

ALCOHOL-RELATED PROBLEMS AMONG ADOLESCENT SUICIDES IN FINLAND

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Abstract — We studied 106 adolescent suicides out of a total nationwide population of 1397 suicides. Forty-four (42%) of these 13–22-year-old victims were classified as having suffered either a DSM-III-R alcohol use disorder or diagnostically subthreshold alcohol misuse according to retrospective evaluation using the Michigan Alcoholism Screening Test (MAST). These victims were found to differ from the other adolescent suicides in several characteristics: they were more likely to have comorbid categorical DSM-III-R disorders, antisocial behaviour, disturbed family backgrounds, precipitating life-events as stressors and severe psychosocial impairment. In addition, they also had a greater tendency to be alcohol-intoxicated at the time of the suicidal act, which tended to occur during weekends, suggesting that drinking in itself, and its weekly pattern, each contributed to the completion of their suicides.

INTRODUCTION

Abuse of, or dependence on, alcohol and other psychoactive substances in adolescence is often associated with suicidal ideation, suicide attempts (Berman and Schwartz, 1990; Deykin and Buka, 1994; Beautrais *et al.*, 1996), and completed suicide (Brent *et al.*, 1988; Allebeck and Allgulander, 1990; Shaffer *et al.*, 1996). Longitudinal studies of adolescent psychiatric patients and suicide attempters have found alcohol and drug abuse to be one of the major risk factors for suicide (Östman, 1991; Hawton *et al.*, 1993). In a meta-analysis, the lifetime risk of suicide for alcoholism was estimated at 7% (Inskip *et al.*, 1998). Moreover, suicidal behaviour is more common among alcoholics with early rather than late onset of heavy drinking (Buydens-Branchey *et al.*, 1989).

In suicides before 30 years of age, psychoactive substance use disorders have been reported in 47–66% (Rich *et al.*, 1986; Runeson, 1990), and in

26–62% of victims aged under 20 years (Brent *et al.*, 1988, 1993; Shafii *et al.*, 1988; Marttunen *et al.*, 1991; Shaffer *et al.*, 1996). When compared with the general adolescent population or suicidal inpatient controls, young suicide completers are more likely to have suffered alcohol or other substance abuse (Brent *et al.*, 1988, 1993; Shaffer *et al.*, 1996).

In Finland, *per capita* alcohol consumption is reportedly associated with suicide rates, particularly in the age groups 15–34 and 35–49 years (Mäkelä, 1996). Adolescent alcohol use and abuse *per se* are known to be associated with aggressive and impulsive behaviour, dysphoric mood, and—among alcohol abusers—suicide risk (Bukstein *et al.*, 1993; Milgram, 1993). We have previously reported a contribution of alcohol intoxication to weekend suicides among currently employed alcohol misusers in a total population of suicides (Pirkola *et al.*, 1997). Alcohol drinking among adolescents is concentrated at weekends (Wilson, 1980; Simpura, 1987). In a study at a Finnish children's hospital, most of the alcohol intoxication admissions occurred on Fridays (37%) and Saturdays (24%) (Lamminpää and Vilska, 1990). In emergency units, alcohol intoxication is known to be associated with weekends (Walsh and Macleod, 1983; Varadaraj and Mendonca, 1988).

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Most previous studies on the relationship of substance use to youthful suicides have focused on suicide victims with a categorical diagnosis of alcohol or other substance abuse or dependence; subjects with substance use not severe or longstanding enough to be diagnosed by such diagnostic criteria have not been included in the analyses. The exception is one psychological autopsy study of adolescent suicides (Shafii *et al.*, 1985) which reported frequent use of alcohol or non-prescribed drugs in 70% of suicides compared with 29% of control subjects. Alcohol use and misuse occur on a continuum, and associated problems go far beyond actual diagnosable alcohol dependence (Heather, 1994; Rohde *et al.*, 1996). The normal cut-off point for making an alcohol use disorder diagnosis in adults may be inappropriate for adolescents, who often have subthreshold mental disorders not fulfilling all required diagnostic criteria for specific psychiatric disorders (White and Labouvie, 1989; Rohde *et al.*, 1996).

