

Suicide Attempts Associated With Externalizing Psychopathology in an Epidemiological Sample

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Objective: Borrowing from recent dimensional models of psychopathology, the authors conducted analyses that optimized the common variance shared by internalizing (depression, anxiety) and externalizing (antisocial personality, substance dependence) disorders in statistically predicting suicidal behaviors. These relationships were analyzed in a large epidemiological sample, thus allowing for the examination of gender differences in risk for suicide attempts associated with psychopathology.

Method: The data were obtained from the Colorado Social Health Survey. Participants (N=4,745) were a community sample recruited by household address. Structured clinical interviews were used to obtain lifetime diagnostic and symptom count information. Symptom counts were included in a factor analysis that yielded two main dimensions of psychopathology: internalizing and externalizing. These

factors were used in hierarchical logistic regression analyses to predict history of suicide attempts associated with the presence of internalizing symptoms, externalizing symptoms, and comorbid internalizing and externalizing symptoms.

Results: After the investigators controlled for the presence of internalizing symptoms and the comorbidity of internalizing and externalizing symptoms, externalizing symptoms were related to suicidal behavior in both men and women, although comorbidity was most predictive of suicide attempts among women, compared to men.

Conclusions: Suicidal behavior among individuals with externalizing symptoms is not necessarily a result of comorbid depressive or other internalizing disorder. Thus, persons exhibiting antisocial behaviors should receive rigorous assessment for suicidal ideation and behavior.

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The growing incidence of suicidal acts among prisoners (1) and jail detainees (2) has heightened awareness of the risk for suicide among persons characterized by criminal, aggressive, and substance abuse behaviors. The importance of these “externalizing” syndromes, as well as of “internalizing” forms of psychopathology such as depressive disorders, in predicting suicide is well established (3–5). Most research examining suicide risk among individuals who exhibit externalizing syndromes has been conducted with forensic or psychiatric patients (6, 7). Although these subjects are often ideal for studies that examine extreme behaviors, their inclusion impedes disentangling the effects of incarceration or acute institutionalization from more stable underlying processes that place these persons at risk for suicide (8). Even in community samples, the risk for suicide among persons exhibiting acting-out behaviors may simply reflect risk associated with the comorbidity of such behaviors with an internalizing axis I disorder, such as depression (9, 10).

Mounting evidence supports the supposition that externalizing psychopathology represents a key risk factor for suicide. In this regard, Apter and colleagues (7, 11) identified at least two subtypes of individuals with suicidal behaviors: depressed/withdrawn and irritable/aggressive.

They found that among violent male patients and adolescents with conduct disorder, sadness did not correlate with suicidal behavior. On the other hand, the correlation between depression and suicidal acts was significant for nonviolent hospital patients and adolescents with internalizing syndromes (7, 12). Although major depression is an important precipitant, suicide risk among individuals with externalizing disorders may instead be related to impulsive and anger-related behaviors. Despite this evidence, a few issues prevent firm conclusions about the roles of internalizing and externalizing psychopathology in suicidal behavior. First, in the studies just discussed, the study groups were composed of psychiatric patients, and we wanted to examine whether these relationships could be found in the general population. Second, prior research has not statistically controlled for depressive symptoms, or comorbidity between internalizing and externalizing disorders, in analyzing the relationship between externalizing disorders and suicidal behavior. Finally, few authors have examined gender differences in the effect of internalizing and externalizing disorders and their co-occurrence on suicidal behaviors in a large group of men and women from the community.

The high rate of comorbidity among mental disorders is relevant to the understanding of risk for suicide in different diagnostic groups. Epidemiological data support the high rate of comorbidity among depressive and anxiety disorders (13, 14), as well as the co-occurrence of externalizing symptoms (including antisocial and criminal behaviors, excessive alcohol use, and aggressive acting out) within individuals (15–18). Krueger (19) suggested that these patterns of comorbidity represent meaningful covariance. Specifically, he validated a two-factor model of common mental disorders (i.e., not including schizophrenia and bipolar disorder): an internalizing factor representing mood and anxiety disorders and an externalizing factor that included antisocial personality disorder and alcohol and other substance dependence. This dimensional model suggests that each factor (or cluster of related disorders) represents a common underlying process of psychopathology (20, 21).

