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Suicidal ideation and suicide attempts: comorbidity with depression, anxiety disorders, and substance abuse disorder

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Abstract The effect of comorbidity on rates of suicidal ideation and suicide attempts from an adult general population of former West Germany is investigated. The assessment instrument is a modified German version of the Diagnostic Interview Schedule (DIS), a fully standardized interview for the assessment of selected DSM-III lifetime diagnoses as well as suicidal ideation and suicide attempts. Of the general population 4.1% (2.2% male and 4.1% female) made suicide attempts during their lifetime. Only 2 of 18 people who attempted suicide did not meet criteria for a DSM-III-R diagnosis. Cases with pure major depression did not have an odds ratio for suicide attempts significantly higher than subjects with no DSM-III diagnosis. However, cases with both a major depression and a lifetime-anxiety-disorder diagnosis showed significantly elevated odds ratios. Therefore, it is suggested that comorbidity of anxiety and depression, and not depression itself, seems to be a risk factor for suicide attempts.

Key words Epidemiology · Suicidal ideation · Suicide attempts · Comorbidity

Introduction

Many studies have investigated suicidal ideation, suicide attempts, and suicide in relationship to depressive disorders (Weissman 1974; Roy 1989; Ennis et al. 1989). Only very recently have a few studies dealt with the potential importance of other disorders as well as comorbidity (the presence of more than one mental disorder such as anxiety *and* depressive disorder) for the risk of suicidal behavior (Weissmann et al. 1989; Markowitz et al. 1989; Johnson et al. 1990; Petronis et al. 1990). Most of these studies have been concerned primarily with the relationship of suicidal ideation or suicide attempts, and panic attacks or panic disorders, to depression (Weissman et al. 1989; Markowitz et al. 1989; Johnson et al. 1990).

The likelihood of suicide attempts for subjects with panic disorders or attacks has been reported to be similar to or greater than those associated with major depression (Markowitz et al. 1989). Murphy and Wetzel (1990) estimated that the suicide rate for alcoholics in epidemiologic studies is approximately 2.0–3.4%. Hawton et al. (1989) reported that alcoholics with prior histories of suicide attempts were at greater risk for additional attempts during their 10-year follow-up than nonalcoholics with previous suicide attempts.

The following diagnoses have been found by Petronis et al. (1990) to be risk factors for making a suicide attempt during a 1–2 year observation interval based on an analysis of data from the Epidemiologic Catchment Area (ECA) surveys in the United States: a current diagnosis of major depression, alcohol dependency, and any use of cocaine. These studies suggest that major depression, panic attacks or disorder, alcoholism, and cocaine use are all diagnoses that contribute substantially to the risk of subjects making suicide attempts. However, the effect of comorbidity on the risk of making suicide attempts with regard to depression, substance abuse, and panic attacks or disorders remains an open question.

We report on the effect of comorbidity on rates of suicidal ideation and suicide attempts in an adult general population sample of former West Germany (The Munich Follow-up Study [MFS]; Wittchen and von Zerssen 1988) using the Diagnostic Interview Schedule (DIS; Robins et al. 1981) as a standardized assessment instrument for DSM-III diagnoses as well as for the assessment of suicidal ideation and suicide attempts.

The following questions are addressed in this study:

1. How prevalent are suicidal ideation and suicide attempts in the general population?
2. How frequent are suicidal ideation and suicide attempts in different DSM-III disorders?
3. How frequent are suicide ideation and suicide attempts in comorbid cases?

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Methods

Description of Munich Follow-up Study

The Munich Follow-up Study (MFS) is a 7 year prospective and retrospective follow-up study of: (a) a cohort of former psychiatric inpatients at the Max Planck Institute of Psychiatry in Munich (not reported here) and (b) a cohort of a general population sample of the adult population of former West Germany, including former West Berlin. The same evaluation methods were used for both samples (Wittchen 1986, 1987, 1988; Wittchen et al. 1985). This paper describes results exclusively from the epidemiologic sample.