The aim of this study was to analyse the frequency of alcohol use in adolescent suicides, and to characterize youthful suicide victims with a history of diagnostically subthreshold or diagnosable alcohol misuse (SDAM) in terms of family background, current life circumstances, psychopathology and clinical characteristics, using a nationwide unselected adolescent suicide population. Suicides with SDAM were grouped together and compared with those without such misuse. In addition, the role of alcohol intoxication in suicide with regard to the timing of the act in the week was examined.

On the basis of previous research (Brent *et al.*, 1988, 1993; Marttunen *et al.*, 1994; Shaffer *et al.*, 1996), we expected that adolescent suicides with alcohol misuse not necessarily fulfilling categorical diagnostic criteria would come from more disturbed backgrounds, would have experienced more psychosocial stressors, and have made more previous suicide attempts than the other victims. In terms of psychopathology we expected them to be more severely impaired, and to have more personality disorders and other psychiatric comorbidity. It was also assumed that a pattern of alcohol use based on cultural influences that included drinking more heavily during weekends would encourage more frequent suicides during weekends among alcohol-misusing adolescents, as is the case in currently employed alcohol misuser suicides in the general population.

SUBJECTS AND METHODS

All suicides ($n = 1397$) committed in Finland, a North European country with an ethnically homogeneous population of 5.1 million, during a 12-month period (1 April 1987 to 31 March 1988) were comprehensively analysed using the psychological autopsy method (Shneidman, 1981; Clark and Horton-Deutsch, 1992). The definition of suicide was based on Finnish law for determining the cause of death—in every case of violent, sudden, or unexpected death, the possibility of suicide is assessed by police and through medicolegal investigations involving autopsy and forensic examinations. In this period, there were 116 suicides (97 males and 19 females) in the age group 13–22 years.

Data collection

During the research period, police and forensic examinations, including toxicological analyses of all deaths suspected as suicide, were more systematic and detailed than usual. Thorough interviews of the next of kin and attending health care personnel, using interview schedules developed for the project, were conducted. The structured format for the family interviews contained 234 items relating to the victim's everyday life and behaviour, family-related factors, use of alcohol and drugs, previous suicide attempts and communication, help-seeking, and life events. Interviews of the family members were usually conducted in the homes of the families ~4 months after the suicide (mean \pm SD 134 \pm 83 days, median 115, range 29–409), and each interview lasted ~3 h (mean \pm SD 172 \pm 66 min, median 165, range 60–450). The interviewers were mental health professionals trained in the interview technique and the structured form used. Informed consent from the relatives was always requested and documented in written form. The interview schedules are obtainable from one of the authors (S.P.P.).

Health care professionals who had attended the victims during the previous year were interviewed to obtain information about the victims' state of health, treatment received, psychosocial symptoms, stressors, and level of functioning. These face-to-face interviews were structured, and the form contained 113 items. An interview using a semi-structured form containing eight items was conducted, either face-to-face or by telephone with the health care or

social service professional with whom the victim was last in contact before death. Supplementary unstructured interviews were also conducted when needed, usually by telephone. Medical, social agency and police records, as well as any others, were included. A multidisciplinary team discussed each case based on all the data collected, and a comprehensive case report was written for each suicide (Marttunen *et al.*, 1991; Henriksson *et al.*, 1993).

Subjects

The subjects of this study were those 106 victims (88/97 males, 18/19 females) aged 13–22 years during the study period where the data were sufficient for assessing the use of alcohol. As expected, most (eight of 10) excluded suicides were due to lack of family interviews. The 10 exclusions were slightly older than the other 106 victims (mean age \pm SD 20.5 ± 1.35 years vs 19.1 ± 2.14 years; $t = -1.962$, $df = 114$, $P = 0.05$), but did not differ statistically significantly with respect to sex, toxicology or method of suicide.

Subthreshold or diagnosable alcohol misuse (SDAM)

To gain sensitivity in detecting problematic alcohol use, alcohol misuse was assessed using the Michigan Alcoholism Screening Test (MAST; Seltzer, 1971) by scoring every possible item in the MAST for each victim based on all information from different sources. A victim was classified to have misused alcohol if s/he received a total score of ≥ 4 , a cut-off point which Seltzer originally considered suggestive of alcoholism. Victims who received a DSM-III-R diagnosis of alcohol dependence or abuse in the diagnostic assessment (see below) were included in the SDAM category. Using these criteria, two researchers independently assessed whether or not a victim was classified as having SDAM. The inter-rater reliability for the assessment was measured using the kappa statistics (Fleiss, 1981), and was found to be good (kappa 0.88). Eight cases with disagreement between the two researchers were then reanalysed with a third researcher to achieve final consensus for the classification.

