Substance Abuse and Adolescent Suicidal Behavior

Frank E. Crumley, MD

Evidence suggests a significant association between use of psychoactive substances among adolescents and suicidal behavior among adolescents during the past two decades. Accumulating evidence, although not unanimous, supports the hypothesis of psychoactive substance abuse among adolescents as a risk factor for a range of suicidal behavior—ideation, attempted suicide, and completed suicide. With increasing rates of psychoactive substance abuse for the adolescent population during the past 20 years, this appears to be an increasingly important factor. It is not known if the association is causal. Psychoactive substance abuse appears to be associated with a greater frequency and repetitiveness of suicide attempts, more medically lethal attempts, a measured seriousness of intention, and greater suicidal ideation. Additional data support a specific association between alcohol intoxication and suicide by firearms among adolescents. Adolescents who abuse psychoactive substances, particularly those with any type of depressive disorder, appear to be at higher risk for suicidal behavior and may need appropriate psychiatric treatment.

(*JAMA*. 1990;263:3051-3056)

PSYCHOACTIVE substance use disorders among adolescents have markedly increased during the past two decades.[1] The proportion of senior high school students in the United States who reported daily marijuana use rose from 5% in 1975 to a peak of 10.7% in 1978.[1] For the daily drug use of marijuana and alcohol by seniors, the rate among males was twice the rate among females each year from 1975 through 1985, showing that regular substance use is primarily reported by male adolescents.[1] The suicide rate for white male adolescents aged 15 through 19 years increased 305.4% from 1950 through 1980, while the rate for females increased 66.7% during the same three decades.[2] The increase in youth suicide is due primarily to an increasing suicide rate among males. The suicide rate for males increased from 3.5 per 100 000 in 1950 to 13.8 per 100 000 in 1980, while for females the increase was from 1.8 per 100 000 in 1950 to 3.0 per 100 000 in 1980.[2] Moreover, the rates of depression have increased for all those born after 1940, with depression more often occurring during adolescence and young adulthood, rather than later in life.[3] However, rates of depression are consistently lower for males than for females.[3]

Although some data support a direct link between substance abuse and suicidal behavior,[4,5] the nature of this link is unclear. Establishing that substance abuse is a contributory cause of suicide requires a demonstration that the presumed cause (substance abuse) precedes the effect (suicide attempt/completion) and that altering only the cause alters the effect.[6] Other data suggest that substance abuse is secondary to an affective disorder: "Substance abuse may be an indicator of adolescents at higher risk, such as those with a particular maladaptive response to depressive affect, or . . . substance abuse itself, with its own destructive effects, may make the abusing adolescent more likely to be suicidal."[7] Another possibility that should not be ruled out is that "the two are parallel, but unrelated, or that both are secondary to some third factor,"[6] eg, depression or hopelessness.

This article examines the evidence for an association between psychoactive substance abuse/dependency and adolescent suicide attempts/completions. Such an association could be considered a risk factor, which is defined as an attribute or characteristic that is associated with an increased likelihood of suicidal behavior. If psychoactive substance abuse/dependency were found to occur among adolescents together with suicide attempts and suicide with a greater frequency than would be expected to occur by chance, then psychoactive substance abuse/dependency could be considered a risk factor for adolescent suicidal behavior.[6]

Psychoactive substance abuse refers to the regular use of psychoactive substances despite adverse physical, psychological, or social problems caused or exacerbated by the use of psychoactive substances. *Psychoactive substance abuse, psychoactive substance use disorders*, or *chemical dependency* are several of many terms used for these disorders. This article will refer to all maladaptive, regular use of amphetamines, hallucinogenics, phencyclidine hydrochloride, and all other psychoactive drugs or chemicals, including alcohol, as substance abuse or psychoactive substance abuse without regard to the specific classification. Some authors refer to alcohol abuse/dependency as a separate category for substance or drug abuse. Others include it within a general term such as *chemical dependency* or *drug abuse/dependency*. If so used, this will be specified.

EVIDENCE FOR AN ASSOCIATION BETWEEN SUBSTANCE ABUSE AND ADOLESCENT SUICIDE AND ATTEMPTED SUICIDE

Prior to 1970, reports on US youth who committed suicide rarely mentioned alcohol or substance abuse.[8] After examining the literature from 1900 through 1967, Seiden[9] found "scanty evidence of a direct causal relationship between drug usage and suicide." He mentions only one case report in 1966 of an adolescent girl who used drugs and attempted suicide to escape an unbearable family situation. Jacobziner[10] reported only 6 (2%) of 299 suicide attempts by intentional overdose in children and adolescents (aged 8 through 19 years) reported to the New

From the Department of Psychiatry, Baylor University Medical Center, Dallas, Tex.

Reprint requests to Baylor Medical Plaza, 3600 Gaston Ave, #808, Dallas, TX 75246 (Dr Crumley).

