

Incidence of suicide ideation and attempts in adults: the 13-year follow-up of a community sample in Baltimore, Maryland

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ABSTRACT

Background. Utilizing a prospectively designed community sample, we set out to estimate the rate of newly-incident suicidal ideation and attempts (non-fatal suicide behaviour) in a community sample, to evaluate antecedent sociodemographic characteristics and psychiatric disorders, and to assess use of mental health services in relation to non-fatal suicide behaviour.

Method. Prospectively-gathered data was utilized from 3481 continuing participants in the 13-year follow-up of the Baltimore sample of the NIMH Epidemiologic Catchment Area survey interviewed in 1981, 1982 and 1993/6.

Results. The incidence of suicide attempts was estimated at 148.8 per 100000 person-years and ideation at 419.9 per 100000 person-years. Persons in the youngest age group, in the lowest socio-economic status, and previously married persons were at increased risk for non-fatal suicide behaviour during the follow-up interval. Persons who reported suicidal ideation at baseline were more likely to report having attempted suicide at follow-up (RR = 6.09, 95% CI 2.58–14.36). Psychiatric disorders, especially depression and substance abuse, were associated with new-onset of non-fatal suicidal behaviour. While persons who reported newly-incident suicidal behaviour were more likely to report use of mental health services, few said that suicidal ideation or attempts were the reason for the visits.

Conclusions. Suicidal ideation is a common and important antecedent to suicide attempts and deserves more attention in community and general medical settings.

INTRODUCTION

Suicide is the third leading cause of death in young people aged 15 to 24 years and the eighth leading cause of death among the general population in the United States (National Center of Health Statistics, 1999). Attempted suicide, also known as parasuicide, is also a significant public health problem. In the United States, one suicide attempt occurs nearly every minute (McGinnis, 1987). Recent reports from the

United Nations (United Nations Department for Policy Coordination and Sustainable Development, 1996) and the Surgeon General of the United States (US Public Health Service, 1999) have highlighted the need to develop interventions to prevent suicidal behaviour based on knowledge of antecedents. While our understanding of the biological and psychological factors associated with suicidal behaviour has improved (Stoff & Mann, 1997), few studies have integrated both community-based samples and longitudinal methods to study suicide attempts and suicidal ideation.

Suicidal ideation is a significant risk factor for suicide attempts and completed suicide but has

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not received much attention because it is difficult to obtain prospective reports of suicidal ideation in community samples (Lester, 1989; Vilhjalmsson *et al.* 1998). Rates of suicidal behaviour differ by age (Moscicki *et al.* 1988; Bolger *et al.* 1989; Lewinsohn *et al.* 1996), gender (Moscicki, 1994), ethnicity (Petronis *et al.* 1990; Moscicki, 1997; Roberts *et al.* 1997), socio-economic status (Moscicki *et al.* 1988; Sorenson & Golding, 1988; Petronis *et al.* 1990) and marital status (Kreitman, 1988; Petronis *et al.* 1990). Religious background has also been associated with suicidal behaviour, with religious individuals having lower rates of suicidal behaviour (Kelleher *et al.* 1998; Neeleman *et al.* 1998). Psychiatric disorders, especially depression, substance abuse and schizophrenia, are highly associated with suicidal behaviour (Brent *et al.* 1986; Moscicki *et al.* 1988; Weissman *et al.* 1989; Petronis *et al.* 1990; Moscicki 1995, 1997; Lewinsohn *et al.* 1996; Vilhjalmsson *et al.* 1998; Kessler *et al.* 1999). Suicidal ideation strongly increases the risk for eventual suicide attempts (Kessler *et al.* 1999), but most of the earlier studies of suicidal ideation estimate only prevalence or occurrence of ideation, not new-onset of ideation (Sorenson & Golding, 1988; Crosby *et al.* 1999; Kessler *et al.* 1999; Weissman *et al.* 1999).