Psychiatric diagnoses and psychosocial impairment

Psychiatric diagnoses were independently assessed by two psychiatrists in accordance with DSM-III-R criteria (American Psychiatric Association, 1987).

Provisional best-estimate diagnoses were generated by weighing and integrating all available information. After these assessments, all cases with diagnostic disagreement were reanalysed with a third psychiatrist to achieve general consensus for the final diagnoses. Multiple diagnoses on axes I–III were made, when applicable (Marttunen *et al.*, 1991; Henriksson *et al.*, 1993). The inter-rater reliability of the provisional diagnoses was moderate or good (kappa coefficients between 0.50 and 0.91) in all major diagnostic categories (Marttunen *et al.*, 1995). In addition, when there was a diagnosis other than a substance use disorder, a judgement was made about the order of appearance of SDAM and the comorbid non-substance use psychiatric disorder.

The victim's psychological, social and occupational functioning was assessed using the Global Assessment of Functioning Scale (GAF-Scale) of DSM-III-R (Axis V). The assessment was based on the highest level of functioning for at least a few months during the year prior to suicide. For victims in school, the assessment period included at least 1 month during the school year. The judgement of current functioning was based on the last week before suicide. These assessments were based on consensus decisions by two researchers.

Contacts with health care and psychiatric care

Data relating to the victims' contacts with health care during the final year were based on interviews and records. A victim was considered to have had psychiatric contacts if s/he had at least once consulted mental health professionals for psychiatric evaluation or treatment.

Psychosocial stressors

Psychosocial stressors were recorded by a life event questionnaire administered to the relatives (Rahe, 1977; Heikkinen *et al.*, 1992), and by thorough review of all the data collected on the subjects. The assessment of stressors and precipitants was based on consensus between two investigators (Marttunen *et al.*, 1994). Interpersonal stressors included separations and conflicts among others. The stressor category of family problems consisted of family discord and parental psychiatric or somatic illness.

Blood alcohol levels

All available information was used to estimate whether there was an obvious state of alcohol

intoxication at the time of suicide; the concentration of alcohol detected in blood at the time of death had been measured at autopsy in 94.3% ($n = 100/106$) of the subjects. We considered a concentration of 0.15% (150 mg/dl) to represent a state of heavy alcohol intoxication. The day of the week of suicide was determined by the forensic examiner according to all the information available. The time of suicide was dichotomized to weekdays and weekend, the latter comprising Friday to Sunday.

Statistical methods

Victims with SDAM were compared with those without SDAM using the χ^2 -test with Yates' correction, the Fisher exact test, and Student's *t*-test, all two-tailed. $P < 0.05$ was considered significant.

To control for confounding factors, a backward stepwise logistic regression model was created with SDAM as the dependent variable. In addition to age (continuous) and sex, variables showing a tendency of $P < 0.1$ in univariate analysis were first entered into the model and then a backward stepwise procedure performed. The dichotomous independent variables were: previous suicide attempts, a personality disorder, no psychiatric contacts in the month before suicide, current dating, paternal alcohol abuse, parental violence, parents divorced, four or more stressors, blood alcohol concentration >150 mg/dl at the time of suicide, and suicide during weekend. To avoid problems of co-linearity, paternal alcohol abuse, and parental violence and divorce were also tested separately.

To further analyse the connections of regular misuse, suicide during weekend, and the influence of alcohol, we also created a logistic regression model predicting suicide occurring under the influence of alcohol. Independent variables entered were age (continuous), sex, suicide during weekend, SDAM classification, four or more stressors, previous suicide attempts, and a personality disorder. In statistical analysis, SPSS software was used (Norusis, 1993).

RESULTS

Data concerning subjects with and without SDAM appear in Tables 1–3. The mean age of the subjects was 19.1 years (SD 2.1) and there were 88 males and 18 females. All but one of the 106

victims were unmarried. The parental socioeconomic status (Central Statistical Office of Finland, 1987) was manual worker in 59%, lower-level employee in 16%, upper-level employee in 10%, employer in 3%, entrepreneur in 7%, and other or unknown in 5%.