Although some controversy exists in the interpretation of Krueger's analyses (22), his conceptualization provides a parsimonious approach to examining the influence of a collection of correlated syndromes on outcomes. Following this framework, we attempted to validate this two-factor structure of mental disorders in an epidemiological sample and extended Krueger's work by including both schizophrenia and bipolar disorder in these analyses to determine if these inclusions would change the factor structure. Then, factor scores were used in regression analyses to determine whether externalizing psychopathology predicts risk for suicide attempts above the variance accounted for by the presence of internalizing symptoms and comorbid internalizing *and* externalizing symptoms.

In addition, we were interested in whether these effects would be similar for both genders. Typically, women are more likely to experience depressive and internalizing symptoms and engage in suicide attempts (23–25), but externalizing behaviors are more strongly associated with men (26). Thus, we explored whether the effect of externalizing disorders on suicide was equally robust for both genders.

Method

Participants

The data for this study were obtained as part of the Colorado Social Health Survey (27), which included an epidemiological sample of the Colorado general adult population (N=4,745). The survey method was patterned after that of the Epidemiological Catchment Area program (see reference 28). During 1985–1986, participants were randomly sampled by household address, and potential respondents were then interviewed in their homes by trained lay interviewers. Participants were first provided with a description of the study, and they signed an informed consent form. Ciarlo and colleagues (27) have provided a full description of the Colorado Social Health Survey procedures. The mean age of the participants was 43.0 years (SD=17.5); 48% (N=2,265) of the sample were men, and 52% (N=2,479) were women. The ethnic

composition of the sample was as follows: 2% (N=99) were Native American, Asian, or Pacific Islander; 4% (N=178) were African American; 84% (N=3,986) were Caucasian; and 10% (N=472) were Hispanic.

Diagnostic Assessment

Participants' psychiatric disorders were assessed by means of the highly structured interview protocol of the National Institute of Mental Health Diagnostic Interview Schedule (DIS) (29). The DIS was used to obtain present and past DSM-III axis I diagnoses through a patterned series of specified questions. Questions pertaining to one axis II disorder, antisocial personality disorder, were also included in the interview. Robins and colleagues (29) have demonstrated that the DIS has adequate reliability (kappa coefficients ranging from 0.60 to 0.86), and sensitivity and specificity indices (true positive and true negative rates, respectively) that are in the adequate to excellent range (80%–94%).

The following diagnoses were assessed: bipolar disorder (manic), major depression, dysthymic disorder, schizophrenia, obsessive-compulsive disorder (OCD), phobic disorder, panic disorder, generalized anxiety disorder, alcohol abuse/dependence, other substance abuse/dependence, and antisocial personality disorder. The criteria for receiving a diagnosis followed directly from the criteria set forth in DSM-III. While there have been some modifications in diagnostic criteria from DSM-III to DSM-IV, for the most part changes have been minimal and there is considerable overlap. The fact that we conducted primary analyses by using symptom count variables (see later discussion) and not diagnoses largely resolves concerns about discrepancies in criteria across different versions of DSM. For the purposes of this study, lifetime diagnostic and symptom information were used as independent variables. Our hypothesis was that the vulnerability to externalizing disorders (evidenced by the participant's having experienced a series of externalizing symptoms at some point in his or her lifetime), and not just the current presence of the syndrome, represents the underlying risk for suicidal acts.