Our principal aim in this study was to investigate the incidence and correlates of two important non-fatal suicidal behaviours; namely, suicide attempts and ideation. First, the incident cases of suicide attempts and ideation in the follow-up period in a community-based longitudinal study were identified and incidence rates were then estimated. Secondly, we examined how new ideation and attempts were related to sociodemographic variables and psychiatric disorders assessed at baseline interviews. Lastly, the utilization of mental health services by persons with new suicidal ideation and attempts was evaluated. Our study differs from earlier investigations of suicidal behaviour because we have based on results on standardized interviews of a community sample with roughly 13 years of follow-up, permitting us to evaluate the antecedents of new-onset suicidal ideation and suicide attempts from prospectively-gathered data.

METHOD

The Epidemiologic Catchment Area (ECA) Program

The ECA Program was an investigation of psychopathology and health utilization patterns among the population in five US communities, conducted between 1980 and 1984 (Regier *et al.* 1984). After probability sampling of adult household residents aged 18 years and older, the National Institute of Mental Health-designed Diagnostic Interview Schedule (DIS) (Robins *et al.* 1981) was administered by trained non-clinician interviewers. At the Baltimore site, Wave 1 interviews were carried out in 1981. Details of the study design of the ECA have been published elsewhere (Robins & Regier, 1991; Eaton *et al.* 1997).

The Baltimore ECA follow-up

In Baltimore and four other ECA sites, the initial cohort was the target for re-interview 1 year later. At the Baltimore site, the Wave 2 interview was administered in 1982. The entire Baltimore ECA cohort of 3481 participants surveyed at the Wave 1 interview was the target for tracing 13 years later. Between 1993 and 1996, 88% of the original Baltimore cohort was traced and 73% of those known to be alive ($N = 1920$) were re-interviewed using a modified version of the DIS. More detail regarding the survey method employed in Wave 3 can be found elsewhere (Eaton *et al.* 1997). Prior analyses showed that loss to follow-up was not associated with history of either suicide attempts or ideation at initial interview (Eaton *et al.* 1997; Badawi *et al.* 1999). Protocols of the Baltimore ECA Program were reviewed and approved by the Committee on Human Research of the Johns Hopkins University School of Hygiene and Public Health.

Measurement strategy

Suicide attempts and ideation

Suicidal ideation was assessed with the question, 'Have you ever felt so low you thought of committing suicide?'. Next all participants were asked, 'Have you ever attempted suicide?'. If the respondent 'ever' had the symptom or behaviour, the respondent was then asked when the last time the symptom was present (recency)

and when was the first time the symptom was present (onset).

Sociodemographic variables

Gender, age, self-reported ethnicity, socio-economic status (SES), marital status, and religious affiliation were measured in every wave of the ECA Program. Age and marital status were partitioned into standard categories. The socio-economic status variable was generated from information about level of educational attainment, reported household income and the prestige associated with the respondent's occupation at the time of the baseline interview and was then divided into four quartiles, consistent with prior work from the ECA (Gallo *et al.* 1995; Marino *et al.* 1995). Religious affiliation reported by the participant at baseline was categorized into five categories: Protestant, Roman Catholic, Jewish, others (including Muslims and Buddhists) and no religious affiliation.

Psychiatric diagnoses

Based on the Diagnostic and Statistical Manual of Mental Disorders, third Edition (DSM-III), psychiatric diagnoses were generated by a computer algorithm (for further details, see Eaton *et al.* 1997).

Use of health services

History of mental health service utilization was assessed with the question, 'Have you ever sought any professional help due to your mental health problems?'. If the respondent 'ever' sought professional help for their mental health problems, the respondent was then asked which specific mental health professional they had seen. In each separate mental health setting specified, the reason why the treatment was sought was probed with an open-ended question. A respondent could mention as many mental health problems or conditions as he or she could recall.

Analytical strategy

The analysis plan proceeded in three phases. In the first phase, annual incidence rates and cumulative incidence over the 13-year period were estimated for suicide attempts and ideation.

The cumulative incidence represents the proportion of those at risk who reported incident suicidal behaviour at the Wave 3 interview. Annual incidence rates were estimated using the actuarial approach, in which years at risk at each year of life is taken for person-years occurring during the 1981 to 1993/6 follow-up interval. The same methods have been used in earlier studies from the Baltimore ECA follow-up to estimate the incidence of depressive disorders (Eaton *et al.* 1997), panic disorder (Eaton *et al.* 1998), obsessive-compulsive disorder (Nestadt *et al.* 1998) and social phobia (Neufeld *et al.* 1999).