Downloaded from jamanetwork.com by Weill Cornell Medical Library user on 11/26/2024

York Poison Control Center from 1955 through 1957 as being secondary to "drug addiction." The children reported therein also included preadolescents (5% younger than 13 years). Increased alcohol use was described by Perlstein[11] as one of many prodromal changes that occurs before attempted suicide by adolescents. Neither time course, frequency, nor quantity of alcohol consumption was mentioned. Shaffer,[12] in a retrospective study of 31 suicides in 1962 through 1968 among English and Welsh schoolchildren aged 14 years and younger, found only two who were intoxicated at the time. In 1977, Miles,[13] after reviewing the literature, reversed Seiden's conclusion and suggested that "drug usage may be the most important single factor in the suicide rate increase among youth in the United States." Yet virtually all his data for this were from a few studies in other countries.

Research reports during the past 20 years on adolescent suicides that have occurred in the United States support this position. Percentages of adolescent suicide victims and attempters who abused psychoactive drugs have been increasing markedly during the past few decades. Sanborn et al,[14] in a retrospective study of completed suicides in New Hampshire in 1968 through 1970, reported on 10 adolescents aged 11 through 19 years who had committed suicide. The number was small, yet 1 victim out of this small sample definitely had a substance abuse problem (hallucinogenic drugs and alcohol).

In one key study, Schneer et al[15] observed the increased incidence of drug abuse and increased suicide attempts among adolescent patients between two decades. This retrospective study of hospitalized adolescents compared patients admitted to a Brooklyn hospital in 1957 with those admitted in 1967 through 1970. Drug abuse, just noticeable in the 1957 population of adolescents who attempted suicide (4%), increased 10 times to 40% in the 1967 through 1970 population. The number of admissions of those who attempted suicide in 1967 through 1970 doubled compared with the 1957 sample. Using total population statistics for Brooklyn, the investigators calculated the incidence of specific admissions for attempted suicide per 1000 twelve- to 16-year-olds in Brooklyn of the same race and sex. The incidence for boys increased approximately three times, from 0.12 per 1000 in 1957 to 0.31 per 1000 in 1967 through 1970. The rates for girls changed only slowly, from 0.43 per 1000 to 0.55 per 1000. Statistical significance of rates of substance abuse was not determined in the study. The design of the study also precluded definition of causes. However, the rate of regular drug use observed by Schneer et al[15] (40%) is much higher than the 6% to 10.7% daily rate of marijuana use reported by the National Institute on Drug Abuse survey from 1975 through 1978.[1]

Other studies in the 1970s and 1980s of adolescents in the United States who attempted suicide in the 1970s and 1980s show an increased incidence of substance abuse. Stevenson et al[16] found 23% of 26 adolescents hospitalized between September 1965 and February 1968 who had attempted suicide were definitely abusing alcohol or drugs. However, this was not statistically significant compared with the 12% for hospitalized psychiatric adolescents who had not attempted suicide. Crumley[17] reported a study of 40 adolescents who had attempted suicide from 1972 through 1978. Combined diagnoses were typical, particularly depressive disorders, substance abuse, and borderline personality disorder. Fifty percent of the total number of adolescents who attempted suicide were eventually revealed to be regularly abusing psychoactive substances over a long period. Marijuana was used by all who abused drugs, while amphetamines and alcohol were second and third. The diagnosis of substance abuse requires continuous or episodic abuse for at least a month and social complications of use. Most abused several substances, but rarely was any of this apparent at the start of treatment. The true extent of dependency on psychoactive substances was not known until well into treatment and the patient denial was lifted. No estimate of significance of the rate of substance abuse was possible, since no control group was used.

In a study published in 1984, Clarkin et al[18] reported on 24 adolescents admitted to the hospital after making a suicide attempt within 3 months prior to admission. They diagnosed 33% with drug abuse disorder, 25% with alcoholism, and 71% with major depression following research diagnostic criteria. Fifty-eight percent of the adolescents made attempts that were of a seriously lethal nature. It is unfortunate that the authors did not statistically correlate the rate of substance abuse and attempted suicide or seriousness of lethality.

A very well-designed retrospective study by Brent[4] and coworkers of 197 instances of completed suicide among 10- to 19-year-olds in Allegheny County, Pennsylvania, covered a 24-year period from 1960 through 1983. A "dramatic" increase in the suicide rate in that county from 1.59 to 4.36 per 100 000 was accompanied by a significant increase in the frequency of positive blood alcohol determinations, from 12.9% in 1968 to 46% in 1978 through 1980. There was no significant change in the proportion of suicide victims under the influence of other drugs. Because of limitations of retrospective data from records, "it is impossible to determine if there was a stable pattern of alcohol abuse prior to death or merely a one time binge." The authors conclude that "the epidemic increase in the suicide rate among youth may be associated with an increase in prevalence of alcohol abuse."