The lifetime prevalence of generalized anxiety disorder (17%) in the Colorado Social Health Survey was higher than that reported in other samples (30), but the discrepancy was due mostly to the difference in duration criteria from DSM-III (1 month) to DSM-III-R and DSM-IV (6 months). A reanalysis of the data for this diagnosis by using more stringent duration criteria (i.e., symptoms that lingered or recurred for longer than 1 month) resulted in a lifetime prevalence (6.3%) similar to that found in other epidemiological studies (30). In addition, to avoid confounding diagnostic (major depression) and outcome (suicide) variables, major depression diagnoses and symptom counts were calculated with the omission of data from the survey questions about suicidal ideation or suicide attempts. This change affected 62 persons who would have met the criteria for a lifetime diagnosis of major depression but subsequently, with this revision, did not. It is interesting to note that the prevalence of suicide attempts among persons with a lifetime major depression diagnosis was very similar when we used the original criteria (24.6%) and when we used the revised criteria (24.3%). Dysthymic disorder, alcohol abuse, and other substance abuse were not included in the analyses because of symptom overlap with their more severe versions (major depression, alcohol dependence, and other substance dependence). A diagnosis of childhood conduct disorder was not used in the analyses of the dichotomous diagnostic variables because only adult diagnoses were included. However, a symptom count for childhood antisocial behavior was calculated for use in the factor analysis.

Symptom Count Variables

For the factor analysis and logistic regression analyses, we used symptom count variables (number of symptoms endorsed for

TABLE 1. Lifetime Prevalence of 10 DSM-III Disorders and Suicide Attempts in a Community Sample of Adults (N=4,745)^a

| Disorder | Subjects With Diagnosis | | Subjects With Diagnosis Who Attempted Suicide ^b | | Analysis | |
|---------------------------------|-------------------------|------|--|------|------------|-----------------|
| | N | % | N | % | Odds Ratio | χ^2 (df=1) |
| Internalizing disorders | | | | | | |
| Major depression ^c | 221 | 4.7 | 54 | 24.3 | 7.14 | 281.26* |
| Generalized anxiety disorder | 812 | 17.1 | 91 | 11.2 | 4.81 | 157.66* |
| Phobic disorder | 584 | 12.3 | 56 | 9.6 | 3.17 | 66.92* |
| Obsessive-compulsive disorder | 80 | 1.7 | 13 | 16.3 | 4.11 | 36.80* |
| Panic disorder | 88 | 1.9 | 13 | 14.7 | 3.79 | 31.60* |
| Externalizing disorders | | | | | | |
| Alcohol dependence | 752 | 15.8 | 67 | 8.9 | 3.11 | 69.53* |
| Other substance dependence | 248 | 5.3 | 35 | 14.6 | 4.23 | 92.79* |
| Antisocial personality disorder | 261 | 5.5 | 27 | 10.3 | 2.93 | 32.27* |
| Less common disorders | | | | | | |
| Schizophrenia | 32 | 0.7 | 15 | 46.9 | 7.80 | 171.38* |
| Bipolar disorder (manic) | 9 | 0.2 | 5 | 55.6 | 7.19 | 68.74* |

^a Data from the Colorado Social Health Survey (27), a statewide survey of the Colorado general adult population conducted during 1985–1986.

^b The number and percentage of persons within each diagnostic category who reported a history of suicide attempts.

^c Prevalence of major depression was determined by excluding criteria related to suicidal ideation and suicide attempts.

* $p < 0.01$.

each disorder), instead of the dichotomous diagnosis variables (present versus absent) (20, 21). Psychopathology researchers have argued that symptoms of mental disorders are distributed continuously in the population, with increasing symptom levels indicative of greater dysfunction (31). In addition, symptom count variables yield greater statistical power in studies of general population samples with lower base rates of psychopathology, compared with clinical samples (21). Moreover, Krueger (32) has confirmed that analyses of symptom counts result in distinct lifetime patterns of comorbidity that are not solely attributable to criterion overlap.

For each disorder, the symptom count variables corresponded to the following DSM-III criteria: for major depression, criteria A and B; for alcohol and other substance dependence, criteria A, B and C; for panic disorder, criteria A and B; for generalized anxiety disorder, criteria A and B; for phobic disorder, all symptom criteria; for OCD, criterion A; for schizophrenia, criteria A, B, and C; and for bipolar disorder (manic), criteria A and B. Antisocial personality disorder symptoms were divided into adult antisocial behavior and child antisocial behavior symptoms (i.e., DSM-III criterion C for antisocial personality disorder). The symptom count variables were positively skewed in distribution; thus, we used a rank-normalizing transformation previously used in these types of analyses (33).

