

# Psychiatric Risk Factors for Adolescent Suicide: A Case-Control Study

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**Abstract.** **Objective:** The objective of this study was to determine the psychiatric risk factors for adolescent suicide. **Method:** Sixty-seven adolescent suicide victims were compared with 67 demographically matched community controls. Psychiatric disorder was assessed in suicide victims using a psychological autopsy protocol and in controls using similar semistructured psychiatric interviews. Risk factors were quantified by use of the odds ratio (OR), that is, the relative frequency of the occurrence of a given condition in the suicides compared with the controls. **Results:** The most significant psychiatric risk factors associated with adolescent suicide were major depression (OR = 27.0), bipolar mixed state (OR = 9.0), substance abuse (OR = 8.5), and conduct disorder (OR = 6.0). Substance abuse was a more significant risk factor when comorbid with affective illness than when alone (OR = 17.0 versus 3.3). The majority of depressed suicide victims had a primary affective disorder (82%). A significant minority (31%) of depressed suicide victims had been depressed less than 3 months. Previous suicide attempts, suicidal ideation, and homicidal ideation also were associated with adolescent suicide. **Conclusions:** The development of effective treatments for youth who fit the above-noted risk profiles should be given high priority. *J. Am. Acad. Child Adolesc. Psychiatry*, 1993, 32, 3:521-529. **Key Words:** suicide, depression, conduct disorder, substance abuse, adolescent.

The relationship between psychiatric disorder and adolescent suicide is now well established. Psychological autopsy studies of consecutive adolescent suicides from a wide range of geographic areas have reported rates of psychiatric disorder in adolescent suicide victims on the order of 90% (Brent et al., 1988a; Marttunen et al., 1991; Shaffer et al., 1988; Shafii et al., 1988). On the other hand, there is considerably less consensus as to the types of psychopathology most closely associated with adolescent suicide. In specific, there are studies that find substance abuse and antisocial disorder to be the most frequent conditions in youthful suicide (Rich et al., 1986, 1990; Shaffer et al., 1988), whereas others, including our previous study, have found that affective illness is the most prevalent (Brent et al., 1988a; Shafii et al., 1988). We previously reported an association of bipolar disorder with completed suicide in adolescents, a finding that was not confirmed in two other investigations (Marttunen et al., 1991; Rich et al., 1990) and not addressed in two

other papers (Shaffer et al., 1988; Shafii et al., 1988). Finally, it is difficult to evaluate the rates of disorders reported in some of these studies, as they have not included a community control group as a reference (Brent et al., 1988a; Marttunen et al., 1991; Rich et al., 1986, 1990; Shafii et al., 1988).

Accurate identification of the psychopathological substrate associated with adolescent suicide is critical to additional research on the etiology and prevention of this major cause of mortality in adolescents (Centers for Disease Control, 1985; Shaffer et al., 1988). Progress in the understanding of the etiology of adolescent suicide may be likely to come from the intensive study of those living patients who most closely resemble suicide victims. Similarly, the prevention of suicide can be achieved most efficiently through the identification and treatment of youth with psychopathologic characteristics that most closely resemble suicide victims. From both a research and prevention viewpoint, it is critical to identify the independent and interactive roles of affective disorder, substance abuse, and conduct disorder in completed suicide in adolescents. Therefore, we report here on a large sample of adolescent suicide victims and demographically matched community controls. Based on our previous findings, we expect primary affective illness to be closely associated with adolescent suicide and that bipolar affective illness also will be a significant risk factor for adolescent suicide. Additionally, we predict, compared with affective illness, that substance abuse and conduct disorder will make substantive but quantitatively smaller contributions to the risk for suicide and will do so most often when comorbid with affective illness.