More recent studies of completed suicide are now available, which include larger numbers and are limited to adolescents rather than also including young adults. A retrospective study of 229 victims of suicide younger than 19 years in Minnesota between 1975 and 1985 by Hoberman and Garfinkel[19] characterized 22% of the suicide victims as either alcohol abusers (10%) or drug abusers (12%). Males were more likely to abuse alcohol than females. Moreover, at least 45% in this study showed evidence of drug or alcohol abuse at time of death. The suicides were typically by firearms. Differences between male and female suicide victims were also studied. "Female decedents were more likely to have a current depressive disorder, while males were more likely to be characterized as alcohol abusers."[19] In summary, "youth most at risk for completed suicide are males who have affective disorder or alcohol abuse or drug abuse and who have experienced an acute proximal stressor that involves either a social loss or a blow to their self-esteem."[19] Poteet[20] also found that 45% of adolescent suicide victims used alcohol or a psychoactive substance at the time of death in a retrospective study of 87 completed suicides in Tennessee between 1970 and 1985. At least 27.6% showed evidence of a "previous history of drug or ethanol abuse." No comparison control group was available in either of these two studies.

Alcohol abuse was found to be the most common risk factor in a retrospective study of 190 Canadian suicide victims younger than 21 years by Thompson.[21] These suicides occurred from 1971 through 1984 and were investigated by a retrospective study of files of coroners' reports. Alcohol abuse was found in 37% of the victims and other drug abuse in 17%. There was no control group available for comparison.

The association between substance abuse and suicide is even stronger for suicides that occurred among young adults aged 20 through 30 years. In a well-designed retrospective study of

Downloaded from jamanetwork.com by Weill Cornell Medical Library user on 11/26/2024

133 suicide victims younger than 30 years from San Diego County, California, between 1981 and 1983, 53% of the victims were substance abusers. Typically, substance abuse started at age 14 years and lasted 9 years before ending in suicide.[22,23] Eleven percent committed suicide before age 20 years, while 89% became victims while aged 20 through 30 years.

Several studies are available that include a control group for comparison and address the issue of whether there is a significant association between substance abuse and suicidal behavior (both attempts and completed suicide). In a study of 550 Canadian children and adolescents seen in an emergency department in 1970 through 1977 after attempting suicide, Garfinkel et al[24] found that a significant 11.3% were revealed by chart review to be using alcohol or drugs at the time of admission. Of the control group matched for age, sex, and time of event of emergency department visit only, 1.3% were revealed to have used drugs. In a later study[25] in 1979 through 1980, patients seen in an Ohio emergency department were specifically interviewed for substance abuse. Those brought in for attempted suicide formed one group. A control group of patients seen for minor injuries was matched as closely as possible for sex and socioeconomic status. Forty-three percent of the attempters were revealed to have "serious drug problems." Moreover, "drugs were used in the suicide attempt by 39 of the 46 adolescents." The suicide attempters used drugs significantly more than the control group; the specific substances used more frequently by those attempting suicide were alcohol ($P<.0001$), marijuana ($P<.001$), stimulants ($P<.02$), and depressants ($P<.03$).[25] No causal relationship was implied because of the study design, but the fact that these studies show a rather high coincidence linking substance abuse and adolescent suicide attempts suggests a risk factor. Thus, the 43% rate of serious drug use is more than four times greater than the 10.3% of seniors who reported daily marijuana use in 1979.[1] In both of these studies, the control group was a sample drawn from an emergency department group and was not a sample from the general population at risk for suicide attempts. Therefore, no definite conclusions can be assumed regarding significance of rate of substance abuse in suicide attempters compared with adolescents at large.

Shafii et al[26] investigated the background of 24 adolescent suicides, 13 through 19 years of age, from 1980 through 1983 by repeatedly interviewing family members. This was one of the few studies of completed suicide that used a control group. They discovered that a statistically significant 70% of the young suicide victims frequently had used nonprescription drugs or alcohol. The authors used a control group composed of friends of the victims. This helped to match closely for sex, age, race, socioeconomic status, education, and personal characteristics. However, the death of a close friend by suicide combined with the lack of anonymity may have led to underreporting of substance abuse in the control group.

Shaffer et al,[27] in a recent study of 104 adolescent suicide victims in New York, NY, found substance abuse to be associated with 37% of the male and 5% of the female suicides. Only 7% of the male or female control adolescents showed evidence of substance abuse. Using the proportion of suicide completers and normal controls with a particular risk factor along with sex- and age-specific suicide rates from the general population, they calculated a probable incidence of suicide in various subgroups that showed risk factors. They estimated that substance abuse was the third most important risk factor for males, following suicide attempts and major depression; it was the fourth for adolescent females, in whom antisocial behavior exceeded substance abuse as a risk factor.

Brent et al[28] designed a sophisticated case-control study in which cases of adolescent suicide were compared retrospectively with a group of adolescents on a hospital psychiatry unit whose symptoms resemble those of victims of suicide. The inpatients were chosen if suicide ideation with intent to die, suicide threats, or suicide attempts were part of the clinical picture. In the study, the diagnosis of any psychoactive substance abuse disorder was not significantly associated with completed suicide compared with suicidal inpatients. Suicide "completers did not show a greater frequency of the combination of affective disorder and substance abuse as initially hypothesized."[28] However, completers "were more likely to have a co-occurrence of affective and any nonaffective disorder than were suicidal inpatients."[28] Substance abuse was one of these coexisting disorders.