Adolescent suicides with SDAM

Five female and 39 male suicides had a history of SDAM. Seventeen had received a diagnosis of alcohol abuse and 12 alcohol dependence. None of the suicides had only misused substances other than alcohol. Ten victims with SDAM had also used other substances; solvents in two, non-prescribed drugs in five, and marijuana or other illicit drugs in three cases. However, only three victims received an actual diagnosis of other substance abuse or dependence. A vast majority (82%) of victims with SDAM committed suicide under influence of alcohol and 39% were heavily intoxicated, whereas these figures were 40% and 5% for the others (Table 1).

Characteristics of victims with and without SDAM

All but one victim with SDAM received a psychiatric diagnosis other than a substance use disorder. In 83.7% ($n = 36/43$) of these cases SDAM was secondary to a psychiatric disorder in temporal sequence. In 75% ($n = 18/24$) of victims with SDAM and a diagnosis of a mood disorder (and in six of eight with major depression), the mood disorder had preceded SDAM. Mood disorders were common both among subjects with SDAM (55%; $n = 24/44$) and those without it (50%; $n = 31/62$). Personality disorders and other comorbid psychiatric disorders were more common among victims with SDAM (Table 2). Ten (23%) of the 44 victims with SDAM compared to none of the others received a diagnosis of conduct disorder or antisocial personality disorder (Fisher exact test, $P < 0.001$). Sixteen victims (36%) with SDAM had been convicted of an offence compared with none of those without SDAM (Fisher exact test, $P < 0.0001$).

Previous suicide attempts tended to be more common among victims with than without SDAM (Table 2). A higher proportion of victims with SDAM (38.6%, $n = 17/44$) than without SDAM (19.4%, $n = 12/62$) had made their first suicide attempt more than 3 months before the fatal attempt ($\chi^2 = 3.893$, $df = 1$, $P < 0.05$).

Psychosocial impairment during the year preceding suicide was more severe among SDAM

Table 1. Situational factors and family background of 44 adolescent suicides with subthreshold or diagnosed alcohol misuse (SDAM) and 62 adolescent suicides with no SDAM

Parameter	SDAM (<i>n</i> = 44)		No SDAM (<i>n</i> = 62)		Significance (<i>P</i>)
	<i>n</i>	%	<i>n</i>	%	
Suicide method					
Violent*	32	72.7	51	82.3	
Non-violent†	12	27.2	11	17.7	
Suicide under influence of alcohol	36	81.8	25	40.3	<0.001 ^a
BAC ≥150 mg/dl‡	16/41	39.0	3/59	5.1	<0.001 ^b
Suicide during weekend	28	63.6	26	41.9	<0.05 ^c
Family related factors					
Parental divorce	20	45.5	15	24.2	<0.04 ^d
Parental violence	14	31.8	5	8.1	<0.004 ^e
Parental alcohol abuse	17	38.6	12	19.4	<0.05 ^f
Paternal alcohol abuse	15	34.1	9	14.5	<0.04 ^g
Parental suicidal behaviour¶	5	11.4	3	4.9	
Institutional rearing	6	13.6	2	3.2	

*Shooting, hanging, jumping from height, traffic death; †drowning, use of drugs or gases; ‡percentage based on the 100 cases with blood alcohol concentration (BAC) measured; ¶completed or attempted suicide of parent. χ^2 with Yates' correction: ^a16.480, *df* = 1; ^b15.967, *df* = 1; ^c4.020, *df* = 1; ^d4.343, *df* = 1; ^e8.322, *df* = 1; ^f3.893, *df* = 1; ^g4.568, *df* = 1.

Table 2. Selected psychiatric diagnoses and clinical factors of 44 adolescent suicides with subthreshold or diagnosed alcohol misuse (SDAM) and 62 adolescent suicides with no SDAM