## Subjects and Methods

The suicide completer sample was drawn from a consecutive series of adolescent suicide victims during a period from July 1986 to August 1990 in the 28 counties of western Pennsylvania. This is a new sample and does not overlap

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with our previous report (Brent et al., 1988a). The greatest number of suicides came from Allegheny County (35.8%), an area that includes Pittsburgh and its suburbs and is much more densely populated than the other counties in western Pennsylvania. Only families of adolescents aged 19 and under who received a definite verdict of suicide were identified for study. The families of the suicide victims were contacted by mail 3 months after the death, and then by telephone 1 week later to schedule an interview. Of 91 suicides that occurred during this period, the families of 67 agreed to participate (73.6%), whereas 8 (8.8%) could not be traced, and 16 (17.6%) refused the interview. There were no differences between suicide victims whose families agreed to participate and those whose families refused or could not be traced with respect to age, gender, race, county of origin, method of suicide, or toxicology. Interviews took place a median of 5 months after the death ( $M = 5.1$  months,  $SD = 2.9$ , range 1 to 19 months). Primary informants consisted of parents or a parental figure. Additionally, siblings and friends were interviewed in a majority of cases. The median number of informants per suicide was four (range one to 14). The majority of interviews took place in the homes of the informants, and the remainder were conducted at Western Psychiatric Institute and Clinic.

#### *Community Controls*

Controls were obtained by geographic cluster sampling of communities with similar median income, population density, racial composition, and age distribution to those of suicide victims (Brent et al., 1992). Communities were sampled from October 1989 through March 1991. Nearly complete ascertainment (98%) of randomly targeted housing tracts ( $n = 38$ ; number of homes assessed = 7,721) was obtained, and 73% of controls approached for the interview agreed to participate.

The 67 community controls for this study were drawn from a pool of 129 controls obtained through this sampling procedure and were individually matched to suicides on age, gender, socioeconomic status (SES), and county of residence. The 67 controls used for this study were representative of the entire sample with respect to age, race, SES, proportion that lived with both biologic parents, and mean Child Behavior Checklist scores (Achenbach & Edelbrock, 1983). Both the community control and at least one parent served as informants.

Informed consent was obtained from all informants in both groups in accordance with the guidelines of the Psychosocial Institutional Review Board of the University of Pittsburgh.

#### **Assessment Measures**

##### *Demographic Variables*

Family constellation and SES were assigned on the basis of the living arrangements of the subject during the year before assessment and were assessed by direct interview with informants. SES was assessed through use of the Hollingshead Four Factor Scale (Hollingshead, 1975).

#### *Psychiatric Symptomatology and Diagnoses*

The Schedule for Affective Disorders and Schizophrenia for School Age Children, Epidemiologic and Present versions (K-SADS-E and P; Chambers et al., 1985; Orvaschel et al., 1982) were used to assess lifetime and current symptomatology, *DSM-III* diagnoses (American Psychiatric Association, 1980), and past and current psychiatric treatment among suicide completers and community controls. Through the use of these two related instruments, the age of onset of disorder, course, and current severity of symptomatology were assessed. Previous studies have indicated that these instruments can be used to assess these parameters reliably and validly, even when obtaining the information through a psychological autopsy format (Brent et al., 1988a,b, in press). Although the number of informants varied, the correlation between the number of informants and the number of diagnoses in the suicide victims was low ( $\rho = 0.17$ ). Interrater reliability was continually monitored during this project and was acceptable for both symptomatology, mean  $ICC = 0.96$ ,  $SD = 0.17$ , and for diagnoses, mean  $\kappa = 0.98$ ,  $SD = 0.13$ .

#### *Interviewing and Diagnostic Procedure*

The interviewers who assessed the subjects using the K-SADS-E and P were master's level clinicians with extensive interviewing and clinical experience with psychiatrically ill adolescents. All interviews were monitored by audiotapes, and a subsample was reviewed for establishment of interrater reliability and diagnostic validity. Diagnoses were made according to *DSM-III* (American Psychiatric Association, 1980), with the additional requirement for evidence of functional impairment in work, school, interpersonal relationships, or in the community. *DSM-III-R* (American Psychiatric Association, 1987) criteria were not employed both because the study began before the publication of the *DSM-III-R* manual and to ensure comparability to our group's previous study (e.g., Brent et al., 1988a), which used *DSM-III*. Diagnoses are reported as definite (meeting all criteria) or probable (evidence of functional impairment, but one symptom shy of criteria). Best-estimate diagnoses were made by consensus and generated through an integration of all available sources, according to the manner of Leckman et al. (1982) in diagnostic conferences chaired by the senior author (D.A.B.). Discrepancies between informants were resolved by reinterview of all sources around the areas of discrepancies until satisfactory consensus could be obtained. It was not possible to maintain blindness of participants in the diagnostic conferences with respect to suicidal status.

