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Familial Aggregation and Coaggregation of Suicide Attempts and Comorbid Mental Disorders in Adults

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IMPORTANCE Clarification of the joint influence of familial patterns of suicide attempts and comorbid mental disorders can enhance the understanding and prevention of suicide attempts.

OBJECTIVE To investigate the familial patterns of suicide attempts and comorbid mental disorders and their associations in a 2-site family study of mood and anxiety disorders.

DESIGN, SETTING, AND PARTICIPANTS Data were obtained from 2 parallel community-based family studies conducted in the United States (National Institute of Mental Health [NIMH] study) and in Lausanne, Switzerland (PsyCoLaus study), on the comorbidity of mood and anxiety disorders. The study sample comprised 1119 adult probands and 5355 first-degree relatives. Data were collected and analyzed from October 2004 to December 2016.

MAIN OUTCOMES AND MEASURES Lifetime suicide attempt and mental disorders in first-degree relatives, obtained through direct interviews or family history reports.

RESULTS The study included 1119 adult probands (675 female [60.3%] and a mean [SD] age of 50 [12.0] years) and 5355 first-degree relatives (2752 female [51.4%] and a mean [SD] age of 52 [1.5] years). Of these participants, 90 (8.0%) of 1119 probands and 199 (3.7%) of 5355 relatives had a lifetime history of suicide attempt. Those with such a history had higher rates of all mental disorders, a greater number of disorders, and statistically significantly poorer current and lifetime global functioning. After adjustment for age and sex, a statistically significant association between suicide attempts in probands and in relatives was found at the NIMH site (OR, 2.6; 95% CI, 1.5-4.7), at the Lausanne site (OR, 3.1; 95% CI, 1.6-6.0), and in the combined data (OR, 2.9; 95% CI, 1.9-4.5). All mood disorder subtypes and substance use disorders were statistically significantly associated with suicide attempts. The familial association between lifetime suicide attempts in probands and relatives was not statistically significant for the combined sample (OR, 1.6; 95% CI, 1.0-2.7) after adjustment for comorbid conditions in probands and relatives. Social anxiety disorder in probands was associated with suicide attempts in relatives (OR, 2.4; 95% CI, 1.7-3.5) after controlling for comorbid mood, anxiety, and substance use disorders.

CONCLUSIONS AND RELEVANCE Familiality of suicide attempts appears to be explained by a history of mental disorders among those with suicide attempts; the novel finding of a common familial diathesis for suicide attempts and social anxiety, particularly in combination with mood disorders, has heuristic value for future research and may be a risk marker that can inform prevention efforts.

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In 2016, more than 44 000 Americans died by suicide, representing a growing increase in both suicide attempts and deaths by suicide.[1,2] Therefore, identifying individuals at high risk for suicide attempt is a national priority.[3] One of the most potent risk factors for suicide attempts and deaths by suicide is a family history of suicide, as documented by family studies of clinical and community samples[4-15] and population registries.[16-19] Twin[18,20-23] and adoption studies[19] have implicated genetic factors in suicide attempts and deaths by suicide, but they are only 1 component of a complex array of risk factors for suicide attempts that include biologic susceptibility, familial environment, and unique experiences of the individual.[24]

Many individuals who die by suicide have experienced major depression,[25] but evidence from several large community studies shows that multiple lifetime mental disorders, including mood disorders (particularly bipolar disorder[26]), anxiety disorders[27] (ie, panic attacks and disorder and[28-30] social anxiety[31-33]), posttraumatic stress disorder,[34] and substance use disorders, may be independent factors of both suicide attempt[35-37] and death by suicide.[38,39] Comorbidity among these conditions is associated with elevated rates of suicide attempts.[40]

Evidence is inconsistent regarding the extent to which mental disorders may explain the familiality of suicide.[41] Many studies have found that familial transmission of suicide was only in part explained by familial transmission of comorbid conditions.[16] However, most previous studies have had small sample sizes, clinical or treatment registry ascertainment, or limited assessment of the full range of mental disorders in both probands and relatives.