Another approach is to examine the suicide rates of a population free of alcohol and drug abuse. Egeland and Sussex[29] studied suicide among the American Amish, among whom alcohol is culturally prohibited and drug abuse is unthinkable. The suicide rate per 100 000 for all ages for 1961 through 1970 was a low 4.3, and from 1971 through 1980 it decreased to 3.7. In 100 years (1880 through 1980), no suicide was reported for males younger than 18 years and none for females younger than 42 years.

EVIDENCE FOR THE ASSOCIATION BETWEEN SUBSTANCE ABUSE AND THE FREQUENCY AND MEDICAL SERIOUSNESS OF SUICIDE ATTEMPTS

The association between substance abuse and the medical seriousness of suicides attempted has been observed by both Brent et al[28,30,31] and Robbins and Alessi.[7] The evidence for a specific association between completed suicide and substance abuse is not consistent in all reports. Robbins and Alessi[7] studied 64 consecutively hospitalized adolescents (aged 13 through 18 years) by standard research interview. Thirty-three adolescents had made at least one suicide attempt prior to admission. The investigators specifically studied the association between suicidal behavior (number of suicide attempts, seriousness of attempt, medical lethality, and suicidal tendencies) and ordinal symptom ratings on a structured interview, including alcohol abuse and other drug abuse. They reported that "alcohol abuse was significantly associated with all four dimensions of suicidal ideation and behavior,"[7] accounting for 25% of variance in number of suicide gestures. Moreover, "substance abuse in a depressed adolescent appears to both increase the risk of multiple attempts and add to the risk of medically serious attempts."[7] As the authors pointed out, these data do not allow us to understand the exact nature of the association, but substance abuse appears to be an important complication or concomitant of affective disorder in adolescents, which may increase the risk for suicide. The conclusions would be more compelling if a statistical analysis that did not assume continuous data had been used. A chart review by Pfeffer et al[32] of 200 adolescents hospitalized in 1983 also showed alcohol abuse as one of the best predictions of "severity of suicidal behavior." Schneer et al[15] found that the adolescents hospitalized between 1967 and 1970 who had an increased use of psychoactive substances also had more repetitious suicide attempts than those of an earlier generation who abused chemicals less frequently.

Another way to examine suicide is to study intensively individuals who have made attempts that most closely resemble the attempts of those who die of suicide, but through circumstances have survived. Brent et al[31] retrospectively studied the charts of 131 consecu-

Downloaded from jamanetwork.com by Weill Cornell Medical Library user on 11/26/2024

tive suicide attempters younger than 19 years who presented to an emergency department. Measures of medical lethality were determined on a risk rescue rating scale for statistical analysis. As the authors point out, this is suitable for hypothesis generation, rather than hypothesis testing. The correlates of medical lethality of suicide attempts in the sample included the diagnosis of affective disorder, particularly in combination with substance abuse. Since the sample of patients was taken from those in treatment, it is not known if this applies to a general population of adolescents.

EVIDENCE FOR AN ASSOCIATION BETWEEN SUBSTANCE ABUSE AND DEPRESSION AND/OR CONDUCT AND PERSONALITY DISORDERS

Psychoactive substance abuse in adolescence has been linked with depression,[17-20,24,33-37] conduct,[30,37] and personality disorders.[19,20,34,35,37-40] One or more of these combinations of disorders are often part of the description of the suicidal teenager.[4,18,19] Friedman et al[33] found a significantly higher frequency of suicide attempts and more seriously lethal attempts among depressed adolescent inpatients with borderline personality disorder than among other depressed inpatients. Substance abuse was not studied but is typically a part of the diagnosis for patients with borderline disorder. Famularo et al[36] described 10 adolescents who met the criteria in the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition* of drug abuse or dependency by age 13 years. Five were also diagnosed with bipolar disorder. The authors suggest a possible relationship between the early onset of alcohol abuse and the development of major affective disorders in adolescents, particularly bipolar disorder.

The time course of this association with depression, conduct, and personality disorders is controversial. Kandel[34] implied that depressive mood preceded the substance use. Lidz et al[35] postulated a preexisting personality disorder that led to both depression and subsequent substance abuse. MacDonald[37] described depression and suicidal thoughts as a later state of adolescent substance dependency. Crumley[38] found that the effect of intoxication by alcohol or drugs often seemed to deepen depression, which precipitated a suicide attempt. Moreover, substance abuse aggravated long-standing social, interpersonal problems and "added to the depression in the long run." The users' inability to control themselves, their lives, or their chemical use led to hopelessness and attempts to escape by death. Hopelessness was found to be associated with adolescent suicide attempts, suicidal ideation, and depression and substance abuse.[31,40,41] Hoberman and Garfinkel[19] found that some of the stressors that precede completed suicide "may be the consequences of being depressed or abusing substances."

A large-scale study[42] of 1824 adolescents (mean age, 16 years) pooled from numerous residential centers for treatment of substance abuse revealed a high incidence of depressive symptoms, suicidal thought, and attempted suicide. These teenagers were entering a residential program in 1984 through 1986. Of the teenagers of this population, 40.7% were frequently troubled with suicidal thoughts, 73.6% described feelings of sadness, and 30.4% of the girls and 10.3% of the boys acknowledged a suicidal attempt the year before treatment.