#### *Data Analysis*

Because the two groups were matched one-to-one, all between-group comparisons required paired statistical tests. For continuous variables, either a paired *t*-test or Wilcoxon signed rank test was employed, depending on whether the data were normally distributed or skewed. For dichotomous variables, McNemar's  $\chi^2$  was utilized. When dichotomous variables were examined and one cell was zero, the binomial

test was utilized (Schlesselman, 1982). Also, for dichotomous variables, matched odds ratios (OR) and 95% confidence intervals (CI) were calculated (Schlesselman, 1982). Specifically, the OR is the frequency with which a condition or risk factor occurred in suicides relative to controls. To calculate the matched OR, the number of suicide victim-control pairs in which the suicide victim had the risk factor and the control did not was divided by the number of pairs in which the suicide victim did *not* have the risk factor and the control *did*. Comparisons between groups were made using both parent and best-estimate reports. Because the OR did not differ greatly between the two types of sources, only best-estimate diagnoses are reported herein. The level of statistical significance was set at  $p = 0.05$  for all planned contrasts, whereas the method of Bonferroni was used to correct for multiple comparisons for all other contrasts (Hays, 1981). Log-linear analyses were utilized to examine the relationship between patterns of comorbid diagnoses among completed suicide victims.

## Results

### Demographic Characteristics

By design, completers and controls were matched with respect to age,  $M = 17.1$  ( $SD = 1.9$ ) versus  $17.3$  ( $1.6$ ) years, gender (both 85.1% male), SES (for completers I and II, 31.4%; III, 26.9%; IV and V, 41.8%; for controls I and II, 20.9%; III, 34.3%; IV and V, 44.7%), and county of origin (35.8% versus 34.3% from Allegheny County). Three completers were black and were matched to white controls. One completer was matched on age, race, gender, and SES to a control but differed on county of origin. Completers were less likely than were controls to have resided with both biologic parents (44.8% versus 64.2%, McNemar's  $\chi^2 = 6.26$ ,  $p = 0.01$ ).

### Current Psychiatric Disorder (Table 1)

Suicides were much more likely to meet definite *DSM-III* criteria for psychiatric disorder at the time of death than were controls at the time of interview. The proportion of suicide victims meeting definite or probable disorder was even higher (89.6%). As hypothesized, suicide victims showed much higher rates of affective illness than did controls. Although almost half (16/33; 48.5%) of these affective disorders were associated with nonaffective comorbidity, the majority of these affective disorders were primary (27/33; 81.8%); that is, the affective disorder began before other comorbid conditions. The single biggest diagnostic risk factor for adolescent completed suicide was major depression (OR = 27.0, 95% CI = 3.6—199.8). As had been reported previously, a bipolar mixed state (probable or definite) occurred in a significant number of suicide victims (OR = 9.0, 95% CI = 1.1—71.0). Rates of substance abuse (OR = 8.5, 95% CI = 2.0—36.8), and conduct disorder (OR = 6.0, 95% CI = 1.8—20.4) were also elevated in suicide victims. Because we had not predicted any differences between suicides and controls in the rates of anxiety disorders, the differences between suicide victims and controls in the rates of overanxious disorder (9.0% versus 0.0%,  $p = 0.02$ ) escaped statistical significance after correction for multiple

comparisons ( $\alpha$  was set at 0.004 for unplanned comparisons).

### Patterns of Comorbidity with Suicide Victims

Overall, there was frequent overlap in diagnostic categories found among suicide victims. Most notably, substantial proportions of those suicide victims with affective disorder had comorbid substance abuse (8/33; 24.2%), conduct disorder (6/33; 18.2%), or anxiety disorder (7/33; 21.2%). Of those with substance abuse, the most common two comorbid diagnoses were affective disorder (8/18; 44.4%) and conduct disorder (6/18; 33.3%). Almost all anxiety disorders were comorbid with affective disorder (7/8; 87.5%), and more than one-third of anxiety disorders (3/8; 37.5%) had comorbidity with *both* affective disorder and substance abuse. Log-linear analyses were performed to assess statistically significant patterns of comorbidity among completers and revealed a significant association of depression and anxiety ( $\Delta\chi^2 = 3.98$ ,  $df = 1$ ,  $p = 0.05$ ).