In the second phase of the analysis, persons with and without incident suicidal ideation attempts were compared according to age, gender, self-reported ethnicity, marital status and socio-economic status based on information provided by the participant at the baseline interview. The association between religious affiliation and incident suicidal ideation and attempts was examined. Diagnoses of psychiatric disorders as assessed at baseline were also compared in relation to suicidal ideation and attempts. Finally, suicide ideation as a risk factor for incident attempts was examined. In the third phase of the analysis, we examined bivariate associations between newly-incident suicide attempts and ideation and use of health services.

Chi-square and Fisher's exact tests were used in the bivariate analyses, using $P = 0.05$ as the level set to determine statistical significance. After estimating measures of association in bivariate comparisons, we employed the multivariate form of the logistic regression model to adjust our measures of association for potentially influential covariates (Hosmer & Lemeshow, 1989), recognizing that tests of statistical significance are approximations that serve as aids to interpretation and inference. SPSS 8.0 for Windows was used for analyses.

RESULTS

Study sample

Participants who reported any lifetime history of suicidal ideation or attempts at baseline were excluded from this analysis since we were only interested in newly-onset cases. After exclusion,

there were 1802 subjects considered susceptible for a first suicide attempt and 1708 participants susceptible for new onset of suicidal ideation.

Incidence rates

Suicide attempt

There were 34 newly-incident suicide attempts identified, yielding a cumulative incidence of 1.9% (95% CI 1.22–2.58%) and an annual incidence estimate of 148.8 per 100000 person-years. Table 1 shows that 11 of these newly-incident suicide attempts were reported by men and 23 by women. For both men and women, younger people had an increased risk to incident suicidal attempt when compared to older persons. Women in the youngest group had the highest risk of incident suicidal attempts.

Suicidal ideation

There were 89 new cases of suicidal ideation identified among the participants at risk. The 13-year cumulative incidence of suicidal ideation was 5.6% (95% CI 4.46–6.74%). The annual incidence rate was 415.43 per 100000 person-years. The mean age reported for first suicidal ideation was 41.6 years (95% CI 38.4–44.8 years). Of the persons reporting newly-incident suicidal ideation, 35 were men and 54 were women. The distribution pattern of incident suicide ideators was similar to the distribution pattern of incident suicide attempters (Table 1). Similar to the demographic distribution among attempters, younger women (aged 18–44 years at baseline interview) exhibited the highest risk of incident suicidal ideation.

Sociodemographic and psychiatric correlates

Suicide attempt

Univariate analyses revealed that younger age groups, persons in the lowest socio-economic status, and persons who were never married at the baseline interview had significantly higher incidence rates of suicide attempts (Table 2). When all the sociodemographic variables were simultaneously adjusted for in a logistic regression model, younger age group, being in the lowest socio-economic status, being widowed or separated/divorced were independently associated with new suicide attempts reported at follow-up. There was a trend toward fewer new cases among African Americans, though the association did not reach statistical significance

by conventional criteria (i.e. $P > 0.05$). Gender was not statistically significant as a risk factor for incident suicide attempts. There was no association between religious affiliation and incidence of suicide attempts (not shown in Table 2).

Several differences in baseline psychiatric diagnoses were evident between participants who did or did not report a newly-incident suicide attempt (Table 3, column 3). New attempts had a significantly higher prevalence of a history of drug abuse/dependent problems, major depressive episodes, and antisocial personality disorder. While there was no statistical association, a trend was noted toward a higher risk of incident suicide attempts among participants with diagnoses of alcohol abuse/dependence, agoraphobia, simple phobia, or obsessive-compulsive disorder (OCD) at baseline.

History of suicidal ideation at baseline significantly increased the risk of incident suicide attempts. Among participants who reported at baseline interview that they ever had suicidal ideation but never had attempted suicide, 10% reported newly-incident suicide attempts, compared to 1.6% among persons who reported that they never had suicidal ideation (adjusted risk ratio (RR) = 6.09, 95% CI 2.58–14.4).