History of Suicidal Behavior

As part of the assessment procedure, participants were asked about history of suicidal behavior. For purposes of this study, we chose to focus on suicide attempts, because a suicide attempt represents a more severe manifestation of suicidal behavior than does suicidal ideation. Although some data suggest that suicide attempters differ from persons who die by suicide (34), research indicates that self-harm not resulting in death is related to a high risk for eventual suicide (6, 35). A dichotomous variable representing lifetime history of suicide attempts was used as the dependent variable to ensure that we obtained a large enough group of suicide attempters for the analyses.

Statistical Analyses

First, chi-square analyses were conducted to determine whether lifetime diagnoses (present or absent) statistically predicted suicide attempt history. Then, we employed the common extraction method of principal axis factor analysis (20) to examine the relationships between the common mental disorders (i.e., the 11 transformed symptom count variables representing life-

time symptoms) previously described. Hierarchical logistic regression analyses were then performed, wherein dichotomous lifetime suicide attempt history was the criterion variable. Gender, the internalizing and externalizing factors that resulted from the factor analysis, and their interactions were included as independent variables in these regression analyses. A significant reduction in the $(-2)\log$ likelihood estimate from the restricted model (with the internalizing factor and gender as predictors) to the full model (which included the externalizing factor in a second step, the internalizing factor-by-externalizing factor interaction term in a third step, and the internalizing factor-by-externalizing factor-by-gender interaction in a final step) would represent an improvement in statistical prediction of suicide history, which was calculated as a chi-square statistic with a corresponding p value (36).

Results

History of Suicide Attempts Across Diagnostic Groups

Across the overall sample, 173 persons (3.7% of the sample) reported that they had attempted suicide in their lifetime. Women were significantly more likely to report suicide attempts ($N=128$; 5.2% of women) than men ($N=44$; 1.9% of men) ($\chi^2=35.14$, $df=1$, $N=4,744$, $p<0.001$). Information on gender was not available for one person who reported a suicide attempt. As reported in Table 1, all lifetime diagnostic conditions (present versus absent, without regard to comorbidity) were significantly related to a history of suicide attempts. Since the large sample size may have influenced the p value estimates, we also calculated odds ratios and reported them in Table 1. It is typical to report odds ratios in such cases to best evaluate the contribution of each diagnostic syndrome in the prediction of suicide attempts (9). An examination of Table 1 reveals that, of the internalizing disorders, major depression confers the most risk for suicidal acts (37). The other internalizing disorders (anxiety disorders) and the externalizing disorders (antisocial personality disorder, alcohol dependence, and other substance dependence) were similarly predictive of suicide attempts.

TABLE 2. Lifetime Prevalence of Suicide Attempts in a Community Sample of Adults in Four Diagnostic Categories, by Gender^a

| Diagnostic Category and Analysis | Overall Sample (N=4,745) ^b | | | Men (N=2,265) | | | Women (N=2,479) | | |
|--|---------------------------------------|-------------------|--------|---------------|-------------------|--------|-----------------|-------------------|--------|
| | Total N | Attempted Suicide | | Total N | Attempted Suicide | | Total N | Attempted Suicide | |
| Diagnostic category | | N | % | | N | % | | N | % |
| No lifetime history of any DSM-III disorder | 2,842 | 28 | 1.0 | 1,305 | 4 | 0.3 | 1,536 | 24 | 1.6 |
| At least one internalizing disorder ^c | 893 | 54 | 6.0 | 239 | 7 | 2.9 | 653 | 47 | 7.2 |
| At least one externalizing disorder ^d | 607 | 17 | 2.8 | 487 | 7 | 1.4 | 119 | 9 | 7.6 |
| Both internalizing and externalizing disorders | 404 | 75 | 18.6 | 233 | 26 | 11.2 | 171 | 49 | 28.7 |
| Analysis ^e | | χ^2 | p | | χ^2 | p | | χ^2 | p |
| All diagnostic groups (df=3) | | 327.35 | <0.001 | | 124.05 | <0.001 | | 238.53 | <0.001 |
| At least one internalizing disorder versus at least one externalizing disorder (df=1) | | 8.45 | <0.01 | | 1.89 | n.s. | | 0.02 | n.s. |
| At least one internalizing disorder versus both internalizing and externalizing disorders (df=1) | | 48.66 | <0.001 | | 12.29 | <0.001 | | 60.62 | <0.001 |
| At least one externalizing disorder versus both internalizing and externalizing disorders (df=1) | | 72.87 | <0.001 | | 34.06 | <0.001 | | 19.51 | <0.001 |

^a Data from the Colorado Social Health Survey (27), a statewide survey of the Colorado general adult population conducted during 1985–1986.