Again, control groups were not available for comparison in this study. Therefore, it is not known if this is a significantly higher prevalence rate of reported depressive symptoms and suicide attempts in comparison with the general population or a sample without substance abuse. However, evidence reported in 1987 suggests that these rates are elevated, based on anonymous questionnaires sent to 380 unscreened high school adolescents.[43] The survey found a suicide attempt rate of 9% in this general population, which presumably would have included those who abused substances.

A study of 422 suicide attempts by 362 fifteen- to 19-year-old Finnish adolescents by Kotila and Lonnqvist[44] found that boys were more susceptible to alcohol-provoked suicidal behavior. Fifty-three percent of boys and 40% of the girls had consumed alcohol when making the attempt. Thirty-one percent of the boys and 23% of the girls reported a provoking influence of alcohol. This difference was significant ($P<.001$). Moreover, 15% of the boys and 5% of the girls reported suicidal thoughts and acts only when under the influence of alcohol, linking alcohol abuse directly with symptoms of depression.

These studies suggest that the drug-abusing adolescent population is more frequently troubled by suicidal thoughts, sadness, and emotional disturbances than are adolescents in general. Members of this population may also have had a previous suicide attempt or drug overdose episode. The rate of completed suicide appears to be higher in this population than in the general adolescent population, although suicide may occur after adolescence during young adult life.[22,45,46]

As Brent et al[4] observed, long-term use has serious implications regarding the level of risk factor. Chronic substance abuse may lead to disruption of social relationships, producing social isolation and hopelessness. Chronic substance abuse had a biologic effect, including depression and central serotoninergic depletion, both of which are risk factors. On the other hand, acute substance abuse may reflect impaired judgment and despondency, which may lower the threshold for suicidal behavior.

Little research attention has been directed to the difference in depression between males and females. Yet, males predominate both in frequency of excessive and continued use of psychoactive substances and in completed suicide. However, females are reported to have a greater lifetime risk of depression.[3]

Klerman[47] noted that the rates for depression, suicide attempts/deaths, and drug abuse have all increased between 1960 and 1980. "There are important gender and ethnic differences in these rates: females are more prone to depression, whereas males are more prone to drug abuse and suicide." A comprehensive explanation would have to account not only for the increased rates, but also why some individuals manifest their clinical picture in depression, others in drug abuse, and others in comorbidity of these disorders.[47]

EVIDENCE FOR AN ASSOCIATION BETWEEN ALCOHOL ABUSE AND FIREARM SUICIDE BY ADOLESCENTS

Evidence for an association specifically between adolescent alcohol intoxication and suicide by firearms was found by Brent et al[4] in a retrospective study of completed adolescent suicide in Pennsylvania from 1960 through 1983. These data showed a "striking association" between the ingestion of alcohol and the use of firearms as a method of suicide. There was a direct relationship between the blood alcohol content and increased frequency of suicide by firearms ($P>.0001$). Boyd and Moscicki[48] found a marked rise in the national firearm suicide rate among adolescents and young adults during the same period from 1960 through 1980. The firearm suicide rate has climbed three times faster than the suicide rate for all other methods for males aged 15 through 19 years since 1970. The investigators noted an increase in the availability of domestic firearms, but drew no conclusions regarding relationships. Firearms were the major method of death—40%,[49] 74%,[21] 56%,[22] and 42%[20]— by

Downloaded from jamanetwork.com by Weill Cornell Medical Library user on 11/26/2024

young suicide completers in other studies during the same time frame. Brent et al[4] observed that suicide victims who used firearms were 4.9 times more likely to have been drinking than were those who used other means. It is impossible, however, to determine whether the alcohol use was a stable pattern of alcohol abuse prior to death or merely a onetime binge. This investigation "suggests that there is an association between alcohol intoxication and suicide by firearms."

LIMITATIONS AND ARTIFACTS OF STUDIES

All studies that focused specifically on adolescent suicide were found to be retrospective and are subject to the limitations of these types of studies. No causal inferences can be drawn from the statistical associations. Also, retrospective studies of suicide data are limited to sources other than the patient; the data gathered from friends or relatives may be biased by their reactions to the suicide. Most studies, in fact, do not even include a control group at all.

Prospective studies, to date, have not focused on suicides that occurred during the adolescent years. Several follow-up studies of high-risk children and adolescents following suicide attempts or hospitalization for depression have been large enough to include a number of suicides during the follow-up period.[45,46,50,51] However, the age at the time of death is not given because this was not a focus of attention. Such studies are less likely than retrospective reports to provide information about the events immediately preceding the suicide.[52] Additional research is needed to help establish causality factors as well as risk factors that lead to adolescent suicide. Because of the relative rarity of the occurrence of suicide, this would require an enormous number of subjects from a general population. Prospective studies of adolescents believed to be at high risk for suicide with and without the postulated risk factors would also require large numbers and long-term follow-up, but this is more feasible.[52]

Other limitations or artifacts are introduced by the selection of the population to be studied. Reports of suicide attempts are taken only from those who reach treatment (eg, emergency department, hospital, or psychiatric outpatient facility). The actual rate of suicide attempts by adolescents in the general population is not known. The results of studies based on selected populations may not be directly applicable to the general population of suicidal adolescents. Also, several studies are based on subjects from other countries,[12,21,22,44-46,50,51] which makes comparison of adolescents in this country more difficult since cultural, religious, and ethic traditions may affect suicidal rates and suicidal methodology.