Suicidal ideation

Univariate analyses indicated that only age was significantly associated with incidence of suicidal ideation (Table 4). When terms representing sociodemographic variables were simultaneously included in logistic regression models, age remained the only factor independently associated with suicidal ideation. However, there were trends toward fewer incident cases among African Americans and more cases among persons who were widowed or separated/divorced at the baseline interview. Neither gender nor socio-economic status was a significant risk factor for incident suicidal ideation. There was no significant association between religious affiliation and incidence of suicidal ideation.

Baseline differences in psychiatric diagnoses were evident between participants with and without incident suicidal ideation (Table 3, column 6). Participants who reported newly-incident suicidal ideation were more likely to

Table 1. Estimates of annual incidence of suicide attempts and suicidal ideation. Data from the follow-up of the Baltimore Epidemiologic Catchment Area sample 1981–1993/6

Age at Wave 1 (1981)	Person-years exposure	New cases <i>N</i>	Rate per 100000 person-years
Suicide attempts			
Male subjects			
18–29	3122·29	7	224·19
30–44	2422·23	2	82·57
45–64	2018·60	2	99·06
≥ 65	1014·88	0	0
All ages	8578·00	11	128·24
Female subjects			
18–29	4286·83	16	373·24
30–44	4111·00	5	121·62
45–64	3780·42	1	26·45
≥ 65	2088·02	1	47·89
All ages	14266·27	23	161·22
Both genders			
18–29	7409·12	23	310·43
30–44	6533·23	7	107·14
45–64	5799·02	3	51·73
≥ 65	3102·90	1	32·23
All ages	22844·27	34	148·80
Suicide ideation			
Male subjects			
18–29	2907·08	16	550·38
30–44	2268·56	14	617·13
45–64	1922·87	4	208·02
≥ 65	986·38	1	101·38
All ages	8084·89	35	434·84
Female subjects			
18–29	3920·45	27	688·70
30–44	3676·54	16	435·19
45–64	3679·14	9	244·62
≥ 65	2037·27	2	98·17
All ages	13313·40	54	405·61
Both genders			
18–29	6827·53	43	629·8
30–44	5945·10	30	504·62
45–64	5602·01	13	232·06
≥ 65	3023·65	3	99·22
All ages	21398·29	89	415·92

have a lifetime history of drug abuse/dependent problems or dysthymic disorder. Trends toward higher risk of incident suicidal ideation among participants with diagnoses of alcohol abuse/dependence, panic disorder, agoraphobia, OCD, schizophrenia, and antisocial personality disorder did not reach statistical significance.

Use of health services

Suicide attempt

With regard to the use of health services (Table 5), 91% of participants who reported a newly-incident suicide attempt at follow-up had sought help for mental health problems in their lifetime, 75·8% from mental health specialists (including drug and alcohol clinics). This rate of health services use was significantly higher than participants who did not report a suicide attempt at

follow-up, for whom 34·8% has sought help for mental health problems ($P < 0·001$) and 25·0% sought care from a specialist in mental health ($P < 0·001$). We found that 12·1% of participants with newly-incident suicide attempts had sought help in a hospital emergency room, compared to 2·9% among persons who did not report a suicide attempt. Persons who reported newly-incident suicide attempt were 6·6 times as likely (95% CI 3·2–3·4) to report having sought treatment from a non-psychiatrist medical doctor as persons without newly-incident suicide attempt. However, few attempters who sought treatment specified their suicidal problems as their main reasons for seeking help: only 4 out of 34 attempters reported that they sought help mainly for problems related to suicidal behaviour.