The family study design may be used to investigate the explanations for comorbidity.[42] Coaggregation of suicide attempts and specific disorders within families supports a common familial diathesis underlying suicide attempts and mental disorders, whereas independent familial associations are consistent with suicidal behavior as a consequence of (or precursor to) mental disorders. In this study, we examined data from 2 parallel community-based family studies in the United States and Switzerland to examine the (1) associations between suicide attempts in probands and relatives; (2) associations between suicide attempts and comorbid mood, anxiety, and substance use disorders in probands and relatives; and (3) familial associations of suicide attempts (ie, independent aggregation vs coaggregation), controlling for comorbid disorders in probands and relatives.

Key Points

Question Are suicide attempts familial, and is familial aggregation explained by comorbid mental disorders?

Findings In this study of data of 1119 adult probands and 5355 first-degree relatives, suicide attempts were moderately familial and associated with mental disorders, particularly mood disorders. Social anxiety disorder in probands was statistically significantly associated with suicide attempts in relatives.

Meaning Suicide attempts appear to be familial, but much of the familial aggregation may be explained by comorbid mental conditions; the increase in suicide attempt risk among people with a familial diathesis for social anxiety or its underlying components may provide insight into the mechanisms and prevention of suicide.

Methods

The Combined Neuroscience Institutional Review Board at the National Institutes of Health approved the National Institute of Mental Health (NIMH) study, and all participants provided written informed consent. The Institutional Ethics Committee of the Faculty of Medicine of the University of Lausanne approved the Cohort Study of Lausanne (CoLaus) and, subsequently, its psychiatric component the PsyCoLaus study, and written informed consent was obtained from participants. Data for these analyses were based on proband recruitment that began in October 2014 and relative recruitment through December 2016.

Participants

The total sample included 1119 adult probands (154 with bipolar disorder, 475 with major depressive disorder, and 182 with other non–mood disorders; 308 were controls) and 5355 first-degree relatives from a 2-site family study (1 at a US site and 1 at a Lausanne, Switzerland, site) on the comorbidity of mood and anxiety disorder spectrum using parallel diagnostic methods for family studies. The mean (SD) age of probands was 50 (12.0) years and of relatives was 52 (1.5) years, and 56% of the probands and 60.3% of the relatives were female.

National Institute of Mental Health Study

Probands (n = 468) were recruited from a community screening of the greater Washington, DC, area supplemented by the National Institutes of Health general volunteer referral core and the NIMH Adult Mood and Anxiety Disorders Program. The proband sample included 142 with bipolar disorder, 162 with major depressive disorder, 63 with an anxiety disorder or other disorder without depression, and 101 without any history of a mental disorder. Probands were eligible for participation if they were English-speaking, were available for interviews, and consented to have at least 2 first-degree relatives contacted for interview. Information on psychiatric disorders and suicide attempts was available for 2193 first-degree adult relatives of the probands (804 parents [36.7%], 917 siblings [41.8%], and 472 offspring [21.5%]), obtained either by a direct diagnostic interview or by family history reports (often multiple family history reports).[43]

Lausanne Community Family Study

The CoLaus sample included 651 probands and their 3162 relatives (1215 parents [38.4%]; 1242 siblings [39.3%]; and 705 offspring [22.3%]) who participated in the PsyCoLaus study.[44] Probands from the PsyCoLaus study were eligible for participation in the CoLaus study if they were fluent in French, were available for interviews, and consented to have at least 1 of their first-degree relatives contacted for interview. The Lausanne

Table 1. Demographic Characteristics of Probands and Relatives by a Lifetime History of Suicide Attempts in the NIMH and Lausanne Studies