The epidemiologic sample was originally drawn in 1974, the year the phase I investigation of the MFS took place. In this first phase 1952 of 2524 subjects (77.3%) randomly drawn from the general population were interviewed for the first time (The refusal rate was 16.2%; 4.9% either were not available or did not complete the interview, and 1.6% had missing values in at least one of the scales used and thus were excluded from further analysis.) Because additional information proved to be very helpful for a prospective study we decided to use this 1974 sample as a basis for our 1981 phase II investigation for determining prevalence rates of mental disorders.

The phase I interviews (Wittchen and von Zerssen 1988) were done by trained interviewers of a health research survey company (Infratest/Gesundheitsforschung) using psychologists and other professionals from the social sciences. These interviews included questions to assess social, marital, and occupational status, as well as use of and attitudes toward health services, use of different types of medications, and lifestyle patterns (exercise, eating habits, etc.).

The phase II examination in 1981 (7 years later) was designed as a clinical/psychiatric follow-up. Continuous contact was established with the ECA program, which was going on at about the same time, so that training in the use of the DIS (version 2) could be given and comparisons made with the present study. The phase II interviews were conducted exclusively by clinicians (psychiatrists and clinical psychologists). Because of this and limited financial and personnel resources only some of the 1952 subjects of phase I could be selected for the more intensive second phase.

To ensure comparability with our inpatient sample it was decided to use the same inclusion criteria. Thus, all subjects were excluded who: (a) at phase I were younger than 18 or older than 57, or had an intelligence quotient (IQ) below 85, resulting in 487 subjects being excluded, or (b) were not available ($n = 99$).

Secondly, it was decided to stratify the remaining 1366 subjects. To ensure both a representative random sample and a high number of probable cases, a stratification method was based on the scores in the Clinical Self-Rating-Scales (CSR-S). After analyzing the score distribution of the Somatic Complaint List, Depression-Scale, Paranoid-Scale, and the Munich Alcoholism Test (MALT) for all phase I respondents, a 38.9% ($n = 532$) simple random sample was drawn. The cut-off scores for each of the four clinical rating scales were used to include all probable cases with mental disorders. A total of 125 subjects with scores above the cut-off threshold on at least one of the scales, who had not been included in the straight random sample, were then added to the 532 subjects. Thus, 657 subjects were followed-up for 7 years (1974–1981) by monitoring health insurance records for the more detailed clinical follow-up investigation in 1981.

At the phase II investigation in 1981, 22 subjects (3.3%) had died, 97 (14.8%) refused the whole interview, and 37 (5.6%) refused parts of it. Of the 657 subjects, 501 (response rate 76.2%) could be interviewed in phase II. Of these 501 subjects, only 481 (73.5%) had a full data set and were used for this study. Prevalence rates for suicidal ideation and suicide attempts were weighted back to the original sample of 1366, from which the sample of 481 interviewed subjects was obtained.

In addition, prevalence rates are given in percentages. The weighting was done in the following way: 1366 people were interviewed at the first time ("total population"); 1160 of them were low scorers and 206 were high scorers. In the second interview 9 years later 354 of the 1160 low scorers were reanalyzed, as well as 127 of the 206 high scorers. We weighted the prevalence rates back to the "total population" by weighting the low scorers with 1160/354 (3.28) and the high scorers with 206/127 (1.62). Thus, the prevalence rates (%) for suicidal ideation and suicide attempts are weighted back to the original 1366 person sample that formed the basis for our phase II stratification.

Table 1 shows the sociodemographic characteristics of subjects who were interviewed in 1981. Compared with the adult general population there is slight preponderance of women. Most of the subjects were married, living in inner-city areas, and employed.

Design and study instruments

In addition to other instruments (for details see Wittchen and von Zerssen 1988) all subjects and patients were interviewed with the German version of the Diagnostic Interview Schedule (DIS; Robins et al. 1981; Wittchen and Rupp 1981). This instrument allows the use of computer programs for scoring DIS information to produce diagnostic information according to DSM-III for lifetime, 6-month, and current diagnoses.

In our study only lifetime diagnoses are considered. Anxiety (panic disorder, agoraphobia, simple, and social phobia), depressive (major depression, single episode, recurrent, dysthymia, and bipolar), substance abuse disorders (alcohol and drug abuse/dependence), somatization, schizophrenia, obsessive-compulsive disorder, psychosexual dysfunction, and eating disorders are included in the DIS used in the MFS, giving 16 possible DSM-III diagnoses.