^b One person with a suicide attempt did not indicate gender.

^c Major depression and/or any of the anxiety disorders.

^d Antisocial personality disorder, alcohol dependence, and/or other substance dependence.

^e Test of significance of differences in prevalence of suicide attempts between the different diagnostic categories.

As has been found in other work, schizophrenia and bipolar disorder (manic) were strongly associated with suicidal behaviors, with risk just slightly higher than that for major depression. Consistent with other epidemiological investigations, the base rates of schizophrenia (N=32) and bipolar disorder (manic) (N=9) were low (below 1%) in this sample, making conclusive statements about these relationships quite tenuous. In addition, all of the persons meeting the criteria for schizophrenia or bipolar disorder (manic), except one, met the criteria for another disorder. For both of these diagnoses, comorbidity was mostly with an internalizing disorder or with comorbid internalizing and externalizing disorders. Only four participants with a schizophrenia diagnosis had only an externalizing comorbid disorder.

Among participants with a “pure” externalizing or internalizing disorder, women were more likely than men to have a history of an internalizing disorder ($\chi^2=193.27$, $df=1$, $N=4,744$, $p<0.001$). Men were more likely than women to have a history of an externalizing disorder ($\chi^2=294.43$, $df=1$, $N=4,744$, $p<0.001$) and of both internalizing and externalizing disorders ($\chi^2=17.91$, $df=1$, $N=4,744$, $p<0.001$). In Table 2, we present the prevalence of suicide attempts by diagnostic categories. Chi-square analyses revealed that participants in each of the psychopathology groups were more likely to have attempted suicide than participants with no prior psychopathology (Table 2). Those with only an internalizing diagnosis were slightly more likely to have attempted suicide than participants with only an externalizing diagnosis, although this result was not significant when analyses were conducted separately for men and women. Participants who met the criteria for both internalizing and externalizing diagnoses were more likely to

attempt suicide than those with only an internalizing diagnosis or only an externalizing diagnosis (Table 2).

Latent Structure of Mental Disorders

Borrowing from the literature on dimensional models of psychopathology (19, 38), we conducted a principal axis factor analysis, with promax rotation, using the 11 symptom count variables described earlier. The scree plot and eigenvalues (>1) revealed a clear two-factor solution; factors other than the two major factors had trivial eigenvalues (Table 3 provides eigenvalues and factor loadings for the full sample and for each gender). The major depression, panic disorder, generalized anxiety disorder, and phobia symptom count variables loaded highly on the first factor (the internalizing factor), and OCD loaded moderately on this factor. The internalizing factor variables loaded negligibly on the second factor. Symptom counts for adulthood antisocial behavior, childhood antisocial behavior, alcohol dependence, and other substance dependence loaded highly on the second factor (the externalizing factor) and negligibly on the first factor. Separate analyses performed on the symptom count data for men and women revealed very similar two-factor solutions, indicative of internalizing and externalizing factors, for both genders (Table 3).

Schizophrenia and bipolar disorder symptoms loaded highly on the internalizing factor and negligibly on the externalizing factor (Table 3); this pattern may have occurred because persons with these symptoms were more likely to also have internalizing symptoms, as was discussed earlier. The result may also be an artifact of the low base rates of schizophrenia and bipolar disorder (manic) symptoms; thus, a separate factor could not be detected in