	Suicide Attempts							
	Probands				Relatives			
	NIMH (n = 468)		Lausanne (n = 651)		NIMH (n = 2193)		Lausanne (n = 3162)	
Variable	Yes	No	Yes	No	Yes	No	Yes	No
No. (%)	58 (12.4)	410 (87.6)	32 (4.9)	619 (95.0)	98 (4.5)	2095 (95.5)	101 (3.2)	3061 (96.8)
Female, No. (%)	379 (80.9)	305 (65.1)	509 (78.1)	356 (54.6)	1476 (67.3)	1149 (52.4)	2065 (65.3)	1575 (49.8)
P value	.02		.009		.004		.002	
Age, mean (SD) [range], y	43.2 (12.5) [20.0-69.0]	50.3 (15.1) [18.0-90.0]	50.7 (8.5) [38.7-68.7]	51.0 (9.2) [35.8-78.5]	49.7 (17.4) [18.0-91.0]	54.2 (18.9) [18.0-102.0]	49.8(17.3) [20.0-91.0]	55.0 (19.7) [18.0-98.0]
P value	.001		.83		.02		.009	

Abbreviation: NIMH, National Institute of Mental Health.

study sample included 12 probands with bipolar disorder, 313 with major depressive disorder, 119 with other disorders without a mood disorder, and 207 without a lifetime history of a mental disorder.

Procedures

Standard family study methods were used, including direct interviews with probands and available relatives, as well as structured diagnostic assessments and semistructured family history assessments of probands and relatives from multiple informants. Suicide attempts were assessed in a separate module on suicide or self-harm in both the direct diagnostic interview and the family history interview. The study methods and ascertainment procedures are presented in the eMethods in the Supplement.

Statistical Analysis

The association between proband and relative suicide attempts and mental disorders was evaluated using mixed-effects logistic regression, including both fixed and random effects. The models assessed the association between proband suicide attempts and relative suicide attempts after controlling for age (continuous), sex (female vs male), study source (NIMH vs Lausanne), and comorbid disorders in probands and relatives. The models included a random intercept to account for clustering of family members in each family. The statistical tests used to calculate *P* values were χ^2 and *t* tests for raw data, and 2-tailed $P < .05$ was considered statistically significant. Analyses were completed using SAS, version 9.4 (SAS Institute Inc).

Results

Demographic characteristics of probands and relatives by a lifetime history of suicide attempts are shown in **Table 1**. In total, the study included 1119 adult probands (675 female [60.3%] and a mean [SD] age of 50 [12.0] years) and 5355 first-degree relatives (2752 female [51.4%] and a mean [SD] age of 52 [1.5] years). Of these samples, 90 probands (8.0%) and 199 relatives (3.7%) had a lifetime history of a suicide attempt. Rates of suicide attempts were higher in the NIMH study compared with the Lausanne sample (probands: 4.5% vs 3.2% [$P < .02$]; relatives: 12.4% vs 4.9% [$P < .001$]). Across sites, individuals with a lifetime suicide attempt were considerably more likely to be female and tended to be younger than those who had not made a suicide attempt.

Lifetime rates of suicide attempts by lifetime mental disorders, global functioning, and number of mental disorders in relatives are shown in **Table 2**. The rates of all subtypes of mood, anxiety, and substance use disorders in relatives were greater among those with a lifetime history of suicide attempt compared with those without a history of suicide attempt. All subtypes of mood disorders were statistically significantly associated with suicide attempts (bipolar I: OR, 36.1 [95% CI, 21.0-61.9]; bipolar II: OR, 7.1 [95% CI, 3.0-16.8]; and major depression: OR, 6.4 [95% CI, 4.3-9.4]). Substance use disorders were also statistically significantly associated with suicide attempts after controlling for mood and anxiety disorders (OR, 2.0; 95% CI, 1.4-3.0).

Comorbidity was also associated with suicide attempts. Of those with suicide attempts, 56.8% (113 of 199) had a history of more than 2 disorders compared with only 17.3% (891 of 5155) of those without suicide attempts. Individuals with a history of suicide attempt also had statistically significantly greater lifetime, current, or worst level of functional impairment than those without a history of suicide attempts.