In line with our original hypotheses, substance abuse in combination with affective disorder conveyed a much *higher* risk of suicide than did substance abuse alone (ORs = 17.0 versus 3.3; Table 2). In contrast, conduct disorder comorbid with affective illness was associated with a *lower* risk of suicide (ORs = 2.5 versus 12.0). On the other hand, anxiety disorder was associated with risk for suicide *only* when comorbid with affective illness (ORs = 7.0 versus 1.0).

### Duration of Current Disorders

Of those suicide victims who died in the midst of a major depressive disorder ( $n = 29$ ), a substantial proportion has the onset of depression within 3 months of death ( $n = 9$  or 31.0%), more than one-third ( $n = 12$ , 41.4%) had onset of depression within 6 months of the death, and nearly half had depressive onset with 12 months of the death ( $n = 14$  or 48.3%). On the other hand, relatively few of those with substance abuse (16.7%) or conduct disorder (11.1%) had their onset within 12 months of death, and in fact, the median duration was at least 36 months for both conduct disordered ( $M = 45.9$  months,  $SD = 33.2$ ) and substance abusing ( $M = 35.6$  months,  $SD = 22.4$ ) suicide victims.

### Suicidal and Homicidal Ideation within the Previous Week

Suicide victims were much more likely to have shown evidence of suicidal ideation with a plan in the week before death than were controls during the week before interview (76.8% versus 0.0%, binomial test,  $p < 0.0001$ ). During this same time frame, suicide victims were also more likely to have manifested homicidal ideation with a plan than were controls (13.8% versus 0.0%, binomial test,  $p = 0.004$ ). Of the eight suicide victims with homicidal ideation, seven had major depression, either alone ( $n = 1$ ), comorbid with conduct disorder ( $n = 2$ ), substance abuse ( $n = 2$ ), anxiety disorder ( $n = 1$ ), or both anxiety and substance abuse ( $n = 1$ ).

### Lifetime Psychiatric History

Lifetime rates of affective illness (50.7% versus 16.4%,  $\chi^2 = 16.03$ ,  $p = 0.0001$ ), major depression (46.3% versus

TABLE 1. Current Best-Estimate DSM-III Psychiatric Diagnoses in Suicide Completers and Community Controls (%)

	Suicide Completers (n = 67)	Community Controls (n = 67)	Odds Ratio	95% Confidence Interval	$\chi^2$	p
Any psychiatric disorder	79.1	26.9	35.0	4.8–255.4	33.11	<0.0001
Any psychiatric disorder (definite or probable)	89.6	34.3	37.0	5.1–269.5	35.10	<0.0001
Any affective disorder	49.3	10.4	13.5	3.2–56.8	22.53	<0.0001
Primary affective disorder	40.9	10.6	7.7	2.3–25.4	15.39	0.0001
Affective disorder with nonaffective comorbidity	22.7	7.5	4.3	1.2–15.1	6.06	0.01
Major depression	43.3	4.5	27.0	3.6–199.8	24.14	<0.0001
Mixed state (probable or definite)	13.4	1.5	9.0	1.1–71.0	6.40	0.02
Substance abuse	27.3	4.5	8.5	2.0–36.8	11.84	0.0006
Alcohol abuse	24.2	4.5	7.5	1.7–32.8	9.94	0.002
Drug abuse	13.4	1.5	9.0	1.1–71.0	6.40	0.01
Conduct disorder	28.4	6.0	6.0	1.8–20.4	10.71	0.0001
Attention deficit disorder	13.4	13.4				
Any anxiety disorder <sup>a,b</sup>	11.9	3.0				
Psychosis (nonaffective)	0.0	0.0				

<sup>a</sup>No difference after Bonferroni correction for multiple contrasts.

<sup>b</sup>No significant difference in rates of phobias, panic disorder, separation anxiety disorder, obsessive-compulsive disorder; difference in overanxious disorder (9.0% vs. 0.0%, p = 0.02) escaped statistical significance after correction for multiple comparisons.

13.4,  $\chi^2 = 15.13$ ,  $p = 0.0001$ ) and bipolar spectrum disorder (bipolar I, bipolar II, or cyclothymia; 17.9% versus 3.0%,  $\chi^2 = 8.33$ ,  $p = 0.004$ ) were elevated in completers relative to controls, but curiously, the rate of recurrent unipolar disorder was not (4.5% versus 0.0%, NS). Lifetime rates of substance abuse (30.3% versus 10.6%,  $\chi^2 = 8.05$ ,  $p = 0.004$ ), and conduct disorder (34.3% versus 13.4%,  $\chi^2 = 7.54$ ,  $p = 0.006$ ) also were elevated in completers relative to controls.