The DIS data on alcohol use are based on a modified alcohol section that included the results of a combined self-report questionnaire and observer's checklist (MALT; Feuerlein et al. 1979),

Table 1 Sociodemographic characteristics of general population sample

Sociodemographic category	General population sample ($N = 481$)[a]	
	N	%
Gender		
Male	231	48.0
Female	250	52.0
Age (years)		
25–34	80	16.6
35–44	169	35.1
45–54	130	27.0
55–63	102	21.2
Mean (SD)	44.85	(9.60)
Marital status		
Single	36	7.5
Married	388	80.7
Separated	7	1.5
Widowed	20	4.2
Divorced	30	6.2
Social class[b]		
I	18	3.8
II	73	15.3
III	214	45.0
IV	157	33.0
V	14	2.9

[a] Five subjects in general population sample did not have any data on social class

[b] Based on Hollingshead and Redlich (1958)

Table 2 Diagnostic Interview Schedule (DIS) items with regard to suicidal ideation and suicide attempts

D 88:	*Thinking about death* Has there ever been a period of 1 week or more when you thought (Did you think) a lot about death, either your own, someone else's, or death in general?
D 89:	*Wish to die* Has there been a period of 1 week or more when you felt (Did you feel) like you wanted to die?
D 90:	*Suicide ideas* Have you ever felt (Did you feel) so low you thought of committing suicide?
D 91:	*Suicide attempts* Have you ever attempted (Did you attempt) suicide?

instead of some of the original DIS questions (for description, see Bronisch and Wittchen 1992) to ensure a high degree of comparability with the instruments used in phase I.

Although the DIS is designed for use by lay interviewers, only clinicians administered the DIS and all other instruments (Wittchen and von Zerssen 1988) in the MFS. These clinicians were either experienced physicians (more than 2 years of practical psychiatric training and experience after receiving their medical degree; $n = 8$) or clinical psychologists ($n = 12$). They were all trained in the use of this DIS, with a 2-week video-assisted session using the training material and a manual of instructions from the principal authors of the DIS. The interview training included further video-assisted practical experience with the DIS as well as the other study instruments under supervision throughout the entire study (Wittchen 1984). Table 2 shows the questions of the DIS concerning suicidal ideation and suicide attempts.

Statistical analysis

Prevalence rates reported are weighted data. Weights used refer to the stratification described previously. Adjusted odds ratios with 95% confidence intervals (95% CI) were calculated. The ratios indicate the strength of the association between the diagnostic groups and the suicide-related variables. The statistical significance of the adjusted odds ratios can be judged from the confidence intervals (whether the interval excludes 1.0). A confidence interval that includes 1.0 indicates no statistical evidence for excess risk for the diangostic group compared with no disorder. A confidence interval greater than an excluding 1.0 indicates increased risks for suicidal ideation and suicide attempts. No adjustment was done for the odds ratios. The calculation was done according to the normal formula

	+	−	
+	a	b	
−	c	d	odds ratio = (a : d)/(b : c)

e.g., major depression only, thinking about death:

	+	−	
+	352	14	
−	89	10	odds ratio = (352:10)/(14:89) = 2.8

Results

Prevalence rates of suicide ideation and suicide attempts in the MFS

Table 3 shows the weighted prevalence rates of suicidal ideation and suicide attempts in the MFS. The number of subjects "wishing to die" was lower than that of subjects having "suicide ideas." However, suicide ideas are not dependent on the 1-week-duration criterion compared to the wishes to die (Table 2). As expected, the number of subjects with suicide attempts is considerably lower compared to that of suicidal ideation.