The associations between suicide attempts in probands and relatives by site and for the combined sample are presented in eTable 1 in the Supplement. After adjustment for sex and age of the relatives, we found statistically significant familial associations for suicide attempts at the NIMH site (OR, 2.6; 95% CI, 1.5-4.7), the Lausanne site (OR, 3.1; 95% CI, 1.6-6.0), and in the combined sample (OR, 2.9; 95% CI, 1.9-4.5). Female relatives had statistically significantly more suicide attempts than males at both sites as well as in the cross-site data (OR, 1.9; 95% CI, 1.4-2.6). A decrease in suicide attempts occurred with increasing age at both sites and in the cross-site data (OR, 0.99; 95% CI, 0.98-0.99).

To investigate the extent to which suicide attempts in relatives are explained by familial mental disorders, we analyzed the association between specific mental disorders in probands and suicide attempts in relatives. The results are shown in eTable 2 in the Supplement. No increase was found in familial aggregation of suicide attempts among probands with bipolar disorder, whereas suicide attempts were familial among probands with major depression, generalized anxiety disor-

Table 2. Lifetime Suicide Attempts Among Relatives by Lifetime Mental Disorders, Number of Disorders, and Global Severity

Lifetime Disorder	Lifetime Suicide Attempts		Odds Ratio (95% CI)[a]	Adjusted Odds Ratio (95% CI)[b]
	Yes (n = 199)	No (n = 5156)		
Mood, No. (%)				
Bipolar I	48 (24.7)	94 (1.8)	16.2 (10.4-25.1)	36.1 (21.0-61.9)
Bipolar II	8 (4.1)	77 (1.5)	2.0 (0.9-4.5)	7.1 (3.0-16.8)
Major depression	98 (50.0)	1069 (21.0)	3.2 (2.3-4.3)	6.4 (4.3-9.4)
Anxiety, No. (%)				
Panic	26 (13.4)	150 (2.9)	3.7 (2.3-6.0)	1.4 (0.8-2.3)
Generalized anxiety	50 (25.5)	356 (6.9)	4.0 (2.7-6.0)	1.5 (0.9-2.3)
Social anxiety	31 (15.7)	288 (5.6)	2.5 (1.6-3.8)	1.0 (0.6-1.6)
Substance, No. (%)				
Substance use	59 (30.6)	583 (11.4)	3.6 (2.5-5.0)	2.0 (1.4-3.0)
No. of disorders, No. (%)				
0	23 (11.6)	3114 (60.4)[c]	NA	NA
1	63 (31.7)	1150 (22.3)	NA	NA
2	62 (31.2)	636 (12.3)	NA	NA
≥3	51 (25.6)	255 (5.0)	NA	NA
Global functioning, mean				
Lifetime	54.1	73.4[c]	NA	NA
Current	38.4	70.5[c]	NA	NA
Worst	25.7	59.0[c]	NA	NA

Abbreviation: NA, not applicable.

[a] Unadjusted.

[b] Adjusted for other disorders.

[c] $P < .001$.

der, social anxiety disorder, and substance use disorder. However, no statistically significant interactions between disorders and suicide attempts in probands and suicide attempts in relatives were found after controlling for comorbid conditions in relatives.

Table 3 shows the associations between proband and relative suicide attempts after adjustment for comorbid conditions in probands (upper half) and in relatives (lower half) and for age, sex, and study site in probands and relatives. Statistically significant associations were found between suicide attempts in probands (marginally) and social anxiety in probands with suicide attempts in relatives (see **Figure**). All subtypes of mood disorders, generalized anxiety disorder, and substance use were also statistically significantly associated with suicide attempts in relatives. Neither the sex of the probands nor the relatives was associated with suicide attempts in relatives. The inverse association between generalized anxiety disorder in probands and suicide attempts in relatives (OR, 0.6; 95% CI, 0.3-0.9) was explained by lower rates of suicide attempts among the small number of probands with generalized anxiety disorder alone compared with those with comorbid mood disorders.