The increase in suicide rate may be related to other known social and economic events that parallel the rate of adolescent suicide, eg, divorce rate, relative proportion of adolescents in a total population, sexual abuse, family mobility, or other factors.[53,54]

The study of any relationship between adolescent suicide and substance abuse is relatively recent. Solid epidemiologic data regarding the rates of psychoactive substance abuse prior to 1975 in the adolescent general population are not available. Consequently, correlations between suicide and the rate of psychoactive substance abuse prior to this time cannot be made. Also, the probability of underreporting psychoactive substance abuse of any type is well-known. Investigation of substance abuse in the individual patient requires careful, thorough investigation to overcome denial so a diagnosis can be obtained or ruled out. It is unclear in most studies how thoroughly this was investigated. The more thoroughly this is examined, the more important it appears as a factor.

Another limitation is the general lack of clarification or standardization of definition of psychoactive substance abuse between studies. This makes comparison between studies of limited value. In most reports, it is unclear how the diagnosis was determined, what criteria were used, or how thoroughly substance abuse was screened. Ratings for the degree of dependency or the frequency of use are even less well-defined.

CONCLUSIONS

Evidence suggests that the increased incidence of psychoactive substance abuse among adolescents during the past two decades is significantly related to increasing adolescent suicidal behavior. This article examines evidence for a significant association between adolescent psychoactive substance use disorders and suicide among adolescents. Increasing evidence also supports a significant association between substance abuse and suicide attempts with an increased incidence, increased repetitiveness, increased seriousness of intention, and increased medical lethality. From the evidence reviewed, it is not possible to state the nature of the association between substance abuse and suicidal behavior in the adolescent. Psychoactive substance abuse appears to have become an addition to the list of risk factors for adolescent suicidal behavior. Alcohol abuse seems to be most often associated with increased risk.

More research is needed to establish the nature and degree of the association (ie, how much of adolescent suicide was and still is linked to substance abuse and whether the relationship is causal, connected but correlated with another risk factor, or secondarily related). With the increased rate of substance abuse among adolescents during the past two decades, it is possible that substance abuse was and remains a major contributing factor to the rising rate of adolescent suicide, but the data are not available to demonstrate this definitely. Prospective studies and additional case-control studies are needed to help us better understand the complex intermingling of substance abuse and suicidal behavior. Nevertheless, knowledge of the increasing rate of psychoactive substance abuse among adolescents who are suicidal is helpful to clinicians when evaluating teenagers.

In the interests of reducing the rate of adolescent self-injury and death, physicians and chemical dependency counselors of teenagers should keep the following points in mind. Although not all encompassing, there is apparently an interconnection between psychoactive substance use and suicide ideation/attempts/completions, particularly in combination with depression, personality, and conduct disorders.

If the teenager is known to use psychoactive substances, depression and suicidal impulses need to be carefully considered in the evaluation and treatment. Specific direct questions should be asked the patient, the parent, or any other information source regarding the extent of substance use, suicidal thoughts, attempts, possible plans for attempts, feelings of hopelessness, and recent losses. Recent interpersonal loss may increase the risk for the adolescent or trigger a suicidal attempt in a high-risk patient for some period.[22] Suicidal tendencies may be latent and bringing the issue to the surface may provide relief to the teenager who is secretly struggling with it. Depression is frequently hidden from awareness. The degree of depression, onset, and association with loss of reality are part of the assessment for depression. A relatively mild depression coupled with substance abuse or personality disorder results in a higher suicidal risk.

Conversely, it is important to keep a high index of suspicion for the presence of psychoactive substance use disorders when evaluating any adolescent who appears suicidal or depressed. Since substance use may provide a coping mecha-

Downloaded from jamanetwork.com by Weill Cornell Medical Library user on 11/26/2024

nism for the severely depressed adolescent patient, removal of such a mechanism may be seen as extremely threatening and demoralizing, leading to temporarily increased depressive feelings and suicidal thoughts and impulses.

Any true adolescent suicide attempt should be considered indicative of serious underlying psychiatric disorder.[55] Hospitalization may be indicated to protect the individual from self-injurious behavior as well as to treat the depression intensively. A specialized adolescent psychiatry unit is best suited for such treatment, in my experience. Any treatment must emphasize total abstinence from the abused substance, but programs that stress confrontation may be difficult for the severely depressed, suicidal adolescent, particularly in an outpatient setting.