Table 2. Sociodemographic characteristics of subjects with and without incident suicide attempts: data obtained from baseline interviews in 1981 in the Baltimore Epidemiologic Catchment Area sample

	Cases	Non-cases	OR (95% CI)	Adjusted OR† (95% CI)
Age (years)				
18–29 (reference)	23	549	1.00	1.00
30–44	7	504	0.33* (0.14, 0.78)	0.31* (0.12, 0.82)
45–64	3	415	0.17* (0.05, 0.58)	0.10* (0.02, 0.44)
≥ 65	1	169	0.14 (0.02, 1.05)	0.04* (0.01, 0.47)
Sex				
Male	11	621	1.00	1.00
Female	23	1016	1.28 (0.62, 2.64)	1.15 (0.52, 2.55)
Race				
White	21	1002	1.00	1.00
African-American	13	578	1.07 (0.53, 2.16)	0.48 (0.22, 1.03)
Other	0	57	—	—
Socio-economic status (in quartiles)				
Lowest	11	259	1.00	1.00
Medium low	15	654	0.54 (0.24, 1.19)	0.42* (0.18, 0.95)
Medium high	8	548	0.34* (0.14, 0.86)	0.22* (0.08, 0.58)
Highest	0	176	—	—
Marital status				
Married	6	750	1.00	1.00
Widowed	3	148	2.53 (0.63, 10.23)	6.79* (1.30, 35.37)
Separated/divorced	9	298	3.77* (1.33, 10.69)	4.22* (1.42, 12.47)
Never married	16	440	4.54* (1.76, 11.69)	2.49 (0.87, 7.17)
Suicide ideation history				
No	25	1550	1.00	1.00
Yes	9	87	6.41* (2.91, 14.2)	6.09* (2.58, 14.36)

OR, Odds ratio; 95% CI, 95% confidence interval.

† Odds ratios adjusted for gender, age in 1981, socio-economic status, self-reported ethnicity and marital status in 1981.

* $P < 0.05$.

Table 3. Relative risks for the association of DIS/DSM-III diagnoses as determined by interview in 1981 and subsequent suicidal attempt or ideation at 13-year follow-up, from analysis of prospectively-gathered data from the Baltimore Epidemiologic Catchment Area site, 1981–1994

	Suicide attempts			Suicide ideation		
	Case %	Non-cases %	Adjusted RR† (95% CI)	Case %	Non-cases %	Adjusted RR† (95% CI)
Alcohol use disorder	2.7	2	1.38 (0.53, 3.60)	8.2	5.3	1.60 (0.84, 3.05)
Drug abuse/dependence	5.4	1.8	3.02* (1.14, 7.99)	17	5	3.17* (1.64, 6.12)
Major depression	8.2	1.8	5.02* (2.01, 12.5)	2.4	5.7	0.35 (0.05, 2.58)
Bipolar disorder	0	2	—	0	5.6	—
Any affective disorders‡	5.9	17.6	3.11* (1.18, 8.21)	5.6	4.1	1.26 (0.48, 3.29)
Panic disorder	0	2	—	8.3	5.6	1.31 (0.17, 10.4)
Any phobia§	32.4	20.7	1.60 (0.74, 3.44)	22.5	20.3	1.18 (0.69, 3.44)
Obsessive-compulsive disorder	4.9	2	2.56 (0.59, 11.0)	13.2	5.5	2.25 (0.84, 5.99)
Schizophrenia	0	2.1	—	14.3	5.6	3.01 (0.34, 26.57)
Antisocial personality disorder	8.2	1.9	4.69* (1.59, 13.87)	9.5	5.5	1.34 (0.45, 3.95)

RR, Relative risk; 95% CI, 95% confidence interval.

† Relative risks adjusted for gender, age in 1981, socio-economic status, self-reported ethnicity and marital status in 1981.

‡ Including major depression, dysthymia and bipolar disorder.

§ Including agoraphobia, social phobia and simple phobia.

* $P < 0.05$.

Table 4. Sociodemographic characteristics of subjects with and without incident suicidal ideation. Data obtained from baseline interviews in 1981 in the Baltimore Epidemiologic Catchment Area sample