The Figure summarizes the results shown in Table 3. The statistically significant familial association of suicide of 2.9 (95% CI, 1.9-2.5; shown in eTable 2 in the Supplement) was reduced to an OR of 1.6 (95% CI, 1.0-2.7) after adjustment for comorbid conditions in probands and relatives. Social anxiety disorder in probands was associated with an increased risk of suicide attempt in relatives after controlling for the comorbid mood, anxiety, and substance use disorders in both probands and relatives (OR, 2.4; 95% CI, 1.7-3.5).

Discussion

To our knowledge, this study is the largest direct interview study of familial patterns of suicide and comorbid mental disorders. Based on evaluation of a comprehensive range of mental disorders of probands and relatives, the findings suggest that suicide attempt is moderately familial and largely explained by comorbidity with mood and other disorders, particularly bipolar disorder. The monotonic increase in suicide attempts by the number of lifetime disorders suggests the potent influence of pervasive comorbidity with suicide risk.[45] Different patterns of suicide risk for different types of disorders may, therefore, reflect the severity of the psychiatric disorder rather than the specificity of any disorder alone.[46] The association between suicide attempt and familial social anxiety disorder is novel and indicates a new avenue of research into the biologic, psychologic, and contextual factors that may inform the potential mechanism through which this association may elevate suicide risk.

Suicidal behavior has been shown to be heritable, but identification of genes has been challenging. Genome-wide association studies of suicide attempts[47-49] have yielded a few suggestive markers that are, in part, shared with those for mental disorders.[49,50] The reduction in familiality of suicide attempts after incorporation of individual and familial mental disorders in the present study suggests that familial factors for suicide attempts may operate through psychiatric disorders. However, most previous family and twin studies have found that the familial and genetic factors underlying suicidal behavior could not be solely attributed to psychiatric

Table 3. Adjusted Associations Between Suicide Attempts and Mental Disorders in Probands and Relatives

Variable	Outcome: Suicide Attempts in Relatives (n = 5355), Odds Ratio (95% CI)	*P* Value
Probands		
Suicide attempts	1.6 (1.0-2.7)	.06
Mental disorders		
Bipolar I	1.2 (0.6-2.5)	.53
Bipolar II	0.9 (0.5-1.9)	.88
Generalized anxiety	0.6 (0.3-0.9)	.03
Major depression	1.0 (0.7-1.6)	.83
Panic	1.2 (0.7-2.0)	.41
Social anxiety	2.4 (1.7-3.5)	<.001
Substance use	1.4 (0.9-2.0)	.11
Covariates		
Age	1.0 (0.99-1.03)	.16
Female vs male	1.0 (0.7-1.4)	.86
Study (NIMH vs Lausanne)	0.6 (0.4-0.9)	.02
Relatives		
Mental disorders		
Bipolar I	30.6 (17.3-53.9)	<.001
Bipolar II	6.9 (2.8-16.6)	<.001
Generalized anxiety	1.6 (1.01-2.6)	.04
Major depression	6.2 (4.2-9.3)	<.001
Panic	1.4 (0.9-2.4)	.17
Social anxiety	1.0 (0.6-1.6)	.91
Substance use	2.0 (1.4-2.9)	.004
Covariates		
Age	1.0 (0.99-1.0)	.39
Female vs male	1.4 (0.99-2.0)	.06

Abbreviation: NIMH, National Institute of Mental Health.

disorders.[10,12,19] Familial aggregation could also operate through factors that underlie psychiatric conditions, such as irritable aggression[51] or other personality traits or disorders[46]; an increased tendency to act on suicidal ideation[41]; or common familial environmental factors known to elevate suicide risk, such as common exposure to trauma[52] or stress.[34] For example, a study of adoptees showed an increase in suicide attempts among adoptees with both a biological family history of suicidal behavior and psychiatric hospitalization in the adoptive parent.[53]