The average ages of onset for any psychiatric disorder were similar for suicide victims and controls, 11.4 (5.2) versus 9.5 (5.4) years. Specifically, ages of onset for suicide victims and controls were comparable for affective illness, 14.5 (3.6) versus 14.6 (2.2) years; substance abuse, 15.5 (1.7) versus 15.9 (1.7) years; and conduct disorders, 13.7 (2.6) versus 14.7 (2.1) years. Therefore, suicide victims did not show earlier manifestations of psychiatric illness than did psychiatric illness than did psychiatrically ill community controls. However, this confirms previous reports indicating that for many suicide victims, the earliest onset of psychiatric illness began on average at least 6 years before the suicide (Brent et al., 1988a; Marttunen et al., 1991). A chronic course of illness leading to suicide appears to be most common in those victims with externalizing disorders, such as substance abuse or conduct disorder. In contrast, those suicide victims with affective illness often suffered an acute or subacute downhill course, insofar as nearly half (43.3%) of those who died in the midst of depressive episodes had been in the current episode for less than 6 months, and it was almost always a first episode (89.7%).

#### Previous Treatment

Suicide victims were more likely to have received some type of psychiatric treatment sometime in their lifetime than

were controls (58.2% versus 16.4%,  $\chi^2 = 24.5$ ,  $p < 0.0001$ ), either outpatient (58.2% versus 16.4%,  $\chi^2 = 24.5$ ,  $p < 0.0001$ ) or inpatient care (14.9% versus 1.5%,  $\chi^2 = 7.36$ ,  $p = 0.007$ ). The majority (85.1%) of suicide victims were not in active psychiatric treatment within 1 month of death, although a greater proportion of suicide victims were in active treatment than were controls (14.9% versus 4.5%,  $\chi^2 = 3.77$ ,  $p = 0.055$ ).

#### Past Suicidal Behavior

A much greater proportion of suicide victims, compared with controls, had previously engaged in a suicide attempt (25.8% versus 1.5%,  $\chi^2 = 14.22$ ,  $p = 0.0002$ ; OR = 17.0; 95% CI = 2.3–127.7) or suicidal gesture, threat, or ideation with a plan (20.9% versus 3.0%,  $\chi^2 = 9.00$ ,  $p = 0.003$ ; OR = 21.0; 95% CI = 2.8–156.3). Overall, 47.8% of the suicide victims had shown overt evidence of suicidal ideation with a plan, suicidal threat, gesture, or attempt, as compared with 4.5% of the controls ( $\chi^2 = 27.13$ ,  $p < 0.0001$ ; OR = 30.0; 95% CI = 4.1–220.2).

#### Discussion

In this study, we confirmed our initial predictions that affective disorder, most specifically, major depression, was the single most significant risk factor for completed suicide in adolescents. We also replicated our previous finding that bipolar affective illness was also a significant risk factor for completed suicide. Substance abuse and conduct disorder were also important but quantitatively lesser risk factors than was depression. As originally predicted, substance abuse conveyed a much higher risk for suicide when it was comorbid with affective disorder. Contrary to our initial expectations, conduct disorder conveyed a higher risk in the absence of an affective illness. The implications of these findings

## PSYCHIATRIC RISK FACTORS FOR ADOLESCENT SUICIDE

TABLE 2. Frequency of Substance Abuse, Conduct Disorder, and Anxiety Disorder in Suicide Victims and Controls:  
Effects of Comorbid Affective Disorder

	Comorbid Affective Disorder			No Comorbid Affective Disorder		
	Odds Ratio	95% Confidence Interval		Odds Ratio	95% Confidence Interval	
Substance abuse	17.0 <sup>a</sup>	1.0-294.0		3.3	0.9-11.9	
Alcohol	13.0 <sup>a</sup>	0.7-231.4		3.3	0.9-11.9	
Drugs	9.0 <sup>a</sup>	0.5-167.4		5.0	0.6-43.0	
Conduct disorder	2.5	0.5-12.8		12.0	1.6-92.4	
Anxiety disorder	7.0	0.9-35.0		1.0	0.1-16.0	

<sup>a</sup>Odds ratios estimated ( $B + 0.5/C + 0.5$ ), because denominator (C) was zero.

will be discussed, followed by a delineation of the limitations of this study.