Parameter	SDAM (<i>n</i> = 44)		No SDAM (<i>n</i> = 62)		Significance (<i>P</i>)
	<i>n</i>	%	<i>n</i>	%	
Psychiatric diagnoses					
Major depression	8	18.2	13	21.0	
Non-affective psychotic disorders*	1	2.3	8	12.9	
Anxiety disorders	1	2.3	2	3.2	
Adjustment disorders	6	13.6	11	17.7	
Conduct disorder	4	9.1	0	0.0	
Personality disorder	28	61.4	9	14.5	<i>P</i> < 0.001 ^a
Two or more comorbid psychiatric disorders on axis I–II†	28	63.6	19	30.7	<i>P</i> < 0.002 ^b
No psychiatric diagnosis	0	0.0	8	12.9	<i>P</i> = 0.02 ^c
Suicide attempts and contacts with psychiatric care					
Previous suicide attempts	20	45.5	16	25.8	<i>P</i> = 0.06 ^d
Contact with psychiatric care					
lifetime	19	43.2	18	29.0	
previous year	10	22.7	17	27.4	
previous month	3	6.8	13	21.0	<i>P</i> = 0.08 ^e
Psychiatric hospitalization					
lifetime	8	18.2	11	17.7	
previous year	5	11.4	11	17.7	

*Includes schizophrenia, schizoaffective disorder, and other psychotic disorders; †substance abuse and dependence excluded. ^a χ^2 with Yates' correction: 23.138, *df* = 1; ^b χ^2 with Yates' correction: 10.05, *df* = 1; ^cFisher exact test; ^d χ^2 with Yates' correction: 3.60, *df* = 1; ^e χ^2 with Yates' correction = 2.99, *df* = 1.

Table 3. Frequencies of stressors during the month preceding suicides in 106 adolescent victims with ($n = 44$) or without ($n = 62$) subthreshold or diagnosed alcohol misuse (SDAM)

Stressor	SDAM ($n = 44$)		No SDAM ($n = 62$)		Significance (P)
	n	%	n	%	
Interpersonal stressors	33	75	35	56	0.06 ^a
Difficulties with discipline or law	12	27	7	11	
Problems at school or work	8	18	16	26	
Unemployment	15	34	10	16	0.06 ^b
Home move	8	18	2	3	<0.02 ^c
Financial problems	18	41	4	6	<0.001 ^d
Family problems	22	50	27	43	

^a χ^2 with Yates' correction = 3.446, $df = 1$; ^b χ^2 with Yates' correction = 3.664, $df = 1$; ^cFisher exact test; ^d χ^2 with Yates' correction = 16.54, $df = 1$.

victims (mean \pm SD GAF score 62.6 ± 13.1 with SDAM vs 72.7 ± 15.4 without SDAM; $t = -3.51$, $df = 104$, $P = 0.001$).

Dating experiences within the last year were more common in victims with SDAM than among the others (75%, $n = 33/44$ vs 53%, $n = 33/62$; $\chi^2 = 4.308$, $P = 0.038$), as was current dating (50%, $n = 22/44$ vs 24%, $n = 15/62$; $\chi^2 = 6.450$, $P = 0.01$).

All the victims with SDAM and 95% ($n = 59/62$) of the others had experienced life event stressors during the last month, and their mean number was higher among victims with SDAM (3.52 ± 1.39 vs 2.48 ± 1.39 ; $t = 3.510$, $df = 104$, $P = 0.001$). Problems with discipline or the law and unemployment tended to be more frequent, and home move and financial problems significantly more frequent among SDAM victims (Table 3).

Suicide during weekends

SDAM victims were more likely to commit suicide during weekends than the others (Table 1). Two-thirds ($n = 37/56$) of all victims with alcohol detected in the blood had committed suicide during a weekend, compared to 30% ($n = 13/44$) of those with no blood alcohol ($\chi^2 = 11.729$, $df = 1$, $P = 0.0006$). When examined separately, SDAM victims were more likely to have alcohol in the blood regardless of the time of week of suicide (weekend vs weekday among SDAM: 85%, $n = 22/26$ vs 73%, $n = 11/15$; $\chi^2 = 0.220$, $df = 1$, $P = 0.64$), whereas the others had a greater tendency to have alcohol in the blood in weekend suicides (63%, $n = 15/24$ vs 23%, $n = 8/35$; $\chi^2 = 7.814$, $df = 1$, $P = 0.005$).

Logistic regression

In the backward stepwise (likelihood ratio) logistic procedure, the variables that stayed in the model and predicted SDAM in 86.5% were: previous suicide attempts, a personality disorder, no psychiatric contacts within a month, four or more stressors, current dating, parental violence and alcohol concentration of ≥ 150 mg/dl (Hosmer-Lemeshov Goodness-of-fit $\chi^2 = 4.859$, $df = 7$, $P = 0.677$) (Table 4).