TABLE 3. Eigenvalues and Factor Loadings for Promax-Rotated Internalizing and Externalizing Dimensions Extracted From Principal Axis Factor Analysis of Psychiatric Symptom Counts in a Community Sample of Adults, by Gender^a

| Variable | Overall Sample (N=4,745) ^b | | Women (N=2,479) | | Men (N=2,265) | |
|-------------------------------|---------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | Internalizing Factor | Externalizing Factor | Internalizing Factor | Externalizing Factor | Internalizing Factor | Externalizing Factor |
| Eigenvalue | 2.3 | 2.3 | 2.4 | 2.2 | 2.4 | 2.4 |
| % Variance | 30.4 | 15.4 | 31.3 | 13.1 | 13.8 | 31.6 |
| Factor loadings | | | | | | |
| Major depression | 0.71 ^c | 0.02 | 0.69 ^c | 0.03 | 0.65 ^c | 0.07 |
| Generalized anxiety disorder | 0.56 ^c | -0.07 | 0.60 ^c | -0.10 | 0.48 ^c | -0.04 |
| Phobic disorder | 0.47 ^c | -0.04 | 0.44 ^c | -0.06 | 0.54 ^c | -0.11 |
| Obsessive-compulsive disorder | 0.40 ^c | 0.15 | 0.46 ^c | 0.09 | 0.37 ^c | 0.14 |
| Panic disorder | 0.49 ^c | 0.02 | 0.45 ^c | 0.02 | 0.50 ^c | 0.01 |
| Alcohol dependence | -0.03 | 0.66 ^c | 0.05 | 0.54 ^c | 0.01 | 0.74 |
| Other substance dependence | 0.01 | 0.61 ^c | -0.11 | 0.72 ^c | -0.04 | 0.62 |
| Childhood antisocial behavior | -0.07 | 0.71 ^c | -0.03 | 0.65 ^c | -0.06 | 0.69 |
| Adulthood antisocial behavior | 0.06 | 0.71 ^c | 0.11 | 0.62 ^c | -0.01 | 0.74 |
| Schizophrenia | 0.47 ^c | 0.03 | 0.43 ^c | 0.08 | 0.50 ^c | -0.04 |
| Bipolar disorder (manic) | 0.49 ^c | 0.15 | 0.53 ^c | 0.08 | 0.52 ^c | 0.10 |

^a Data from the Colorado Social Health Survey (27), a statewide survey of the Colorado general adult population conducted during 1985–1986.

^b One person did not indicate gender.

^c Factor loading >0.30.

the analyses. We excluded the schizophrenia and bipolar disorder symptom counts from the calculation of the two internalizing and externalizing factor scores because their inclusion may have confounded the interpretation of the two factors (since schizophrenia and bipolar disorder [manic] symptoms loaded on the internalizing factor and not on the externalizing factor). With this exclusion, scores on the internalizing and externalizing factors, extracted from the overall analyses, were used as independent variables in the regression analyses predicting suicide attempt history.

Risk for Suicide Associated With Internalizing and Externalizing Factors

We conducted a hierarchical logistic regression analysis with four steps (Table 4 provides $[-2]\log$ likelihood, chi-square, and Wald statistics for all steps of the analysis). Gender and internalizing factor scores were included as predictors in the first step, which significantly improved prediction of suicide attempts above a constant. When externalizing factor scores were entered in a second block, the model fit was significantly improved. Then, the internalizing factor-by-externalizing factor interaction term was included in a third step, which also improved model fit. It is important to note that the contribution of the externalizing factor remained highly significant in this third step (Wald $\chi^2=53.21$, $df=1$, $p<0.001$). Finally, the internalizing factor-by-externalizing factor-by-gender interaction included in a final step was not significant in predicting suicide attempts ($p=0.09$) (Table 4). Also, in this step, the two-way internalizing factor-by-externalizing factor interaction became nonsignificant in this final step ($p=0.74$), whereas the externalizing factor main effect remained highly significant (Wald $\chi^2=54.80$, $df=1$, $p<0.001$).

Due to the significant gender differences on all the variables of interest (history of suicide attempts, internalizing

factor, and externalizing factor), we also conducted hierarchical regression analyses separately by gender (independent variables included the internalizing factor, externalizing factor, and internalizing factor-by-externalizing factor) (Table 4). For women, the internalizing factor was a significant predictor in the first step and improved model fit above a constant, as did the externalizing factor in the second step of the model. In addition, the interaction between internalizing and externalizing factors was a significant predictor of suicide attempts in the final step; the interaction improved model fit further for women. For men, the internalizing factor in the first step and the externalizing factor in a second step both made independent significant contributions to prediction; however, for men, the internalizing factor-by-externalizing factor interaction term included in the third step of the analyses did not improve model fit significantly. These results suggest that when internalizing and externalizing factor effects are held constant, their co-occurrence plays a more influential role in suicidal behaviors among women than among men.