Both substance abuse disorders and depression need to be treated, although the focus at any one phase of treatment will depend on the motivation and attitude of the adolescent, the degree of pathology of each disorder, and the teenager's awareness of each disorder at the particular time. Both disorders need specific treatments and treatment of one should not be expected to resolve the other.[56,57]

Another important strategy when confronted with a potentially suicidal adolescent would be to inquire about access to firearms and recommend that they be removed from the house or any area of access of the patient. The availability of firearms at home has been shown to be "much greater" in the homes of suicide completers than in those of comparable groups of at-risk youth.[4]

References

1. Johnston LD, O'Malley PM, Bachman JG. *Drug Use Among American High School Students, College Students and Other Young Adults.* Rockville, Md: National Institute on Drug Abuse; 1986.
2. *Youth Suicide in the United States, 1970-1980.* Atlanta, Ga: Centers for Disease Control; 1986.
3. Klerman GJ, Weissman MM. Increasing rates of depression. *JAMA.* 1989;261:2229-2235.
4. Brent DA, Perper JA, Allmon CJ. Alcohol, firearms, and suicide among youth. *JAMA.* 1987;257:3369-3372.
5. Schuckitt MA, Morrissey ER. Propoxyphene and phencyclidine (PCP) use in adolescents. *J Clin Psychiatry.* 1978;39:7-13.
6. Reigelman RK. *Studying a Study and Testing a Test.* Boston, Mass: Little Brown & Co Inc; 1981.
7. Robbins DR, Alessi NE. Depressive symptoms and suicidal behavior in adolescents. *Am J Psychiatry.* 1985;142.5:588-592.
8. Finch SM, Polanski ED. *Adolescent Suicide.* Springfield, Ill: Charles C Thomas Publisher; 1971:3-55.
9. Seiden RH. *Suicide Among Youth: A Review of the Literature, 1900-1967.* Washington, DC: US Dept of Health, Education, and Welfare; 1969:32. US Public Health Service publication 1971.
10. Jacobziner H. Attempted suicide in children. *J Pediatrics.* 1960;56:519-525.
11. Perlstein AP. Suicide in adolescence. *N Y State Med J.* 1966;66:3017-3020.
12. Shaffer D. Suicide in childhood and early adolescence. *J Child Psychol Psychiatry.* 1974;15:275-291.
13. Miles CP. Conditions predisposing to suicide: a review. *J Nerv Ment Dis.* 1977;64:231-246.
14. Sanborn DE, Sanborn CJ, Cimbolic P. Two years of suicide: a study of adolescent suicide in New Hampshire. *Child Psychiatry Hum Dev.* 1973;3:234-242.
15. Schneer HI, Perlstein A, Brozovsky M. Hospitalized suicidal adolescents—two generations. *J Am Acad Child Adolesc Psychiatry.* 1975;14:268-280.
16. Stevenson EK, Hudgens RW, Held CP, Meredith CH, Hendrix ME, Carr DL. Suicidal communication by adolescents: study of two matched groups of 60 teenagers. *Dis Nervous System.* 1972;33:112-122.
17. Crumley FE. Adolescent suicide attempts. *JAMA.* 1979;241:2404-2407.
18. Clarkin JF, Friedman RC, Hurt SW, Corn R, Arnoff M. Affective and character pathology of suicidal adolescent and young adult in-patients. *J Clin Psychiatry.* 1984;45:19-21.
19. Hoberman HM, Garfinkel BD. Completed suicide in children and adolescents. *J Am Acad Child Adolesc Psychiatry.* 1988;6:689-695.
20. Poteet DJ. Adolescent suicide: a review of 87 cases of completed suicide in Shelby County, Tennessee. *Am J Forensic Med Pathol.* 1987;8:12-17.
21. Thompson TR. Childhood and adolescent suicide in Manitoba: a demographic study. *Can J Psychiatry.* 1987;32:264-269.
22. Fowler RC, Rick CL, Young D. San Diego Suicide Study, II: substance abuse in young cases. *Arch Gen Psychiatry.* 1986;43:962-965.
23. Rich RL, Fowler RC, Fogarty LA, Young D. San Diego Suicide Study, III: relationships between diagnosis and stressors. *Arch Gen Psychiatry.* 1988;45:589-592.
24. Garfinkel BD, Froese A, Hood J. Suicide attempts in children and adolescents. *Am J Psychiatry.* 1982;139:1257-1261.
25. McKenry PC, Tishler CL, Kelley C. The role of drugs in adolescent suicide attempts. *Suicide Life Threat Behav.* 1983;13:166-175.
26. Shafii M, Carrigan S, Whittinghill JR, Derrick A. Psychological autopsy of completed suicide in children and adolescents. *Am J Psychiatry.* 1985;142:1061-1064.
27. Shaffer D, Garland A, Gould M, Fisher P, Trautman P. Preventing teenage suicide: a critical review. *J Am Acad Child Adolesc Psychiatry.* 1988;27:675-687.
28. Brent DA, Perper JA, Goldstein CE, et al. Risk factors for adolescent suicide: a comparison of adolescent suicide victims with suicidal inpatients. *Arch Gen Psychiatry.* 1988;45:581-588.