The other model, predicting suicide under the influence of alcohol in 78.6%, found weekends and SDAM to be the only significant factors.

DISCUSSION

The frequency (42%) of SDAM in this study was somewhat higher than the rates (22–37%) of alcohol abuse or dependence diagnoses by DSM-III classification reported in previous psychological autopsy studies (Brent *et al.*, 1988, 1993; Shaffer *et al.*, 1996), and higher than the 20% frequency of 'alcohol use enough to affect the victims' lives' reported in the study by Eisele *et al.* (1987). However, Shafii *et al.* (1985) reported a much higher frequency (70%) of 'use of alcohol or non-prescribed drugs' in adolescent victims. Other notable discordancies between the present and previous studies — mainly from the USA — are our lower frequency of misuse of substances other than alcohol, and that all our adolescent victims who had misused drugs had also misused alcohol.

Table 4. The logistic model predicting subthreshold and diagnosed alcohol misuse (SDAM) among completed adolescent suicides

Variable	Significance (<i>P</i>)	OR	Pseudo <i>R</i>	95% CI
Previous attempts	0.083	3.63	0.088	0.84–15.60
Personality disorder	0.001	13.54	0.277	3.09–59.28
No psychiatric contact within year	0.022	11.51	0.159	1.43–92.72
Parental violence	0.109	3.84	0.067	0.74–19.88
Four or more stressors	0.077	3.50	0.093	0.87–14.04
Heavy alcohol intoxication	0.009	11.63	0.192	1.83–73.99
Current dating	0.082	3.32	0.089	0.86–12.86

OR = odds ratio; CI = confidence interval.

These findings probably reflect the substance use patterns prevailing in Finland during the 1980s (Hakkarainen, 1994).

As expected, a higher proportion of victims with SDAM committed suicide under the influence of alcohol and were also heavily intoxicated. Nevertheless, a large proportion of the others (no SDAM) had also consumed alcohol at the time of the act. SDAM victims were frequently intoxicated at the time of suicide almost regardless of its timing. Compared with the others, however, their suicides tended to take place during weekends, suggesting that a pattern of weekend drinking among SDAM victims directly contributed to their suicides. In those with no SDAM the suicide rate showed no weekly pattern, but the victims were more likely to be intoxicated during weekend suicides, almost certainly again reflecting a typical pattern of alcohol use; although, as this probably involved lower frequency and smaller amounts with less disinhibiting and dysphoric power, it had no effect on the weekly variation in suicide rate. This finding is in agreement with a case-control study by Bukstein *et al.* (1993), which identified current active substance abuse as a risk factor for completed suicide among adolescents with substance abuse.

Family factors, psychopathology and suicidal behaviour

Socio-environmental circumstances, such as family history of suicidal behaviour and poor parent-child communication, are reportedly risk factors for adolescent suicides (Gould *et al.*, 1996). In our study, a larger proportion of victims with than without SDAM came from unstable family backgrounds, which accords with the findings of

Runeson (1990). This latter author also reported that almost all suicides aged under 30 years with a substance use disorder also had other disorders, suggesting that dual diagnoses are almost the rule in young victims who have misused alcohol or other substances. In general suicide populations, the comorbidity of personality disorders, affective disorders, and substance use disorders is associated with suicidal behaviour and increased suicide risk (Isometsä *et al.*, 1994; Cheng *et al.*, 1997).

In a study by Shaffer *et al.* (1996) of 120 adolescent suicides, substance or alcohol abuse was almost invariably associated with either a mood or a disruptive disorder, or both. Likewise, we found that three-quarters of victims with SDAM had either a mood disorder or an antisocial disorder. However, at variance with the study by Shaffer *et al.* (1996), but consistent with another psychological autopsy study (Brent *et al.*, 1993), the majority of our cases had mood disorders predating SDAM. This is also congruent with findings from studies among high school and college students, which revealed that alcohol disorders followed rather than preceded the onset of other psychiatric disorders (Deykin *et al.*, 1987; Rohde *et al.*, 1996). However, due to the second-hand nature of data collection in our study, the results have to be interpreted with some caution.