The association between bipolar disorder and lifetime suicide attempts confirms previous research from both clinical and community samples.[54] Meta-analysis of suicide attempts and deaths showed that bipolar disorder accounted for 3% to 14% of all suicide deaths and with an estimated 23% to 26% of attempted suicides by individuals with bipolar disorder (or mania).[55] Some of the correlates of bipolar disorder that may increase suicide risk include comorbid social anxiety[56] and/or substance abuse[57]; traits associated with bipolar disorder, such as aggressivity[58] or impulsive aggression[51]; or sleep and circadian rhythm disturbances that often characterize bipolar disorder.[59-61] The latter is particularly noteworthy because of evidence that lithium may reduce suicide risk, in part because of its antiaggressive and anti-impulsive properties and its potential to stabilize circadian rhythms.[26,62]

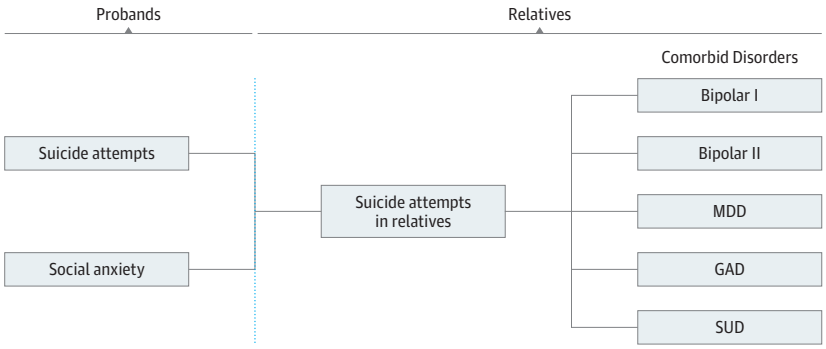
Beyond the elevated risk of suicide attempts among those with bipolar disorder, we confirmed previous research that has shown that major depression is rarely the sole mental disorder associated with suicidal behavior.[40,63] Pervasive comorbidity between mood disorders and anxiety disorders, substance use disorders, and behavior disorders was associated with suicide attempts. Comorbid conditions may also influence different aspects of suicidal behavior; for example, in adolescent female twins, social anxiety alone was associated with suicidal ideation, whereas suicide attempt was elevated among those with comorbid depression.[64]

Comorbidity could either reflect a nonspecific association with an index of severity or disturbances in multiple systems or a specific association with different aspects of suicidal risk or behavior. Almost 90% of people who die by suicide have a history of mental disorders,[39] but prevention of suicide attempts among those in treatment for mental disorders has been a major clinical challenge. Prospective evidence from population studies exists regarding the effect of lithium on reducing suicide attempts,[62] but there is a dearth of randomized clinical trials[65] and a paucity of detailed information and optimal treatments for people with bipolar disorder with comorbid anxiety and substance use disorders.[66] Data from studies of adolescents also suggest that early interventions that prevent the well-established transitions to substance abuse among those with bipolar disorder,[67] or from suicidal ideation to attempts among those with social phobia and comorbid depression,[64] may be a promising future direction.

The finding that social anxiety disorder may represent a marker of the familial diathesis for suicide attempts suggests that factors underlying social anxiety, such as behavioral inhibition, anxiety sensitivity,[68] dysregulation of processing of automatic negative emotions,[69] and feelings of social isolation,[31] could be associated with an increased risk of suicide attempts. People with these traits could have greater reactivity to social loss or disruptions, or have increased burdensomeness as postulated by the interpersonal theory of suicide risk.[32,45,70] The findings that patients with a major depressive disorder and a suicide attempt history have increased fear-potentiated startle reactivity and familial startle reactivity among people with social anxiety disorder may provide insight into potential biologic systems that could increase environmental reactivity.[71] Future studies of the core components of social anxiety that are familial, and possibly genetic, may provide information for identifying people at risk and possibly preventing suicide attempts.