	Cases	Controls	OR (95% CI)	Adjusted OR (95% CI)
Age (years)				
18–29	43	492	1.00	1.00
30–44	30	443	0.77 (0.48, 1.26)	0.73 (0.43, 1.24)
45–64	13	393	0.38* (0.20, 0.71)	0.31* (0.15, 0.64)
≥ 65	3	164	0.21* (0.06, 0.68)	0.14* (0.04, 0.53)
Sex				
Male	35	567	1.00	1.00
Female	54	925	0.94 (0.61, 1.47)	0.96 (0.60, 1.54)
Race				
White	58	899	1.00	1.00
African-American	28	542	0.80 (0.50, 1.27)	0.65 (0.39, 1.07)
Other	3	51	0.91 (0.28, 3.01)	0.93 (0.28, 3.12)
Socio-economic status (in quartiles)				
Lowest	12	248	1.00	1.00
Medium low	37	599	1.28 (0.65, 2.49)	1.06 (0.53, 2.09)
Medium high	34	486	1.44 (0.74, 2.84)	1.01 (0.50, 2.08)
Highest	6	159	0.78 (0.29, 2.12)	0.52 (0.18, 1.47)
Marital status				
Married	37	681	1.00	1.00
Widowed	6	144	0.77 (0.32, 1.85)	1.55 (0.59, 4.08)
Separated/divorced	18	264	1.25 (0.70, 2.24)	1.25 (0.68, 2.30)
Never married	28	402	1.28 (0.77, 2.13)	0.94 (0.52, 1.69)

OR, Odds ratio; 95% CI, 95% confidence interval.

† Odds ratios adjusted for gender, age in 1981, socio-economic status, self-reported ethnicity and marital status in 1981.

* $P < 0.05$.

Table 5. Relative risks for the association of use of health care services as determined by interview in 1993/6 and newly-incident suicidal attempt or ideation, from analysis of prospectively-gathered data from the Baltimore Epidemiologic Catchment Area site, 1981–1994

	Suicide attempts			Suicide ideation		
	Case %	Non-cases %	Adjusted RR† (95% CI)	Case %	Non-cases %	Adjusted RR† (95% CI)
Any treatment seeking for mental health problems	90.9	34.8	18.7 (5.7, 61.6)	75.3	31.8	6.5 (4.0, 10.7)
Seeking treatment from mental health professionals	75.8	25	9.4 (4.2, 21.0)	64	22.3	6.2 (4.0, 9.7)
Mental health specialist at a health plan or clinics	45.5	7.4	10.5 (5.1, 21.3)	28.1	6	6.2 (3.7, 10.2)
Mental health specialist in private practice	30.3	13.3	2.9 (1.3, 6.1)	25.8	12.1	2.5 (1.5, 4.2)
Non-psychiatrist medical doctor	42.4	10.1	6.6 (3.2, 13.4)	25.8	9.2	3.44 (2.1, 5.7)
Mental health centre	18.2	2.7	8.0 (3.2, 20.5)	11.2	2.3	5.5 (2.6, 11.5)
Psychiatric out-patient clinic at general hospital	27.3	4.3	8.4 (3.8, 18.9)	11.2	3.9	3.1 (1.5, 6.3)
Out-patient clinic in a psychiatric hospital	3	0.3	3.8 (0.5, 30.0)	0	0.9	—
Drug clinic	18.2	2.1	10.2 (4.0, 26.4)	12.4	2.1	6.7 (3.2, 13.9)
Alcohol clinic	0	0.1	—	11.2	2	6.2 (2.9, 13.2)
Community programme, crisis centre or hotline	12.1	1.4	9.9 (3.2, 30.5)	4.5	1.2	4.0 (1.3, 12.1)
Counsellor	18.2	2.3	9.7 (3.8, 24.8)	9	2.1	4.5 (2.0, 10.2)
Emergency rooms	12.1	2.9	4.6 (1.5, 13.5)	6.7	2.8	2.5 (1.0, 6.0)

RR, Relative risk; 95% CI, 95% confidence interval.

† Relative risks adjusted for gender, age in 1981, socio-economic status, self-reported ethnicity and marital status in 1981.

* $P < 0.05$.

Suicidal ideation

Among newly-incident suicide ideators, 75.3% had sought help for mental health problems in their lifetime, a significantly higher proportion

than the rate for persons without suicidal ideation, 31.8% ($P < 0.001$; see Table 5). Sixty-four per cent of newly-incident suicide ideators has sought help specifically from a mental health specialist, compared to 22.3% of non-ideators

($P < 0.001$). Additionally, there was a significant difference for patterns of treatment seeking in hospital emergency rooms: 6.7% of subjects with incident suicidal ideation had sought help in this setting, compared to 2.8% among non-ideators. Compared to persons without suicidal ideation, persons with newly-incident suicidal ideation were 3.4 times as likely to have sought help from a non-psychiatrist medical doctor (95% CI 2.1–5.7). However, few ideators who had sought treatment specified that help-seeking was specifically related to their suicide thoughts. Only three out of 89 ideators reported that they sought help due problems related to suicidal behaviour or ideation.