#### Central Role of Affective Disorder

Our findings replicate and build on our earlier report on 27 adolescent suicides with respect to the proportion with major depressive disorder (Brent et al., 1988a). We again found that affective disorder is the most significant and predominant risk factor for adolescent suicide. In this study, we extend these findings to show that the majority of these affective disorders are primary and first-episode. These findings are also consistent with several psychological autopsy studies of suicide in adults and adolescents (Arato et al., 1988; Barraclough et al., 1974; Dorpat et al., 1960; Marttunen et al., 1991; Robins et al., 1959; Shafii et al., 1988) which indicate that mood disorders are the single most prevalent diagnosis. Although Shaffer et al. (1988) found substantially lower rates of depressive disorder in their psychological autopsy study than we report herein, they also concluded that depressive disorders were the single most significant diagnostic risk factor for adolescent suicide, reporting odds ratios of depression given suicide of 8.6 for males and 49.0 for females. In fact, the estimate of odds ratios of depression given suicide in our study (univariate OR = 27.0) corresponds almost exactly with the 30-fold increase in the suicide rate among persons with primary affective disorder calculated by Guze and Robins (1970) in their review of prospective studies of affectively disordered adult patients. Our findings are also consistent with epidemiologic studies of adolescent suicide attempts (Andrews and Lewinsohn, 1992; Garrison and Jackson, 1991; Velez and Cohen, 1988), as well as longitudinal clinical studies of adolescents, all of which indicate that mood disorders are central risk factors for completed (Morrison, 1982; Otto, 1972; Welner and Welner, 1979) and attempted suicide (Kovacs et al., 1993; Pfeffer et al., 1991).

As noted above, a significant proportion of suicide victims in this sample were in their first depressive episode, and, for many, this episode was of relatively short duration. Our observation is consistent with that of Guze and Robins (1970), who found that suicide in primary affective illness tends to occur early in the course of the disorder. This finding highlights the importance of early identification and rapid treatment of depressive disorders in adolescents and of the importance of gaining an improved understanding of the interrelationships between stressors, depression, and

suicide. Given that no single treatment approach for adolescent depression has been shown to be effective (Geller et al., 1990; Reynolds and Coates, 1986; Ryan, 1990), with one exception of a community based study (Lewinsohn et al., 1990), it is vital that a high priority be give to the development and testing of psychosocial and pharmacologic interventions for depressed adolescents.

#### Bipolar Disorder

We again found bipolar spectrum disorder to be associated with adolescent suicide, a finding validated by an increased rate of bipolar disorder in the relatives of completers compared with controls (Brent et al., in press). Our rate for bipolar spectrum disorder in this study was 17.9%, similar to our previously reported rate of 22.2% (Brent et al., 1988a). These data, in combination with two other psychological autopsy studies of adults, both reporting rates of bipolar disorder of 20%, support the view that bipolar disorder is common among suicide victims and that suicide is a common complication of bipolar disorder (Arato et al., 1988; Barraclough et al., 1974). A recent review of the literature indicates that bipolar disorder, particularly bipolar II disorder was even more closely associated with suicidal behavior than was unipolar depressive disorder (Cassano et al., 1992). In this series, bipolar mixed state (probable or definite) appeared to be a final common pathway to suicide for a significant proportion (13.4%) of these youth. The proper diagnosis and treatment of this condition cannot be overemphasized (Himmelhoch and Garfinkel, 1986; Strober et al., 1988). Furthermore, prospective studies of youth with bipolar disorder are warranted to learn more about the risks that this condition conveys for suicide and suicidal behavior and how proper treatment may attenuate that risk.

Recently, it has been reported that as many as one-third of adolescent and young adult suicides are associated with borderline personality disorder (Runeson, 1989; Runeson and Beskow, 1991). The delineation between cyclothymia, bipolar II, and borderline disorders is difficult to establish, owing to ambiguities in the diagnostic criteria (Akiskal, 1981; Gunderson and Phillips, 1991; Kutcher et al., 1990), and it is possible that Runeson and our group are describing essentially the same phenomena. Wender et al. (1986, p. 925), in their genetic study of suicide, indicate that an "affect reaction," that is, "those who manifest histrionic or panic behavior or make an impulsive suicide attempt," is one of the most important psychopathologic substrates of

suicide, particularly familial suicide. An accumulating body of work highlight the importance of a more critical assessment and understanding of personality factors associated with suicide (Marttunen et al., 1991; Runeson, 1989; Runeson and Beskow, 1991; Shaffer, 1974, Shafii et al., 1985, 1988).

