both variables remained in the multivariate logistic regression model, indicating independent associations. One could also assume that the frequent occurrence of substance abuse among male suicide was a reason for the family discord, but adjustments for alcohol abuse only slightly altered the ORs (results not shown).

Most previous studies have explored life events during a short time period. We expanded the time period to 24 months, and found that most of the important life events were chronic in nature. One exception, suggesting problems of more acute nature, was family discord in men. In women the frequency of family discord was at a constant high level during the last 2 years, but for men the frequency increased by almost 50 % during the last 6 months. Separation, which is often cited as a motive for suicide in younger and mixed age groups (Heikkinen & Lönnqvist, 1995), was not a risk factor in the

current study, suggesting that separation may be an age specific risk factor.

Feelings of loneliness were more common in suicides and were more common among females than males in both suicides and controls. However, among males, family discord was a much stronger risk factor than loneliness (OR 64·3 *v.* 6·8), which indicates that a troubled relationship is a greater risk factor than a lack of social support. The difference was not as pronounced in women (OR 9·5 *v.* 8·4). The proportion of female controls reporting family discord and loneliness was much higher than for the male controls. Whether this reflects actual sex differences in the occurrence of these factors, or a sex-related difference in the tendency to acknowledge them remains unclear. Controlled studies using operationalized criteria for the measurement of loneliness and social distress are needed.

Somatic illness was common in the suicide cases, as has been reported by others. However, as the occurrence was also very high in the controls, the importance of somatic illness was rather small compared to several other risk factors for suicide. Somatic illness did not remain in the multivariate logistic regression model.

The suicide cases had lower educational levels. It is possible that the proxy procedure yielded less complete data on schooling than the self-reported procedure. The difference might also be due to selection bias, which could also explain the lower proportion of workers among the controls. However, the results did not change significantly when educational level or profession were controlled for in the bivariate analyses (results not shown), which suggests that the importance of life events as risk factors for suicide does not differ much between different occupational groups.

The suicide cases had more often lost close family members to suicide than the controls (15·3 % *v.* 4·6 %). Fifteen per cent is a conservative figure as information regarding this variable was missing for 31 of the suicide cases. The association may thus be even stronger. This parallels findings from studies on younger suicides (Murphy & Wetzel, 1982; Roy *et al.* 1995; Brent *et al.* 1996; Runeson, 1998). It has been suggested that when a familial propensity for suicidal behaviour is present, the suicide occurs before the person reaches old age. Other studies report that suicide runs in families of elderly persons with attempted (Batchelor & Napier, 1953) or completed suicide (Clark & Clark, 1993). The results of this study support these conclusions and suggest that a familial vulnerability may operate even in the elderly.

Recent bereavement was not an important risk factor in this study. In fact the tendency was that recent bereavement was more common in the controls. This is in contrast to previous reports that found recent death of a spouse or other close family member much more common in suicide cases than in controls, particularly among males (MacMahon & Pugh, 1965; Bolin *et al.* 1968; Rorsman, 1973). However, those studies included younger age groups, and the results suggest that recent bereavement play a more important role as a risk factor for suicide in the younger than in the elderly. However, Guohua (1995) reported an adjusted relative risk of suicide in elderly widowers being five times that of married men, but for elderly women there were no difference between married women and widows.

Living alone has previously been shown to be more common in depressive suicides than in depressive controls (42 % *v.* 7 %; Barraclough & Pallis, 1975). Similar proportions were found in psychiatric patient suicides compared to psychiatric patient controls (50 % *v.* 16 % in females) (Rorsman, 1973), and alcoholic suicides compared with alcoholic controls (45 % *v.* 17 %; Murphy *et al.* 1992). These studies included younger age groups. In the present study living alone was not a risk factor for suicide. Again, the situation might be different among the elderly – living alone was also common among the controls in this age group. Heikkinen & Lönnqvist (1995) showed that living alone was less common among elderly men who commit suicide than in their younger counterparts, whereas the opposite was seen in women. The frequency of assistance in daily living was similar in female and male suicides, but the OR for women was much higher, which was due to the higher frequency in male controls in comparison with female controls.

An important methodological problem was the asymmetry of data sources. The possibility of interviewing informants of living controls was, however, considered unrealistic and also ethically dubious. Such interviews would not

have been directly comparable in any case, as it would have been a totally different situation to answer questions about a living person. Nevertheless, the asymmetric sources for the cases and controls make it necessary to be very cautious when interpreting the results. Some events might be unknown to the informants and others may be over-reported. For example, reports of family discord and psychiatric symptoms might be retrospective rationalizations. Another problem could be that controls who declined to take part in the study were more likely to have suffered life events or mental illness than those who participated. However, exaggeration on the part of the informant or control bias can hardly explain the very high OR for family discord. The high proportion of mental disorders is in line with earlier reports (Arato *et al.* 1988; Conwell & Caine, 1991; Clark & Clark, 1993; Carney *et al.* 1994; Henriksson *et al.* 1995; Lawrence *et al.* 2000). Another methodological problem was the age difference between the cases and the controls, as the controls were selected by year of birth rather than age. However, age was included as a covariate in all analyses of OR, and did not result in any major changes in the results. Methodological strengths, on the other hand, were that the measurements used in this study have been developed, validated and used for a number of years. This includes the life events questions, as discussed in the introduction, and the CIRS-G which was introduced more than 30 years ago (Linn *et al.* 1968), and later refined specifically for the geriatric patient.

In summary, mental disorder and family discord were the two major risk factors for suicide among the elderly in this study. While the importance of interpersonal problems as a risk factor for suicide late in life needs to be verified using operationalized measures, our findings suggest that psychological support may be an important focus of the treatment plan for the suicidal elderly.

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