Discussion

An innovative aspect of this study was the application of dimensional models of psychopathology (19, 38) to the examination of relations between internalizing or externalizing symptoms and suicidal behavior. Although a large literature has confirmed relationships between suicidal behaviors and externalizing syndromes (5, 39–41), a number of these studies have been conducted with incarcerated or psychiatric subjects. Our results support the validity of the link between externalizing syndromes and suicidal behavior in a large community sample, confirming that this relationship is robust across psychopathological and “normal” populations.

In addition, our data provide support for the thesis that the relationship between a history of suicidal behavior and a history of impulsive, deviant (externalizing) behaviors is independent of internalizing symptoms and independent of comorbidity between internalizing and externalizing symptoms. Indeed, the results of the chi-square analyses of diagnostic categories showed that persons who had internalizing disorders did not differ in rate of suicide attempts from those with externalizing disorders. A more important finding was that the results of the regression analyses of symptom count data suggested that the common variance associated with these disorders (i.e., the externalizing factor dimension) is predictive of a history of suicide attempts. As suggested by Krueger and colleagues (19, 21), a common vulnerability factor may underlie the co-occurrence of externalizing behaviors; our data indicate that suicide risk among persons with externalizing syndromes may also be related to this common diathesis (5). The underlying mechanism in this relationship (e.g., impulsivity) would theoretically be different from the mechanism that links suicide to depressive and other internalizing disorders (e.g., hopelessness) (7, 11, 12).

Results from the current study point to other areas for future study. Research on normal personality links to psychopathology can help in identifying the common risk factor for externalizing and suicidal behaviors. For example, in a study by Verona et al. (42), analyses revealed that extremes in personality traits reflective of negative emotionality and (low) constraint accounted for the relationship between antisocial behavior history and suicide attempt history among male offenders. Moreover, Krueger and colleagues (20, 21) have confirmed that the externalizing spectrum of disorders is related to the genetically linked personality trait of low constraint. Although trait negative emotionality may represent vulnerability to both internalizing and externalizing psychopathology (and thus explain their comorbidity), low constraint seems to be related to engagement in externalizing versus internalizing behaviors (20). Application of this hypothesis to the relationship between suicidal behavior and externalizing symptoms should be examined directly in future work.

Another important contribution of this study is the analysis of relationships between psychopathology and suicidal behavior in men and women separately. As in earlier studies, women were more likely to engage in suicidal behaviors than men, probably because they had a higher prevalence of depression, which was a strong predictor of suicide attempts. However, externalizing psychopathology uniquely predicted suicidal behaviors in both genders, even though women showed fewer externalizing symptoms. On the other hand, women, more than men, showed strong relationships between comorbid externalizing and internalizing psychopathology and suicide attempt history. These results are only preliminary and require replication; however, they suggest that suicidal behaviors in women with externalizing symptoms may relate

TABLE 4. Hierarchical Logistic Regression Analysis Predicting History of Suicide Attempts in a Community Sample of Adults and Among Men and Women in the Sample^a

| Sample and Factor | (-2)Log Likelihood ^b | Step Analysis ^c | | Wald χ^2 (df=1) ^d |
|--|---------------------------------|----------------------------|----|-----------------------------------|
| | | χ^2 | df | |
| Overall sample (N=4,745) ^e | | | | |
| Gender | 1144.94 ^f | 337.08† | 2 | 13.42† |
| Internalizing factor | 1144.94 ^f | 337.08† | 2 | 276.45† |
| Externalizing factor | 1089.46 | 55.49† | 1 | 55.44† |
| Internalizing factor-by-externalizing factor | 1084.78 | 4.68** | 1 | 4.96** |
| Internalizing factor-by-externalizing factor-by-gender | 1081.82 | 2.96* | 1 | 2.90* |
| Men (N=2,265) | | | | |
| Internalizing factor | 322.86 | 113.42† | 1 | 103.57† |
| Externalizing factor | 311.59 | 11.27† | 1 | 11.14† |
| Internalizing factor-by-externalizing factor | 310.01 | 1.58 | 1 | 1.70 |
| Women (N=2,479) | | | | |
| Internalizing factor | 819.38 | 189.71† | 1 | 174.14† |
| Externalizing factor | 775.74 | 43.65† | 1 | 43.87† |
| Internalizing factor-by-externalizing factor | 767.90 | 7.83*** | 1 | 8.13*** |