DISCUSSION

In contrast to cross-sectional studies of suicidal ideation and attempt, incidence studies can provide a clearer picture of antecedent factors. Our purpose was to investigate the incidence and correlates of non-fatal suicide behaviour in the community, based on prospectively-gathered data from the Baltimore Epidemiologic Catchment Area Program. We found an annual incidence rate of 148.8 per 100 000 person-years for suicide attempts and 419.92 per 100 000 person-years for suicidal ideation. Cumulate incidence proportions were 1.9% for suicide attempts and 5.6% for suicidal ideation in the 13-year follow-up period.

Before discussing our findings in detail, some limitations deserve comment. First, the incidence estimates we have reported in this investigation should be interpreted with caution. Our study design involved interviews carried out after a long follow-up interval without continued contact with the sample, increasing the possibility that episodes of suicidal ideation or attempts would be forgotten and leading to underestimated rates (Eaton, 1995). Secondly, the outcomes of interest and risk estimates in this study are based on respondents' self-reports of suicidal behaviour and psychiatric symptoms in the DIS items and use of health care services, and not on review of records or other clinical methods, and thus are subject to imperfect recall, social desirability, and other sources of error. Thirdly, some persons may have been misclassified as new cases of suicidal ideation or attempts because they incorrectly denied suicidal

ideation or attempts at the baseline interview. Fourthly, without studying participants who died of completed suicide, many important aspects of suicidal behaviour cannot be addressed. Even in a follow-up of this size, there are too few completed suicides to study (with 87% of death certificates collected as of January 2001, only seven suicide cases were identified). In addition, with only 34 new cases of suicide attempts, our risk estimates might not be as stable as we hoped. Fifthly, the adolescent population is the one at the highest risk for first suicide attempts. However, due to the nature of the ECA sample, we were not able to study incidence in adolescents prospectively. Furthermore, persons with a disorder of early onset (such as bipolar disorder, schizophrenia, or panic disorder) may have been unlikely to participate in the ECA and the follow-up. Finally, methods used in suicide attempts were not available so we have no information on severity or lethality. More severe and lethal suicide attempts may be associated with a different set of determinants than milder attempts. Similarly, we could not assess the seriousness of the suicide plan among persons with suicide ideation.

Notwithstanding study limitations, the size and nature of the study sample, consisting of almost 2000 individuals followed up in a community-based sample, confers a distinct advantage since most studies are based on much smaller clinical samples or on restricted samples, such as members of Health Maintenance Organizations or users of mental health services. Clinical samples are by definition confined to persons who have sought treatment, and therefore are of limited value in understanding the factors that precede the decision to seek care. Nevertheless, although our study was based on a community sample and involved a much longer follow-up interval than many studies, our results were comparable to earlier findings based on clinical samples (Diekstra *et al.* 1982; Platt *et al.* 1992; Birkhead *et al.* 1993). Our estimates were also comparable to the study results based solely on the Wave 1 and Wave 2 interviews of the ECA Program, which used a 1-year follow-up period and reported an estimate of 190 per 100 000 person-years for suicide attempts (Petronis *et al.* 1990).

We were unable to find any studies reporting

an estimate of the rate of newly-incident suicidal ideation in adults aged 18 years and older, as we have done here. Most earlier studies of suicidal ideation estimated only prevalence of occurrence rates from surveys without follow-up (Sorenson & Golding, 1988; Crosby *et al.* 1999; Kessler *et al.* 1999; Weissman *et al.* 1999). One study provided the 1-year estimate of incident suicidal ideation among adolescents 7th to 8th grades as 1.7% (Garrison *et al.* 1991; McKeown *et al.* 1998), but our report may be the first to estimate the incidence of suicidal ideation in an adult community sample.