29. Egeland JA, Sussex JN. Suicide and family loading for affective disorders. *JAMA.* 1985;254:915-918.
30. Brent DA. Correlates of the medical lethality of suicide attempts in children and adolescents. *J Am Acad Child Adolesc Psychiatry.* 1987;26:87-91.
31. Brent DA, Kalas R, Edelbrock C, Costello AJ, Dulcan MK, Conover N. Psychopathology and its relationship to suicidal ideation in childhood and adolescence. *J Am Acad Child Adolesc Psychiatry.* 1986;25:666-673.
32. Pfeffer CR, Newcorn J, Kaplan G, Mizruchi MS, Plutchik R. Suicidal behavior in adolescent psychiatric inpatients. *J Am Acad Child Adolesc Psychiatry.* 1988;27:357-361.
33. Friedman RC, Corn R, Aronoff SW, et al. The seriously suicidal adolescent: affective and character pathology. In: Sudak HS, Ford AB, Rushforth NB, eds. *Suicide in the Young.* Littleton, Mass: John Wright–PSG Inc; 1984:220.
34. Kandel DB. Epidemiological perspectives of adolescent drug use. *J Am Acad Adolesc Child Psychiatry.* 1982;21:328-345.
35. Lidz T, Lidz RW, Rubenstein R. An anaclitic syndrome in adolescent amphetamine addicts. In: Eissler RS, Freud KM, Solnit AJ, eds. *The Psychoanalytic Study of the Child.* New Haven, Conn: Yale University Press; 1976:317-348.
36. Famularo R, Stone K, Popper C. Preadolescent alcohol abuse and dependence. *Am J Psychiatry.* 1985;142:1187-1189.
37. MacDonald DI. *Drugs, Drinking, and Adolescents.* Chicago, Ill: Year Book Medical Publishers Inc; 1984:25.
38. Crumley FE. Adolescent suicide attempts and borderline personality disorder. *South Med J.* 1981;74:546-549.
39. Alessi NE, McManus M, Brickman A, Grapentine L. Suicidal behavior among serious juvenile offenders. *Am J Psychiatry.* 1984;141:286-287.
40. Ryan ND, Puig-Antich J, Ambrosini P, et al. The clinical picture of major depression in children and adolescents. *Arch Gen Psychiatry.* 1987;44:854-861.
41. Brent DA, Kupfer DJ, Bromet EJ, Dew MA. The assessment and treatment of patients at risk for suicide. In: Frances AJ, Hales RE, eds. *Review of Psychiatry.* Washington, DC: American Psychiatric Press Inc; 1988;7:353-386.
42. Harrison PA, Hoffman NG. *CATOR 1987 Report.* St Paul, Minn: Chemical Abuse/Addiction Treatment Outcome Registry; 1987.
43. Freidman JM, Asmis GM, Boeck M, et al. Prevalence of specific suicidal behaviors in a high school sample. *Am J Psychiatry.* 1987;144:1203-1206.
44. Kotila L, Lonnqvist J. Adolescent suicide attempts: sex differences predicting suicide. *Acta Psychiatr Scand.* 1988;77:264-270.
45. Motto JA. Suicide in male adolescents. In: Sudak HSA, Ford AB, Rushforth NB, eds. *Suicide in the Young.* Littleton, Mass: John Wright–PSG Inc; 1984:227-244.
46. Benson G, Holmberg MB. Drug related mortality in young people. *Acta Psychiatr Scand.* 1984;70:525-534.
47. Klerman GL. The current age of youthful melancholia: evidence for increase in depression among adolescents and young adults. *Br J Psychiatry.* 1988;152:4-14.
48. Boyd JH, Moscicki EK. Firearms and youth suicide. *Am J Public Health.* 1986;7:1240-1242.
49. Garfinkel BD, Golombek H. Suicidal behavior in adolescents. In: Garfinkel BD, Golombek H, eds. *The Adolescent and Mood Disturbances.* New York, NY: International Universities Press Inc; 1983:189-217.
50. Otto V. Suicidal acts by children and adolescents. *Acta Psychiatr Scand Suppl.* 1972;223:7-123.
51. Goldacre M, Hawton K. Repetition of self-poisoning and subsequent death in adolescents who take overdoses. *Br J Psychiatry.* 1985;140:395-398.
52. Robins LN, Kullok PA. Epidemiological studies in suicide. In: Frances AJ, Hales RE, eds. *Review of Psychiatry.* Washington, DC: American Psychiatric Press Inc; 1988;7:289-306.
53. Pfeffer CP. Suicidal behavior among children and adolescents. In: Frances AJ, Hales RE, eds. *Review of Psychiatry.* Washington, DC: American Psychiatric Press Inc; 1988;7:386-402.
54. Rushford NB, Ford AB, Sudak HS, et al. Increased suicide rates in adolescents to young adults in an urban community. In: Sudak HS, Ford AB, Rushford NB, eds. *Suicide in the Young.* Littleton, Mass: John Wright–PSG Inc; 1984:45-68.
55. Crumley FE. The adolescent suicide attempt: a cardinal symptom of a serious psychiatric disorder. *Am J Psychotherapy.* 1982;36:158-165.
56. Nace EP. *The Treatment of Alcoholism.* New York, NY: Brunner/Mazel Inc; 1987.
57. Du Pont RL. *Getting Tough on Gateway Drugs.* Washington, DC: American Psychiatric Press Inc; 1984:20-24.

Downloaded from jamanetwork.com by Weill Cornell Medical Library user on 11/26/2024