#### *Anxiety Disorder*

We report the association of overanxious disorder and suicide as increased, but not statistically significantly so, after correction for multiple comparisons. There may be reason to believe this finding was not because of chance alone. A substantial proportion of adolescent suicide victims have been described as anxious, inhibited, and perfectionistic (Shaffer, 1974; Shafii et al., 1985), although another study has reported relatively low rates of anxiety disorders among suicide victims (Marttunen et al., 1991). Anxiety disorder, both alone and in combination with affective illness, has been increasingly recognized as a risk factor for suicide and suicidal behavior among adults (Allgulander and Lavori, 1991; Fawcett et al., 1990; Markowitz et al., 1989; Weissman et al., 1989). In this study, overanxious disorder occurred almost always in the context of an affective illness, so that the impact of anxiety disorder alone or suicidal risk could not be accurately ascertained. The contribution of anxiety disorders to risk for suicide and suicidal behavior in adolescents merits much closer scrutiny than this topic has received heretofore.

#### *Substance Abuse and Antisocial Disorder*

The above-noted findings about the central role of affective illness in suicide notwithstanding, there are studies to suggest that substance abuse and antisocial disorders are the most important contributors to risk for adolescent suicide. Rich et al. (1986) found that substance abuse was much more common among completers younger than the age of 30 than those older than 30. Carlson et al. (1991) in reanalyzing data from young adult suicides in St. Louis and San Diego, observed that substance abuse was the most significant contributor to the increase in the adolescent suicide rate. In an epidemiologic study of adolescent suicides in Allegheny County, we have reported a 3.6-fold increase in the proportion of adolescent suicide victims who were toxicology positive for alcohol over a period from 1968 to 1983 (Brent et al., 1987). However, although these data all indicate that substance abuse has contributed substantially to the *increase* in the suicide rate in adolescents, they do not establish substance abuse as the leading contributor to adolescent suicide in and of itself.

In fact, our data suggested that substance abuse is most significant as a risk factor when comorbid with affective illness, a finding consistent with the previous report of Shafii et al. (1988). Although several other studies also reported high rates of comorbidity of substance abuse and affective illness, they were uncontrolled, so that the risk of suicide associated with substance abuse alone versus substance abuse comorbid with affective illness could not be determined (Fowler et al.; 1986; Marttunen et al., 1991; Runeson,

1989). In the one controlled study of adult alcoholics, comorbid depression is a highly significant risk factor for suicide (Murphy et al., 1992). However, in the case of adult suicides, the depressive syndrome usually is regarded as secondary to alcohol or substance abuse, whereas our retrospective assessment indicated that, in most of our youthful suicide victims with substance abuse comorbid with affective illness, the substance abuse was secondary to affective illness. These findings are consistent with community based studies of adolescents and young adults that show the substance abuse can be a frequent *complication* of depressive symptomatology (Deykin et al., 1987; Kandel et al., 1986). Taken together, these findings support the "dual diagnosis" concept (Deykin et al., 1992). If clinicians are confronted with substance abusing adolescents, it is critical to rule out an underlying affective illness as well as to treat the substance abuse problem.

On the other hand, conduct disorder is a significant risk factor for suicide that, if anything, was of greater significance in the absence of affective illness. Other longitudinal studies certainly have supported the role of conduct disorder as a risk factor for completed suicide (Kuperman et al., 1988). These findings highlight the importance of the role of impulsive violence in suicidal behavior (Pfeffer et al., 1983, 1988, 1989; Plutchik and van Praag, 1990), and support the view that this contribution to suicidal risk may be independent of affective illness and may be mediated by alterations in the central serotonergic system (e.g., Coccaro et al., 1989). An additional specific link between violent behavior and suicide was demonstrated, insofar as a substantial number ( $n = 8$ ; 13.8%) of the suicide victims had significant homicidal ideation with a specific homicidal plan within a week of their death. This finding is consonant with a recent report linking homicidal and suicidal ideation in depressed adults (Rosenbaum and Bennett, 1986). Suicidal risk should be assessed in all homicidal adolescents. Conversely, all suicidal adolescents should be assessed for the presence of homicidal ideation.