Sociodemographic risk factors were significantly associated with the development of non-fatal suicidal behaviour, especially with regard to attempts. Being younger, in the lowest socioeconomic status, and previously married (divorced, separated, or widowed) significantly increased the risk for suicide attempts; however, only younger age was significantly associated with increased risk for suicidal ideation. Ours were similar to findings from earlier studies (Moscicki, 1995; Vilhjalmsson *et al.* 1998). Unlike others (Kelleher *et al.* 1998; Neeleman *et al.* 1998), we found that religious affiliation was not associated with either suicide attempts or ideation.

Women have been reported to be more likely than men to exhibit suicidal behaviour (Moscicki, 1994, 1995); however, we did not find any association of either newly-incident suicidal ideation or attempts with gender. In previous work, women are noted to be better at reporting their health history and may be more likely to recall attempted suicide (Moscicki *et al.* 1988; Moscicki, 1994, 1995; Canetto & Lester, 1995; Frank & Dingle, 1999) than men. It may be that in a longitudinal study that examines incidence, instead of prevalence, of suicidal behaviour, any effect of differential reporting between men and women will be minimized. Thus, higher incidence rates of suicidal behaviour in women are not found in our study.

With regard to age, we found that younger persons were at increased risk of reporting newly-incident suicidal attempts and ideation at the follow-up interview. Based on a stratified sample of older primary care attenders, Callahan and colleagues (1996) estimated the prevalence of suicidal ideation at 0.7 to 1.2% among persons aged 70 years and older interviewed in

Germany, 14.7% expressed thoughts of death, 5.4% wanted to be dead or thought about suicide, but less than 1% revealed acute suicidal ideation or gestures (Linden & Barnow, 1998). Despite the increasing rates of suicide with advancing age, compared to younger persons, older adults (especially older adults from minority ethnic groups) may be less likely to report suicidal ideation (Gallo *et al.* 1994, 1999).

Among psychiatric diagnoses identified at the baseline interview, depressive disorders and drug abuse/dependence were associated with the highest risk for the development of non-fatal suicide behaviour. Antisocial personality disorder was an important risk factor for suicide attempts, but not for ideation. While not statistically significant, most psychiatric diagnoses displayed trends toward increased risk for suicide attempts and ideation for persons meeting criteria at baseline. Based either on cross-sectional data or on shorter follow-up periods, earlier studies have also found an association between suicidal behaviour and psychopathology (Brent *et al.* 1986; Moscicki *et al.* 1988; Weissman *et al.* 1989; Petronis *et al.* 1990; Moscicki, 1995, 1997; Lewinsohn *et al.* 1996; Vilhjalmsson *et al.* 1998; Kessler *et al.* 1999). Given the prospective nature of our study, in which we have excluded persons with a history of suicidal ideation or attempt at baseline interview, we can more clearly than others relate the presence of psychopathology to subsequent development of suicidal ideation or attempt.

Although most of the participants with newly-incident suicide attempts and ideation were more likely to report having sought treatment for mental health problems than those reporting no suicidal behaviour, few participants reported that suicidal problems were the reason for presentation in treatment settings. When probed about their reasons for seeking mental health care, most of the participants with a history of suicidal behaviour reported that they sought treatment for depression, anxiety, or substance abuse problems. Persons with newly-incident suicidal attempts and ideation were several times more likely than persons without suicidal attempts and ideation to have sought care from a non-psychiatrist medical doctor for care. Others have called attention to the importance of general medical settings for the identification and treatment of persons with mental dis-

turbances (Gallo *et al.* 1995, 1997; Marino *et al.* 1995; Haste *et al.* 1998), and our findings reiterate the need to improve the skill of personnel in these settings to address suicidal ideation appropriately.

In our study, persons in the community who were contemplating suicide were over six times as likely as others to report an attempt at suicide over the course of a 13-year follow-up interval. Persons with psychiatric disturbances, especially major depression, were at especially high risk. Most of the persons with a history of suicidal ideation or attempts reported seeking professional help for their mental health problems. However, very few who sought help specifically stated that they did so for suicidal thoughts or behaviours. Suicide behaviour remains a pressing worldwide public health problem, and efforts to address this issue will require sustained effort across a range of community venues.

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