Table 3 Weighted prevalence rates of suicidal ideation and suicide attempts in the Munich Follow-up Study (MFS; $N = 481$)

DIS items	Total		Male		Female	
	N	Rates/ 100 (SD)	*N*	Rates/ 100 (SD)	*N*	Rates/ 100 (SD)
Thinking about death	99	18.5 (1.4)	26	11.0 (1.7)	73	25.5 (2.3)
Wish to die	33	5.3 (0.7)	6	2.5 (0.8)	27	7.6 (1.2)
Suicide ideas	83	14.7 (1.3)	30	12.5 (1.7)	53	16.3 (1.8)
Suicide attempts	18	4.1 (1.0)	5	2.2 (0.8)	13	4.1 (1.0)

Frequency of suicidal ideation and suicide attempts, and DSM-III diagnoses

Table 4 shows the frequency of suicidal ideation and suicide attempts across selected DSM-III diagnoses of the subjects. Because there were no cases of illicit drug abuse we refer only to medication abuse. Only those diagnoses where a sufficient number of cases with a DSM-III diagnosis were identified (fewer than five cases) are considered.

Subjects with no diagnosis have a lower frequency of suicidal ideation and suicide attempts compared to subjects with DSM-III diagnoses. The rates of suicide ideas and attempts are, however, rather similar for each of the DSM-III diagnoses considered.

Table 5 shows the comparison of subjects of the MFS with no DIS diagnosis to those with major depression without and with other DIS diagnoses (panic attacks, phobias, and substance abuse disorder) with regard to suicidal ideation and suicide attempts. Dysthymia was excluded as a condition never occurring in its pure form. Because no differences were found between alcohol dependency and medication abuse these two diagnoses were combined into one category of substance abuse disorder to increase the group size. Table 5 reveals markedly higher rates for pure depression in suicidal ideation, but not in suicide attempts. The comparison beween subjects with a pure major depression and subjects with a major depression *and* panic attacks, phobias, or substance abuse disorder showed markedly higher rates of suicide attempts of the comorbid diagnostic groups. Unfortunately there were not enough cases with pure panic attacks, phobias, and substance abuse disorder for more detailed comparisons.

Table 4 DSM-III diagnoses, suicidal ideation, and suicide attempts of subjects of the MFS ($N = 481$)

DIS items (lifetime)	No DIS diagnosis ($N = 316$)		Major depression ($N = 54$)		Dysthymia ($N = 46$)		Panic attacks[a] ($N = 53$)		Phobias[b] ($N = 66$)		Alcohol abuse/ dependence ($N = 67$)		Drug abuse/ dependence[c] ($N = 12$)	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Thinking about death	46	15	30	56	20	44	19	36	25	38	13	19	4	33
Wish to die	6	2	20	37	16	35	11	21	10	15	8	12	2	17
Suicide ideas	25	8	37	69	30	65	23	43	24	36	14	21	4	33
Suicide attempt	6	2	8	15	4	9	7	13	6	9	5	8	2	17

[a] Defined as meeting criteria A + B
[b] Includes simple, social, and agoraphobias
[c] Medication abuse/dependence only

Table 5 Comparison of subjects of the MFS with no DIS diagnosis to those with major depression without and with other DIS diagnoses, with regard to suicidal ideation and suicide attempts ($N = 481$)

DIS items (lifetime)	No DIS diagnosis ($N = 316$)		Major depression only ($N = 24$)		Major depression and panic attacks ($N = 23$)		Major depression and phobias ($N = 21$)		Major depression and substance abuse disorder ($N = 9$)	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%
Thinking about death	46	15	10	42	13	57	12	57	6	67
Wish to die	6	2	17	71	9	39	7	34	6	67
Suicide ideas	25	8	15	63	18	78	15	71	8	89
Suicide attempts	6	2	1	4	6	26	4	19	3	33

Table 6 Odds ratios (OR) of subjects of the MFS with any DIS diagnosis and with major depression without and with other DIS diagnoses with regard to suicidal ideation and suicide attempts

DIS items (lifetime)	Any DIS diagnosis ($N = 165$)		Major depression only ($N = 24$)		Major depression and panic attacks ($N = 23$)		Major depression and phobias ($N = 21$)		Major depression and substance abuse disorder ($N = 9$)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Thinking about death	2.7*	(1.7– 4.3)	2.8*	(1.2– 6.8)	5.4*	(2.3–12.7)	5.5*	(2.2–13.4)	7.8*	(1.9– 31.8)
Wish to die	9.8*	(4.0–24.3)	6.5*	(2.5–17.1)	11.1*	(4.4–28.3)	8.0*	(3.0–21.5)	31.6*	(7.5–133.1)
Suicide ideas	6.1*	(3.7–10.3)	9.0*	(3.8–21.6)	20.7*	(7.4–57.7)	13.8*	(5.1–36.6)	40.3*	(5.0–327.2)
Suicide attempts	3.9*	(1.5–10.7)	1.1	(0.1– 8.5)	12.6*	(4.2–37.6)	7.2*	(2.1–24.2)	14.6*	(3.3– 64.2)