#### *Past Suicidal Behavior*

Our finding that past suicidal behavior is associated with completed suicide is consistent with previous psychological autopsy studies (Brent et al., 1988a; Shaffer et al., 1988; Shaffer, 1974; Shafii et al., 1985), and prospective investigations (Garfinkel et al., 1982; Otto, 1972). We can reemphasize the report of Shaffer et al. (1988), which concluded that, aside from depression, previous suicidal behavior was the most significant risk factor for adolescent suicide. In our study, past suicidal ideation with a plan was at least as strongly associated with completed suicide as was a past attempt. These findings are consistent with two previous longitudinal studies of adult patients (Fowler et al., 1979; Pokorny, 1966). Therefore, patients who present with suicidal ideation with a specific plan should be regarded as at high risk for suicide even if they have not engaged in suicidal behavior.

### Limitations

These findings and their implications must be viewed within the limitations of this study. They may not be generalizable to other communities, particularly those whose ethnic makeup includes substantial numbers of African Americans, Native Americans, Asian Americans, or Hispanics. Additional studies of suicide in various ethnic groups should be pursued. This study, as was the case in all previous psychological autopsy studies of youth (Brent et al., 1988a; Marttunen et al., 1991; Runeson, 1989; Shaffer et al., 1988; Shafii et al., 1988), did not examine the psychological characteristics of probable or possible suicides that received undetermined verdicts. However, the proportion of suicidal deaths receiving an undetermined verdict in this region is low (Brent et al., 1987).

It is possible that, owing to the retrospective nature of the psychological autopsy, biases in assessment and diagnosis occurred. We tried to guard against this by monitoring the reliability of the interviews and using the best-estimate procedure in diagnostic conferences. The reliability of psychological autopsy data also is supported by findings that diagnostic results are unaffected by the passage of time after the death or by the degree of depressive symptomatology of the informant (Barraclough et al., 1974; Brent et al., 1988b). Furthermore, two studies support the validity of diagnoses obtained from psychological autopsies. Barraclough et al. (1974) noted that the clinical picture of depression reported by informants in a psychological autopsy study was identical to that of clinically depressed patients. We recently showed that familial rates of depression, bipolar disorder, substance abuse, and conduct disorder in the families of suicide victims (as determined by family history obtained blind to proband diagnoses), were increased in suicide victims with those specific disorders (Brent et al., in press).

Our choice of community rather than psychiatric controls meant that we could not draw fine-grained conclusions about what aspects of psychiatric illness predispose to suicide. However, we previously reported on a comparison of suicides and psychiatric controls (Brent et al., 1988a). For this study, we felt that it was important to obtain a community sample for comparison with the suicide victims, to establish which disorders conveyed the highest risk for suicide in reference to the rates obtained in an unrefined sample. Our decision to obtain community controls from communities *other* than those where the suicide took place also can be questioned. However, we wanted to avoid recruiting controls who might have been exposed to a recent suicide, thereby resulting in inflated rates of psychopathology and suicidal behavior among our community controls, as has been reported to occur (Brent et al., 1992). A final concern is that our rates in the community controls of overall psychiatric disorder of 26.9% and of attention deficit disorder of 13.4% are somewhat higher than have been reported in larger community surveys (range for overall psychiatric disorder, 17.6% to 23.0% and attention deficit disorder, 2.2% to 9.9% respectively; Costello et al., 1989). Some of the difference in the prevalences of the latter disorder may be accounted for by the predominance of males in our control group.

### Conclusions

These findings in combination with other reports in the literature, form the basis for identifying youth at high risk for suicide. Research, treatment, and prevention efforts should target particularly those with mood disorders, but also youth with substance abuse, conduct disorder, and a history of suicidal behavior. Biological investigations of these correlates of suicidal behavior in these high-risk youth, as well as longitudinal studies of these cohorts, are warranted to clarify the mechanisms by which these risk factors are etiologically linked to adolescent suicide. The development of effective treatments and their evaluation through treatment outcome studies in these high-risk youth should be given the highest priority. The findings of such studies will sharpen the focus and effectiveness of prevention efforts and give cause to hope the increase in the adolescent suicide rate that has occurred during the past three decades can be reversed.

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