Victims with SDAM were significantly more likely to demonstrate antisocial behaviour (conduct disorder or ASPD, and convictions) than the others. This may be suggestive of early onset alcoholism, where antisocial behaviour, violence, depression, suicide attempts, and paternal alcoholism are reportedly more common than in those with a later onset (Cloninger *et al.*, 1981; Buydens-Branchey *et al.*, 1989).

Precipitating life events

Interpersonal losses and conflicts, as well as problems with the law, are common precipitants in serious suicide attempts and completed suicides among adolescents (Gould *et al.*, 1996; Beautrais *et al.*, 1997). Precipitating life events were identifiable in almost all of our study subjects, but the mean number of stressors was higher among those with SDAM. This accords with what is known about alcohol use disorders in adult suicide populations (Murphy, 1992; Heikkinen *et al.*, 1994). Although some of the events may have resulted from the SDAM victims' more unstable lifestyle, the finding probably also reflects their increased vulnerability to several stressors (Murphy, 1992).

Treatment

The more severe psychosocial impairment during the year preceding suicide among victims with SDAM is likely to reflect their greater tendency to psychiatric comorbidity, and particularly to personality disorders, generating maladaptive patterns in their long-term functioning. Despite this, they had received no more psychiatric treatment than the others, but rather tended to have received less during the last month. This may indicate problems in the treatment of dual diagnosed adults (Pirkola *et al.*, 1999), as well as adolescents (Belfer, 1993). Furthermore, lack of proper follow-up and segregation of treatment services may be a particular problem for adolescent subjects with alcohol-related problems and contemporary social or legal problems.

Methodology

Limitations of psychological autopsy studies of suicide necessitate reliance on retrospective data provided by interviews of bereaved informants close to the victim (Clark and Horton-Deutsch, 1992). The psychological autopsy is often the only method available to study the victims' detailed characteristics preceding death among unselected suicides, and methodological studies have supported its acceptability (Brent *et al.*, 1988; Beskow and Runeson, 1991). Lack of control subjects in our study did not allow us to quantify the relative risk associated with probable risk factors.

The strengths of the present study include the nationwide population-based series of unselected consecutive youth suicides, and the comprehensive data collection. The families' participation rate was

high, several informants were interviewed in most cases, and data from medical records were usually available. The diagnostic classification included explicit diagnostic criteria, and the final psychiatric diagnoses as well as the assessment of psychosocial impairment and psychosocial stressors were based on consensus. The best-estimate diagnostic procedure may have led to underestimation of the prevalences of some specific diagnoses (Marttunen, *et al.*, 1991; Henriksson *et al.*, 1993). In contrast with structured interview schedules, however, this method allowed us to integrate comprehensive data from several different sources.

The risk of false-negative diagnoses of alcoholism has been suggested to be increased by the young age of subjects when the diagnoses are based on the family history method that is analogous to the psychological autopsy method in using the subjects' relatives as informants (Roy *et al.*, 1994). Thus, it may be that the frequency of psychoactive substance use disorders diagnosed according to DSM-III-R criteria in this study are underestimates. Our decision to assess SDAM with a sensitive instrument was based on the assumption that many adolescent suicide victims have suffered from clinically significant misuse of alcohol and other substances not severe enough to fulfil the DSM-III-R criteria for actual psychoactive substance use disorders.

The MAST questionnaire was originally not designed for retrospective and second-hand evaluation. In many cases it was not possible to find answers to all 25 items reliably. However, based on a thorough review of all collected information, including a separate form for substance use issues, some of the MAST issues were always answerable. The fact that, in addition to subthreshold alcohol misusers, every case having received a DSM-III-R substance abuse or dependence was included, suggests that the instrument was valid and more sensitive for alcohol abuse than categorical diagnostic criteria.

In conclusion, adolescent suicide victims with misuse of alcohol suffered from more severe and long-standing psychiatric morbidity and psychosocial impairment, and were more likely to have antisocial behaviour and disturbed family backgrounds. Nevertheless, these victims received no more psychiatric treatment than others. Our findings suggest that in young people alcohol use at levels not yet fulfilling the categorical diagnostic

criteria of alcohol abuse or dependence may be indicative of serious problems and symptoms that can enhance the suicidal process. Moreover, the act of using alcohol in the context of misuse during weekends appears to contribute to the final suicidal act among adolescents with SDAM.

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