^a Data from the Colorado Social Health Survey (27), a statewide survey of the Colorado general adult population conducted during 1985–1986.

^b Significant decreases from the previous model represent improvement in prediction when including the next predictor.

^c Estimate of the increment in prediction provided by the particular step of the model (inclusion of new variable to the model).

^d Test of the variable's independent contribution to the prediction of suicide attempts, after other predictors are held constant.

^e One person with a suicide attempt did not indicate gender.

^f Gender and the internalizing factor were included together in the first step of the model; thus, (-2)log likelihood and chi-square statistics for that step are the same for gender and for internalizing factor.

* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$. † $p < 0.001$.

to the combination of emotional instability (such as depression or anxiety) and behavioral disinhibition (represented by acting-out behaviors) (43). This latter description is reminiscent of borderline personality traits, which are strongly linked to self-harm in women. Unfortunately, the Colorado Social Health Survey did not obtain information on borderline personality disorder, which is a limitation of this study. Thus, we could not investigate this hypothesis directly, although such an endeavor would be an important contribution in future work.

Some have suggested that substance dependence and antisocial personality disorder in men may be the equivalents of depression or anxiety in women and, thus, that externalizing syndromes may represent unrecognized depression in men (see reference 44). However, in our study, men were more likely than women to endorse both internalizing and externalizing symptoms; thus, the differential results for men and women are too preliminary to interpret fully. Nonetheless, these results suggest that gender differences in the link between psychopathology and suicide should be explored further in other samples in which rates of suicide attempt are higher, especially among male participants (see reference 45).

Certain limitations of the current study should be considered in interpreting the findings. The diagnosticians were lay interviewers; thus, our results need to be replicated in studies utilizing experienced clinical interviewers. Also, diagnosis and symptom assessment relied on DSM-III criteria, and future research should confirm these results using the most recent version of DSM. We also relied on participants' retrospective reports, which is a limitation of using lifetime diagnosis and symptom counts. However, this strategy allowed us to obtain data from a large number of persons who endorsed psychopathological symptoms, increasing the reliability of our statistics. In addition, when analyses were performed by using more current (within the last year) information on diagnostic and suicidal behavior variables, we found similar results. Nonetheless, future research can examine, in a prospective or longitudinal fashion, whether initial symptoms of externalizing disorders predict later suicidal behaviors. An additional weakness of the current study is the binary index (yes/no) of suicidal behavior that was utilized. However, there was clear evidence for the validity of the index, in that it was correlated in predicted ways with diagnostic variables (particularly the high concordance of suicidal behavior with depression). Nonetheless, this limitation should be remedied in future research to help uncover differences in the nature of suicidal acts performed by antisocial individuals, compared with clinically depressed individuals (16).

Another weakness of this study is that we could not fully examine the important relationship between suicide and symptoms of schizophrenia and bipolar disorder, because of the low base rates of these syndromes in the studied population. In extending Krueger's work, we did find that these two symptom clusters tended to load on the internalizing factor of psychopathology. However, our factor analytic results need to be replicated in future research, which should examine further the relationship of schizophrenia and bipolar disorder symptoms with externalizing disorders and suicidal behaviors.

Our results also have clinical implications. In general, this work informs the development of interventions to prevent individuals from engaging in behaviors that are destructive to the self and to others. Our results suggest that clinicians and treatment providers would benefit from paying closer attention to the assessment of suicidal impulses in persons exhibiting externalizing behaviors, even if they do not (but especially when they do) present with comorbid depression.

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