We confirm the potent contribution of familial suicide attempts and comorbid mental disorders to the multifactorial complex of enduring familial, biologic, and environmental factors as well as the proximal individual-level contextual factors for suicide attempts.[72] The novel finding of a common familial diathesis for suicide attempts and social anxiety, particularly in combination with mood disorders, has heuristic value for future research, potentially as a marker for prevention. The broader association of mental disorders with familial environment suggests that risk research that focuses solely

Figure. Summary of Significant Associations From Adjusted Models of the Familial Aggregation and Coaggregation of Suicide Attempts and Mental Disorders in Probands and Relatives



The left side of the figure shows the associations between suicide attempts and comorbid disorders in probands and suicide attempts in relatives. The right side of the figure depicts the association between suicide attempt and comorbid conditions in relatives. Adjusted odds ratios and 95% CIs are shown in Table 3. GAD indicates generalized anxiety disorder; MDD, major depressive disorder; and SUD, substance use disorder.

on individual-level biomarkers, susceptibility genes, or neural architecture may be unable to identify suicide risk without accounting for the contextual association with vulnerability to proximal life challenges. Progress on risk identification will be best achieved through a combination of study designs to identify the complex web of proximal and enduring risk factors, collaborative research to accumulate sufficient sample sizes of this relatively rare event, and more intensive sampling using in-time assessments to identify proximal triggers of suicide.[73,74]

Limitations and Strengths

This study has several limitations. First, the community sample underrepresents individuals with severe forms of psychiatric disorder, such as psychoses or schizophrenia, that are associated with elevated rates of suicide.[75] Second, lifetime suicidal behavior and psychiatric disorder were retrospectively assessed; thus, we could not reliably track the order of onset. Third, we could not assess the full range of suicidal behavior, including suicidal ideation, which was unreliably assessed in relatives who were not interviewed and in the rare cases of death by suicide. Fourth, we did not include the full domain of potential risk factors for suicide outcomes, such as childhood trauma, because of the lack of reliability of long-term retrospective recall, or recent trauma, which could not be assessed in relatives who were not interviewed. Fifth, the differences in sampling and methods between the 2 sites may have affected the aggregate associations despite the remarkable similarity in the findings by site. However, such heterogeneity across studies is likely to induce nondifferential (conservative) bias. Sixth, the assessment of suicide attempt in most relatives was based on family history reports. In general, the family history instrument reveals good overall interinformant agreement with direct diagnostic interviews for suicidal attempts, but informants are frequently not aware of suicidal attempts by persons on whom they are reporting. However, this type of reporting is likely to induce nondifferential bias and lead to an underestimation of the true magnitude of associations. Seventh, unmeasured sources of bias could have led to the underestimation of the familiality of suicide attempts.

Strengths of the study include the (1) recruitment of probands from predominantly nontreatment settings, which minimized biases of specialty treatment settings and improved the generalizability of the findings; (2) community source that provided data on a broad range of severity of mood and anxiety disorders as well as a representative sample of unaffected people to serve as controls; (3) systematic recruitment of relatives with direct interviews of living relatives who consented to participate; (4) diagnostic interview that captured the full range of common mental disorders that were not assessed in many previous studies of the familiality of suicide; and (5) 2-site study design that provided an opportunity for cross-validation and increased the generalizability of the findings.

Conclusions

Findings from the present study provide valuable information that may help to address the urgent national priority of identifying risk factors for suicidal behavior. Suicide attempts appear to be moderately familial and are largely explained by comorbid mental disorders, particularly bipolar disorder, pervasive comorbidity, and a lifetime history of functional impairment. Potential explanations for the association between suicide attempts and the familial diathesis underlying social anxiety disorder should be evaluated.

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Acquisition, analysis, or interpretation of data: All authors.
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