* Asterisks indicate increased risks for suicidal ideation and suicide attempts

Comorbidity of DSM-III diagnoses with suicidal ideation and suicide attempts

Table 6 shows the odds ratios of subjects of the MFS with any DSM-III diagnoses and with major depression without and with other DIS diagnoses (panic attacks, phobias, and substance abuse disorder) with regard to suicidal ideation and suicide attempts. Cases with any DSM-III diagnoses show significantly higher odds ratios of suicidal ideation and suicide attempts than the subjects without a DSM-III diagnosis. The highest odds ratios were obtained by the subjects with a major depression with panic attacks and with substance abuse disorder, whereas subjects with a pure major depression did not display a significantly elevated odds ratio.

Discussion

Our survey, the MFS is based on a small but representative sample of former West German households (Wittchen et al. 1992) using a standardized diagnostic instrument for DSM-III (DIS; Robins et al. 1981). The rates of suicide attempts (2.2% for males and 4.1% for females) is similar to that found in other studies in the United States, Canada, and New Zealand that used the same diagnostic instrument (Weissman et al. 1993). Using self-report scales, Korczak (1988) found that suicidal ideation is reported from 16% of the German population, which is very similar to our findings (14%).

The result that only two subjects without a DIS/DSM-III diagnosis made a suicide attempt was expected. Epi-

demiologic studies using DSM-III or DSM-III-R diagnoses have found a high percentage of depressive disorder, panic attacks, and panic, as well as addictive disorders, in subjects making suicide attempts (Weissman et al. 1989; Petronis et al. 1990). However, the finding that cases with a diagnosis of pure major depression did not have a significantly higher odds ratio for suicide attempts than subjects with no DSM-III diagnosis was unexpected. Epidemiologic studies assessing risk factors for subjects who had attempted suicide have always reported a depressive disorder as the most important risk factor (Weissman 1974; Ennis et al. 1989; Petronis et al. 1990). However, these studies did not address the issue of comorbidity, i.e., most cases might have had another diagnosis in addition to a depressive disorder. The study of Petronis et al. (1990) included only active cases of a major depression within an observation period of 1 year, not lifetime diagnoses, as in the present study. On the other hand, our sample size was very small (only one "pure" major depressive made a suicide attempt), therefore our results should be regarded as tentative.

In contrast to the cases with a pure major depression, all cases with *both* a major depression and a phobic disorder, panic disorder, or substance abuse disorder showed very high odds ratios, especially those with panic disorders and substance abuse disorders. Comorbidity seems to be a powerful risk factor for suicide attempts, whereas a depressive disorder alone is not. Unfortunately, our numbers of cases with panic attacks or panic disorder solely, or with a substance abuse disorder solely, were too small for the calculation of odds ratios. Finally, we cannot determine whether suicidal ideation and suicide attempts coincided with the DSM-III diagnoses and, if so, with which DSM-III diagnoses.

Our study documents the critical role of comorbidity, but does not answer the essential question of why and how comorbidity contributes to elevated suicidal ideation and suicide attempts. This problem might be best solved in prospective clinical follow-up studies (Wittchen 1991; Wittchen et al. 1991). Methodologically, however, it should be taken into account that inpatients of a psychiatric hospital usually display extremely high rates of comorbidity (up to 90% of all patients; Wittchen and von Zerssen 1988), therefore outpatients with a lower degree of comorbidity might be more useful for this kind of research. Personality disorders should also be assessed, because subjects and patients with personality disorders make suicide attempts more frequently (Ennis et al. 1989) and display a high degree of comorbidity with Axis-I DSM-III and DSM-III-R personality disorders (Alnaes and Torgersen 1988; Fyer et al. 1988).

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